

## Standard Cylinders ISO 15552

### Global product range

The P1F Series meets the specifications of the ISO 15552 standard. This means full interchangeability to any cylinder anywhere around the globe.

The P1F will be available throughout the extensive worldwide Parker Hannifin organisation – for the benefit to you and your customers.

### Features

- Smooth profile or Tie-Rods design.
- Bore sizes 32 - 125 mm.
- Stroke up to 2500 mm.
- Corrosion resistant design.
- Stainless steel piston rod.
- Polyurethane seal technology.
- Stainless steel cushioning screws on same side.
- New adjustable pneumatic and mechanical cushioning system reduces noise.
- Full range of mountings.
- Full range of drop-in' sensors.



## Design Variants

### Smooth profile - P1F-S, P1F-K

The P1F in bore sizes Ø32 to Ø125 mm is a smooth profile designed cylinder with a magnetic piston used for standard temperature range from -20°C to +80°C. Utilising internal composite technology to save weight and reduce impact kinetic energy, while assuring the high performance and functionality expected for an ISO cylinder. Aluminium end covers, stainless steel piston rod guided with a PTFE coated steel bearing, pneumatic cushioning and polyurethane (PUR) seals as standard, this is our smooth profile industrial ISO cylinder.

### Smooth profile - P1F-A

Similar to the smooth profile version but in an ATEX variant and a restricted temperature range from -20°C to +60°C. Average speed up to 0.5 m/s and max. frequency 1Hz.

CE Ex II 2GD Ex h IIC T4 T=120°C GDb -20°C ≤ Ta ≤ +60°C

### Twin Rods smooth profile - P1F-R, P1F-Q

Similar to the smooth profile version but with Twin Rods for non-rotating applications like handling and packaging.

### Tie-Rods round profile - P1F-T, P1F-N

Similar to the smooth profile version but in a Tie-Rods design for heavy duty applications. Round tube is made in anodised aluminium; Tie-Rods in stainless steel as a standard. Bore sizes Ø32 to Ø125 mm.

Large bore sizes Ø160 to Ø320 mm, see catalogue PDE2667TCEN.



### Smooth profile with rod locks - P1F-L, P1F-H

With an air/spring rod lock allowing the piston rod to be braked or locked in any position. Incorporating a powerful piston rod locking device, which clamps the piston rod and locks it in position in static, H version or in dynamic, L version. In the absence of an air signal pressure, full holding force is applied to the piston rod. Fully integrated in the front end cap for the L version, added as an accessories for the H version.

### Air Reservoirs - P1F-P

The air reservoirs are produced by a cylinder tube and two standard rear end plates and used, e.g. together with throttle valves to achieve a timer function in a pneumatic system. The delay of time will be varied by changing the throttle valve and by the size of the air reservoir. With a well functioning throttle valve and a suitable air reservoir it would be possible to achieve an accuracy of  $\pm 5\%$ . The reservoir is also used to equal pressure variants into system and to handling short extreme air consumptions without functional disorders. The air reservoirs could also be used together with check valves in order to retain a pressure which is essential for safety reasons.

## Options

### High temperature

All seals in the high temperature version of P1F are developed and validated for continuous operation up to  $+150^{\circ}\text{C}$ . The combination of the seal geometry and the FKM (fluoro elastomers) material ensures reliable and long service life. High temperature cylinders have no magnetic piston and cannot be fitted with sensors (the magnetic field strength in high temperatures is too low to ensure correct reliable sensor function).

### Chemical resistance scraper

For use in applications where chemicals may affect the scraper in the front end cover, an option with a scraper in FKM (fluoro elastomers) for better chemical resistance must be used. This sealing option is combined with both end covers having a specific anodisation to a better corrosion resistance and with stainless steel screws and piston rod nut.

### Metallic scraper

In environments where the piston rod may be coated with resin, ice, cement, sugar crystals, dough, etc., primarily in timber handling, refrigerated/chilled transport, cement industry, chemicals and food and drinks a metal scraper in combination with a hard-chromium plated piston rod is the right solution. Available for low temperature range applications from  $-30^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ .



### Low temperature

All seals in the low temperature version of P1F are developed and validated for continuous operation down to  $-40^{\circ}\text{C}$ . Ultrathin polyurethane TPU-PUR seal technology and specifically formulated grease support performance and reliability for low temperature applications. As standard supplied with a magnetic ring in the piston for proximity sensing.

### Dry running scraper

In many applications, primarily in the foodstuffs industry, the cylinders are cleaned frequently. This means that the film of grease on the piston rod is washed off, which puts special demands on the material with an FDA conformity and on the design of the piston wiper / rod itself. This sealing option is combined with both end covers having a specific anodisation to a better corrosion resistance and with the stainless steel screws and piston rod nut. Suitable for non food area EN1672-2.

### Stainless steel screws and anodised end caps

Piston rod nut and end covers fixing screws are made in stainless steel, piston rod bushing in a high polymer and end covers are anodised for a better corrosion resistance and use for applications where humidity is constant and when cylinders are frequently cleaned by chemical agents. Only available for chemical resistance and dry running scraper options.

## Technical Data

### Cylinder forces

| Bore/piston rod [mm] | Stroke | Surface area [cm <sup>2</sup> ] | Max theoretical force in N in relation to applied pressure in bar |      |      |      |      |             |      |      |       |       |
|----------------------|--------|---------------------------------|-------------------------------------------------------------------|------|------|------|------|-------------|------|------|-------|-------|
|                      |        |                                 | 1                                                                 | 2    | 3    | 4    | 5    | 6           | 7    | 8    | 9     | 10    |
| <b>32/12</b>         | +      | 8.0                             | 80                                                                | 161  | 241  | 322  | 402  | <b>483</b>  | 563  | 643  | 724   | 804   |
|                      | -      | 6.9                             | 69                                                                | 138  | 207  | 276  | 346  | <b>415</b>  | 484  | 553  | 622   | 691   |
| <b>40/16</b>         | +      | 12.6                            | 126                                                               | 251  | 377  | 503  | 628  | <b>754</b>  | 880  | 1005 | 1131  | 1257  |
|                      | -      | 10.6                            | 106                                                               | 211  | 317  | 422  | 528  | <b>633</b>  | 739  | 844  | 950   | 1056  |
| <b>50/20</b>         | +      | 19.6                            | 196                                                               | 393  | 589  | 785  | 982  | <b>1178</b> | 1374 | 1571 | 1767  | 1964  |
|                      | -      | 16.5                            | 165                                                               | 330  | 495  | 660  | 825  | <b>990</b>  | 1155 | 1319 | 1484  | 1649  |
| <b>63/20</b>         | +      | 31.2                            | 312                                                               | 623  | 935  | 1247 | 1559 | <b>1870</b> | 2182 | 2494 | 2806  | 3117  |
|                      | -      | 28.0                            | 280                                                               | 561  | 841  | 1121 | 1402 | <b>1682</b> | 1962 | 2242 | 2523  | 2803  |
| <b>80/25</b>         | +      | 50.3                            | 503                                                               | 1005 | 1508 | 2011 | 2513 | <b>3016</b> | 3519 | 4021 | 4524  | 5027  |
|                      | -      | 45.4                            | 454                                                               | 907  | 1361 | 1814 | 2268 | <b>2721</b> | 3175 | 3629 | 4082  | 4536  |
| <b>100/25</b>        | +      | 78.5                            | 785                                                               | 1571 | 2356 | 3142 | 3927 | <b>4712</b> | 5498 | 6283 | 7069  | 7854  |
|                      | -      | 73.6                            | 736                                                               | 1473 | 2209 | 2945 | 3682 | <b>4418</b> | 5154 | 5891 | 6627  | 7363  |
| <b>125/32</b>        | +      | 122.7                           | 1227                                                              | 2454 | 3682 | 4909 | 6136 | <b>7363</b> | 8590 | 9818 | 11045 | 12272 |
|                      | -      | 114.7                           | 1147                                                              | 2294 | 3440 | 4587 | 5734 | <b>6881</b> | 8027 | 9174 | 10321 | 11468 |

+ = outward stroke  
- = return stroke

### Cylinder air consumption

| Bore/piston rod [mm]           | Stroke | Surface area [cm <sup>2</sup> ] | Air consumption in l/mm in relation to applied pressure in bar |       |       |       |       |              |       |       |       |       |
|--------------------------------|--------|---------------------------------|----------------------------------------------------------------|-------|-------|-------|-------|--------------|-------|-------|-------|-------|
|                                |        |                                 | 1                                                              | 2     | 3     | 4     | 5     | 6            | 7     | 8     | 9     | 10    |
| <b>32/12</b><br><b>(G1/8)</b>  | +      | 8.0                             | 0.016                                                          | 0.024 | 0.032 | 0.040 | 0.048 | <b>0.056</b> | 0.064 | 0.072 | 0.079 | 0.087 |
|                                | -      | 6.9                             | 0.014                                                          | 0.021 | 0.027 | 0.034 | 0.041 | <b>0.048</b> | 0.055 | 0.061 | 0.068 | 0.075 |
| <b>40/16</b><br><b>(G1/4)</b>  | +      | 12.6                            | 0.025                                                          | 0.037 | 0.050 | 0.062 | 0.075 | <b>0.087</b> | 0.099 | 0.112 | 0.124 | 0.137 |
|                                | -      | 10.6                            | 0.021                                                          | 0.031 | 0.042 | 0.052 | 0.063 | <b>0.073</b> | 0.083 | 0.094 | 0.104 | 0.115 |
| <b>50/20</b><br><b>(G1/4)</b>  | +      | 19.6                            | 0.039                                                          | 0.058 | 0.078 | 0.097 | 0.117 | <b>0.136</b> | 0.155 | 0.175 | 0.194 | 0.213 |
|                                | -      | 16.5                            | 0.033                                                          | 0.049 | 0.065 | 0.082 | 0.098 | <b>0.114</b> | 0.130 | 0.147 | 0.163 | 0.179 |
| <b>63/20</b><br><b>(G3/8)</b>  | +      | 31.2                            | 0.062                                                          | 0.093 | 0.123 | 0.154 | 0.185 | <b>0.216</b> | 0.247 | 0.277 | 0.308 | 0.339 |
|                                | -      | 28.0                            | 0.056                                                          | 0.083 | 0.111 | 0.139 | 0.166 | <b>0.194</b> | 0.222 | 0.249 | 0.277 | 0.305 |
| <b>80/25</b><br><b>(G3/8)</b>  | +      | 50.3                            | 0.100                                                          | 0.150 | 0.199 | 0.249 | 0.298 | <b>0.348</b> | 0.398 | 0.447 | 0.497 | 0.546 |
|                                | -      | 45.4                            | 0.090                                                          | 0.135 | 0.180 | 0.224 | 0.269 | <b>0.314</b> | 0.359 | 0.404 | 0.448 | 0.493 |
| <b>100/25</b><br><b>(G1/2)</b> | +      | 78.5                            | 0.156                                                          | 0.234 | 0.311 | 0.389 | 0.466 | <b>0.544</b> | 0.621 | 0.699 | 0.776 | 0.854 |
|                                | -      | 73.6                            | 0.146                                                          | 0.219 | 0.292 | 0.364 | 0.437 | <b>0.510</b> | 0.582 | 0.655 | 0.728 | 0.800 |
| <b>125/32</b><br><b>(G1/2)</b> | +      | 122.7                           | 0.244                                                          | 0.365 | 0.486 | 0.607 | 0.728 | <b>0.850</b> | 0.971 | 1.092 | 1.213 | 1.334 |
|                                | -      | 114.7                           | 0.228                                                          | 0.341 | 0.454 | 0.567 | 0.681 | <b>0.794</b> | 0.907 | 1.020 | 1.134 | 1.247 |

free air consumption for 1 cycle, 10 mm inward and 10 mm outward

+ = outward stroke  
- = return stroke

### Weight

| Cyl.-bore [mm] | P1F-S/A/L/H    |                 | P1F-T          |                 | Moving parts   |                 | Adder for rod lock |            |
|----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|--------------------|------------|
|                | Base 0 mm [kg] | per 100 mm [kg] | Base 0 mm [kg] | per 100 mm [kg] | Base 0 mm [kg] | per 100 mm [kg] | P1F-H [kg]         | P1F-L [kg] |
| Ø32            | 0.54           | 0.23            | 0.49           | 0.27            | 0.10           | 0.09            | 0.6                | 0.41       |
| Ø40            | 0.74           | 0.32            | 0.73           | 0.31            | 0.19           | 0.16            | 0.8                | 0.44       |
| Ø50            | 1.22           | 0.47            | 1.19           | 0.52            | 0.34           | 0.25            | 1.0                | 0.61       |
| Ø63            | 1.69           | 0.49            | 1.68           | 0.54            | 0.40           | 0.24            | 1.2                | 1.25       |
| Ø80            | 2.50           | 0.73            | 2.48           | 0.84            | 0.73           | 0.39            | 1.4                | 2.45       |
| Ø100           | 3.65           | 0.80            | 3.66           | 0.88            | 1.02           | 0.38            | 1.6                | 3.72       |
| Ø125           | 6.41           | 1.37            | 6.30           | 1.32            | 2.01           | 0.63            | 1.8                | 6.07       |

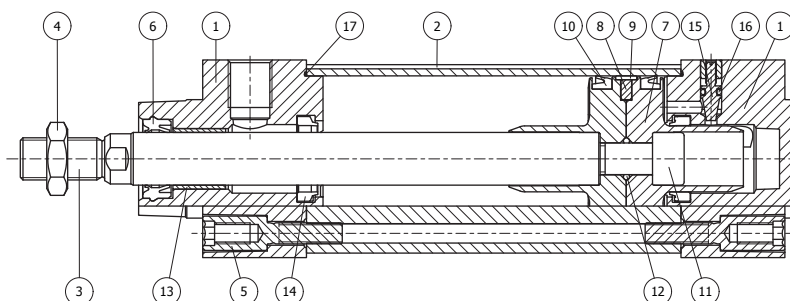
## Technical Data

|                  |                                          |
|------------------|------------------------------------------|
| Product type     | Standard cylinder according to ISO 15552 |
| Bore size        | 32 - 125 mm                              |
| Stroke length    | 5 - 2500 mm                              |
| Versions         | Double acting                            |
| Cushioning       | Adjustable air cushioning                |
| Position sensing | Proximity sensor                         |
| Installation     | ISO cylinder and piston rod mountings    |



## Operating and environmental data

|                      |                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                                 |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------|
| Operating medium     | For best possible service life and trouble-free operation dry filtered compressed air to ISO 8573-1:2010 quality 3.4.3 should be used. This specifies a dew point of + 3°C for indoor operation (a lower dew point should be selected for minus temperature operation and we recommend the use of an inline dryer) and is in line with the air quality from most standard compressors with a standard filter. |                 |                                                 |
| Operating pressure   | 1 to 10 bar                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                                 |
| Ambient temperature  | Standard temperature (option M):                                                                                                                                                                                                                                                                                                                                                                              | -20°C to +80°C  | Metal scraper (option Q): -30°C to +80°C        |
|                      | High temperature (option F):                                                                                                                                                                                                                                                                                                                                                                                  | -10°C to +150°C | FKM wiper rod seal (option V): -10°C to +80°C   |
|                      | Low temperature (option L):                                                                                                                                                                                                                                                                                                                                                                                   | -40°C to + 80°C | POLON wiper rod seal (option D): -20°C to +80°C |
| Pre-lubricated       | Further lubrication is normally not necessary. If additional lubrication is introduced it must be continued. Hydraulic oil type HLP (DIN 51524. ISO 11158). Viscosity by 40°C: 32 mm <sup>2</sup> /s (cst). Example: Shell Tellus 32 or equal.                                                                                                                                                                |                 |                                                 |
| Corrosion resistance | Material and surface treatment selected for typical industrial applications with resistance to corrosion and chemicals.                                                                                                                                                                                                                                                                                       |                 |                                                 |



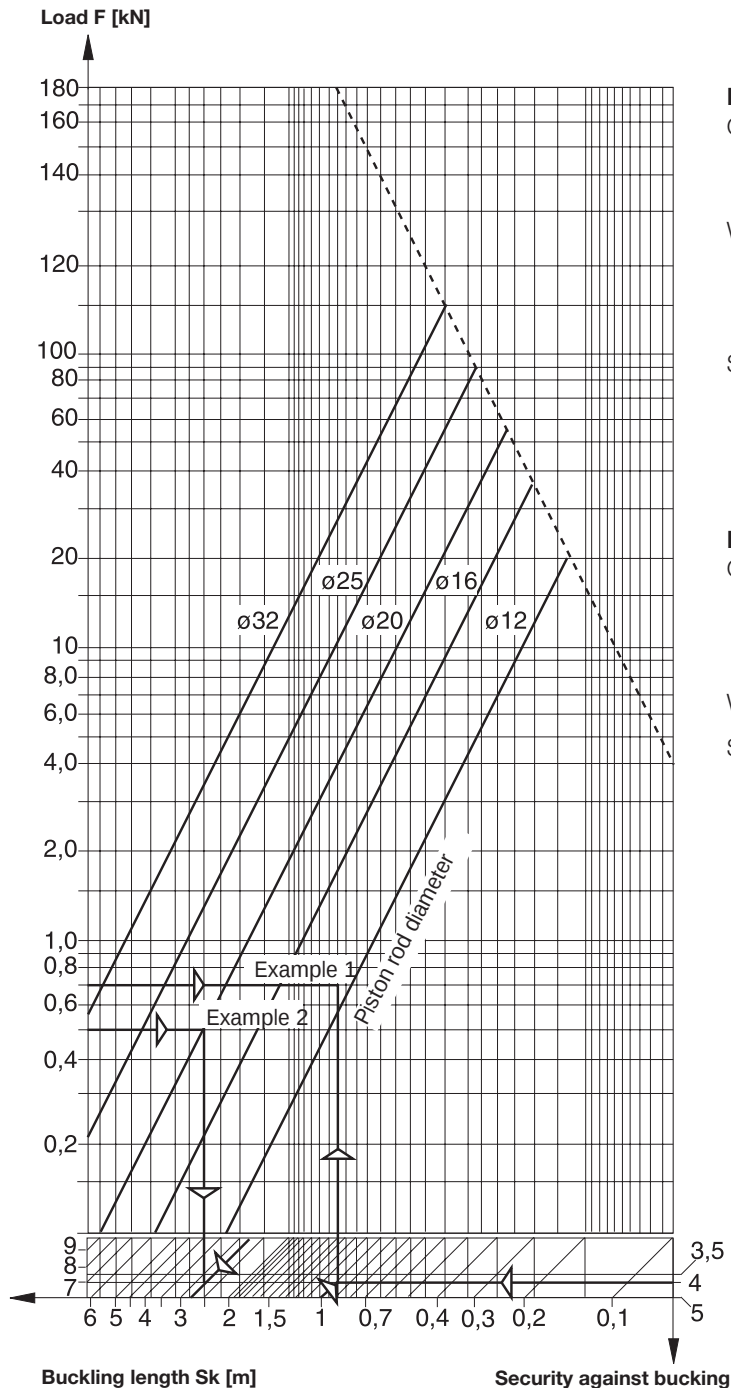
## Material specification

| Pos | Part                    | Specification                                                                                                                 |
|-----|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1   | End covers              | Aluminium / Optional black anodised (options V & D only)                                                                      |
| 2   | Cylinder barrel         | Anodised aluminium (profile or round tube)                                                                                    |
| 3   | Piston rod              | Standard: Austenitic stainless steel, DIN X8 CrNiS 18-9                                                                       |
|     |                         | Optional: Chromium plated steel DIN C45E                                                                                      |
|     |                         | Optional: Chromium plated stainless steel DIN X2 CrNiMoN 17-12-2, Acid proof                                                  |
| 4   | Piston rod nut          | Zinc plated steel / Stainless steel (option V & D only)                                                                       |
| 5   | End cover screws        | Zinc plated steel / Stainless steel (option V & D only)                                                                       |
| 6   | Piston rod seal         | Standard: Polyurethane (PUR)                                                                                                  |
|     |                         | Optional: Fluoro elastomer (FKM) / Ultrathanpolyurethane (TPU-PUR) / Metallic scraper (Brass) nitrile (NBR) / Polon / UHMW-PE |
| 7   | Piston                  | Standard: Poloxymethylene (POM)                                                                                               |
|     |                         | Optional: Aluminium                                                                                                           |
| 8   | Magnet                  | Plastic coated magnetic material                                                                                              |
| 9   | Piston bearing          | Standard: Poloxymethylene (POM)                                                                                               |
|     |                         | Optional: Polytetrafluoroethylene (PTFE), for aluminium piston                                                                |
| 10  | Piston seals            | Standard: Polyurethane (PUR)                                                                                                  |
|     |                         | Optional: Fluoro elastomer (FKM) / Ultrathanpolyurethane (TPU-PUR)                                                            |
| 11  | Piston bolt             | Zinc plated steel                                                                                                             |
| 12  | O-ring piston bolt      | Standard: Nitrile rubber (NBR)                                                                                                |
|     |                         | Optional: Fluoro elastomer (FKM)                                                                                              |
| 13  | Piston rod bearing      | Multilayer Steel / PTFE / Optional high polymer (option V & D only)                                                           |
| 14  | Cushioning seals        | Standard: Polyurethane (PUR)                                                                                                  |
|     |                         | Optional: Fluoro elastomer (FKM) / Ultrathanpolyurethane (TPU-PUR)                                                            |
| 15  | Cushioning screw        | Stainless steel DIN X8 CrNiS 18-9                                                                                             |
| 16  | O-ring cushioning screw | Standard: Nitrile rubber (NBR)                                                                                                |
|     |                         | Optional: Fluoro elastomer (FKM)                                                                                              |
| 17  | O-ring end cover        | Standard: Nitrile rubber (NBR)                                                                                                |
|     |                         | Optional: Fluoro elastomer (FKM)                                                                                              |
|     | Tie-Rods                | Austenitic stainless steel, DIN X8 CrNiS 18-9                                                                                 |
|     | Tie-Rods nut            | Zinc plated steel                                                                                                             |

### Piston rod load diagram

The piston rod diameter has to be determined to prevent the rod from buckling. Always take the maximum piston thrust force achievable at the specified operating pressure with the cylinder in question.

Loads resulting from longer strokes (as indicated in the diagram) on request. In case of special mounting conditions and transverse forces please consult. Recommended security factor against buckling: 3,5 to 5.



#### Example 1:

Given Piston thrust: 0.7 kN  
Stroke length: 1000 mm  
Operating pressure: approx. 6 bar

Wanted Piston rod diameter with 4-fold security against buckling;  
Check the piston thrust of the cylinder diameter resulting from the piston rod diameter.

Solution see example 1 in piston rod load diagram.  
The piston rod diameter lies between 12 and 16 mm - a cylinder with a piston rod of 16 mm diameter therefore has to be chosen.

#### Example 2:

Given Cylinder: Ø 50 mm  
Piston rod: Ø 20 mm  
Stroke length: 1000 mm  
Piston thrust: 0.5 kN at 6 bar

Wanted max. stroke with 4-fold security against buckling

Solution see example 2 in piston rod load diagram.  
Sk = 2900 mm  
max. stroke = 1450 mm

### Buckling Possibilities of Piston Rods



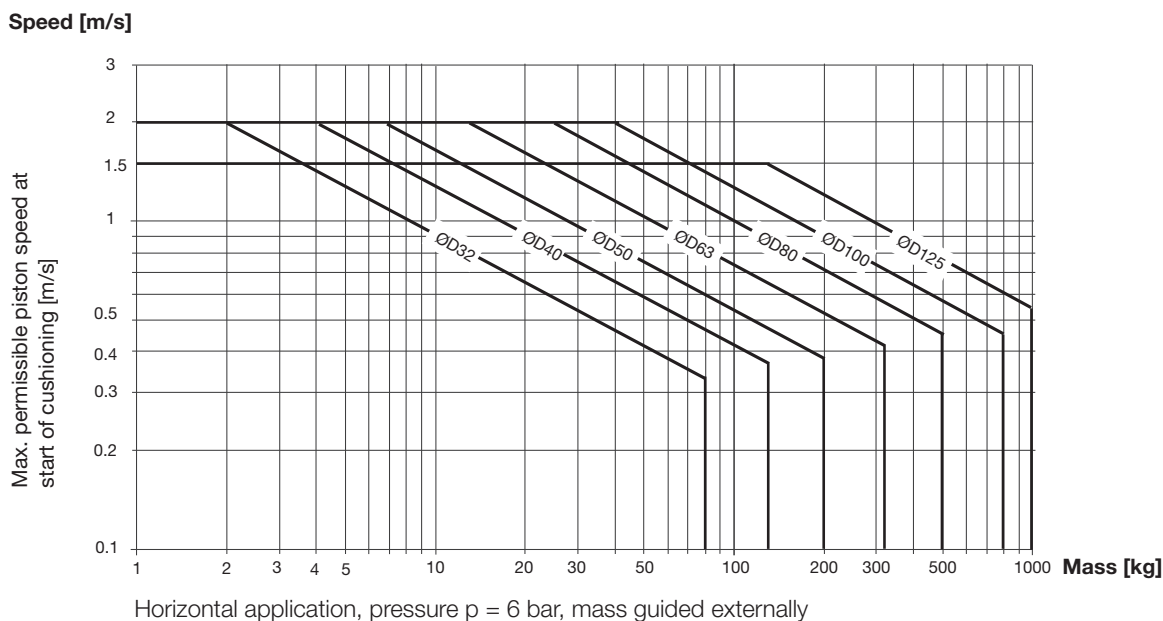
### Cushioning Characteristics

Air cushion is used to absorb kinetic energy due to load and speed at both end of stroke. This typically consists of a threaded needle screw that adjusts into an orifice in the cylinder end plate. By adjusting the screw further into the orifice you lessen the amount of air that can escape in a given time. Slowing the exhaust of air creates back pressure which slows the piston as it enters into the end cushioning seal.

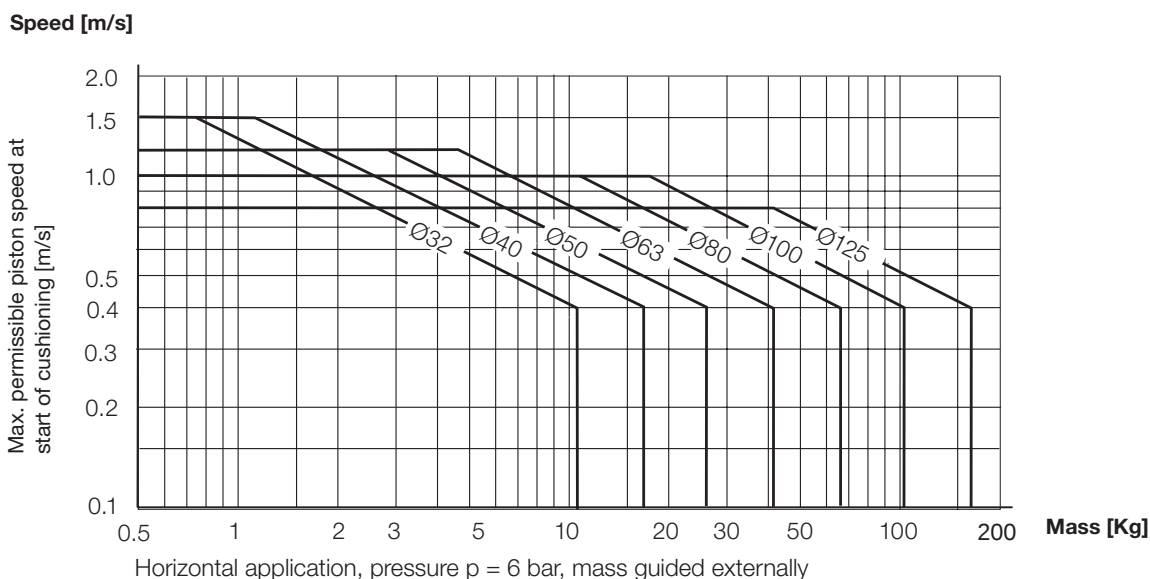
### Cushioning Diagram

Work out your expected moving mass and read off the maximum permissible speed at start of cushioning. Alternatively, take your desired speed and expected mass and find the cylinder size required. Please note that piston speed at start of cushioning is typically approx. 50 % higher than the average speed, and that it is this higher speed which determines the choice of cylinder.

The mass is the sum of internal and external friction, plus any gravitational forces.



### Cushioning Diagram for Cylinders with rod locks



## Rod Locks

**Function on pressure loss** | The piston rod lock can be used in all material handling systems where controlled fastening or positioning is required. Additional measures are required for use in safety-related applications (refer to EC Machinery Directive).

The piston rod cylinder with brakes is suitable for use in safety-related sections of control systems. The piston rod lock is also suitable for use as a pressure-loss brake for cylinders with suspended loads. Piston rod can be held in position for long periods even with alternating loads, fluctuating operating pressure or leaks in the system. The signal air to the lock unit can be connected directly to the air system or to the supply air for the valve controlling the cylinder. For controlled on/off operation of the rod lock unit, a separate valve, with large exhaust flow capacity, must be used.

**Clean and compact design** | The front end piece and rod lock unit for the P1F-L variant form an integrated block, keeping the length of the cylinder as short as possible. The design is

easy to clean, sealed and waterproof. The exhaust air from the lock unit can be removed by replacing the filter unit with a fitting and hose. This is an advantage in terms of cleaning or when environmental factors are important.

**Use as a brake** | The graph on page 9 shows the maximum values for speed and braking mass if the cylinder is used as a brake. The cylinder should not be exposed to additional compressive forces as this significantly reduces the external mass that can be braked.

The cylinder does not act as a motor during braking. Heat is generated if the brake is used frequently, and this must be taken into account too. The static locking force corresponds to 7 bar pressure. Under certain circumstances, the rod lock can also be used as a brake for positioning or similar applications. The maximum values set out in the cushioning graph must not be exceeded.

### Static lock forces

| Cylinder bore [mm] | [N] P1F-L | [N] P1F-H |
|--------------------|-----------|-----------|
| Ø32                | 550       | 600       |
| Ø40                | 860       | 1000      |
| Ø50                | 1345      | 1500      |
| Ø63                | 2140      | 2200      |
| Ø80                | 3450      | 3000      |
| Ø100               | 5390      | 5000      |
| Ø125               | 8425      | 7500      |

### Technical data

|                                  |                             |                             |
|----------------------------------|-----------------------------|-----------------------------|
| Working pressure:                | Max 10 bar                  | Max 10 bar                  |
| Working media:                   | Dry filtered compressed air | Dry filtered compressed air |
| Working temperature:             | -20 to +80°C                | -20 to +80°C                |
| Release pressure <sup>1)</sup> : | Min 4 bar +/- 10%           | > 4 bar                     |

<sup>1)</sup> Signal pressure to inlet port of lock unit

### Material specification, piston rod locking

|                      | P1F-L                   | P1F-H              |
|----------------------|-------------------------|--------------------|
| Housing              | Anodised aluminium      | Anodised aluminium |
| Carriage             | -                       | Anodised aluminium |
| Lock collars         | Hardened steel          | Brass              |
| Springs              | Stainless steel         | Stainless steel    |
| Rod seal Ø 32-40 mm  | UHMWPE plastic          | -                  |
| Rod seal Ø 50-125 mm | Polyurethane PUR        | -                  |
| O Rings              | Nitrile rubber NBR      | -                  |
| Scraper ring         | Polyurethane PUR        | Polyurethane PUR   |
| Air filter           | Brass / Sintered bronze | -                  |

#### Note!

If a rod guidance module is to be fitted to the brake and the cylinder, as the piston rod extension (WH dimension) for P1F-L is not in accordance with the ISO standard, the piston rod must be extended to provide the same WH dimension as for the cylinder itself. Cylinder piston rod material must be made in chromium plated steel.

Separate Rod Locking Device

The cylinder needs to have an extended piston rod.  
Cylinder piston rod material must be made in chromium plated steel.

| Cyl.-bore<br>[mm] | Rod<br>[mm] | Rod extension<br>[mm] | Weight<br>[kg] | Order Code |
|-------------------|-------------|-----------------------|----------------|------------|
| Ø32               | 12          | 48                    | 0.60           | KC8227     |
| Ø40               | 16          | 55                    | 0.80           | KC8228     |
| Ø50               | 20          | 70                    | 1.00           | KC8229     |
| Ø63               | 20          | 70                    | 1.20           | KC8230     |
| Ø80               | 25          | 90                    | 1.40           | KC8231     |
| Ø100              | 25          | 92                    | 1.60           | KC8232     |
| Ø125              | 32          | 122                   | 1.80           | KC8233     |



Functioning:

The holding force relates to a static load. If this load is exceeded, slippage can occur. Any dynamic forces occurring in operation must not exceed the static holding force. In clamped operating mode, if the load is fluctuating, the clamping unit is not free from play. The cylinder is not suitable for positioning tasks.

Important:

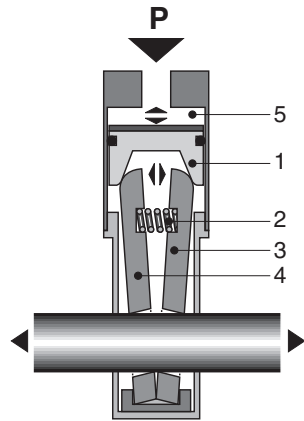
- The locking unit can only be mounted on the cylinder if it is held in its unlocked position either by air pressure or by a suitable screw.
- When the cylinder piston rod is locked it must not be rotated or subjected to external force.

Actuation:

The clamping unit must only be released when both cylinder chambers are pressurised, otherwise there is danger of an accident from the irregular movement of the piston rod. Shutting off the compressed air supply at both ends with a 5/3 ways valve provides adequate safety only for a short time.

Pneumatic circuit:

The design of safe pneumatic circuits begins with a careful risk assessment. The process involves designers of all systems within a machine and/or process from mechanical to electrical. The first step is to look at the project and identify any potential hazards and risks for injury. The next step is to do a risk estimate and evaluation of each hazard. The designers can then develop the appropriate preventive measures to minimize the risk to acceptable levels. The standard developed within ISO 13849 outlines the process by which machine builders can develop their own standard for meeting the guidelines with the goal of making machines as safe as possible. The standard addresses the control of a machine and not the actual moving components (i.e. cylinders, actuators). Pneumatic circuits are usually only one part of a machine that could pose potential hazards.



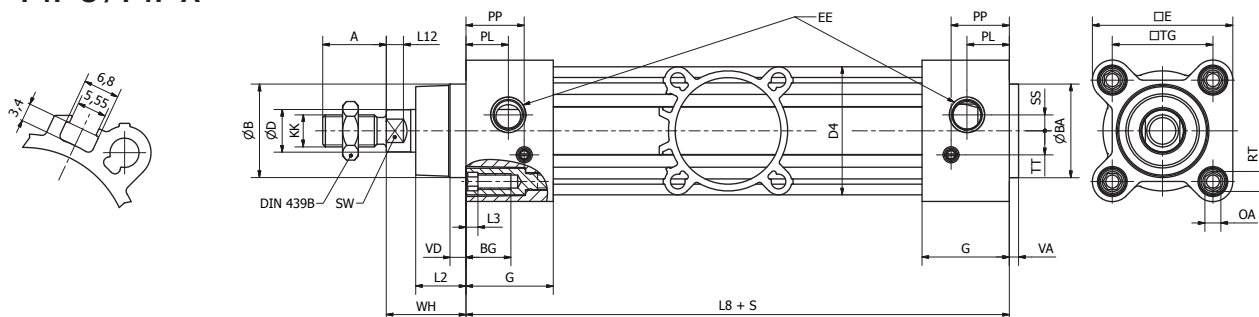
Function:

If the pressure drops the piston rod is locked by two tilting plates. When the piston (1) is put under pressure it is pushed downwards, pressing the two tilting plates (3) and (4) together. The piston rod is then free to move. If the pressure drops in piston chamber (5), a spring pushes the two plates (3) and (4) apart, so that the wedge effect pushes the piston (1) upwards and the tilting plates lock the piston rod.

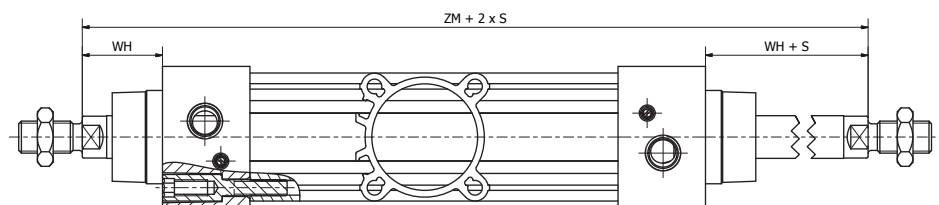
## Dimensions

### Smooth profile design

#### P1F-S / P1F-A

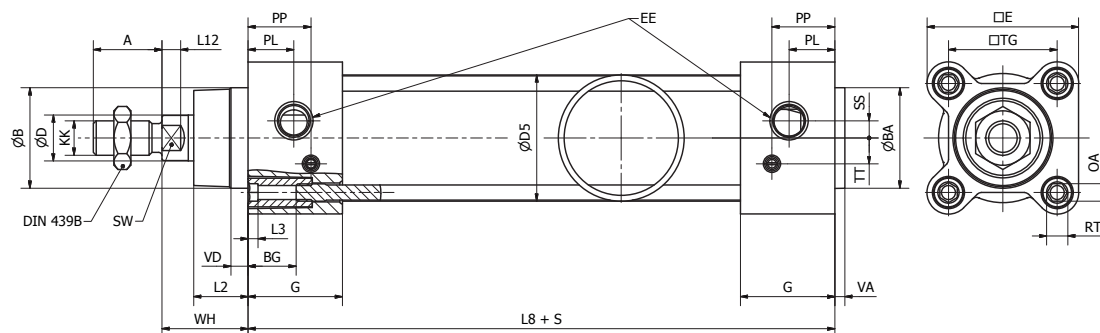


#### P1F-K

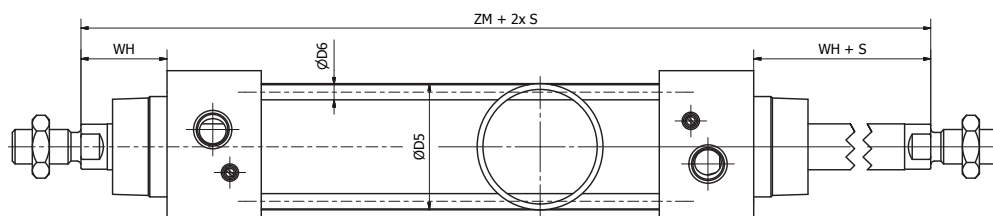


### Tie-Rods with round profile design

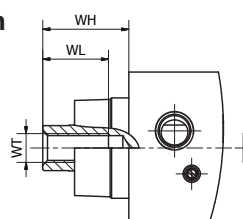
#### P1F-T



#### P1F-N



### Female piston rod option



## Dimensions

### Dimensions [mm]

| Cyl.-bore<br>[mm] | A  | ØB<br>d11 | ØBA<br>d11 | BG   | ØD | D4   | ØD5 | ØD6  | E    | EE   | G    | KK       | L2   | L3  | L8  |
|-------------------|----|-----------|------------|------|----|------|-----|------|------|------|------|----------|------|-----|-----|
| Ø32               | 22 | 30        | 30         | 17   | 12 | 42.5 | 35  | 5.3  | 47   | G1/8 | 28.4 | M10x1.25 | 16.8 | 4.5 | 94  |
| Ø40               | 24 | 35        | 35         | 17   | 16 | 48   | 43  | 5.3  | 53   | G1/4 | 33   | M12x1.25 | 19   | 4.5 | 105 |
| Ø50               | 32 | 40        | 40         | 18   | 20 | 59.5 | 54  | 7.1  | 64.5 | G1/4 | 33.4 | M16x1.5  | 27.6 | 4.5 | 106 |
| Ø63               | 32 | 45        | 45         | 18   | 20 | 69.5 | 67  | 7.1  | 75   | G3/8 | 39.4 | M16x1.5  | 24.3 | 4.5 | 121 |
| Ø80               | 40 | 45        | 45         | 19.5 | 25 | 86   | 85  | 8.9  | 94   | G3/8 | 39.4 | M20x1.5  | 30.1 | 5.5 | 128 |
| Ø100              | 40 | 55        | 55         | 19.5 | 25 | 103  | 105 | 8.9  | 111  | G1/2 | 44.3 | M20x1.5  | 34   | 5.5 | 138 |
| Ø125              | 54 | 60        | 60         | 20   | 32 | 130  | 130 | 10.8 | 136  | G1/2 | 50.8 | M27x2    | 45   | 0   | 160 |

| Cyl.-bore<br>[mm] | L12 | OA | PL   | PP   | RT  | SS   | SW | TG   | TT  | VA  | VD | WH | WL | WT       | ZM  |
|-------------------|-----|----|------|------|-----|------|----|------|-----|-----|----|----|----|----------|-----|
| Ø32               | 6   | 6  | 14   | 20   | M6  | 5    | 10 | 32.5 | 6.5 | 3.6 | 6  | 26 | 21 | M8x1     | 146 |
| Ø40               | 6.5 | 6  | 16   | 22   | M6  | 6    | 13 | 38   | 9   | 3.5 | 6  | 30 | 23 | M10x1.25 | 165 |
| Ø50               | 8   | 8  | 15.5 | 21.5 | M8  | 6    | 17 | 46.5 | 9   | 3.6 | 6  | 37 | 31 | M14x1.5  | 180 |
| Ø63               | 8   | 8  | 18   | 28   | M8  | 10   | 17 | 56.5 | 11  | 3.5 | 6  | 37 | 31 | M14x1.5  | 195 |
| Ø80               | 10  | 10 | 20   | 30   | M10 | 11.5 | 22 | 72   | 14  | 3.5 | 6  | 46 | 39 | M18x1.5  | 220 |
| Ø100              | 10  | 10 | 18   | 33   | M10 | 11.5 | 22 | 89   | 14  | 3.5 | 6  | 51 | 39 | M18x1.5  | 240 |
| Ø125              | 13  | 8  | 20   | 40   | M12 | 0    | 27 | 110  | 22  | 5.5 | 9  | 65 | 53 | M24x2    | 290 |

### Tolerances [mm]

| Cyl.-bore<br>[mm] | A         | L8            | TG    | ZM           | stroke tolerance |                     |            |
|-------------------|-----------|---------------|-------|--------------|------------------|---------------------|------------|
|                   |           |               |       |              | s ≤ 350 mm       | 350 mm < s ≤ 600 mm | s > 600 mm |
| Ø32               | 0 / - 0.5 | ± 0.3         | ± 0.4 | -0.4 / + 2.2 | + 1.7            | + 1.9               | + 2.3      |
| Ø40               | 0 / - 0.5 | ± 0.3         | ± 0.4 | -0.4 / + 2.2 | + 1.7            | + 1.9               | + 2.3      |
| Ø50               | 0 / - 0.5 | ± 0.4         | ± 0.4 | -0.4 / + 2.2 | + 1.8            | + 2                 | + 2.4      |
| Ø63               | 0 / - 0.5 | - 0.5 / + 0.3 | ± 0.4 | -0.4 / + 2.2 | + 1.9            | + 2.1               | + 2.5      |
| Ø80               | 0 / - 0.5 | ± 0.4         | ± 0.4 | -0.4 / + 2.2 | + 1.9            | + 2.1               | + 2.5      |
| Ø100              | 0 / - 0.5 | ± 0.5         | ± 0.4 | -0 / + 2.5   | + 2.0            | + 2.2               | + 2.6      |
| Ø125              | 0 / - 1.0 | ± 0.5         | ± 0.4 | -0 / + 2.6   | + 2.1            | + 2.3               | + 2.7      |



## Mountings

Flange MF1 / MF2 ①



Foot brackets MS1 ②



Pivot bracket with rigid bearing AB7 ③



Swivel eye bracket MP6 ④



Clevis bracket MP2 ⑤



|      |          |          |           |           |           |
|------|----------|----------|-----------|-----------|-----------|
| Ø32  | P1C-4KMB | P1C-4KMF | P1C-4KMDB | P1C-4KMSB | P1C-4KMTB |
| Ø40  | P1C-4LMB | P1C-4LMF | P1C-4LMDB | P1C-4LMSB | P1C-4LMTB |
| Ø50  | P1C-4MMB | P1C-4MMF | P1C-4MMDB | P1C-4MMSB | P1C-4MMTB |
| Ø63  | P1C-4NMB | P1C-4NMF | P1C-4NMDB | P1C-4NMSB | P1C-4NMTB |
| Ø80  | P1C-4PMB | P1C-4PMF | P1C-4PMDB | P1C-4PMSB | P1C-4PMTB |
| Ø100 | P1C-4QMB | P1C-4QMF | P1C-4QMDB | P1C-4QMSB | P1C-4QMTB |
| Ø125 | P1C-4RMB | P1C-4RMF | P1C-4RMDB | P1C-4RMSB | P1C-4RMTB |

Clevis bracket MP4 ⑥



Clevis bracket AB6 ⑦



Pivot bracket with swivel bearing CS7 ⑧



3 and 4 position flange JP1 ⑨



Pivot brackets AT4 ⑩



|      |           |            |           |          |            |
|------|-----------|------------|-----------|----------|------------|
| Ø32  | P1C-4KMEB | P1C-4KMCEB | P1C-4KMAF | P1E-6KB0 | 9301054261 |
| Ø40  | P1C-4LMEB | P1C-4LMCEB | P1C-4LMAF | P1E-6LB0 | 9301054262 |
| Ø50  | P1C-4MMEB | P1C-4MMCEB | P1C-4MMAF | P1E-6MB0 | 9301054262 |
| Ø63  | P1C-4NMEB | P1C-4NMCEB | P1C-4NMAF | P1E-6NB0 | 9301054264 |
| Ø80  | P1C-4PMEB | P1C-4PMCEB | P1C-4PMAF | P1E-6PB0 | 9301054264 |
| Ø100 | P1C-4QMEB | P1C-4QMCEB | P1C-4QMAF | P1E-6QB0 | 9301054266 |
| Ø125 | P1C-4RMEB | P1C-4RMCEB | P1C-4RMAF |          | 9301054266 |

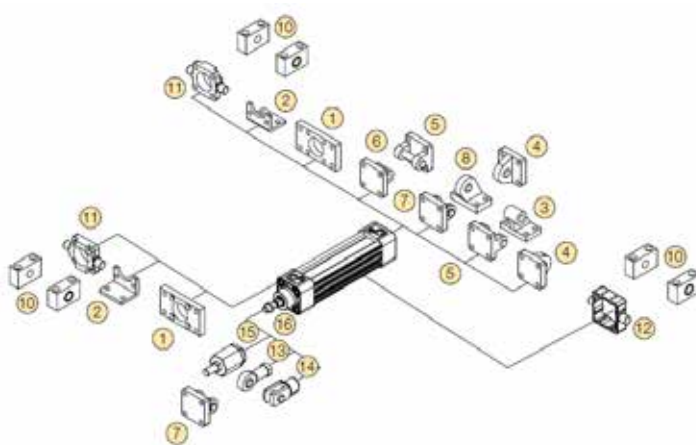
Flange trunnion MT5/MT6 ⑪



Intermediate trunnion MT4 ⑫



|      |           |                  |
|------|-----------|------------------|
| Ø32  | P1D-4KMYF | refer to page 34 |
| Ø40  | P1D-4LMYF | refer to page 34 |
| Ø50  | P1D-4MMYF | refer to page 34 |
| Ø63  | P1D-4NMYF | refer to page 34 |
| Ø80  | P1D-4PMYF | refer to page 34 |
| Ø100 | P1D-4QMYF | refer to page 34 |
| Ø125 |           | refer to page 34 |



Nut MR9 (pack of 10) ⑬

Zinc plated steel



Stainless steel



Swivel rod eye AP6 ⑬



Clevis AP2 ⑭



Flexo coupling PM5 ⑮



|      |           |           |          |          |          |
|------|-----------|-----------|----------|----------|----------|
| Ø32  | P14-4KRPZ | P14-4KRPS | P1C-4KRS | P1C-4KRC | P1C-4KRF |
| Ø40  | P14-4LRPZ | P14-4LRPS | P1C-4LRS | P1C-4LRC | P1C-4LRF |
| Ø50  | P14-4MRPZ | P14-4MRPS | P1C-4MRS | P1C-4MRC | P1C-4MRF |
| Ø63  | P14-4MRPZ | P14-4MRPS | P1C-4MRS | P1C-4MRC | P1C-4MRF |
| Ø80  | P14-4PRPZ | P14-4PRPS | P1C-4PRS | P1C-4PRC | P1C-4PRF |
| Ø100 | P14-4PRPZ | P14-4PRPS | P1C-4PRS | P1C-4PRC | P1C-4PRF |
| Ø125 | P14-4RRPZ | P14-4RRPS | P1C-4RRS | P1C-4RRC | P1C-4RRF |

## Seal Kits

### Complete seal kits consisting of:

- 2 piston seals.
- 2 cushioning seals.
- 1 wiper / piston rod seal.
- 2 O-Rings.

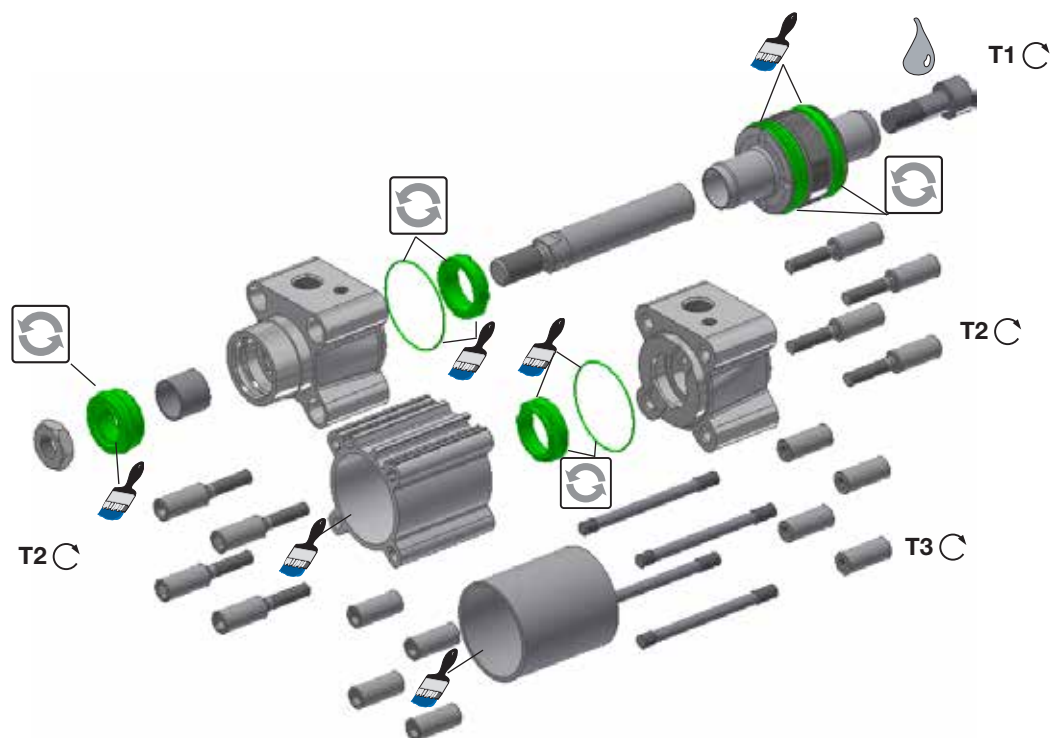
### Greases

|                                                                                    |                              |      |            |
|------------------------------------------------------------------------------------|------------------------------|------|------------|
|  | Standard and low temperature | 30 g | 9127394541 |
|                                                                                    | High temperature             | 30 g | 9127394521 |

| Cyl.-bore<br>[mm] | Standard<br>temperature <sup>1)</sup> | High<br>temperature <sup>1)</sup> | Low<br>temperature <sup>1)</sup> | Metallic<br>scraper <sup>1) 2)</sup> | FKM Wiper<br>seal <sup>1)</sup> | With dyn. rod<br>lock <sup>1)</sup> | With static rod<br>lock <sup>1)</sup> | Polon/<br>UHMW-PE |
|-------------------|---------------------------------------|-----------------------------------|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|---------------------------------------|-------------------|
| Ø32               | P1F-6032RN                            | P1F-6032RF                        | P1F-6032RL                       | P1F-6032RQ                           | P1F-6032RV                      | P1F-6032RNL                         | P1F-6032RNH                           | P1F-6032RD        |
| Ø40               | P1F-6040RN                            | P1F-6040RF                        | P1F-6040RL                       | P1F-6040RQ                           | P1F-6040RV                      | P1F-6040RNL                         | P1F-6040RNH                           | P1F-6040RD        |
| Ø50               | P1F-6050RN                            | P1F-6050RF                        | P1F-6050RL                       | P1F-6050RQ                           | P1F-6050RV                      | P1F-6050RNL                         | P1F-6050RNH                           | P1F-6050RD        |
| Ø63               | P1F-6063RN                            | P1F-6063RF                        | P1F-6063RL                       | P1F-6063RQ                           | P1F-6063RV                      | P1F-6063RNL                         | P1F-6063RNH                           | P1F-6050RD        |
| Ø80               | P1F-6080RN                            | P1F-6080RF                        | P1F-6080RL                       | P1F-6080RQ                           | P1F-6080RV                      | P1F-6080RNL                         | P1F-6080RNH                           | P1F-6080RD        |
| Ø100              | P1F-6100RN                            | P1F-6100RF                        | P1F-6100RL                       | P1F-6100RQ                           | P1F-6100RV                      | P1F-6100RNL                         | P1F-6100RNH                           | P1F-6100RD        |
| Ø125              | P1F-6125RN                            | P1F-6125RF                        | P1F-6125RL                       | P1F-6125RQ                           | P1F-6125RV                      | P1F-6125RNL                         | P1F-6125RNH                           | P1F-6125RD        |

<sup>1)</sup> for through piston rod, add K at the end, ie P1F-6032RNK

<sup>2)</sup> -30 to +80°C



| Cyl.-bore<br>[mm] | AF<br>[mm] | Plastic<br>piston T1<br>[Nm] | Alu<br>Piston T1<br>[Nm] | AF<br>[mm] | T2<br>[Nm] | AF<br>[mm] | T3<br>[Nm] |
|-------------------|------------|------------------------------|--------------------------|------------|------------|------------|------------|
| Ø32               | 6          | 4.5                          | 15                       | 6          | 11         | 6          | 4.5        |
| Ø40               | 8          | 11                           | 30                       | 8          | 11         | 6          | 4.5        |
| Ø50               | 10         | 20                           | 40                       | 10         | 18         | 8          | 9.5        |
| Ø63               | 10         | 20                           | 40                       | 10         | 18         | 8          | 9.5        |
| Ø80               | 14         | 40                           | 120                      | 14         | 29         | 6          | 19         |
| Ø100              | 14         | 120                          | 120                      | 14         | 29         | 6          | 19         |
| Ø125              | 14         | 120                          | 120                      | 14         | 70         | 8          | 40         |



= Included in seal kit



= Socket head across flats



= Tightening torque



Lubricated with grease



Locking fluid  
Loctite 270 or Loctite 2701 locking fluid must be used