Mahr

## Inductive Probe

# **Millimar** 1340

## Operating Instructions

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CE UKCA

**Dear customer,**

Congratulations on choosing a product by Mahr GmbH. We kindly request that you follow the instructions below to ensure the long-term precision of your measuring instrument.

We operate a policy of continuous improvement and are constantly developing our products. Therefore, it is possible that there may be slight differences between the text and illustrations in this document and the measuring instrument in your possession, especially with regard to type designations. We reserve the right to make changes to the design and scope of supply, the right to undertake further technical developments, and all rights relating to translation of this documentation.

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The following symbols are used in these operating instructions:

**General information**

**! Important note**

Failure to follow instructions marked with this symbol can cause inaccurate results and lead to equipment damage.

## Introduction

### Permitted uses

The inductive probe Millimar C 1340 is to be used to determine length measurements and can be employed in production, quality control and in the workshop.
Permitted use is subject to compliance with all published information relating to this product. Any other use is not in accordance with the permitted use. The manufacturer accepts no liability for damages resulting from improper use.
All statutory and other regulations and guidelines applicable to the area of use must be observed.

To bring about the greatest benefits from this measuring instrument, you must read the operating instructions before placing it into operation.

### Disposal information

Electronic equipment which was purchased from us after March 23, 2006 can be returned to us. We will dispose of this equipment in an environmentally-friendly way in accordance with the applicable EU Directives (WEEE (Waste Electrical and Electronic Equipment, RoHS, and the German National - Electrical and Electronic Equipment Act, ElektroG).



**EU/UK Declaration of Conformity**

This measuring instrument complies with the applicable EU/UK directives.

A copy of the current Declaration of Conformity is available to download at www.mahr.com/products on the page for the relevant product and can be requested from the following address: Mahr GmbH, Carl-Mahr-Straße 1, D-37073 Göttingen

**Confirmation of traceability**

We declare, with sole responsibility, that this product conforms with standards and technical data as specified in our sales documents (operating instructions, leaflet, catalog).
We certify that the testing equipment used to check this product, and guaranteed by our Quality Assurance, is traceable to national standards.
Thank you for placing your trust in us by purchasing this product.

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## 1 Characteristics

The inductive axial probe 1340 stands out for its especially high measuring accuracy. Throughout the entire measuring range of 4 mm, the linearity error is smaller than 0.01%, i.e. smaller than 0.4 µm. In conjunction with the length measuring instrument Millitron 1240 M, high-precision measurements are feasible such that even tiny tolerances can be checked. Via an adapter, the 1340 probe can also be connected to any other length measuring instrument of the Feinprüf Perthen programme.
The measuring bolt features no mechanical connection to the clamping shaft, which ensures the probes' insuscep-tibility towards clamping forces. An even higher degree of protection is attained by the possibility to confine the free lift.
The polyurethane connection cable resists oil, grease, and water. Hence, the probe can be employed on the shop floor without any problems. The 1340 probe possesses a pneumatic probe lifting unit which operates with partial vacuum.

## 2 Scope of delivery

The scope of delivery includes:

- 1340 probe
- Stylus with spherical carbide tip (Ø 3 mm)
- Storage casing
- Connection cable (1.5 m) consisting of polyurethane
- Allen wrench (1.2 mm) for adjusting the free lift
- Open jawed spanner (SW 3.5) for interchanging the stylus
- Operating instructions

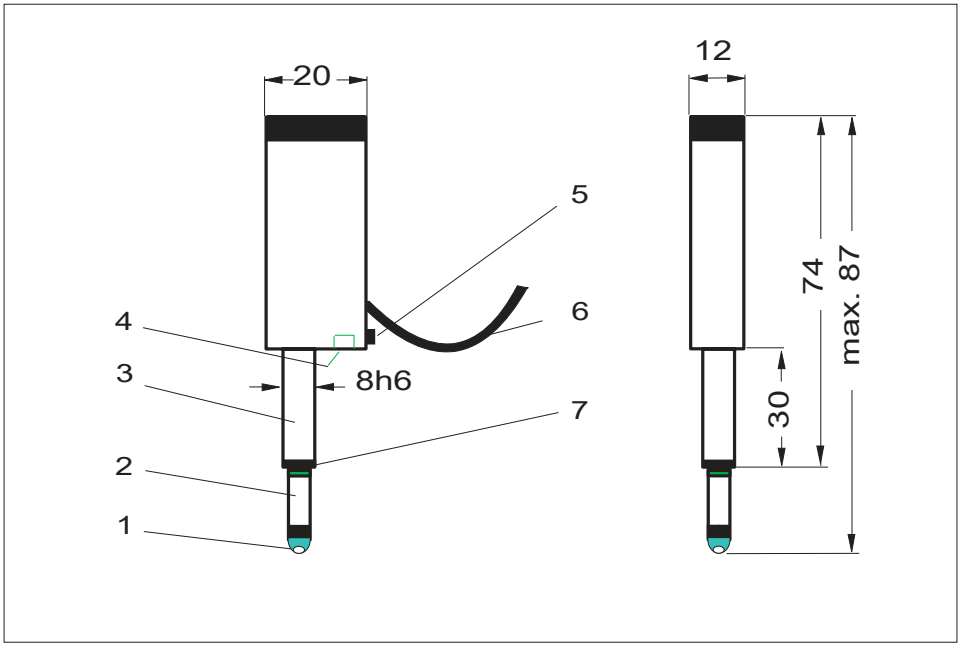



*Fig. 1*
*1340 probe*

*1 Stylus with spherical carbide tip*
*2 Measuring bolt*
*3 Clamping shaft (8h6)*
*4 Free lift adjustment screw*
*5 Suction air connection*
*6 Connection cable*
*7 Sealing membrane*

## 3 Description

### Clamping shaft

The Ø 8h6 clamping shaft of the probe mates with the conventional Ø 8h7 holder for precision probes and dial gauges. During clamping, the shaft should not be deformed excessively. We therefore recommend to apply the clamping force not to a single point, but to distribute it evenly over the clamping shaft. An even distribution of the applied force is obtained by customary fixing devices*. The probe holder and the fixing device have to be sufficiently rigid in order to avoid measuring errors arising from the deformation of the measurement set-up.

### Measuring bolt

The measuring bolt is equipped with two bearings: its bottom is supported by an allowance-free ball bushing and its top by a low-allowance sliding bearing. The ball bushing has no mechanical connection to the clamping shaft such that the measuring bolt is not damaged when applying excessive clamping forces to the shaft.

### Free lift (restriction of the probe's stroke)

The immersion of the stylus tip into a deep groove of the rotating workpiece may result in probe damage. For reasons of safety, the admissible stroke (free lift) can thus be limited to 0.5 mm.

### Free lift adjustment screw

The free lift of the probe is adjusted as desired by rotating the free lift adjustment screw with the Allen wrench included in the scope of delivery. Turning the screw to the right-hand side reduces the free lift, while turning the screw to the left increases it. The free lift value set can be read off from the measuring instrument.

### Upper/lower stop for the stroke

The mechanical stroke of the probe stretches from +3 mm (upper stop) to –2.2 mm (lower stop, adjusted ex works). The lower stop is displaced by the adjusted free lift value.

### Probe measuring range

The probe features a measuring range of ±2 mm, i.e. 4 mm over all. The measuring range is reduced by the established free lift value.

### Suction air connection

In order to take advantage of the pneumatic probe lifting, the suction air connection and the vacuum controller, which operates with a nominal pressure of 0.5 bar (e.g. foot-operated probe lifting unit) are connected via a hose. The ends of the hose have to be seated firmly on the fittings.

### Connection cable

The connection cable is 1.5 m long. Electrically compen-sated extension cables of 5 m, 10 m, 20 m, and 30 m are also available. The combination of several extension cables is not favourable, since the measuring accuracy suffers.
The polyurethane cable resists grease, oil, and water. It should, however, not be brought into contact with acids. The curvature radius of the cable must never be smaller than 3.4 cm.

**!** Whenever changing the cable length, the probe has to be calibrated anew.

Besides the Millitron 1240, the 1340 probe can be operated with any other length measuring instrument of the Feinprüf Perthen programme via an adapter cable.

### Polarity of the probe

With the measuring bolt being shifted upwards, the indicated value becomes more positive, provided that in the Millitron's instrument settings a positive sign (+) was assigned to the measuring value (positive polarity). In case a negative sign (–) was assigned (negative polarity), the indicated measuring value becomes increasingly negative as the measuring bolt is pushed upwards.

### Stylus

Any stylus featuring a M 2.5 thread can be employed. The standard scope of delivery includes a 6 mm stylus with a tip diameter of 3 mm. When interchanging the stylus, the measuring bolt has to be secured against distortion by means of the SW 3.5 open jawed spanner. The stylus is loosened and fixed manually.

### Sealing membrane

The sealing membrane consists of an external ring and a sealing, which tightly seals the measuring bolt in the clamping shaft. When using the probe for the intended purposes, no liquid may penetrate through the inside, either.
The membrane is completely resistant to oil and aliphatics and, to a certain degree, also chlorinated hydrocarbons. In case the membrane does no longer provide air-tight sealing, it must be exchanged.

For this,
- remove the stylus (use the SW 3.5 open jawed spanner to secure the measuring bolt against distortion),
- remove the old membrane from the clamping shaft,
- insert the new membrane.

* Screw-in (Order No. 5111780) or glue-in-place fixtures (Order No. 5111790), for example.

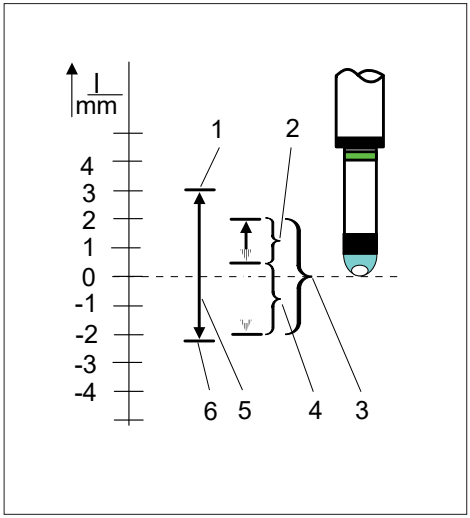



*Fig. 2*
*Probe measuring range, stroke, free lift*

*1 Upper stop (+3 mm)*
*2 Measuring range at max. free lift limitation (1.5 mm)*
*3 Measuring range without free lift limitation (4 mm)*
*4 Free lift adjustment range*
*5 Stroke*
*6 Lower stop (–2.2 mm, adjustment ex works)*

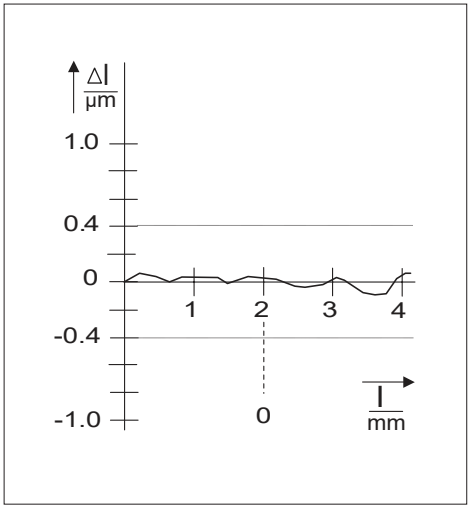



*Fig. 3*
*Diagram of a typical linearity error*

## 4 Measurement

The high linearity and thus the measuring accuracy can be fully taken advantage of by using the probe together with the length measuring instrument Millitron 1240. Although the probe can be connected to any other length measuring instrument of the Feinprüf Perthen programme via the adapter cable, the outstanding characteristics of the probe are only fully exploited in the above mentioned combination.

### Pneumatic lifting of the measuring bolt

Operation of the probe is simplified by the possibility to lift and lower the measuring bolt "remote controlled" at any time. Low-speed lowering of the measuring bolt is also feasible, which is important e.g. for checking gauge blocks.

### Environmental conditions

The 1340 probe is designed for shop floor application. It is also suited for measurements inside the machine. The connection cable resists oil, grease, and water, but it should never be brought into contact with acids. The sealing membrane, however, is of low chemical resistance. Thus, the environmental conditions govern the frequency of membrane interchange.

### Measuring accuracy

The small linearity error of the probe which is smaller than 0.01 % (i.e. 0.4 µm over the measuring range of 4 mm) enables an extremely high measuring accuracy. This accuracy is also guaranteed when extension cables are employed, provided that the Feinprüf Perthen cables are used. On delivery, the probe features a sensitivity error of max. 0.5 %. In case the entire measuring accuracy of the probe is to be taken full advantage of, probe, measuring instrument, and, as the case may be, the extension cable are to be calibrated together. This is done e.g. by taking a measurement on a gauge block which is followed by the modification of the correction factor or the sensitivity adjustment, respectively. The calibration procedure is described in the operating instructions of the employed measuring instrument.

### Tracing force

The tracing force is set to 0.75 N. The spring generating the tracing force cannot be exchanged. In case different tracing forces are required, please contact the Feinprüf Perthen after-sales service.

### Stylus

The stylus has to be selected in accordance with the measuring problem. Please make sure that the manually fixed stylus is firmly attached to the probe. A loose stylus may be the reason for large measuring result spreadings !

## 5 Maintenance

! The 1340 probe is a precision transducer and thus, it has to be handled carefully. Except for exchanging the sealing membrane, no repair or maintenance work is to be performed on the probe. This in particular refers to opening the probe housing, for air-tight sealing is mandatory for the perfect functioning of the probe.
In case of supposed disturbances, the probe has to be sent to Feinprüf Perthen GmbH in order to inspect and, if necessary, repair it.

☞ The probe may be cleaned with a soft cloth. Solvents must not be used for this purpose.

! When exchanging the stylus, secure the measuring bolt against distortion by all means, using the open jawed spanner.

## 6 Spare parts, accessories

| | |
|---|---|
| Sealing membrane | 7018429 |

Foot-operated measuring bolt lifting unit 5313419
for easy operation. The partial vacuum is generated with compressed air (principle of Venturi). Up to 4 probes can be operated simultaneously.
- Foot-operated switch
- Polyurethane hose (8 m)
- T-piece, 3 pieces

Stylus (M 2.5) with plane measuring surface; hardened steel; available lengths:

| | |
|---|---|
| 6 mm | 5112060 |
| 10 mm | 5112062 |
| 15 mm | 5112064 |
| 20 mm | 5112065 |

Stylus (M 2.5) with plane measuring surface; tungsten carbide; available lengths:

| | |
|---|---|
| 6 mm | 5112080 |
| 8 mm | 5112081 |
| 10 mm | 5112082 |
| 12 mm | 5112083 |
| 15 mm | 5112084 |
| 20 mm | 5112085 |
| 50 mm | 5112088 |

Stylus (M 2.5) with tip-Ø of 3 mm;

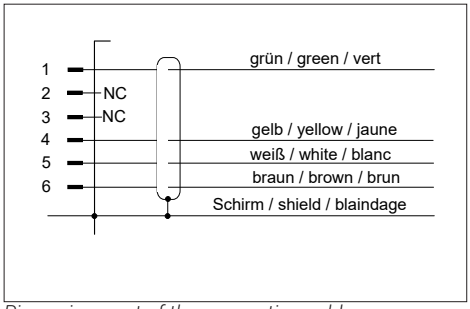
| Lengths | Ruby | Steel | Carbide |
|---|---|---|---|
| 6 mm | 5112000 | 5112020 | 5112040 |
| 8 mm | – | – | 5112041 |
| 10 mm | 5112002 | 5112022 | 5112042 |
| 12 mm | 5112003 | 5112023 | – |
| 15 mm | 5112004 | 5112024 | 5112044 |
| 20 mm | 5112005 | 5112025 | 5112045 |
| 25 mm | 5112006 | – | 5112046 |
| 35 mm | 5112007 | – | 5112047 |
| 50 mm | 5112008 | 5112028 | 5112048 |

| | |
|---|---|
| Screw-in fixture | 5111780 |
| Screw-in fixture 25 mm | 5111781 |
| Glue-in-place fixture | 5111790 |

## 7 Technical data

| | |
|---|---|
| Measuring principle | inductive |
| Linearity error | < 0.01 % |
| Type | axial probe |
| Operating position | any |
| Stylus | any stylus w. M 2.5 thread; usually, styli with Ø 3 mm carbide tip are used |
| Dimensions (mm) | 87 x 20 x 12 |
| Protective class as per DIN 40050 | IP 54 |
| Clamping shaft | Ø 8 mm (8h6) |
| Measuring bolt lifting unit | pneumatic through of a partial vacuum of 0.5 bar |
| Connection cable length | 1.5 m |
| Extension cable lengths | electrically compensated cables of 5, 10, 20, and 30 m length |
| Measuring bolt bearing | precision ball bushing and sliding bearing |
| Moved mass | approx. 5 g |
| Sensitivity | 0.316 mV/µm |
| at a supply voltage of | 5 V |
| and a carrier frequency of | 19.4 kHz |
| Sensitivity tolerance (when uncalibrated) | 0.5 % |
| Tracing length | 4 mm |
| Separation of the stops from zero position | |
| upper stop | 3 mm |
| lower stop | 2.2 mm (adjustable) |
| Tracing force | 0.75 N ±0.15 N |
| Tracing force increase | 0.08 N/mm |
| Reproducibility | 0.02 µm |
| Temperature coefficient | – 0.6 µm/°C |
| Operating temperature | +10 °C ... + 40 °C |
| Storage temperature | –10 °C ... + 80 °C |
| Chemical resistance | |
| Sealing membrane | resistant to oil, benzine, water, aliphatics, moderately resistant to acid, basis, solvents, ozon |
| Cable | polyurethane, resistant to water, oil, and grese, and, to a lower degree, to acids curvature radius > 3.4 cm |

## 8 Pin assignment




*Pin assignment of the connection cable*
*Fig. 4*

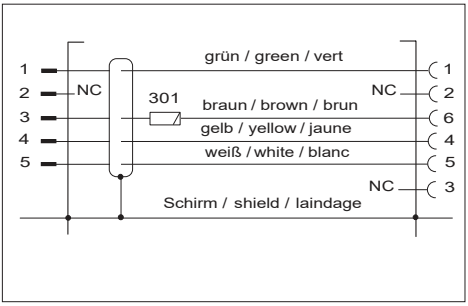



*Fig. 5*
*Pin assignment of the adapter cable*