Pneumatic Cylinders for Extreme Conditions
Series P1D-X
According to ISO 15552
PDE2662TCUK September 2013

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

ENGINEERING YOUR SUCCESS.
Important
Before attempting any external or internal work on the cylinder or any connected components, make sure the cylinder is vented and disconnect the air supply in order to ensure isolation of the air supply.

Note
All technical data in this catalogue are typical data only.
Air quality is essential for maximum cylinder service life (see ISO 8573).

WARNING
FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.
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SALE CONDITIONS
The items described in this document are available for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. Any sale contract entered into by Parker will be governed by the provisions stated in Parker’s standard terms and conditions of sale (copy available upon request).
Challenges encountered within rigorous environments require leading engineered solutions and products. Meeting these exacting needs the P1D-X Series of ISO 15552 pneumatic cylinders provides the answer for high and low temperature applications. Engineered to provide superior performance in harsh conditions using proven class leading seal technology for reliable operation and long service life in temperatures down to \(-40^\circ C\) and up to \(+150^\circ C\). With robust corrosion resistant metal body, PTFE coated steel bearing and optional metal scraper the P1D-X Series is available in bore sizes 32 to 125mm. Fully supported by a range of ISO mountings the P1D-X leads the way in todays changing climate.
Proven pneumatic cylinders up to 150°C

The new high temperature P1D-X range has been developed based on the know-how over decades from a variety of high temperature applications for pneumatic actuators e.g. for use in boilers and iron works.

More specifically the vast and in-depth experience from 40 years as leading partner for dedicated Crust Breaker cylinders to the Aluminium Smelter Industry (production of primary aluminium) has been a decisive knowledge and reference for the design work. The results from extensive testing and the long reference list of proven, successful Aluminium Smelter applications with Crust Breaker and Feeder cylinder operating continuously, year after year, in up to 150°C has given us a solid knowledge for the design of P1D-X.

Seal and grease technology for high temperatures

The key for reliable operation of pneumatic cylinders in high temperatures is the seal and grease system. It takes thorough testing to arrive at the optimum and proven technology.

- Seals in proven FPM (Viton) material for reliability and long service life.
- Dedicated high temperature grease with special formula is vital for the performance of the cylinder.
- The combined system of seals and grease developed for P1D-X is the key for the excellent function in the temperature range -10°C to +150°C.

High temperature cylinder series

P1D-X ***MF

- ISO 15552 conformity
- Bore sizes Ø32 - Ø125 mm
- Temperature range -10°C to +150°C
- Corrosion resistant
Reliable low temperature pneumatic cylinders

As a developer of engineered solutions Parker Hannifin is a major supplier to companies within the Bus, Truck and Rail industries. The experience gained over the decades on these demanding applications has formed the basis for the development of our new generation of low temperature pneumatic cylinders. Repeated high reliability in extreme temperature conditions, sealing systems with low leakage and corrosion resistance design are key product properties engineered into the P1D-X Series of low temperature cylinders.

Seal technology

Parker have combined the most sought after features of seal technology to provide low temperature pneumatic cylinders with high reliability, low leakage and long service life.

- Seals engineered for low temperature in polyurethane formulated specifically for optimal performance in the temperature range -40°C to +80°C.
- Seal material retains its elastic properties with maintained performance even at extreme low temperatures.
- Low temperature characteristics but maintaining superior wear resistance.
- Industrial proven profiles.

Low temperature cylinder series

P1D-X ***ML

- Temperature range -40°C to +80°C
- ISO 15552 conformity
- Bore sizes Ø32 - Ø125 mm
- Corrosion resistant

Features

- Lightweight diecast aluminium construction but maintaining torsional rigidity
- End covers and body extrusion in anodised aluminium as well as piston rod and cushioning screws in stainless steel.
- Grease specifically formulated to support performance and reliability at low temperatures
- Proximity sensing (but please note that the sensors are normally specified for full performance down to -25°C only)
- A wide range of cylinder mountings in anodised aluminium providing the same overall corrosion resistance.

Bus Industry

- Operational reliability
- Flexible mounting
- Easily accessible adjustment
- Repairable

Road Industry

- Long life non lube service
- Leak proof design
- Corrosion resistant surface
- Easily repairable

Rail Industry

- User servicable construction
- Performance and reliability
- Low friction seal technology
P1D-X High Temperature Cylinders

All seals in the high temperature version of P1D-X are developed and validated for continuous operation up to +150°C. The combination of the seal geometry and the FPM material (Viton) ensures reliable and long service life. Certain restrictions apply when choosing sensors due to the temperature range. 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).

- Conforms to ISO 15552.
- Bore 32-125 mm.
- Double acting.
- Stainless steel piston rod.
- Adjustable air cushioning.
- Wide range of mountings

P1D-X - High temperature - Double acting

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The cylinders are supplied complete with a zinc plated steel piston rod nut.
P1D-X Low Temperature Cylinders

All seals in the low temperature version of P1D-X are developed and validated for continuous operation down to -40°C. Polyurethane 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 but please note that the sensors are normally specified for full performance to -25°C only.

- Conforms to ISO 15552.
- Bore 32-125 mm.
- Double acting.
- Stainless steel piston rod.
- Adjustable air cushioning.
- Wide range of mountings and drop-in sensors.

### Operating information

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#### P1D-X - Low temperature - Double acting

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The cylinders are supplied complete with a zinc plated steel piston rod nut.
P1D-X Double acting

**Dimensions**

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<th>R</th>
<th>RT</th>
<th>SS</th>
<th>SW</th>
<th>TT</th>
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S=Stroke

**Tolerances**

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<th>B</th>
<th>BA</th>
<th>L₁</th>
<th>L₂</th>
<th>R</th>
<th>Stroke tolerance up to stroke 500 mm</th>
<th>Stroke tolerance for stroke over 500 mm</th>
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<td>32</td>
<td>d11</td>
<td>d11</td>
<td>±0,4</td>
<td>±2</td>
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<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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<td>d11</td>
<td>d11</td>
<td>±0,7</td>
<td>±2</td>
<td>±0,5</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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<tr>
<td>50</td>
<td>d11</td>
<td>d11</td>
<td>±0,7</td>
<td>±2</td>
<td>±0,6</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
</tr>
<tr>
<td>63</td>
<td>d11</td>
<td>d11</td>
<td>±0,8</td>
<td>±2</td>
<td>±0,7</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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<td>d11</td>
<td>±0,8</td>
<td>±3</td>
<td>±0,7</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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<tr>
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<td>d11</td>
<td>d11</td>
<td>±1,0</td>
<td>±3</td>
<td>±1,1</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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<td>125</td>
<td>d11</td>
<td>d11</td>
<td>±1,0</td>
<td>±3</td>
<td>±1,1</td>
<td>+0,3/+2,0</td>
<td>+0,3/+3,0</td>
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For P1D-X Series product information and CAD visit www.parker.com/pde/p1d-x
### Order Key Code

**Order no Cylinder bore** = **Standard stroke (mm)** = **Stroke to special order**

<table>
<thead>
<tr>
<th>Stroke (mm) e.g. 0100 = 100 mm</th>
<th>Optional stroke lengths up to 2800 mm. Standard strokes see table below</th>
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</table>

### Cylinder version

<table>
<thead>
<tr>
<th>Cylinder version</th>
<th>Cylinder bore mm</th>
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<tr>
<td>T</td>
<td>040</td>
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<tr>
<td></td>
<td>050</td>
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<td></td>
<td>063</td>
</tr>
<tr>
<td></td>
<td>080</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>125</td>
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### Cylinder bore mm

<table>
<thead>
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<th>Cylinder bore mm</th>
<th>Piston rod extension</th>
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<tr>
<td>L</td>
<td>40</td>
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<td>P</td>
<td>80</td>
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<tr>
<td>Q</td>
<td>100</td>
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<tr>
<td>R</td>
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### Piston rod extension

<table>
<thead>
<tr>
<th>E.g. KR5 = Cylinder bore 32 mm with piston rod extension = 255 mm</th>
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<td>02-99</td>
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<td>03-99</td>
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<td>10-99</td>
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<tr>
<td>11-99</td>
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<td>12-99</td>
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### End cover screws

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<th>Standard</th>
<th>Stainless steel</th>
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<td>Std scraper</td>
<td>Metal scraper</td>
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<td>M</td>
<td>Q</td>
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<table>
<thead>
<tr>
<th>Temperature range</th>
<th>Standard temperature version = -20°C to +80°C</th>
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<tbody>
<tr>
<td>-30°C to +80°C</td>
<td>High temperature version = -10°C to +150°C</td>
</tr>
<tr>
<td></td>
<td>Low temperature version = -40°C to +80°C</td>
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### Piston rod material

<table>
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<th>Standard temperature version</th>
<th>High temperature version</th>
<th>Low temperature version</th>
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<tbody>
<tr>
<td>Temperature range</td>
<td>-10°C to +150°C</td>
<td>-40°C to +80°C</td>
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### Seals

<table>
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<th>Standard temperature version</th>
<th>High temperature version</th>
<th>Low pressure hydraulic version</th>
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<tr>
<td>Temperature range</td>
<td>-10°C to +150°C</td>
<td>-20°C to +80°C</td>
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### Standard strokes

Standard strokes for all P1D-X cylinders comply with ISO 4393. Special strokes up to 2800 mm.

**Order no Cylinder bore** = **Standard stroke (mm)** = **Stroke to special order**

<table>
<thead>
<tr>
<th>Order no</th>
<th>Cylinder bore (mm)</th>
<th>Standard stroke (mm)</th>
<th>Stroke to special order</th>
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<tbody>
<tr>
<td>XXXX</td>
<td>25</td>
<td>50</td>
<td>80</td>
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### Further options available

Please consult Sales Office for advice.
# P1D-X Pneumatic ISO Cylinders

## Cylinder forces, double acting variants

<table>
<thead>
<tr>
<th>Cyl. bore/Stroke</th>
<th>Piston area cm²</th>
<th>Max theoretical force in N (bar)</th>
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<td>Piston rod area cm²</td>
<td>1.0</td>
<td>2.0</td>
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<tr>
<td>Piston rod thread</td>
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<td></td>
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<tr>
<td>Cushioning length mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption [litre]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection thread</td>
<td></td>
<td></td>
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<tr>
<td>32/12</td>
<td>+</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>6.9</td>
</tr>
<tr>
<td>40/16</td>
<td>+</td>
<td>12.6</td>
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<tr>
<td></td>
<td>-</td>
<td>10.6</td>
</tr>
<tr>
<td>50/20</td>
<td>+</td>
<td>19.6</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>16.5</td>
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<tr>
<td>63/20</td>
<td>+</td>
<td>31.2</td>
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<td>28.0</td>
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<td>80/25</td>
<td>+</td>
<td>50.3</td>
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<td>-</td>
<td>45.4</td>
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<tr>
<td>100/25</td>
<td>+</td>
<td>78.5</td>
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<tr>
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<td>-</td>
<td>73.6</td>
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<tr>
<td>125/32</td>
<td>+</td>
<td>122.7</td>
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<tr>
<td></td>
<td>-</td>
<td>114.7</td>
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**Note:**
Select a theoretical force 50-100% larger than the force required

## Main data: P1D-X

### Cylinder forces, double acting variants

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<tr>
<th>Cylinder designation</th>
<th>Cylinder bore mm</th>
<th>Piston rod dia. mm</th>
<th>Piston rod area cm²</th>
<th>Piston rod thread</th>
<th>Cushioning length mm</th>
<th>Consumption [litre]</th>
<th>Connection thread</th>
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<td>32</td>
<td>8.0</td>
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<td>1.1</td>
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<td>0.105</td>
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<td>12.6</td>
<td>16</td>
<td>2.0</td>
<td>M12x1.25</td>
<td>19</td>
<td>0.162</td>
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<td>50</td>
<td>19.6</td>
<td>20</td>
<td>3.1</td>
<td>M16x1.5</td>
<td>20</td>
<td>0.253</td>
</tr>
<tr>
<td>P1D-X63••XXXXX</td>
<td>63</td>
<td>31.2</td>
<td>20</td>
<td>3.1</td>
<td>M16x1.5</td>
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<td>0.414</td>
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<td>25</td>
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<td>25</td>
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<td>32</td>
<td>8.0</td>
<td>M27x2</td>
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<td>1.662</td>
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### Total mass including moving parts

<table>
<thead>
<tr>
<th>Cylinder designation</th>
<th>Total mass (kg) at 0 mm stroke</th>
<th>Total mass (kg) Supplemented per 10 mm stroke</th>
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<tbody>
<tr>
<td>P1D-X32••XXXXX</td>
<td>0.55</td>
<td>0.023</td>
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<td>P1D-X40••XXXXX</td>
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<td>0.033</td>
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<td>P1D-X50••XXXXX</td>
<td>1.20</td>
<td>0.048</td>
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<td>P1D-X63••XXXXX</td>
<td>1.73</td>
<td>0.051</td>
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<tr>
<td>P1D-X80••XXXXX</td>
<td>2.45</td>
<td>0.075</td>
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<td>P1D-X100••XXXXX</td>
<td>4.00</td>
<td>0.084</td>
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<td>P1D-X125••XXXXX</td>
<td>6.87</td>
<td>0.138</td>
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### Mass moving parts only (for cushioning calculation)

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<th>Mass moving parts (kg) at 0 mm stroke</th>
<th>Supplemented per 10 mm stroke</th>
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</thead>
<tbody>
<tr>
<td>P1D-X32••XXXXX</td>
<td>0.13</td>
<td>0.009</td>
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<td>0.016</td>
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<td>0.025</td>
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<td>P1D-X63••XXXXX</td>
<td>0.50</td>
<td>0.025</td>
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<tr>
<td>P1D-X80••XXXXX</td>
<td>0.90</td>
<td>0.039</td>
</tr>
<tr>
<td>P1D-X100••XXXXX</td>
<td>1.10</td>
<td>0.039</td>
</tr>
<tr>
<td>P1D-X125••XXXXX</td>
<td>2.34</td>
<td>0.063</td>
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1) XXXX = stroke  
2) Free air consumption per 10 mm stroke for a double stroke at 6 bar
P1D-X Pneumatic ISO Cylinders

General technical data

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<th>Product type</th>
<th>Standard cylinder according to ISO 15552</th>
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<td>32 - 125 mm</td>
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<tr>
<td>Stroke length</td>
<td>5-2800 mm</td>
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<td>Versions</td>
<td>Double acting</td>
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<tr>
<td>Cushioning</td>
<td>Adjustable air cushioning</td>
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<tr>
<td>Position sensing</td>
<td>Proximity sensor in temperature range -25°C to +80°C</td>
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<tr>
<td>Installation</td>
<td>P1D cylinder and piston rod mountings</td>
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<td>Mounting position</td>
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Operating and environmental data

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<tr>
<th>Operating medium</th>
<th>For best possible service life and trouble-free operation dry, filtered compressed air to ISO 8573-1:2010 quality class 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating pressure</td>
<td>0,5 bar to 10 bar - Hydraulic version : 2 bar to 10 bar</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>High temp version : -10°C to +150°C - Hydraulic version : -20°C to +80°C</td>
</tr>
<tr>
<td></td>
<td>Low temp version : -40°C to +80°C - Metal scraper version : -30°C to +80°C</td>
</tr>
<tr>
<td>Pre-lubricated</td>
<td>Further lubrication is normally not necessary. If additional lubrication is introduced it must be continued.</td>
</tr>
<tr>
<td>Oil used for hydraulic version</td>
<td>Hydraulic oil type HLP (DIN 51524, ISO 11158). Viscosity by 40°C: 32 mm²/s (cst). Example: Shell Tellus 32 or equal.</td>
</tr>
<tr>
<td>Corrosion resistance</td>
<td>High resistance to corrosion and chemicals. Materials and surface treatment have been selected for industrial applications where solvents and detergents are frequently used.</td>
</tr>
</tbody>
</table>

Material specification

<table>
<thead>
<tr>
<th>Pos</th>
<th>Part</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>End covers</td>
<td>Anodised aluminium</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder barrel</td>
<td>Anodised aluminium</td>
</tr>
<tr>
<td>3</td>
<td>Piston rod</td>
<td>Standard Stainless steel, DIN X 10 CrNiS 18 9</td>
</tr>
<tr>
<td></td>
<td>Optional</td>
<td>Hard chromium plated Fe 490-2 FN Acid-proof steel Chrome plated stainless steel</td>
</tr>
<tr>
<td>4</td>
<td>Piston rod nut</td>
<td>Standard Zinc plated steel</td>
</tr>
<tr>
<td></td>
<td>Optional</td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td>Optional</td>
<td>Acid-proof steel</td>
</tr>
<tr>
<td>5</td>
<td>End cover screws</td>
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</tr>
<tr>
<td></td>
<td>Optional</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>6</td>
<td>Scraper ring</td>
<td>High temperature FPM (Viton)</td>
</tr>
<tr>
<td></td>
<td>Low temperature PUR (Polyurethane)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metal scraper</td>
<td>Stainless steel / Brass / NBR</td>
</tr>
<tr>
<td>7</td>
<td>Piston rod seal</td>
<td>High temperature FPM (Viton)</td>
</tr>
<tr>
<td></td>
<td>Low temperature PUR (Polyurethane)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Piston</td>
<td>Aluminium</td>
</tr>
<tr>
<td>9</td>
<td>Magnet</td>
<td>Plastic coated magnetic material (Low temperature version only)</td>
</tr>
<tr>
<td>10</td>
<td>Piston bearing</td>
<td>PTFE</td>
</tr>
<tr>
<td>11</td>
<td>Piston seals</td>
<td>High temperature FPM (Viton)</td>
</tr>
<tr>
<td></td>
<td>Low temperature PUR (Polyurethane)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Piston bolt</td>
<td>Zinc plated steel</td>
</tr>
<tr>
<td>13</td>
<td>O-rings</td>
<td>Nitrile rubber</td>
</tr>
<tr>
<td>14</td>
<td>Piston rod bearing</td>
<td>Multilayer PTFE/steel</td>
</tr>
<tr>
<td>15</td>
<td>Cushioning screws</td>
<td>Stainless steel, DIN X 10 CrNiS 18 ntl</td>
</tr>
<tr>
<td>16</td>
<td>Cushioning seals</td>
<td>High temperature FPM (Viton)</td>
</tr>
<tr>
<td></td>
<td>Low temperature PUR (Polyurethane)</td>
<td></td>
</tr>
<tr>
<td>Note on materials</td>
<td>RoHS compliant</td>
<td></td>
</tr>
</tbody>
</table>
Cushioning characteristics

The diagram below is used for dimensioning of cylinders related to the cushioning capacity. The maximum cushioning capacity shown in the diagram assumes the following:

- Low load, i.e. low pressure drop across the piston
- Equilibrium speed
- Correctly adjusted cushioning screw
- 6 bar at cylinder port

The load is the sum of internal and external friction, plus any gravitational forces. At high relative load (pressure drop exceeding 1 bar), we recommend that for any given speed, the mass should be reduced by a factor of 2.5, or for a given mass, the speed should be reduced by a factor of 1.5. This is in relation to the maximum performance given in the diagram.
Guide for selecting suitable tubing

The selection of the correct size of tubing is often based on experience, with no great thought to optimizing energy efficiency and cylinder velocity. This is usually acceptable, but making a rough calculation can result in worthwhile economic gains.

The following is the basic principle:
1. The primary line to the working valve could be oversized (this does not cause any extra air consumption and consequently does not create any extra costs in operation).
2. The tubes between the valve and the cylinder should, however, be optimized according to the principle that an insufficient bore throttles the flow and thus limits the cylinder speed, while an oversized pipe creates a dead volume which increases the air consumption and filling time.

The chart below is intended to help when selecting the correct size of tube to use between the valve and the cylinder.

The following prerequisites apply:
- Cylinder load should be about 50% of the theoretical force (= normal load). A lower load gives a higher velocity and vice versa. The tube size is selected as a function of the cylinder bore, the desired cylinder velocity and the tube length between the valve and the cylinder.
- If you want to use the capacity of the valve to its maximum, and obtain maximum speed, the tubing should be chosen so that they at least correspond with the equivalent restriction diameter (see description below), so that the tubing does not restrict the total flow. This means that a short tubing must have at least the equivalent restriction diameter. If the tubing is longer, choose it from the table below. Straight fittings should be chosen for highest flow rates. (Elbow and banjo fittings cause restriction.)

1) - The “equivalent throttling bore” is a long throttle (for example a tube) or a series of throttles (for example, through a valve) converted to a short throttle which gives a corresponding flow rate. This should not be confused with the “orifice” which is sometimes specified for valves. The value for the orifice does not normally take account of the fact that the valve contains a number of throttles.

2) - Qn is a measure of the valve flow capacity, with flow measured in litre per minute (l/min) at 6 bar(e) supply pressure and 1 bar pressure drop across the valve.
Example ①: Which tube diameter should be used?
A 50 mm bore cylinder is to be operated at 0.5 m/s. The tube length between the valve and cylinder is 2 m. In the diagram we follow the line from 50 mm bore to 0.5 m/s and get an "equivalent throttling bore" of approximately 4 mm. We continue out to the right in the chart and intersect the line for a 2 m tube between the curves for 4 mm (6/4 tube) and 6 mm(8/6 tube). This means that a 6/4 tube throttles the velocity somewhat, while an 8/6 tube is a little too large. We select the 8/6 tube to obtain full cylinder velocity.

Example ②: What cylinder velocity will be obtained?
A 80 mm bore cylinder will be used, connected by 8 m 12/10 tube to a valve with Qn 1200 Nl/min. What cylinder velocity will we get? We refer to the diagram and follow the line from 8 mm tube length up to the curve for 12/10 tube. From there, we go horizontally to the curve for the Ø80 cylinder. We find that the velocity will be about 0.5 m/s.

Example ③: What is the minimum inner diameter and maximum length of tube?
For a application a 125 mm bore cylinder will be used. Maximum velocity of piston rod is 0.5 m/s. The cylinder will be controlled by a valve with Qn 3200 Nl/min. What diameter of tube can be used and what is maximum length of tube.
We refer to the diagram. We start at the left side of the diagram cylinder Ø125. We follow the line until the intersection with the velocity line of 0.5 m/s. From here we draw a horizontal line in the diagram. This line shows us the minimum inner diameter (rightside diagram) in combination with the maximum length of tube (bottomside diagram).

For example:
Intersection one: When a tube (14/11) will be used, the maximum length of tube is 0.7 meter.
Intersection two: When a tube (—/13) will be used, the maximum length of tube is 3.7 meter.
Intersection three: When a tube (—/14) will be used, the maximum length of tube is 6 meter.

Example ④: Determining tube size and cylinder velocity with a particular cylinder and valve?
For an application using a 40 mm bore cylinder with a valve with Qn=800 Nl/min. The distance between the cylinder and valve has been set to 5 m.
**Tube dimension:** What tube bore should be selected to obtain the maximum cylinder velocity? Start at pipe length 5 m, follow the line up to the intersection with 800 Nl/min. Select the next largest tube diameter, in this case Ø10/8 mm.
**Cylinder velocity:** What maximum cylinder velocity will be obtained? Follow the line for 800 Nl/min to the left until it intersects with the line for the Ø40 mm cylinder. In this example, the speed is just above 1.1 m/s.
P1D-X Pneumatic ISO Cylinders

Mountings

<table>
<thead>
<tr>
<th>Flange MF1/MF2</th>
<th>Foot bracket MS1</th>
<th>Pivot bracket with rigid bearing</th>
<th>Swivel eye bracket</th>
<th>Clevis bracket MP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 32 P1C-4KMB</td>
<td>P1C-4KMF</td>
<td>P1C-4KMD</td>
<td>P1C-4KMSA</td>
<td>P1C-4KMT</td>
</tr>
<tr>
<td>Ø 40 P1C-4LMB</td>
<td>P1C-4LMF</td>
<td>P1C-4LMD</td>
<td>P1C-4LMSA</td>
<td>P1C-4LMT</td>
</tr>
<tr>
<td>Ø 50 P1C-4MMB</td>
<td>P1C-4MMF</td>
<td>P1C-4MMD</td>
<td>P1C-4MMSA</td>
<td>P1C-4MMT</td>
</tr>
<tr>
<td>Ø 63 P1C-4NMB</td>
<td>P1C-4NMF</td>
<td>P1C-4NMD</td>
<td>P1C-4NMSA</td>
<td>P1C-4NMT</td>
</tr>
<tr>
<td>Ø 80 P1C-4PMB</td>
<td>P1C-4PMF</td>
<td>P1C-4PMD</td>
<td>P1C-4PMSA</td>
<td>P1C-4PMT</td>
</tr>
<tr>
<td>Ø 100 P1C-4QMB</td>
<td>P1C-4QMF</td>
<td>P1C-4QMD</td>
<td>P1C-4QMSA</td>
<td>P1C-4QMT</td>
</tr>
<tr>
<td>Ø 125 P1C-4RMB</td>
<td>P1C-4RMF</td>
<td>P1C-4RMD</td>
<td>P1C-4RMSA</td>
<td>P1C-4RMT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clevis bracket MP4</th>
<th>Clevis bracket GA</th>
<th>Pivot bracket with swivel bearing</th>
<th>Mounting kit</th>
<th>Pivot bracket for MT4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 32 P1C-4KME</td>
<td>P1C-4KMCA</td>
<td>P1C-4KMA</td>
<td>P1E-6KB0</td>
<td>9301054261</td>
</tr>
<tr>
<td>Ø 40 P1C-4LME</td>
<td>P1C-4LMCA</td>
<td>P1C-4LMA</td>
<td>P1E-6LB0</td>
<td>9301054262</td>
</tr>
<tr>
<td>Ø 50 P1C-4MME</td>
<td>P1C-4MMCA</td>
<td>P1C-4NMA</td>
<td>P1E-6NB0</td>
<td>9301054264</td>
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<tr>
<td>Ø 63 P1C-4NME</td>
<td>P1C-4NMC</td>
<td>P1C-4PMA</td>
<td>P1E-6PB0</td>
<td>9301054264</td>
</tr>
<tr>
<td>Ø 80 P1C-4PME</td>
<td>P1C-4PMCA</td>
<td>P1C-4QMA</td>
<td>P1E-6QB0</td>
<td>9301054266</td>
</tr>
<tr>
<td>Ø 100 P1C-4QME</td>
<td>P1C-4QMC</td>
<td>P1C-4RMA</td>
<td></td>
<td>9301054266</td>
</tr>
<tr>
<td>Ø 125 P1C-4RME</td>
<td>P1C-4RMC</td>
<td>P1C-4RMF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flange mounting trunion</th>
<th>Center Trunnion</th>
<th>Swivel rod eye</th>
<th>Clevis</th>
<th>Flexo coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 32 P1D-4KMYF</td>
<td>Factory fitted</td>
<td>P1C-4KRS</td>
<td>P1C-4KRC</td>
<td>P1C-4KRF</td>
</tr>
<tr>
<td>Ø 40 P1D-4LMYF</td>
<td>Factory fitted</td>
<td>P1C-4LRS</td>
<td>P1C-4LRC</td>
<td>P1C-4LRF</td>
</tr>
<tr>
<td>Ø 50 P1D-4MMYF</td>
<td>Factory fitted</td>
<td>P1C-4MRS</td>
<td>P1C-4MRC</td>
<td>P1C-4MRF</td>
</tr>
<tr>
<td>Ø 63 P1D-4NMYF</td>
<td>Factory fitted</td>
<td>P1C-4PRS</td>
<td>P1C-4PRC</td>
<td>P1C-4PRF</td>
</tr>
<tr>
<td>Ø 80 P1D-4PMYF</td>
<td>Factory fitted</td>
<td>P1C-4PRS</td>
<td>P1C-4PRC</td>
<td>P1C-4PRF</td>
</tr>
<tr>
<td>Ø 100 P1D-4QMYF</td>
<td>Factory fitted</td>
<td>P1C-4PRS</td>
<td>P1C-4PRC</td>
<td>P1C-4PRF</td>
</tr>
<tr>
<td>Ø 125 P1D-4RMYF</td>
<td>Factory fitted</td>
<td>P1C-4PRS</td>
<td>P1C-4PRC</td>
<td>P1C-4PRF</td>
</tr>
</tbody>
</table>

Nut

| Ø 32 P14-4KRPZ         | Ø 40 P14-4LRPZ | Ø 50 P14-4MRPZ | Ø 63 P14-4MRPZ | Ø 80 P14-4PRPZ | Ø 100 P14-4PRPZ | Ø 125 P14-4RRPZ |
**Cylinder mountings**

**Flange MF1/MF2**

Intended for fixed mounting of cylinder. Flange can be fitted to front or rear end cover of cylinder.

Material:
- Flange: Surface-treated steel
- Mounting screws acc. to DIN 6912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

According to ISO MF1/MF2, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Ø mm</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,23</td>
<td></td>
<td>P1C-4KMB</td>
</tr>
<tr>
<td>40</td>
<td>0,28</td>
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</tr>
<tr>
<td>50</td>
<td>0,53</td>
<td></td>
<td>P1C-4MMB</td>
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<tr>
<td>63</td>
<td>0,71</td>
<td></td>
<td>P1C-4NMB</td>
</tr>
<tr>
<td>80</td>
<td>1,59</td>
<td></td>
<td>P1C-4PMB</td>
</tr>
<tr>
<td>100</td>
<td>2,19</td>
<td></td>
<td>P1C-4QMB</td>
</tr>
<tr>
<td>125</td>
<td>3,78</td>
<td></td>
<td>P1C-4RMB</td>
</tr>
</tbody>
</table>

**Foot bracket MS1**

Intended for fixed mounting of cylinder. Foot bracket can be fitted to front and rear end covers of cylinder.

Material:
- Foot bracket: Surface-treated steel
- Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied in pairs with mounting screws for attachment to cylinder.

According to ISO MS1, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Ø mm</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,06**</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>0,08**</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0,16**</td>
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<tr>
<td>63</td>
<td>0,25**</td>
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<tr>
<td>80</td>
<td>0,50**</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0,85**</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>1,48**</td>
<td></td>
</tr>
</tbody>
</table>

**Pivot bracket with rigid bearing**

Intended for flexible mounting of cylinder. The pivot bracket can be combined with clevis bracket MP2.

Material:
- Pivot bracket: Surface-treated aluminium, black
- Bearing: Sintered oil-bronze bushing

According to CETOP RP 107 P, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Ø mm</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,06</td>
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<tr>
<td>40</td>
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<td>63</td>
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<tr>
<td>80</td>
<td>0,33</td>
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<tr>
<td>100</td>
<td>0,49</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>1,02</td>
<td></td>
</tr>
</tbody>
</table>
Cylinder mountings

Swivel eye bracket

Intended for use together with clevis bracket GA

Material:
Bracket: Surface-treated aluminium, black
Swivel bearing acc. to DIN 648K: Hardened steel

Supplied complete with mounting screws for attachment to cylinder.

According to VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,08</td>
<td>P1C-4KMSA</td>
</tr>
<tr>
<td>40</td>
<td>0,11</td>
<td>P1C-4LMSA</td>
</tr>
<tr>
<td>50</td>
<td>0,20</td>
<td>P1C-4MMSA</td>
</tr>
<tr>
<td>63</td>
<td>0,27</td>
<td>P1C-4NMSA</td>
</tr>
<tr>
<td>80</td>
<td>0,52</td>
<td>P1C-4PMSA</td>
</tr>
<tr>
<td>100</td>
<td>0,72</td>
<td>P1C-4QMSA</td>
</tr>
<tr>
<td>125</td>
<td>1,53</td>
<td>P1C-4RMSA</td>
</tr>
</tbody>
</table>

S = Stroke length

Clevis bracket MP2

Intended for flexible mounting of cylinder. Clevis bracket MP2 can be combined with clevis bracket MP4.

Material:
Clevis bracket: Surface-treated aluminium, black
Pin: Surface hardened steel
Circlips according to DIN 471: Stainless steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

According to ISO MP2, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,08</td>
<td>P1C-4KMT</td>
</tr>
<tr>
<td>40</td>
<td>0,11</td>
<td>P1C-4LMT</td>
</tr>
<tr>
<td>50</td>
<td>0,14</td>
<td>P1C-4MMT</td>
</tr>
<tr>
<td>63</td>
<td>0,29</td>
<td>P1C-4NMT</td>
</tr>
<tr>
<td>80</td>
<td>0,36</td>
<td>P1C-4PMT</td>
</tr>
<tr>
<td>100</td>
<td>0,64</td>
<td>P1C-4QMT</td>
</tr>
<tr>
<td>125</td>
<td>1,17</td>
<td>P1C-4RMT</td>
</tr>
</tbody>
</table>

S = Stroke length

Clevis bracket MP2 with Stainless steel Pin

Intended for flexible mounting of cylinder. Clevis bracket MP2 can be combined with clevis bracket MP4.

Material:
Clevis bracket: Surface-treated aluminium, black
Pin: Stainless steel
Circlips according to DIN 471: Stainless steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8 also stainless steel A2

Supplied complete with mounting screws for attachment to cylinder.

According to ISO MP2, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0,08</td>
<td>P1C-4KMTS</td>
</tr>
<tr>
<td>40</td>
<td>0,11</td>
<td>P1C-4LMTS</td>
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<tr>
<td>50</td>
<td>0,14</td>
<td>P1C-4MMTS</td>
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<tr>
<td>63</td>
<td>0,29</td>
<td>P1C-4NMTS</td>
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<tr>
<td>80</td>
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<td>P1C-4QMTS</td>
</tr>
<tr>
<td>125</td>
<td>1,17</td>
<td>P1C-4RMTS</td>
</tr>
</tbody>
</table>

S = Stroke length
Cylinder mountings

Clevis bracket MP4

Intended for flexible mounting of cylinder. Clevis bracket MP4 can be combined with clevis bracket MP2.

Material:
Clevis bracket: Surface-treated aluminium, black
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

According to ISO MP4, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,09</td>
<td>P1C-4KME</td>
</tr>
<tr>
<td>40</td>
<td>0,13</td>
<td>P1C-4LME</td>
</tr>
<tr>
<td>50</td>
<td>0,17</td>
<td>P1C-4MME</td>
</tr>
<tr>
<td>63</td>
<td>0,36</td>
<td>P1C-4NME</td>
</tr>
<tr>
<td>80</td>
<td>0,46</td>
<td>P1C-4PME</td>
</tr>
<tr>
<td>100</td>
<td>0,83</td>
<td>P1C-4QME</td>
</tr>
<tr>
<td>125</td>
<td>1,53</td>
<td>P1C-4RME</td>
</tr>
</tbody>
</table>

Clevis bracket GA

Intended for flexible mounting of cylinder. Clevis bracket GA can be combined with pivot bracket with swivel bearing, swivel eye bracket and swivel rod eye.

Material:
Clevis bracket: Surface-treated aluminium
Pin: Surface hardened steel
Locking pin: Spring steel
Circlips according to DIN 471: Spring steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

Clevis bracket GA with Stainless steel Pin

Intended for flexible mounting of cylinder. Clevis bracket GA can be combined with pivot bracket with swivel bearing, swivel eye bracket and swivel rod eye.

Material:
Clevis bracket: Surface-treated aluminium
Pin: Stainless steel
Locking pin: Stainless steel
Circlips according to DIN 471: Stainless steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8 also stainless steel A2

Supplied complete with mounting screws for attachment to cylinder.

According to VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,09</td>
<td>P1C-4KMCAS</td>
</tr>
<tr>
<td>40</td>
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<td>0,17</td>
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<td>P1C-4NMCA</td>
</tr>
<tr>
<td>80</td>
<td>0,58</td>
<td>P1C-4PMCA</td>
</tr>
<tr>
<td>100</td>
<td>0,89</td>
<td>P1C-4QMCAS</td>
</tr>
<tr>
<td>125</td>
<td>1,75</td>
<td>P1C-4RMCA</td>
</tr>
</tbody>
</table>

Cylinder mountings

Clevis bracket MP4

Intended for flexible mounting of cylinder. Clevis bracket MP4 can be combined with clevis bracket MP2.

Material:
Clevis bracket: Surface-treated aluminium, black
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

According to ISO MP4, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,09</td>
<td>P1C-4KME</td>
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<tr>
<td>40</td>
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<td>0,17</td>
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<td>80</td>
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</tr>
<tr>
<td>125</td>
<td>1,53</td>
<td>P1C-4RME</td>
</tr>
</tbody>
</table>

Clevis bracket GA

Intended for flexible mounting of cylinder. Clevis bracket GA can be combined with pivot bracket with swivel bearing, swivel eye bracket and swivel rod eye.

Material:
Clevis bracket: Surface-treated aluminium
Pin: Surface hardened steel
Locking pin: Spring steel
Circlips according to DIN 471: Spring steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.

Clevis bracket GA with Stainless steel Pin

Intended for flexible mounting of cylinder. Clevis bracket GA can be combined with pivot bracket with swivel bearing, swivel eye bracket and swivel rod eye.

Material:
Clevis bracket: Surface-treated aluminium
Pin: Stainless steel
Locking pin: Stainless steel
Circlips according to DIN 471: Stainless steel
Mounting screws acc. to DIN 912: Zinc-plated steel 8.8 also stainless steel A2

Supplied complete with mounting screws for attachment to cylinder.

According to VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,09</td>
<td>P1C-4KMCAS</td>
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<tr>
<td>40</td>
<td>0,13</td>
<td>P1C-4LMCAS</td>
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<td>0,17</td>
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<tr>
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</tr>
<tr>
<td>125</td>
<td>1,75</td>
<td>P1C-4RMCA</td>
</tr>
</tbody>
</table>

S = Stroke length
Cylinder mountings

Pivot bracket with swivel bearing

Intended for use together with clevis bracket GA.

Material:
Pivot bracket: Surface-treated steel, black
Swivel bearing acc. to DIN 648K: Hardened steel

According to VDMA 24 562, AFNOR:

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>CN</th>
<th>S5</th>
<th>K1</th>
<th>K2</th>
<th>EU</th>
<th>G1</th>
<th>G2</th>
<th>EN</th>
<th>CH</th>
<th>H6</th>
<th>ER</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>H7</td>
<td>H13</td>
<td>JS14</td>
<td>JS14</td>
<td>JS14</td>
<td>JS15</td>
<td>JS15</td>
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<td>Z</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>10</td>
<td>6,6</td>
<td>38</td>
<td>51</td>
<td>10,5</td>
<td>21</td>
<td>18</td>
<td>14</td>
<td>31</td>
<td>32</td>
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<td>16</td>
</tr>
<tr>
<td>40</td>
<td>12</td>
<td>6,6</td>
<td>41</td>
<td>54</td>
<td>12,0</td>
<td>24</td>
<td>22</td>
<td>16</td>
<td>35</td>
<td>36</td>
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<td>18</td>
</tr>
<tr>
<td>50</td>
<td>16</td>
<td>9,0</td>
<td>50</td>
<td>65</td>
<td>15,0</td>
<td>33</td>
<td>30</td>
<td>21</td>
<td>45</td>
<td>45</td>
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<td>21</td>
</tr>
<tr>
<td>63</td>
<td>16</td>
<td>9,0</td>
<td>52</td>
<td>67</td>
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<td>37</td>
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<td>21</td>
<td>50</td>
<td>50</td>
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<td>23</td>
</tr>
<tr>
<td>80</td>
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<td>11,0</td>
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<td>86</td>
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<td>25</td>
<td>60</td>
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<td>124</td>
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<td>37</td>
<td>90</td>
<td>90</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

Mounting kit

Mounting kit for back to back mounted cylinders, 3 and 4 position cylinders.

Material:
Mounting: Aluminium
Mounting screws: Zinc-plated steel 8.8

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>E</th>
<th>TG</th>
<th>ØFB</th>
<th>MF</th>
<th>A</th>
<th>ØBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
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<tr>
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<td>50</td>
<td>32,5</td>
<td>6,5</td>
<td>5</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>60</td>
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<td>5</td>
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<td>35</td>
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<tr>
<td>50</td>
<td>66</td>
<td>46,5</td>
<td>8,5</td>
<td>6</td>
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<td>40</td>
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<tr>
<td>63</td>
<td>80</td>
<td>56,5</td>
<td>8,5</td>
<td>6</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>80</td>
<td>100</td>
<td>72,0</td>
<td>10,5</td>
<td>8</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>100</td>
<td>118</td>
<td>89,0</td>
<td>10,5</td>
<td>8</td>
<td>25</td>
<td>55</td>
</tr>
</tbody>
</table>

Pivot bracket for MT4

Intended for use together with centre trunnion MT4.

Material:
Pivot bracket: Surface-treated aluminium
Bearing acc. to DIN 1850 C: Sintered oil-bronze bushing
Supplied in pairs.

According to ISO, VDMA 24 562, AFNOR:

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>B1</th>
<th>B2</th>
<th>A</th>
<th>C</th>
<th>d1</th>
<th>d2</th>
<th>H1</th>
<th>H2</th>
<th>fx45°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>min</td>
</tr>
<tr>
<td>32</td>
<td>46</td>
<td>18,0</td>
<td>32</td>
<td>10,5</td>
<td>12</td>
<td>6,6</td>
<td>30</td>
<td>15</td>
<td>1,0</td>
</tr>
<tr>
<td>40</td>
<td>55</td>
<td>21,0</td>
<td>36</td>
<td>12,0</td>
<td>16</td>
<td>9,0</td>
<td>36</td>
<td>18</td>
<td>1,6</td>
</tr>
<tr>
<td>50</td>
<td>55</td>
<td>21,0</td>
<td>36</td>
<td>12,0</td>
<td>16</td>
<td>9,0</td>
<td>36</td>
<td>18</td>
<td>1,6</td>
</tr>
<tr>
<td>63</td>
<td>65</td>
<td>23,0</td>
<td>42</td>
<td>13,0</td>
<td>20</td>
<td>11,0</td>
<td>40</td>
<td>20</td>
<td>1,6</td>
</tr>
<tr>
<td>80</td>
<td>65</td>
<td>23,0</td>
<td>42</td>
<td>13,0</td>
<td>20</td>
<td>11,0</td>
<td>40</td>
<td>20</td>
<td>1,6</td>
</tr>
<tr>
<td>100</td>
<td>75</td>
<td>28,5</td>
<td>50</td>
<td>16,0</td>
<td>25</td>
<td>14,0</td>
<td>50</td>
<td>25</td>
<td>2,0</td>
</tr>
<tr>
<td>125</td>
<td>75</td>
<td>28,5</td>
<td>50</td>
<td>16,0</td>
<td>25</td>
<td>14,0</td>
<td>50</td>
<td>25</td>
<td>2,0</td>
</tr>
</tbody>
</table>

* Weight per item.
Cylinder mountings

**Flange mounted trunnion**

Intended for articulated mounting of cylinder. This trunnion can be flange mounted on the front or rear end cover of all P1D cylinders. Individual trunnions have order code as shown to the right.

Material:
- Trunnion: zinc plated steel
- Screws: zinc plated steel, 8.8

Delivered complete with mounting screws for attachment to the cylinder.

---

According to ISO MT4, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 32 mm</td>
<td>0.17</td>
<td>P1D-4KMYF</td>
</tr>
<tr>
<td>Ø 40 mm</td>
<td>0.43</td>
<td>P1D-4LMYF</td>
</tr>
<tr>
<td>Ø 50 mm</td>
<td>0.55</td>
<td>P1D-4MMYF</td>
</tr>
<tr>
<td>Ø 63 mm</td>
<td>1.10</td>
<td>P1D-4NMYF</td>
</tr>
<tr>
<td>Ø 80 mm</td>
<td>1.66</td>
<td>P1D-4PMYF</td>
</tr>
<tr>
<td>Ø 100 mm</td>
<td>3.00</td>
<td>P1D-4QMYF</td>
</tr>
</tbody>
</table>

---

**Centre trunnion MT4 for P1D-X**

Intended for articulated mounting of cylinder. This mounting is available for P1D-X and P1D-T.

The trunnion is factory-fitted in the centre of the cylinder or at an optional location specified by the XV-measure – Combined with pivot bracket for MT4.

Material:
- Trunnion: zinc plated steel

---

**Centre trunnion MT4 for P1D-T**

Trunnion centred

The central trunnion for the P1D-X and P1D-T is ordered with letter D in position 17 (no dimension specified in positions 18-20).

Trunnion with optional location

The central trunnion for the P1D-X and P1D-T is ordered with letter G in position 17 and desired XV-measure (3-digit measure in mm) in positions 18-20.

Trunnion loose

P1D-X can also be ordered with the centre trunnion loosely fitted to the cylinder (not fixed in position). This allows the position to be established at the time of installation.

Ordered with letter G in position 17 and 000 in positions 18-20.

---

According to ISO MT4, VDMA 24 562, AFNOR

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>TM h14</th>
<th>TL h14</th>
<th>TD e9</th>
<th>R</th>
<th>UW</th>
<th>L1</th>
<th>XVl</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 32 mm</td>
<td>50</td>
<td>12</td>
<td>12</td>
<td>1,0</td>
<td>46</td>
<td>14</td>
<td>19,5</td>
<td>126,5</td>
<td>11</td>
</tr>
<tr>
<td>Ø 40 mm</td>
<td>63</td>
<td>16</td>
<td>16</td>
<td>1,6</td>
<td>59</td>
<td>19</td>
<td>21,0</td>
<td>140,0</td>
<td>14</td>
</tr>
<tr>
<td>Ø 50 mm</td>
<td>75</td>
<td>16</td>
<td>16</td>
<td>1,6</td>
<td>69</td>
<td>19</td>
<td>28,0</td>
<td>152,0</td>
<td>20</td>
</tr>
<tr>
<td>Ø 63 mm</td>
<td>90</td>
<td>20</td>
<td>20</td>
<td>1,6</td>
<td>84</td>
<td>24</td>
<td>25,5</td>
<td>169,5</td>
<td>20</td>
</tr>
<tr>
<td>Ø 80 mm</td>
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<td>20</td>
<td>20</td>
<td>1,6</td>
<td>102</td>
<td>24</td>
<td>34,5</td>
<td>185,5</td>
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</tr>
<tr>
<td>Ø 100 mm</td>
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<td>25</td>
<td>2,0</td>
<td>125</td>
<td>29</td>
<td>37,0</td>
<td>203,0</td>
<td>31</td>
</tr>
</tbody>
</table>

---

XVstd = X1 + Stroke length/2, XVmax = X2 + Stroke length

* Does not apply to cylinders with lock unit.
Piston rod mountings

Swivel rod eye
Swivel rod eye for articulated mounting of cylinder. Swivel rod eye can be combined with clevis bracket GA. Maintenance-free.

Material:
Swivel rod eye: Zinc-plated steel
Swivel bearing according to DIN 648K: Hardened steel

Stainless steel swivel rod eye
Stainless-steel swivel rod eye for articulated mounting of cylinder. Swivel rod eye can be combined with clevis bracket GA. Maintenance-free.

Material:
Swivel rod eye: Stainless steel
Swivel bearing according to DIN 648K: Stainless steel

According to ISO 8139

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,08</td>
<td>P1C-4KRS</td>
</tr>
<tr>
<td>40</td>
<td>0,12</td>
<td>P1C-4LRS</td>
</tr>
<tr>
<td>50</td>
<td>0,25</td>
<td>P1C-4MRS</td>
</tr>
<tr>
<td>63</td>
<td>0,25</td>
<td>P1C-4MRS</td>
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</tr>
<tr>
<td>125</td>
<td>1,28</td>
<td>P1C-4RRS</td>
</tr>
</tbody>
</table>

Clevis
Clevis for articulated mounting of cylinder.

Material:
Clevis, clip: Galvanized steel
Pin: Hardened steel

Stainless steel clevis
Stainless-steel clevis for articulated mounting of cylinder.

Material:
Clevis: Stainless steel
Pin: Stainless steel
Circlips according to DIN 471: Stainless steel

According to ISO 8140

<table>
<thead>
<tr>
<th>Cyl. bore</th>
<th>Weight</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø mm</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>0,09</td>
<td>P1C-4KRC</td>
</tr>
<tr>
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<td>0,15</td>
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<td>P1C-4PRC</td>
</tr>
<tr>
<td>125</td>
<td>2,10</td>
<td>P1C-4RRC</td>
</tr>
</tbody>
</table>

Stainless steel clevis
Stainless-steel clevis for articulated mounting of cylinder.

Material:
Clevis: Stainless steel
Pin: Stainless steel
Circlips according to DIN 471: Stainless steel

Cyl. bore Weight Order code
Ø mm kg
32 0,09 P1S-4JRD
40 0,15 P1S-4LRD
50 0,35 P1S-4MRD
63 0,35 P1S-4MRD
80 0,75 P1S-4PRD
100 0,75 P1S-4PRD
125 2,10 P1S-4RRD
Flexo coupling

Flexo coupling for articulated mounting of piston rod. Flexo fitting is intended to take up axial angle errors within a range of ±4°.

Material
Flexo coupling, nut: Zinc-plated steel
Socket: Hardened steel

Supplied complete with galvanized adjustment nut.

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0.21</td>
<td>P1C-4KRF</td>
</tr>
<tr>
<td>40</td>
<td>0.22</td>
<td>P1C-4LRF</td>
</tr>
<tr>
<td>50</td>
<td>0.67</td>
<td>P1C-4MRF</td>
</tr>
<tr>
<td>63</td>
<td>0.67</td>
<td>P1C-4MRF</td>
</tr>
<tr>
<td>80</td>
<td>0.72</td>
<td>P1C-4PRF</td>
</tr>
<tr>
<td>100</td>
<td>0.72</td>
<td>P1C-4PRF</td>
</tr>
<tr>
<td>125</td>
<td>1.80</td>
<td>P1C-4RRF</td>
</tr>
</tbody>
</table>

Nut

Intended for fixed mounting of accessories to the piston rod.
Material: Zinc-plated steel

All P1D cylinders are delivered with a zinc-plated steel piston rod nut.

Supplied as pack of 10 off

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight * kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0.007</td>
<td>P14-4KRPZ</td>
</tr>
<tr>
<td>40</td>
<td>0.010</td>
<td>P14-4LPPZ</td>
</tr>
<tr>
<td>50</td>
<td>0.021</td>
<td>P14-4MRPZ</td>
</tr>
<tr>
<td>63</td>
<td>0.021</td>
<td>P14-4MRPZ</td>
</tr>
<tr>
<td>80</td>
<td>0.040</td>
<td>P14-4PRPZ</td>
</tr>
<tr>
<td>100</td>
<td>0.040</td>
<td>P14-4PRPZ</td>
</tr>
<tr>
<td>125</td>
<td>0.100</td>
<td>P14-4RRPZ</td>
</tr>
</tbody>
</table>

* Weight per item

Stainless steel nut

Intended for fixed mounting of accessories to the piston rod.
Material: Stainless steel A2

All P1D cylinders are delivered with a zinc-plated steel piston rod nut.

Supplied as pack of 10 off

According to DIN 439 B

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>17</td>
<td>5,0</td>
<td>M10x1,25</td>
</tr>
<tr>
<td>40</td>
<td>19</td>
<td>6,0</td>
<td>M12x1,25</td>
</tr>
<tr>
<td>50</td>
<td>24</td>
<td>8,0</td>
<td>M16x1,5</td>
</tr>
<tr>
<td>63</td>
<td>24</td>
<td>8,0</td>
<td>M16x1,5</td>
</tr>
<tr>
<td>80</td>
<td>30</td>
<td>10,0</td>
<td>M20x1,5</td>
</tr>
<tr>
<td>100</td>
<td>30</td>
<td>10,0</td>
<td>M20x1,5</td>
</tr>
<tr>
<td>125</td>
<td>41</td>
<td>13,5</td>
<td>M27x2</td>
</tr>
</tbody>
</table>

* Weight per item
Cylinder mountings

Stainless steel screw set
MP2, MP4, MS1 and GA

Set of stainless steel screws for fitting clevis brackets MP2, MP4 and GA onto the cylinder. The screws have an internal hexagonal head and are used in special environments, e.g. the food industry, or where there are extra demands for protection against corrosion.

Material:
According to DIN 912, Stainless steel, A2

4 pcs per pack.

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0.02</td>
<td>9301054321</td>
</tr>
<tr>
<td>40</td>
<td>0.02</td>
<td>9301054321</td>
</tr>
<tr>
<td>50</td>
<td>0.05</td>
<td>9301054322</td>
</tr>
<tr>
<td>63</td>
<td>0.05</td>
<td>9301054322</td>
</tr>
<tr>
<td>80</td>
<td>0.09</td>
<td>9301054323</td>
</tr>
<tr>
<td>100</td>
<td>0.09</td>
<td>9301054323</td>
</tr>
<tr>
<td>125</td>
<td>0.15</td>
<td>9301054324</td>
</tr>
</tbody>
</table>

Stainless steel screw set
for MF1/MF2

Set of stainless steel screws for fitting flanges MF1/MF2 onto the cylinder. The screws have an internal hexagonal head and are used in special environments, e.g. the food industry, or where there are extra demands for protection against corrosion.

Material:
According to DIN 6912, Stainless steel, A2

4 pcs per pack.

<table>
<thead>
<tr>
<th>Cyl. bore Ø mm</th>
<th>Weight kg</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>0.02</td>
<td>9301054331</td>
</tr>
<tr>
<td>40</td>
<td>0.02</td>
<td>9301054331</td>
</tr>
<tr>
<td>50</td>
<td>0.04</td>
<td>9301054332</td>
</tr>
<tr>
<td>63</td>
<td>0.04</td>
<td>9301054332</td>
</tr>
<tr>
<td>80</td>
<td>0.07</td>
<td>9301054333</td>
</tr>
<tr>
<td>100</td>
<td>0.07</td>
<td>9301054333</td>
</tr>
<tr>
<td>125</td>
<td>0.12</td>
<td>9301054334</td>
</tr>
</tbody>
</table>
Drop-in sensors
Suitable for low temperature versions only.

The P1D sensors can easily be installed from the side in the sensor groove, at any position along the piston stroke. The sensors are completely recessed and thus mechanically protected. Choose between electronic or reed sensors and several cable lengths and M12 connectors. The same standard sensors are used for all P1D versions.

The low temperature version has a magnetic ring in the piston for proximity sensing (but please note that the sensors are normally specified for full performance down to -25°C only). The high temperature version does not have a magnetic ring in the piston and therefore cannot be used with sensors.

Electronic sensors
The electronic sensors are "Solid State", i.e. they have no moving parts at all. They are provided with short-circuit protection and transient protection as standard. The built-in electronics make the sensors suitable for applications with high on and off switching frequency, and where very long service life is required.

Reed sensors
The sensors are based on proven reed switches, which offer reliable function in many applications. Simple installation, a protected position on the cylinder and clear LED indication are important advantages of this range of sensors.

Technical data

<table>
<thead>
<tr>
<th>Design</th>
<th>GMR (Giant Magnetic Resistance) magneto-resistive function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>From side, down into the sensor groove, so-called drop-in</td>
</tr>
<tr>
<td>Outputs</td>
<td>PNP, normally open (also available in NPN design, normally closed, on request)</td>
</tr>
<tr>
<td>Voltage range</td>
<td>10-30 VDC</td>
</tr>
<tr>
<td></td>
<td>10-18 V DC, ATEX sensor</td>
</tr>
<tr>
<td>Ripple</td>
<td>max 10%</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>max 2.5 V</td>
</tr>
<tr>
<td>Load current</td>
<td>max 100 mA</td>
</tr>
<tr>
<td>Internal consumption</td>
<td>max 10 mA</td>
</tr>
<tr>
<td>Actuating distance</td>
<td>min 9 mm</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>max 1.5 mm</td>
</tr>
<tr>
<td>Repeatability accuracy</td>
<td>max 0.2 mm</td>
</tr>
<tr>
<td>On/off switching frequency</td>
<td>max 5 kHz</td>
</tr>
<tr>
<td>On switching time</td>
<td>max 2 ms</td>
</tr>
<tr>
<td>Off switching time</td>
<td>max 2 ms</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>IP 67 (EN 60529)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-25 °C to +75 °C</td>
</tr>
<tr>
<td></td>
<td>-20 °C to +45 °C, ATEX sensor</td>
</tr>
<tr>
<td>Indication</td>
<td>LED, yellow</td>
</tr>
<tr>
<td>Material housing</td>
<td>PA 12</td>
</tr>
<tr>
<td>Material screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Cable</td>
<td>PVC or PUR 3x0.25 mm²</td>
</tr>
<tr>
<td></td>
<td>see order code respectively</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Design</th>
<th>Reed element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>From side, down into the sensor groove, so-called drop-in</td>
</tr>
<tr>
<td>Output</td>
<td>Normally open, or normally closed</td>
</tr>
<tr>
<td>Voltage range</td>
<td>10-30 V AC/DC or 10-120 V AC/DC</td>
</tr>
<tr>
<td></td>
<td>24-230 V AC/DC</td>
</tr>
<tr>
<td>Load current</td>
<td>max 500 mA for 10-30 V or max 100 mA for 10-120 V or max 30 mA for 24-230 V</td>
</tr>
<tr>
<td>Breaking power (resistive)</td>
<td>max 6 W/VA</td>
</tr>
<tr>
<td>Actuating distance</td>
<td>min 9 mm</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>max 1.5 mm</td>
</tr>
<tr>
<td>Repeatability accuracy</td>
<td>0.2 mm</td>
</tr>
<tr>
<td>On/off switching frequency</td>
<td>max 400 Hz</td>
</tr>
<tr>
<td>On switching time</td>
<td>max 1.5 ms</td>
</tr>
<tr>
<td>Off switching time</td>
<td>max 0.5 ms</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>IP 67 (EN 60529)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-25 °C to +75 °C</td>
</tr>
<tr>
<td>Indication</td>
<td>LED, yellow</td>
</tr>
<tr>
<td>Material housing</td>
<td>PA12</td>
</tr>
<tr>
<td>Material screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Cable</td>
<td>PVC or PUR 3x0.14 mm²</td>
</tr>
<tr>
<td></td>
<td>see order code respectively</td>
</tr>
</tbody>
</table>
**Electronic sensors**

<table>
<thead>
<tr>
<th>M8</th>
<th>Signal</th>
<th>+V DC</th>
<th>1</th>
<th>4</th>
<th>AC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>Black</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M12</th>
<th>Signal</th>
<th>– V DC</th>
<th>3</th>
<th>4</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>Black</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reed sensors**

<table>
<thead>
<tr>
<th>M8</th>
<th>Signal</th>
<th>+(-) V AC/DC</th>
<th>1</th>
<th>3</th>
<th>AC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>Black</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M12</th>
<th>Signal</th>
<th>–(+ V AC/DC</th>
<th>4</th>
<th>3</th>
<th>AC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>Black</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

**Sensors**

- Insert sensor
- LED
- Turn sensor
- Tighten screw
- Torque: 0.20 ±0.05Nm

**Sensor Installation**

- Insert sensor
- LED
- Turn sensor
- Tighten screw
- Torque: 0.20 ±0.05Nm
Ordering data

<table>
<thead>
<tr>
<th>Output/function, 10-30 V DC</th>
<th>Cable/connector</th>
<th>Weight (kg)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic sensors, 10-30 V DC</td>
<td>PNP type, normally open</td>
<td>0.007</td>
<td>P8S-GPSHX</td>
</tr>
<tr>
<td></td>
<td>0.27 m PUR-cable and 8 mm snap-in male connector</td>
<td>0.015</td>
<td>P8S-GPMHDX</td>
</tr>
<tr>
<td></td>
<td>3 m PVC-cable without connector</td>
<td>0.030</td>
<td>P8S-GPFLX</td>
</tr>
<tr>
<td></td>
<td>10 m PVC-cable without connector</td>
<td>0.110</td>
<td>P8S-GPFTX</td>
</tr>
<tr>
<td>Reed sensors, 10-30 V AC/DC</td>
<td>Normally open</td>
<td>0.007</td>
<td>P8S-GSSHX</td>
</tr>
<tr>
<td></td>
<td>0.27 m PUR-cable and 8 mm snap-in male connector</td>
<td>0.015</td>
<td>P8S-GSMHDX</td>
</tr>
<tr>
<td></td>
<td>3 m PVC-cable without connector</td>
<td>0.030</td>
<td>P8S-GSFLX</td>
</tr>
<tr>
<td></td>
<td>10 m PVC-cable without connector</td>
<td>0.110</td>
<td>P8S-GSFTX</td>
</tr>
<tr>
<td></td>
<td>5m PVC-cable without connector (1)</td>
<td>0.050</td>
<td>P8S-GCFX</td>
</tr>
<tr>
<td>Reed sensors, 10-120 V AC/DC</td>
<td>Normally open</td>
<td>0.030</td>
<td>P8S-GRFLX</td>
</tr>
<tr>
<td>Reed sensor, 24-230 V AC/DC</td>
<td>Normally open</td>
<td>0.030</td>
<td>P8S-GRFLX2</td>
</tr>
<tr>
<td></td>
<td>3 m PVC-cable without connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 m PVC-cable without connector</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Without LED

Connecting cables with one connector

The cables have an integral snap-in female connector.

<table>
<thead>
<tr>
<th>Type of cable, Cables for sensors, complete with one female connector</th>
<th>Cable/connector</th>
<th>Weight (kg)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable, Flex PVC</td>
<td>3 m, 8 mm Snap-in connector</td>
<td>0.07</td>
<td>9126344341</td>
</tr>
<tr>
<td>Cable, Flex PVC</td>
<td>10 m, 8 mm Snap-in connector</td>
<td>0.21</td>
<td>9126344342</td>
</tr>
<tr>
<td>Cable, Polyurethane</td>
<td>3 m, 8 mm Snap-in connector</td>
<td>0.01</td>
<td>9126344345</td>
</tr>
<tr>
<td>Cable, Polyurethane</td>
<td>10 m, 8 mm Snap-in connector</td>
<td>0.20</td>
<td>9126344346</td>
</tr>
<tr>
<td>Cable, Polyurethane</td>
<td>5 m, M12 screw connector</td>
<td>0.07</td>
<td>9126344348</td>
</tr>
<tr>
<td>Cable, Polyurethane</td>
<td>10 m, M12 screw connector</td>
<td>0.20</td>
<td>9126344349</td>
</tr>
</tbody>
</table>

Male connectors for connecting cables

Cable connectors for producing your own connecting cables. The connectors can be quickly attached to the cable without special tools. Only the outer sheath of the cable is removed. The connectors are available for M8 and M12 screw connectors and meet protection class IP 65.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Weight (kg)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8 screw connector</td>
<td>0.017</td>
<td>P8CS0803J</td>
</tr>
<tr>
<td>M12 screw connector</td>
<td>0.022</td>
<td>P8CS1204J</td>
</tr>
</tbody>
</table>
P1D-X Pneumatic ISO Cylinders

P1D-X Seal kits
Complete seal kits consisting of:
Piston seals
Cushioning seals
Piston rod seal
O-rings
Scraper ring
Material specification, see page 11

Order codes

<table>
<thead>
<tr>
<th>Cyl.bore mm</th>
<th>P1D cylinder version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High temp P1D</td>
</tr>
<tr>
<td>32</td>
<td>P1D-6KRFX</td>
</tr>
<tr>
<td>40</td>
<td>P1D-6LRF</td>
</tr>
<tr>
<td>50</td>
<td>P1D-6MRFX</td>
</tr>
<tr>
<td>63</td>
<td>P1D-6NRF</td>
</tr>
<tr>
<td>80</td>
<td>P1D-6QRF</td>
</tr>
<tr>
<td>100</td>
<td>P1D-6QRF</td>
</tr>
<tr>
<td>125</td>
<td>P1D-6QRF</td>
</tr>
</tbody>
</table>

Seal kit

- Included in seal kit
- Socket head
- Tightening torque

= Lubricated with grease
= Locking fluid

Loctite 270 or Loctite 2701 locking fluid must be used

For through rods variants, order two seal kits.

Example: For a P1D-X Ø63 with through rod, high temperature version, order 2 x P1D-6NRF

Order codes

High temperature 30g 9127394521
Low temperature 30g 9127394541

Cyl.-dia

<table>
<thead>
<tr>
<th>Cyl.-dia mm</th>
<th>Aluminium piston T1 Nm</th>
<th>AF mm</th>
<th>C T2 Nm</th>
<th>AF mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>15</td>
<td>6</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>40</td>
<td>10</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>63</td>
<td>40</td>
<td>10</td>
<td>20</td>
<td>8</td>
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<tr>
<td>80</td>
<td>120</td>
<td>14</td>
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<td>6</td>
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<tr>
<td>100</td>
<td>120</td>
<td>14</td>
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<td>6</td>
</tr>
<tr>
<td>125</td>
<td>120</td>
<td>14</td>
<td>70</td>
<td>8</td>
</tr>
</tbody>
</table>
Specifying air quality (purity) in accordance with ISO8573-1:2010, the international standard for Compressed Air Quality

ISO8573-1 is the primary document used from the ISO8573 series as it is this document which specifies the amount of contamination allowed in each cubic metre of compressed air.

ISO8573-1 lists the main contaminants as Solid Particulate, Water and Oil. The purity levels for each contaminant are shown separately in tabular form, however for ease of use, this document combines all three contaminants into one easy to use table.

<table>
<thead>
<tr>
<th>ISO8573-1:2010 CLASS</th>
<th>Solid Particulate</th>
<th>Water</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum number of particles per m³</td>
<td>Mass Concentration mg/m³</td>
<td>Vapour Pressure Dewpoint</td>
</tr>
<tr>
<td></td>
<td>0.1 - 0.5 micron</td>
<td>0.5 - 1 micron</td>
<td>1 - 5 micron</td>
</tr>
<tr>
<td>0</td>
<td>≤ 20 000</td>
<td>≤ 400</td>
<td>≤ 10</td>
</tr>
<tr>
<td>1</td>
<td>≤ 400 000</td>
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Specifying air quality in accordance with ISO8573-1:2010

When specifying the purity of air required, the standard must always be referenced, followed by the purity class selected for each contaminant (a different purity class can be selected for each contamination if required).

An example of how to write an air quality specification is shown below:

ISO 8573-1:2010 Class 1.2.1

ISO 8573-1:2010 refers to the standard document and its revision, the three digits refer to the purity classifications selected for solid particulate, water and total oil. Selecting an air purity class of 1.2.1 would specify the following air quality when operating at the standard’s reference conditions:

Class 1 - Particulate

In each cubic metre of compressed air, the particulate count should not exceed 20,000 particles in the 0.1 - 0.5 micron size range, 400 particles in the 0.5 - 1 micron size range and 10 particles in the 1 - 5 micron size range.

Class 2 - Water

A pressure dewpoint (PDP) of -40°C or better is required and no liquid water is allowed.

Class 1 - Oil

In each cubic metre of compressed air, not more than 0.01mg of oil is allowed. This is a total level for liquid oil, oil aerosol and oil vapour.

ISO8573-1:2010 Class zero

- Class 0 does not mean zero contamination.
- Class 0 requires the user and the equipment manufacturer to agree contamination levels as part of a written specification.
- The agreed contamination levels for a Class 0 specification should be within the measurement capabilities of the test equipment and test methods shown in ISO8573 Pt 2 to Pt 9.
- The agreed Class 0 specification must be written on all documentation to be in accordance with the standard.
- Stating Class 0 without the agreed specification is meaningless and not in accordance with the standard.
- A number of compressor manufacturers claim that the delivered air from their oil-free compressors is in compliance with Class 0.
- If the compressor was tested in clean room conditions, the contamination detected at the outlet will be minimal. Should the same compressor now be installed in typical urban environment, the level of contamination will be dependent upon what is drawn into the compressor intake, rendering the Class 0 claim invalid.
- A compressor delivering air to Class 0 will still require purification equipment in both the compressor room and at the point of use for the Class 0 purity to be maintained at the application.
- Air for critical applications such as breathing, medical, food, etc typically only requires air quality to Class 2.2.1 or Class 2.1.1.
- Purification of air to meet a Class 0 specification is only cost effective if carried out at the point of use.

Specifying air purity in accordance with ISO8573-1:2010

When specifying the purity of air required, the standard must always be referenced, followed by the purity class selected for each contaminant (a different purity class can be selected for each contamination if required).
P1D-X Pneumatic ISO Cylinders