



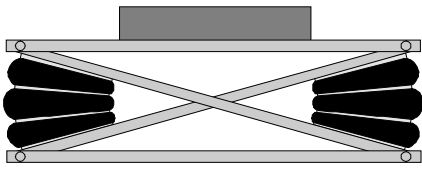
# *Air Bellows Pneuride<sup>®</sup>*

*Ø70mm - 660mm*

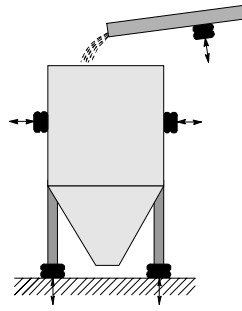
*Catalogue 2118GB-7-po*



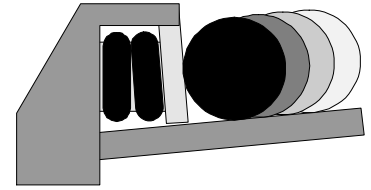
**Applications**



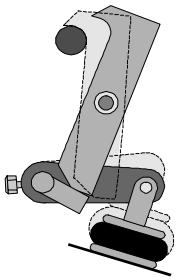
**Scissor lift**



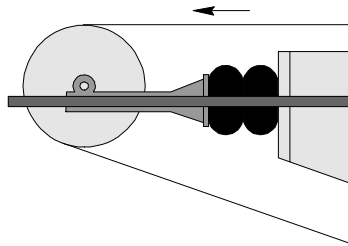
**Hopper vibration and damping**



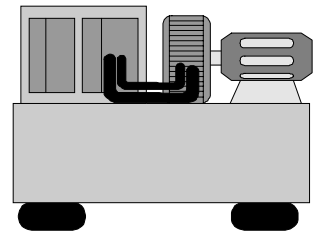
**Mechanical handling stop**



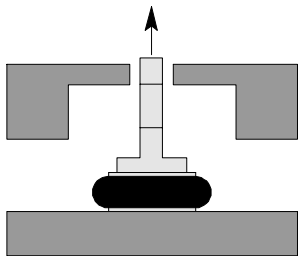
**Quick lock device**



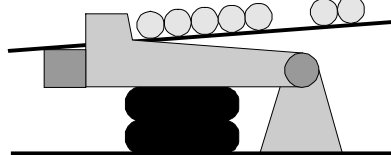
**Reel tensioning**



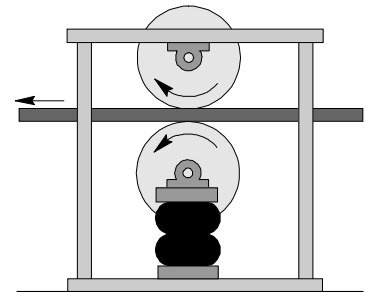
**Machine isolation**



**Direct force**



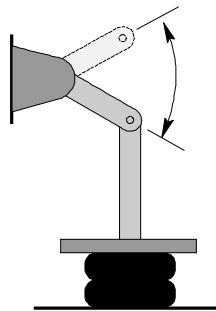
**Impact absorption**



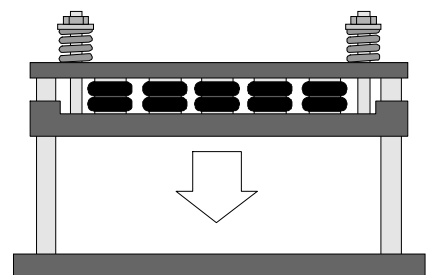
**Roller tensioning**



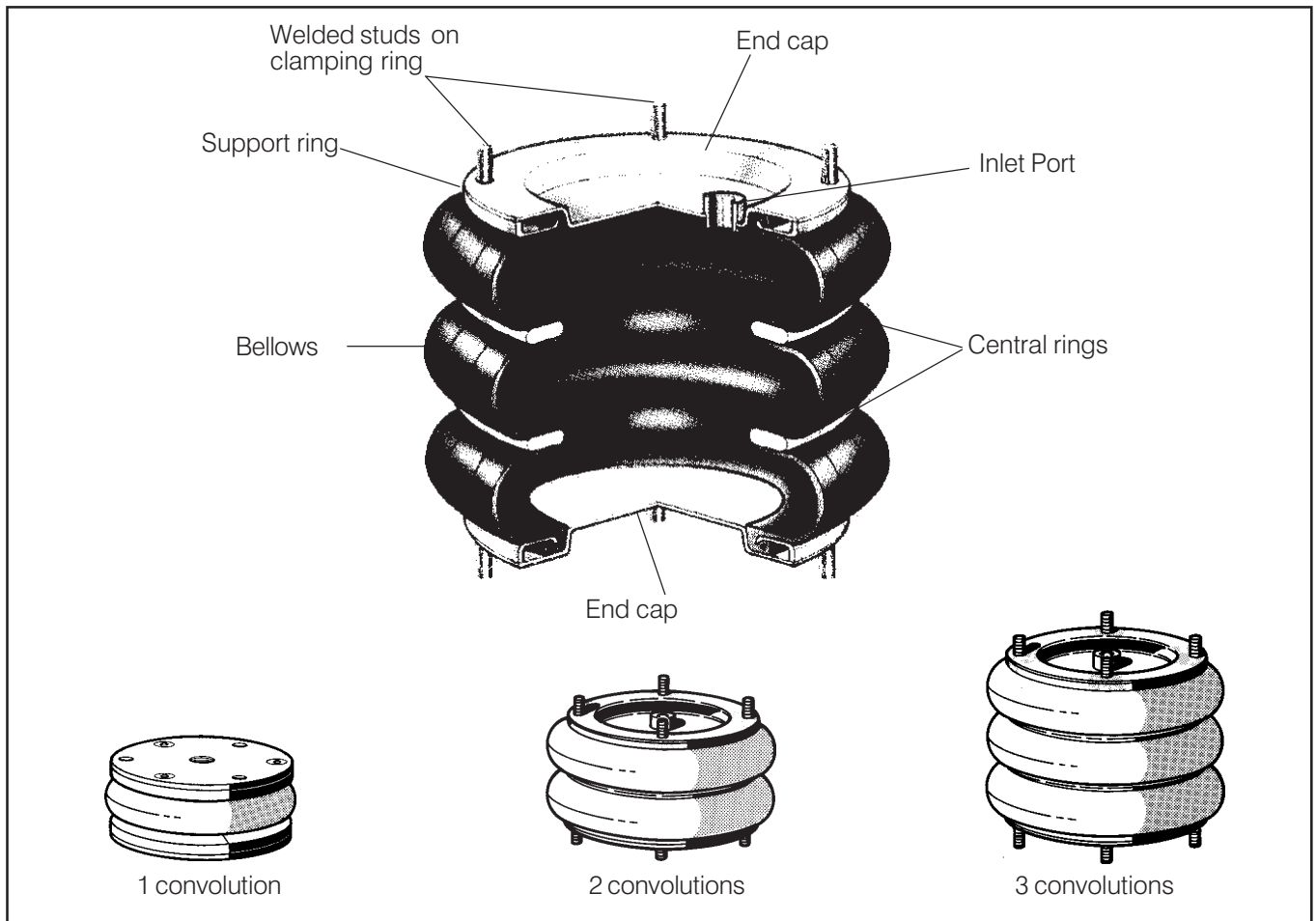
**Platform lift**



**Short stroke mechanical linkage**



**Hot foil stamping press**



### Air Bellows

Air bellows are the ideal choice for applications requiring short stroke, high thrust single acting actuators.

Manufactured from fabric reinforced synthetic rubber in one, two or three convolutions according to stroke and model. They incorporate no reciprocating metal parts and so provide virtually frictionless thrust compared with conventional pneumatic cylinders.

All models are single acting only. The return stroke is provided in part by the natural spring action of the bellows but more usually by the load itself. The simplicity of construction provides an extremely long, virtually maintenance-free service life even under arduous conditions.

### Versions

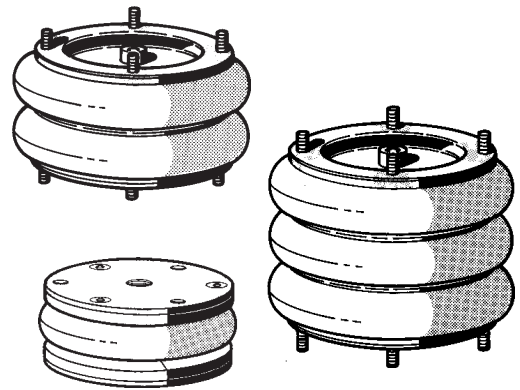
Available in ten bore sizes, they are supplied completely assembled. Bore 70 up to 150 mm Air Bellows have aluminium end caps and support rings.

### Operation

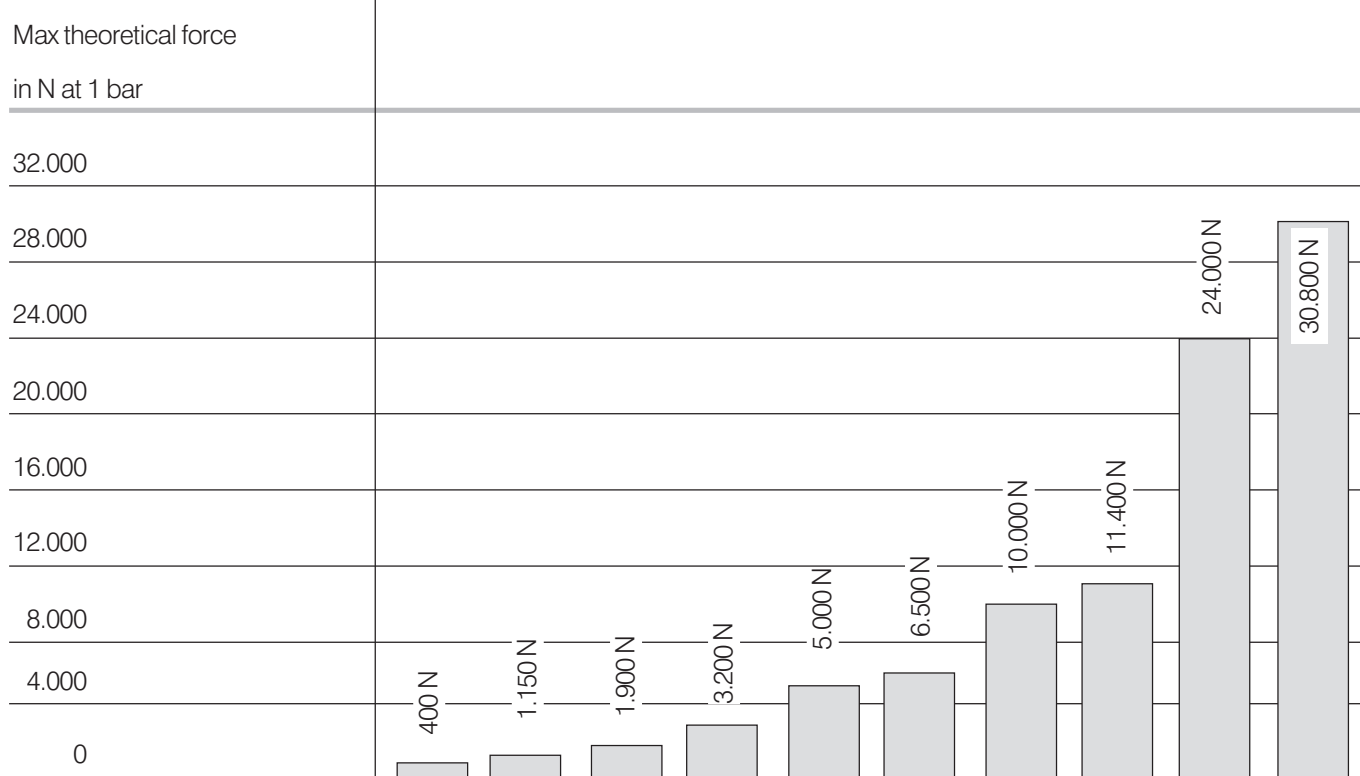
Due to their flexible construction the mounting of Air Bellows is less critical than with conventional pneumatic cylinders, which normally require rigid fixing and guidance and provide only one axis of movement. Air Bellows will operate in any axis within a limit of 15° between faces. Additionally the axial location of the end plates may be off set by up to 10mm. When pressurised Air Bellows will follow the line of least resistance. Accordingly care must be taken with the mounting geometry in angled applications.

When depressurised Air Bellows will fit in to surprisingly small spaces, especially useful for clamping or moving awkwardly shaped or very heavy loads.

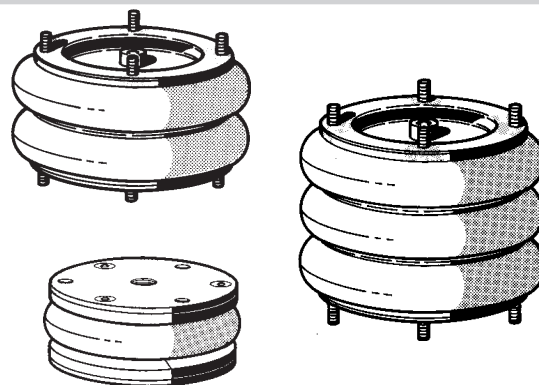
In operation it is recommended that the unit is not allowed to 'bottom out' or achieve its maximum height. Various mechanical devices may be employed to achieve this.



| Cylinder bore              | mm   | 70   | 110  | 150  | 200  | 250  | 300  | 370  | 410  | 550  | 660  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|
|                            | inch | 2¾   | 4½   | 6    | 8    | 10   | 12   | 14½  | 16   | 21½  | 26   |
| Port size                  |      | G1/4 | G3/8 | G1/2 | G1/2 | G1/2 | G1/2 | G1/2 | G1/2 | G3/4 | G3/4 |
| Max stroke mm              |      | 65   | 100  | 173  | 225  | 300  | 330  | 350  | 375  | 300  | 310  |
| Max diameter mm            |      | 80   | 125  | 175  | 230  | 280  | 330  | 395  | 440  | 580  | 700  |
| Max operating pressure bar |      | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    |
| Single acting              |      | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| High-temp                  |      | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| Low-temp                   |      | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| Dry                        |      | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    |



- 10 sizes, diameters 70-660 mm
- Strokes from 65 to 430 mm
- Single, double or triple convolutions
- High thrust and frictionless movement
- Maintenance free



## Specification

### Material

#### Standard versions

End plates

|                               |           |
|-------------------------------|-----------|
| Ø70, 110, 150, 550            | Aluminium |
| Ø200, 250, 300, 370, 410, 660 | Steel     |

Clamping ring, central ring;

|                          |           |
|--------------------------|-----------|
| Ø70, 110, 150, 550, 660  | Aluminium |
| Ø200, 250, 300, 370, 410 | Steel     |

|         |     |
|---------|-----|
| Bellows | NBR |
|---------|-----|

## Operating information

|                     |                 |
|---------------------|-----------------|
| Working pressure    | Max 8 bar       |
| Working temperature | -30 ° to +70 °C |
| Operation           | Dry air         |

Mounting :

|                           |                |
|---------------------------|----------------|
| Ø 70, 110, 150, 550, 660  | Threaded holes |
| Ø 200, 250, 300, 370, 410 | Studs          |

Clamping torques for screws and mounting nuts :

|                      |            |
|----------------------|------------|
| Ø 70 x 2 and 70 x 3  | 5Nm        |
| Ø 110 x 1 to 110 x 3 | 7 to 11 Nm |
| Ø 150 x 1 to 150 x 3 | 12Nm       |
| Ø 200 x 1 to 660 x2  | 20 à 28 Nm |

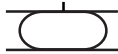
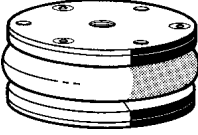
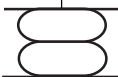
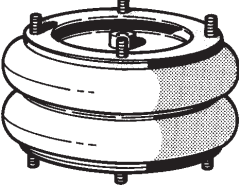
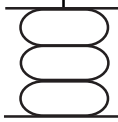
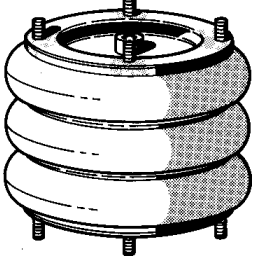
## Options and additional information

### High-temperature version :

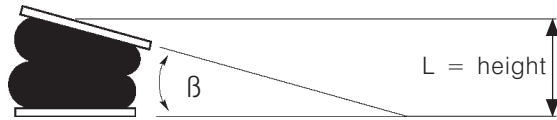
|                    |                          |
|--------------------|--------------------------|
| Bellows material : | Chlorobutyl              |
|                    | -30° C to +115°C dynamic |
|                    | -40°C to +130° static    |


Air bellows are suitable for vibration applications i.e. device feeders at high frequency. Please refer to technical leaflet for more information

It is recommended that external mechanical stops are used to limit the stroke. The units should not achieve maximum stroke or be allowed to 'bottom out'.  
Air Bellows may not be stacked, use singly only.

| Symbol  | Ø                                  | Port size | Maxi stroke | Weight         | Order code      |                 |
|---|------------------------------------|-----------|-------------|----------------|-----------------|-----------------|
|   | mm                                 |           |             |                | mm              | (kg)            |
| <b>Single convolution</b><br><br>      | <b>110</b> (4 <sup>1/2</sup> X 1)  | G3/8      | 45          | 0,8            | <b>9109400</b>  | <b>9109600</b>  |
|   | <b>150</b> (6 X 1)                 | G1/2      | 55          | 2,4            | <b>9109004A</b> | <b>9109204A</b> |
|   | <b>200</b> (8 x 1)                 | G1/2      | 75          | 3,05           | <b>9109014</b>  | <b>9109214</b>  |
|   | <b>250</b> (10 x 1)                | G1/2      | 100         | 3,9            | <b>9109024</b>  | <b>9109224</b>  |
|   | <b>300</b> (12 x1)                 | G1/2      | 100         | 6,2            | <b>9109044</b>  | <b>9109244</b>  |
|   | <b>370</b> (14 <sup>1/2</sup> x 1) | G1/2      | 115         | 6,9            | <b>9109064</b>  | <b>9109264</b>  |
| <b>Double convolutions</b><br><br>   | <b>70</b> (2 <sup>3/4</sup> X 2)   | G1/4      | 50          | 0,5            | <b>9109009</b>  | <b>9109509</b>  |
|   | <b>110</b> (4 <sup>1/2</sup> X 2)  | G3/8      | 80          | 1              | <b>9109401</b>  | <b>9109502</b>  |
|   | <b>150</b> (6 X 2)                 | G1/2      | 112         | 2,7            | <b>9109001A</b> | <b>9109201A</b> |
|   | <b>200</b> (8 x 2)                 | G1/2      | 180         | 3,7            | <b>9109011</b>  | <b>9109211</b>  |
|   | <b>250</b> (10 x 2)                | G1/2      | 200         | 5              | <b>9109021</b>  | <b>9109221</b>  |
|   | <b>300</b> (12 x2)                 | G1/2      | 195         | 6,7            | <b>9109041</b>  | <b>9109241</b>  |
|   | <b>370</b> (14 <sup>1/2</sup> x 2) | G1/2      | 225         | 9,1            | <b>9109061</b>  | <b>9109261</b>  |
|   | <b>410</b> (16x2)                  | G1/2      | 250         | 9,7            | <b>9109171</b>  | <b>9109271</b>  |
|   | <b>550</b> (21 <sup>1/2</sup> x 2) | G3/4      | 300         | 20,6           | <b>9109150</b>  | <b>9109250</b>  |
| <b>660</b> (26 x2)  | G3/4                               | 310       | 23          | <b>9109156</b> | <b>N/A</b>      |                 |
| <b>Triple convolutions</b><br><br> | <b>70</b> (2 <sup>3/4</sup> X 3)   | G1/4      | 65          | 0,6            | <b>9109010</b>  | <b>9109510</b>  |
|   | <b>110</b> (4 <sup>1/2</sup> X 3)  | G3/8      | 100         | 1,2            | <b>9109402</b>  | <b>9109503</b>  |
|   | <b>150</b> (6 X 3)                 | G1/2      | 173         | 3              | <b>9109007A</b> | <b>9109207</b>  |
|   | <b>200</b> (8 x 3)                 | G1/2      | 225         | 4,4            | <b>9109017</b>  | <b>9109219</b>  |
|   | <b>250</b> (10 x 3)                | G1/2      | 300         | 5,6            | <b>9109031</b>  | <b>9109231</b>  |
|   | <b>300</b> (12 x 3)                | G1/2      | 330         | 8,1            | <b>9109051</b>  | <b>9109251</b>  |
|   | <b>370</b> (14 <sup>1/2</sup> x 3) | G1/2      | 350         | 10,7           | <b>9109069</b>  | <b>9109269</b>  |
| <b>410</b> (16 x 3)   | G1/2                               | 375       | 12,9        | <b>9109177</b> | <b>9109275</b>  |                 |

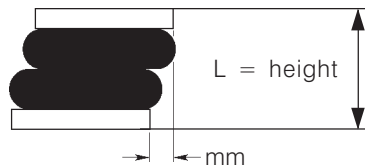
## Angular misalignment



 It is not possible to combine angular misalignment with axial misalignment

| Ø mm | Convolution | Types                 | Angle $\beta = 5^\circ$  | Angle $\beta = 10^\circ$ | Angle $\beta = 15^\circ$ | Angle $\beta = 20^\circ$ | Angle $\beta = 25^\circ$ |
|------|-------------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|      |             |                       | For heights (mm) between | For heights (mm) between | For heights (mm) between | For heights (mm) between | For heights (mm) between |
| 70   | 2           | 2 <sup>3/4</sup> X 2  | 75-100                   | 80-95                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 3           | 2 <sup>3/4</sup> X 3  | 90-120                   | 95-110                   | XXXXX                    | XXXXX                    | XXXXX                    |
| 110  | 1           | 4 <sup>1/2</sup> X 1  | 60-75                    | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 2           | 4 <sup>1/2</sup> X 2  | 75-130                   | 80-125                   | 90-120                   | 100-115                  | XXXXX                    |
| 150  | 3           | 4 <sup>1/2</sup> X 3  | 125-180                  | 130-170                  | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 1           | 6 X 1                 | 95-85                    | 65-80                    | XXXXX                    | XXXXX                    | XXXXX                    |
| 200  | 2           | 6 X 2                 | 90-155                   | 95-150                   | 105-145                  | 110-135                  | XXXXX                    |
|      | 3           | 6 X 3                 | 195-255                  | 200-250                  | XXXXX                    | XXXXX                    | XXXXX                    |
| 250  | 1           | 8 x 1                 | 60-105                   | 70-100                   | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 2           | 8 x 2                 | XXXXX                    | 90-210                   | 100-205                  | 110-220                  | 115-190                  |
| 300  | 3           | 8 x 3                 | 250-305                  | 255-300                  | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 1           | 10 x 1                | 60-125                   | 70-115                   | 80-105                   | XXXXX                    | XXXXX                    |
| 370  | 2           | 10 x 2                | XXXXX                    | 95-260                   | 115-250                  | 135-245                  | 155-235                  |
|      | 3           | 10 x 3                | 185-330                  | 245-370                  | 280-350                  | XXXXX                    | XXXXX                    |
| 410  | 1           | 12 x 1                | 60-125                   | 75-115                   | 90-105                   | XXXXX                    | XXXXX                    |
|      | 2           | 12 x 2                | XXXXX                    | 100-255                  | 110-245                  | 115-235                  | 160-225                  |
| 410  | 3           | 12 x 3                | 200-375                  | 230-340                  | 250-310                  | XXXXX                    | XXXXX                    |
|      | 1           | 14 <sup>1/2</sup> x 1 | 65-145                   | 85-135                   | XXXXX                    | XXXXX                    | XXXXX                    |
| 410  | 2           | 14 <sup>1/2</sup> x 2 | XXXXX                    | 105-300                  | 115-290                  | 135-275                  | 170-260                  |
|      | 3           | 14 <sup>1/2</sup> x 3 | 280-430                  | 300-390                  | 270-310                  | XXXXX                    | XXXXX                    |
| 410  | 2           | 16 x 2                | XXXXX                    | 125-350                  | 150-340                  | 185-325                  | 225-310                  |
|      | 3           | 16 x 3                | 200-510                  | 350-480                  | 370-450                  | XXXXX                    | XXXXX                    |

## Axial misalignment



The following values are for short time movement

| Ø mm | Convolution | Types                 | 5 mm                     | 10 mm                    | 20 mm                    | 30 mm                    | 40 mm                    | 50 mm                    |
|------|-------------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|      |             |                       | For heights (mm) between | For heights (mm) between | For heights (mm) between | For heights (mm) between | For heights (mm) between | For heights (mm) between |
| 70   | 2           | 2 <sup>3/4</sup> X 2  | 80-100                   | 85-95                    | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 3           | 2 <sup>3/4</sup> X 3  | 90-125                   | 100-115                  | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
| 110  | 1           | 4 <sup>1/2</sup> X 1  | 60-80                    | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 2           | 4 <sup>1/2</sup> X 2  | XXXXX                    | 85-135                   | 95-130                   | 110-130                  | XXXXX                    | XXXXX                    |
| 150  | 3           | 4 <sup>1/2</sup> X 3  | 120-200                  | 110-180                  | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 1           | 6 X 1                 | XXXXX                    | 70-80                    | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
| 200  | 2           | 6 X 2                 | XXXXX                    | 100-165                  | 125-155                  | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 3           | 6 X 3                 | 115-250                  | 105-230                  | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
| 250  | 1           | 8 x 1                 | XXXXX                    | 95-115                   | 70-95                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 2           | 8 x 2                 | XXXXX                    | 95-230                   | 95-220                   | 115-210                  | 130-195                  | XXXXX                    |
| 300  | 3           | 8 x 3                 | 110-280                  | 100-260                  | XXXXX                    | XXXXX                    | XXXXX                    | XXXXX                    |
|      | 1           | 10 x 1                | XXXXX                    | 70-135                   | 80-130                   | 90-115                   | XXXXX                    | XXXXX                    |
| 370  | 2           | 10 x 2                | XXXXX                    | 105-280                  | 125-275                  | 145-265                  | 170-250                  | XXXXX                    |
|      | 3           | 10 x 3                | XXXXX                    | 165-390                  | 200-380                  | 220-365                  | 230-350                  | 240-345                  |
| 410  | 1           | 12 x 1                | XXXXX                    | 70-135                   | 80-130                   | 90-115                   | XXXXX                    | XXXXX                    |
|      | 2           | 12 x 2                | XXXXX                    | 105-270                  | 130-260                  | 150-245                  | 175-230                  | XXXXX                    |
| 410  | 3           | 12 x 3                | XXXXX                    | 150-400                  | 175-385                  | 195-375                  | 215-360                  | 235-345                  |
|      | 1           | 14 <sup>1/2</sup> x 1 | XXXXX                    | 85-160                   | 95-145                   | 105-125                  | XXXXX                    | XXXXX                    |
| 410  | 2           | 14 <sup>1/2</sup> x 2 | XXXXX                    | 120-330                  | 140-320                  | 165-315                  | 185-305                  | XXXXX                    |
|      | 3           | 14 <sup>1/2</sup> x 3 | XXXXX                    | 180-450                  | 205-440                  | 225-425                  | 245-410                  | 260-385                  |
| 410  | 2           | 16 x 2                | XXXXX                    | 180-380                  | 205-375                  | 225-365                  | 245-355                  | XXXXX                    |
|      | 3           | 16 x 3                | XXXXX                    | 230-520                  | 255-510                  | 275-500                  | 290-485                  | 305-475                  |

| Types<br>bore<br>mm<br>inches | Force in N at 1 bar<br>Note: Max force and stroke may exceed values - see next two columns |           |           |           |            |            |            |            |            |            |            |            |            |  | Max<br>force<br>in N<br>for max<br>stroke<br>at 1 bar | Max<br>stroke<br>mm | Height<br>mm |     | Load<br>to<br>obtain<br>min<br>height<br>N |  |
|-------------------------------|--|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--|---|---------------------|--------------|-----|--|--|
|                               |  |           |           |           |            |            |            |            |            |            |            |            |            |  |   |                     | min          | max |  |  |
| 70                            | 400  | 250       | 70        |           |            |            |            |            |            |            |            |            |            |  | 70  | 50                  | 65           | 115 | 140  |  |
| 2 3/4                         | 370  | 270       | 150       |           |            |            |            |            |            |            |            |            |            |  | 70  | 65                  | 80           | 145 | 160  |  |
| 110                           | 1150   | 700       | 200       |           |            |            |            |            |            |            |            |            |            |  | 200   | 45                  | 45           | 90  | 120  |  |
| 4 1/2                         | 900  | 750       | 550       | 300       |            |            |            |            |            |            |            |            |            |  | 280   | 80                  | 65           | 145 | 130  |  |
|                               | 900  | 750       | 600       | 450       | 280        |            |            |            |            |            |            |            |            |  | 280   | 100                 | 100          | 200 | 140  |  |
| 150                           | 1900   | 1200      | 500       |           |            |            |            |            |            |            |            |            |            |  | 350   | 55                  | 50           | 105 | 140  |  |
| 6                             | 1800   | 1650      | 1400      | 1100      | 800        | 450        |            |            |            |            |            |            |            |  | 400   | 112                 | 78           | 190 | 170  |  |
|                               | 1800   | 1600      | 1400      | 1200      | 1000       | 800        | 600        | 400        |            |            |            |            |            |  | 400   | 173                 | 102          | 275 | 190  |  |
| 200                           | 3200   | 2400      | 1700      | 850       |            |            |            |            |            |            |            |            |            |  | 850   | 75                  | 50           | 125 | 120  |  |
| 8                             | 3000   | 2900      | 2600      | 2250      | 1900       | 1600       | 1200       | 800        |            |            |            |            |            |  | 800   | 180                 | 70           | 250 | 130  |  |
|                               | 3000   | 2750      | 2500      | 2250      | 2000       | 1750       | 1500       | 1250       | 1050       | 950        |            |            |            |  | 800   | 225                 | 100          | 325 | 150  |  |
| 250                           | 5000   | 4000      | 3300      | 2100      | 1000       |            |            |            |            |            |            |            |            |  | 1000  | 100                 | 50           | 150 | 100  |  |
| 10                            | 4800   | 4500      | 4250      | 3700      | 3200       | 2800       | 2400       | 1800       | 1250       |            |            |            |            |  | 1250  | 200                 | 70           | 270 | 100  |  |
|                               | 4800   | 4600      | 4400      | 4160      | 3900       | 3600       | 3300       | 2900       | 2500       | 2100       | 1700       | 1300       | 800        |  | 800   | 300                 | 100          | 400 | 110  |  |
| 300                           | 6500   | 5900      | 4900      | 3500      | 2000       |            |            |            |            |            |            |            |            |  | 2000  | 100                 | 50           | 150 | 90   |  |
| 12                            | 6800   | 6400      | 6000      | 5200      | 4800       | 4200       | 3150       | 2950       | 2250       |            |            |            |            |  | 2250  | 195                 | 75           | 270 | 90   |  |
|                               | 6800   | 6500      | 6200      | 5850      | 5500       | 5200       | 4800       | 4400       | 4000       | 3600       | 3000       | 2500       | 1800       |  | 1800  | 330                 | 100          | 430 | 100  |  |
| 370                           | 9600   | 8800      | 7700      | 6300      | 4500       |            |            |            |            |            |            |            |            |  | 3500  | 115                 | 50           | 165 | 80   |  |
| 14 1/2                        | 10000  | 9500      | 9000      | 8500      | 7800       | 7250       | 6600       | 6000       | 5250       | 4500       |            |            |            |  | 4500  | 225                 | 70           | 295 | 80   |  |
|                               | 10200  | 10000     | 9700      | 9550      | 9250       | 8750       | 8500       | 8000       | 7500       | 7100       | 6500       | 6000       | 5500       |  | 3500  | 350                 | 100          | 450 | 290  |  |
| 410                           | 11400  | 11100     | 10600     | 10100     | 9600       | 9000       | 8400       | 7750       | 7200       | 6500       | 5300       |            |            |  | 5300  | 250                 | 75           | 325 | 80   |  |
| 16                            | 10500  | 10250     | 10000     | 9600      | 9250       | 8900       | 8600       | 8200       | 7700       | 7250       | 6750       | 6250       | 5750       |  | 4200  | 375                 | 125          | 500 | 650  |  |
| 550                           | 24000  | 23000     | 22000     | 20080     | 19500      | 18200      | 17000      | 15300      | 13800      | 12000      | 10000      | 8000       | 6000       |  | 6000  | 300                 | 90           | 390 | 70   |  |
| 21 1/2                        |  |           |           |           |            |            |            |            |            |            |            |            |            |  |   |                     |              |     |  |  |
| 660                           | 30800  | 30500     | 30000     | 29200     | 28100      | 26900      | 25600      | 24300      | 23000      | 21800      | 20700      | 19500      | 18200      |  | 18200   | 310                 | 90           | 400 | 70   |  |
| 26                            |  |           |           |           |            |            |            |            |            |            |            |            |            |  |   |                     |              |     |  |  |
| <b>Stroke</b>                 | <b>0</b>   | <b>25</b> | <b>50</b> | <b>75</b> | <b>100</b> | <b>125</b> | <b>150</b> | <b>175</b> | <b>200</b> | <b>225</b> | <b>250</b> | <b>275</b> | <b>300</b> |  |   |                     |              |     |  |  |

## Selection of Air Bellows

1. Establish the force required in N at working air pressure
2. Divide the force required by the working air pressure in bar
3. Select the standard stroke: Always choose the next highest stroke to that required
4. Read upwards in the column to find the figure equal to or greater than the figure which resulted from step 2
5. Read across to the left for recommended unit size

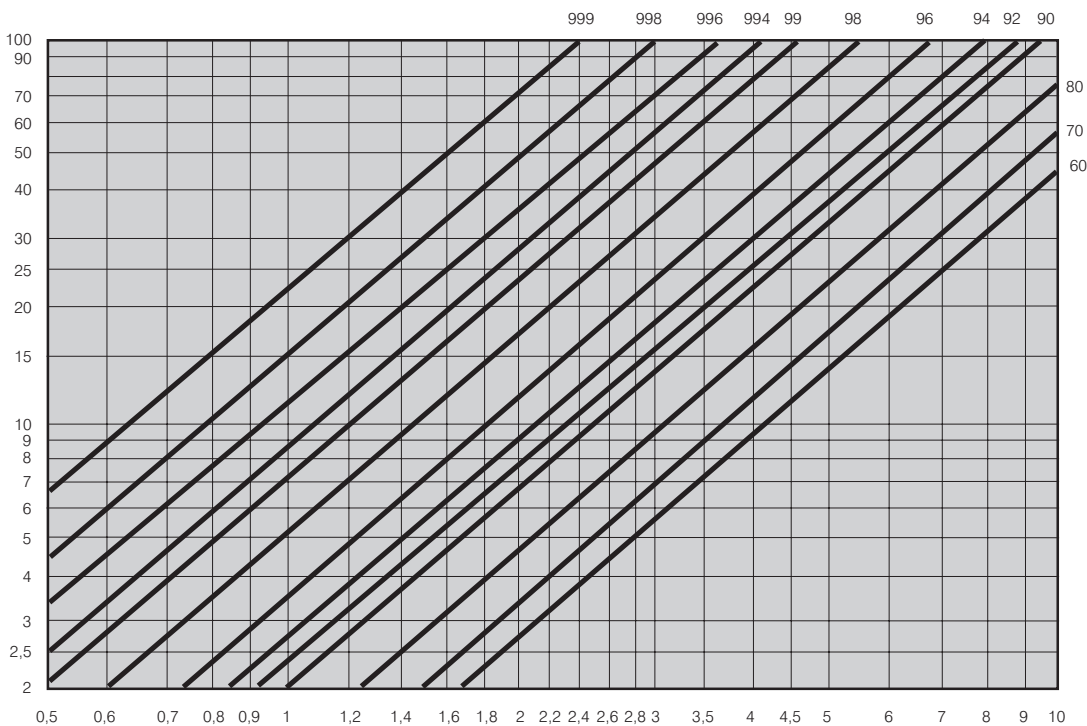
## Example

1. Force required 35000N. Working air pressure 7 bar
2. Force at 1 bar is:  $35000 \div 7 = 5000$  N
3. Stroke required 120 mm - Use 125 mm
4. Use 125 stroke column, 5200 N at 1 bar
5. Recommended unit is Ø300 mm (12 inches) 3 convolutions

## Vibration isolation (damping) charts

Vibration frequency Hz

Damping %



## Air Bellows frequency Hz

| Ø mm | Convolu-<br>tion | Types                 | Frequency 6 bar<br>Hz | Static height<br>mm | Loading<br>6bar in kg |
|------|------------------|-----------------------|-----------------------|---------------------|-----------------------|
| 70   | 2                | 2 <sup>3/4</sup> X 2  | 3,8                   | 90                  | 150                   |
|      | 3                | 2 <sup>3/4</sup> X 3  | 3,2                   | 110                 | 156                   |
| 110  | 1                | 4 <sup>1/2</sup> X 1  | 3,8                   | 70                  | 335                   |
|      | 2                | 4 <sup>1/2</sup> X 2  | 3                     | 100                 | 390                   |
| 150  | 3                | 4 <sup>1/2</sup> X 3  | 2,6                   | 145                 | 378                   |
|      | 1                | 6 X 1                 | 3,2                   | 80                  | 640                   |
|      | 2                | 6 X 2                 | 2,2                   | 140                 | 685                   |
| 200  | 3                | 6 X 3                 | 1,9                   | 180                 | 660                   |
|      | 1                | 8 x 1                 | 2,77                  | 90                  | 1275                  |
|      | 2                | 8 x 2                 | 1,95                  | 160                 | 1225                  |
| 250  | 3                | 8 x 3                 | 1,75                  | 210                 | 1200                  |
|      | 1                | 10 x 1                | 2,63                  | 100                 | 1960                  |
|      | 2                | 10 x 2                | 1,75                  | 170                 | 1900                  |
| 300  | 3                | 10 x 3                | 1,43                  | 250                 | 1770                  |
|      | 1                | 12 x 1                | 2,44                  | 100                 | 2975                  |
|      | 2                | 12 x 2                | 1,78                  | 170                 | 2910                  |
| 370  | 3                | 12 x 3                | 1,44                  | 250                 | 2930                  |
|      | 1                | 14 <sup>1/2</sup> x 1 | 2,22                  | 110                 | 4555                  |
|      | 2                | 14 <sup>1/2</sup> x 2 | 1,61                  | 200                 | 4445                  |
| 410  | 3                | 14 <sup>1/2</sup> x 3 | 1,31                  | 290                 | 4320                  |
|      | 2                | 16 x 2                | 1,44                  | 200                 | 5195                  |
| 550  | 3                | 16 x 3                | 1,24                  | 290                 | 4950                  |
|      | 2                | 21 1/2 x 2            | 1,49                  | 200                 | 11785                 |

## How to establish damping %

1. On the graph establish the frequency of vibration requiring damping.
2. On the chart below select the loading and size of the unit suitable for the application.
3. Having chosen the unit required, the frequency in Hz quoted should be read off the bottom axis on the graph.
4. The damping % figure is given where the figures established at point 1 and point 3 coincide, reading diagonally to the right hand top edge of the graph.

## Example

1. Frequency requiring damping = 10Hz.
2. Loading of Air Bellows unit = 1500kg.
3. Suitable unit with pressure of 1 bar = Ø10" x 2, (frequency quoted = 2).
4. Produces 96,8% damping.

## Mounting dimensions

Ø 70 mm (2<sup>3</sup>/<sub>4</sub>")

Aluminium end plates version

Ø 110 mm (4<sup>1</sup>/<sub>2</sub>")

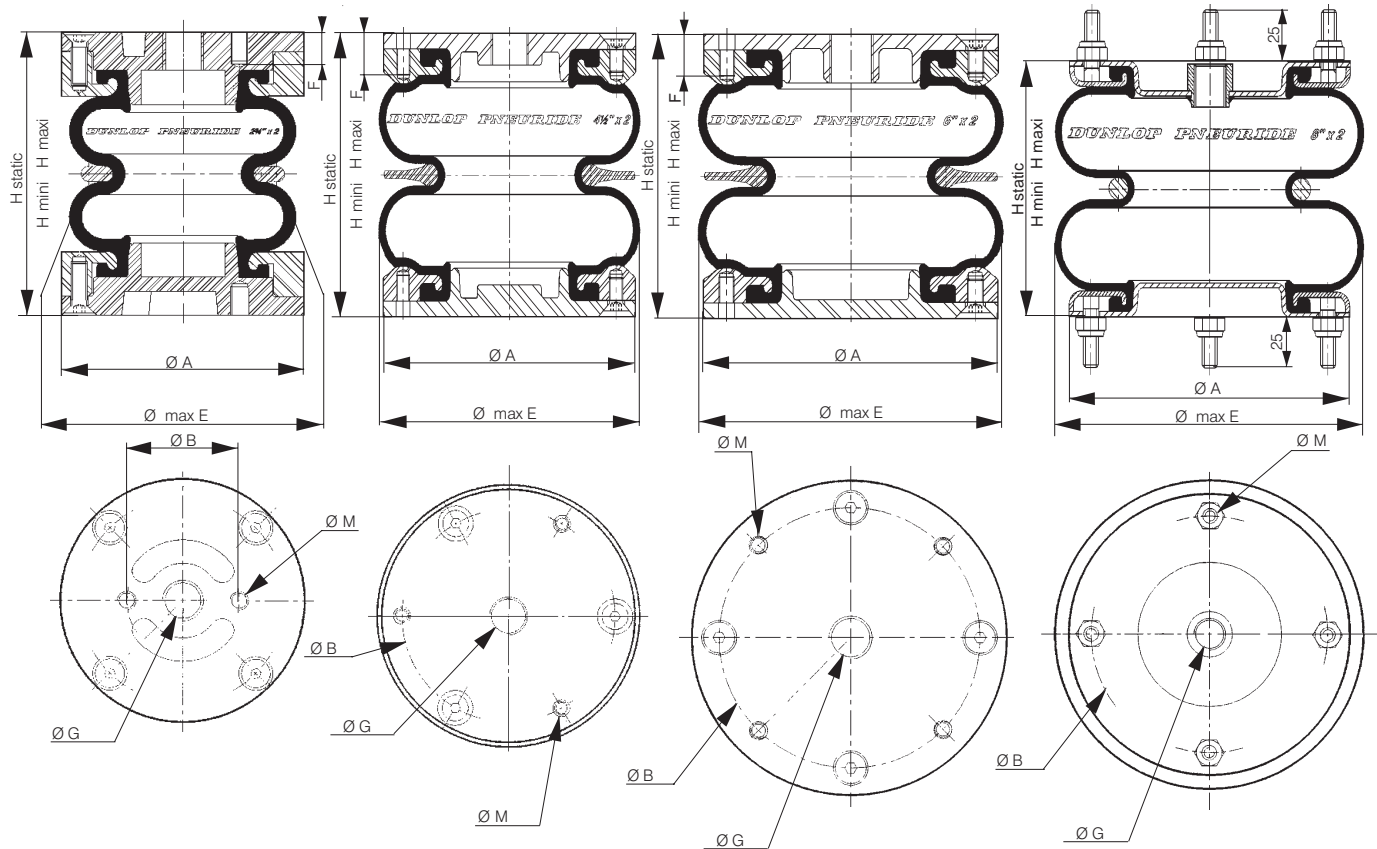
Aluminium end plates version

Ø 150 mm (6")

Aluminium end plates version

Ø 200 to 410 mm (8 to 16")

Steel end plates version



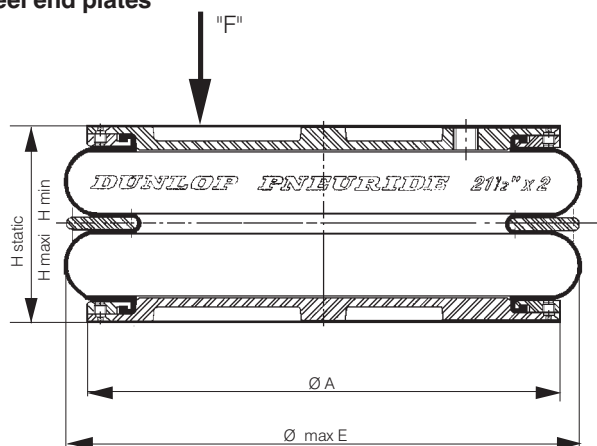
| Ø mm | Convolution | Types                              | Order code      | H mini | H static | H maxi | Stroke maxi | Ø E maxi | Ø A | Ø B   | F  | Ø M | Port size Ø G | P max pressure (bar) | Weight (kg) |
|------|-------------|------------------------------------|-----------------|--------|----------|--------|-------------|----------|-----|-------|----|-----|---------------|----------------------|-------------|
| 70   | 2           | 2 <sup>3</sup> / <sub>4</sub> X 2  | <b>9109009</b>  | 65     | 90       | 115    | 50          | 80       | 78  | 36    | 9  | M6  | G1/4          | 8                    | 0,5         |
|      | 3           | 2 <sup>3</sup> / <sub>4</sub> X 3  | <b>9109010</b>  | 80     | 110      | 145    | 65          | 80       | 78  | 36    | 9  | M6  | G1/4          | 8                    | 0,6         |
|      | 1           | 4 <sup>1</sup> / <sub>2</sub> X 1  | <b>9109400</b>  | 45     | 65       | 90     | 45          | 125      | 110 | 93    | 13 | M6  | G3/8          | 8                    | 0,8         |
| 110  | 2           | 4 <sup>1</sup> / <sub>2</sub> X 2  | <b>9109401</b>  | 65     | 100      | 145    | 80          | 125      | 110 | 93    | 13 | M6  | G3/8          | 8                    | 1           |
|      | 3           | 4 <sup>1</sup> / <sub>2</sub> X 3  | <b>9109402</b>  | 100    | 145      | 200    | 100         | 125      | 110 | 93    | 13 | M6  | G3/8          | 8                    | 1,2         |
| 150  | 1           | 6 X 1                              | <b>9109004A</b> | 50     | 80       | 105    | 55          | 175      | 155 | 127   | 16 | M8  | G1/2          | 8                    | 2,4         |
|      | 2           | 6 X 2                              | <b>9109001A</b> | 78     | 130      | 190    | 112         | 175      | 155 | 127   | 16 | M8  | G1/2          | 8                    | 2,7         |
|      | 3           | 6 X 3                              | <b>9109007A</b> | 102    | 190      | 275    | 173         | 175      | 155 | 127   | 16 | M8  | G1/2          | 8                    | 3           |
| 200  | 1           | 8 x 1                              | <b>9109014</b>  | 50     | 90       | 125    | 75          | 230      | 184 | 155,5 |    | M10 | G1/2          | 8                    | 3,05        |
|      | 2           | 8 x 2                              | <b>9109011</b>  | 70     | 160      | 250    | 180         | 230      | 184 | 155,5 |    | M10 | G1/2          | 8                    | 3,7         |
|      | 3           | 8 x 3                              | <b>9109017</b>  | 100    | 205      | 325    | 225         | 230      | 184 | 155,5 |    | M10 | G1/2          | 8                    | 4,4         |
| 250  | 1           | 10 x 1                             | <b>9109024</b>  | 50     | 100      | 150    | 100         | 280      | 210 | 181   |    | M10 | G1/2          | 8                    | 3,9         |
|      | 2           | 10 x 2                             | <b>9109021</b>  | 70     | 170      | 270    | 200         | 280      | 210 | 181   |    | M10 | G1/2          | 8                    | 5           |
|      | 3           | 10 x 3                             | <b>9109031</b>  | 100    | 250      | 400    | 300         | 280      | 210 | 181   |    | M10 | G1/2          | 8                    | 5,6         |
| 300  | 1           | 12 x 1                             | <b>9109044</b>  | 50     | 100      | 150    | 100         | 330      | 260 | 232   |    | M10 | G1/2          | 8                    | 6,2         |
|      | 2           | 12 x 2                             | <b>9109041</b>  | 75     | 170      | 270    | 195         | 330      | 260 | 232   |    | M10 | G1/2          | 8                    | 6,7         |
|      | 3           | 12 x 3                             | <b>9109051</b>  | 100    | 250      | 430    | 330         | 330      | 260 | 232   |    | M10 | G1/2          | 8                    | 8,1         |
| 370  | 1           | 14 <sup>1</sup> / <sub>2</sub> x 1 | <b>9109064</b>  | 50     | 110      | 165    | 115         | 395      | 310 | 282,5 |    | M10 | G1/2          | 8                    | 6,9         |
|      | 2           | 14 <sup>1</sup> / <sub>2</sub> x 2 | <b>9109061</b>  | 70     | 180      | 295    | 225         | 395      | 310 | 282,5 |    | M10 | G1/2          | 8                    | 9,1         |
|      | 3           | 14 <sup>1</sup> / <sub>2</sub> x 3 | <b>9109069</b>  | 100    | 280      | 450    | 350         | 395      | 310 | 282,5 |    | M10 | G1/2          | 8                    | 10,7        |
| 410  | 2           | 16 x 2                             | <b>9109171</b>  | 75     | 200      | 325    | 250         | 440      | 310 | 282,5 |    | M10 | G1/2          | 8                    | 9,7         |
|      | 3           | 16 x 3                             | <b>9109177</b>  | 125    | 300      | 500    | 375         | 440      | 310 | 282,5 |    | M10 | G1/2          | 8                    | 12,9        |

**Note:** The burst pressure is quoted at maximum stroke.

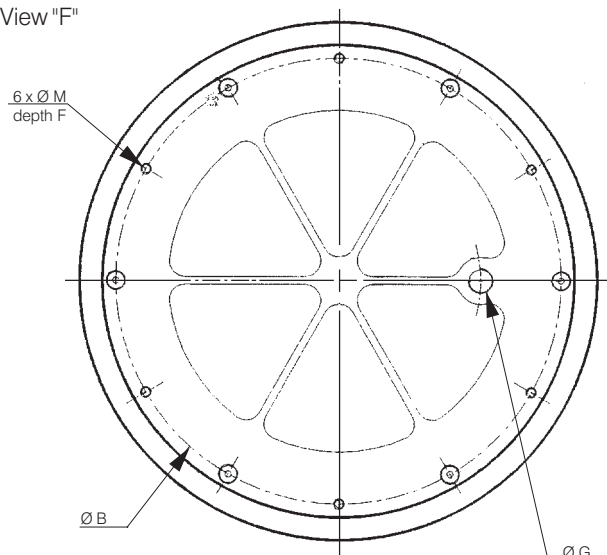
## Mounting dimensions

Ø 550 mm (21<sup>1/2</sup>")  
Aluminium end plates

Ø 660 mm (26")  
Steel end plates



View "F"



| Ø mm | Convolution | Types     | Order code      | H mini | H static | H maxi | Maxi stroke | Ø E maxi | Ø A   | Ø B | F  | Ø M | Port size Ø G | P max pressure (bar) | Weight (kg) |
|------|-------------|-----------|-----------------|--------|----------|--------|-------------|----------|-------|-----|----|-----|---------------|----------------------|-------------|
| 550  | 2           | 211/2 x 2 | <b>9109150</b>  | 90     | 200      | 390    | 300         | 580      | 498,5 | 470 | 19 | M10 | G3/4          | 8                    | 20,6        |
|      |             | 211/2 x 2 | <b>9109153*</b> | 90     | 200      | 390    | 300         | 580      | 498,5 | 470 |    | M10 | G3/4          | 8                    | 11,5        |
| 660  | 2           | 26 x 2    | <b>9109156</b>  | 90     | 200      | 400    | 310         | 700      | 601   | 470 | 19 | M10 | G3/4          | 8                    | 23          |

**Note:** The burst pressure is quoted at maximum stroke.

\* Air bellows less end caps

## Spare parts

| Ø mm | Convolution | Types                 | Bellows  |             | End plates     |                 | Support ring | Central ring |
|------|-------------|-----------------------|----------|-------------|----------------|-----------------|--------------|--------------|
|      |             |                       | Standard | Chlorobutyl | W/o inlet port | With inlet port |              |              |
| 70   | 2           | 2 <sup>3/4</sup> X 2  | 9109152  | 9109303     |                |                 |              |              |
|      | 3           | 2 <sup>3/4</sup> X 3  | 9109090  | 9109304     | 9109065        | 9109181         | 9109197      | 9109209      |
| 110  | 1           | 4 <sup>1/2</sup> X 1  | 9109145  | 9109288     |                |                 |              |              |
|      | 2           | 4 <sup>1/2</sup> X 2  | 9109189  | 9109289     | 9109188        | 9109187         | 9109186      | 9109184      |
|      | 3           | 4 <sup>1/2</sup> X 3  | 9109147  | 9109287     |                |                 |              |              |
| 150  | 1           | 6 X 1                 | 9109191  | 9109391     |                |                 |              |              |
|      | 2           | 6 X 2                 | 9109091  | 9109291     | 9109070A       | 9109075A        | 9109080A     | 9109098A     |
|      | 3           | 6 X 3                 | 9109149  | 9109286     |                |                 |              |              |
| 200  | 1           | 8 x 1                 | 9109192  | 9109392     |                |                 |              |              |
|      | 2           | 8 x 2                 | 9109092  | 9109292     | 9109071        | 9109076         | 9109086      | 9109099      |
|      | 3           | 8 x 3                 | 9109151  | 9109300     |                |                 |              |              |
| 250  | 1           | 10 x 1                | 9109146  | 9109393     |                |                 |              |              |
|      | 2           | 10 x 2                | 9109093  | 9109293     | 9109072        | 9109077         | 9109087      | 9109100      |
|      | 3           | 10 x 3                | 9109094  | 9109294     |                |                 |              |              |
| 300  | 1           | 12 x 1                | 9109195  | 9109395     |                |                 |              |              |
|      | 2           | 12 x 2                | 9109095  | 9109295     | 9109073        | 9109078         | 9109088      | 9109101      |
|      | 3           | 12 x 3                | 9109096  | 9109296     |                |                 |              |              |
| 370  | 1           | 14 <sup>1/2</sup> x 1 | 9109197  | 9109397     |                |                 |              |              |
|      | 2           | 14 <sup>1/2</sup> x 2 | 9109097  | 9109297     | 9109074        | 9109178         | 9109089      | 9109170      |
|      | 3           | 14 <sup>1/2</sup> x 3 | 9109148  | 9109301     |                |                 |              |              |
| 410  | 2           | 16 x 2                | 9109199  | 9109298     |                |                 |              |              |
|      | 3           | 16 x 3                | 9109200  | 9109299     | 9109074        | 9109178         | 9109089      | 9109170      |
| 550  | 2           | 211/2 x 2             | 9109190  | 9109290     | 9109068        | 9109067         | 9109183      | 9109185      |
| 660  | 2           | 26 x 2                | 9109198  | 9109302     | 9109155        | 9109157         | 9109183      | 9109185      |