Mitutoyo

Mitutoyo Quality

Lever-Type Dial Indicators

# DIAL TEST INDICATORS

SMALL TOOL INSTRUMENTS
AND DATA MANAGEMENT

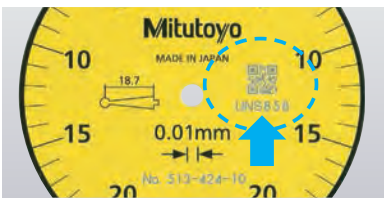
Products

# Enhanced Durability, Sensitivity and Readability

NEW Products

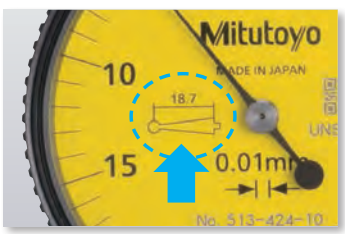
## Inspection

- The QR code is used by the factory to accurately match the inspection certificate to the test indicator.




## Stylus length is marked on the dial face

- Stylus length is marked on the dial face to assist customers when ordering replacement styli.



## Attachable limit hands

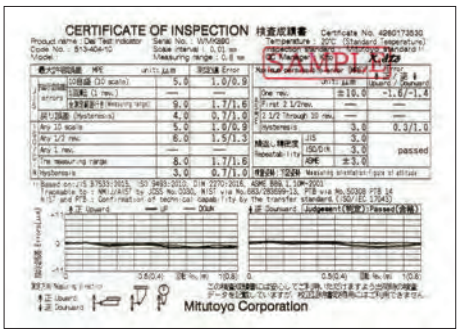
- Limit hands (optional) can be attached to the bezel, allowing easy identification of the upper and lower limits of tolerance.

## ø8/ø9.52 stem to fit dovetails is a standard accessory

- A ø8mm (ø0.315 in) plain stem (**21CAB104**) for the Metric models or a ø9.52mm (ø3/8 in) plain stem (**21CAB105**) for the Inch models that attaches to any dovetail on the frame is supplied as a standard accessory. Other sizes are available as optional accessories:

ø4mm (ø0.157 in) stem: **21CAB106**
ø6mm (ø0.236 in) stem: **21CAB103**

## certificate provided

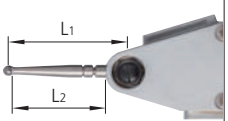

CERTIFICATE OF INSPECTION

Mitutoyo Corporation

## Extended stylus length for 0.001mm, 0.002mm, and 0.0001" graduation models

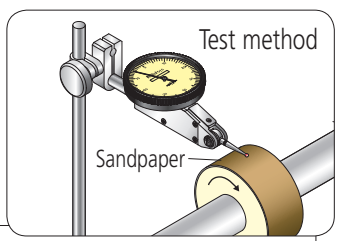
- Longer styli for the most sensitive indicators allow access to difficult-to-measure features.

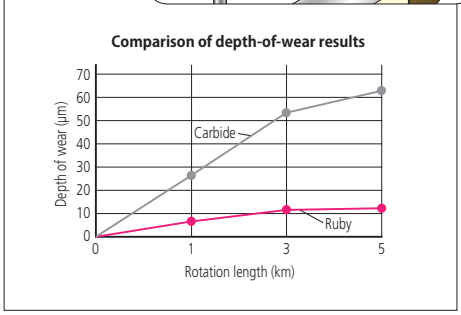
0.001mm graduation models: $L_2$ now 15.2mm, was 11.2mm
0.002mm graduation models: $L_2$ now 11.2mm, was 9.4mm
0.0001 in graduation models: $L_2$ now 0.61 in, was 0.45 in




## Ruby ball-tipped stylus added

- A ruby tip has wear-resistance several times greater than a carbide tip and, since it is nonconductive, it can be used safely on an electrical discharge machine.



# Enhanced Durability, Sensitivity and Readability

## Crystal for readability

- Glare-free flat crystal face allows easy reading of graduations.

Conventional New

## Prevents dust and oil from penetrating the dial face

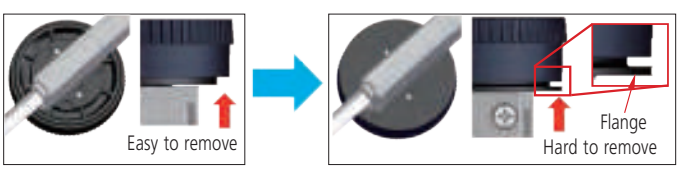
- The O-ring seal on the bezel provides smooth rotation and prevents dust and oil from penetrating the dial face.

## Bonded bezel and crystal

- Bonding the bezel and crystal eliminates a gap for cutting fluid or oil to penetrate the dial face.

## Prevents bezel detachment

- A flange prevents the bezel from unintentionally being removed during handling.



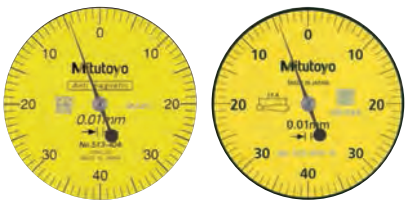

Conventional New

## Maintain trackability

- The ability of the indicator to track small changes in displacement deteriorates with prolonged use due to minute changes in clearance between the gears. Redesigned mounting for the gears enables the ability to maintain good trackability.

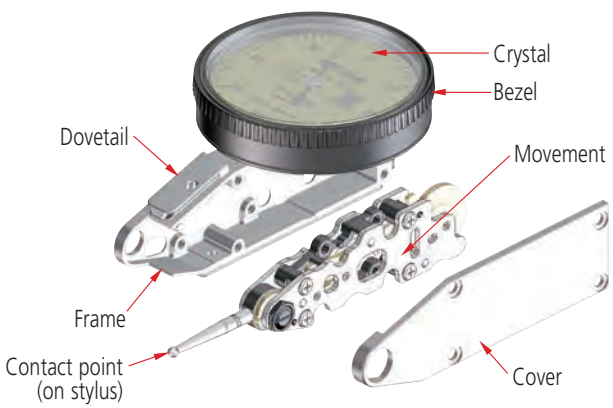
## Improved readability

- Using universal fonts, changing dial face color and reviewing the relationship between pointer and scale marks have drastically improved readability.



Conventional New

## Parts



## Choice of dial position

Four models are available, each with a different orientation of the dial to allow the best visibility in any situation.

- Horizontal (standard model) - dial is on top of the frame.
- Vertical: dial is on the end of the frame.
- Horizontal (20° tilted face): dial is on top of the frame but tilted 20°.
- Parallel: dial is on the side of the frame.

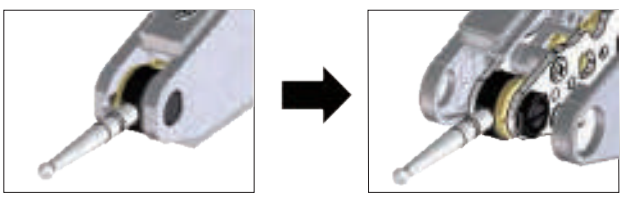
Horizontal | Vertical | Horizontal (20° Tilted face) | Parallel

## Multi-layer coatings on the crystal

- Hard, antifouling and non-glare coatings on the crystal inhibit scratches, contamination and glare on the surface.

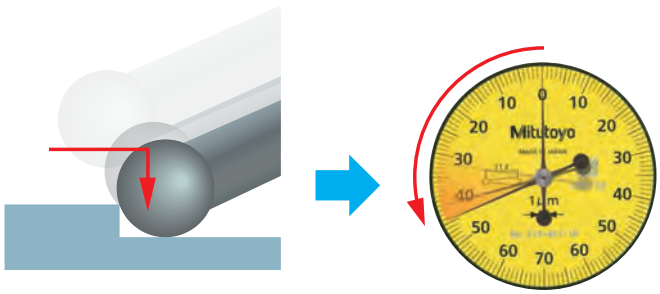
## Improved stylus bearing

- The conventional method of mounting the stylus pivot bearing screw in the frame is prone to loosen with prolonged use. A unique sub-plate structure has been incorporated in all models to eliminate this issue.



Stylus bearing screw held in frame.

Stylus bearing screw held in sub-plate.

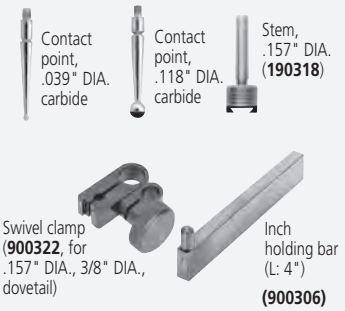



Indicator trackability depends on maintaining gear-train stability

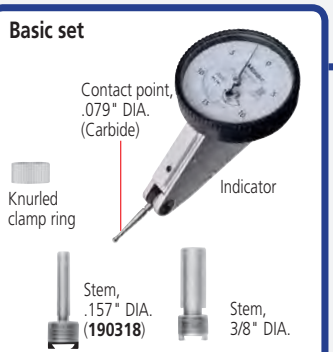
## Set Configuation

### Inch

**Full set** — **T set**

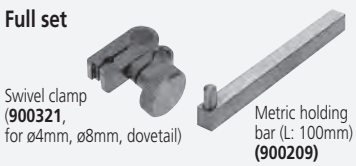



**Basic set** — **E set**

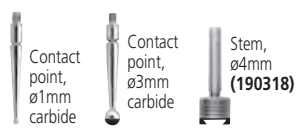



### Metric

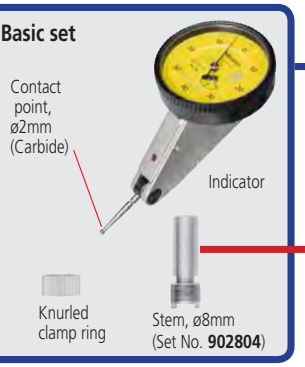
**Full set** — **T set**




**Plus set** — **A set** / **C set** (ø 6 Stem)




**Basic set** — **E set**




**H set** (ø 6 Stem)

## Horizontal (Standard model)

**Metric** Wide variations of models conform to the required accuracy, range and surface of workpieces.

**513-424-10**

**Contact point No. 137557**

Graduation: 0.01mm
Range: 0.5mm

**513-424-10E/513-424-10A/ 513-424-10T**

- Standard
- Double scale spacing
- Carbide contact point (Anti-magnet)

**513-478-10**

**Contact point No. 21CZA210**

Graduation: 0.01mm
Range: 0.5mm

**513-478-10E**

- Ruby contact point (non-magnet)
- Standard
- Double scale spacing

**513-466-10**

**Contact point No. 137557**

Graduation: 0.01mm
Range: 0.5mm

**513-466-10E**

- Small face diameter
- Double scale spacing
- Compact
- Carbide contact point (Anti-magnet)

**513-404-10**

**Contact point No. 103006**

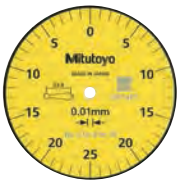
Graduation: 0.01mm
Range: 0.8mm

**513-404-10E/513-404-10A/ 513-404-10T/513-404-10C**

- Standard
- Carbide contact point (Anti-magnet)

**513-414-10**

**Contact point No. 131324**



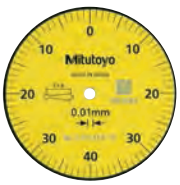

Graduation: 0.01mm
Range: 0.5mm

**513-414-10E/513-414-10A/ 513-414-10T**

- Long stylus
- Carbide contact point (Anti-magnet)
- Double scale spacing

**513-474-10**

**Contact point No. 21CZA201**




Graduation: 0.01mm
Range: 0.8mm

**513-474-10E**

- Ruby contact point (non-magnet)
- Standard

**513-464-10**

**Contact point No. 103006**

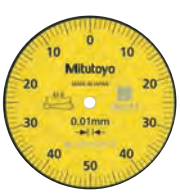
Graduation: 0.01mm
Range: 0.8mm

**513-464-10E**

- Small face diameter
- Compact
- Carbide contact point (Anti-magnet)

**513-415-10**

**Contact point No. 136013**



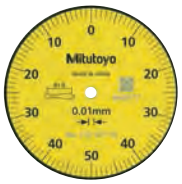

Graduation: 0.01mm
Range: 1.0mm

**513-415-10E/513-415-10A/ 513-415-10T**

- Long stylus
- Carbide contact point (Anti-magnet)

**513-477-10**

**Contact point No. 21CZA211**



Graduation: 0.01mm
Range: 1.0mm

**513-477-10E**

- Ruby contact point (non-magnet)
- Long stylus

**513-475-10**

**Contact point No. 21CZB068**

Graduation: 0.002mm
Range: 0.2mm

**513-475-10E**

- Ruby contact point (non-magnet)
- Standard

**513-426-10**

**Contact point No. 137557**

Graduation: 0.01mm
Range: 1.5mm

**513-426-10E/513-426-10A**

- With revolution counter
- Double scale spacing
- Carbide contact point (Anti-magnet)

**513-425-10**

**Contact point No. 103011**

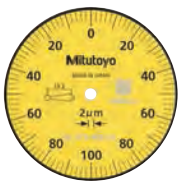
Graduation: 0.002mm
Range: 0.6mm

**513-425-10E/513-425-10A**

- With revolution counter
- Carbide contact point (Anti-magnet)

**513-405-10**

**Contact point No. 103011**



Graduation: 0.002mm
Range: 0.2mm

**513-405-10E/513-405-10A/ 513-405-10T**

- Standard
- Carbide contact point (Anti-magnet)

**513-465-10**

**Contact point No. 103011**

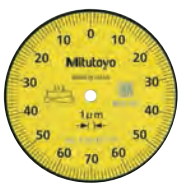
Graduation: 0.002mm
Range: 0.2mm

**513-465-10E**

- Small face diameter
- Compact
- Carbide contact point (Anti-magnet)

**513-471-10**

**Contact point No. 21CZA209**



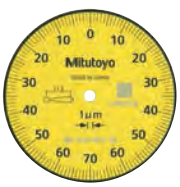
Graduation: 0.001mm
Range: 0.14mm

**513-471-10E**

- Ruby contact point (non-magnet)
- High accuracy

**513-401-10**

**Contact point No. 103010**



Graduation: 0.001mm
Range: 0.14mm

**513-401-10E**

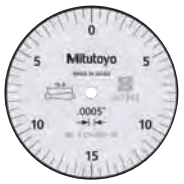
- High accuracy
- Carbide contact point (Anti-magnet)

## Horizontal (Standard model)

### Inch

**513-402-10**

**Contact point No. 133195**



Graduation: 0.0005 in
Range: 0.03 in

**513-402-10E/513-402-10T**

- Standard
- Carbide contact point (Anti-magnet)

**513-462-10**

**Contact point No. 133195**

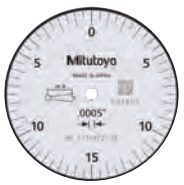
Graduation: 0.0005 in
Range: 0.03 in

**513-462-10E**

- Compact
- Carbide contact point (Anti-magnet)

**513-472-10**

**Contact point No. 21CZA204**



Graduation: 0.0005 in
Range: 0.03 in

**513-472-10E**

- Standard
- Ruby contact point (non-magnet)

**513-403-10**

**Contact point No. 21CZB064**

Graduation: 0.0001 in
Range: 0.008 in

**513-403-10E/513-403-10T**

- Standard
- Anti-magnet (non-magnet)

**513-412-10**

**Contact point No. 136290**

Graduation: 0.0005 in
Range: 0.03 in

**513-412-10E/513-412-10T**

- Long stylus
- Carbide contact point (Anti-magnet)

**513-473-10**

**Contact point No. 21CZB112**

Graduation: 0.0001 in
Range: 0.008 in

**513-473-10E**

- Standard
- Ruby contact point (non-magnet)

**512-479-10**

**Contact point No. 21CZA214**

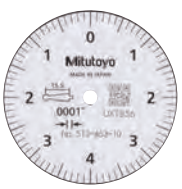
Graduation: 0.0005 in
Range: 0.03 in

**512-479-10E**

- Long stylus
- Ruby contact point (non-magnet)

**513-463-10**

**Contact point No. 21CZB064**



Graduation: 0.0001 in
Range: 0.008 in

**513-463-10E**

- Compact
- Carbide contact point (Anti-magnet)

## Metric/Inch

513-409-10

Contact point No. 103011

Graduation: 0.002mm/0.0001 in
Range: 0.2mm/0.0076 in

513-409-10E/513-409-10T

Carbide contact point (Anti-magnet)

## Inch/Metric

513-406-10

Contact point No. 133195

Graduation: 0.0005 in/0.01mm
Range: 0.03 in/0.7mm

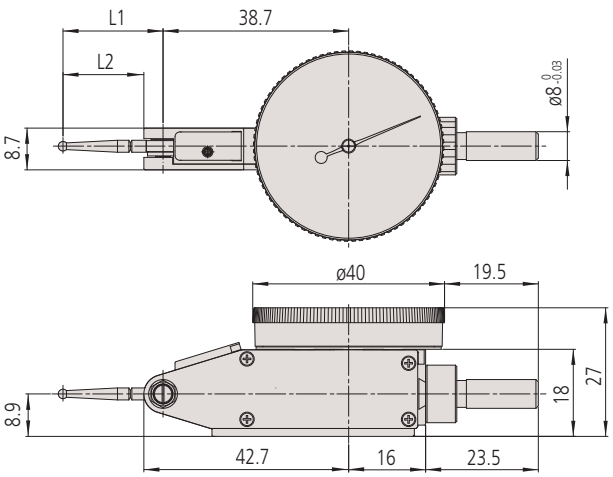
513-406-10E/513-406-10T

Carbide contact point (Anti-magnet)

## DIMENSIONS

### Vertical

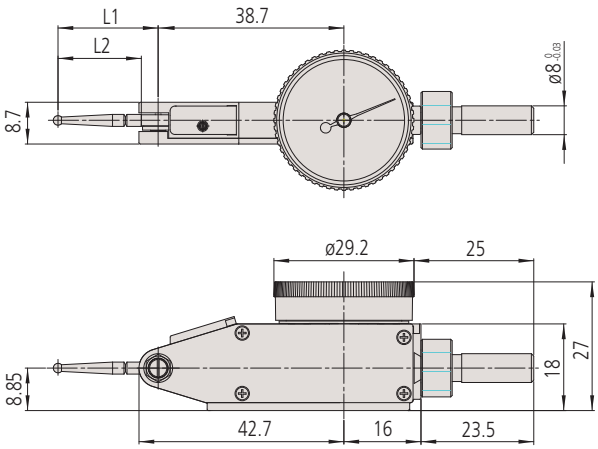
Unit: mm




| Type | Order No. | L1 | L2 |
|---|---|---|---|
| Vertical | 513-401-10E | 14.7 | 11.2 |
| | 513-471-10E | | |
| | 513-405-10E/A/T | 18.7 | 15.2 |
| | 513-415-10E/A | | |
| | 513-475-10E | | |
| | 513-404-10E/A/T | 20.9 | 17.4 |
| | 513-474-10E | | |
| | 513-424-10E/A/T | 22.2 | 18.7 |
| | 513-426-10E/A | | |
| | 513-478-10E | | |
| | 513-414-10E/A/T | 37.4 | 33.9 |
| | 513-415-10E/A/T | 44.5 | 41.0 |
| | 513-477-10E | | |

### Compact

Unit: mm




| Type | Order No. | L1 | L2 |
|---|---|---|---|
| Compact | 513-465-10E | 18.7 | 15.2 |
| | 513-464-10E | 20.9 | 17.4 |
| | 513-466-10E | 22.2 | 18.7 |

# Horizontal (Standard model)

## SPECIFICATIONS

### Metric

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | 10 scale divisions | Hysteresis | Repeatability | | | | | | | | | | |
| **513-424-10E** | **513-424-10A** | **513-424-10T** | 0.01 mm | 0.5 mm | 0-25-0 | 6 µm | 5 µm | 4 µm | 3 µm | 45g | 0.3N or less | | | | ✓ | ✓ | | ✓ | |
| **513-478-10E** | – | – | | | | | | | | | | | | | ✓ | ✓ | | | ✓ |
| **513-466-10E** | – | – | | | | 6 µm | | 4 µm | | 41g | 0.3N or less | | | | | ✓ | ✓ | ✓ | |
| **513-404-10E** | **513-404-10A** | **513-404-10T** | | 0.8 mm | 0-40-0 | 9 µm | | | | 45g | | | | | ✓ | | | ✓ | |
| **513-414-10E** | **513-414-10A** | **513-414-10T** | | 0.5 mm | 0-25-0 | 10 µm | | 5 µm | | | 0.2N or less | | | ✓ | | ✓ | | ✓ | |
| **513-474-10E** | – | – | | 0.8 mm | 0-40-0 | 9 µm | | 4 µm | | | 0.3N or less | | | | ✓ | | | | ✓ |
| **513-464-10E** | – | – | | | | | | | | 41g | | | | | | | ✓ | ✓ | |
| **513-415-10E** | **513-415-10A** | **513-415-10T** | | 1.0 mm | 0-50-0 | 10 µm | | 5 µm | | 45g | 0.2N or less | | | ✓ | | | | ✓ | |
| **513-477-10E** | – | – | | | | | | | | | | | | ✓ | | | | | ✓ |
| **513-426-10E** | **513-426-10A** | – | | 1.5 mm | 0-25-0 | 16 µm | | | | | 0.4N or less | | ✓ | | | ✓ | | ✓ | |
| **543-405-10E** | **543-405-10A** | **543-405-10T** | 0.002 mm | 0.2 mm | 0-100-0 | 4 µm | 2 µm | 3 µm | 1 µm | | 0.3N or less | | | | ✓ | | | ✓ | |
| **513-471-10E** | – | – | 0.001 mm | 0.14 mm | 0-70-0 | | | | | | | ✓ | | | | | | | ✓ |
| **513-475-10E** | – | – | | 0.2 mm | | | | | | | | | | | ✓ | | | | ✓ |
| **513-425-10E** | **513-425-10A** | – | 0.002 mm | 0.6 mm | 0-100-0 | 7 µm | | 4 µm | | | 0.4N or less | | ✓ | | | | | ✓ | |
| **513-465-10E** | – | – | | 0.2 mm | | 4 µm | | 3 µm | | 41g | 0.3N or less | | | | | | ✓ | ✓ | |
| **513-401-10E** | – | – | 0.001 mm | 0.14 mm | 0-70-0 | | | | | 45g | | ✓ | | | | | | ✓ | |

### Inch

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | One rev. | Hysteresis | Repeatability | | | | | | | | | | | |
| **513-402-10E** | – | **513-402-10T** | 0.0005 in | 0.03 in | 0-15-0 | ±0.0005 in | 0.0002 in | 0.0002 in | 45g | 0.3N or less | | | | ✓ | | | | ✓ | |
| **513-472-10E** | – | – | | | | | | | | | | | | ✓ | | | | | ✓ |
| **513-412-10E** | – | **513-412-10T** | | | | | | | | 0.2N or less | | | ✓ | | | | | ✓ | |
| **513-479-10E** | – | – | | | | | | | | | | | ✓ | | | | | | ✓ |
| **513-462-10E** | – | – | | | | | | | 41g | 0.3N or less | | | | | | ✓ | ✓ | ✓ | |
| **513-403-10E** | – | **513-403-10T** | 0.0001 in | 0.008 in | 0-4-0 | ±0.0001 in | 0.0001 in | 0.00004 in | 45g | | | | | ✓ | | | | ✓ | |
| **513-473-10E** | – | – | | | | | | | | | | | | ✓ | | | | | ✓ |
| **513-463-10E** | – | – | | | | | | | 41g | | | | | | | ✓ | ✓ | | |

### Metric/Inch

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | 10 scale divisions | Hysteresis | Repeatability | | | | | | | | | | |
| **513-409-10E** | – | **513-409-10T** | 0.002mm /0.0001 in | 0.2mm /0.0076 in | 0-10-0 /0-38-0 | 4µm | 2µm | 3µm | 1µm | 45g | 0.3N or less | | | | | | | ✓ | ✓ |

### Inch/Metric

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | Hysteresis | Repeatability | | | | | | | | | | | |
| **513-406-10E** | – | **513-406-10T** | 0.0005 in /0.01mm | 0.03 in /0.7mm | 0-15-0 /0-35-0 | ±0.0005 in | 0.0002 in | 0.0002 in | 45g | 0.3N or less | | | | | | | | ✓ | ✓ |

* Stem with ø6 dovetail groove is not included in the mass.

* Be sure to perform calibration with reference gage, etc. after changing the contact point. The inside parts may be damaged when the contact point is changed due to the breakage. In the case the of the significant deterioration during the operation, repair is required.

## Parallel (The scale can be read from the front, with the contact point pivoting in a plane parallel to that of the dial face.)

### Metric

**513-484-10**

**Contact point No. 103006**

Graduation: 0.01mm
Range: 0.8mm

**513-484-10E/513-484-10A/ 513-484-10T**

Carbide contact point (Anti-magnet)

**513-486-10**

**Contact point No. 137557**

Graduation: 0.01mm
Range: 0.5mm

**513-486-10E**

Double scale spacing
Carbide contact point (Anti-magnet)

**513-485-10**

**Contact point No. 103011**

Graduation: 0.002mm
Range: 0.2mm

**513-485-10E**

Carbide contact point (Anti-magnet)

### Inch

**513-482-10**

**Contact point No. 133195**

Graduation: 0.0005 in
Range: 0.03 in

**513-482-10A/513-482-10T**

Carbide contact point (Anti-magnet)

## SPECIFICATIONS

### Metric

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | 10 scale divisions | Hysteresis | Repeatability | | | | | | | | | | |
| **513-484-10E** | **513-484-10A** | **513-484-10T** | 0.01mm | 0.8mm | 0-40-0 | 9µm | 5µm | 4µm | 3µm | 53g | 0.3N or less | | | | | | | ✓ | |
| **513-485-10E** | – | – | 0.002mm | 0.2mm | 0-100-0 | 4µm | 2µm | 3µm | 1µm | | | | | | | | | ✓ | |
| **513-486-10E** | – | – | 0.01mm | 0.5mm | 0-25-0 | 6µm | 5µm | 4µm | 3µm | | | | | | | ✓ | | ✓ | |

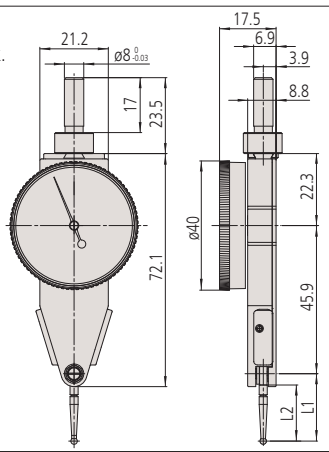
### Inch

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | Hysteresis | Repeatability | | | | | | | | | | |
| – | **513-482-10A** | **513-482-10T** | 0.0005 in | 0.03 in | 0-15-0 | ±0.0005 in | 0.0002 in | 0.0002 in | 53g | 0.3N or less | | | | | | | ✓ | |

* Stem with ø6 dovetail groove is not included in the mass.
* Be sure to perform calibration with reference gage, etc. after changing the contact point. The inside parts may be damaged when the contact point is changed due to the breakage. In the case the of the significant deterioration during the operation, repair is required.

## DIMENSIONS

* No dovetail in the back.




Unit: mm

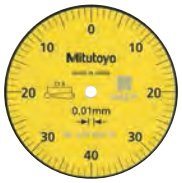
| Order No. | L1 | L2 |
|---|---|---|
| **513-484-10E** | 20.9 | 17.4 |
| **513-485-10E** | 18.7 | 15.2 |
| **513-486-10E** | 22.2 | 18.7 |

## Vertical (Best suited for centering holes under the spindle of a machine tool.)

### Metric

**513-454-10**

**Contact point No. 103006**




Graduation: 0.01mm
Range: 0.8mm

**513-454-10E/513-454-10A/ 513-454-10T**

Carbide contact point (Anti-magnet)

**513-455-10**

**Contact point No. 103011**

Graduation: 0.002mm
Range: 0.2mm

**513-455-10E/513-455-10A/ 513-455-10T**

Carbide contact point (Anti-magnet)

**513-456-10**

**Contact point No. 137557**

Graduation: 0.01mm
Range: 0.5mm

**513-456-10E**

Double scale spacing

Carbide contact point (Anti-magnet)

### Inch

**513-452-10**

**Contact point No. 133195**

Graduation: 0.0005 in
Range: 0.03 in

**513-452-10E/513-452-10T**

Carbide contact point (Anti-magnet)

**513-453-10**

**Contact point No. 21CZB064**

Graduation: 0.0001 in
Range: 0.008 in

**513-453-10E/513-453-10T**

Carbide contact point (Anti-magnet)

## SPECIFICATIONS

### Metric

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | 10 scale divisions | Hysteresis | Repeatability | | | | | | | | | | |
| **513-454-10E** | **513-454-10A** | **513-454-10T** | 0.01mm | 0.8mm | 0-40-0 | 9µm | 5µm | 4µm | 3µm | 46g | 0.3N or less | | | | | | | ✓ | |
| **513-455-10E** | **513-455-10A** | **513-455-10T** | 0.002mm | 0.2mm | 0-100-0 | 4µm | 2µm | 3µm | 1µm | | | | | | | | | ✓ | |
| **513-456-10E** | – | – | 0.01mm | 0.5mm | 0-25-0 | 6µm | 5µm | 4µm | 3µm | | | | | | | ✓ | | ✓ | |

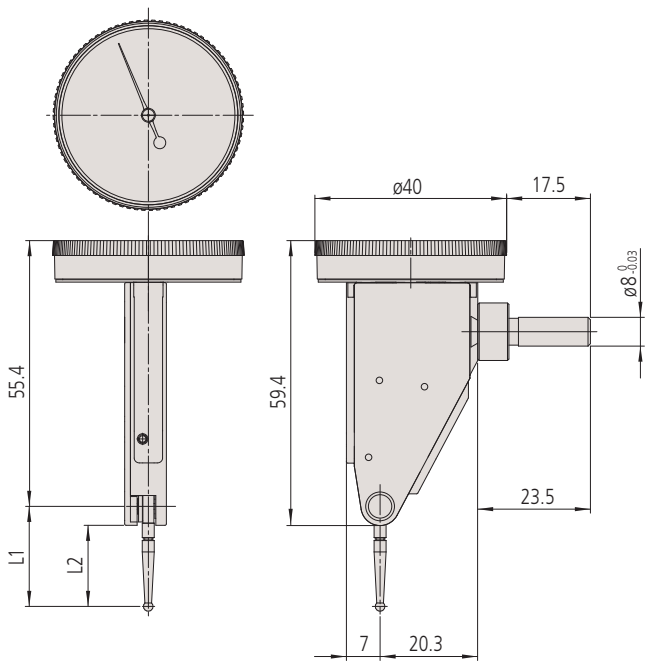
### Inch

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | Hysteresis | Repeatability | | | | | | | | | | |
| **513-452-10E** | – | **513-452-10T** | 0.0005 in | 0.03 in | 0-15-0 | ±0.0005 in | 0.0002 in | 0.0002 in | 46g | 0.3N or less | | | | | | | ✓ | |
| **513-453-10E** | – | **513-453-10T** | 0.0001 in | 0.008 in | 0-4-0 | ±0.0001 in | 0.0001 in | 0.00004 in | | | | | | | | | ✓ | |

* Stem with ø6 dovetail groove is not included in the mass.
* Be sure to perform calibration with reference gage, etc. after changing the contact point. The inside parts may be damaged when the contact point is changed due to the breakage. In the case the of the significant deterioration during the operation, repair is required.

## DIMENSIONS

Unit: mm




| Order No. | L1 | L2 |
|---|---|---|
| **513-454-10E** | 20.9 | 17.4 |
| **513-455-10E** | 18.7 | 15.2 |
| **513-456-10E** | 22.2 | 18.7 |

## Horizontal (20° Tilted Face) (Dial face inclined 20°, compared with the vertical type.)

### Metric

**513-444-10**

**Contact point No. 103006**

Graduation: 0.01mm
Range: 1.6mm

**513-444-10E/513-444-10A/ 513-444-10T**

- With revolution counter
- Carbide contact point (Anti-magnet)

**513-445-10**

**Contact point No. 103011**

Graduation: 0.02mm
Range: 0.4mm

**513-445-10E/513-445-10A/ 513-445-10T**

- With revolution counter
- Carbide contact point (Anti-magnet)

### Inch

**513-442-10**

**Contact point No. 133195**

Graduation: 0.0005 in
Range: 0.06 in

**513-442-10A/513-442-10T**

- With revolution counter
- Carbide contact point (Anti-magnet)

**513-442-16**

**Contact point No. 133195**

Graduation: 0.0005 in
Range: 0.06 in

**513-442-16A/513-442-16T**

- With revolution counter
- Carbide contact point (Anti-magnet)

**513-446-10**

**Contact point No. 136290**

Graduation: 0.0005 in
Range: 0.06 in

**513-446-10A/513-446-10T**

- With revolution counter
- Long stylus
- Carbide contact point (Anti-magnet)

**513-446-16**

**Contact point No. 136290**

Graduation: 0.0005 in
Range: 0.06 in

**513-446-16A/513-446-16T**

- With revolution counter
- Long stylus
- Carbide contact point (Anti-magnet)

**513-443-10**

**Contact point No. 21CZB064**

Graduation: 0.0001 in
Range: 0.016 in

**513-443-10A/513-443-10T**

- With revolution counter
- Carbide contact point (Anti-magnet)

**513-443-16**

**Contact point No. 21CZB064**

Graduation: 0.0001 in
Range: 0.016 in

**513-443-16A/513-443-16T**

- With revolution counter
- Carbide contact point (Anti-magnet)

## SPECIFICATIONS

### Metric

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | 10 scale divisions | Hysteresis | Repeatability | | | | | | | | | | |
| **513-444-10E** | **513-444-10A** | **513-444-10T** | 0.01mm | 1.6mm | 0-40-0 | 16µm | 5µm | 5µm | 3µm | 48g | 0.3N or less | | ✓ | | | | | ✓ | |
| **513-445-10E** | **513-445-10A** | **513-445-10T** | 0.002mm | 0.4mm | 0-100-0 | 6µm | 2µm | 4µm | 1µm | | | | ✓ | | | | | ✓ | |

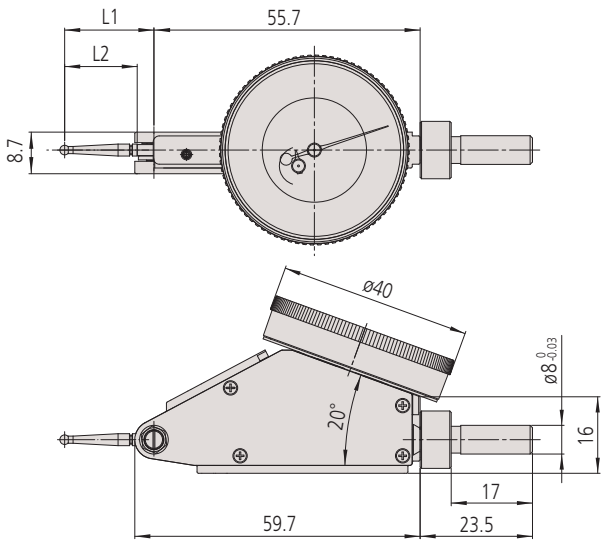
### Inch

| Order No. | | | Graduation | Range | Dial reading | Indication accuracy | | | Mass | Measuring force | High accuracy | With revolution counter | Long stylus | Standard | Double scale spacing | Compact | Carbide contact point (Anti-magnet) | Ruby contact point (non-magnet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic set | Plus set | Full set | | | | Measuring range | Hysteresis | Repeatability | | | | | | | | | | |
| – | **513-442-10A** | **513-442-10T** | 0.0005 in | 0.06 in | 0-15-0 | ±0.0005 in | 0.0002 in | 0.0002 in | 48g | 0.3N or less | | ✓ | | | | | ✓ | |
| – | **513-442-16A** | **513-442-16T** | | | | | | | | | | ✓ | | | | | ✓ | |
| – | **513-446-10A** | **513-446-10T** | | | | | | | | 0.2N or less | | ✓ | ✓ | | | | ✓ | |
| – | **513-446-16A** | **513-446-16T** | | | | | | | | | | ✓ | ✓ | | | | ✓ | |
| – | **513-443-10A** | **513-443-10T** | 0.0001 in | 0.016 in | 0-4-0 | ±0.0002 in | 0.0001 in | 0.00004 in | | 0.3N or less | | ✓ | | | | | ✓ | |
| – | **513-443-16A** | **513-443-16T** | | | | | | | | | | ✓ | | | | | ✓ | |

* Stem with ø6 dovetail groove is not included in the mass.
* Be sure to perform calibration with reference gage, etc. after changing the contact point. The inside parts may be damaged when the contact point is changed due to the breakage. In the case the of the significant deterioration during the operation, repair is required.

## DIMENSIONS

Unit: mm




| Order No. | L1 | L2 |
|---|---|---|
| **513-445-10E** | 18.7 | 15.2 |
| **513-444-10E** | 20.9 | 17.4 |

Refer to MEASURING INSTRUMENTS CATALOG No. US-1004 for the accessories such as styli, stems with dovetail, holding bars, etc.