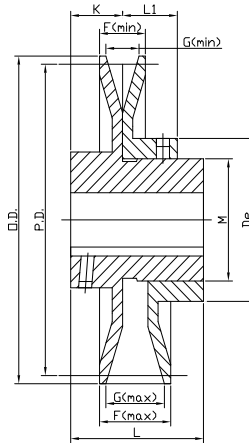


## 1VP

Cast iron sheaves - **Light Duty**

Bored - to Size

1VP sheaves for 3L,4L, 5L, A, B, and 5V belts.



### One Groove Dimensions (Inches)

| Part No. | O.D.  | F     |       | G     |       | L     | K     | Bore                         | M     | De   | Avg. Wt. |
|----------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-------|------|----------|
|          |       | Max   | Min   | Max   | Min   |       |       |                              |       |      |          |
| 1VP25    | 2.380 | 0.810 | 0.560 | 0.630 | 0.380 | 1.590 | 0.620 | 1/2, 5/8, 3/4                | 1.375 | 2.00 | 1.0      |
| 1VP30    | 2.870 | 0.810 | 0.560 | 0.630 | 0.380 | 1.660 | 0.630 | 1/2, 5/8, 3/4                | 1.500 | 2.13 | 1.4      |
| 1VP34    | 3.150 | 1.000 | 0.690 | 0.810 | 0.500 | 1.880 | 0.780 | 1/2, 5/8, 3/4                | 1.500 | 2.13 | 1.5      |
|          |       |       |       |       |       |       |       | 7/8, 1, 1 1/8                | 1.750 | 2.38 | 1.7      |
| 1VP40    | 3.750 | 1.060 | 0.690 | 0.880 | 0.500 | 1.880 | 0.660 | 1/2, 5/8, 3/4                | 1.500 | 2.13 | 2.0      |
|          |       |       |       |       |       |       |       | 7/8, 1, 1 1/8                | 1.750 | 2.38 | 2.0      |
| 1VP44    | 4.150 | 1.060 | 0.690 | 0.880 | 0.500 | 1.880 | 0.660 | 1/2, 5/8, 3/4                | 1.500 | 2.13 | 2.2      |
|          |       |       |       |       |       |       |       | 7/8, 1, 1 1/8                | 1.750 | 2.38 | 2.2      |
| 1VP50    | 4.750 | 1.060 | 0.690 | 0.880 | 0.500 | 2.000 | 0.780 | 1/2, 5/8, 3/4                | 1.500 | 2.13 | 2.7      |
|          |       |       |       |       |       |       |       | 7/8, 1, 1 1/8                | 1.750 | 2.38 | 2.8      |
| 1VP56    | 5.350 | 1.060 | 0.690 | 0.880 | 0.500 | 2.000 | 0.780 | 1/2, 5/8, 3/4, 7/8, 1, 1 1/8 | 1.750 | 2.38 | 3.4      |
|          |       |       |       |       |       |       |       |                              |       |      |          |
| 1VP60    | 6.000 | 1.250 | 0.880 | 1.031 | 0.660 | 2.160 | 0.850 | 5/8, 3/4, 7/8, 1, 1 1/8      | 2.000 | 2.62 | 4.6      |
|          |       |       |       |       |       |       |       | 1 3/8, 1 5/8                 | 2.500 | 3.29 | 5.3      |
| 1VP62    | 5.950 | 1.130 | 0.750 | 0.880 | 0.500 | 2.000 | 0.780 | 5/8, 3/4, 7/8, 1, 1 1/8      | 2.000 | 2.62 | 4.6      |
|          |       |       |       |       |       |       |       | 1 1/4, 1 3/8                 | 2.500 | 3.29 | 5.3      |
| 1VP65    | 6.500 | 1.250 | 0.880 | 1.030 | 0.660 | 2.160 | 0.850 | 3/4, 7/8, 1 1/8              | 2.000 | 2.62 | 5.3      |
|          |       |       |       |       |       |       |       | 1 1/4, 1 3/8                 | 2.500 | 3.29 | 5.8      |
| 1VP68    | 6.550 | 1.130 | 0.750 | 0.880 | 0.500 | 2.000 | 0.780 | 5/8, 3/4, 7/8, 1, 1 1/8      | 2.000 | 2.62 | 5.2      |
|          |       |       |       |       |       |       |       | 1 1/4, 1 3/8                 | 2.500 | 3.29 | 5.8      |
| 1VP71    | 7.100 | 1.250 | 0.880 | 1.030 | 0.660 | 2.160 | 0.850 | 3/4, 7/8, 1 1/8              | 2.000 | 2.62 | 6.5      |
|          |       |       |       |       |       |       |       | 1 3/8, 1 5/8                 | 2.500 | 3.29 | 6.8      |
| 1VP75    | 7.500 | 1.250 | 0.880 | 1.030 | 0.660 | 2.160 | 0.850 | 3/4, 7/8, 1 1/8              | 2.000 | 2.62 | 7.0      |
|          |       |       |       |       |       |       |       | 1 3/8, 1 5/8                 | 2.500 | 3.29 | 7.6      |

### Installation Instructions

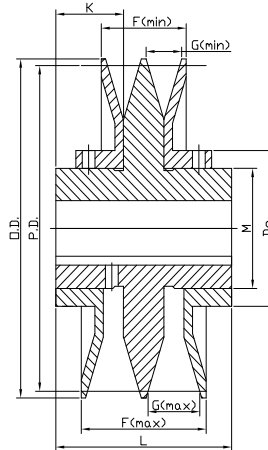
| Part No. | Diameter Ranges (Inches) |            |            |            |                       |            |           |            |                       |            |           |            |              |            |            |            |
|----------|--------------------------|------------|------------|------------|-----------------------|------------|-----------|------------|-----------------------|------------|-----------|------------|--------------|------------|------------|------------|
|          | " 3L " Belts             |            |            |            | " 4L " or " A " Belts |            |           |            | " 5L " or " B " Belts |            |           |            | " 5V " Belts |            |            |            |
|          | Min Pitch                | Turns Open | Max. Pitch | Turns Open | Min Datum             | Turns Open | Max Datum | Turns Open | Min Datum             | Turns Open | Max Datum | Turns Open | Min Pitch    | Turns Open | Max. Pitch | Turns Open |
| 1VP25    | 1.6                      | 4          | 2.4        | 0          | -                     | -          | -         | -          | -                     | -          | -         | -          | -            | -          | -          | -          |
| 1VP30    | 1.8                      | 4          | 2.7        | 0          | -                     | -          | -         | -          | -                     | -          | -         | -          | -            | -          | -          | -          |
| 1VP34    | 1.7                      | 4          | 2.5        | 0          | 1.9                   | 5          | 2.9       | 0          | 2.4                   | 5          | 3.2       | 1          | -            | -          | -          | -          |
| 1VP40    | 2.3                      | 4          | 3.1        | 0          | 2.4                   | 5          | 3.4       | 0          | 2.7                   | 6          | 3.7       | 1          | -            | -          | -          | -          |
| 1VP44    | 2.7                      | 4          | 3.5        | 0          | 2.8                   | 5          | 3.8       | 0          | 3.1                   | 6          | 4.1       | 1          | -            | -          | -          | -          |
| 1VP50    | 3.3                      | 4          | 4.1        | 0          | 3.4                   | 5          | 4.4       | 0          | 3.7                   | 6          | 4.7       | 1          | -            | -          | -          | -          |
| 1VP56    | 3.9                      | 4          | 4.7        | 0          | 4.0                   | 5          | 5.0       | 0          | 4.3                   | 6          | 5.3       | 1          | -            | -          | -          | -          |
| 1VP60    | -                        | -          | -          | -          | 4.2                   | 5          | 5.2       | 0          | 4.3                   | 6          | 5.5       | 0          | -            | -          | -          | -          |
| 1VP62    | 4.5                      | 4          | 5.3        | 0          | 4.6                   | 5          | 5.6       | 0          | 4.9                   | 6          | 5.9       | 1          | 5.3          | 6          | 6.3        | 1          |
| 1VP65    | -                        | -          | -          | -          | 4.7                   | 5          | 5.7       | 0          | 4.8                   | 6          | 6.0       | 0          | 5.2          | 6          | 6.4        | 0          |
| 1VP68    | 5.1                      | 4          | 5.9        | 0          | 5.2                   | 5          | 6.2       | 0          | 5.5                   | 6          | 6.5       | 1          | 5.9          | 6          | 6.9        | 1          |
| 1VP71    | -                        | -          | -          | -          | 5.3                   | 5          | 6.3       | 0          | 5.4                   | 6          | 6.6       | 0          | 5.8          | 6          | 7.0        | 0          |
| 1VP75    | -                        | -          | -          | -          | 5.7                   | 5          | 6.7       | 0          | 5.8                   | 6          | 7.0       | 0          | 6.2          | 6          | 7.4        | 0          |

## 2VP

Cast iron sheaves - **Light Duty**

Bored - to Size

2VP sheaves for 3L, 4L, 5L, A, B, and 5V belts.



### Two Grooves Dimensions (Inches)

| Part No. | O.D.  | F     |       | G     |       | L     | K     | Bore                                      | M     | De   | Avg. Wt. |
|----------|-------|-------|-------|-------|-------|-------|-------|---|-------|------|----------|
|          |       | Max   | Min   | Max   | Min   |       |       |   |       |      |          |
| 2VP36    | 3.350 | 2.000 | 1.380 | 0.810 | 0.500 | 3.000 | 1.190 | 1/2, 5/8, 3/4, 7/8, 1, 1 1/8              | 2.000 | 2.62 | 3.8      |
| 2VP42    | 3.950 | 2.130 | 1.380 | 0.880 | 0.500 | 3.000 | 1.190 | 5/8, 3/4, 7/8, 1, 1 1/8                   | 2.000 | 2.62 | 4.7      |
| 2VP50    | 4.750 | 2.130 | 1.380 | 0.880 | 0.500 | 3.000 | 1.190 | 5/8, 3/4, 7/8, 1, 1 1/8                   | 2.125 | 2.75 | 6.3      |
| 2VP56    | 5.350 | 2.130 | 1.380 | 0.880 | 0.500 | 3.000 | 1.190 | 5/8, 3/4, 7/8, 1, 1 1/8<br>1 3/8, 1 5/8   | 2.125 | 2.75 | 7.7      |
| 2VP60    | 6.000 | 2.380 | 1.630 | 1.030 | 0.660 | 3.250 | 1.250 | 3/4, 7/8, 1, 1 1/8<br>1 3/8, 1 5/8        | 2.125 | 2.75 | 9.8      |
| 2VP62    | 5.950 | 2.130 | 1.380 | 0.880 | 0.500 | 3.000 | 1.190 | 3/4, 7/8, 1, 1 1/8<br>1 3/8, 1 5/8        | 2.125 | 2.75 | 9.0      |
| 2VP65    | 6.500 | 2.380 | 1.630 | 1.030 | 0.660 | 3.250 | 1.250 | 3/4, 7/8, 1 1/8<br>1 1/4, 1 3/8           | 2.125 | 2.75 | 11.0     |
| 2VP68    | 6.550 | 2.130 | 1.380 | 0.880 | 0.500 | 3.000 | 1.190 | 3/4, 7/8, 1, 1 1/8<br>1 1/4, 1 3/8, 1 5/8 | 2.125 | 2.75 | 10.5     |
| 2VP71    | 7.100 | 2.380 | 1.630 | 1.030 | 0.660 | 3.250 | 1.250 | 3/4, 7/8, 1 1/8<br>1 3/8, 1 5/8           | 2.125 | 2.75 | 13.4     |
| 2VP75    | 7.500 | 2.380 | 1.630 | 1.030 | 0.660 | 3.250 | 1.250 | 3/4, 7/8, 1 1/8<br>1 3/8, 1 5/8           | 2.125 | 2.75 | 14.6     |
|          |       |       |       |       |       |       |       |   | 2.500 | 3.29 | 15.0     |

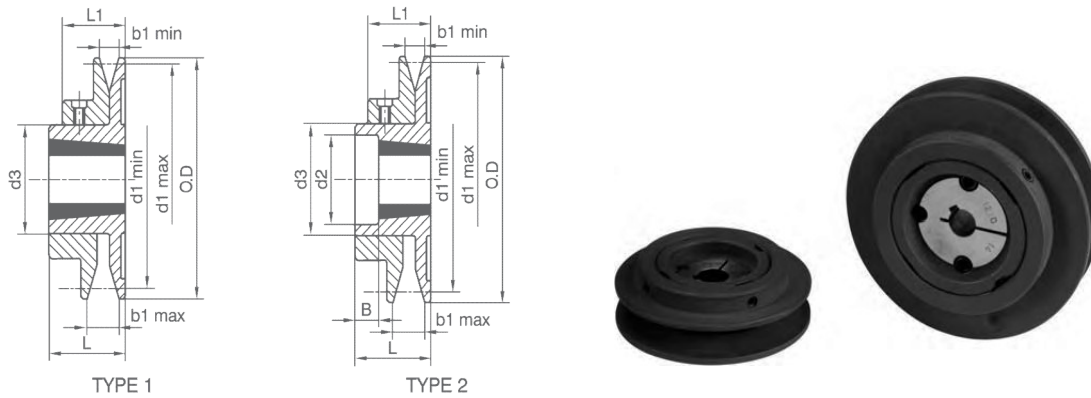
### Installation Instructions

| Part No. | Diameter Ranges (Inches) |            |            |            |                       |            |           |            |                       |            |           |            |              |            |            |            |
|----------|--------------------------|------------|------------|------------|-----------------------|------------|-----------|------------|-----------------------|------------|-----------|------------|--------------|------------|------------|------------|
|          | " 3L " Belts             |            |            |            | " 4L " or " A " Belts |            |           |            | " 5L " or " B " Belts |            |           |            | " 5V " Belts |            |            |            |
|          | Min Pitch                | Turns Open | Max. Pitch | Turns Open | Min Datum             | Turns Open | Max Datum | Turns Open | Min Datum             | Turns Open | Max Datum | Turns Open | Min Pitch    | Turns Open | Max. Pitch | Turns Open |
| 2VP36    | 1.9                      | 4          | 2.7        | 0          | 2.00                  | 5          | 3.00      | 0          | 2.5                   | 5          | 3.3       | 1          | -            | -          | -          | -          |
| 2VP42    | 2.5                      | 4          | 3.3        | 0          | 2.60                  | 5          | 3.60      | 0          | 2.9                   | 6          | 3.9       | 1          | -            | -          | -          | -          |
| 2VP50    | 3.3                      | 4          | 4.1        | 0          | 3.4                   | 5          | 4.4       | 0          | 3.7                   | 5          | 4.7       | 1          | -            | -          | -          | -          |
| 2VP56    | 3.9                      | 4          | 4.7        | 0          | 4.0                   | 5          | 5.0       | 0          | 4.3                   | 6          | 5.3       | 1          | -            | -          | -          | -          |
| 2VP60    | -                        | -          | -          | -          | 4.2                   | 5          | 5.2       | 0          | 4.3                   | 6          | 5.5       | 0          | -            | -          | -          | -          |
| 2VP62    | 4.5                      | 4          | 5.3        | 0          | 4.6                   | 5          | 5.6       | 0          | 4.9                   | 6          | 5.9       | 1          | 5.30         | 6          | 6.3        | 1          |
| 2VP65    | -                        | -          | -          | -          | 4.7                   | 5          | 5.7       | 0          | 4.8                   | 6          | 6.0       | 0          | 5.20         | 6          | 6.4        | 0          |
| 2VP68    | 5.1                      | 4          | 5.9        | 0          | 5.2                   | 5          | 6.2       | 0          | 5.5                   | 6          | 6.5       | 1          | 5.90         | 6          | 6.9        | 1          |
| 2VP71    | -                        | -          | -          | -          | 5.3                   | 5          | 6.3       | 0          | 5.4                   | 6          | 6.6       | 0          | 5.8          | 6          | 7.0        | 0          |
| 2VP75    | -                        | -          | -          | -          | 5.7                   | 5          | 6.7       | 0          | 5.8                   | 6          | 7.0       | 0          | 6.2          | 6          | 7.4        | 0          |

### Standard Keyway ( Inch bore )

| Bore range    | Keyway ( W x D ) |
|---------------|------------------|
| 1/2.          | None             |
| 5/8 - 7/8     | 3/16 X 3/32      |
| 15/16 - 1 1/4 | 1/4 X 1/8        |

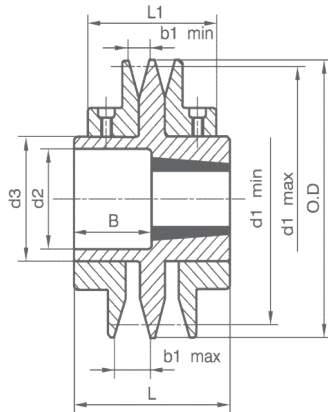
| Bore range     | Keyway ( W x D ) |
|----------------|------------------|
| 1 5/16 - 1 3/8 | 5/16 X 5/32      |
| 1 7/16 - 1 3/4 | 3/8 X 3/16       |



## TB-1 Taper Bushed bore, 1 groove

| Item           | Type | Bush | O.D | L    | L1   | b1  |      | d1                       |                          | Set screws | B    | d2 | d3 |                                   |
|----------------|------|------|-----|------|------|-----|------|--------------------------|--------------------------|------------|------|----|----|-----------------------------------|
|                |      |      |     |      |      | min | max  | min                      | max                      |            |      |    |    |                                   |
| <b>TB093-1</b> | 2    | 1108 | 93  | 36.5 | 29   | 13  | 20.5 | 60<br>63                 | 78<br>85                 | M6 x 6     | 13.5 | 39 | 50 | Z 10 x 6<br>A13 x 8               |
| <b>TB108-1</b> | 1    | 1215 | 108 | 38   | 30.5 | 13  | 20.5 | 75<br>78<br>80<br>83     | 92<br>100<br>92<br>100   | M6 x 6     | -    | -  | 60 | Z 10 x 6<br>A13 x 8<br>SPZ<br>SPA |
| <b>TB120-1</b> | 1    | 1215 | 120 | 38   | 30.5 | 13  | 20.5 | 87<br>90<br>92<br>95     | 104<br>112<br>104<br>112 | M6 x 6     | -    | -  | 60 | Z 10 x 6<br>A13 x 8<br>SPZ<br>SPA |
| <b>TB138-1</b> | 1    | 1615 | 138 | 38   | 30.5 | 13  | 20.5 | 105<br>108<br>110<br>113 | 122<br>130<br>122<br>130 | M6 x 6     | -    | -  | 75 | Z 10 x 6<br>A13 x 8<br>SPZ<br>SPA |
| <b>TB160-1</b> | 2    | 1615 | 160 | 45   | 35.5 | 17  | 26.5 | 117<br>120<br>122<br>128 | 138<br>150<br>138<br>150 | M8 x 8     | 6.5  | 58 | 75 | A13 x 8<br>B17 x 11<br>SPA<br>SPB |
| <b>TB180-1</b> | 2    | 2012 | 180 | 45   | 35.5 | 17  | 26.5 | 137<br>140<br>142<br>148 | 158<br>170<br>158<br>170 | M8 x 8     | 12.5 | 71 | 90 | A13 x 8<br>B17 x 11<br>SPA<br>SPB |
| <b>TB200-1</b> | 2    | 2012 | 200 | 45   | 35.5 | 17  | 26.5 | 157<br>160<br>162<br>168 | 177<br>190<br>177<br>190 | M8 x 8     | 12.5 | 71 | 90 | A13 x 8<br>B17 x 11<br>SPA<br>SPB |

Material: Cast iron GG25  
Surface treatment: Phosphating



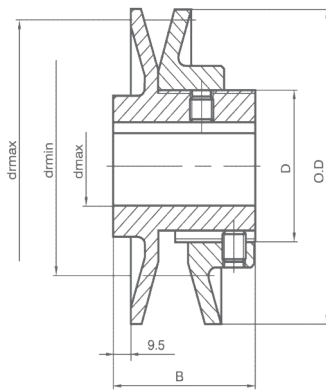
TYPE 3



## TB-2 Taper Bushed bore, 2 grooves

| Item    | Type | Bush | O.D | L  | L1 | b1  |      | d1  |     | Set screws | B    | d2   | d3 |          |
|---------|------|------|-----|----|----|-----|------|-----|-----|------------|------|------|----|----------|
|         |      |      |     |    |    | min | max  | min | max |            |      |      |    |          |
| TB108-2 | 3    | 1215 | 108 | 73 | 58 | 13  | 20.5 | 75  | 92  | M6 x 6     | 34.5 | 48.5 | 60 | Z 10 x 6 |
|         |      |      |     |    |    |     |      | 78  | 100 |            |      |      |    | A13 x 8  |
|         |      |      |     |    |    |     |      | 80  | 92  |            |      |      |    | SPZ      |
|         |      |      |     |    |    |     |      | 83  | 100 |            |      |      |    | SPA      |
| TB120-2 | 3    | 1215 | 120 | 73 | 58 | 13  | 20.5 | 87  | 104 | M6 x 6     | 34.5 | 48.5 | 60 | Z 10 x 6 |
|         |      |      |     |    |    |     |      | 90  | 112 |            |      |      |    | A13 x 8  |
|         |      |      |     |    |    |     |      | 92  | 104 |            |      |      |    | SPZ      |
|         |      |      |     |    |    |     |      | 95  | 112 |            |      |      |    | SPA      |
| TB138-2 | 3    | 1615 | 138 | 73 | 58 | 13  | 20.5 | 105 | 122 | M6 x 6     | 34.5 | 58.5 | 75 | Z 10 x 6 |
|         |      |      |     |    |    |     |      | 108 | 130 |            |      |      |    | A13 x 8  |
|         |      |      |     |    |    |     |      | 110 | 122 |            |      |      |    | SPZ      |
|         |      |      |     |    |    |     |      | 113 | 130 |            |      |      |    | SPA      |
| TB160-2 | 3    | 1615 | 160 | 87 | 68 | 17  | 26.5 | 117 | 138 | M8 x 8     | 48.5 | 58.5 | 75 | A13 x 8  |
|         |      |      |     |    |    |     |      | 120 | 150 |            |      |      |    | B17 x 11 |
|         |      |      |     |    |    |     |      | 122 | 138 |            |      |      |    | SPA      |
|         |      |      |     |    |    |     |      | 128 | 150 |            |      |      |    | SPB      |
| TB180-2 | 3    | 2012 | 180 | 87 | 68 | 17  | 26.5 | 137 | 158 | M8 x 8     | 54   | 71   | 90 | A13 x 8  |
|         |      |      |     |    |    |     |      | 140 | 170 |            |      |      |    | B17 x 11 |
|         |      |      |     |    |    |     |      | 142 | 158 |            |      |      |    | SPA      |
|         |      |      |     |    |    |     |      | 148 | 170 |            |      |      |    | SPB      |
| TB200-2 | 3    | 2012 | 200 | 87 | 68 | 17  | 26.5 | 157 | 177 | M8 x 8     | 54   | 71   | 90 | A13 x 8  |
|         |      |      |     |    |    |     |      | 160 | 190 |            |      |      |    | B17 x 11 |
|         |      |      |     |    |    |     |      | 162 | 177 |            |      |      |    | SPA      |
|         |      |      |     |    |    |     |      | 168 | 190 |            |      |      |    | SPB      |

Material: Cast iron GG25  
 Surface treatment: Phosphating



## SB-1 Pilot bore, 1 groove

| Item           | O.D | D  | Bore dmax | B  | dr                                     |  | Set screws |  |
|----------------|-----|----|-----------|----|--|--|------------|--|
|                |     |    |           |    | min                                    | max                                    |            |  |
| <b>SB083-1</b> | 83  | 40 | 22        | 48 | 58<br>53                               | 72<br>72                               | M6 x 6     | SPZ<br>Z 10 x 6  |
| <b>SB093-1</b> | 93  | 45 | 26        | 48 | 65<br>68<br>60<br>63                   | 78<br>85<br>78<br>85                   | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB108-1</b> | 108 | 50 | 28        | 48 | 80<br>83<br>75<br>78                   | 93<br>100<br>93<br>100                 | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB120-1</b> | 120 | 55 | 28        | 48 | 92<br>95<br>87<br>90                   | 104<br>112<br>104<br>112               | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB138-1</b> | 138 | 55 | 36        | 48 | 110<br>113<br>119<br>115<br>108<br>111 | 122<br>130<br>131<br>122<br>130<br>128 | M6 x 6     | SPZ<br>SPA<br>SPB<br>Z 10 x 6<br>A 13 x 8<br>B 17 x 11 |
| <b>SB160-1</b> | 160 | 80 | 52        | 53 | 119<br>122<br>128<br>113<br>117<br>120 | 133<br>140<br>150<br>133<br>138<br>150 | M8 x 8     | SPZ<br>SPA<br>SPB<br>Z 10 x 6<br>A 13 x 8<br>B 17 x 11 |
| <b>SB180-1</b> | 180 | 80 | 52        | 53 | 142<br>148<br>137<br>140               | 160<br>170<br>158<br>170               | M8 x 8     | SPA<br>SPB<br>A 13 x 8<br>B 17 x 11                    |

Material: Cast iron GG25  
Surface treatment: Phosphating



## SB-2 Pilot bore, 2 grooves

| Item           | O.D | D  | Bore dmax | B  | dr                                     |  | Set screws |  |
|----------------|-----|----|-----------|----|--|--|------------|--|
|                |     |    |           |    | min                                    | max                                    |            |  |
| <b>SB083-2</b> | 83  | 40 | 22        | 76 | 58<br>53                               | 72<br>72                               | M6 x 6     | SPZ<br>Z 10 x 6  |
| <b>SB093-2</b> | 93  | 45 | 26        | 76 | 65<br>68<br>60<br>63                   | 78<br>85<br>78<br>85                   | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB108-2</b> | 108 | 50 | 28        | 76 | 80<br>83<br>75<br>78                   | 93<br>100<br>93<br>100                 | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB120-2</b> | 120 | 55 | 28        | 76 | 92<br>95<br>87<br>90                   | 104<br>112<br>104<br>112               | M6 x 6     | SPZ<br>SPA<br>Z 10 x 6<br>A 13 x 8                     |
| <b>SB138-2</b> | 138 | 55 | 36        | 76 | 110<br>113<br>119<br>115<br>108<br>111 | 122<br>130<br>131<br>122<br>130<br>128 | M6 x 6     | SPZ<br>SPA<br>SPB<br>Z 10 x 6<br>A 13 x 8<br>B 17 x 11 |
| <b>SB160-2</b> | 160 | 80 | 52        | 90 | 119<br>122<br>128<br>113<br>117<br>120 | 133<br>140<br>150<br>133<br>138<br>150 | M8 x 8     | SPZ<br>SPA<br>SPB<br>Z 10 x 6<br>A 13 x 8<br>B 17 x 11 |
| <b>SB180-2</b> | 180 | 80 | 52        | 90 | 142<br>148<br>137<br>140               | 160<br>170<br>158<br>170               | M8 x 8     | SPA<br>SPB<br>A 13 x 8<br>B 17 x 11                    |

Material: Cast iron GG25  
Surface treatment: Phosphating