

PLN 4009

Certificate of calibration

1 ring gauge of steel, ø 40 mm

Identification: SIP 42898

Applicant:SIP, Société Genevoise d'Instruments de Physique,
1217 Meyrin**Extent of calibration**

Diameter and roundness deviation at three heights of the cylinder.

Measurement procedure and conditions

The diameter of the ring gauge was calibrated on a length measurement machine using a laser interferometer and mechanical probing, according to the internal calibration procedure 11370K02.

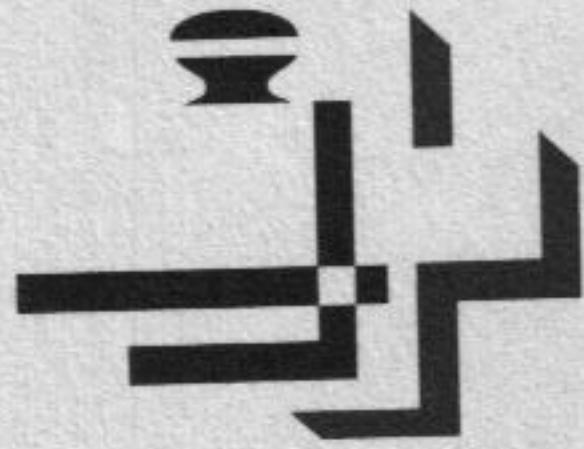
Measurement probe: ruby sphere, 4 mm diameter
Measurement force: extrapolated to zero
Measurement direction: between the reference marks,
perpendicular to the cylinder axis

The roundness measurement was carried out on a form measurement machine.

Measurement probe: ruby sphere, 4 mm diameter
Measurement force: <50 mN
Filter: digital filter, 1-50 upr, 2RC, phase corrected

The roundness deviation was measured according to ISO 6318. It is defined as the peak to valley deviation from the least squares (LS) circle fitted to the measured profile.

The ambient temperature during the measurements was $(20 \pm 0.2)^\circ\text{C}$. The temperature of the ring gauge was 19.96°C . The diameter results were corrected to the reference temperature of 20°C assuming a linear coefficient of thermal expansion of $11.6 \cdot 10^{-6} \text{ K}^{-1}$.



OFMET
EAM
UFMET

Eidgenössisches Amt für Messwesen
Office fédéral de métrologie
Ufficio federale di metrologia
Swiss Federal Office of Metrology

No 113-2973

Certificate of calibration (ctd.)

Measurement results

Identification	Measurement position from mid height	Measured diameter	Roundness
SIP 42898	+7.0 mm	39.999'41 mm	0.18 µm
	0	39.999'40 mm	0.17 µm
	-7.0 mm	39.999'41 mm	0.24 µm

Measurement uncertainty: diameter $U = 0.15 \mu\text{m}$
roundness $U = 0.10 \mu\text{m}$

Measurement uncertainty

The reported uncertainty of measurement is stated as the combined standard uncertainty multiplied by a coverage factor $k = 2$. The measured value (y) and the associated expanded uncertainty (U) represent the interval $(y \pm U)$ which contains the value of the measured quantity with a probability of approximately 95%. The uncertainty was estimated following the guidelines of the ISO.

The measurement uncertainty contains contributions originating from the measurement standard, from the calibration method, from the environmental conditions and from the object being calibrated.

Traceability

The reported measurement values are traceable to national standards and thus to the SI-units.

Date of calibration / Marking

The calibration was carried on 12. September and 5. October 2000. The ring gauge was provided with an OFMET calibration label.

For the measurements:

Swiss Federal Office of Metrology
Division of Mechanics, Radiation and
Legal Metrology

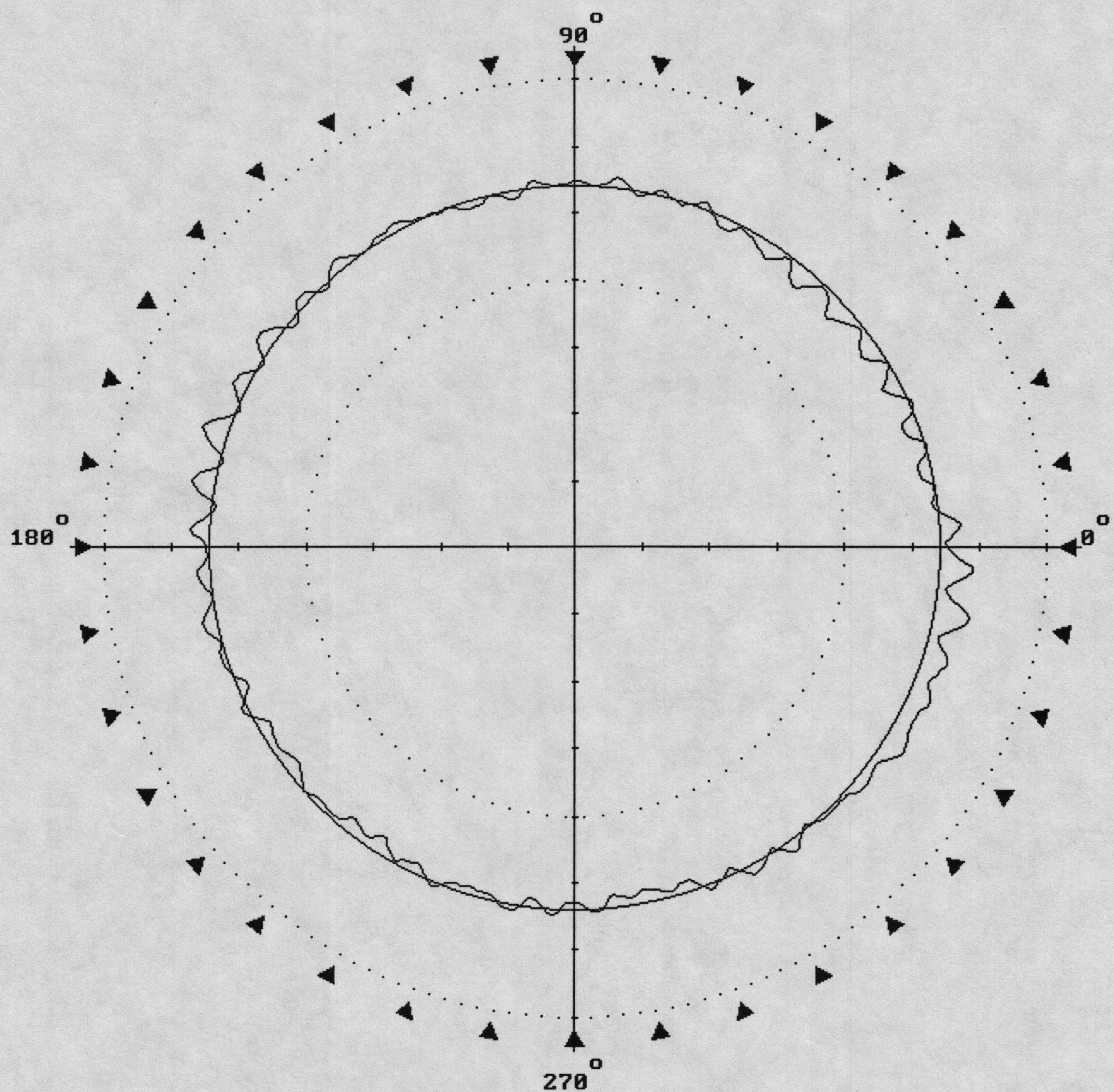


- 4 form measurement protocols

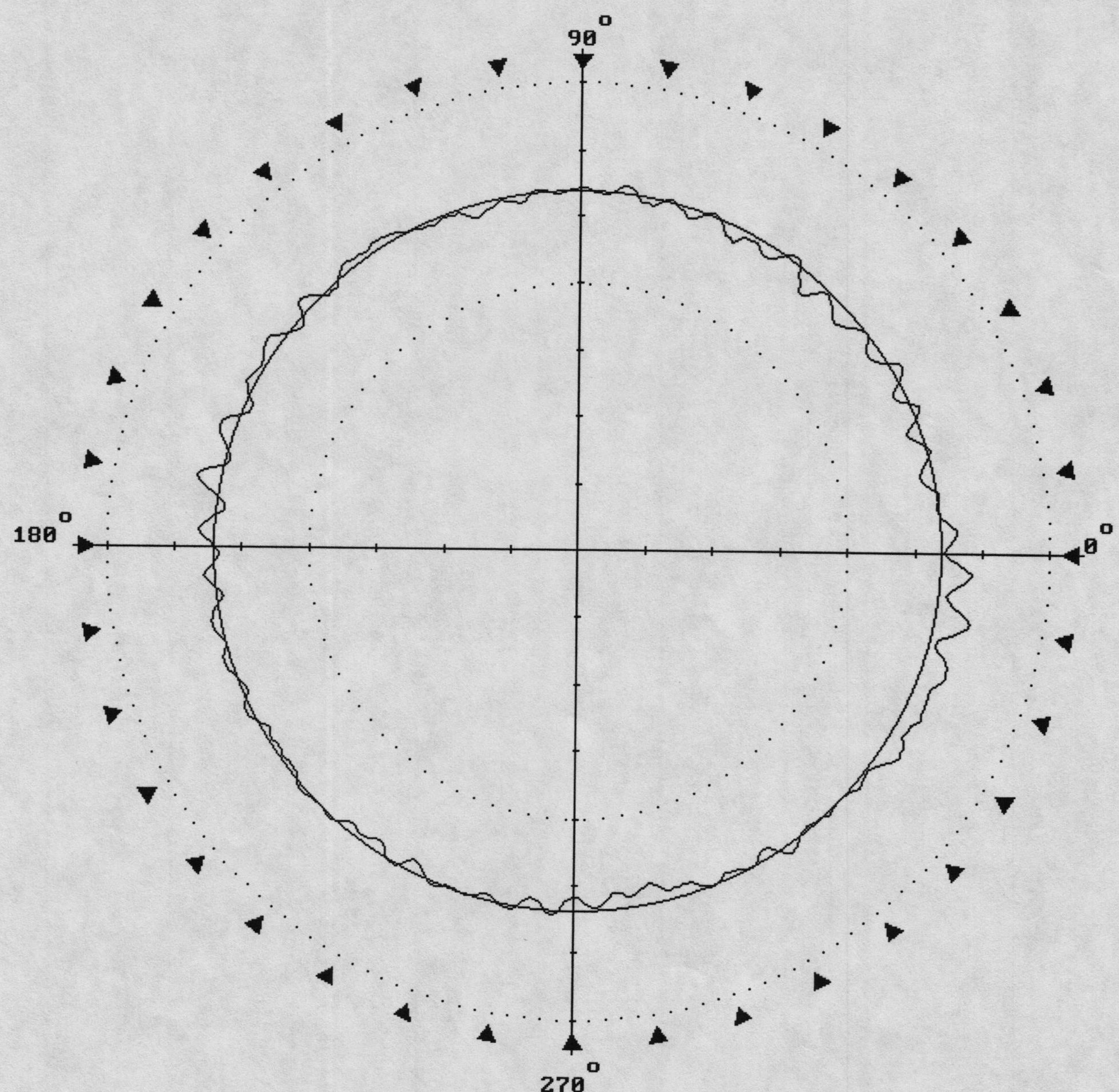
Dr. B. Vaucher, Deputy Director

Wabern, 10. October 2000/Sp

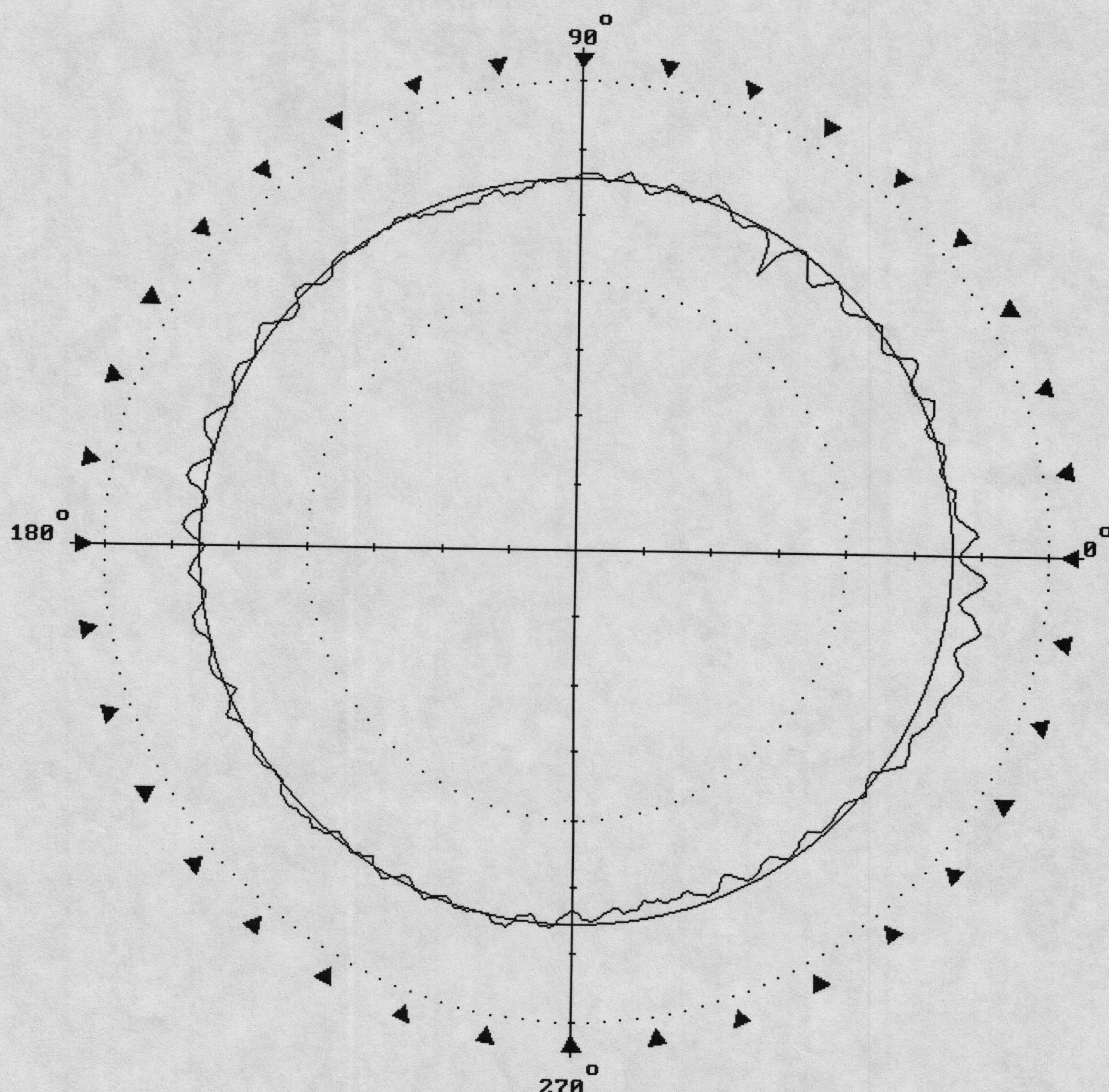
<u>LS ROUNDNESS RESULTS</u>		Scale	0.20 um	Meas mode	Internal
Featurename	EAM	Zht	22.7 mm	Meas. date	
Measurement no.	02	Radius	15.0571 mm	Meas. time	15:08:31
O	0.18 um	Datum	SPINDLE		
E	0.18 um	Filter type	ZCR		
L	215.3 deg	Filter	1-50 upr		
A	0.45 um	Profile	100.0 %		

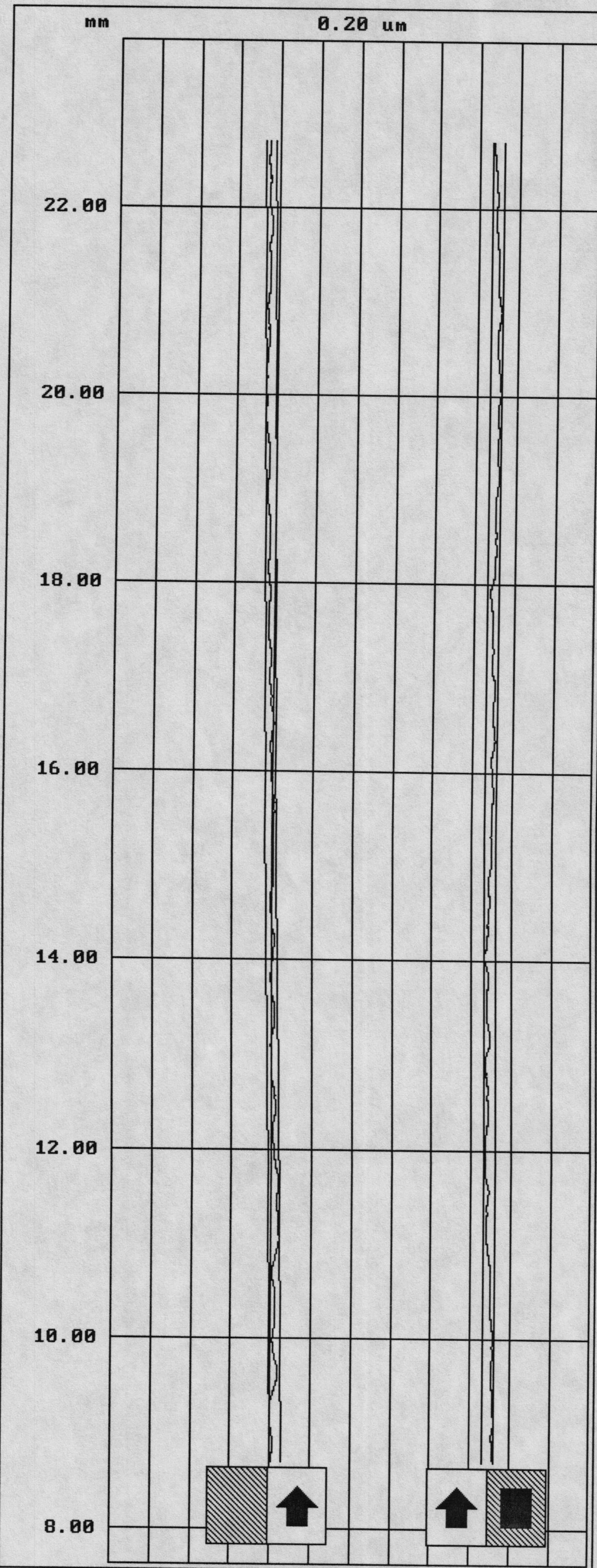


LS ROUNDNESS RESULTS		Scale	0.20 um	Meas mode	Internal
Featurename	EAM	Zht	15.7 mm	Meas. date	
Measurement no.	00	Radius	15.0571 mm	Meas. time	15:06:27
O	0.17 um	Datum	SPINDLE		
E	0.17 um	Filter type	2CR		
L	214.8 deg	Filter	1-50 upr		
A	0.42 um	Profile	100.0 %		



<u>LS ROUNDNESS RESULTS</u>		Scale	0.20 um	Meas mode	Internal
Featurename	EAM	Zht	8.7 mm	Meas. date	
Measurement no.	01	Radius	15.0572 mm	Meas. time	15:07:29
O	0.24 um	Datum	SPINDLE		
E	0.18 um	Filter type	2CR		
L	213.7 deg	Filter	1-50 upr		
A	0.51 um	Profile	100.0 %		





RTH TR300 V04.00 S0

Eidg. Amt fuer Messwesen

MZ VERT PARALLELISM

Featurename	EAM
Measurement no.	04
Par.	0.10 um
P-U	0.05 um
Par Angle	-1.2 sec
Trav. Lth.	14.0 mm
Trav. Start	8.7 mm
Trav. End	22.7 mm
Spindle ang.	359.9 deg
Datum	EAM 03
Filter	0.80 mm
Profile	100.0 %
Meas. Mode	Vert. Up
Meas. date	
Meas. time	15:10:29

SIP

Ring gauge , SIP ; D = 40mm

1217 Meyrin 1 / Geneve

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