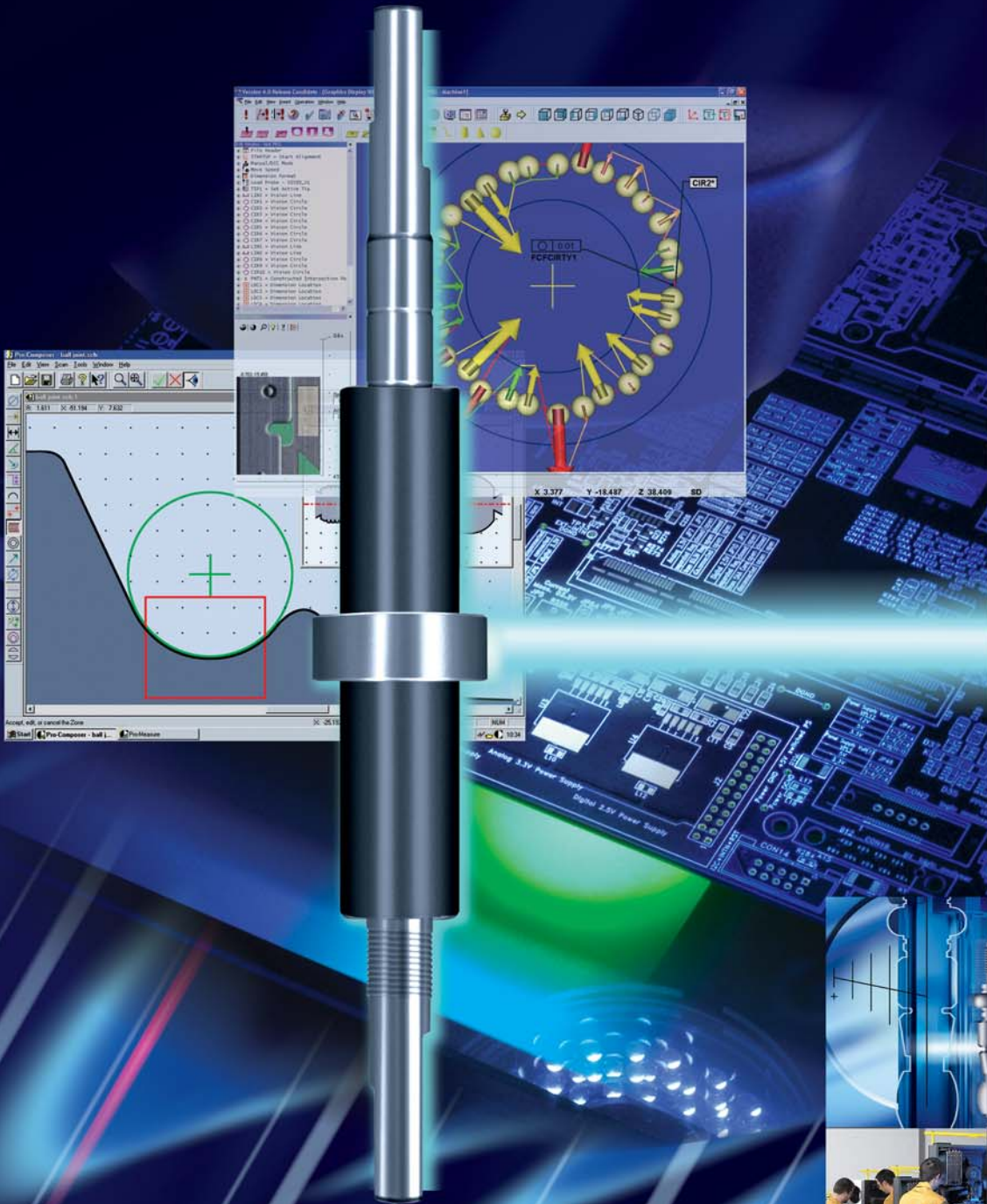


# Optical Measurement



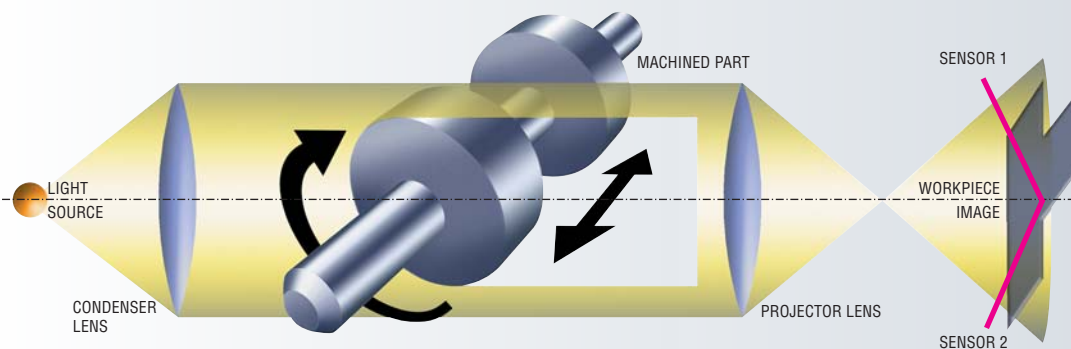
# FAST ROUND PART INSPECTION

The whole TESA-Scan product line belongs to the range of dedicated non-contact opto-electronic measuring centres that provide Users with a complete solution for inspecting small round parts quickly. Including a variety of systems such as those usually integrated into profile projectors or microscopes, they offer the round part manufacturer a more capable alternative to traditional inspection methods. TESA's product range can measure shapes and sizes of round parts from 0,3 up to 80 mm in diameter, which can be as long as 500 mm.



## Operating Principle

All TESA measuring centres incorporate high-resolution CCD linear sensors. Each sensor is subdivided into thousands of light sensitive pixels. As the part image is being projected, these sensors, which act as light sensitive rulers, can detect the slightest changes at sub-pixel level. The workpiece is illuminated with parallel white light and its image is projected onto the linear CCD sensors, which are inclined to 7,5°. They provide the information obtained from the image, thus allowing accurate analysis of the geometry of the workpiece features.



Complex part features such as straightness or circularity can easily be inspected by combining rotation with axial movement. This permits any surface of the workpiece to be scanned dynamically in order to determine the part axis for true 3D alignment and reference purposes.

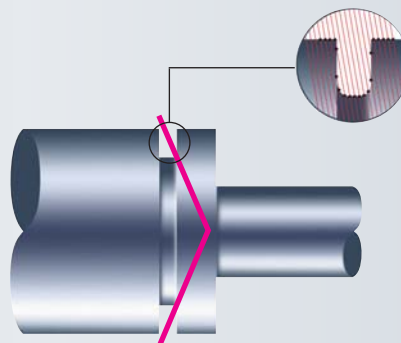
## Dynamic Measurement

Rotation is a standard function of the inspection process, allowing a rotary scanning of the workpiece for highly accurate measurement of both the part geometry and shape, also with high speed.

## 2D Measurement

The part profile is obtained by scanning along the part axis. A two-axis image projection is produced as the workpiece diameter and length are being measured simultaneously.

A unique feature of these systems from TESA lies in the orientation of the linear sensors to 75° (10° for TESA-Scan 80) with respect to the workpiece axis, guaranteeing accurate measurement of all individual geometric elements such as angles, radii, diameters or any other part features with parallel or inclined surfaces.

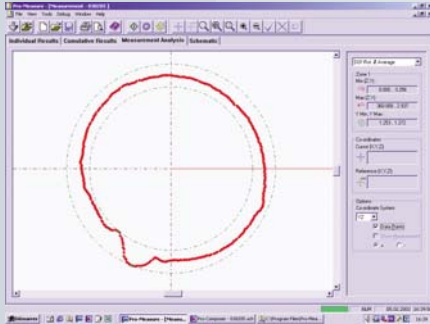
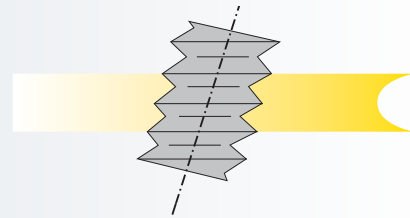




## Thread Measurement

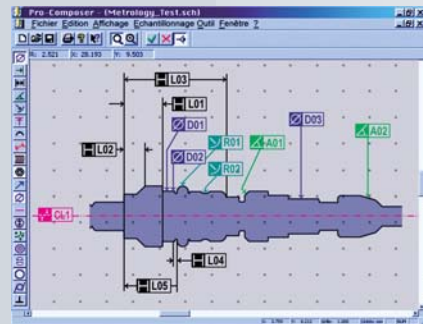
External threads are important features of round parts, and their measurement is a high labour intensive operation. The true profile of any thread shape can be obtained with either Tesa-Scan system.

To measure shape and sizes or check worm threads, both TESA-Scan 50 Plus and TESA-Scan 80 also offer a mechanism for tilting the workpiece to the helix angle in order to view the true size of the profile.



## Form and Shape Measurement

Sophisticated round part applications involving form and shape measurement are easily carried out using the flexible programming facility. Pro-Measure is a powerful software system, which allows a visual comparison of the true form obtained. This tool makes the analysis of manufacturing problems easier. It also provides the operator with a useful guidance when creating part programs.



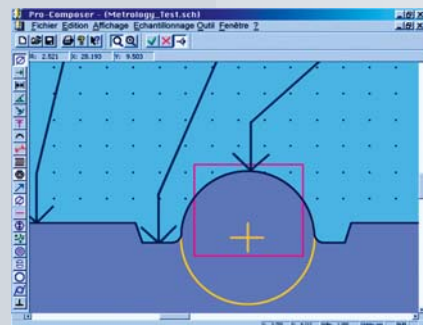
## Graphic Interface

Pro-Composer is an easy-to-use software tool for part programming created on the computer directly linked to the machine or off-line. It uses the graphic representation of the part profile created by scanning or importing the required geometry from a CAD file. For the programming sequence, the user simply selects the measurement function from the icon menu. For ease of use, all selected tolerances and parameter values can be retrieved based on the database available from international standards.

Le.	Description	Actual	Ecart	LTS	UTI	Classe	Caractéristiques	Nominal
D01	Ø Average	18.000	0.005	18.000	17.996			18.000
D02	Ø Average	33.000	0.000	33.100	32.900			33.000
D03	Ø Min Form	17.249	-0.251	17.000	17.400	hors tol		17.500
A01	Included Angle	58.805	0.005	61.000	56.000			60.000
R01	Radius	6.002	0.003	6.500	5.500			6.000
R02	Radial Run Out	0.006	0.006	0.100	0.000			0.000
O01	Rot Ø Ovality	0.004	0.004	0.100	0.000			0.000
L01	Length	99.003	0.003	99.050	98.950			99.000
L02	Length	18.001	0.001	18.050	17.950			18.000
L03	Length	58.819	-0.011	60.950	60.950			60.000
L04	Length	57.003	0.003	57.050	56.950			57.000

## Flexible Reporting

Pro-Measure enables the user to present all measurement data in a variety of numeric and graphic formats together with relevant process related information. Text, logos and Bitmap images can be included in the reports through the editing functions. Pro-Measure can easily be networked or interfaced to existing shop floor systems for data collection.



## Graphic Analysis

Pro-Composer allows visual inspection of lines and radii with a comparison of part data to given nominals available from the drawing. The results are then displayed in a graphic format. This option enables any defects occurring during a production run to be straightly eliminated, and is also very useful as debugging tool during part program creation.

## Comprehensive Reporting

Pro-Measure is a flexible software system that can accept data from other precision tools (e.g. those used for internal measuring). These data are then included into a single report. This software can be programmed so as to tell the operator that measurements taken by means of a handtool are required as the relevant inspection sequence will be starting or ending up.

## Part Programme Creation within Minutes

Pro-Measure further enhances the flexibility of the machine. This highly intuitive industrial software system is suited for each stage of the manufacturing process. In most cases, part program creation is only a matter of minutes.



## Performances

(Valid for any type of machines)

### 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 and interrupted diameters, form diameter, taper, parallel thread profile.

Runout – Plain or interrupted diameters.

Roundness and cylindricity.

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 tilting

- 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

### Thread and worm thread measurement – With mechanical tilting

- Parallel threads
  - Major diameter
  - Flank diameter
  - Pitch
  - Minor diameter
  - Flank angle
  - Root radius
  - Crest radius
  - Circularity
  - Lead error
- Worm threads (on request)
  - Pitch
  - Major and minor diameters
  - Over Wire diameter
  - Tooth thickness
  - Pressure angle
  - Addendum
  - Dedendum
  - Thread depth
  - Runout
- Taper threads
  - Pitch diameter
  - Major diameter
  - Minor diameter
  - Taper
- Ball screws (on request)
  - Pitch
  - Lead error
  - Over wire diameter
- Double-threads, parallel
  - Major and minor diameters
  - Half pitch
  - Flank angle
  - Crest radius
  - Root radius

### Image cleaning

The software includes a number of filters that can be selected at various levels to reduce the effect of contaminated workpieces.

# TESA-Scan 25



840 x 640 x 460 mm,  
33 x 25 x 18 in

Diameter: 0,5 s  
Length: 0,5 s

Performances:  
see page P-4

100/110-220/240 VAC  
50/60 Hz

10 to 35°C  
50 to 95°F

10 to 80%



55 kg  
121 lbs

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.

## Technical Data

	D mm	L mm	D in	L in	
Measuring capacity	25	200	1.0	8.0	
Component capacity	59	270	2.3	10.6	2 kg/ 4.4 lbs
Resolution	0,0002	0,001	0.00001	0.00004	
Accuracy (20°C ± 1°C)	1,5+(0,01 D) µm (D in mm)	6 + (0,01 L) µm (L in mm)	(0.06 + 0.01 D)/ 1000 in (D in in)	(0.24 + 0.01 L)/ 1000 in (L in in)	
Repeatability (±2s = 95%)	0,001	0,0025	0.00004	0.0001	



02430000

**TESA-Scan 25** (Ø 25 x 200 mm). Measuring Centre with part rotation including 1 headstock Z173-3004, 1 tailstock Z125-3003 plus 2 male centres TL02-0001. Supplied with PC, mouse, installed **Windows XP Multilingual** operating system, TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).

Pro-measure/  
Pro-Composer  
see page 9



## TESA-Scan 50

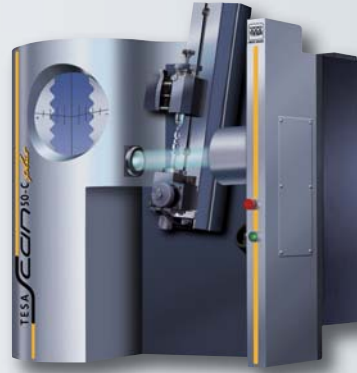
Measuring capacity:  
D = 50 mm, L = 275 mm



## TESA-Scan 50 C Plus

Measuring capacity:  
D = 50 mm,  
L = 275 mm

Equipped with slewing mechanism for thread measurement through advanced functions.



### Technical Data

	D mm	L mm	D in	L in	
<b>TESA-Scan 50</b>					
Measuring capacity	50	275	1.96	10.8	
Component capacity	100	290	3.9	11.4	4 kg/ 8.8 lbs
Resolution	0,0003	0,001	0.00001	0.00004	
Accuracy (20°C ± 1°C)	2 + (0,01 D) µm (D in mm)	7 + (0,01 L) µm (L in mm)	(0.08 + 0.01 D)/ 1000 in (D in in)	(0.28 + 0.01 L)/ 1000 in (L in in)	
Repeatability (±2s = 95%)	0,001	0,0025	0.00004	0.0001	

	D mm	L mm	D in	L in	
<b>TESA-Scan 50 C Plus</b>					
Measuring capacity	50	275	1.96	10.8	
Component capacity	100	290	3.9	11.4	4 kg/ 8.8 lbs
Tilting for thread measurement	max. 15°				
Resolution	0,0003	0,001	0.00001	0.00004	
Accuracy (20°C ± 1°C)	2 + (0,01 D) µm (D in mm)	7 + (0,01 L) µm (L in mm)	(0.08 + 0.01 D)/ 1000 in (D in in)	(0.28 + 0.01 L)/ 1000 in (L in in)	
Repeatability (±2s = 95%)	0,001	0,0025	0.00004	0.0001	

**No**

**=**

**02430010** **TESA-Scan 50** (Ø 50 x 275 mm). Measuring Centre with part rotation. Basis machine including 1 headstock Z178-3004, 1 tailstock Z178-3003 plus 2 male centres TL02-0002. Supplied along with PC, mouse, installed **Windows XP Multilingual** operating system TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).

**02430020** **TESA-Scan 50 C Plus** (Ø 50 x 275 mm). Measuring Centre with rotation and slewing mechanism for thread measurement. Basis machine including 1 headstock Z178-3004, 1 tailstock Z178-3003 plus 2 male centres TL02-0002. Supplied along with PC, mouse, installed **Windows XP Multilingual** operating system, TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).



1050 x 800 x 580 mm,  
41 x 32 x 23 in

Diameter: 0,5 s  
Length: 0,5 s

Performances:  
see page P-4

100/110-220/240 VAC  
50/60 Hz

10 to 35°C  
50 to 95°F

10 to 80%



115 kg, 250 lbs  
125 kg, 272 lbs

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.

Pro-measure/  
Pro-Composer  
see page 9



1450 x 800 x 580 mm,  
57 x 32 x 23 in

Diameter: 0,5 s  
Length: 0,5 s

Performances:  
see page P-4

100/110-  
220/240 VAC  
50/60 Hz

10 to 35°C  
50 to 95°F

10 to 80%



160 kg, 350 lbs

Shipping  
packaging

Inspection  
report with  
a declaration  
of conformity

## TESA-Scan 50 Plus

Measuring capacity: D = 50 mm, L = 500 mm

Equipped with slewing mechanism for thread measurement through advanced functions.



### Technical Data

	D mm	L mm	D in	L in	
Measuring capacity	50	500	1.96	19.7	
Component capacity	100	515	3.9	20.3	6 kg/ 13,2 lbs
Tilting for thread measurement	max. 15°				
Resolution	0,0003	0,001	0.00001	0.00004	
Accuracy (20°C ± 1°C)	2 + (0,01 D) µm (D in mm)	7 + (0,01 L) µm (L in mm)	(0.08 + 0.01 D)/ 1000 in (D in in)	(0.28 + 0.01 L)/ 1000 in (L in in)	
Repeatability (±2s = 95%)	0,001	0,0025	0.00004	0.0001	

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 Centre with part rotation and slewing mechanism for thread measurement. Basis machine including 1 headstock Z178-3004, 1 tailstock Z178-3003 plus 2 male centres TL02-0002. Supplied along with PC, mouse, installed **Windows XP Multilingual** operating system, TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).

Pro-measure/  
Pro-Composer  
see page 9



# TESA-Scan 80 / 80 Plus



- ✓
- 1500 x 750 x 520 mm, 60 x 30 x 20 in
- Diameter: 0,5 s  
Length: 0,5 s
- Performances: see page P-4
- 100/110-220/240 VAC  
50/60 Hz
- 10 to 35°C  
50 to 95°F
- 10 to 80%
- ✓
- 250 kg, 552 lbs  
260 kg, 574 lbs
- Shipping packaging
- Inspection report with a declaration of conformity

## Technical Data

	D mm	L mm	D in	L in	
Measuring capacity	80	500	3.1	19.7	
Component capacity	100	515	3.9	20.3	6 kg/ 13.2 lbs
Tilting for thread measurement	(80 Plus) max. helix angle 10°				
Resolution	0,0002	0,001	0.00001	0.00004	
Accuracy Ø <30 mm	1,5+(0,01 D) µm (D in mm)	7 + (0,01 L) µm (L in mm)	(0.06 + 0.01 D)/ 1000 in (D in in)	(0.28 + 0.01 L)/ 1000 in (L in in)	
Ø >30 mm (20°C ± 1°C)	2 + (0,01 D) µm (D in mm)	8 + (0,01 L) µm (L in mm)	(0.08 + 0.01 D)/ 1000 in (D in in)	(0.35 + 0.01 L)/ 1000 in (L in in)	
Repeatability (±2s = 95%)	0,001	0,003	0.00004	0.00012	
Air supply	4-6 bar		60-90 PSI		

*Performances are based on the results obtained from clean, ground components measured at 20°C. They may be affected by the component shape and surface finish.*

**No**

**=**

**02430050** **TESA-Scan 80** (Ø 80 x 500 mm). Measuring Centre with part rotation. Basis machine including 1 headstock Z178-3004, 1 tailstock Z178-3003 plus 2 male centres TL02-0002. Supplied along with PC, mouse, installed **Windows XP Multilingual** operating system, TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).

**02430060** **TESA-Scan 80 Plus** (Ø 80 x 500 mm). Measuring Centre with protective enclosure, part rotation and slewing mechanism for thread measurement. Basis machine including 1 headstock Z178-3004, 1 tailstock Z178-3003 plus 2 male centres TL02-0002. Supplied along with PC, mouse, installed **Windows XP Multilingual** operating system, TFT monitor 17", US keyboard, Pro-Measure/Pro-Composer with Handbook E-F-D on CD (order No. 02460011).

Pro-measure/  
Pro-Composer  
see page 9



## Software and Interfaces

*Software*

<b>02460011</b>	Pro-Measure/Pro-Composer along with hard-key plus Handbook in English, French and German on CD. Another version can additionally be made available for off-line programming.
<b>02460010</b>	Pro-Measure/Pro-Composer (CD only)

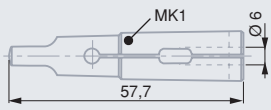
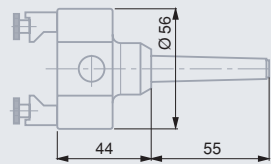
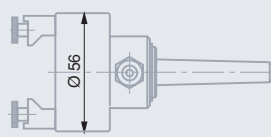
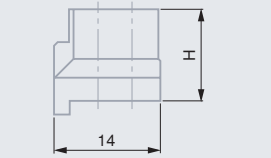
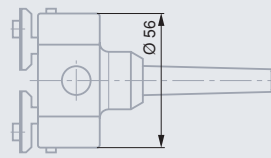
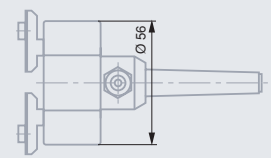
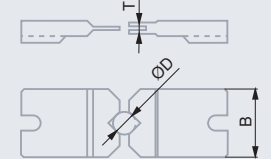
*Interfaces*

<b>XS01-0001</b>	Gageport NT interface for inductive probe, 2 probe inputs
<b>XS01-0011</b>	Gageport NT interface, digital, 2 probe inputs
<b>XS01-0008</b>	Gageport NT interface, digital, 4 probe inputs
<b>XS01-0010</b>	Extension unit for inductive probes, 8 probe inputs
<b>XS01-0013</b>	Gageport extension box (for 4 modules)
<b>04761061</b>	*Connecting cable Gageport to PC
<b>04761054</b>	*Power supply
<b>04761055</b>	*EU connecting cable
<b>04761056</b>	*US connecting cable

\* Instead of XS00-0006



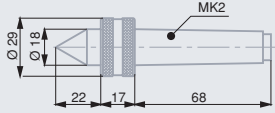
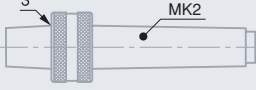
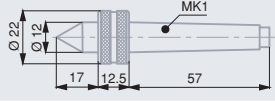
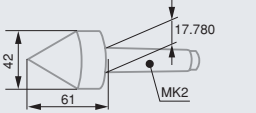
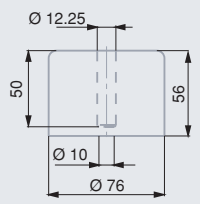
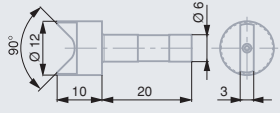
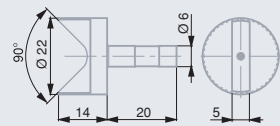
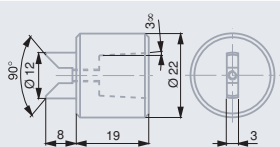
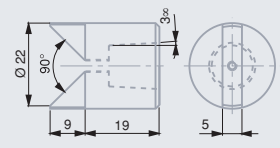
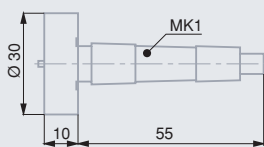
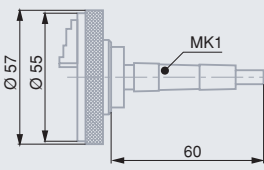
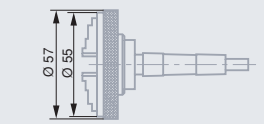
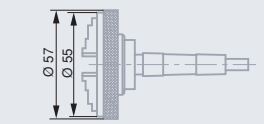
Accessories

Order Number		Morse 1 TESA-Scan 25	Morse 2 TESA-Scan 50 TESA-Scan 80	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 80	Notes	Description
<b>TL01-0015</b> D = 4-5 mm H = 6,6 mm <b>TL01-0016</b> D = 5-6 mm H = 8,6 mm <b>TL01-0017</b> D = 6-8 mm H = 11,5 mm <b>TL01-0018</b> D = 8-11 mm H = 17,5 mm <b>TL01-0019</b> D = 11-15 mm H = 20 mm <b>TL01-0020</b> D = 15-19 mm H = 20,2 mm		For TL01-0007 TL01-0008	-	-	Internal jaws, in pairs
<b>TL01-0022</b>	Set of jaws including: TL01-0015 TL01-0016 TL01-0017 TL01-0018 TL01-0019 TL01-0020	For TL01-0007	-	-	Internal jaws, in pairs
<b>TL01-0026</b>		-	●	-	Centre adapter with a 6 mm dia. coupling bore
<b>TL01-0027</b>		-	●	-	Reduction sleeve, Morse 2 to 1
<b>TL02-0001</b>		●	-	2 items provided with TESA-Scan 25	Extra male centre, 10 mm
<b>TL02-0002</b>		-	●	2 items provided with TESA-Scan 50 TESA-Scan 80	Extra male centre, 17 mm
<b>TL02-0003</b>		●	-	Diamond coated 10 mm	Drive centre
<b>TL02-0016</b>		●	-	For added sleeves Z173- 0922/0923	Rotation centre with a B12 male taper plus a Morse 1 taper shank



Order Number		Morse 1 TESA-Scan 25	Morse 2 TESA-Scan 50 TESA-Scan 80	Notes	Description
TL02-0017		-	●	-	Rotation centre, Morse 2
TL02-0018		-	●	-	Rotation centre with a B12 male taper plus a Morse 1 shank
TL02-0019		●	-	-	Rotation centre, Morse 1
TL02-0021		-	●	-	Rotation centre, Morse 2
Z173-0908		For TL01-0003 TL01-0004 TL01-0007 TL01-0008	-	Ensures stable positioning for mounting jaws	Vertical support
Z173-0920		● Requires TL01-0002	● Requires TL01-0026	-	Female centre, 10 mm dia.
Z173-0921		● Requires TL01-0002	● Requires TL01-0026	-	Female centre, 20 mm dia.
Z173-0922		● Requires TL02-0016	-	-	Female centre, 10 mm dia. Also with internal B12 taper
Z173-0923		● Requires TL02-0016	-	-	Female centre, 10 mm dia. Also with internal B12 taper
Z173-0961		●	-	-	Platten, 30 mm dia.
Z173-2020		●	● Requires TL01-0027	Clamping capacity: outside 1÷15 mm inside 11÷26 mm	3-jaw chuck, clamping range 1÷15 mm
Z173-2024		-	●	-	6-jaw chuck, clamping range 0,7÷15 mm
Z173-2025		●	-	-	

Order Number		Morse 1 TESA-Scan 25	Morse 2 TESA-Scan 50 TESA-Scan 80	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.

