

## Bore Gages

### Bore Gages SERIES 511 — for Blind Holes

- Capable of ID (inside diameter) measurement close to the bottom of a hole.
- The contact point and anvil have a carbide ball tip that is highly durable and abrasion-resistant.
- Optional Extension Rods can be attached for measuring deep holes. (For details, refer to page C-49)



511-415

Note: The dial indicator and the dial protection cover are optional.

### SPECIFICATIONS

| Metric     |            |                              |                |                     |                      |                     |                 |                |                                  |                       |         |        |                    |  |
|------------|------------|------------------------------|----------------|---------------------|----------------------|---------------------|-----------------|----------------|----------------------------------|-----------------------|---------|--------|--------------------|--|
| Order No.  | Range (mm) | Stroke of contact point (mm) | Accuracy* (μm) | Repeatability* (μm) | Adjacent error* (μm) | Measuring force (N) | Guide force (N) | Content of set |                                  |                       |         |        | Probing depth (mm) |  |
|            |            |                              |                |                     |                      |                     |                 | Bore gage      | Dial indicator                   | Dial protection cover | Anvil   | Washer |                    |  |
| 511-415    | 15 - 35    |                              |                |                     |                      |                     |                 | 511-415        |                                  |                       | 11 pcs. | 1 pc.  | 150                |  |
| 511-416    | 35 - 60    | 1.2                          | 4              | 1                   | 1                    | 4 or less           | 6 or less       | 511-416        | Not supplied                     | Not supplied          | 6 pcs.  | 4 pcs. |                    |  |
| 511-417    | 50 - 150   |                              |                |                     |                      | 5 or less           | 10 or less      | 511-417        |                                  |                       | 11 pcs. |        |                    |  |
| 511-425-20 | 15 - 35    |                              |                |                     |                      |                     |                 | 511-415        | 2046AB (Graduation: 0.01 mm)     | 21DZA000              | 11 pcs. | 1 pc.  | 150                |  |
| 511-426-20 | 35 - 60    | 1.2                          | 4              | 1                   | 1                    | 4 or less           | 6 or less       | 511-416        |                                  |                       | 6 pcs.  | 4 pcs. |                    |  |
| 511-427-20 | 50 - 150   |                              |                |                     |                      | 5 or less           | 10 or less      | 511-417        |                                  |                       | 11 pcs. |        |                    |  |
| 511-435-20 | 15 - 35    |                              |                |                     |                      |                     |                 | 511-415        | 2109AB-10 (Graduation: 0.001 mm) | 21DZA000              | 11 pcs. | 1 pc.  | 150                |  |
| 511-436-20 | 35 - 60    | 1.2                          | 4              | 1                   | 1                    | 4 or less           | 6 or less       | 511-416        |                                  |                       | 6 pcs.  | 4 pcs. |                    |  |
| 511-437-20 | 50 - 150   |                              |                |                     |                      | 5 or less           | 10 or less      | 511-417        |                                  |                       | 11 pcs. |        |                    |  |

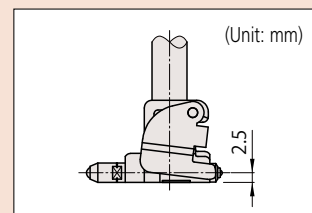
| Inch       |            |                              |                |                     |                      |                     |                 |                |                                   |                       |         |        |                    |  |
|------------|------------|------------------------------|----------------|---------------------|----------------------|---------------------|-----------------|----------------|-----------------------------------|-----------------------|---------|--------|--------------------|--|
| Order No.  | Range (in) | Stroke of contact point (in) | Accuracy* (in) | Repeatability* (in) | Adjacent error* (in) | Measuring force (N) | Guide force (N) | Content of set |                                   |                       |         |        | Probing depth (in) |  |
|            |            |                              |                |                     |                      |                     |                 | Bore gage      | Dial indicator                    | Dial protection cover | Anvil   | Washer |                    |  |
| 511-418    | 0.6 - 1.4  |                              |                |                     |                      |                     |                 | 511-418        |                                   |                       | 11 pcs. | 1 pc.  | 6                  |  |
| 511-419    | 1.4 - 2.4  | 0.047                        | 0.00016        | 0.00004             | 0.00004              | 4 or less           | 6 or less       | 511-419        | Not supplied                      | Not supplied          | 6 pcs.  | 4 pcs. |                    |  |
| 511-420    | 2.0 - 6.0  |                              |                |                     |                      | 5 or less           | 10 or less      | 511-420        |                                   |                       | 11 pcs. |        |                    |  |
| 511-428-20 | 0.6 - 1.4  |                              |                |                     |                      |                     |                 | 511-418        | 2922AB (Graduation: 0.0005 in)    | 21DZA000              | 11 pcs. | 1 pc.  | 6                  |  |
| 511-429-20 | 1.4 - 2.4  | 0.047                        | 0.00016        | 0.00004             | 0.00004              | 4 or less           | 6 or less       | 511-419        |                                   |                       | 6 pcs.  | 4 pcs. |                    |  |
| 511-430-20 | 2.0 - 6.0  |                              |                |                     |                      | 5 or less           | 10 or less      | 511-420        |                                   |                       | 11 pcs. |        |                    |  |
| 511-438-20 | 0.6 - 1.4  |                              |                |                     |                      |                     |                 | 511-418        | 2923AB-10 (Graduation: 0.0001 in) | 21DZA000              | 11 pcs. | 1 pc.  | 6                  |  |
| 511-439-20 | 1.4 - 2.4  | 0.047                        | 0.00016        | 0.00004             | 0.00004              | 4 or less           | 6 or less       | 511-419        |                                   |                       | 6 pcs.  | 4 pcs. |                    |  |
| 511-440-20 | 2.0 - 6.0  |                              |                |                     |                      | 5 or less           | 10 or less      | 511-420        |                                   |                       | 11 pcs. |        |                    |  |

\* Accuracy of the bore gage alone.

Note 1: A 10 mm (0.4 in) sub-anvil is supplied with 511-415/425-20/435-20/418/428-20/438-20 and a 50 mm (2 in) sub-anvil is supplied with 511-417/427-20/437-20/420/430-20/440-20.

Note 2: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

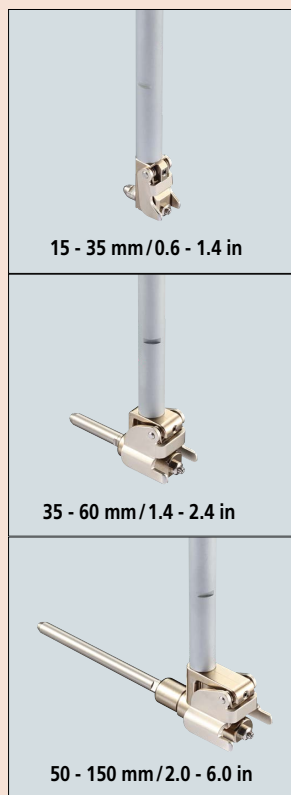
### Measurement example



### The dial protection cover, recommended indicators

Refer to page C-50.

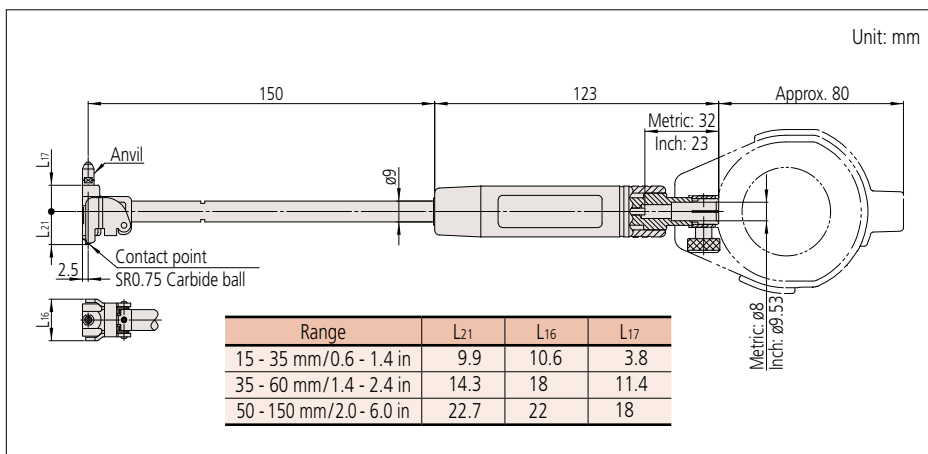
## Contact Points



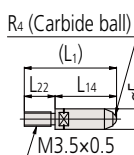
## Recommended Digimatic Indicators

Refer to page C-36.

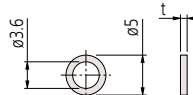
## DIMENSIONS



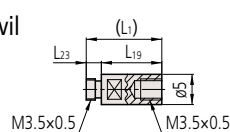
### Anvil



### Interchangeable washer

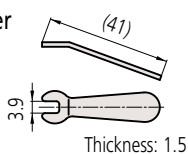


### Sub-anvil

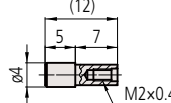


Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

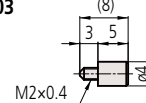
### Spanner 204354



### Washer holder 212202



### Locking screw 212203



## STANDARD ACCESSORIES

| Bore gage<br>(Main body)                                     | Anvil         |           |                                   |                |                 |                |                 |                                      | Interchangeable<br>washer                                            |           | Sub-Anvil       |                  |
|--------------------------------------------------------------|---------------|-----------|-----------------------------------|----------------|-----------------|----------------|-----------------|--------------------------------------|----------------------------------------------------------------------|-----------|-----------------|------------------|
|                                                              | Marked<br>No. | Order No. | Indication of measuring size      | L <sub>1</sub> | L <sub>22</sub> | R <sub>4</sub> | L <sub>14</sub> | Order No.                            | t                                                                    | Order No. | L <sub>23</sub> | L <sub>19</sub>  |
| 511-415<br>511-418<br>( ) Using<br>10 mm/0.4 in<br>Sub-Anvil | 1             | 21DZA376A | 15 mm (25 mm)/0.59 in (0.98 in)   | 4.5            |                 |                | 2               |                                      |                                                                      |           |                 |                  |
|                                                              | 2             | 21DZA376B | 16 mm (26 mm)/0.63 in (1.02 in)   | 5.5            |                 |                | 3               |                                      |                                                                      |           |                 |                  |
|                                                              | 3             | 21DZA376C | 17 mm (27 mm)/0.67 in (1.06 in)   | 6.5            |                 |                | 4               |                                      |                                                                      |           |                 |                  |
|                                                              | 4             | 21DZA376D | 18 mm (28 mm)/0.71 in (1.10 in)   | 7.5            |                 |                | 5               |                                      |                                                                      |           |                 |                  |
|                                                              | 5             | 21DZA376E | 19 mm (29 mm)/0.75 in (1.14 in)   | 8.5            |                 |                | 6               |                                      |                                                                      |           |                 |                  |
|                                                              | 6             | 21DZA376F | 20 mm (30 mm)/0.79 in (1.18 in)   | 9.5            | 2.5             |                | 7               | 212127                               | 0.5 mm/0.02 in                                                       | 21DAA563  | 2.5             | 10 mm/<br>0.4 in |
|                                                              | 7             | 21DZA376G | 21 mm (31 mm)/0.83 in (1.22 in)   | 10.5           |                 |                | 8               |                                      |                                                                      |           |                 |                  |
|                                                              | 8             | 21DZA376H | 22 mm (32 mm)/0.87 in (1.26 in)   | 11.5           |                 |                | 9               |                                      |                                                                      |           |                 |                  |
|                                                              | 9             | 21DZA376J | 23 mm (33 mm)/0.91 in (1.30 in)   | 12.5           |                 |                | 10              |                                      |                                                                      |           |                 |                  |
|                                                              | 10            | 21DZA376L | 24 mm (34 mm)/0.94 in (1.34 in)   | 13.5           |                 |                | 11              |                                      |                                                                      |           |                 |                  |
|                                                              | 11            | 21DZA376M | 25 mm (35 mm)/0.98 in (1.38 in)   | 14.5           |                 |                | 12              |                                      |                                                                      |           |                 |                  |
| 511-416<br>511-419                                           | 1             | 21DZA404A | 35 mm/1.38 in                     | 17.5           |                 |                | 10              |                                      |                                                                      |           |                 |                  |
|                                                              | 2             | 21DZA404B | 40 mm/1.57 in                     | 22.5           |                 |                | 15              |                                      |                                                                      |           |                 |                  |
|                                                              | 3             | 21DZA404C | 45 mm/1.77 in                     | 27.5           |                 |                | 20              | 212127<br>212128<br>212129<br>212130 | 0.5 mm/0.02 in<br>1.0 mm/0.04 in<br>2.0 mm/0.08 in<br>3.0 mm/0.12 in |           |                 |                  |
|                                                              | 4             | 21DZA404D | 50 mm/1.97 in                     | 32.5           | 7.5             | SR1.5          | 25              |                                      |                                                                      |           |                 |                  |
|                                                              | 5             | 21DZA404E | 55 mm/2.17 in                     | 37.5           |                 |                | 30              |                                      |                                                                      |           |                 |                  |
|                                                              | 6             | 21DZA404F | 60 mm/2.36 in                     | 42.5           |                 |                | 35              |                                      |                                                                      |           |                 |                  |
| 511-417<br>511-420<br>( ) Using<br>50 mm/2 in<br>Sub-Anvil   | 1             | 21DZA404A | 50 mm (100 mm)/1.97 in (3.94 in)  | 17.5           |                 |                | 10              |                                      |                                                                      |           |                 |                  |
|                                                              | 2             | 21DZA404B | 55 mm (105 mm)/2.17 in (4.13 in)  | 22.5           |                 |                | 15              |                                      |                                                                      |           |                 |                  |
|                                                              | 3             | 21DZA404C | 60 mm (110 mm)/2.36 in (4.33 in)  | 27.5           |                 |                | 20              |                                      |                                                                      |           |                 |                  |
|                                                              | 4             | 21DZA404D | 65 mm (115 mm)/2.56 in (4.53 in)  | 32.5           |                 |                | 25              |                                      |                                                                      |           |                 |                  |
|                                                              | 5             | 21DZA404E | 70 mm (120 mm)/2.76 in (4.72 in)  | 37.5           |                 |                | 30              |                                      |                                                                      |           |                 |                  |
|                                                              | 6             | 21DZA404F | 75 mm (125 mm)/2.95 in (4.92 in)  | 42.5           | 7.5             | SR1.5          | 35              | 212127<br>212128<br>212129<br>212130 | 0.5 mm/0.02 in<br>1.0 mm/0.04 in<br>2.0 mm/0.08 in<br>3.0 mm/0.12 in | 21DAA596  | 7.5             | 50 mm/<br>2 in   |
|                                                              | 7             | 21DZA404G | 80 mm (130 mm)/3.15 in (5.12 in)  | 47.5           |                 |                | 40              |                                      |                                                                      |           |                 |                  |
|                                                              | 8             | 21DZA404H | 85 mm (135 mm)/3.35 in (5.31 in)  | 52.5           |                 |                | 45              |                                      |                                                                      |           |                 |                  |
|                                                              | 9             | 21DZA404J | 90 mm (140 mm)/3.54 in (5.51 in)  | 57.5           |                 |                | 50              |                                      |                                                                      |           |                 |                  |
|                                                              | 10            | 21DZA404L | 95 mm (145 mm)/3.74 in (5.71 in)  | 62.5           |                 |                | 55              |                                      |                                                                      |           |                 |                  |
|                                                              | 11            | 21DZA404M | 100 mm (150 mm)/3.94 in (5.91 in) | 67.5           |                 |                | 60              |                                      |                                                                      |           |                 |                  |