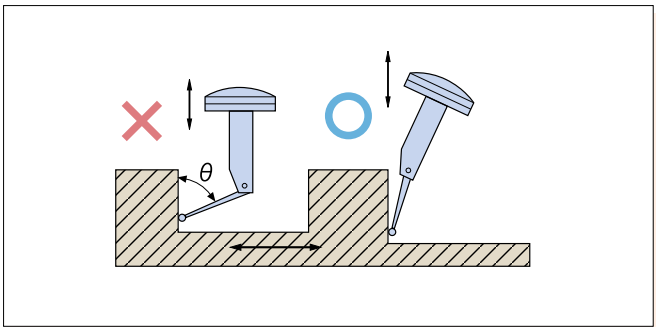
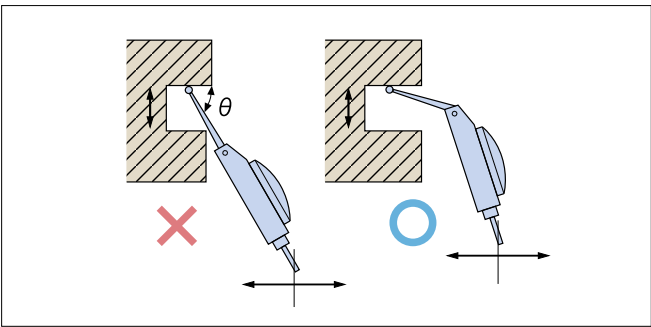
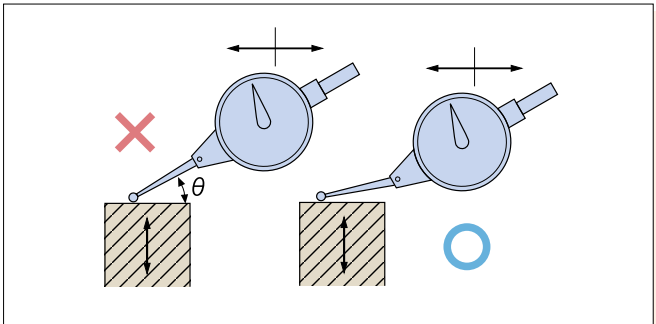
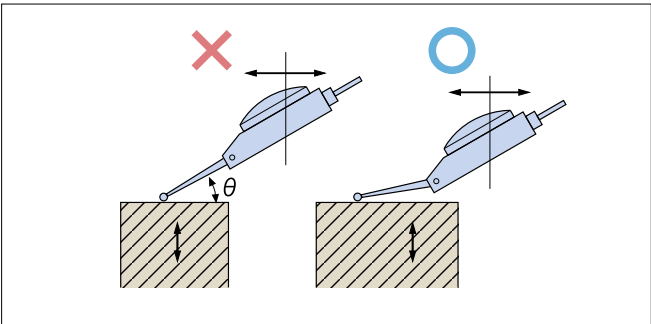
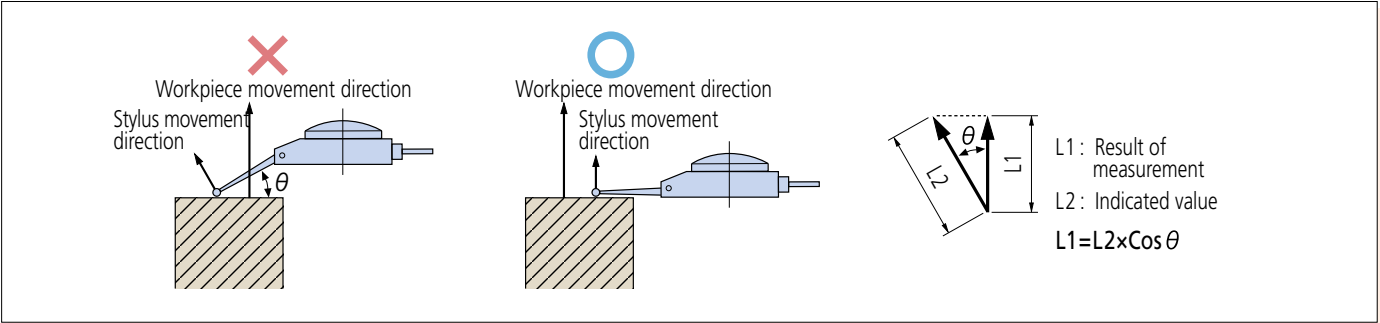


# Dial Indicators and Digital Indicators

## Dial Test Indicators and the Cosine Effect

Always minimize the angle between movement directions during use.



The reading of any indicator will not represent an accurate measurement if its measuring direction is misaligned with the intended direction of measurement (cosine effect). Because the measuring direction of a dial test indicator is at right angles to a line drawn through the contact point and the stylus pivot, this effect can be minimized by setting the stylus to minimize angle  $\theta$  (as shown in the figures). If necessary, the dial reading can be compensated for the actual  $\theta$  value by using the table below to give the result of measurement.

Result of measurement = indicated value x compensation value

### Compensating for a non-zero angle

Angle	Compensation value
10°	0.98
20°	0.94
30°	0.86
40°	0.76
50°	0.64
60°	0.50

### Examples

If a 0.200mm measurement is indicated on the dial at various values of  $\theta$ , the result of measurements are:

For  $\theta = 10^\circ$ ,  $0.200\text{mm} \times 0.98 = 0.196\text{mm}$

For  $\theta = 20^\circ$ ,  $0.200\text{mm} \times 0.94 = 0.188\text{mm}$

For  $\theta = 30^\circ$ ,  $0.200\text{mm} \times 0.86 = 0.172\text{mm}$

Note: A special contact point of involute form can be used to apply compensation automatically and allow measurement to be performed without manual compensation for any angle  $\theta$  from 0 to 30°. (This type of contact point is custom-made.)

