Square Jaw Brute™
Parallel Grippers
& COLLET GRIPPERS

RAD
ROBOTIC ACCESSORIES DIVISION
Square Jaw Brute™ Parallel Grippers

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Operating Principle

True Parallel Motion of the fingers is achieved through a toggle mechanism linking the piston of the double acting pneumatic cylinder to the jaws. The jaws remain synchronous and parallel through the normal motion of the piston. This parallel motion provides a consistent grip force throughout the range of the stroke.

Features

- The Square Jaw Brute™ is field repairable for minimum downtime. Most replacement parts are available the same day, to be shipped from our facility.

- The Square Jaw Brute™ Gripper has been designed to provide long life with trouble free operation. Beta test site applications have achieved over 10 million loaded cycles with minimal wear. Actual life cycle of the gripper may vary depending on the application, maintenance and environment. Contact our Technical Sales department for actual case studies.

- The customer interface mounting holes are metric. See specific model in the catalog for sizes and locations.

- Hardened tool steel wear surfaces allow the Square Jaw Brute™ to operate for millions of cycles in dirty environments where anodized aluminum wear surfaces have failed.

- The cylinders come standard with a magnetic piston which enables mid-stroke signaling and exact end of stroke sensing. A sensor can be positioned anywhere in any of the standard 6 dovetail slots and is locked into position with an integral screw. Multiple sensors can be installed in one or more of the dovetails. Sensors are ordered separately (see Sensor section).

- Standard seals are internally lubricated modified Buna N O-rings. All units are factory lubricated with Magnalube®-G (a grease loaded with microscopic size particles of TFE in suspension). This combination has been found suitable for long life in most non-lube service applications.
Application Guidelines

- The maximum load the gripper can handle will vary based on the size, shape and texture of the part, texture and shape of the fingers, acceleration and speed of the system and air line pressure.

- Design the tooling fingers as short as possible to maximize grip force and extend the life of the gripper. See loading charts specific to each gripper.

- All grippers are factory lubricated for service under normal operating conditions. Periodic lubrication of the slide and jaws is required. The frequency is dependent on the application and environmental conditions.

- The gripper is designed for use in temperatures from -25°F to 250°F (-32°C to 121°C). Viton Seals are optional for high temperature environments (up to 400°F/204°C) and are resistant to many hostile fluids.

- A four way solenoid valve is required to control the gripper.

- Always key and/or dowel fingers onto the jaws.

- The grip force can be adjusted by varying the air pressure.

- Use dry air only, not to exceed 120 psi/8.3 bar.

How to Order

Style of Gripper

- **P** = Parallel
- **C** = Collet

Model Number

- 3100, 3200
- 3300, 3400
- 3600, 3700
- 3800, 3900
- 8500, 8600
- 8700

Options

- **V** = Viton Seals
- **FP** = Front Ports
- **SM** = Side Mount
- **S** = Proximity Switch Mounting
- **JS** = Jaw Hard Stop
Viton Seals (-V) these seals are optional for high temperature environments (up to 400°F/204°C) and are resistant to many hostile fluids.

Front Ports (-FP) The location of the air ports can be rotated in 90° increments relative to the jaws at your request.

Side Mounting (-SM) A side mounting plate is available for all 2 Jaw Square Jaw Brute™ Grippers.

Proximity Switches (-S) Proximity Switches thread directly into the housing of the gripper offering protection from dirt and debris. Contact Robotic Accessories for model availability.

Hard Stop (-JS) A pneumatically actuated hard stop is available at any location along the stroke in the close direction on 2 jaw models. This creates a third close/open position. Contact Robotic Accessories for model availability.

Adapter Plates can be ordered separately and are available for any model.

Sensors

Sensors are mounted in the dovetail slots in the wall of the gripper cylinder. They are actuated by the magnetic piston. The sensors are 1/4" with a 3/8" boot and can be mounted in or removed from the gripper at any time. These sensors are encased in a plastic housing and are corrosion resistant. The 45° wire outlet allows close mounting. Each sensor is furnished complete with a hex socket screw, mounting clamp and a hex wrench for secure installation. The table below lists the sensor specifications and ordering information.

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Prewired 9 ft. Part No.</th>
<th>Quick Disconnect Part No.*</th>
<th>Wire Leads</th>
<th>LED</th>
<th>Electrical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic</td>
<td>4008</td>
<td>4009</td>
<td>3</td>
<td>Yes</td>
<td>Sourcing PNP 6-24 VDC, 0.20 Amp Max Current, 0.5 Voltage Drop</td>
</tr>
<tr>
<td>Electronic</td>
<td>4010</td>
<td>4011</td>
<td>3</td>
<td>Yes</td>
<td>Sinking NPN 6-24 VDC, 0.20 Amp Max Current, 0.5 Voltage Drop</td>
</tr>
<tr>
<td>Reed</td>
<td>4015</td>
<td>4016</td>
<td>2</td>
<td>Yes</td>
<td>5-120 VDC/VAC, 0.03 Amp Max current, 4 Watt Max, 2.0 Voltage Drop</td>
</tr>
</tbody>
</table>

*Quick Disconnect Styles are supplied with 6 inch pigtail with male connector. Order Female cordsets separately.

Temperature range for Sensors: -4° to +176°F / -20° to +80°C
**MODEL P-3100**

**Specifications**

Total Stroke .................. 30 mm (1.2 in)
Total Grip Force at 6.2 bar/90 psi
Open .......................... 466 N (104 lbf)
Close .......................... 350 N (78 lbf)
Grip Force per Jaw at 6.2 bar/90 psi
Open .......................... 233 N (52 lbf)
Close .......................... 175 N (39 lbf)
Mass ............................ 0.5 kg (1.1 lb)
Bore Diameter .................. 32 mm (1.26 in)
Max. Operating Pressure ........... 8.3 bar (120 psi)

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**Grip Force Close vs. Finger Length**

**Grip Force per Jaw vs. Pressure**

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**Dimensions**

- **MS x 0.8 Tap X 6 mm DP. TYP. (4)**
- **S. F. for 2.5 mm DWL X 6 mm DP. TYP. (2)**
- **Open/Closed Ports #10-32 TYP. (2)**
- **Sensor Groove 3/8-60 dovetail TYP. (6)**
- **Optional Side Mount Plate Option**
- **Side Mounting Holes M5 x 0.8 Tap X 12 mm DP. TYP. (4)**

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**Contact Information**

Phone 937-667-5705  
www.robotic-accessories.com  
FAX: 937-667-7602
MODEL P-3200

Specifications
Total Stroke ........................................... 39 mm (1.5 in)
Total Grip Force at 6.2 bar/90 psi

Open ................................................... 1126 N (254 lbf)
Close .................................................... 952 N (214 lbf)

Grip Force per Jaw at 6.2 bar/90 psi

Open ................................................... 563 N (127 lbf)
Close .................................................... 476 N (107 lbf)

Mass ..................................................... 1.1 kg (2.4 lb)

Bore Diameter ....................................... 50 mm (1.97 in)

Max. Operating Pressure ......................... 8.3 bar (120 psi)
**MODEL P-3300**

**Specifications**

Total Stroke ....................... 60 mm (2.4 in)
Total Grip Force at 6.2 bar/90 psi
Open .......................... 2876 N (626 lbf)
Close ......................... 2574 N (578 lbf)
Grip Force per Jaw at 6.2 bar/90 psi
Open ......................... 1438 N (323 lbf)
Close .......................... 1287 N (289 lbf)
Mass ............................. 3.0 kg (6.6 lb)
Bore Diameter ..................... 80 mm (3.15 in)
Max. Operating Pressure ........... 8.3 bar (120 psi)

**Grip Force Close vs. Finger Length**

<table>
<thead>
<tr>
<th>Finger Length (mm)</th>
<th>Grip Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>51</td>
<td>250</td>
</tr>
<tr>
<td>102</td>
<td>200</td>
</tr>
<tr>
<td>152</td>
<td>150</td>
</tr>
<tr>
<td>203</td>
<td>100</td>
</tr>
</tbody>
</table>

**Grip Force per Jaw vs. Pressure**

<table>
<thead>
<tr>
<th>Pressure (bar)</th>
<th>Grip Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>100</td>
</tr>
<tr>
<td>2.8</td>
<td>125</td>
</tr>
<tr>
<td>4.1</td>
<td>150</td>
</tr>
<tr>
<td>5.5</td>
<td>175</td>
</tr>
<tr>
<td>6.9</td>
<td>200</td>
</tr>
</tbody>
</table>

Phone 937-667-5705  
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MODEL P-3400

Specifications
Total Stroke .................. 75 mm (3.0 in)
Total Grip Force at 6.2 bar/90 psi
Open .......................... 4580 N (1030 lbf)
Close ......................... 4198 N (940 lbf)
Grip Force per Jaw at 6.2 bar/90 psi
Open .......................... 2290 N (515 lbf)
Close ......................... 2099 N (470 lbf)
Mass ......................... 7.0 kg (15.5 lb)
Bore Diameter .................. 100 mm (3.94 in)
Max. Operating Pressure ........ 8.3 bar (120 psi)

P-3400
Grip Force Close vs. Finger Length

FINGER LENGTH (INCHES) 0 1 2 3 4 5 6 7 8
Grip Force (Lbf) 460 420 380 340 300 260 220 180 140 100 60 20 0

Grip Force per Jaw vs. Pressure

PRESSURE (PSI) 0 20 40 60 80 100 120 140 160 180 200
Grip Force (Lbf) 450 390 330 270 210 150 90 30 0

SIDE MOUNT VIEW

Mass Mb Mc

STD. MTG HOLES
S.F. FOR M6 X 15 MM DP.
TYP. (4) PER JAW

STD. MTG HOLES
M8 X 1.25 TAP X 12 MM DP.
TYP. (4) PER JAW

OPEN/CLOSE PORTS
3/8 NPT TYP. (2)

DIMENSIONS:
[INCHES]

[MM]
**MODEL P-3600**

**Specifications**
- **Total Stroke**: 9.4 mm (0.37 in)
- **Total Grip Force at 6.2 bar/90 psi**
  - Open: 466 N (104 lbf)
  - Close: 350 N (78 lbf)
- **Grip Force per Jaw at 6.2 bar/90 psi**
  - Open: 155 N (35 lbf)
  - Close: 117 N (26 lbf)
- **Mass**: 0.7 kg (1.5 lb)
- **Bore Diameter**: 32 mm (1.26 in)
- **Max. Operating Pressure**: 8.3 bar (120 psi)

**Grip Force Close vs. Finger Length**

**Grip Force per Jaw vs. Pressure**

**Table:**

<table>
<thead>
<tr>
<th>HOLE #</th>
<th>TYPE</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TAP</td>
<td>-12.02</td>
<td>20.83</td>
</tr>
<tr>
<td>2</td>
<td>TAP</td>
<td>12.02</td>
<td>20.83</td>
</tr>
<tr>
<td>3</td>
<td>TAP</td>
<td>-20.83</td>
<td>12.02</td>
</tr>
<tr>
<td>4</td>
<td>TAP</td>
<td>20.83</td>
<td>12.02</td>
</tr>
<tr>
<td>5</td>
<td>DWL</td>
<td>-13.75</td>
<td>14.37</td>
</tr>
<tr>
<td>6</td>
<td>DWL</td>
<td>13.75</td>
<td>-14.37</td>
</tr>
</tbody>
</table>

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Phone 937-667-5705  
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FAX: 937-667-7602

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MODEL P-3700

Specifications
Total Stroke .................. 12 mm (0.46 in)
Total Grip Force at 6.2 bar/90 psi
Open ........................ 1126 N (254 lbf)
Close ....................... 952 N (214 lbf)
Grip Force per Jaw at 6.2 bar/90 psi
Open ........................ 375 N (85 lbf)
Close ....................... 317 N (71 lbf)
Mass .......................... 1.4 kg (3.1 lb)
Bore Diameter ............... 50 mm (1.97 in)
Max. Operating Pressure .... 8.3 bar (120 psi)

P-3700
Grip Force per Jaw vs. Pressure

![Graph showing grip force per jaw vs. pressure for Model P-3700.]

Grip Force Close vs. Finger Length

![Graph showing grip force close vs. finger length for Model P-3700.]

Dimensions:
- Inches: 1.969 ± 0.001
- Millimeters: 50
- 1.180 ± 0.001
- 30 ± 0.025
- 2.8
- 71
- [1.18±.001]
- 30±.025
- [1.9669]
- 50
- SQUARE
- [2.165±.001]
- 54.99±.0025
- [1.9669]
- 50
- SQUARE
- OPEN/CLOSE PORTS
- 1/4 NPT TYP. (2)
- SENSOR GROOVE
- 3/8 - 60 DOVETAIL TYP. (6)

**MODEL P-3800**

**Specifications**
- **Total Stroke** ............... 18 mm (7.2 in)
- **Total Grip Force at 6.2 bar/90 psi**
  - Open ...................... 2876 N (626 lbf)
  - Close ..................... 2574 N (578 lbf)
- **Grip Force per Jaw at 6.2 bar/90 psi**
  - Open ...................... 959 N (209 lbf)
  - Close ..................... 858 N (193 lbf)
- **Mass** ...................... 4.3 kg (9.5 lb)
- **Bore Diameter** ....... 80 mm (3.15 in)
- **Max. Operating Pressure** .... 8.3 bar (120 psi)

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**P-3800**
**Grip Force Close vs. Finger Length**

**Grip Force vs. Finger Length (inches)**

- **AT 20 PSI/1.4 BAR**
- **AT 50 PSI/3.5 BAR**
- **AT 80 PSI/5.5 BAR**

**Grip Force vs. Finger Length (mm)**

**Grip Force vs. Finger Length (inches)**

**Grip Force vs. Finger Length (mm)**

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**P-3800**
**Grip Force per Jaw vs. Pressure**

**Grip Force per Jaw vs. Pressure (Bar)**

**Grip Force per Jaw vs. Pressure (PSI)**

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**MODEL P-3900**

**Specifications**

- **Total Stroke**: 30 mm (1.2 in)
- **Total Grip Force at 6.2 bar/90 psi**
  - Open: 4580 N (1030 lbf)
  - Close: 4198 N (940 lbf)
- **Grip Force per Jaw at 6.2 bar/90 psi**
  - Open: 1527 N (343 lbf)
  - Close: 1399 N (313 lbf)
- **Mass**: 9.4 kg (20.8 lb)
- **Bore Diameter**: 100 mm (3.94 in)
- **Max. Operating Pressure**: 8.3 bar (120 psi)

**Dimensions**

- **Square**: 3.700 mm (0.146 in) ± 0.001 mm (0.0004 in)
- **50 mm (1.97 in) ± 0.025 mm (0.001 in)
- **2.75 mm (0.108 in) ± 0.001 mm (0.0004 in)
- **69.9 mm (2.75 in) ± 0.025 mm (0.001 in)
- **2.359 mm (0.093 in) ± 0.001 mm (0.0004 in)
- **59.9 mm (2.359 in) ± 0.025 mm (0.001 in)
- **4.31 mm (0.169 in) ± 0.025 mm (0.001 in)
- **109.5 mm (4.31 in) ± 0.025 mm (0.001 in)

**Grip Force Close vs. Finger Length**

- **P-3900**

**Grip Force per Jaw vs. Pressure**

- **P-3900**

**Finger Length (MM)**

**Pressure (Bar)**

**Grip Force (N)**

**Grip Force (lb f)**

**Grip Force Close vs. Finger Length**

**Grip Force per Jaw vs. Pressure**

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Operating Principle

A precision collet is enclosed in a housing that is tapered to conform to the outside diameter of the collet. The collet is linked to a double-acting piston and as the piston actuates, the collet is forced to either open and extend or close and retract.

Ideal Applications

This Collet Gripper is the ideal device for picking and placing cylindrical parts which are uniform in size. It offers good clamping force for rapid part transfer and precise centering of parts.

Application Guidelines

- The maximum load that the grippers can handle will vary based on the size, shape and texture of the part, acceleration and speed of the system, and air line pressure.

- Due to the precise manufacturing of the collet for a particular part dimension, this gripper is best suited for those parts having tight tolerances.

- Do not over-tighten the collet alignment screw. Very little pressure is necessary to effectively maintain the collet position.

- The gripper is designed for use in temperatures from -25° to 150° Fahrenheit.

- The listed Grip Force is per Collet Finger. This is based on 3 fingers per collet. In a pull-out or push-in application, multiply grip force by the coefficient of friction. In a twisting application, multiply pull-out force by the radius of the part.

- The collet alignment screw may require adjustment to accommodate expansion or contraction of materials.

- All grippers are factory lubricated for service under normal operating conditions. Periodic lubrication may be required, depending upon the application.

- A four-way solenoid valve is required to control the gripper.

- For applications where an external torsional force is present a non-rotational cylinder option is required. Contact Technical Sales for additional information.
Features

- Collet Grippers use standard off-the-shelf industrial series 1C, 3C and 5C collets available with round, square or hexagon shaped through-holes.

- This high precision gripper offers 360° of clamping contact on the part.

- The gripper offers precise centering of parts and the narrow profile allows gripper access into tight places.

- By varying the air pressure, the clamping force may be adjusted to grasp and hold delicate items such as glass bottles or rugged heavy parts such as machined assemblies.

- This pneumatically controlled gripper is constructed of aluminum for light weight and the collets are constructed of hardened steel for long life.

- The grippers are field repairable for minimum downtime. Most replacement parts are available the same day, to be shipped from our facility.

- Excellent repeatability within .0005 of the collets original centered position. Adjustable alignment screw insures minimum rotation of the collet to less than .5° throughout the stroke.

- Adapter plates are available for any robot model.

### MODEL C-8500

#### Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Weight</td>
<td>6 oz.</td>
</tr>
<tr>
<td>Max. Air Pressure</td>
<td>120 psi</td>
</tr>
<tr>
<td>Gripping Force at 90 psi</td>
<td>12 lbs.</td>
</tr>
<tr>
<td>Collet Size</td>
<td>1C Series</td>
</tr>
<tr>
<td>Total Displacement</td>
<td>0.027 in²</td>
</tr>
<tr>
<td>Cylinder Bore</td>
<td>3/4 in.</td>
</tr>
<tr>
<td>Maximum Diameter (Std)</td>
<td>0.25 in.</td>
</tr>
<tr>
<td>Special sizes are available</td>
<td>upon request</td>
</tr>
</tbody>
</table>

#### Collet Sizes

- Fractional: 1/64 to 1/4 in. (1/64 in. increments)
- Decimal: 0.016 through 0.250 in. (0.001 in. increments)
- Metric: 0.050mm through 6.35mm (0.5mm increments)
**MODEL C-8600**

**Specifications**
- Unit Weight: 1.2 lbs.
- Max. Air Pressure: 120 psi
- Gripping Force at 90 psi: 32 lbs.
- Collet Size: 3C Series
- Total Displacement: 0.124 in³
- Cylinder Bore: 1-1/8 in.
- Maximum Diameter (Std): 0.50 in.

*Special sizes are available upon request.*

**Collet Sizes**
- Fractional: 1/4 to 1/2 in. (1/64 in. increments)
- Decimal: 0.25 through 0.50 in. (0.001 in. increments)
- Metric: 6.35mm through 12.7mm (0.5mm increments)

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**MODEL C-8700**

**Specifications**
- Unit Weight: 2.5 lbs.
- Max. Air Pressure: 120 psi
- Gripping Force at 90 psi: 62 lbs.
- Collet Size: 5C Series
- Total Displacement: 0.392 in³
- Cylinder Bore: 1-5/8 in.
- Maximum Diameter (Std): 1.06 in.

*Special sizes are available upon request.*

**Collet Sizes**
- Fractional: 1/2 to 1-1/16 in. (1/64 in. increments)
- Decimal: 0.50 through 1.06 in. (0.001 in. increments)
- Metric: 12.7mm through 26.92mm (0.5mm increments)
Other Products:

- Collision Sensors
- Alignment Devices
- Tool Changers
- Variety of Grippers