



Gear Pump Division

Vocational Truck Pump Program Catalog



ENGINEERING YOUR SUCCESS.



Useful Formulas

| | |
|-------------------------------|---|
| Pump Output Horsepower: | HP = GPM x PSI ÷ 1714 |
| Pump Input Horsepower: | HP = GPM x PSI ÷ 1714 ÷ E |
| Pump Input Torque (Lbs. ft.): | T = CID x PSI ÷ 75.36 |
| Gallons Per Minute: | GPM = CID x RPM ÷ 231 |
| Cubic Inches Displacement: | CID = GPM x 231 ÷ RPM |
| Horse Power: | HP = T x RPM ÷ 5252 |
| Flow in GPM using P.T.O.: | GPM = Engine RPM x P.T.O.% x CIR ÷ 231 x E |
| CCM Conversion: | CCM = CID x 16.39 |
| CID Conversion: | CID = CCM x .06102 |

Abbreviations

| | | |
|--|--|----------------------------------|
| HP = Horsepower | CCM = Cubic Centimeter Displacement | RP = Rear Ports |
| GPM = Gallons per Minute | BI = Bi Rotational | RV = Relief Valve |
| CID = Cubic Inches Displacement | CCW = Counter Clockwise | SP = Side Ports |
| PSI = Pounds per Square Inch | CW = Clockwise | SRP = Side and Rear Ports |
| RPM = Revolutions per Minute | MIX = Mixed Porting | W = Wet Spline |
| E = Efficiency | NPT = National Pipe Thread Ports | |
| T = Torque | ODT = O-Ring Boss Ports | |



WARNING — User Responsibility

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.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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Parker Hannifin Corporation is the world's leading diversified manufacturer of motion and control technologies and systems for a wide variety of commercial mobile, industrial and aerospace markets. Among their divisions, the Gear Pump Division engineers specialty products for unique applications in a wide range of industries including truck, refuse, material handling, construction, forestry, agriculture, and industrial. In an effort to meet distributor and customer demands for decreased lead-times, the Gear Pump Division offers the Vocational Truck Pump Program.

Highlights from the program include...

- Products to support truck specific applications
- One price per standard pump families regardless of gear width
- Individually boxed pumps
- Freight paid subject to program qualification (PO value \$5,000 or greater)
- Two week (or better!) lead-time

Our ability to engineer products for unique applications has kept us at the forefront of technology, and ensured our position as industry leaders. Our success has come from providing quality products with excellent sales and service support.

We manufacture hydraulic components for a wide range of applications including:

- Aerial Lift
- Refuse
- Dump Truck
- Salt / Sand
- Low Boy Trailer
- Roll Off
- Moving Floor

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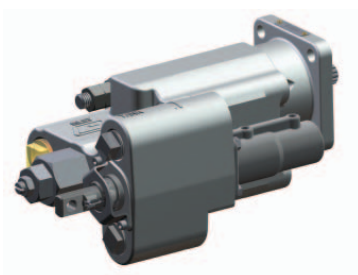
Dump Pumps

C101 / 102 - G101 / 102

- Pressures to 2500 PSI
- Speeds to 2400 RPM

C101 / G101

- Remote Mount
- 1" Round Keyed Shaft



C102 / G102

- SAE "B" 4-Bolt
- SAE "B" 13T Spline

G102

- DIN 4-Bolt
- DIN 8T Spline

| Parker # | Description | Rotation | Gear | CID |
|-----------------------|---|----------|------|------|
| C101/102 Pumps | | | | |
| 3149310226 | C101D-2.5 (Remote Mount) | BI | 2.5" | 6.38 |
| 3149325229 | C102D-2.5-1 (Direct Mount) | CCW | 2.5" | 6.38 |
| 3149325227 | C102D-2.5-1-AS (Direct Mount w/Airshift Installed) | CCW | 2.5" | 6.38 |
| 3149325234 | C102D-2.5 (Direct Mount) | CW | 2.5" | 6.38 |
| G101/102 Pumps | | | | |
| 3089310047 | G101-1-2.0 (Remote Mount) | BI | 2.0" | 3.94 |
| 3089310416 | G102-1-2.0-R-4S (Direct Mount) | CW | 2.0" | 3.94 |
| 3089310903 | G102-1-2.0-R-4S-AS (Direct Mount w/Airshift Installed) | CW | 2.0" | 3.94 |
| 3089310418 | G102-1-2.0-L-4S (Direct Mount) | CCW | 2.0" | 3.94 |
| 3089310905 | G102-1-2.0-L-4S-AS (Direct Mount w/Air Shift Installed) | CCW | 2.0" | 3.94 |
| 3089310913 | G102-1-2.0-R-4D-AS (Direct Mount w/Airshift Installed) | CW | 2.0" | 3.94 |

NOTE: All dump pumps have 3-line sleeve included
All dump pumps have relief valve set at 2000 PSI

Accessories for Reference

| Parker # | Description |
|------------|--|
| 3149414006 | ASK-6 (Air Shift Cylinder C Series with Hoses and Fittings) |
| 3149414017 | ASK-17 (Air Shift Cylinder C Series less Hoses and Fittings) |
| 3140100005 | Remote Mount Bracket C101 |
| 3911832323 | Direct Mount Bracket C102 |
| 3913283052 | 3rd Line Sleeve |
| 3089414016 | ASK-16 (Air Shift Cylinder G Series with Hoses and Fittings) |
| 3089414049 | ASK-49 (Air Shift Cylinder G Series less Hoses and Fittings) |
| 3149414055 | ASK-55 (Air Shift Cylinder C Series less Hoses with Push Connect Fittings) |
| 3089414070 | ASK-70 (Air Shift Cylinder G Series less Hoses with Push Connect Fittings) |



P16 Pumps

- SAE "B" 2-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3000 PSI
- Speeds to 3600 RPM
- Applications – Salt & Sand / Aerial Lift / Low Boy



| Parker # | Model # | Rotation | Port | Inlet | Outlet | CID |
|----------|--------------|----------|-------------|--------|--------|------|
| 0120321 | P16-85A-2N1 | CCW | Rear O-Ring | 1-1/4" | 1" | 1.66 |
| 0120446 | P16-100A-2N1 | CCW | Rear O-Ring | 1-1/4" | 1" | 1.96 |
| 0120440 | P16-100C-2N1 | CW | Rear O-Ring | 1-1/4" | 1" | 1.96 |
| 0120748 | P16-150A-2N1 | CCW | Rear O-Ring | 1-1/4" | 1" | 2.93 |
| 0120749 | P16-150C-2N1 | CW | Rear O-Ring | 1-1/4" | 1" | 2.93 |
| 0121057 | P16-200A-2N1 | CCW | Rear O-Ring | 1-1/4" | 1" | 3.90 |
| 0121056 | P16-200C-2N1 | CW | Rear O-Ring | 1-1/4" | 1" | 3.90 |
| 0120301 | P16-85A-2N2 | CCW | Rear NPT | 1" | 3/4" | 1.66 |
| 0120605 | P16-115A-2N2 | CCW | Rear NPT | 1" | 3/4" | 2.24 |
| 0120606 | P16-115C-2N2 | CW | Rear NPT | 1" | 3/4" | 2.24 |
| 0120750 | P16-150A-2N2 | CCW | Rear NPT | 1" | 3/4" | 2.93 |
| 0120751 | P16-150C-2N2 | CW | Rear NPT | 1" | 3/4" | 2.93 |
| 0120900 | P16-180A-2N2 | CCW | Rear NPT | 1" | 3/4" | 3.90 |

Reference Soft Goods Kits 0015419

PGP020 Pumps

- Bi-Rotational
- SAE "B" 2/4-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- 1" SAE "BB" 15T Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Wrecker / Salt & Sand

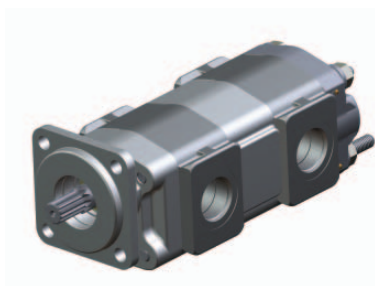


| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|-----------------------------------|------|--------|------|--------|--------|------|
| 3089110271 | PGP020 2/4B NPT SRP 7/8" - 13T 10 | BI | NPT | 1" | 1" | 1" | 1.97 |
| 3089110272 | PGP020 2/4B NPT SRP 7/8" - 13T 12 | BI | NPT | 1" | 1" | 1-1/4" | 2.46 |
| 3089110264 | PGP020 2/4B NPT SRP 7/8" - 13T 15 | BI | NPT | 1" | 1-1/4" | 1-1/2" | 2.96 |
| 3089110265 | PGP020 2/4B NPT SRP 7/8" - 13T 17 | BI | NPT | 1" | 1-1/4" | 1-3/4" | 3.45 |
| 3089110266 | PGP020 2/4B NPT SRP 7/8" - 13T 20 | BI | NPT | 1" | 1-1/4" | 2" | 3.94 |
| 3089110295 | PGP020 2/4B NPT SRP 1" - 15T 20 | BI | NPT | 1" | 1-1/4" | 2" | 3.94 |
| 3089110274 | PGP020 2/4B ODT SRP 7/8" - 13T 10 | BI | O-Ring | 1" | 1" | 1" | 1.97 |
| 3089110278 | PGP020 2/4B ODT SRP 7/8" - 13T 12 | BI | O-Ring | 1" | 1" | 1-1/4" | 2.46 |
| 3089110275 | PGP020 2/4B ODT SRP 7/8" - 13T 15 | BI | O-Ring | 1" | 1-1/4" | 1-1/2" | 2.96 |
| 3089110276 | PGP020 2/4B ODT SRP 7/8" - 13T 17 | BI | O-Ring | 1" | 1-1/4" | 1-3/4" | 3.45 |
| 3089110277 | PGP020 2/4B ODT SRP 7/8" - 13T 20 | BI | O-Ring | 1" | 1-1/4" | 2" | 3.94 |
| 3089110296 | PGP020 2/4B ODT SRP 1" - 15T 20 | BI | O-Ring | 1" | 1-1/4" | 2" | 3.94 |

Reference Soft Goods Kits 3911802584

PGP020 Pumps - Tandem Units

- Bi-Rotational
- SAE "B" 2 or 4-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Bulk Feed

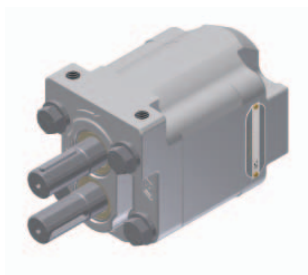


| Parker # | Description | Rot. | Port | Side Inlet Front - Rear | Side Outlet Front - Rear | Gear Front - Rear | CID Front - Rear |
|------------|-------------------------------------|------|--------|----------------------------|-----------------------------|----------------------|---------------------|
| 3089123003 | PGP020 4B NPT SP 7/8" - 13T 20-20 | BI | NPT | 1-1/4" - 1-1/4" | 1-1/4" - 1-1/4" | 2" - 2" | 3.94 - 3.94 |
| 3089123019 | PGP020 4B ODT SP 7/8" - 13T 20-20 | BI | O-Ring | 1-1/4" - 1-1/4" | 1-1/4" - 1-1/4" | 2" - 2" | 3.94 - 3.94 |
| 3089126017 | PGP020 2/4B ODT SP 7/8" - 13T 20-20 | BI | O-Ring | 1" - 1" | 1" - 1" | 2" - 2" | 3.94 - 3.94 |

Reference Soft Goods Kits 3911802791

PGP051 Pumps

- PAD Mount 1-1/8" Key
- Pressures to 2500 PSI
- Up to 1900 RPM
- Applications – Roll off / Moving Floor / Low Boy

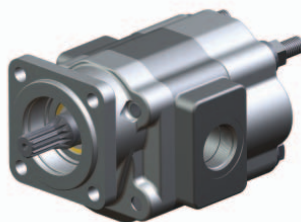


| Parker # | Description | Rot. | Port | Rear | Gear | CID |
|------------|----------------------------------|------|---------|-----------------|--------|------|
| 3139610846 | PGP051 Pad NPT/ODT RP 1-1/8" K22 | CW | NPT/ODT | 1-1/2" S 3/4" P | 2-1/4" | 5.74 |

Reference Soft Goods Kit 3911822183

PGP051 Pumps

- SAE "B" 4-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Moving Floors / Roll Off / Refuse



| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|---------------------------------|------|--------|--------|--------|--------|------|
| 3139610442 | PGP051 4B NPT RP 7/8" - 13T 25 | BI | NPT | 1-1/4" | Blank | 2-1/2" | 6.38 |
| 3139610367 | PGP051 4B NPT SRP 7/8" - 13T 25 | BI | NPT | 1-1/4" | 1-1/4" | 2-1/2" | 6.38 |
| 3139610450 | PGP051 4B NPT SP 7/8" - 13T 25 | BI | NPT | Blank | 1-1/4" | 2-1/2" | 6.38 |
| 3139610727 | PGP051 4B ODT SRP 7/8" - 13T 20 | BI | O-Ring | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610526 | PGP051 4B ODT SRP 7/8" - 13T 25 | BI | O-Ring | 1-1/4" | 1-1/4" | 2-1/2" | 6.38 |

Reference Soft Goods Kit 3911802137

PGP051 Pumps / Motors

- SAE "B" 2/4-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Roll Off / Refuse / Moving Floor



| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|-----------------------------------|------|--------|--------|--------|--------|------|
| 3139610664 | PGP051 2/4B NPT SRP 7/8" - 13T 17 | BI | NPT | 1-1/2" | 1-1/4" | 1-3/4" | 4.46 |
| 3139610663 | PGP051 2/4B NPT SRP 7/8" - 13T 20 | BI | NPT | 1-1/2" | 1-1/4" | 2" | 5.10 |
| 3139610658 | PGP051 2/4B NPT SRP 7/8" - 13T 25 | BI | NPT | 1-1/2" | 1-1/2" | 2-1/2" | 6.38 |
| 3139610800 | PGP051 2/4B NPT SRP 1" - 15T 25 | BI | NPT | 1-1/4" | 1-1/4" | 2-1/2" | 6.38 |
| 3139610769 | PGP051 2/4B ODT SRP 7/8" - 13T 17 | BI | O-Ring | 1-1/4" | 1-1/4" | 1-3/4" | 4.46 |
| 3139610768 | PGP051 2/4B ODT SRP 7/8" - 13T 20 | BI | O-Ring | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610767 | PGP051 2/4B ODT SRP 7/8" - 13T 22 | BI | O-Ring | 1-1/4" | 1-1/4" | 2-1/4" | 5.76 |
| 3139610766 | PGP051 2/4B ODT SRP 7/8" - 13T 25 | BI | O-Ring | 1-1/4" | 1-1/2" | 2-1/2" | 6.38 |
| 3139610801 | PGP051 2/4B ODT SRP 1" - 15T 25 | BI | O-Ring | 1-1/4" | 1-1/2" | 2-1/2" | 6.38 |

Reference Soft Goods Kit 3911842113

NOTE: All pumps have extended studs



PGP051 Pumps / PGM051 Motors

- SAE “B” or “C” 4-Bolt Flange
- SAE “C” 1-1/4" Keyed or 14T Shaft
- Pressures to 2500 PSI
- Speeds to 2400 RPM
- Application – Oil / Gas

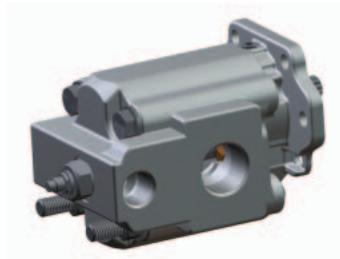


| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|---------------------------------|------|--------|--------|--------|--------|------|
| 3139610814 | PGP051 4C ODT SRP 1-1/4" 14T 20 | BI | O-Ring | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610815 | PGP051 4C ODT SRP 1-1/4" K 20 | BI | O-Ring | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610816 | PGP051 4C NPT SRP 1-1/4" 14T 20 | BI | NPT | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610817 | PGP051 4C NPT SRP 1-1/4" K 20 | BI | NPT | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610818 | PGP051 4C ODT SRP 1-1/4" 14T 25 | BI | O-Ring | 1-1/2" | 1-1/2" | 2-1/2" | 6.38 |
| 3139610819 | PGP051 4C ODT SRP 1-1/4" K 25 | BI | O-Ring | 1-1/2" | 1-1/2" | 2-1/2" | 6.38 |
| 3139610820 | PGP051 4C NPT SRP 1-1/4" 14T 25 | BI | NPT | 1-1/2" | 1-1/2" | 2-1/2" | 6.38 |
| 3139610821 | PGP051 4C NPT SRP 1-1/4" K 25 | BI | NPT | 1-1/2" | 1-1/2" | 2-1/2" | 6.38 |
| 3139710338 | PGM051 4B ODT SRP 1-1/4" K 22 | BI | O-Ring | 1-1/2" | 1-1/2" | 2-1/4" | 5.74 |
| 3139710339 | PGM051 4B NPT SRP 1-1/4" K 22 | BI | NPT | 1-1/2" | 1-1/2" | 2-1/4" | 5.74 |
| 3139610823 | PGP051 4B ODT SRP 1-1/4" K 20 | BI | ODT | 1-1/4" | 1-1/4" | 2" | 5.10 |
| 3139610824 | PGP051 4B NPT SRP 1-1/4" K 20 | BI | NPT | 1-1/4" | 1-1/4" | 2" | 5.10 |

Reference Soft Goods Kit 3911801475

PGP051 Pumps with Relief Valve

- SAE “B” 2/4-Bolt Flange
- 7/8" SAE “B” 13T Shaft
- Pressures to 2500 PSI
- Speeds to 2400 RPM
- Application – Moving Floors / Roll Off / Refuse



| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|-------------------------------------|------|------|------|--------|--------|------|
| 3139610678 | PGP051 2/4B NPT SP 7/8" - 13T 17 RV | CCW | NPT | RV | 1-1/4" | 1-3/4" | 4.46 |
| 3139610699 | PGP051 2/4B NPT SP 7/8" - 13T 25 RV | CCW | NPT | RV | 1-1/2" | 2-1/2" | 6.38 |

Reference Soft Goods Kit 3911842113

Relief Valve Setting 2500 PSI

PGP076 Pumps

- SAE “C” 4-Bolt Flange
- SAE “C” 1-1/4" Rd Key Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Refuse / Side Loader / Front Loader / Rear Loader



| Parker # | Description | Rot. | Port | Inlet | Outlet | Gear | CID |
|------------|-----------------------------|------|------|-------|--------|--------|------|
| 3169610246 | PGP076 4C SF SP 1-1/4" K 22 | CCW | SF | 2" | 1-1/4" | 2-1/4" | 9.22 |

Reference Soft Goods Kit 3911842142

PGPLS076 Pump with Unloader

- SAE "C" 4-Bolt Flange
- SAE "C" 1-1/4" Rd Key Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Refuse / Side Loader / Front Loader / Rear Loader



| Parker # | Description | Rot. | Port | Inlet | Outlet | Gear | CID |
|------------|-------------------------------|------|------|-------|--------|--------|------|
| 3169610258 | PGPLS076 4C SF SP 1-1/4" K 22 | CCW | SF | 2" | 1-1/4" | 2-1/4" | 9.22 |

Reference Soft Goods Kit 391832996

PGP315 Pump / Motors

- SAE "B" 2-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3500 PSI
- Speeds to 3000 RPM
- Applications – Tire Trucks / Salt & Sand

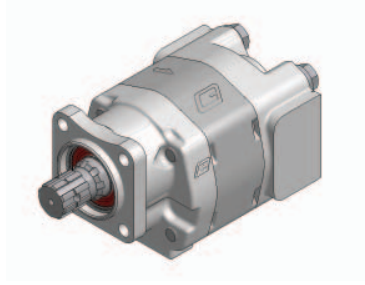


| Parker # | Description | Rot. | Port | Rear | Side | Gear | CID |
|------------|--------------------------------|------|--------|------|-------|------|------|
| 3269110481 | PGP315 2B ODT RP 7/8" - 13T 07 | BI | O-Ring | 1" | Blank | 3/4" | 0.93 |
| 3269110482 | PGP315 2B ODT RP 7/8" - 13T 10 | BI | O-Ring | 1" | Blank | 1" | 1.24 |

Reference Soft Goods Kit 3911801244

Easy Fit DIN Flange

- DIN Flange
- 8T Shaft
- Pressures to 3000 PSI
- Speeds to 2400 RPM
- Applications – Moving Floors / Low Boys / Live Bottoms



| Parker # | Description | Rot. | Port | Inlet | Outlet | Gear | CID |
|------------|-----------------------------|------|--------|--------|--------|--------|------|
| 3249110552 | PGP330 DIN ODT RP 8T DIN 07 | BI | O-Ring | 1" | 1" | 3/4" | 1.48 |
| 3249110553 | PGP330 DIN ODT RP 8T DIN 12 | BI | O-Ring | 1" | 1" | 1-1/4" | 2.46 |
| 3239110548 | PGP350 DIN ODT RP 8T DIN 20 | CCW | O-Ring | 1-1/4" | 1" | 2" | 5.10 |
| 3239110549 | PGP350 DIN ODT RP 8T DIN 25 | CCW | O-Ring | 1-1/4" | 1" | 2-1/2" | 6.38 |
| 3239110550 | PGP350 DIN ODT RP 8T DIN 20 | CW | O-Ring | 1-1/4" | 1" | 2" | 5.10 |
| 3239110551 | PGP350 DIN ODT RP 8T DIN 25 | CW | O-Ring | 1-1/4" | 1" | 2-1/2" | 6.38 |
| 3239110573 | PGP350 DIN ODT RP 8T DIN 15 | BI | O-Ring | 1" | 1" | 1-1/2" | 3.83 |
| 3239110574 | PGP350 DIN ODT RP 8T DIN 20 | BI | O-Ring | 1" | 1" | 2" | 5.10 |

Reference Soft Goods Kit 3911832830

PGP350 Easy Fit

- SAE "B" 4-Bolt Flange
- 7/8" SAE "B" 13T Shaft
- Pressures to 3500 PSI
- Speeds to 2400 RPM
- Applications – Live Floors / Moving Floors / Roll Off Trailers



| Parker # | Description | Rot. | Port | Inlet | Outlet | Gear | CID |
|------------|--------------------------------------|------|--------|--------|--------|--------|------|
| 3239110522 | PGP350 4B ODT RP CW 7/8" - 13T 20 W | CW | O-Ring | 1-1/4" | 1" | 2" | 5.10 |
| 3239110523 | PGP350 4B ODT RP CCW 7/8" - 13T 20 W | CCW | O-Ring | 1-1/4" | 1" | 2" | 5.10 |
| 3239110524 | PGP350 4B ODT RP CW 7/8" - 13T 25 W | CW | O-Ring | 1-1/4" | 1" | 2-1/2" | 6.38 |
| 3239110525 | PGP350 4B ODT RP CCW 7/8" - 13T 25 W | CCW | O-Ring | 1-1/4" | 1" | 2-1/2" | 6.38 |

Reference Soft Goods Kit 3911832806



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Parker Hannifin Corporation – Gear Pump Division

Offer of Sale

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2. Price Adjustments; Payments. Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Delivery Dates; Title and Risk; Shipment. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. Improper use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer. **13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. Termination. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act. Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

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