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**Geometrical product specifications (GPS)
— Dimensional measuring equipment —
Vernier, dial and digital callipers**

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Precision Measuring Instruments Manufacturers Association (JMA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS B 7507 : 2016**), which has been technically revised.

However, **JIS B 7507 : 2016** may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 19 May 2023.

This **JIS** document is protected by the Copyright Act.

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Geometrical product specifications (GPS) — Dimensional measuring equipment — Vernier, dial and digital callipers

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 13385-1 : 2019**, Edition 2, with some modifications of the technical contents to make the standard more practical and in keeping with the actual manufacture and use in Japan.

Annex JA is unique to **JIS** and not given in the corresponding International Standard. The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JB.

This Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see **JIS B 0661**). It influences the chain links F and G of the chain of standards on size and distance in the general GPS matrix. For more detailed information on the relation of this Standard to other GPS standards, see Annex B.

1 Scope

This Standard specifies requirements for callipers equipped with analogue indication with either a vernier scale or a circular scale, and those equipped with digital indication.

NOTE The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 13385-1 : 2019 *Geometrical product specifications (GPS) — Dimensional measuring equipment — Part 1 : Design and metrological characteristics of callipers* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0641-1 *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1 : Decision rules for proving conformance or nonconformance with specifications*

JIS B 0641-5 *Geometrical product specifications (GPS) — Inspection by measure-*

ment of workpieces and measuring equipment — Part 5 : Uncertainty in verification testing of indicating measuring instruments

JIS B 0642 *Geometrical product specifications (GPS) — General concepts and requirements for GPS measuring equipment*

JIS B 0680 *Geometrical Product Specifications (GPS) — Standard reference temperature for geometrical product specification and verification*

JIS B 7506 *Gauge blocks*

JIS C 0920 *Degrees of protection provided by enclosures (IP Code)*

JIS Z 8103 *Glossary of terms used in measurement*

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

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS B 0641-1**, **JIS B 0642** and **JIS Z 8103**, and the following apply.

3.1

calliper

measuring instrument which evaluates a dimensional quantity of an internal or external feature on the basis of opposing contact from the movement of a slider with a measuring jaw, moving relative to a measuring scale on a rigid beam and to a fixed jaw

Note 1 to entry Callipers equipped with a step measuring face and a depth measuring rod at its beam and slider are capable of step and depth measurements.

Note 2 to entry The indication can be either analogue (vernier scale or circular scale) or digital. For digital data output, see 4.4.3.

3.2

measuring face contact

contact between the measuring face and an integral feature of a workpiece

3.3

full measuring face contact

contact between the full area of the measuring face and an integral feature of a workpiece

3.4

partial measuring face contact

contact between a partial area of the measuring face and an integral feature of a workpiece

3.5

measuring face line contact

contact between a line on the measuring face and an integral feature of a workpiece

Note 1 to entry See Figure A.1.

3.6

error of indication

indication of a calliper minus a true value of the corresponding input quantity

Note 1 to entry Since true values are indeterminate, a conventional true value is used in practice.

3.7

measuring range

range in which a calliper is capable of giving measurements with metrological characteristics that fall within the maximum permissible error

3.8

measured length

length within the measuring range that can be measured with metrological characteristics that fall within the maximum permissible error

Note 1 to entry It is a length constituting a given part of the measuring range.

4 Design characteristics

4.1 General

The design characteristics of the calliper shall comply with requirements of this Standard unless otherwise specified by the manufacturer (or the supplier). Examples of typical calliper designs are shown in Figure 1, Figure 2, Figure 3 and Figure 4.

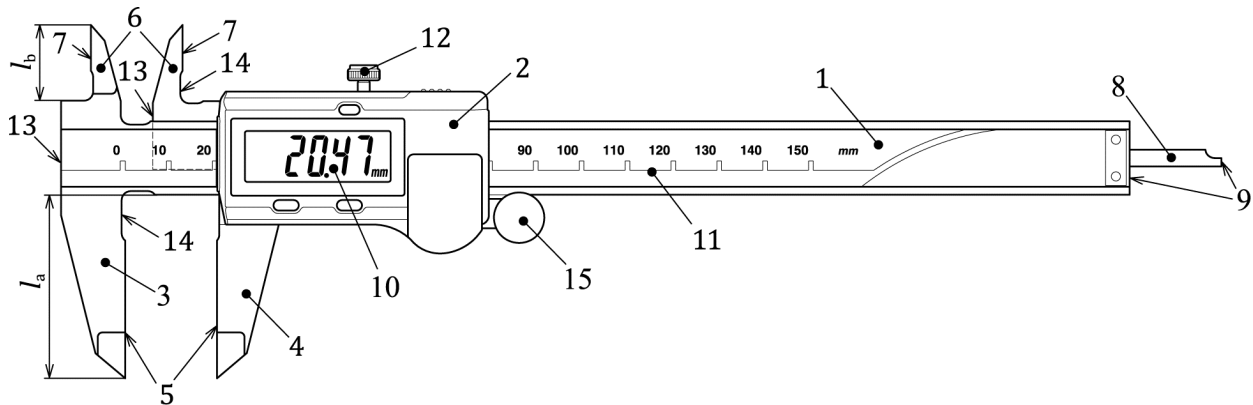
4.2 Names of main parts

The types of calliper covered by this Standard, the M-type calliper, CN-type calliper and CM-type calliper, are illustrated in Figure 1, Figure 2, Figure 3 and Figure 4 along with the names of main parts.

The figures are intended to indicate only the names of main parts but not intended to give the design details.

- **M-type calliper**, having jaws for external measurements and independent jaws for internal measurements. Some may be equipped with a fine adjustment device. Those of maximum measured length 300 mm or under may be equipped with a depth measuring rod.
- **CN-type calliper**, having jaws comprising both the external and internal measuring faces and independent jaws for external measurements. Some may be equipped with a fine adjustment device.
- **CM-type calliper**, having jaws comprising both the external and internal measur-

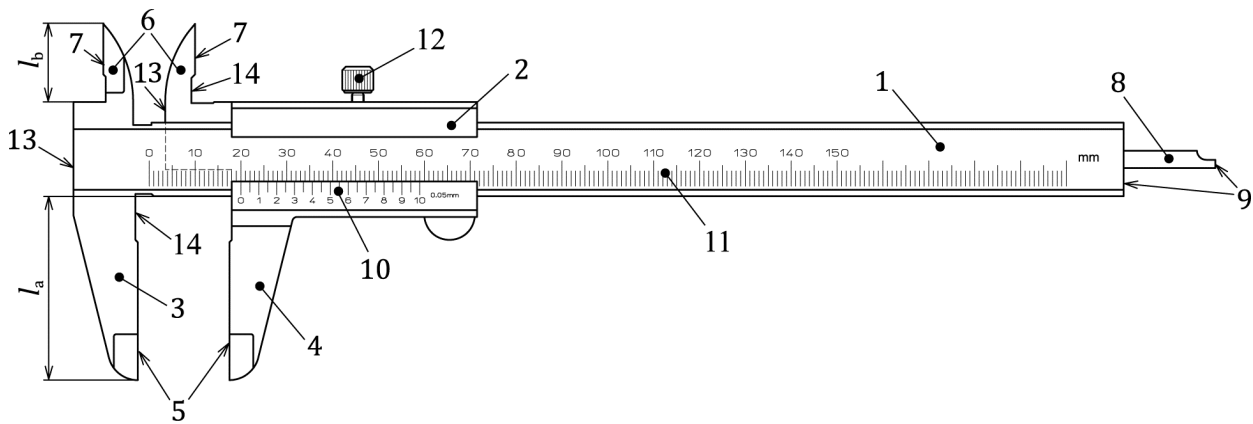
ing faces. Some may be equipped with a fine adjustment device.



Key

- | | | |
|---|--|---|
| 1 beam | 7 measuring faces for internal measurements (crossed knife-edge faces) | 13 measuring faces for step measurement |
| 2 slider | 8 depth measuring rod | 14 undercut |
| 3 jaw for external measurements (fixed jaw) | 9 measuring faces for depth measurement | 15 thumb roller |
| 4 jaw for external measurements (sliding jaw) | 10 digital display | l_a length of jaw for external measurements |
| 5 measuring faces for external measurements | 11 electronic main scale | l_b length of jaw for internal measurements |
| 6 jaws for internal measurements | 12 locking screws | |

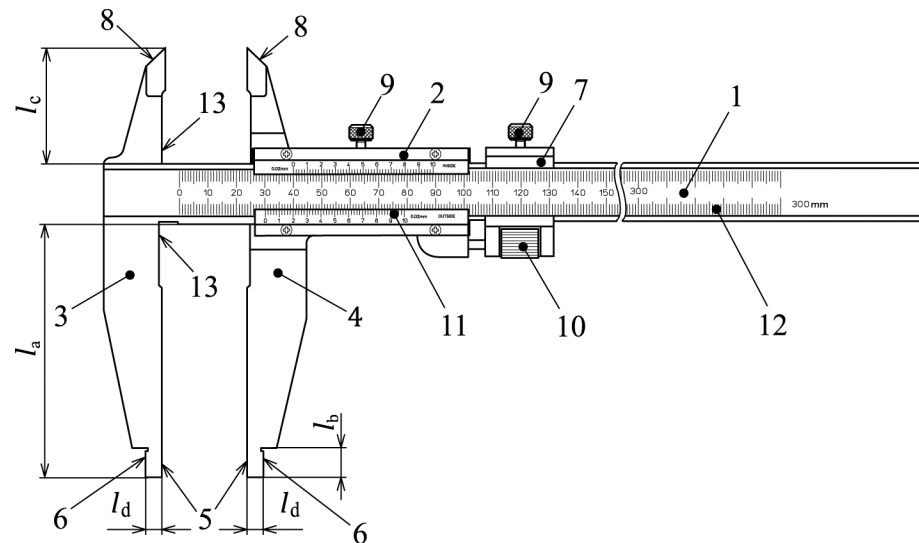
Figure 1 Example design of M-type calliper (digital indication)



Key

- | | | |
|---|--|---|
| 1 beam | 7 measuring faces for internal measurements (crossed knife-edge faces) | 13 measuring faces for step measurement |
| 2 slider | 8 depth measuring rod | 14 undercut |
| 3 jaw for external measurements (fixed jaw) | 9 measuring faces for depth measurement | l_a length of jaw for external measurements |
| 4 jaw for external measurements (sliding jaw) | 10 vernier scale | l_b length of jaw for internal measurements |
| 5 measuring faces for external measurements | 11 main scale | |
| 6 jaws for internal measurements | 12 locking screws | |

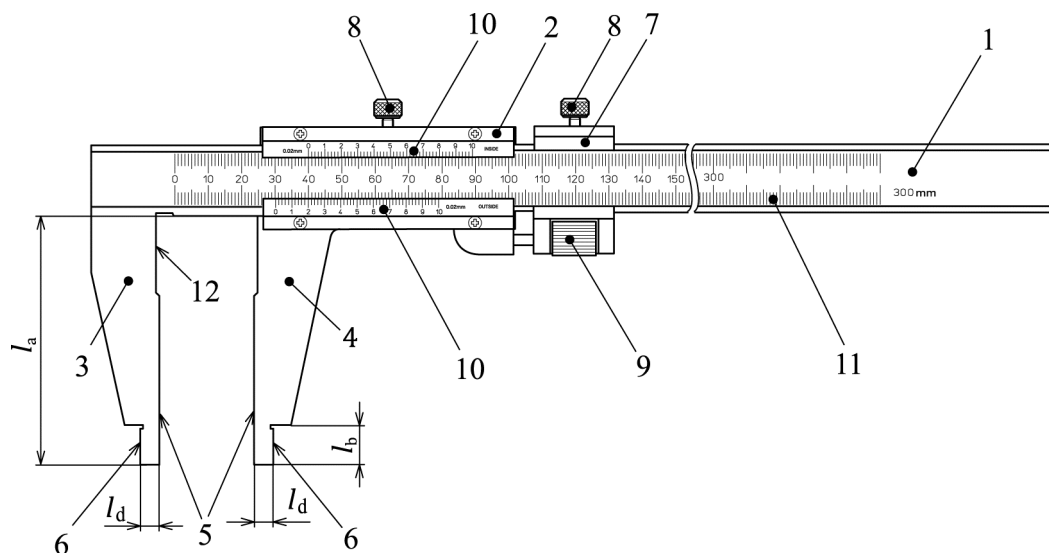
Figure 2 Example design of M-type calliper (vernier scale)



Key

- | | | |
|---|---|--|
| 1 beam | 7 fine adjustment clamp | 13 undercut |
| 2 slider | 8 jaws for external measurements (crossed knife-edge faces) | l_a length of jaw |
| 3 measuring (fixed) jaw | 9 locking screws | l_b length of measuring faces for internal measurements (including undercut) |
| 4 measuring (sliding) jaw | 10 fine adjustment device | l_c length of jaw for external measurements (crossed knife-edge faces) |
| 5 measuring faces for external measurements | 11 vernier scale | l_d width of measuring faces |
| 6 measuring faces for internal measurements | 12 main scale | |

Figure 3 Example design of CN-type calliper



Key

- | | | |
|---|---|--|
| 1 beam | 6 measuring faces for internal measurements | 12 undercut |
| 2 slider | 7 fine adjustment clamp | l_a length of jaw |
| 3 measuring (fixed) jaw | 8 locking screws | l_b length of measuring faces for internal measurements (including undercut) |
| 4 measuring (sliding) jaw | 9 fine adjustment device | l_d thickness of measuring faces |
| 5 measuring faces for external measurements | 10 vernier scale | |
| | 11 main scale | |

Figure 4 Example design of CM-type calliper

4.3 Dimensions

The manufacturer (or the supplier) shall state important calliper design dimensions such as those shown in Table 1 in a catalogue, etc. The values shown in Table 1 are typical dimensions of the elements of callipers and are not requirements of this Standard.

Table 1 does not include the length of the undercut, which is typically kept as small as practicable. For callipers equipped with a depth measuring rod, the manufacturer (or the supplier) shall state the cross-sectional dimensions of the rod, for example ϕ 1.5 mm minimum for round section or 1.2 mm $\times$ 3 mm minimum for rectangular section.

Table 1 Dimensions of callipers

Unit: mm

Measuring range (max.)	M-type calliper		CN- and CM- type calliper			
	l_a	l_b	l_a	l_b	$l_c^{a)}$	l_d
150	40 or under	8 or over up to and incl. 20	50 or under	8 or over up to and incl. 10	25 or over up to and incl. 35	5
200	40 or over up to and incl. 50	8 or over up to and incl. 25	60 or over up to and incl. 80	8 or over up to and incl. 10	25 or over up to and incl. 35	5
300	60 or over up to and incl. 65	10 or over up to and incl. 30	70 or over up to and incl. 100	10 or over up to and incl. 12	35 or over up to and incl. 45	5
750	70 or over up to and incl. 95	15 or over up to and incl. 40	100 or over up to and incl. 150	15 or over up to and incl. 20	50 or over up to and incl. 60	5 or 10
1 000	100 or over up to and incl. 130	20 or over up to and incl. 60	125 or over up to and incl. 150	20 or over up to and incl. 30	50 or over up to and incl. 60	10 or over up to and incl. 20
2 000	100 or over up to and incl. 130	20 or over up to and incl. 60	150 or over up to and incl. 200	20 or over up to and incl. 30	50 or over up to and incl. 60	10 or over up to and incl. 20
NOTE The measuring range in this table refers to the maximum measured length of calliper shown in Figure 1, Figure 2, Figure 3 and Figure 4.						
Note ^{a)} Only applicable to CN- type callipers.						

4.4 Types of indication

4.4.1 General

The indication of callipers can be either analogue (vernier scale or circular scale) or digital.

On callipers with an analogue indication, the minimum reading value or scale interval, and its unit shall be labelled.