



HOMMEL-ETAMIC T1000

Mobile measurement of roughness, waviness and profiles



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 include 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!

Flexible surface measurement

We offer you the right system for every measuring task. Our product portfolio for surface measurement ranges from the compact roughness measuring instrument for mobile use, combined systems for roughness, topography and contour to the special measuring stations designed to meet your requirements.

The T1000 as a mobile roughness measuring instrument supplies accurate measurement results, quickly and easily, both in the production line and in the measuring room. Our roughness measuring instruments are continuously being developed further and therefore always meet the high demands of the latest international standards.

With practical accessories and a wide selection of standard probes and special probes we offer solutions for numerous applications.

HOMMEL-ETAMIC T1000

- Compact and mains-independent
- Fast, accurate measurements
- Simple, convenient user control
- Roughness and waviness parameters according to DIN/ISO/JIS standards
- Special parameters possible:
e.g. material ratio Rmr depending on Rz x 0.25
- Tolerance light
- RS232 interface for connection to PC and remote control
- Integrated printer
- 5 measuring programs
- Optional PC evaluation software TURBO DATAWIN



Simple and flexible measurement

Mobility

The compact T1000 with integrated printer for the immediate logging of the measurement results can be used both as a mobile and as a stationary instrument. The ergonomic design always offers optimum functionality and handling.

Clearness of display

The graphical user interface displays results and profile plots clearly. It guides you through all the necessary settings with menus and keeps you up to date with the measurement run.

Functionality

Five measuring programs ensure quick application and storage of many different measurement tasks. All the common roughness, profile and waviness parameters are calculated according to the latest standards. The measured parameters can be evaluated statistically as required.

User control

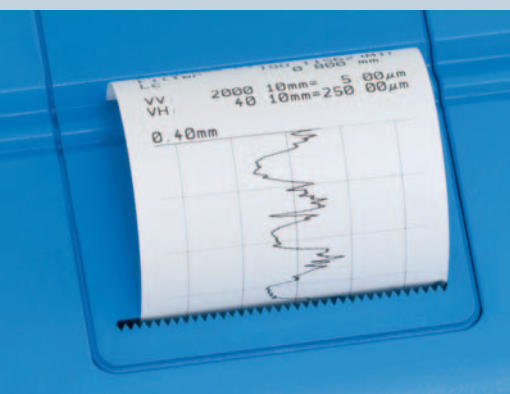
User control is closely based on workshop practice. Easily understandable function keys allow direct calling of all the important functions. Measuring conditions are set and displayed compliant with standards.

Unambiguity

A tolerance light shows green when the measurement results are within the given tolerances or red if the tolerances are exceeded.

Data management

The T1000 saves 999 measurement results and 999 profile data. An optional upgrade for an interchangeable data medium (Compact Flash) is possible. This can be used to manage larger data volumes and transfer them offline to a PC for example.



Integrated printer



Large graphical display, knurled wheel and function keys, tolerance light



Slot for Compact Flash memory card (option)



Roughness measurement with the HOMMEL-ETAMIC T1000 basic

Start and know – that's how quick and easy the mobile T1000 basic makes the accurate measurement of surfaces with the skid tracing system.

It is very easy to handle. The handy linear traverse unit LV16 (including roughness probe T1E) is positioned on the level or curved surface and the result is displayed after a measurement run of only about 10 seconds.

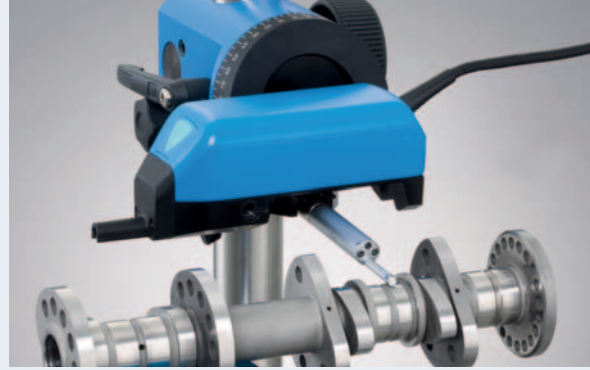
In mobile operation the results are logged directly with the integrated printer. In stationary operation the result and profile data are transferred to a PC for further evaluation.

With the T1000 basic you can measure all common roughness parameters including the core roughness parameters as well as the Motif and JIS parameters.

HOMMEL-ETAMIC T1000 basic
Art. 240 850

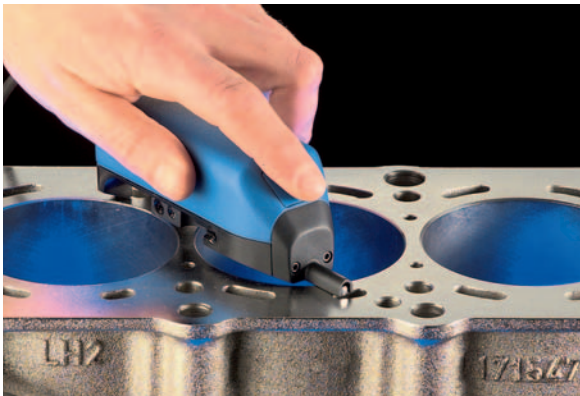


Traverse unit LV16 with probe T1E and probe protection
Position the traverse unit and start the measurement: the integrated Start button enables one-handed user control. The sophisticated mechanical design is extremely reliable and offers a constantly high measuring quality. The probe and probe protection can be changed quickly and simply for different measurement tasks. The traverse unit is suitable for all skid probes from our wide range of probes.



Transverse scanning with the LV16

A decisive advantage: for measurements in grooves, between collars and in incisions the probe can be tilted $\pm 90^\circ$ and thus enables roughness measurements on deep surfaces or between collars. The surface is scanned transversely to the traverse direction without expensive conversion of the traverse unit.



Mobile roughness measurement

Mains-independent and with the handy traverse unit for mobile operation in production.



Application for height stand SH 100

Stationary operation for simple measurement tasks and small workpieces. For integrated coarse height adjustment up to 100 mm.

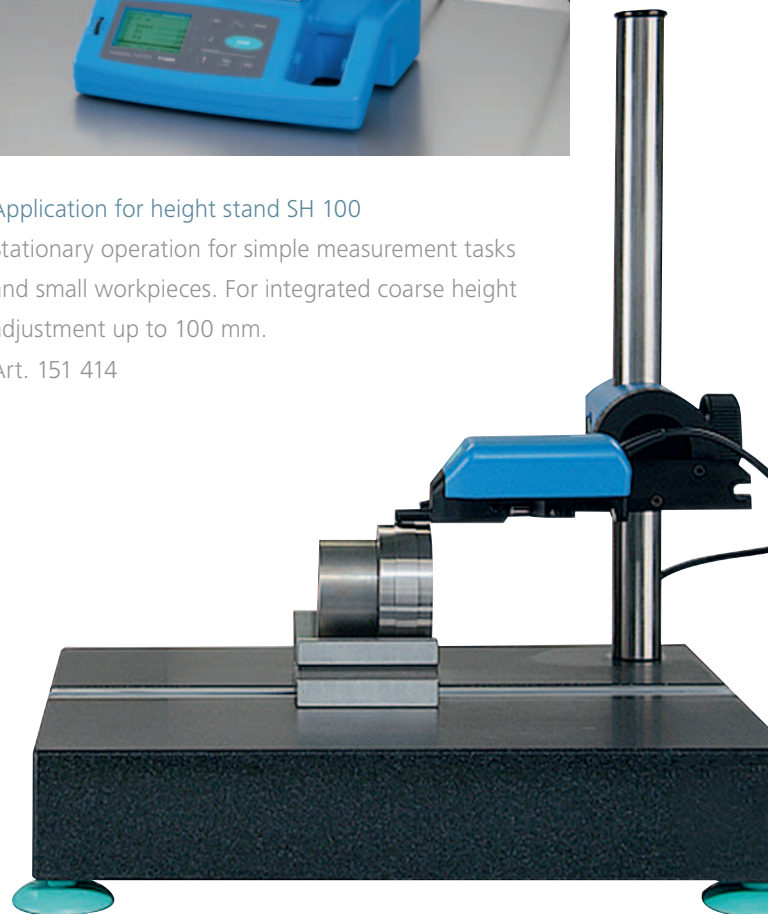
Art. 151 414

Stationary measuring station

HOMMEL-ETAMIC T1000 basic

Compact, stationary measuring station configuration for small and medium-sized workpieces. Granite plate with T-groove 400 x 280 mm; measuring stand with height adjustment range 300 mm and tilting device $\pm 45^\circ$.

Art. 999 011



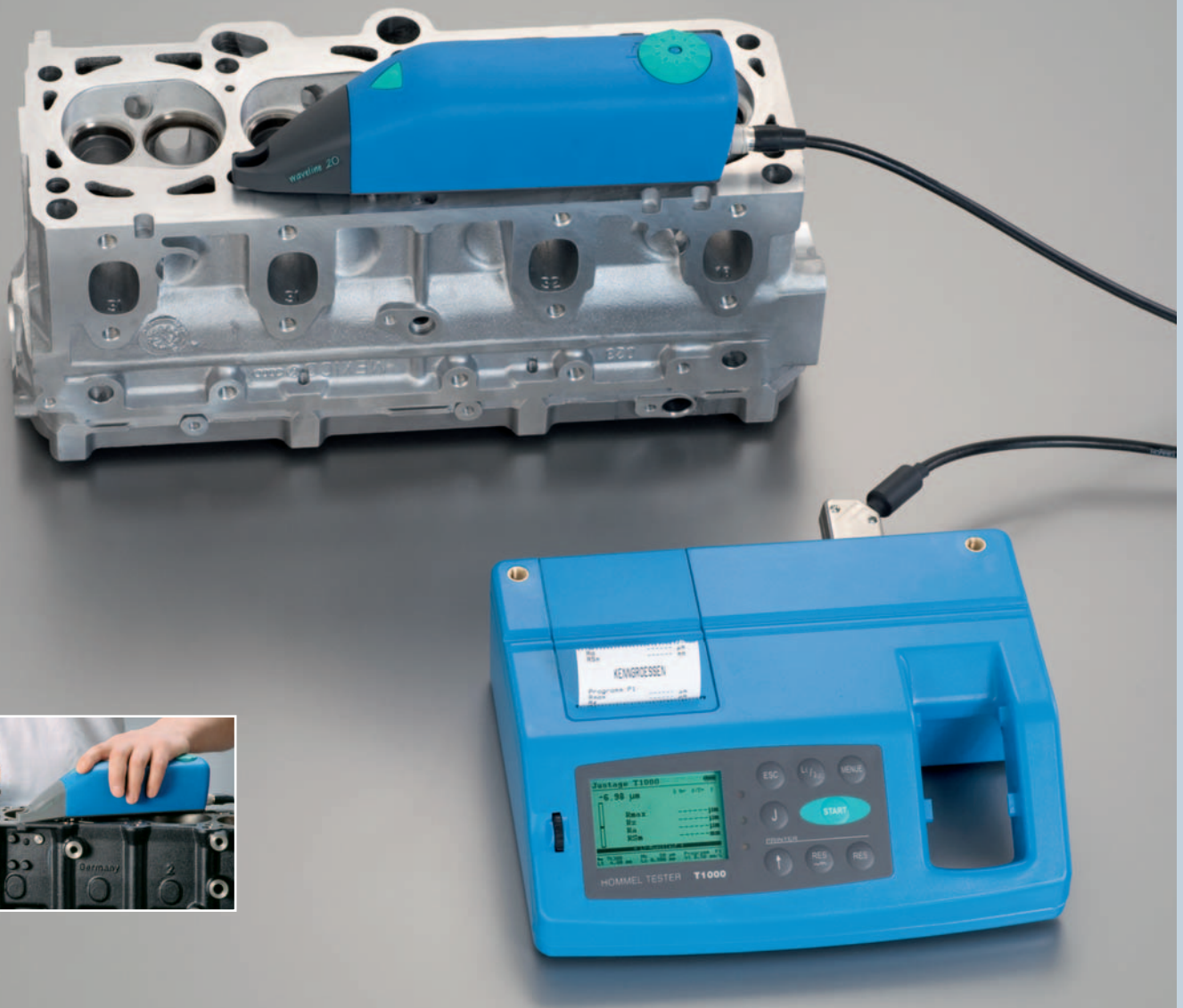
Measurement of roughness, waviness and profile parameters with the HOMMEL-ETAMIC T1000 wave

The T1000 wave bridges the gap between the mobile measuring instruments and classic stationary measuring stations: it unites high-precision roughness, waviness and profile measurement in mobile operation. Based on the advantages of the basic version for pure roughness measurements, the T1000 wave (including the TKL 300 L probe) also performs reference plane measurements

and determines the unfiltered P parameters as well as waviness parameters.

The basic version can be upgraded to the wave version at any time with little effort.

HOMMEL-ETAMIC T1000 wave
Art. 240 865



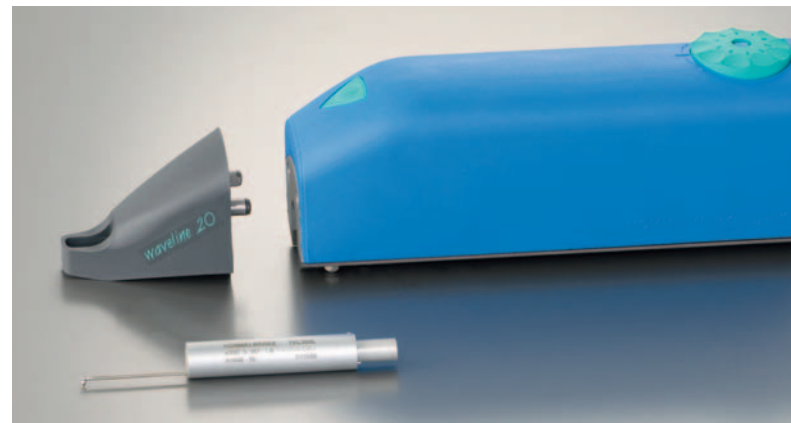
Mobile measurement with the HOMMEL-ETAMIC T1000 wave

Traverse unit waveline 20 for precision roughness and waviness measurements

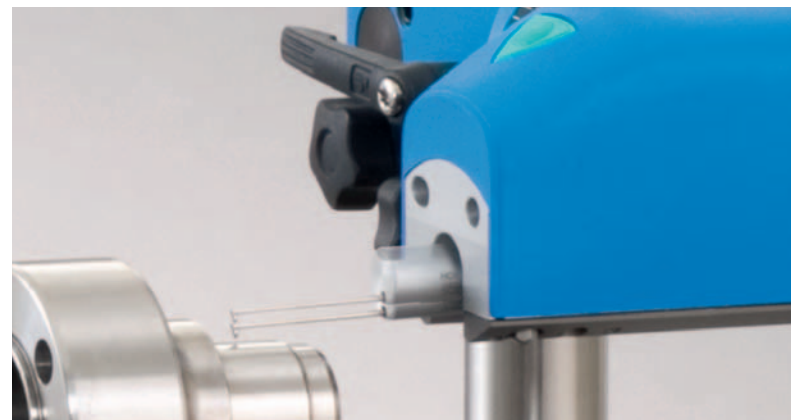
The integrated start button enables one-handed user control. A high-precision linear guide with an alignment range of $\pm 2^\circ$ is the basis for precision straightness and waviness measurements. The waveline 20 also offers a variable measurement speed, measurement in all positions (also overhead) and a motorized lowering of the probe. All reference level probes from our wide range can be used.

Motorized probe lowering

Convenience and protection in one: the motorized probe lowering positions the stylus tip automatically on the workpiece surface and sets the preselected measuring range. At the end of the measurement the stylus tip is lifted again to avoid accidental damage when changing the workpiece.



waveline 20™ with probe TKL 300 L and probe protection



Motorized lowering of the probe for automatic positioning

Stationary measuring station

The mobile T1000 wave measuring instrument can be turned into a complete, stationary measuring station with a few actions. Our extensive range of accessories offers various solutions for save positioning of the workpiece: here the optional measuring table MT2 and vee-block (description page 13).

Granite plate with T-groove 400 x 280 mm; measuring stand with height adjustment range 300 mm and tilting device $\pm 45^\circ$.

Art. 999 011



Professional evaluation software with simple menu guidance

Comprehensive stationary evaluation and archiving of the measured values with TURBO DATAWIN expert

The optional TURBO DATAWIN expert evaluation software for computer-controlled programming and parameter evaluation allows simple user control even without prior knowledge of Windows thanks to its clear menu guidance.

TURBO DATAWIN expert enables the remote control of all the possible settings on the T1000. The parameters are transferred to the computer automatically. Profile diagrams and measured values can then be saved.

TURBO DATAWIN expert is convincing with a large number of functions

- Simple user control by means of function keys or mouse
- Transfer of the graphics and parameters to other applications (Excel, Word etc.)
- Evaluation of all common roughness parameters
- Interactive profile analysis
- Management of any number of measuring programs
- Data export in ASCII format according to Excel, data transfer to qs-STAT®
- Free layout of screen and printout forms
- Statistical evaluations

TURBO DATAWIN expert

Including data cable for HOMMEL-ETAMIC T1000

Art. 1001 6998



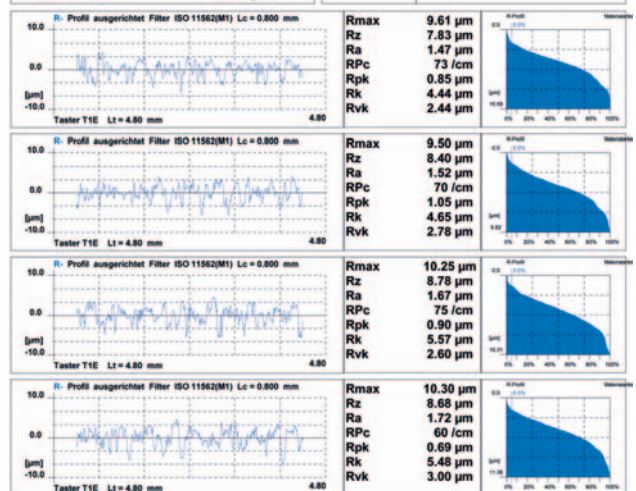
Messprotokoll

Firma: HOMMEL-ETAMIC GmbH
Prüfer: Bernd Schroeter
Abteilung: Feinmessraum
Werkstück: Musterblech
Zeichnung:

HOMMELWERKE 19.12.07
Turbo Datawin-NT V1.48
Meßbedingungen
Tasterart: T1E
Meßbereich: 80 µm
Taststrecke: 4.80 mm
Lc (Cut Off): 0.800 mm
Zählschwelle C1: 0.500 µm
Zählschwelle C2: -0.500 µm



Daten unter: C:\A_DATEN\BLECH1.PIP

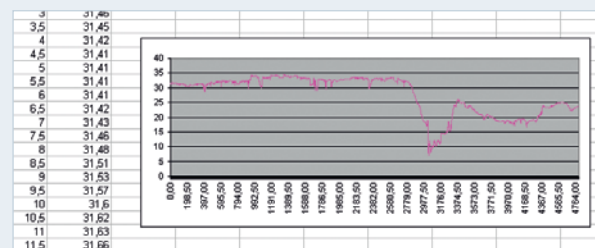
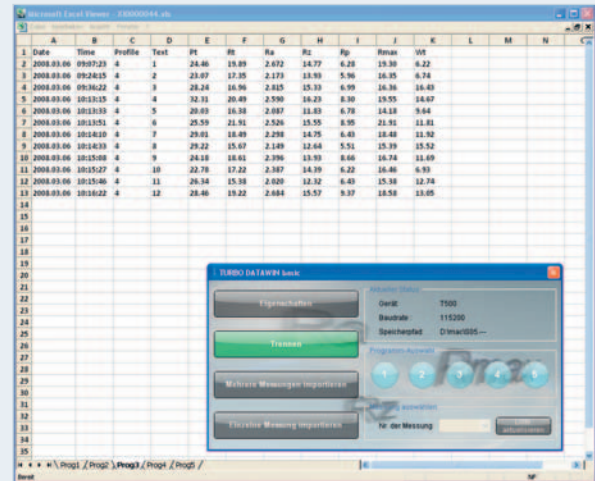


TURBO DATAWIN basic for Excel data import

With the optional TURBO DATAWIN basic software the result data (parameters, profile data and measuring conditions) can be transferred very easily from the T1000 to an Excel worksheet on a PC (as of Microsoft Excel 2000). This allows you an individual further processing and documentation of the measurement results.

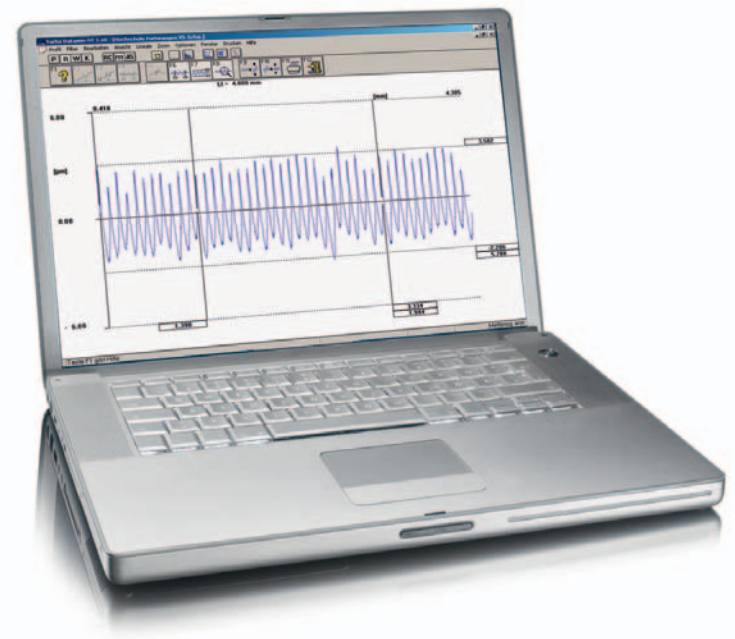
TURBO DATAWIN basic

Including data cable for HOMMEL-ETAMIC T1000
Art. 1003 6645



Optional interchangeable data medium

Compact Flash data medium and slot for saving the measuring programs, profiles and measurement results. Transfer to the PC for further processing or archiving.
Art. 999 160

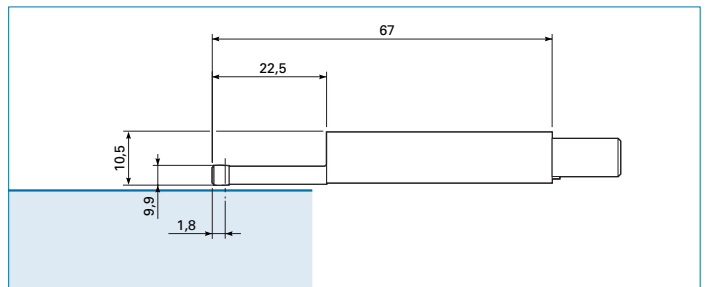


Skid probes for picking up all the roughness parameters

Probe T1E/T3E/T1ET

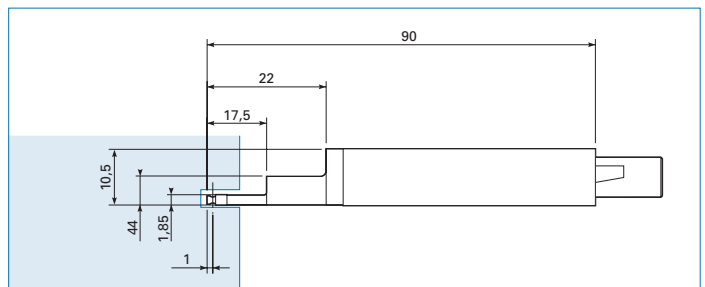
For measurement on flat surfaces, on shafts and in bores. The T1E is included with the T1000 basic.
Stylus tip $5\text{ }\mu\text{m}/90^\circ$.

T1E, measuring range $\pm 100\text{ }\mu\text{m}$	Art. 240 000
T1E, oil-resistant version	Art. 240 008
T3E, measuring range $\pm 300\text{ }\mu\text{m}$	Art. 243 961
T1ET, measuring range $\pm 100\text{ }\mu\text{m}$	Art. 240 009



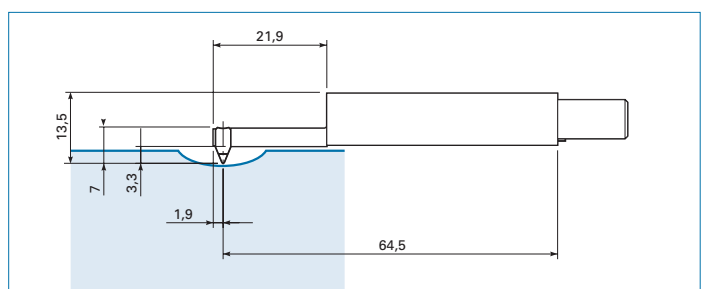
Probe TKO 50

With offset skid for bores from 2 mm diameter.
Stylus tip $5\text{ }\mu\text{m}/90^\circ$, measuring range $-50\text{ }\mu\text{m}$.
Art. 224 114



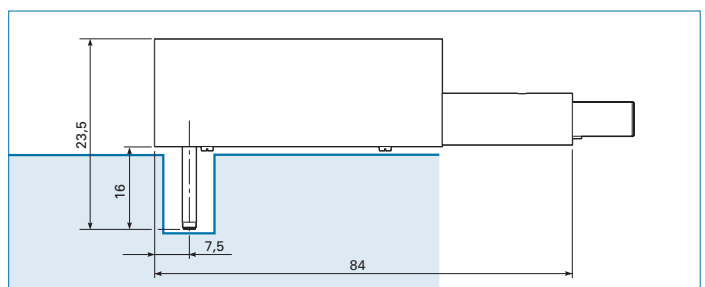
Probe T1K

For measurement on concave and convex surfaces.
Stylus tip $5\text{ }\mu\text{m}/90^\circ$, measuring range $\pm 100\text{ }\mu\text{m}$.
Art. 258 708



Probe TKT 100/17

For measurement on deep lying surfaces.
Stylus tip $5\text{ }\mu\text{m}/90^\circ$, measuring range $\pm 100\text{ }\mu\text{m}$.
Art. M0 435 028

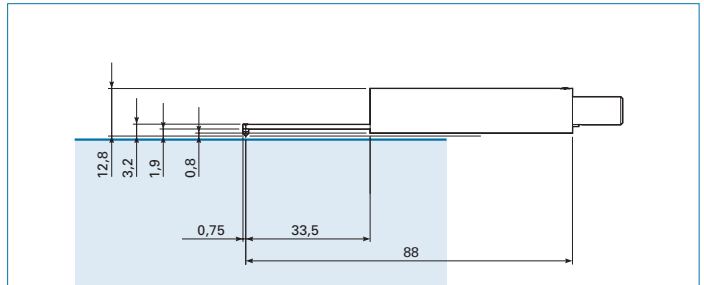


All probes are also available with a $2\text{ }\mu\text{m}/90^\circ$ stylus tip.

Reference level probes for roughness, waviness and profile

Probe TKL 300 L

For measurement of P, W and R profiles on surfaces, on shafts and in bores. Included with the T1000 wave.
Stylus tip $5\text{ }\mu\text{m}/90^\circ$, measuring range $300\text{ }\mu\text{m}$.
Art. 243 588



TKU probe sets

The TKU probe sets are very versatile because they can replace up to three standard probes and therefore offer a low-cost alternative. The probe sets can be extended with additional probe arms.

The probe sets contain

- basic probe
- probe arm TS1 for bores
- probe arm TS1T for grooves
- probe arm TS1D for measurements on collars and directly on end faces
- probe arm protection

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

With $5\text{ }\mu\text{m}$ stylus tips Art. 256 500
With $2\text{ }\mu\text{m}$ stylus tips Art. 256 658
Basic probe TKU 100 without probe arms Art. 256 502

Probe set TKU 300, measuring range $\pm 300\text{ }\mu\text{m}$

With $5\text{ }\mu\text{m}$ stylus tips Art. 258 551
With $2\text{ }\mu\text{m}$ stylus tips Art. 1000 3624
Basic probe TKU 300 without probe arms Art. 233 381



TKU probe sets

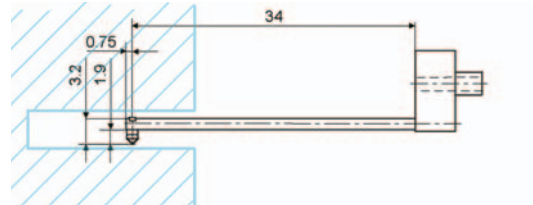
The basic probe of the TKU 100/300 probe set is delivered with the following probe arms.
The probe arms can also be ordered singly.

Probe arm TS1

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

With 5 $\mu\text{m}/90^\circ$ stylus tip Art. 230 475

With 2 $\mu\text{m}/90^\circ$ stylus tip Art. 240 805

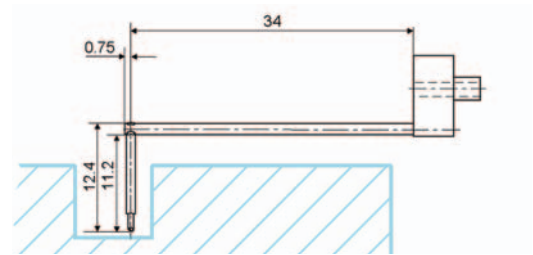


Probe arm TS1T

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

With 5 $\mu\text{m}/90^\circ$ stylus tip Art. 231 289

With 2 $\mu\text{m}/90^\circ$ stylus tip Art. 256 624

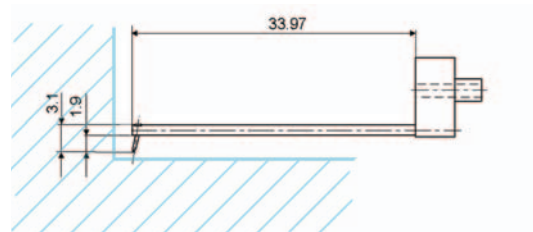


Probe rod TS1D

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

With 5 $\mu\text{m}/60^\circ$ stylus tip Art. 231 291

With 2 $\mu\text{m}/60^\circ$ stylus tip Art. 240 160

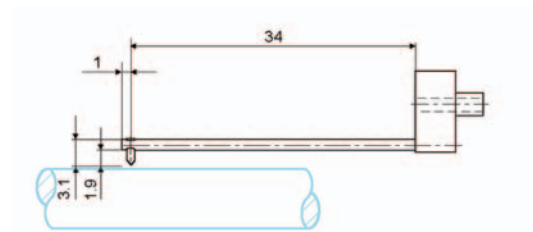


The TKU 100/300 probe sets can be extended with special probe arms.
Here an excerpt from our wide range:

Probe arm TS1 SC5/60D

For small shafts and blades, max. horizontal scanning depth 33 mm.

With 5 $\mu\text{m}/60^\circ$ stylus tip Art. 231 444

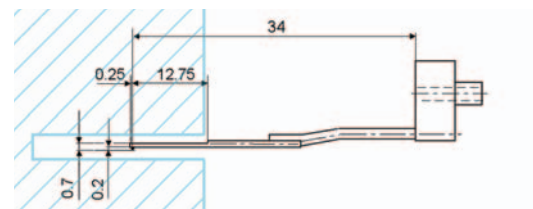


Probe arm TS1K

For bores from 0.8 mm, max. horizontal scanning depth 12 mm.

With 5 $\mu\text{m}/90^\circ$ stylus tip Art. 233 320

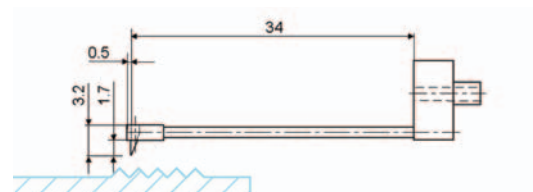
With 2 $\mu\text{m}/60^\circ$ stylus tip Art. 233 336



Probe arm TS1P

With carbide tip for contour measurement up to $\pm 300 \mu\text{m}$ profile height, max. horizontal scanning depth 33 mm.

Art. 232 691



Extensive accessories

Measuring table MT2

For holding and positioning workpieces.

Two co-ordinates ± 12.5 mm adjustable

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

Contact surface: 100 x 100 mm

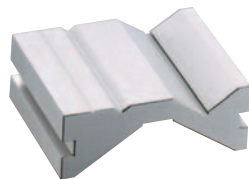
Axis XYO Art. M0 435 278



Vee-block PB

Four different sized, finely ground vees guarantee a holding range for round workpieces and shafts with a diameter between 1 and 150 mm.

Art. M0 435 084



Parallel vices

Two small vee-blocks in the clamping jaws enable clamping of right-angled and cylindrical workpieces.

Jaw width: 35 or 50 mm

Clamping range: 40 or 80 mm

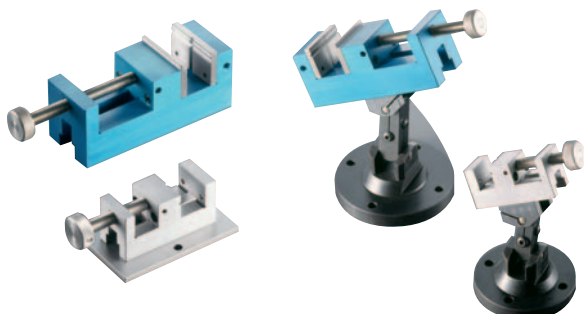
M32 Art. 050 968

M50 Art. 050 965

With continuous tilting and rotating possibility:

M32 with flexible foot Art. 050 966

M50 with flexible foot Art. 050 963



Height stand HS 300

For reception of the traverse unit LV16.

Variable range up to 300 mm.

Art. 191 960

Tilt module for LV16

For height stand HS 300 and stationary measuring station.

Allows the traverse unit to be tilted up for easy loading and unloading of the workpiece.

Art. 1003 3157



Probe extension and limiting

Probe extension AZZ

55 mm

Art. M0 435 041

100 mm

Art. M0 435 042

Probe limiting TB16

for skid probe

Art. 240 893

Roughness standards RNDX

Normal	Ra	Rz	Art.
RNDX I	approx. 0.5 μ	approx. 1.6 μ	256 318
RNDX II	approx. 1 μ	approx. 3.3 μ	256 125
RNDX III	approx. 3.2 μ	approx. 10 μ	233 213
DKD calibration certificate			1000 7481
Inspection report			1000 7482



Roughness measurement on sheets and rollers

Sheet measurement

Probe TKPK 100 Art. 235 730

Special two-skid probe for the surface measurement on cold-rolled sheets according to EN 10049 (formerly SEP 1940), skid radius 50 mm, stylus tip radius 5 µm. Parameters: Ra and R_{Pc}. The skid bearing ensures simple, mobile measurement in connection with the T1000 basic.



Accessories for mobile measuring applications

Probe protection for TKPK probe Art. 240 890

Magnetic holder MH16 for magnetic fixing of the traverse unit on sheets and on coils.

Art. 240 892

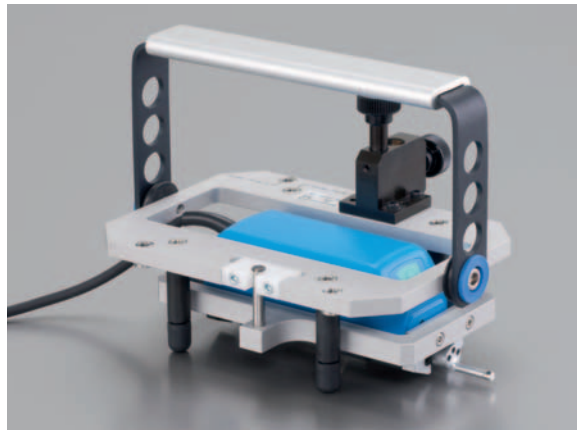
Roller measurement

Roller adapter WA16 Art. 240 872

Adapter for the traverse unit LV16 for simple and reliable measurement directly on roller surfaces.

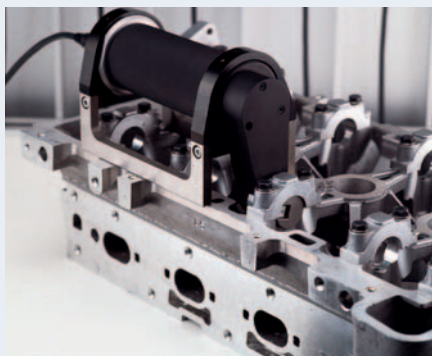
Longitudinal and transverse measurement.

Adjustable diameter range.



Special applications

We offer devices for reliable, high-precision roughness measurement for workpiece-specific measurement tasks in production.



Measuring mandrel for roughness measurement in camshaft bearings



Measuring mandrel for roughness measurement in cylinder bores with pneumatic clamping device

Technical Data

	HOMMEL-ETAMIC T1000 basic Art. 240 850	HOMMEL-ETAMIC T1000 wave Art. 240 865
Measurement	type skid measurement	measurement with independent datum
Total deviation according to DIN 4772	class 1	
Measuring ranges/resolution	$\pm 80 \mu\text{m}/0.01 \mu\text{m} \pm 320 \mu\text{m}/0.04 \mu\text{m}$	
Filter: cut-off lengths l_c (mm)	0.08; 0.25; 0.8; 2.5; 8.0	
Bandpass filter L_c/L_s according to EN ISO 3274	100; 300	
Traverse length l_t according to EN ISO 4288/ EN ISO 12085 (Motif)	l_t (mm) 0.48; 1.5; 4.8; 15; max. 16 variable 0.48-16 mm	l_t (mm) 0.48; 1.5; 4.8; 15; max. 20 variable 0.05-20 mm
Evaluation length l_n according to EN ISO 4287	l_n 1.25; 4.0; 12.5	
Sampling length $l_r/l_w/l_p$ according to EN ISO 4287	1-5 selectable	
Scan rate v_t	v_t (mm/s) 0.15; 0.5; 1.0	v_t (mm/s) 0.1; 0.15; 0.5; 1.0; variable 0.05-3.0
Digital filter	phase-correct profile filter M1 according to EN ISO 11562 Double filter according to EN ISO 13565-1	
Tolerance limit	settable for all characteristic values	
Parameters according to EN ISO 4287	Ra, Rz, Rt, Rmax, Rp, Rpm, Rv, R _{PC} , RSm, Rq, RSk, Rku, Rdq, Rdc, Rmr(c)[%], Rmr(c)[μm], R3z, Rz-ISO Pt, Pmax, Pz, Pa, Pp, Ppm, Pv, P _{PC} , PSm, Pq, PSk, Pku, Pdq, Pdc, Pmr(c)[%], Pmr(c)[μm], Wt, Wmax, Wz, Wa, Wp, Wpm, Wv, W _{PC} , WSm, Wq, WSk, Wku, Wdq	
Parameters according to JIS B601	Rz-JIS	
Parameters according to EN ISO 13565	Rpk*, Rpk, Rk, Rvk, Rvk*, Mr1, Mr2	
Parameters according to EN 10049 (SEP 1940)	R _{PC} , Ra	
Parameters according to EN ISO 12085 (Motif)	R, Rx, Ar, Nr, CR, CF, CL, W, Wx, Aw, Nw	
Special parameters	oil retention volume V0 Sealing parameters: Rmr(c); Pmr(c) with c = factor x parameter (factor: 0.01 - 1.00. parameter: Rt, Rmax, Rz, Ra, Pt, Pmax, Pz; Pa)	
Statistic	999 measurements; Range, Xbar, Max., Min., standard deviation	
Languages	German, English, French, Spanish, Italian, Czech, Polish, Swedish	
Unit	$\mu\text{m}/\mu\text{inch}$ switchable	
Display	backlit graphic display 240 x 160 dots	
Data memory (system)	999 profiles/999 measurements in total	
Measuring programs	5	
Compact Flash drive optional	(999 profiles/999 measurements per measuring program)	
Compact Flash memory card	optional	
Interface	standard-V 24 (RS-232), serial	
Power supply	Ni-metal hydride battery; Power supply unit 24V/2.5A; automatic changeover 90-240V	
Measuring capacity (battery operation)	approx. 500 measurements	
Operating temperature	0-50°C, max. 85% rel. humidity	
Dimensions (L x W x H)	253 x 193 x 80 mm	
Weight	1600 g	1640 g
Integrated printer	alphanumeric display of all measurement results and measuring conditions with profile printout filtered (R), filtered (W) and unfiltered (P), bearing ratio curve filtered (R), filtered (W) and unfiltered (P)	
Print contents	measuring conditions, date, time, result parameters, R profile, Rk profile, P profile, W profile, material ratio, cut-off lines, statistics, tolerances	
Magnification vertical	automatic up to max. 50,000 times	
Magnification horizontal	10/20/40/50/100/200/400 times assigned to the scan distance	
Paper	thermal paper 40-50 g/m ² 57.5 mm wide, length 10 m	
Printing speed	30 mm/s	
Resolution	8 points/mm	

TRAVERSE UNITS	LV16 with 2 m cable, Art. 240 852 with 5 m cable, Art. 240 995	waveline™ 20 Art. 244 280
Insertable probe	skid probe reference	level probe
Scan distances	16 mm	20 mm
Scanning direction	axial, transverse scanning	axial
Workspace	over 360°	over 360°
Operating elements	integrated Start button	integrated Start button, angularity reference plane



Our global presence.

Germany	Spain	Mexico
France	Czech Republic	China
Switzerland	United States	South Korea
		India

Group companies, affiliates and
representation worldwide

www.hommel-etamic.com