PG-38 & PG-45 Locking Grippers
User’s Guide
Warning!
*Always disconnect air and electrical supply lines before working on or around grippers.*

Introduction:
BTM PG-38 & PG-45 Locking Grippers are designed to provide long service in a production environment. For safe operation and best results read this guide thoroughly before installing or servicing BTM grippers. For application questions contact BTM’s sales department at 810-364-4567. For service issues after hours, call our service pager at 810-340-3500 to leave a message and we will return your call promptly.

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2.

**Features**

- **Locking Grip**
  - Roller finds detent on the cam surface to hold the part if air pressure is lost.

- **Adjustable Opening**
  - A single pin adjusts the arm opening to 30° or 45°, remove the pin for 75° opening.

- **Interchangeable Gripper Pads**

See Page 12 for Arm Part Numbers
User’s Guide - BTM PG-38 & PG-45 Grippers

**PG-38 SPECIFICATIONS**
- **BORE:** Ø38.1 [1.5”]
- **STROKE:**
  - @ 30° = 23.9 [0.94]
  - @ 45° = 26.2 [1.03]
  - @ 75° = 29.3 [1.15]
- **WEIGHT:** 0.9kg [1.9 lbs.] ~ w/ switch 1.3kg [2.9 lbs.]
- **GRIPPING FORCE:**
  - @ 4 BAR = .73kN [165 lbs.]
  - @ 5.5 BAR = .98 kN [220 lbs.]

**PG-45 SPECIFICATIONS**
- **BORE:** Ø44.5 [1.75”]
- **STROKE:**
  - @ 30° = 26.9 [1.06]
  - @ 45° = 29.2 [1.15]
  - @ 75° = 33.8 [1.33]
- **WEIGHT:** 1.4kg [2.8 lbs.] ~ w/ switch 1.7kg [3.8 lbs.]
- **GRIPPING FORCE:**
  - @ 4 BAR = 2.2kN [487 lbs.]
  - @ 5.5 BAR = 2.9 kN [650 lbs.]

**MODELS**

### Double Opening Pad Arms
- 30°, 45° or 75° opening per arm
- **PG-38 A**
- **PG-45 A**

### Single Opening Fixed Pad Arm
- 30°, 45° or 75° opening
- **PG-38 B**
- **PG-45 B**

### Double Opening Single Chisel Arm
- 30°, 45° or 75° opening per arm
- **PG-38 C**
- **PG-45 C**

### Single Opening Fixed Single Chisel Arm
- 30°, 45° or 75° opening
- **PG-38 D**
- **PG-45 D**

### Double Opening Double Chisel Arm
- 30°, 45° or 75° opening per arm
- **PG-38 E**
- **PG-45 E**

### Single Opening Fixed Double Chisel Arm
- 30°, 45° or 75° opening
- **PG-38 F**
- **PG-45 F**

### Double Opening Flange Pad Arms
- 30°, 45° or 75° opening per arm
- **PG-38 G**
- **PG-45 G**

### Single Opening Fixed Flange Pad Arms
- 30°, 45° or 75° opening
- **PG-38 H**
- **PG-45 H**

### Double Opening Adaptable Arm
- 30° or 45° opening per arm
- **PG-38 J**
- **PG-45 J**

### Single Opening Fixed Adaptable Arm
- 30°, 45° or 75° opening
- **PG-38 K**
- **PG-45 K**
1. Identification:
BTM PG-38 & PG-45 Locking Grippers are available in numerous configurations and allow many configuration changes to be performed in the field. It is therefore recommended to identify and record the gripper model and configuration before performing any service. A label is affixed to each gripper prior to shipment which lists the model and serial numbers. The degree of opening and gripper pad styles must be confirmed by inspection. It is also advised to confirm the arm styles, as they may have been changed in the field.

Serial No. Used for BTM Records / Date Shipped
Model No. + Degree of Opening + Pads + Mount + Switch

Degree of Opening:
A single pin adjusts the arm opening to 30° or 45°, remove the pin for 75° opening.

2. How to Order PG-38 & PG-45 Grippers:
When ordering grippers, state the model number and degree of opening followed by the options required: pads, mount, part stop and switch package. (Fig. 1)

3. Operation:
a) Recommended operating air pressure is 80 psi (5.5 bars).
b) PG series grippers are lubricated for the life of the unit at the factory. Clean, dry air is required for operation. In-line lubrication is not required but may be used.
c) Maximum cycle rate recommended is 1 second (1/2 second open - 1/2 second close).
d) In applications where the sheet metal hits the gripper body the optional Part Stops should be used to protect the aluminum body.
e) Flow controls may be required to reduce impact loading if additional mass has been added to the grippers arms (generally when adaptable style arms are used).
4. Selection of Gripper Pads:
PG series grippers utilize a cam angle to generate gripping force. The thickness of the metal being gripped must therefore be compensated by the gripper pads. Gripper pads are available in incremental sizes (see “A” Dimension- fig 2.). The distance “A” from the pads pivot point to the gripping surface is designed to accommodate a specific metal thickness range. By combining pads it is possible to achieve a secure grip on a wide range of sheet metal thickness. (Fig 2.) Pads are identified by a number and/or color code. Pads are interchangeable between PG-38 & PG-45 models.

Metal Thickness: 0.5 to 1.0 [.020 to .039] 1.1 to 1.5 [.043 to .059] 1.6 to 2.5 [.063 to .098] 2.6 to 3.0 [.102 to .118] 3.1 to 4.0 [.120 to .158]

Gripper Pad Color Coding:
[P]=Pink
[W]=White
[Y]=Yellow

Single Steel Pads
1 - No. 728039A [P]
2 - No. 728040A [W]
19 - No. 728056A [Y]
Use in pairs or w/ Point Pads

Single Steel Pads
5 - No. 728041A [P]
6 - No. 728042A [W]
Use w/ Steel or Smooth Pads or Chisel

Single Steel Pads
7 - No. 728043A [P]
8 - No. 728044A [W]
Use w/ Steel or Smooth Pads or Chisel
5. Application of Gripper Pads:
When selecting gripper pads, account for the high end of the metal thickness tolerance, as well as burrs or distortions which could effectively increase the real thickness as seen by the pads. Failure to consider these factors could cause the gripper to close on the part before the roller has travelled sufficiently on the cam, reducing the gripping force and/or preventing locking. Incorrect pad selection can also cause the gripper to lock on the part and fail to unlock. The gripper will then have to be opened manually (see pg. 8). Urethane pads are designed to compress on the part, and do not require different “A” sizes.

6. Changing Gripper Pads:
Gripper pads are retained by pins with snap rings (Fig. 4). All pads are interchangeable. Urethane pads, however, utilize washers and a longer pin. To change pads, remove the snap ring and withdraw the pin. The new pads are supplied with pins. Grease the pins with an “extreme pressure” rated grease prior to installation. Install the pads and secure the pins with the snap rings.
7. Gripper Mounting:
Gripper mounts are available in two styles:
The Base Mounts provide 360° rotation and linear adjustment. Two mounts per gripper are recommended. Base Mounts are generally mounted to a weldment with screws and dowels. The Tube Mount is generally used on transfer rails or BTM Robot End Arm Effectors. The Tube Mount provides 360° rotation, swiveling and linear adjustment. The 1" tube mount uses a hardened steel swivel with serrated surfaces to provide a positive locked position.

![Base Mount Diagram]

Base Mounts provide 360° rotation and linear adjustment. Tube mounts provide 360° rotation, swiveling and linear adjustment. A shoulder limits the forward mount position to protect the gripper arms.

![Tube Mount Diagram]

8. Positioning the Gripper:
Positioning the gripper for set up is accomplished as follows:

a) Assemble the gripper in its mount but do not tighten the screws.

b) With the part in its nesting or in working position, orient and lock the gripper jaws onto the part with air pressure.

c) Tighten the screws to secure the mounting position. Torque mounting screws to 12 ft. lbs. [16 Nm] on Base Mounts, 29 ft. lbs. [39 Nm] on Tube mounts.
9. Cycling the Gripper for Set Up:
*Warning: Keep clear of the gripper arm area when cycling the gripper with air pressure!*
When setting the gripper up for an application, it will be necessary to cycle the mechanism in order to position the gripper and ensure a secure grip on the part. The gripper can be cycled under air pressure or manually as shown in Fig. 5.

![Fig. 5](image)

**Manually Opening & Closing The Gripper**
Insert tool between gripper body and arm to reach the cam roller.
*All air pressure must be relieved from the cylinder before manually cycling the gripper.*

10. Manually Opening the Gripper:
*Air pressure must be off when manually opening the gripper.*
The manual technique shown in Fig. 3 is also useful in the event that the gripper becomes locked on the part and will not open under power. This condition can be caused by using the wrong gripper pads for the metal thickness being gripped.

11. Changing the Degree of Opening of the Gripper:
The degree of arm opening can be changed easily by means of a single pin. (Fig. 6 - Pin”A”.
The pin is retained by an internal snap ring. Withdraw the pin and rotate it to indicate 30° or 45°. Remove the pin to achieve the 75° opening. The degree of opening applies to each arm.
*Example: 75° opening on double opening gripper styles equals 150° total opening.*

![Fig. 6](image)
12. Changing the Gripper Arms:
All arm styles are interchangeable within each model. Arms do not interchange between PG-38 and PG-45 models.
The arms can be changed easily by means of a single pin. (Fig. 6 - Pin “B”). The pin is retained at both ends by snap rings. Remove one snap ring and withdraw the pin to remove the arms. Replace with the desired arm style. The fixed arms for single opening grippers are engaged by a pin at the rear of the body’s arm slot. See page 12 for arms.

13. Part Stops:
Hardened steel stops are used to position the part and protect the gripper. Serrated interlocking surfaces securely hold the part stops in position. Part stops are common between PG-38 & PG-45 models. (Fig. 7)

14. Changing Proximity Switches:
Proximity switch options are shown on pages 10 & 11. To replace a proximity switch, follow the procedure below.

a) Remove the shielded electrical cable from the connector on the switch.

b) Remove the two screws which retain the sensor block to the sensor can.

c) Remove the screws which retain the switch to the sensor block.

d) Remove the rubber wire retainer and remove the sensors from the block. Sensors may be retained either by screws or a slip fit.

e) Reverse the procedure to install the new switch, noting that the sensor (SO2) is mounted in the closed (rear) position (Fig. 8). In some instances, the customer may have specified the (SO1) sensor in the closed position. This is designated by placing a “T” in front of the switch option on the order. Ex: TRSPT-DC
15. Proximity Switch Options

Position Sensors
Single Connector Status Controller
AC or DC Proximity Switch
Senses Open & Closed Positions

RSPT-DC
Rear Switch Package - Turck DC
(Ni2-Q6.5-AP6-0.20-FS4.4X3-S304)
for PG-38 ~ No. 753700B
for PG-45 ~ No. 753600B

RSPT-AC
Rear Switch Package - Turck AC
(Ni2-Q6.5-ADZ32-0.16-FB5.4X2-S304)
for PG-38 ~ No. 753700A
for PG-45 ~ No. 753600A

Components

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† Included in Seal Kit (see pg 12)

DC ~ Status Controller
Two Sensors
Supply Voltage: 10-30 VDC
Load Current: ≤150mA
Single Connector ~ Conprox®

SO. 2 reads the closed position of the gripper.
If SO. 2 is required for the open position (transposed), order: TRSPT-DC

AC ~ Status Controller
Two Sensors
Supply Voltage: 20-250 VAC
Load Current: ≤100mA
Single Connector ~ S85

SO. 2 reads the closed position of the gripper.
If SO. 2 is required for the open position (transposed), order: TRSPT-AC
15. Proximity Switch Options

Position Sensors
Single Connector C2000 Cylindicator
AC or DC Proximity Switch
Senses Open & Closed Positions

RSPN-DC
Rear Switch Package - Namco DC
EE280-92140
for PG-38 ~ No. 744400A
for PG-45 ~ No. 744300A

RSPN-AC
Rear Switch Package - Namco AC
EE270-92140
for PG-38 ~ No. 749700A
for PG-45 ~ No. 749600A

Components

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† Included in Seal Kit (see pg 12)

DC ~ Cylindcator
Two 3-Wire Sensors
Supply Voltage: 10-30 VDC
Load Current: 200mA Max.
Single Connector ~ Euro
SO. 2 reads the closed position of the gripper.
If SO. 2 is required for the open position (transposed), order: TRSPN-DC

AC ~ Cylindrical
Two Wire
Supply Voltage: 20-150 VAC
Load Current: 200mA Max.
Single Connector ~ Micro
SO. 2 reads the closed position of the gripper.
If SO. 2 is required for the open position (transposed), order: TRSPN-AC

Fig. 9

00:05:01
16. Components:
The typical gripper components are depicted here. Individual views for each gripper model are shown in BTM catalog 03-G.

**Fig. 10**

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<td>005129</td>
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<tr>
<td>33</td>
<td>Pad Pin for Urethane Pads</td>
<td>2</td>
<td>005277</td>
<td>005277</td>
</tr>
<tr>
<td>34</td>
<td>Pad Pin Retainer</td>
<td>4</td>
<td>020299</td>
<td>020299</td>
</tr>
<tr>
<td>35</td>
<td>Pads</td>
<td>4</td>
<td>See Pg. 31</td>
<td>See Pg. 31</td>
</tr>
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<td>36</td>
<td>Fixed Pad Pin</td>
<td>2</td>
<td>728001A</td>
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<tr>
<td>37</td>
<td>Pin Retainer</td>
<td>2</td>
<td>730210A</td>
<td>728011A</td>
</tr>
<tr>
<td>38</td>
<td>Switch Package (optional)</td>
<td>1</td>
<td>See pp 33-34</td>
<td>See pp 33-34</td>
</tr>
</tbody>
</table>

**Seal Kits:**
- PG-38 BTM No. 018672
- PG-45 BTM No. 018628

**Service Tools Required:**
1. Adjustable Wrench for Pipe/Hose Fittings
2. 3/16" Allen Wrench for Pipe Plugs
3. 5mm Allen Wrench for Base Mounts
4. 4mm Allen Wrench for Switch Package
5. External Snap Ring Pliers
6. Internal Snap Ring Pliers
7. Spanner for End Cap (BTM Tool No. 020501)
8. Spanner for Switch Package End Cap (BTM Tool No. 020499)
9. Socket for Sensing Rod (BTM Tool No. 020396)

**Details 1, 3 & 4 are omitted when gripper is fitted with switch package.**

* 1 Upper & 1 Lower Arm per unit.

04.11.03
17. Preventative Maintenance:
· Keep gripper pads free of contamination build up (sealant, adhesive, metal fragments, etc.). This will cause a change in gripper pad thickness. (Ref. “A” dimension in user’s guide).

· Check gripper pads and pins for excessive wear. If worn, replace with same gripper pad number and gripper pad pin. Apply an extreme pressure rated grease to the pins before installing. Recommended grease: AMOCO Rykotac EP.

· Check gripper pads for proper “Gripper Pad vs. Material Thickness” combination. (See chart in user’s guide). If incorrect, install correct pad combination. Apply an extreme pressure rated grease to pins before installing.

· The cam roller mechanism is not sealed. Check for contamination that may interfere with roller or arm movement. Clean if necessary. Apply a thin film of extreme pressure rated grease to rollers and cam surfaces of arms. Note: For heavily contaminated environments, BTM offers Sealed Power Clamps & Grippers.

· Cylinder seals are self-lubricating and do not require in-line air lubrication. In-line air lubrication can be used, but once used it must not be discontinued.

18. Seal Replacement:
After extended service, it may be necessary to replace the grippers seals. Seal kits (page 13) containing all the required pieces are available from BTMs sales department. To replace the seals, follow the procedure outlined here. Illustrations are referenced as Figure/detail: 10/1 (Figure 10 - Detail 1) A video tape is available from BTM which demonstrates seal replacement.
Disassembly:

a) Remove the snap rings retaining the fixed arm pin (10/39), stroke adjustment pin (10/9) and arm pivot pin (10/11), and remove the pins and arms from the gripper.

b) If a switch package is fitted, remove the screw which retains the switch package to the end cap and remove the switch package. Also remove the snap ring (9/7) and sensor target (9/8) from the sensing rod (9/12) which is now exposed.

c) A spanner wrench is required to remove the end cap. (BTM tool no. 020499 for switch package end caps, BTM tool no. 020501 for non-switch end caps) see page 15.

d) If no switch was fitted, remove the piston center screw (10/3) and piston (10/1). If a switch is fitted, the sensing rod (9/12) replaces the screw. A special tool (BTM tool no. 020396) is required for its removal.
e) The roller slide rod assembly can now be withdrawn from the front of the gripper. Remove the old seals and discard. Clean all components thoroughly.

Reassembly:
a) The rod seal is inserted in the gripper body with the sealing edge facing the cylinder bore. Insertion tools may be used to facilitate this process.

b) Lube the cam roller with an extreme pressure rated grease (AMOCO Rykotac EP) and insert the rod assembly into the body. Reinstall the fixed arm anchor pin and snap rings.

c) The piston o-ring and shock are installed. An adhesive such as Loctite “Black Max” is used to secure the shock o-ring. Grease the piston with extreme pressure rated grease and insert it into the cylinder with the shock facing inward.

d) Apply VibraTite Formula 3 to the threads of the sensing rod and install it to the piston rod. A special socket (BTM tool no. 020396 - available from BTM’s sales department) is used to tighten the sensing rod. Torque the rod to 120 inch pounds. If no switch is fitted, the center screw is used.

e) If a proximity switch is fitted, the end cap sensing rod seal is inserted with the groove facing the cylinder bore. The end cap o-ring seal is then installed.

f) A spanner wrench is required to install the end cap. (BTM tool no. 020499 for switch package end caps, BTM tool no. 020501 for non-switch end caps)

g) Install the switch and arms as outlined in sections 12 & 14 (page 9) and test the unit for proper operation.

19. Warranty:
BTM Corporation warranties its PG 38 and 45 grippers against defects in material and workmanship for (1) million cycles or a period of (1) year after the ship date from BTM which ever comes first.

This warranty is limited to replacing or repairing at BTM’s option, F.O.B. BTM’s factory, any part found by BTM to be defective in materials and/or workmanship. Any application of a BTM product outside the intended use of the product shall not be warranted by BTM Corporation. Furthermore, BTM will not be liable for any expenses incurred for repairs or replacement made outside BTM’s facilities without written consent (or damages arising out of such replacements or repairs). Under no circumstances will BTM be held responsible for any consequential damages. The warranty is limited to the repair or replacement of the defective part(s) and does not include installation.

This warranty is the only warranty extended by the seller in connection with any sale made hereunder and is in lieu of all other warranties, express, implied or statutory including warranties of merchantability and fitness for purpose.
Special Assembly Tools For BTM PG-38 & PG-45 Grippers

- Sensing Rod Torque Tool
  - Part No. 020396

- End Cap Spanner Wrench
  - Part No. 034263

- Switch Package Spanner Wrench
  - Part No. 020501

- Seal Insertion Tools
  - Fits All Models

- Seal Removal Tools
  - Fits All Models
PG-38 & PG-45 Locking grippers
User’s Guide