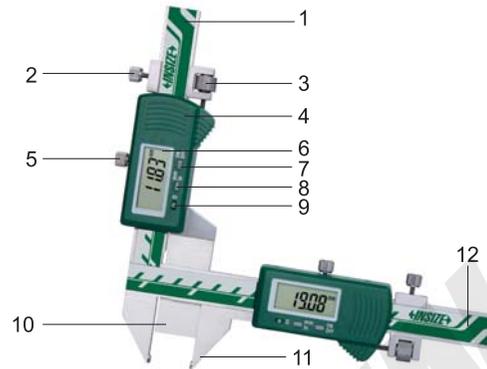


Attention: This caliper is not waterproof. If there is coolant liquid on the sticker, the reading may be incorrect. Please clean the sticker with dry cloths. If the problem is not solved, please use WD40 to clean the sticker.

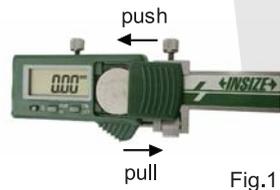
Resolution: 0.01mm/0.0005"

Code	Range	Accuracy
1181-M25A	M1-25mm/P1-P24	±0.04mm/±.0016"
1181-M50A	M5-50mm/P1/2-P5	±0.04mm/±.0016"

- 1-Vertical vernier caliper
- 2-Fine adjustment locking screw
- 3-Fine adjusting wheel
- 4-Battery cover
- 5-Locking screw
- 6-Display
- 7-'ON/OFF' button
- 8-'mm/in' button
- 9-'0' button
- 10-Vertical vernier jaw
- 11-Horizontal vernier jaws
- 12-Horizontal vernier caliper



1. The caliper is not waterproof. Please protect electronic components from liquid.
2. Install battery:
 - Remove the battery cover (fig.1).
 - Put CR2032 battery into battery house, the positive side of battery (+) should face out.
 - Close the battery cover.



3. Buttons:
 - 'mm/in' is for mm and inch conversion.
 - 'ON/OFF' is to turn on/off.
 - '0' is to set zero.
4. Set zero: Before measurement, vertical vernier caliper and horizontal vernier caliper are necessary to set zero.

- Vertical vernier caliper is set zero to on plate(Fig.2). Vertical vernier jaw and horizontal vernier jaws contact the plate, press '0' button to set zero.
- Horizontal vernier caliper is set zero(Fig.3). Close horizontal vernier jaws and press '0' button to set zero.

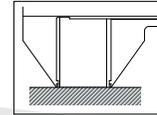


Fig.2

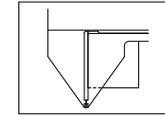


Fig.3

5. Measurement

- Calculate the measured gear's chordal addendum. Set calculated addendum figure, tighten the locking screw.
 - Put caliper on the top of tooth.
 - Move caliper to make horizontal vernier jaw contact the left side of the measured gear. Rotate fine adjusting wheel to move jaw to make the other jaw contact the right side (Fig.4), tighten the locking screw, take down the caliper, get the chordal thickness.
- Note: It is necessary to control the force to move caliper to get accurate result. To avoid deviation, check two jaws contact gear completely.

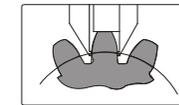


Fig.4

6. One battery can last for one year use. If there is nothing on display or digits flash, battery voltage is too low, please replace battery. If caliper is not be used for a long time, please remove the battery. Otherwise, liquid may leak from the battery and damage the caliper.
7. If digits do not change when buttons are pressed, take out battery and put it back after 1 minute.
8. Working temperature is 0-40°C/32-104°F, relative humidity should not exceed 80%.

Addition: Calculate pitch circle's chordal thickness and chordal addendum:

Theoretical chordal thickness S:

$$S = mZ \cdot \sin\left(\frac{90^\circ}{Z} + \frac{2x}{Z} \tan\alpha\right)$$

Theoretical chordal addendum h:

$$h = h' + \frac{mZ}{2} \left(1 - \cos\frac{90^\circ}{Z} + \frac{2x}{Z} \tan\alpha\right)$$

$$h' = m(f + x - \delta)$$

During measurement, set vertical vernier caliper according to the actual chordal addendum h_a :

$$h_a = h + (d - D) / 2$$

m: Module

Z: Number of teeth

α : Pressure angle

f: Addendum coefficient

x: Modification coefficient

δ : The addendum reduced coefficient

d: Actual diameter

D: Theoretical diameter

MN-1181-C/E