



HOMMEL-ETAMIC T8000 / C8000

Stationary roughness and contour measurement



Precision is our business.

Your partner for industrial metrology

Hommel-Etamic, the Industrial Metrology Division of the Jenoptik group is a leading manufacturer and system provider of high-precision, tactile and non-tactile production metrology. The range of products provided includes total solutions for a wide range of measurement tasks such as testing surfaces, form and determining dimensional tolerances – throughout all phases of the production process, for final inspection or in a metrology lab. Our product portfolio is rounded off by a wide range of services in consulting, training and service, including long-term maintenance contracts.

Hommel-Etamic. Precision is our business!

The perfect solution to your measuring problem

You have a choice. Our range of products include measuring stations for roughness measurements (incl. topography) and contour measurement as well as combined systems for roughness and contour measurement, all of which are available with either separate or integrated measurement systems.

Our pre-configured systems are designed to cover the most common measurement tasks. For non-standard measurements, a wide range of system accessories are available allowing system customization for a whole host of measurement tasks.

Of course, we can also offer you measuring stations that are tailored to your specific requirements. You benefit from our expertise and long history of experience in the design of innovative, high-precision measuring systems.



Roughness measurement



Contour measurement

Flexible roughness and contour measurement

Model	Measuring tasks	Brief description	Page
T8000 R	Roughness measurement, extendable for topography measurement.	Introduction to professional roughness metrology. Different configurations depending on the application requirements. Upgradable for contour measurement.	6/7
C8000	Contour measurement with digital measurement system.	Measure, evaluate and document with optimally adapted contour gauging units.	8/9
T8000 C	Contour measurement with digital measurement system, can be expanded to include roughness measurement.	Individual measurement station configurations for each measuring task, automatic measurement runs.	10/11
T8000 RC	Universal, combined roughness and contour measurement.	Roughness and contour measurement with separate probing systems, without complex conversion.	12/13
T8000 SC	Roughness and contour measurement in one measurement step.	Measurement of the roughness on inclines and curves. Integrated evaluation possibility for the roughness in the contour.	14/15
nanoscan	Top-quality roughness and contour measurement in one action.	Maximum precision and operating convenience for simultaneous measurement of roughness and contour.	16/17



Roughness and contour measurement with one measurement system



Roughness and contour measurement with an ultra-precise opto-mechanical measurement system

Contour measurement using digital technology

Function related geometries become increasingly complex when tolerances become smaller. As a result, all of our contour measurement systems are equipped with digital high-resolution, linear scales in both the Z and X directions, delivering direct 2D coordinate measuring points free from negative, analogue influences.

wavecontour™ digital: cost-effective solution for standard measuring tasks

The wavecontour™ digital measurement system operates reliably with a consistently high level of measuring accuracy in both the measuring room and in production, while meeting all the classic performance requirements in contour measurement technology. The vertical measuring range of 60 mm makes it easy to operate and increases flexibility with everyday measuring tasks. The vertical resolution of 0.05 μm is available over the entire measurement range and a 0.1 μm horizontal measuring resolution enables even the smallest geometries to be measured in a reliable and reproducible way.

Highlights

- digital measurement system
- measuring range 60 mm, resolution 0.05 μm
- motorized probe arm with programmable stroke limit
- adjustable measurement force
- large range of probe arms for individual measuring tasks



wavecontour™ digital measurement system: large measurement range for all of the standard measuring tasks.



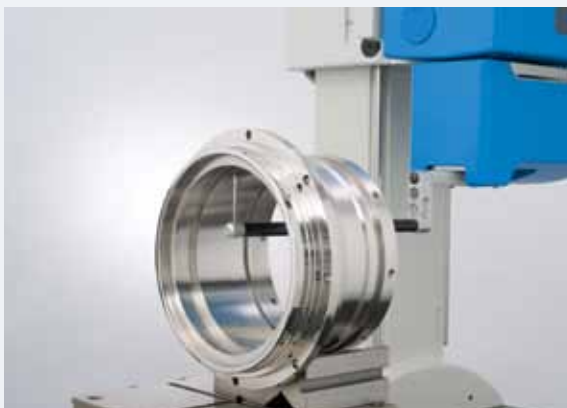
With digital measurement systems, even extremely small geometries can be measured.

wavecontour™ digiscan: system solution for demanding measuring tasks

The wavecontour™ digiscan measurement system uses intelligent probe arms with automatic RFID identification. The contour measurement system detects which probe arm is being used and automatically sets the correct measuring conditions. Thus, when measuring tasks frequently change, any incorrect measurements or damage to stylus tips or workpieces due to operating errors can be avoided. The wavecontour™ digiscan measurement system also allows you to extend the vertical range using specific probe arms and to measure using dual-tip probe arms for outer/inner measurement of workpieces with optional software.

Highlights

- digital measurement system
- measuring range 60/90 mm, resolution 0.05/0.075 µm
- outer/inner measurement via software option
- CNC-controlled probe arm positioning with programmable stroke limit
- electronic stylus tip guard
- automatic RFID identification with
 - automatic configuration of the measurement force and measuring conditions
 - automatic assignment of the probe arm to the measuring program
 - magnetic probe arm holder
- large range of probe arms for individual measuring tasks



wavecontour™ digiscan measurement system with electronic probe arm detection.



Dual-tip probe arms enable outer/inner measurement.

Universally applicable roughness measuring systems

The PC-based T8000 R measuring instruments are designed for demanding tasks in professional roughness metrology. They meet international standards and are used both in production and in the measuring room.

The design allows different levels of expansion of the measuring station configurations and offers upgrade possibilities for topography and contour measurement.

Highlights

- high-precision traverse for skidless measurement
- modular structure
- PC-based evaluation unit
- robust Gauss filter according to ISO/TS 16610-31
- many special parameters from the automotive industry

HOMMEL-ETAMIC T8000 R at a glance

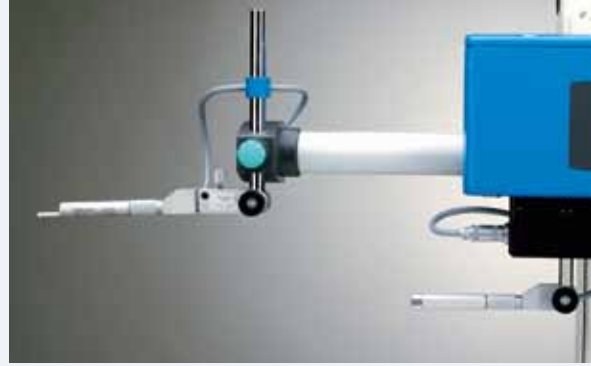
- calculation of all common profile, roughness and waviness parameters (more than 90)
- traverse length 120 mm for roughness and waviness measurement
- also suitable for measurement positions with difficult access thanks to the positioning accuracy of the drive bar
- universally usable roughness probe with exchangeable probe arms for different measuring tasks and special applications
- stable and robust motorized measuring column for automatic probe positioning
- continuous further development of the software with regard to new standards/changes in standards
- user friendly software with individual measuring programs and clearly arranged operating structure

HOMMEL-ETAMIC T8000 R120
with optional wavecontrol™ basic control panel
and optional measuring table MT1 XYO





The probe can be swiveled 90° for measurements on low surfaces or between collars. The surface is scanned perpendicular to the traversing direction without complex conversion.



The roughness probe is attached either to the drive bar or underneath the traverse unit. This guarantees maximum flexibility for use in a wide range of measuring tasks.

HOMMEL-ETAMIC T8000 R

Options

- certified qs-STAT® interface (AQDEF)
- twist measurement: rotary traverse unit for roughness measurement in circumferential direction and twist software
- topography measurement: motorized Y positioner and HOMMEL MAP software for displaying and evaluating 3D parameters
- contour measurement upgrade kit
- roughness probe and probe arms for different applications
- MT1 XY, MT1 XYO measuring table
- wavecontrol™ basic control panel
- GTR instrument table

System components

- evaluation computer with 22" TFT flat screen, CD writer, and evaluation software for roughness
- PDF printout with automatic save function
- motorized wavelift™ 400 measuring column with automatic measurement
- waveline™ 120 traverse unit with incremental linear measuring system
- tilting device for traverse unit with swivel range $\pm 45^\circ$ and fine swivel range $\pm 5^\circ$
- granite plate 780 x 500 mm with 10 mm T groove
- probe set TKU 300/600 incl. 4 probe arms for different applications
- FHZ skidless probe holder
- RNDH2 roughness standard

	T8000 R120 Art. no. 1001 7062
Measuring range	$\pm 300 \mu\text{m}$ or $\pm 600 \mu\text{m}$
Min. resolution	1 nm or 2 nm
Measuring range/horizontal resolution	120 mm/0.1 μm
Vertical travel measuring column	400 mm
1000 x 500 mm granite plate upgrade	Art. no. 1003 6585
800 mm measuring column upgrade	Art. no. 1003 6584
wavecontour™ digital upgrade	Art. no. 1004 3060
wavecontour™ digiscan upgrade	Art. no. 1005 0333

Compact and precise contour measuring systems

The C8000 contour measuring stations boast an optimum price/performance ratio and are designed specifically for high-precision contour measurement.

Highlights

- interactive control of the measuring station
- high, continuous measuring accuracy due to digital measurement systems
- efficient evaluation functions
- processing of multiple profiles

HOMMEL-ETAMIC C8000 at a glance

- motorized probe arm with programmable stroke limit
- automatic measuring runs and evaluation
- easily interchangeable probe arms for numerous applications
- compact and robust structure for production-related operation or for the measuring room

HOMMEL-ETAMIC C8000 digital





HOMMEL-ETAMIC C8000 digital

Application example: measurement of penetration radii of crankshafts.



HOMMEL-ETAMIC C8000 digiscan

Probe arms with automatic RFID identification.

HOMMEL-ETAMIC C8000

Options

- certified qs-STAT® interface (AQDEF)
- wavecontrol™ basic control panel
- KN8 contour standard
- GTR instrument table

System components

depending on the type of device

- evaluation computer with 22" TFT flat screen, CD writer, and evaluation software for contour
- PDF printout with automatic save function
- motorized wavelift™ 400 measuring column with automatic measurement
- waveline™ 120 C traverse unit with incremental linear measuring system
- tilting device for traverse unit with swivel range of $\pm 45^\circ$
- wavecontour™ digital or digiscan contour probe incl. probe arm with carbide tip
- granite plate 780 x 500 mm with 10 mm T groove
- MT1 XYO measuring table for holding the workpieces (also available without)
- calibration set

	C8000 digital Art. no. 1001 7065	C8000 digiscan Art. no. 1005 0329
Measuring range	60 mm	60/90* mm
Min. resolution	50 nm	50/75* nm
Probe force setting	manual	electronic
Probe arm identification	–	electronic, RFID
Outer/inner probing	–	optional
Measuring range/horizontal resolution	120 mm/0.1 μ m	120 mm/0.1 μ m
Vertical travel measuring column	400 mm	400 mm
1000 x 500 mm granite plate upgrade	Art. no. 1003 6585	Art. no. 1003 6585
800 mm measuring column upgrade	Art. no. 1003 6584	Art. no. 1003 6584

* at 1.5 times the length

Individual contour measurement systems with automatic measuring runs

The T8000 contour measuring systems can be upgraded for roughness measurement at any time and therefore offer long-term investment security.

Highlights

- individual measurement station configurations depending on the measuring task and the workpiece size
- measuring station can be interactively controlled
- digital measurement systems ensure a permanently high level of measuring accuracy
- extensive evaluation functions
- processing of several profiles
- can be upgraded for roughness measurement

HOMMEL-ETAMIC T8000 C at a glance

- motorized probe arm
- programmable stroke limit
- automatic measuring and evaluation
- probe arms are easy to change for flexible applications
- modular structure for future expansions

HOMMEL-ETAMIC T8000 C120 digiscan





Reliable measurement of small geometric features.



High performance contour evaluation with digital scales in both the Z and X direction.

HOMMEL-ETAMIC T8000 C

Options

- certified qs-STAT® interface (AQDEF)
- wavecontrol™ basic control panel
- KN8 contour standard
- GTR instrument table
- upgrade kit roughness measurement

System components

depending on the type of device

- evaluation computer with 22" TFT flat screen, CD writer, and evaluation software for contour
- PDF printout with automatic save function
- motorized wavelift™ 400 measuring column with automatic measurement
- waveline™ 120 or 200 traverse unit with incremental linear measuring system
- tilting device for traverse unit with swivel range of $\pm 45^\circ$
- wavecontour™ digital or digiscan contour probe incl. probe arm with carbide tip
- granite plate 780 x 500 mm with 10 mm T groove
- MT1 XYO measuring table for holding the workpieces
- calibration set

	T8000 C120 digital Art. no. 1001 7066	T8000 C120 digiscan Art. no. 1005 0330	T8000 C200 digital Art. no. 1003 6457	T8000 C200 digiscan Art. No. 1005 0331
Measuring range	60 mm	60/90* mm	60 mm	60/90* mm
Min. resolution	50 nm	50/75* nm	50 nm	50/75* nm
Probe force setting	manual	electronic	manual	electronic
Probe arm identification	–	electronic, RFID	–	electronic, RFID
Outer/inner probing	–	optional	–	optional
Measuring range/horizontal resolution	120 mm/0.1 μ m	120 mm/0.1 μ m	200 mm/0.01 μ m	200 mm/0.01 μ m
Vertical travel measuring column	400 mm	400 mm	400 mm	400 mm
1000 x 500 mm granite plate upgrade	Art. no. 1003 6585	Art. no. 1003 6585	Art. no. 1003 6585	Art. no. 1003 6585
800 mm measuring column upgrade	Art. no. 1003 6584	Art. no. 1003 6584	Art. no. 1003 6584	Art. no. 1003 6584
Upgrade kit roughness measurement	Art. no. 1004 7700	Art. no. 1004 7700	Art. no. 1004 7699	Art. no. 1004 7699

* probe at 1.5 times the length

Combined roughness and contour measuring systems

The optimum combination for roughness and contour measurement is provided by the intelligent integration of both measurement systems. Roughness and contour are evaluated by two connected but different measurement systems.

The drive bar positions the roughness probe even in measuring positions with difficult access. The contour probe is easy to change and can be operated parallel to the roughness probe if necessary.

Highlights

- user-friendly roughness and contour measuring system
- easily exchangeable measurement systems
- roughness measurement over the whole traverse length
- automatic measuring runs with motorized lowering/lifting of the probe
- attachment of the roughness probe either to the drive bar or underneath the traverse unit

HOMMEL-ETAMIC T8000 RC at a glance

- uniform user interface for roughness and contour evaluations
- calculation of all common profile, roughness and waviness parameters (more than 90)
- evaluation of geometric characteristics such as distances, angles and radii
- traverse length 120 mm for roughness, waviness and contour measurements
- evaluation of roughness and contour characteristics in one procedure
- traverse unit with high guiding accuracy and digital glass scale for exact measurement results
- stable and robust motorized measuring column for automatic probe positioning

HOMMEL-ETAMIC T8000 RC120
with optional 800 mm measuring column and
optional wavecontrol™ basic control panel





The combined roughness and contour measurement systems enable roughness measurement to be taken over the entire traverse length of 120 mm.

Precise roughness measurement with a large selection of probes for different measuring tasks.

HOMMEL-ETAMIC T8000 RC

Options

- certified qs-STAT® interface (AQDEF)
- special parameters according to VDA and Daimler standard
- twist measurement: rotary traverse unit for roughness measurement in circumferential direction and twist software
- topography measurement: motorized Y positioner and HOMMEL MAP software for displaying and evaluating 3D parameters
- wavecontrol™ basic control panel
- KN8 contour standard
- GTR instrument table

System components

depending on the type of device

- evaluation computer with 22" TFT flat screen, CD writer, evaluation software for roughness and contour
- PDF printout with automatic save function
- motorized wavelift™ 400 measuring column with automatic measurement
- waveline™ 120 traverse unit with incremental linear measuring system
- tilting device for traverse unit with swivel range $\pm 45^\circ$ and fine swivel range $\pm 5^\circ$
- granite plate 780 x 500 mm with 10 mm T groove
- probe set TKU 300/600 incl. 4 probe arms
- FHZ skidless probe holder
- RNDH2 roughness standard
- wavecontour™ digital or digiscan contour probe incl. probe arm with carbide tip
- calibration set
- MT1 XYO measuring table for holding the workpieces

	T8000 RC120 digital Art. no. 1001 7070	T8000 RC120 digiscan Art. no. 1005 0332
Measuring range roughness contour	R: $\pm 300 \mu\text{m}$ or $600 \mu\text{m}$; C: 60 mm	R: $\pm 300 \mu\text{m}$ or $600 \mu\text{m}$; C: 60/90* mm
Min. resolution	R: 1 nm or 2 nm; K: 50 nm	R: 1 nm or 2 nm; C: 50/75* nm
Probe force setting	manual	electronic
Probe arm identification	–	electronic, RFID
Outer/inner probing	–	optional
Measuring range/horizontal resolution	120 mm/0.1 μm	120 mm/0.1 μm
Vertical travel measuring column	400 mm	400 mm
1000 x 500 mm granite plate upgrade	Art. no. 1003 6585	Art. no. 1003 6585
800 mm measuring column upgrade	Art. no. 1003 6584	Art. no. 1003 6584

* at 1.5 times the length

Simultaneous measurement of roughness and contour

The T8000 SC measures roughness and contour simultaneously with a high-resolution measurement system. The geometrical characteristics and roughness parameters are evaluated in one run. With its extraordinary price/performance ratio, this system offers application possibilities that are usually only covered by much more complex laboratory systems.

Highlights

- 6 mm measuring range with industry leading 6 nm of resolution
- full resolution throughout the entire measuring range
- adjustable measurement force
- motorized lifting and lowering of the probe for automatic measuring runs
- modular components

HOMMEL-ETAMIC T8000 SC at a glance

- compact measuring station for use in the production environment or in the measuring room
- only one measurement system for roughness and contour
- roughness measurement on inclined and curved surfaces
- alignment of measuring system to the workpiece surface is unnecessary due to extensive measuring range
- magnetic probe arm holder for fast, reliable probe arm changing
- extensive software functions for evaluation of roughness parameters and contour characteristics

HOMMEL-ETAMIC T8000 SC120





The magnetic holder of the probe arms ensures fast, simple and reliable changing for different measuring tasks.



Combined roughness and contour measurement with the wavecontour™ surfscan on a ball spindle.

HOMMEL-ETAMIC T8000 SC

Options

- certified qs-STAT® interface (AQDEF)
- roughness and contour probe arms for specific measuring tasks
- wavecontrol™ basic control panel
- KN8 contour standard
- GTR instrument table

System components

- evaluation computer with 19" TFT flat screen, CD writer, evaluation software for roughness and contour
- PDF printout with automatic save function
- motorized wavelift™ 400 measuring column with automatic probing
- waveline™ 120 traverse unit with incremental linear measuring system
- tilting device for traverse unit with swivel range $\pm 45^\circ$ and fine swivel range $\pm 5^\circ$
- granite plate 780 x 500 mm with 10 mm T groove
- wavecontour™ surfscan probe incl. 2 probe arms with diamond tip or ruby ball
- RNDH2 roughness standard
- calibration set
- MT1 XYO measuring table for holding the workpieces

	T8000 SC120 Art. no. 1001 7074
Measuring range roughness and contour	R+C: 6 mm
Min. resolution roughness and contour	R+C: 6 nm
Measuring range/horizontal resolution	120 mm/0.1 μm
Vertical travel measuring column	400 mm
1000 x 500 mm granite plate upgrade	Art. no. 1003 6585
800 mm measuring column upgrade	Art. no. 1003 6584

Maximum performance in simultaneous roughness and contour measurement

The nanoscan 855 offers combined, high-precision, measurement of roughness and contour in just one measuring run. Having a single measuring instrument ensures flexible operation for all measuring tasks in the field of surface metrology – saving time and costs.

Highlights

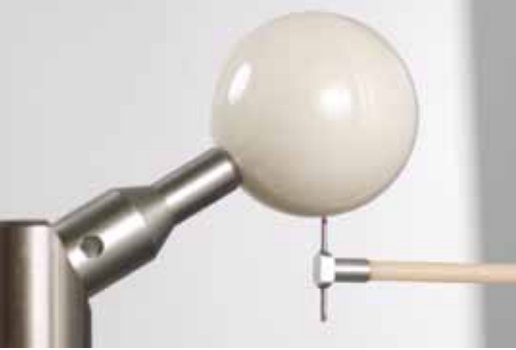
- measuring range 24/48 mm
- automatic RFID identification with
 - automatic configuration of the probing force and measuring conditions
 - automatic assignment of the probe arm to the measuring program
- high-precision probe arm positioning
- outer/inner measurement

HOMMEL-ETAMIC nanoscan at a glance

- ultra-precise opto-mechanical measurement system
- universal application possibilities
- ergonomic measuring station design
- extensive range of probe arms
- technologically innovative
- simple calibration method
- new evaluation possibilities: top and bottom measurement, topography measurement with large measuring stroke

HOMMEL-ETAMIC nanoscan 855 with optional hood





Calibration method

Only one sphere standard is required for calibrating the entire system

Probe arm holder with electronic identification

Thanks to the magnetic probe arm holder, the probe arms can be changed quickly and reliably.

Top and bottom measurement

Dual-tip probe arms are used for measurements requiring scanning in both directions.

HOMMEL-ETAMIC nanoscan

Options

- certified qs-STAT® interface (AQDEF)
- roughness and contour probe arms for specific measuring tasks
- KN8 contour standard
- hood for protection against ambient influences

More information about this measuring station can be found in the separate brochure HOMMEL-ETAMIC nanoscan 855 Roughness and contour measurement with maximum precision (1003 5851).

System components

- evaluation computer with 22" TFT flat screen, CD writer, evaluation software for roughness and contour
- PDF printout with automatic save function
- wavecontrol™ basic control panel
- 3 probe arms with ruby ball or diamond tip
- RNDH2 roughness standard
- sphere standard
- MT1 XYO measuring table for holding the workpieces

	nanoscan 855 Art. no. 1003 0472
Measuring range roughness and contour	R+C: 24/48 mm
Min. resolution roughness and contour	R+C: 0.6/1.2 nm
Measuring range/horizontal resolution	200 mm / 0.01 µm
Vertical travel measuring column	550 mm

EVOVIS – Evaluation software for roughness and contour

The software is easy to use and offers a standardized interface for roughness and contour measurement, regardless of the configuration of the device. Simple pictograms, supported by comprehensive help functions, allow the user to use the efficient measurement and evaluation tools according to their own requirements.

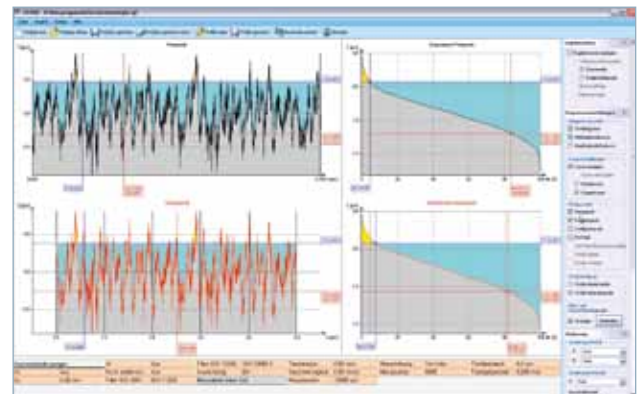
In the workpiece-specific test plan, several measuring tasks can be summarized using different measuring conditions, meaning all of the features to be checked remain in one overview and are documented in the same log.

Roughness measurement and evaluation

- interactive profile analysis functions for evaluating surface parameters
- evaluation of the measurement results in accordance with tolerance specifications displayed in a compact form
- measuring station control: all of the information in one view, reliable operation of all manual and automatic functions
- individual test plan creation
- wizard for selecting the measuring conditions
- over 90 roughness and waviness parameters in accordance with ISO 4287 and other ISO and national standards (ASME, DIN, JIS, Motif etc.)
- robust Gaussian filter in accordance with ISO/TS 16610-31
- optionally can be extended to include function-oriented parameters such as dominant waviness (VDA 2007), twist parameters (MBN 31007-07) and other factory standard-specific parameters
- open design of the print log
- electronic archiving of logs with PDF printout and automatic save function



Measuring station control



Profile analysis of roughness and waviness



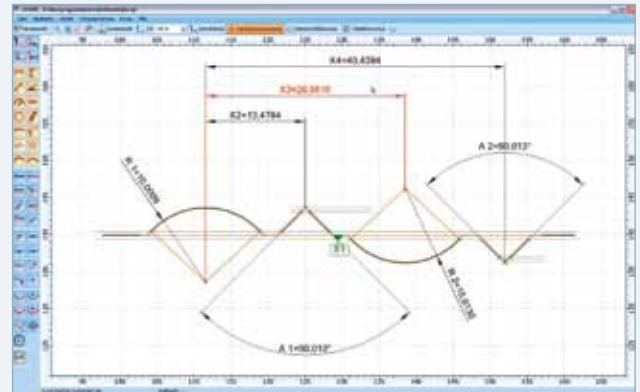
Wizard for selection of measuring conditions

EVOVIS is the quick and reliable way to evaluate geometric features of workpieces, such as radii, angles or distances. Additional evaluation tools are offered by the line profile deviation with variable tolerance range, the comparison option with stored nominal profiles, as well as the automatic evaluation of complex geometric elements such as Gothic arcs or workpiece edges.

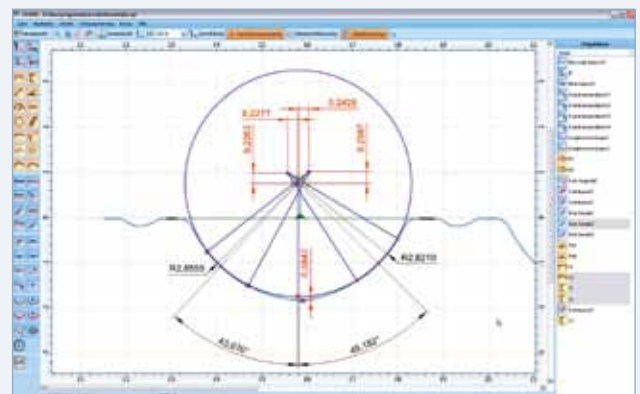
Precision fitting methods, various options for forming help elements, and definition options for the co-ordinate origin also enable complex evaluations to be carried out.

Contour measurement and evaluation

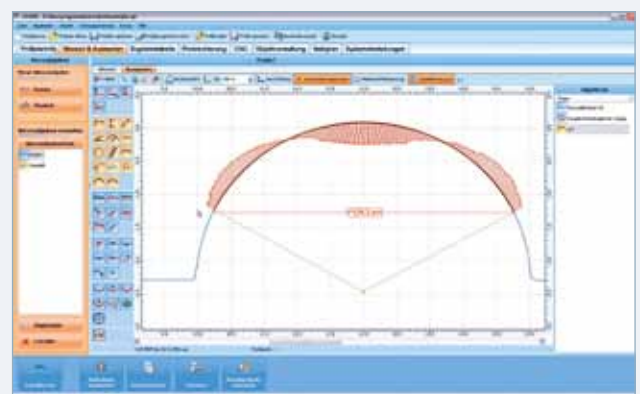
- intelligent measuring station control
- individual test plan creation
- processing of several profiles/features in one test plan
- icon-based contour features for quick test plan creation
- help elements such as references, points, lines or co-ordinate systems
- automatic alignment functions of the measured profile
- automatic evaluation run with clear workflow
- powerful zoom functions
- automatically generated results table
- graphic representation of line profile deviations with variable tolerance range
- morphological filter
- evaluation of complex geometric elements such as Gothic arcs or edge geometries
- open design of the print log
- electronic archiving of logs with PDF printout and automatic save function



Contour evaluation



Gothic arcs



Nominal-actual comparison with profile deviation

Combined evaluation of roughness and contour

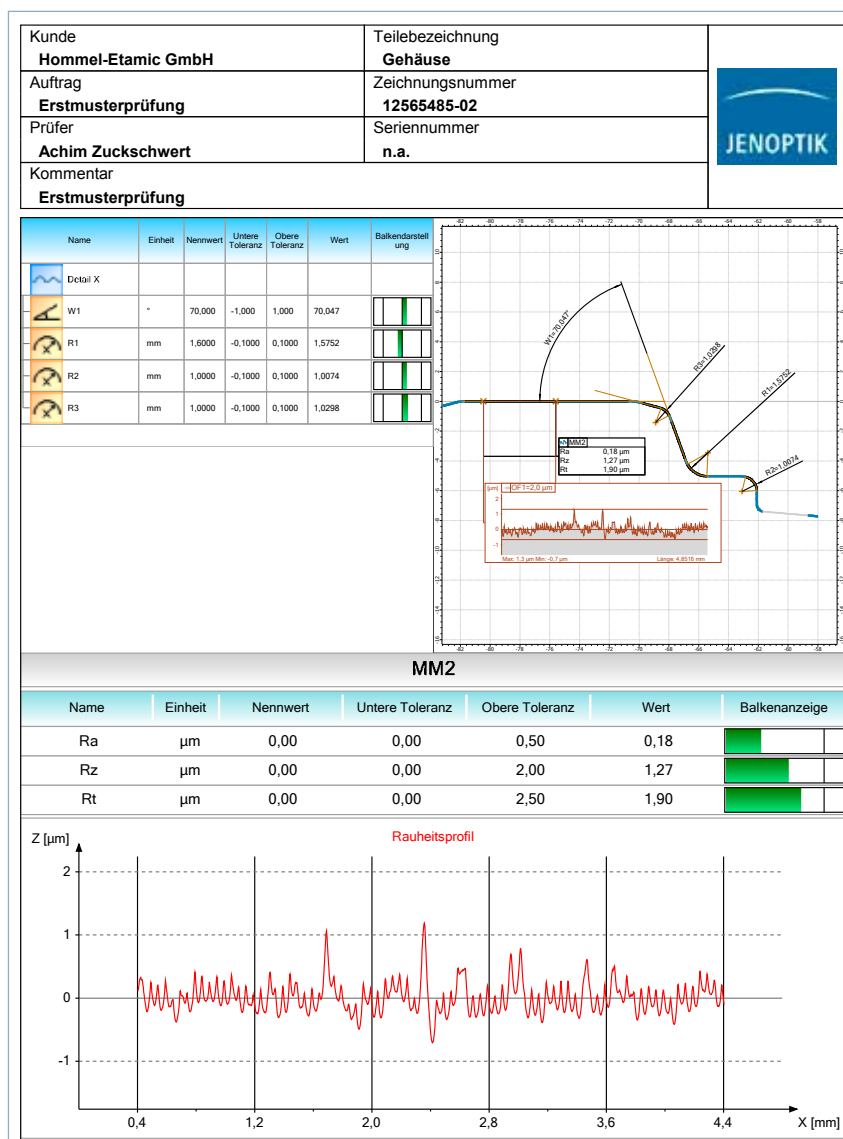
EVOVIS supports innovative, combined, measurement systems and enables the integrated evaluation of roughness and contour characteristics.

The evaluation of roughness parameters can be determined interactively anywhere in the contour profile. The roughness profile can also be shown graphically.

The roughness and contour characteristics are displayed in a table and can also be evaluated statistically.

EVOVIS for combined roughness and contour measuring instruments

- interactive roughness evaluation on the contour profile
- roughness evaluation on straight lines, inclines and radii segments
- individual definition of evaluation length and filter setting for the roughness evaluation
- retrospective roughness evaluation possible on measured profiles



Individual design of print logs: dimensions and roughness parameters evaluated simultaneously.

Software options for EVOVIS

Automatic runs: CNC control

A CNC measuring run needs a lot less time than a manual measurement sequence and supplies operator-independent, reproducible results.

With this option, even complex CNC runs and evaluations can be programmed quickly and easily.

The run commands are selected by mouse click and the necessary parameters are automatically set. The created program run is displayed clearly in a graphic workflow.



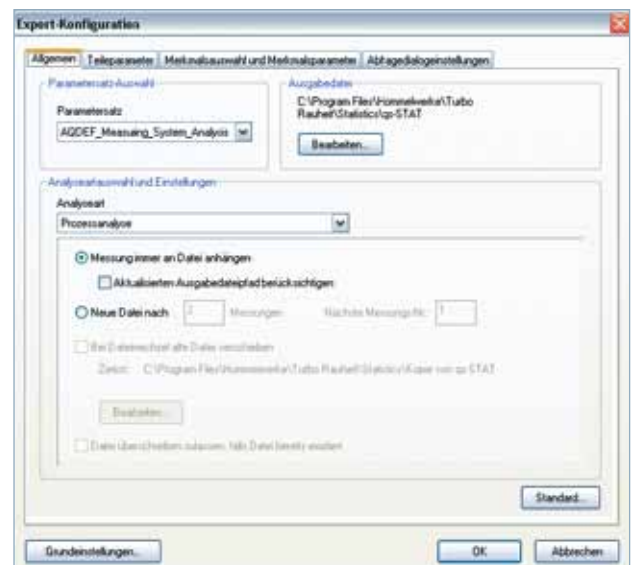
CNC control

qs-STAT® data export interface

The data export interface supports the Q-DAS ASCII transfer format for the exchange of quality information via Q-DAS software modules.

Predefined parameter sets and the possible use of predefined catalogs simplify set-up of the data interface.

The interface is certified by Q-DAS according to AQDEF specifications (Automotive Quality Data Exchange Format).



qs-STAT® data export

Topography evaluation: option for roughness measurement

HOMMEL MAP 3D topography analysis software offers extensive evaluation possibilities for profile and surface data. Both the T8000 and the nanoscan can be upgraded for topography measurement. A Y positioner is necessary in addition to the software (see page 31).

HOMMEL MAP at a glance

- intuitive structure of the analysis documents
- pre-processing of the measured data: alignment, filtering and form removal
- automatic recalculation after changing evaluation steps
- extensive online help
- standards for evaluation of 2D parameters
- future ISO/TS 25178 standard for 3D parameters (only HOMMEL MAP expert and premium)
- extensive metrological and scientific filter possibilities
- extensive graphic and analytical studies

Depending on the requirements, the 3D evaluation software is available in three different versions each one adding greater capabilities than the last.

HOMMEL MAP basic

- document management
- interactive studies of 3D objects
- 2D parameters according to ISO 4287
- distance measurement, step height evaluation

HOMMEL MAP expert

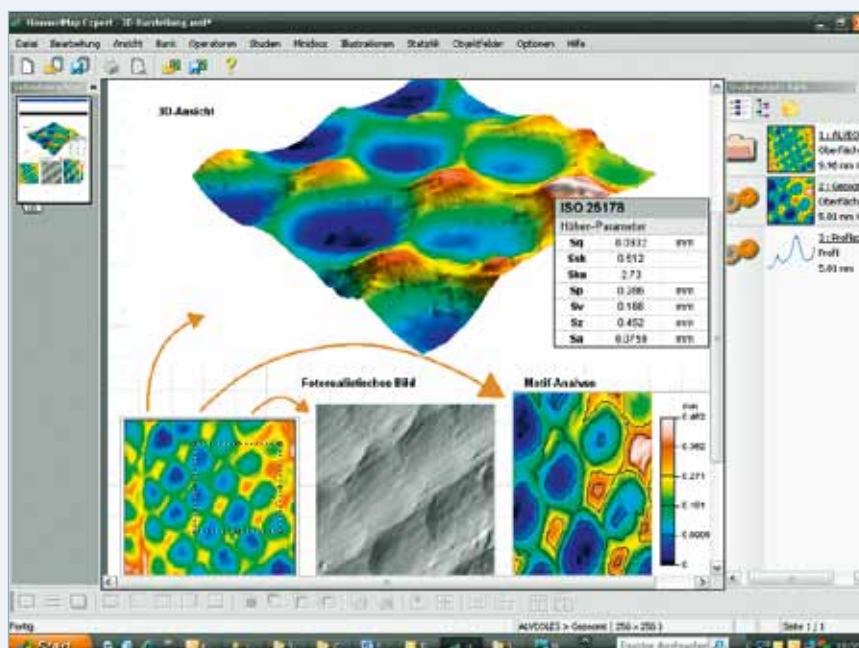
basic functions plus

- evaluation of profile series
- Rk parameters, Motif parameters, 2D parameters automotive
- 3D parameters
- joining of multiple profiles
- FFT analysis, frequency spectrum and autocorrelation
- morphological filtering on 3D objects
- difference between two surfaces

HOMMEL MAP premium

expert functions plus

- extensive studies of surface series
- studies on binary surfaces (grains)
- multilayer surfaces



Topography evaluation

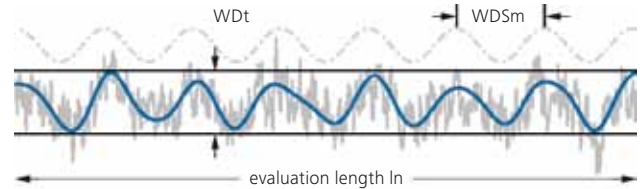
Other options for the roughness measurement

Dominant waviness according to VDA 2007

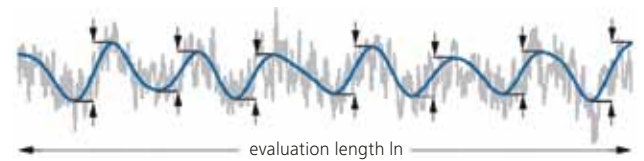
Primary profile is checked for dominant wavinesses. The evaluation method automatically recognizes any existing periodic characteristics and extracts the waviness profile (WD profile) and derives the parameters WDSm, WDt and WDC.

The following functional behavior can be tested, for example, with the dominant waviness analysis:

- statistical tightness
- dynamic tightness
- noise emission
- avoidance of increased wear or malfunctions
- pre-processing conditions



WDSm and WDt



WDC

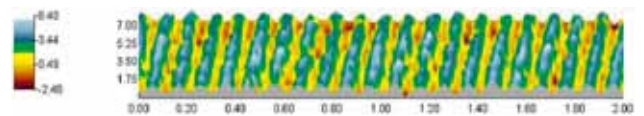
Twist evaluation according to MBN 31007-07

Twist structures at sealing surfaces occur during grinding and impair the sealing function between the shaft and the sealing ring. The most important properties of these surface structures are measured three-dimensionally and the parameters relevant to the tightness determined.

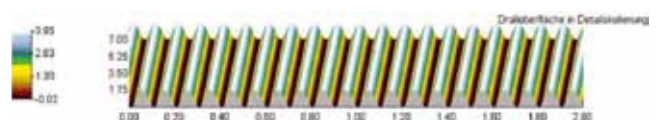
Due to the optimized evaluation of the measurement results in the current version of the Daimler standard MBN 31007-07 from 2009, results are much more stable. The reduction of the evaluation length is a significant saving of time.

The following twist parameters are determined: number of threads DG, twist depth Dt [μm], period length DP [mm], feed cross section DF [μm^2], feed cross section per revolution DFu [$\mu\text{m}^2/\text{r}$], contact length in percent DLU [%], twist angle D γ [°].

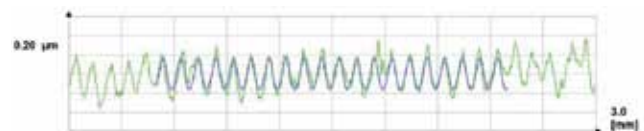
In addition to the software the optional rotary traverse unit for measurement on shaft-shaped parts (see page 30) is required for the twist measurement.



Display of unfiltered primary surface structure



Display of twist structure in detailed scaling



Display of original profile (green) and twist profile (blue)

TKU probe set for measuring all roughness parameters

The TKU probe sets are versatile in use because they replace up to three conventional standard probes and therefore offer a low-cost alternative. The probe sets can also be extended at any time with additional probe arms.

The probe sets contain

- Basic probe, skid and probe protection
- TS1 probe arm for bores
- TS2 probe arm (TKU 300/600 only)
- TS1T probe arm for grooves
- TS1D probe arm for measurements at collars and directly at faces

TKU 100 probe set, measuring range $\pm 100 \mu\text{m}$

With $5 \mu\text{m}$ stylus tip Art. no. 256 500

With $2 \mu\text{m}$ stylus tip Art. no. 256 658

TKU 300/600 probe set, measuring range $\pm 300/600 \mu\text{m}$

With $5 \mu\text{m}$ stylus tip Art. no. 230 450

With $2 \mu\text{m}$ stylus tip Art. no. 256 657

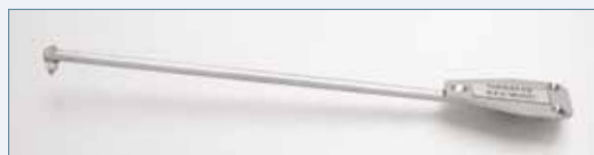
TKU 300 TSM safety adapter probe set

With magnetic probe holder and three probe arms.

With $2 \mu\text{m}/90^\circ$ stylus tips Art. no. 1005 9997



TKU 300/600 probe set



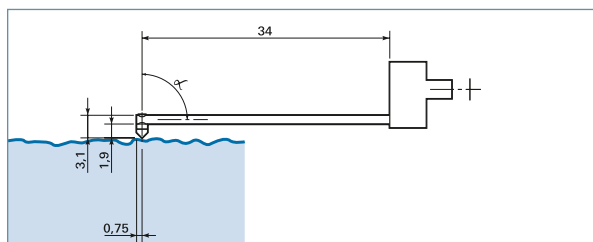
Basic probe and TKU 300 TSM probe arm

TS1 probe arm

For bores from 4 mm, max. horizontal tracing depth 33 mm.

With $5 \mu\text{m}/90^\circ$ stylus tip Art. no. 230 475

With $2 \mu\text{m}/90^\circ$ stylus tip Art. no. 240 805

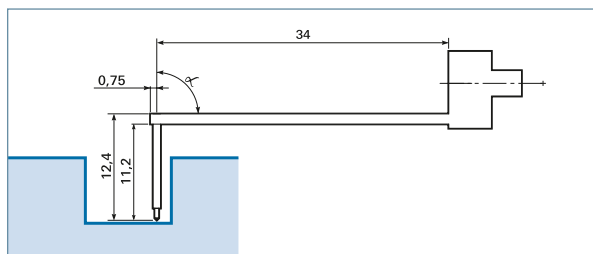


TS1T probe arm

For grooves with max. vertical/horizontal tracing depth of 10/33 mm.

With $5 \mu\text{m}/90^\circ$ stylus tip Art. no. 231 289

With $2 \mu\text{m}/90^\circ$ stylus tip Art. no. 256 624

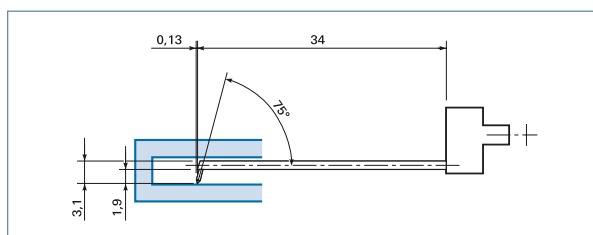


TS1D probe arm

For collars, directly on end faces and bores from 5 mm, distance from end face to probing point 0.2 mm, max. horizontal tracing depth 33 mm.

With $5 \mu\text{m}/60^\circ$ stylus tip Art. no. 231 291

With $2 \mu\text{m}/60^\circ$ stylus tip Art. no. 240 160



Skidless probes for roughness, waviness and profile

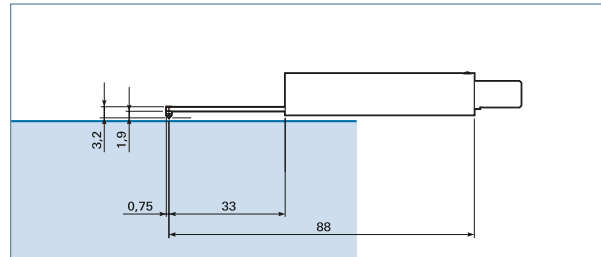
With a measuring range of $\pm 100 \mu\text{m}$ and precise ruby bearings, the TKL probes are particularly suited for measurements of fine roughnesses.

TKL

Standard probe for measurements of P-, W- and R-profiles on plain surfaces, shafts and in bores.

With $5 \mu\text{m}/90^\circ$ stylus tip Art. no. 243 588

With $2 \mu\text{m}/60^\circ$ stylus tip Art. no. 1000 4132

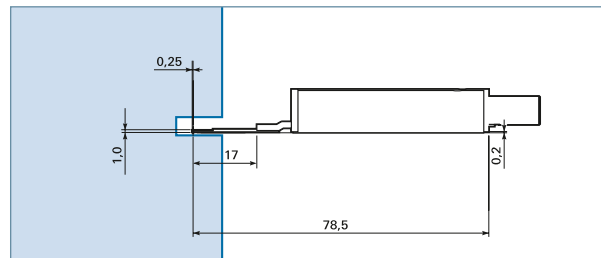


TKLK

For measurements in small bores.

With $5 \mu\text{m}/90^\circ$ stylus tip Art. no. M0 435 035

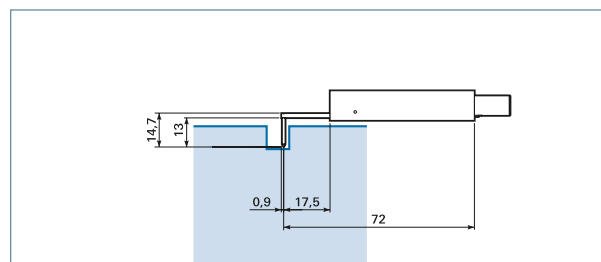
With $2 \mu\text{m}/90^\circ$ stylus tip Art. no. 233 280



TKLT

For measurements in grooves or on recessed surfaces.

With $5 \mu\text{m}/90^\circ$ stylus tip Art. no. 224 835



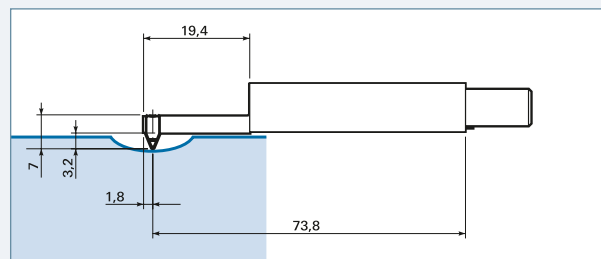
Skid probes for roughness measurement

TKK 50

For measurements on concave and convex surfaces.

Skid depth 3 mm Art. no. M0 435 024

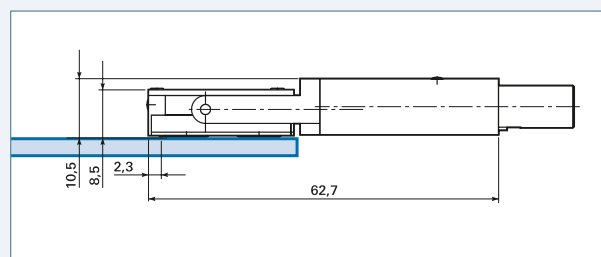
Skid depth 10 mm Art. no. 221 491



TKPK 100

Two-skid probe for measurements on cold-rolled sheets according to EN 10049. Skid radius 50 mm, stylus tip radius $5 \mu\text{m}$. Skid with reduced wear and DLC coating.

Art. no. 235 730



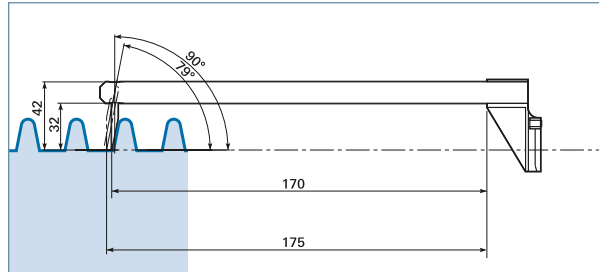
wavecontour™ digital probe arms for measurement of contour parameters

TA-60 probe arm with carbide tip

For profile recording on very fine to coarse structures.

Probe arm Art. no. 243 700

Carbide stylus tip Art. no. 232 586



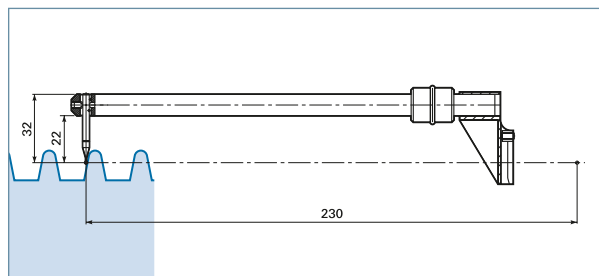
TA-60 probe arm with ruby ball

For measurements on radii or when mechanical pre-filtering is desired.

Probe arm Art. no. 256 497

Ruby ball stylus tip Art. no. 024 743

Adapter stylus tip Art. no. 230 695

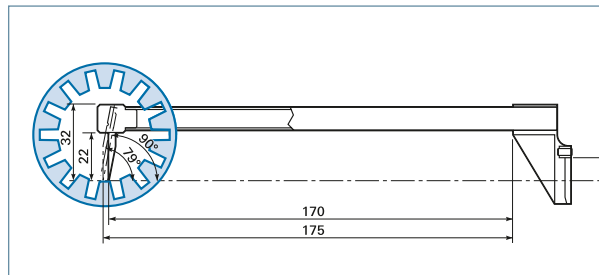


TA-60 probe arm for transverse measurements

Inner profile, e.g. internal gears, are made accessible by the transverse arm of 32.5 mm.

Probe arm Art. no. 256 785

Stylus tip Art. no. 284 039



TA-60 probe arm for bores

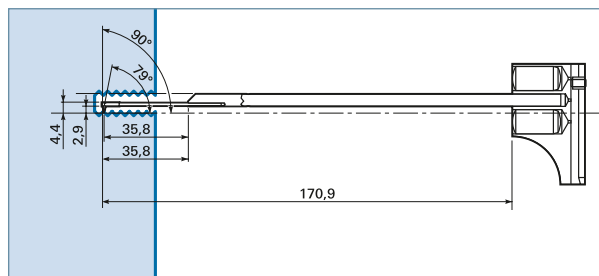
With a maximum tracing depth of 35.8 mm.

For bores from 4.5 mm.

Probe arm Art. no. 256 565

Stylus tip Art. no. M0 445 036

Bores from 4 mm Art. no. 1000 2710



Stylus tips with ruby ball

Adapter M2 for stylus tip Art. no. 230 695

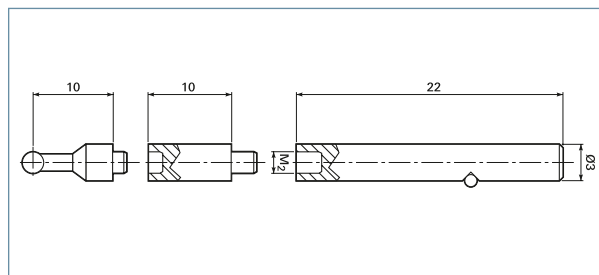
Stylus tip extension Art. no. 051 212

0.250 mm stylus tip Art. no. 051 342

0.500 mm stylus tip Art. no. 024 743

1.000 mm stylus tip Art. no. 051 208

1.500 mm stylus tip Art. no. 063 935

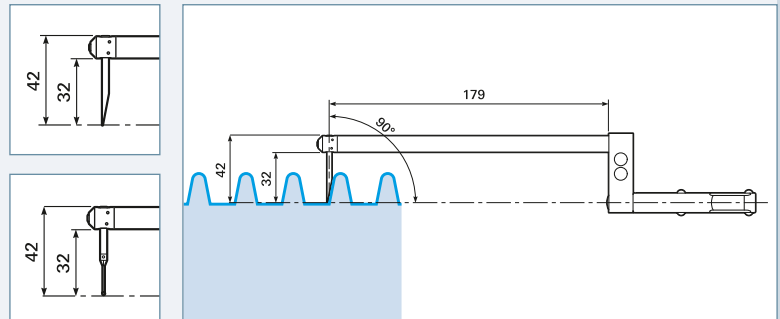


Contour probe arms with magnetic coupling for wavecontour™ digiscan

TD-60 standard probe arm

With carbide tip for profile recording on very fine to coarse structures or with ruby ball for measurements on radii or if mechanical pre-filtering is required.

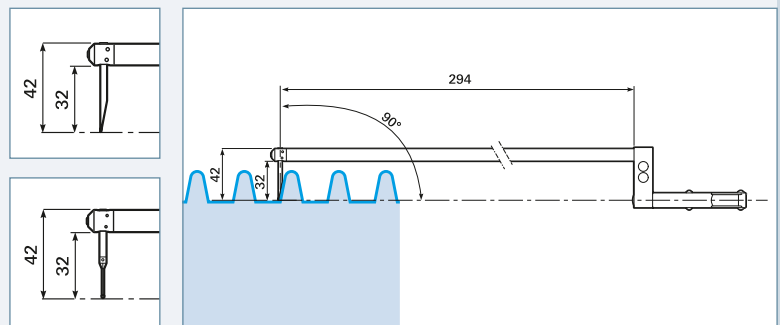
Carbide probe arm	Art. no. 1005 7599
Carbide stylus tip	Art. no. 1005 3157
Ruby ball probe arm	Art. no. 1005 7670
Ruby ball stylus tip	Art. no. 230 695



TD-90 probe arm at 1.5 times the length

For 90 mm measuring range.

Carbide probe arm	Art. no. 1005 7685
Carbide stylus tip	Art. no. 1005 3157
Ruby ball probe arm	Art. no. 1006 2155
Ruby ball stylus tip	Art. no. 230 695



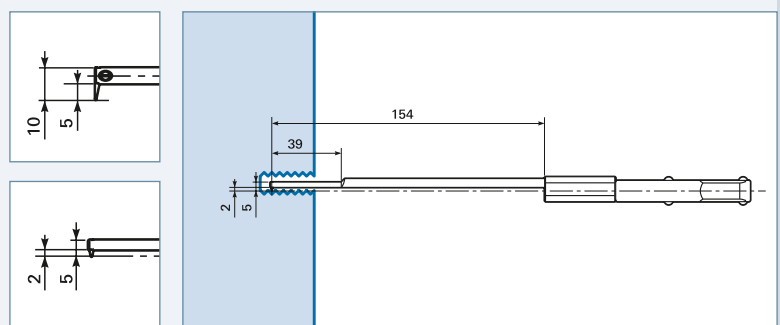
TD-60 probe arm for bores

With a maximum depth of immersion of 150 mm.
For bores from 12 mm.

Probe arm	Art. no. 1005 2855
Stylus tip	Art. no. 244 799

With a maximum depth of immersion of 39 mm.
For bores from 7 mm.

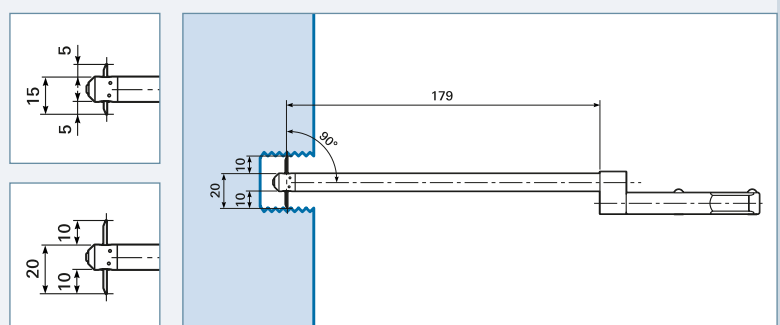
Probe arm	Art. no. 1005 8268
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TD-60 dual-tip probe arm

For outer/inner measurement or top/bottom measuring.

T5 carbide probe arm	Art. no. 1005 8278
Stylus tip	Art. no. 1005 4412
T10 carbide probe arm	Art. no. 1005 8293
Stylus tip	Art. no. 1005 4413
T12 ruby ball probe arm	Art. no. 1005 7699
Stylus tip	Art. no. 1005 5974

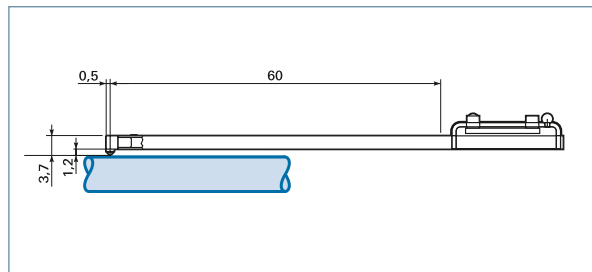


Probes for combined roughness and contour measurement (surfscan)

SC1

Standard probe arm for measurements on flat surfaces, shafts and in bores.

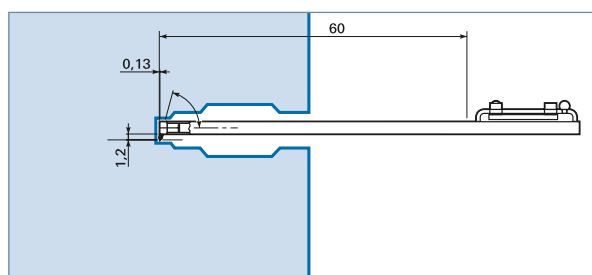
With 2 $\mu\text{m}/90^\circ$ stylus tip Art. no. 1000 4930



SC1D

With angled stylus tip for measurements on collars and directly on end faces.

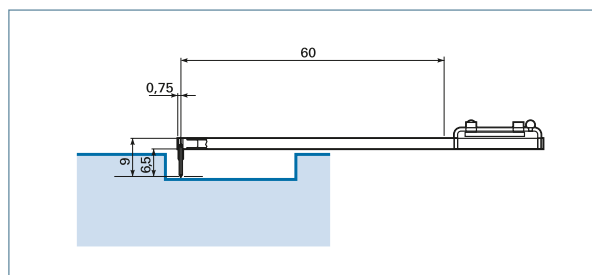
With 5 $\mu\text{m}/60^\circ$ stylus tip Art. no. 1000 4957



SC1T

For measurement on recessed surfaces.

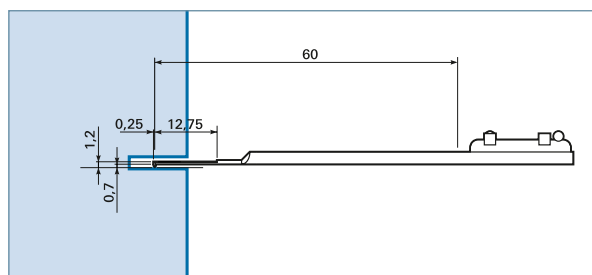
With 5 $\mu\text{m}/60^\circ$ stylus tip Art. no. 1000 9738



SC1K

For measurements on concave and convex surfaces.

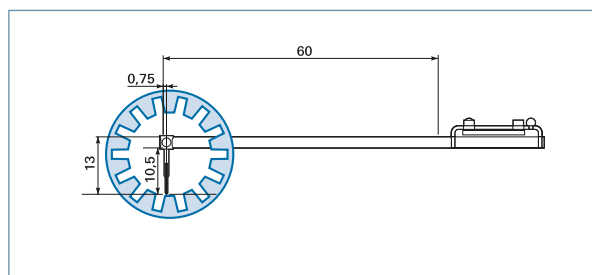
With 2 $\mu\text{m}/60^\circ$ stylus tip Art. no. 1001 3732



SC1Q

For transverse measurements on inner profiles.

With 5 $\mu\text{m}/60^\circ$ stylus tip Art. no. 1002 1315



Accessories for adapting the probing system to the measuring task

PHZ skid probe holder

For holding skid probes because the skid of the probe must adapt to the form deviation of a surface. The skid therefore forms the reference level for the roughness measurement. All roughness parameters are measured with skid probes.

Art. no. 240 211



PHZ skid probe holder

FHZ skidless probe holder

To hold skidless probes so that the stylus tip can measure the form deviations correctly. Skidless probes are used to determine roughness, waviness and form deviations.

Art. no. 240 215



FHZ skidless probe holder

FHZ rotatable skidless probe holder

Rotatable by 360° in steps of 15°.

For measurements overhead and on vertical surfaces.

Art. no. 244 891



FHZ rotatable skidless probe holder

AZZ probe extensions

50 mm

Art. no. M0 435 041

100 mm

Art. no. M0 435 042

150 mm

Art. no. M0 435 043

200 mm

Art. no. M0 435 044



AZZ probe extensions

HA/HAA holder

Twist-protected holder for fixed alignment of the roughness probe.

HAA150

Art. no. M0 435 127



HAA holder

System accessories

Probe adapter

Enables the operation of roughness probes under the traverse unit, alternatively to position on the drive bar.

Art. no. 240 754

Rotary traverse unit waverotor™

For roughness measurements on cylindrical workpieces in circumferential direction. Workpiece held by chuck or optional clamping jaws.

Art. no. 999 061

wavecontrol™ basic control panel

For convenient one-handed user control of the T8000/C8000 measuring systems. Function keys for the most frequent operating functions; joystick for fine control of the axis movements; emergency stop switch close at hand.

Art. no. 1002 5181



waverotor™

probe adapter



wavecontrol™ basic

GTR instrument table

With integrated granite plate on passive damping elements; undercabinet for accommodating the PC, printer and measuring instrument electronics.

Max. load 300 kg.

GTR4 for 780 x 500 mm granite plate Art. no. 235 626

GTR5 for 1000 x 500 mm granite plate Art. no. 239 303

Damping elements with active level regulation

Optional for benchtop or instrument tables.

For 780 x 500 or 1000 x 500 mm granite plates.

Regulates the horizontal alignment of the granite plate; automatic and independent of the workpiece weight.

LC-25 for GTR4 Art. no. 1003 8970

LC-50 for GTR5 Art. no. 1003 8509

LC-25 benchtop version for

780 x 500 mm granite plate Art. no. 240 785



GTR4 instrument table

Accessories for secure holding of the workpieces

Measuring tables

For holding and positioning workpieces.

Two coordinates adjustable ± 12.5 mm

Rotatable: $\pm 5^\circ$ around the vertical axis

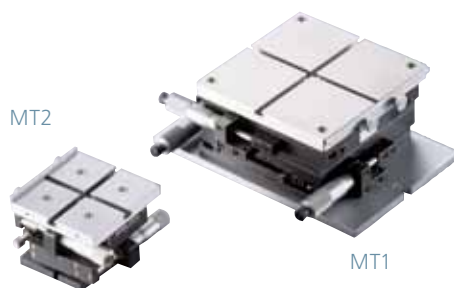
MT1: 160 x 160 mm support area

XYO axis Art. no. M0 435 276

XY axis Art. no. M0 435 273

MT2: 100 x 100 mm support area

XYO axis Art. no. M0 435 278



Vee-block

Four different sized, finely ground vees ensure a holding range of shafts and round workpieces with diameters between 1 and 150 mm.

Art. no. M0 435 084



Y positioner

With roller-mounted stepper motor for recording of topographies or for automatic positioning transversely to the probing direction. Load capacity approx.

30 kg. Guiding accuracy approx. 5 μ m. Max. trace width 50 mm. Smallest step 0.5/2.5 μ m with/without fine adjustment. 160 x 160 mm support area.

2 μ m Art. no. 1005 2547

2 μ m with fine adjustment Art. no. 1005 2599

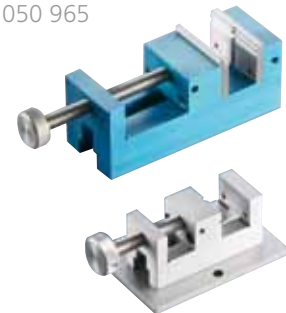


Parallel vises

Two small pairs of vees in the clamping jaws enable clamping of right-angled and cylindrical workpieces in horizontal or vertical position.

M32 Art. no. 050 968

M50 Art. no. 050 965



With flexible foot:

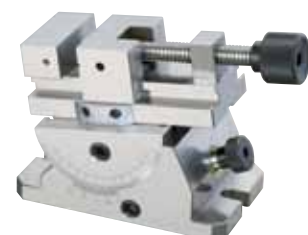
M32/GF32 Art. no. 050 966

M50/GF50 Art. no. 050 963



Angle vise

Completely precision grinded. Angle adjustment in two axes with Nonius scale and screw for fine adjustment. Horizontal swivel range 360°, vertical swivel range $\pm 60^\circ$. Jaw width 70 mm, clamping range 80 mm. Art. no. 1002 7036



Permanent measuring accuracy

DAkKS-DKD calibration laboratory

Continuous monitoring of optimum measurement accuracy is necessary to ensure perfect functioning of the measuring instruments. This is because changes in function can occur over the course of normal use, especially due to wear and tear, and these types of changes can go unnoticed. We calibrate the standards you send us in our ISO/IEC 17025 accredited DAkKS-DKD calibration laboratory. This ensures direct tracing of the gauging components to the Federal Physical-Technical Institute (PTB) and guarantees measurements and calibrations at the highest technical standard for measuring.

If a standard cannot be calibrated, a new one can be obtained directly from any of our facilities. Simple factory calibration certificates and test reports for non-accredited parameters are also available. We carry out capability tests for demanding measurement tasks.

Our range of calibration services:

Our DAkKS-DKD accreditation includes the measurement of variables such as roughness, profile depth, roundness, straightness, and parallelism as well as contour standards and roughness measurement instruments. Within this scope we offer:

- DAkKS-DKD calibration certificates for roughness standards
- DAkKS-DKD calibration certificates for contour standards
- DAkKS-DKD calibration certificates for form standards
- DAkKS-DKD calibration certificates for roughness measurement systems

Roughness standards

Made from steel or glass.

See page 35 for a detailed overview.

DAkKS-DKD calibration certificate Art. no. 1000 7481



KN8 contour standard

For testing contour measuring systems. Conformant with the VDI/VDE Directive 2629. Vertical measuring range: 7.5 mm. Horizontal measuring range: 100 mm. Incl. holder for precise alignment and DAkKS-DKD calibration certificate. Art. no. 1000 1678



Twist standards

With 10 and 30-turn twist. For inspecting the accuracy of the measuring systems. Incl. test report. Art. no. 1001 6265



Individual measuring systems for large workpieces

HOMMEL-ETAMIC T8000 waveslide™

The workpiece is moved into the correct measuring position on a guided air slide without using force. The respective measurement is then performed manually. The measuring stations can be used universally and can accomplish either roughness and/or contour measuring tasks.



HOMMEL-ETAMIC T8000 wavemove™

The wavemove measuring stations are fully automated with up to seven CNC axes. Complex measuring tasks are carried out on cubic or shaft-shaped workpieces.



	Roughness measurement		Contour measurement		
HOMMEL-ETAMIC	T8000 R120	C8000 digital	C8000 digiscan	T8000 C120 digital	T8000 C120 digiscan
Probing system	roughness probe TKU 300/600	wavecontour™ digital	wavecontour™ digiscan	wavecontour™ digital	wavecontour™ digiscan
Measuring range	±300 µm or ±600 µm	60 mm	60 / 90 ⁶⁾ mm	60 mm	60 / 90 ⁶⁾ mm
Resolution	1 nm or 2 nm ¹⁾	50 nm	50 / 75 ⁶⁾ nm	50 nm	50 / 75 ⁶⁾ nm
Probe force	1.6 mN	0-20 mN selectable	electronic ±5 to ±50 mN	0-20 mN selectable	electronic ±5 to ±50 mN
Probe arm identification	–	–	electronic, RFID	–	electronic, RFID
Probe force setting	–	manual	electronic	manual	electronic
Outer/inner measurement	–	–	optional	–	optional
Measuring stroke limitation	–	programmable	programmable	programmable	programmable
Probe					
Length (standard)	34 mm	200 mm	120 mm	200 mm	120 mm
Stylus tip	diamond 5 µm/90°	carbide 20 µm	carbide 20 µm	carbide 20 µm	carbide 20 µm
Mounting	standard: exchangeable optional: magnetic holder with collision protection	quick fastener	magnetic holder	quick fastener	magnetic holder
Traverse unit					
Measuring range (traverse length)	120 mm	120 mm	120 mm	120 mm	120 mm
Resolution	0.1 µm	0.1 µm	0.1 µm	0.1 µm	0.1 µm
Tracing speed	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.
Positioning speed	max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.
Straightness accuracy	≤0.4 µm/120 mm	≤0.4 µm/120 mm	≤0.4 µm/120 mm	≤0.4 µm/120 mm	≤0.4 µm/120 mm
Measuring column²⁾					
Vertical travel	400 mm	400 mm	400 mm	400 mm	400 mm
Auto-null function	in Z-, programmable	in Z-, programmable	in Z-, programmable	in Z-, programmable	in Z-, programmable
Travel speed	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.
Positioning repeatability	≤50 µm	≤50 µm	≤50 µm	≤50 µm	≤50 µm
Measuring station					
Granite plate (L x l x H) ³⁾	780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm
Damping	optional ⁴⁾	optional ⁴⁾	optional ⁴⁾	optional ⁴⁾	optional ⁴⁾
Instrument table (L x l x H)	optional ⁵⁾	optional ⁵⁾	optional ⁵⁾	optional ⁵⁾	optional ⁵⁾
Working table (L x l x H)	–	–	–	–	–

Power supply: 100–240 V AC 50/60 Hz; operating temperature: +10° to +40° C (excepting nanoscan +18° to +25° C), relative humidity max. 85 %, without condensation (Δ T 2° C/h); storage temperature: +10 to +50° C.

1) In smallest measuring range
2) Optional (excepting nanoscan): measuring column with 800 mm travel and travel speed max. 50 mm/sec.

PC evaluation unit for roughness measurement (T8000 R / T8000 RC / T8000 SC / nanoscan)

Measuring ranges/resolution	±8 µm/1 nm; ±80 µm/10 nm; ±800 µm/100 nm; ±8000 µm/1000 nm
Metric system	µm/inch selectable
Filter: Cut-offs	0.025; 0.08; 0.25; 0.8; 2.5; 8 (mm), selectable in -2 to +1 Cut-off steps; variable from 0.001 – 80 in 0.001 steps
DIN 4768	RC, digitally calculated [mm]; Cut-offs 0.025; 0.08; 0.25; 0.8; 2.5; 8
ISO 11562, Part 1	Gauss (M1) digital filter [mm]; Cut-offs 0.025; 0.08; 0.25; 0.8; 2.5; 8
ISO 13565-1	2-fold Gauss (M2) Rk parameters; Cut-offs 0.025; 0.08; 0.25; 0.8; 2.5; 8
ISO/TS 16610-31	robust Gauss filter; Cut-offs 0.025; 0.08; 0.25; 0.8; 2.5; 8
ISO 3274/11562	short-wave Cut-offs λ _s , selectable in λ _c / λ _s 30; 100; 300 steps
Traverse speed vt	lt – 0.05; 0.15; 0.5 mm/s; variable from 0.01 – 2 mm/s in 0.01 steps
Traverse length lt	0.48; 1.5; 4.8; 15; 48 mm or variable from 0.1 – 120/200 mm (depending on traverse unit)
Evaluation length ln	0.4; 1.25; 4; 12.5; 40 mm or variable Cut-offs
Cut-off (mm)	0.08; 0.25; 0.8; 2.5; 8
Roughness parameters ISO 4287	Ra; Rz; Rmax; Rt; Rq; Rsk; lmo; lo; Rdq; da; ln; La; Lq; Rz-ISO; R3z; Rpm; Rp3z; R3zm; Rp; D; RPC; RSm; Rpm/R3z; lr; Rku; tpi; Rdc; tpi; tpia; tpip; tpic; Rt/Ra; Rz1; Rz2; Rz3; Rz4; Rz5; Rmr; Rmr%; Api
Rk parameters ISO 13565-1 to -3	Rpk*; Rpk; Rk; Rvk*; Rvk; Mr1; Mr2; A1; A2; Vo (70 %) 0,01*; Rv / Rk; Rpp; Rvq; Rmq
Profile parameters ISO 4287	Pt'; Pp; Pz; Pa; Pq; Psk; PSm; Pdq; lp; Pku; tpa; tpa; tpa; tpa; Pmr0; APa; APa%; Pmr; Pmr%; Pdc
Waviness parameters ISO 4287	Wt'; Wp; Wz; Wa; Wq; Wsk; WSm; Wdq; lw; Wku; Wdc
Waviness parameters VDA 2007	optional: WDC; WDT; WDSm
Motif parameters ISO 12085	R; Rx; AR; Nr; W; Wx; AW; Nw; Wte; Tpa; (CR, CL, CF)
Roughness parameters JIS B-0601	Rz-JIS; Rmax-JIS

Technical data

		Combined roughness and contour measurement			
T8000 C200 digital	T8000 C200 digiscan	T8000 RC120 digital	T8000 RC120 digiscan	T8000 SC120	nanoscan 855
wavecontour™ digital	wavecontour™ digiscan	roughness probe TKU 300/600 wavecontour™ digital	roughness probe TKU 300/600 wavecontour™ digiscan	roughness and contour combined, inductive	roughness and contour combined, opto-mechanical
60 mm	60 / 90 ⁶⁾ mm	R: ±300 µm or ±600 µm; C: 60 mm	R: ±300 µm or ±600 µm; C: 60 / 90 ⁶⁾ mm	6 mm	24/48 mm
50 nm	50 / 75 ⁶⁾ nm	R: 1 nm or 2 nm ¹⁾ ; C: 50 nm	R: 1 nm or 2 nm ¹⁾ ; C: 50 / 75 ⁶⁾ nm	6 nm	0.6/1.2 nm
0-20 mN selectable	electronic ±5 to ±50 mN	R: 1.6 mN; C: 0 – 20 mN selectable	R: 1,6 mN; C: electronic ±5 to ±50 mN	±1 to 20 mN, manual	±1 to 50 mN, programmable
–	electronic, RFID	–	R:– ; C: electronic, RFID	–	electronic, RFID
manual	electronic	R:– ; C: manual	R:– ; C: electronic	manual	electronic
–	optional	–	optional	–	yes
programmable	programmable	programmable	programmable	mech. adjustable	programmable
200 mm	200 mm	R: 34 mm; C: 200 mm	R: 34 mm; C: 200 mm	76 mm	90 mm
carbide 20 µm	carbide 20 µm	R: 5 µm/90°; C: carbide 20 µm	R: 5 µm/90°; C: carbide 20 µm	diamond 2 µm/60°; ruby ball ø 1 mm; carbide 20 µm	diamond 2 µm/60°; ruby ball ø 1 mm; carbide 20 µm
quick fastener	magnetic holder	R: exchangeable; C: quick fastener	R: exchangeable; C: quick fastener	magnetic holder with collision protection	magnetic holder with collision protection
200 mm	200 mm	120 mm	120 mm	120 mm	200 mm
0.01 µm	0.01 µm	0.1 µm	0.1 µm	0.1 µm	0.01 µm
0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.	0.1 – 3 mm/sec.
max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.	max. 3 mm/sec.	max. 9 mm/sec.
≤0.8 µm/200 mm	≤0.8 µm/200 mm	≤0.4 µm/120 mm	≤0.4 µm/120 mm	≤0.4 µm/120 mm	≤0.4 µm/200 mm
400 mm	400 mm	400 mm	400 mm	400 mm	550 mm
in Z-, programmable	in Z-, programmable	in Z-, programmable	in Z-, programmable	in Z-, programmable	in Z+Z-, programmable
0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 12 mm/sec.	0.1 – 50 mm/sec.
≤50 µm	≤50 µm	≤50 µm	≤50 µm	≤50 µm	≤10 µm
780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm	780 x 500 x 100 mm	850 x 600 x 140 mm
optional ⁴⁾	optional ⁴⁾	optional ⁴⁾	optional ⁴⁾	optional ⁴⁾	active level control with damping function
optional ⁵⁾	optional ⁵⁾	optional ⁵⁾	optional ⁵⁾	optional ⁵⁾	1190 x 800 x 780 mm
–	–	–	–	–	810 x 800 x 780 mm

3) Optional granite plate (L x l x H): 1000 x 500 x 140 mm (excepting nanoscan)

4) Optional passive air damping or active level control

5) Optional instrument tables excepting nanoscan (L x l x H): GTR4 2000 x 800 x 700 mm or

GTR5 2200 x 800 x 700 mm

6) 1.5 times the probe arm length

PC evaluation unit for contour measurement (C8000 / T8000 C / T8000 RC / T8000 SC / nanoscan)

Metric system	µm/inch selectable
Filter	morphological filter
Compensation	stylus tip radius; arc error; linearity
Zoom factors	vertical: 0.1 – 10,000-fold; horizontal: 0.1 – 1,000-fold; manual and automatic zoom function
Evaluation	point, straight line, radius, angle, min-max function, X distances, Z distances, radii comparison, graphical representation, form deviation (straight line, skewness, radius), tabular representation of results with tolerancing, Gothic arcs, crowning, edge geometry, beadings on seals
Profiles/evaluation	4
Traverse speed vt	0.05; 0.15; 0.5 mm/s; variable from 0.01 – 2 mm/s in 0.01 steps
Traverse length lt	variable from 0.1 – 120/200 mm (depending on traverse unit)

Steel roughness standards and glass geometry standards

	Ra	Rz	Rmax	Art. no.	Art. no. with DAkkS-DKD calibration certificate	Art. no. with PTB-calibration certificate	Comments
Roughness standard hard RNDH2	ca. 1 µm	ca. 3 µm	–	231 498	233 234	–	–
Roughness standard hard RNDH3	ca. 3 µm	ca. 9.8 µm	–	230 292	233 232	–	–
Roughness standard extra hard RNDX2	ca. 0.7 µm	ca. 2.6 µm	–	256 125	256 143	–	–
Roughness standard extra hard RNDX3	ca. 3 µm	ca. 9.8 µm	–	233 213	233 233	–	–
PTB roughness standard set with PTB calibration certificate	ca. 0.2/0.5/1.5 µm	ca. 1.5/3/8.5 µm	–	–	–	290 042	–
Setting standard EN9	–	–	–	226 252	224 937	–	Setting groove depth ca. 9 µm
Geometry standard GN ISO	ca. 0.5 µm	ca. 2.2 µm	–	226 250	–	–	Rt 2,5 µm
Geometry standard GN DIN I	ca. 0.3 µm	ca. 1.1 µm	1.15 µm	230 744	230 832	–	–
Geometry standard GN DIN II	ca. 0.75 µm	ca. 2.65 µm	2.7 µm	226 251	224 935	–	–



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