
**Geometrical product specifications
(GPS) — Dimensional measuring
equipment: Electronic digital-indicator
gauge — Design and metrological
characteristics**

*Spécification géométrique des produits (GPS) — Instruments de
mesurage dimensionnel: Comparsateurs à tige rentrante à affichage
numérique — Caractéristiques de conception et caractéristiques
métrologiques*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13102 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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Introduction

This International Standard is a Geometrical Product Specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain link 5 of the chain of standards on size and distance in the general GPS matrix.

The ISO/GPS Masterplan given in ISO/TR 14638 gives an overview of the ISO/GPS system of which this standard is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this standard, and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this standard, unless otherwise indicated.

For more detailed information of the relation of the standard to other standards and the GPS matrix model, see Annex D.

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Geometrical product specifications (GPS) — Dimensional measuring equipment: Electronic digital-indicator gauge — Design and metrological characteristics

1 Scope

This International Standard specifies the most important design and metrological characteristics of electronic digital-indicator gauges.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14253-1, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformance or non-conformance with specifications*

ISO 14253-2, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

ISO 14978:2006, *Geometrical product specification (GPS) — General concepts and requirement for GPS measuring equipment*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14978, and the following apply.

3.1

electronic digital-indicator gauge

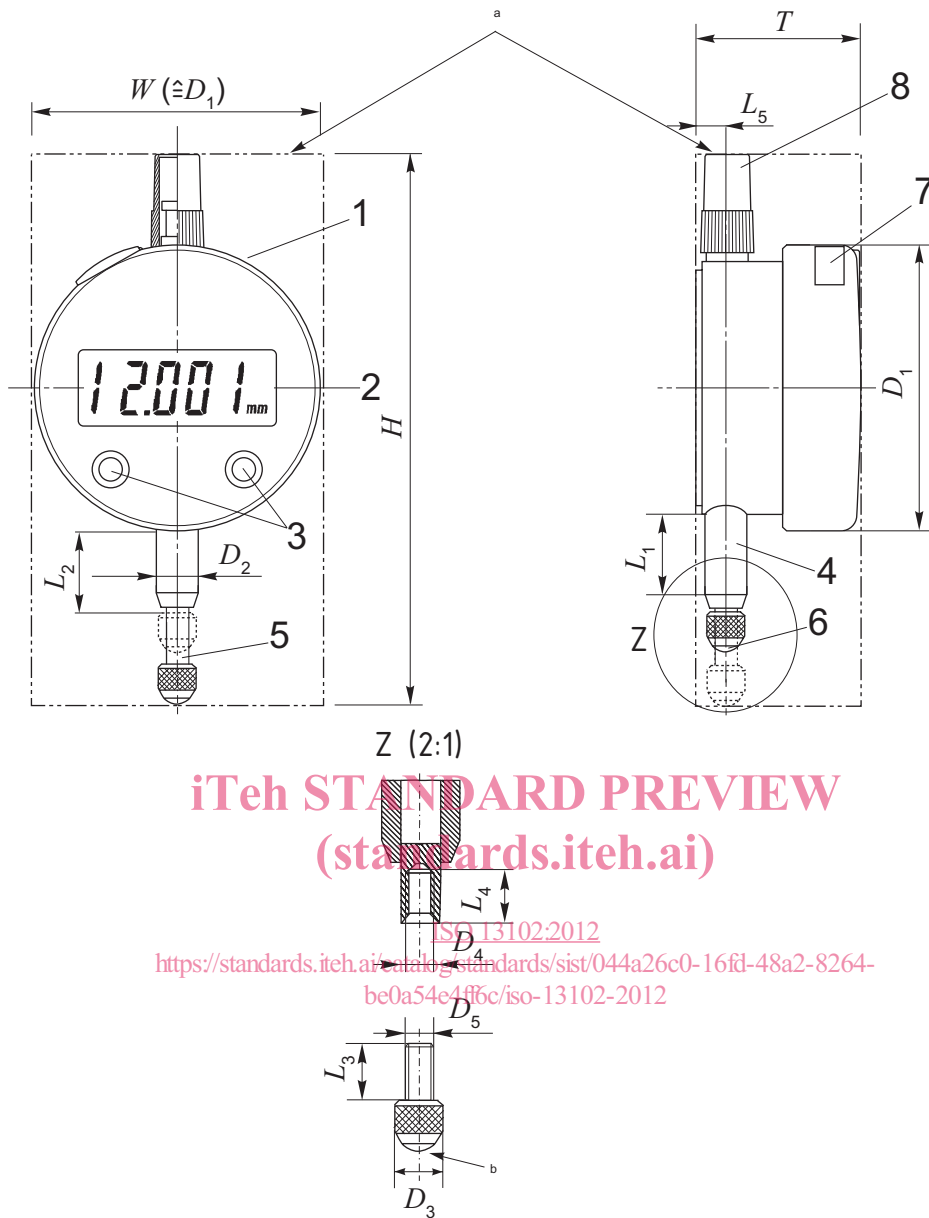
measuring instrument in which the axial displacements of a plunger are obtained by a transducer and converted into an electronic signal by suitable electronic means and transmitted to a physically integrated digital display

4 Design characteristics

4.1 General design and nomenclature

The general design and workmanship shall be such that the performance of the electronic digital-indicator gauge complies with the requirements of this International Standard.

The design and rigidity of the electronic digital-indicator gauge shall be such that the freedom of movement of the plunger is not impaired by clamping the stem of the instrument, providing that such clamping is carried out in a proper manner. Where alternative methods of mounting are provided, e.g. attaching the lug on the back plate, the design and rigidity of that mounting shall be such that the performance is not impaired.



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Key

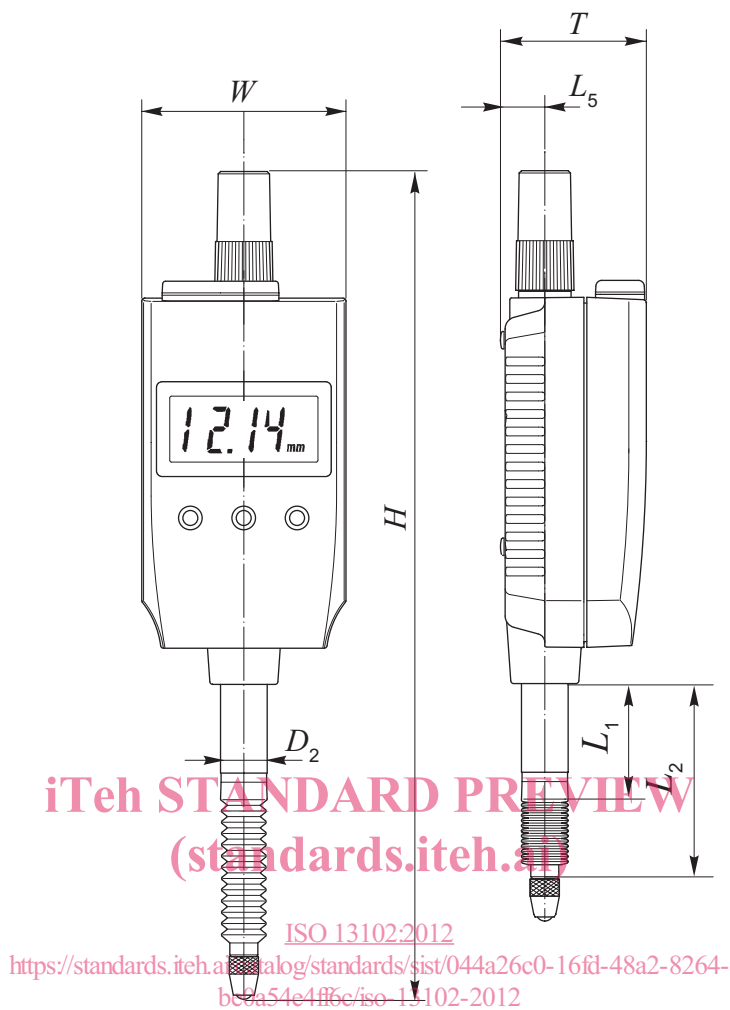
- | | | |
|---------------------|-----------------------------|---------------|
| 1 bezel | 5 plunger | W width |
| 2 display | 6 contact element | H height |
| 3 operating buttons | 7 data output — optional | T thickness |
| 4 stem | 8 protection cap — optional | |

a Overall dimension.

b Measuring face.

See Table 1 for the D and L dimensions.

Figure 1 — Nomenclature and general design of an electronic digital-indicator gauge



See Table 1 for the D and L dimensions.

Figure 2 — Nomenclature and general design of electronic digital-indicator gauge (rectangular type)

4.2 Main dimensions

The electronic digital-indicator gauge shall conform to the dimensions specified in Figures 1 and 2 and Table 1 to ensure interchangeability.

Table 1 — Dimensions of an electronic digital-indicator gauge

Values in millimetres

Dimension	Nominal value
Bezel diameter D_1 ($\hat{=} W$)	a
Stem diameter D_2	8 h6
Contact element outside diameter D_3	max. 7,5
Thread size D_4	M2,5-6H
Thread size D_5	M2,5-6g
Stem length L_1	min. 10
Length L_2 ^b	c
Thread length L_3	max. 5
Thread length L_4	min. 6
Distance L_5	max. 12

^a Generally the diameter of the bezel D_1 equals the maximal width (W) of the electronic digital-indicator gauge.

^b L_2 is the length between the housing and the end of the plunger if the plunger is pressed in.

^c Depending on the measuring range.

4.3 Digital indicating display

The design of the digital indication shall be such that the measured values are clearly displayed in any position of the plunger. The unit of measure shall be clearly identified. In the case of negative values the – sign shall be indicated.

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4.4 Error messages

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The electronic digital-indicator gauge shall include means suited for displaying operation- and system-error messages.

EXAMPLE Error message caused by excessively rapid plunger movement or insufficient power supply.

4.5 Interface

When the unit provides an electronic interface, the manufacturer shall describe the transmission format and protocol of data outputs with as much details as possible.

4.6 Protection for field use

Manufacturers shall clearly indicate, referring to the applicable standard(s), the kind of water and dust protection (e.g. IP code according to IEC 60529), as well as the type of electromagnetic field protection, if present.

4.7 Contact element

The contact element shall be interchangeable. A selection of elements shall be available. They shall have wear-resistant measuring surfaces and shall be of suitable form and surface finish allowing the user to select a suitable contact element depending on the measuring task (see Figure 1).

4.8 Zero adjustment

Each electronic digital indicator shall be provided with means for setting the indicator to a zero indication in any measuring position.

4.9 Additional functions

Additional functions such as counting direction change, value preset and value storage shall be documented by the manufacturer.

4.10 Design characteristics (manufacturer's specification)

As a minimum requirement, the manufacturers shall specify the design characteristics of the electronic digital-indicator gauge, given in Table 2.

Table 2 — Design characteristics

Characteristics		Value	Unit
Overall dimensions	Width W ($\hat{=} D_1$)		mm
	Thickness T		
	Height H		
Measuring range			
Resolution (equal to the digital step)			
Height of figures displayed			
Maximum plunger movement speed			mm/s
Presence of:	Data output	Yes/No	
	Plunger lifting device	Yes/No	
	Attachment mounting and type	Yes/No	
	Fluid (water) and dust protection	Yes ^a /No	
	Electromagnetic field protection (if present)	Yes/No	
	Rotating display	Yes/No	
Type of power supply		Battery/ External	

^a IP code according to IEC 60529.

5 Metrological characteristics

5.1 General

The manufacturer shall specify MPE and MPL information for the metrological characteristics of the electronic digital-indicator gauge which are listed in Table 3. Unless otherwise specified by the manufacturer, the static response of the electronic digital-indicator gauge shall comply with the MPE/MPL values at any orientation of the gauge.

The metrological characteristics of this International Standard apply when the zero or reference point is set at any position within the measuring range.

5.2 Maximum permissible error of indication

5.2.1 Hysteresis of error of indication (limited by MPE_H)

Range of the results measured at the same measuring point using both directions of the plunger displacement.

5.2.2 Repeatability of error of indication (limited by MPE_R)

Range of the results of successive measurements of the same measurand carried out under the same conditions of measurement.