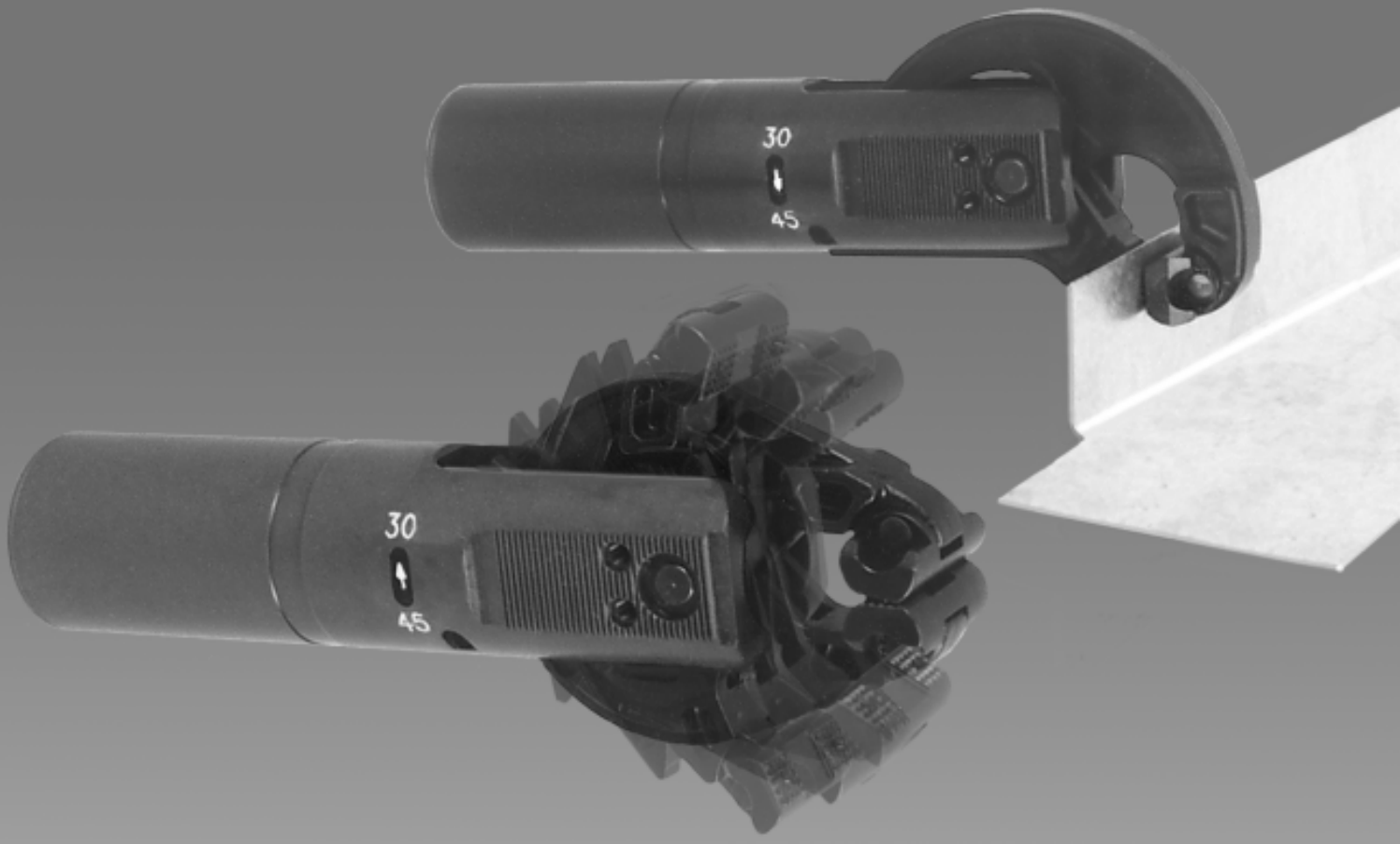
PG-38 & PG-45 Locking Grippers
User's Guide



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User's Guide - BTM PG-38 & PG-45 Grippers

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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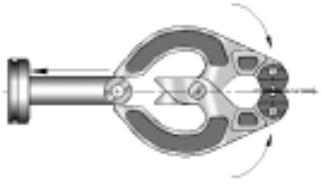
Features

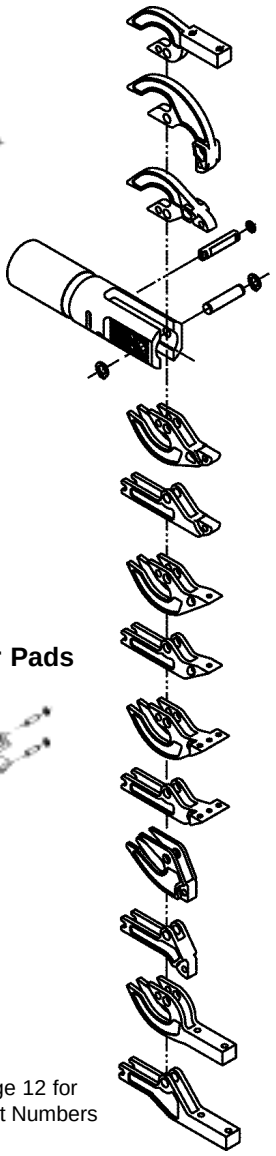
Locking Grip
Roller finds detent on the cam surface to hold the part if air pressure is lost.



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

Interchangeable Gripper Pads

All arm styles are interchangeable.



See Page 12 for Arm Part Numbers

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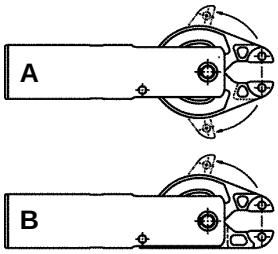
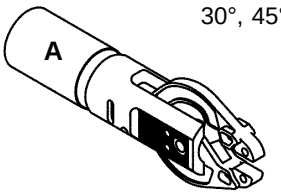
User's Guide - BTM PG-38 & PG-45 Grippers

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.]

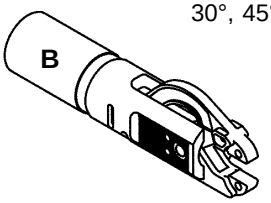
PG-45 SPECIFICATIONS
BORE: Ø44.5 [1.75"]
STROKE: @ 30° = 26.9 [1.06]
@ 45° = 29.2 [1.15]
@ 75° = 33.8 [1.33]
WEIGHT: 1.4kg [2.8 lbs.] ~ w/ switch 1.7kg [3.8 lbs.]
GRIPPING FORCE: @ 4 BAR = 2.2kN [487 lbs.]
@ 5.5 BAR = 2.9 kN [650 lbs.]

MODELS

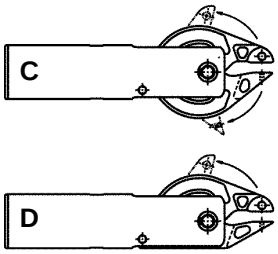


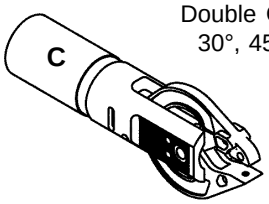


Double Opening Pad Arms
30°, 45° or 75° opening per arm
PG-38 A
PG-45 A

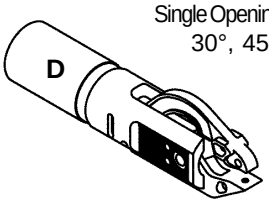


Single Opening Fixed Pad Arm
30°, 45° or 75° opening
PG-38 B
PG-45 B

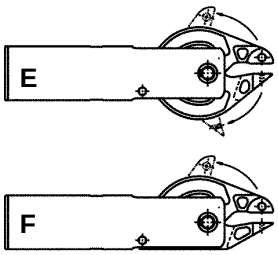


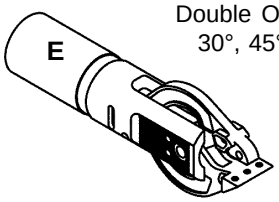


Double Opening Single Chisel Arm
30°, 45° or 75° opening per arm
PG-38 C
PG-45 C

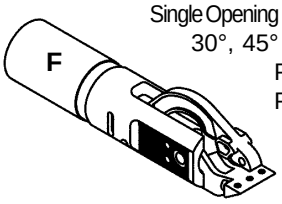


Single Opening Fixed Single Chisel Arm
30°, 45° or 75° opening
PG-38 D
PG-45 D

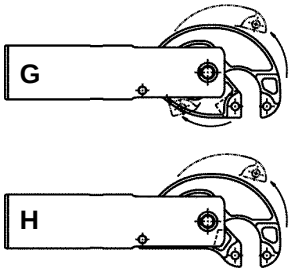


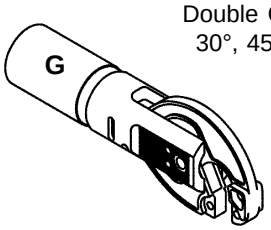


Double Opening Double Chisel Arm
30°, 45° or 75° opening per arm
PG-38 E
PG-45 E

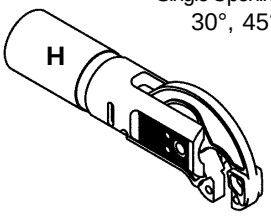


Single Opening Fixed Double Chisel Arm
30°, 45° or 75° opening
PG-38 F
PG-45 F

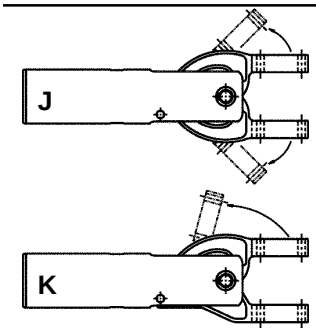


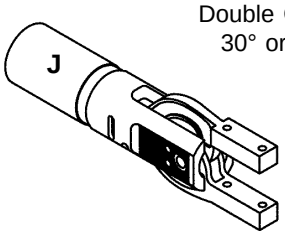


Double Opening Flange Pad Arms
30°, 45° or 75° opening per arm
PG-38 G
PG-45 G

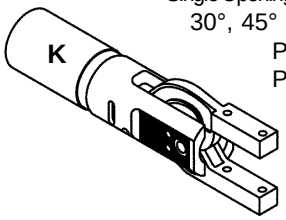


Single Opening Fixed Flange Pad Arms
30°, 45° or 75° opening
PG-38 H
PG-45 H





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

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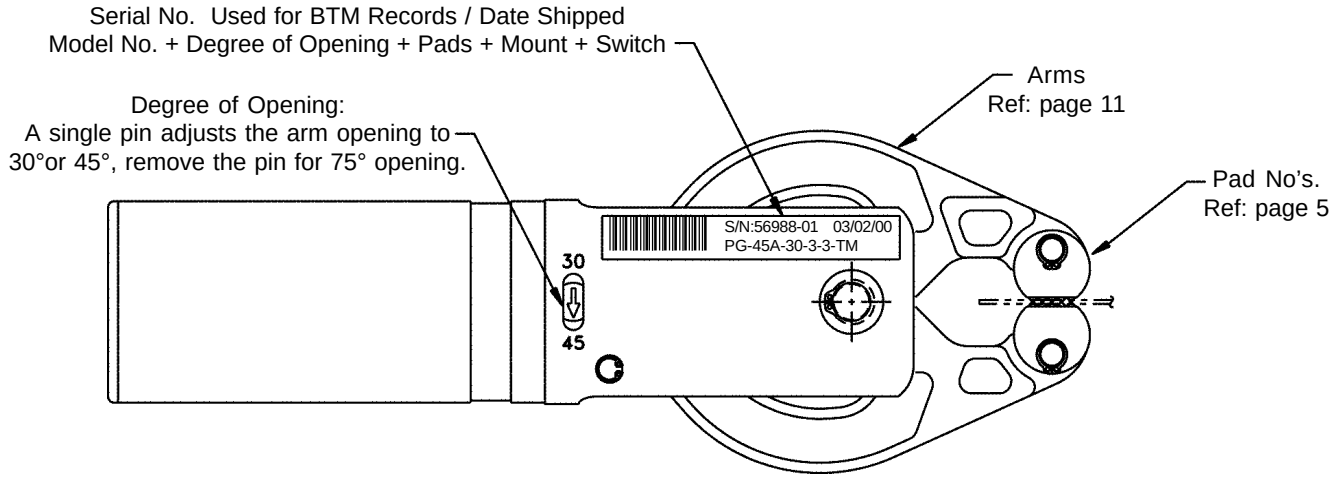
User's Guide - BTM PG-38 & PG-45 Grippers

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.



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)

Fig. 1 **How To Order Grippers**

MODEL
ARM STYLE
ARM OPENING (30°, 45°, or 75°)
UPPER ARM PAD
LOWER ARM PAD
MOUNTS (BM, BM - BM, TM, or HTM)
PART STOPS
REAR SWITCH PACKAGE
SUPPLY VOLTAGE (AC or DC)

PG38A - 30 - 3 - 3 - TM - PS - RSPT-DC

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).

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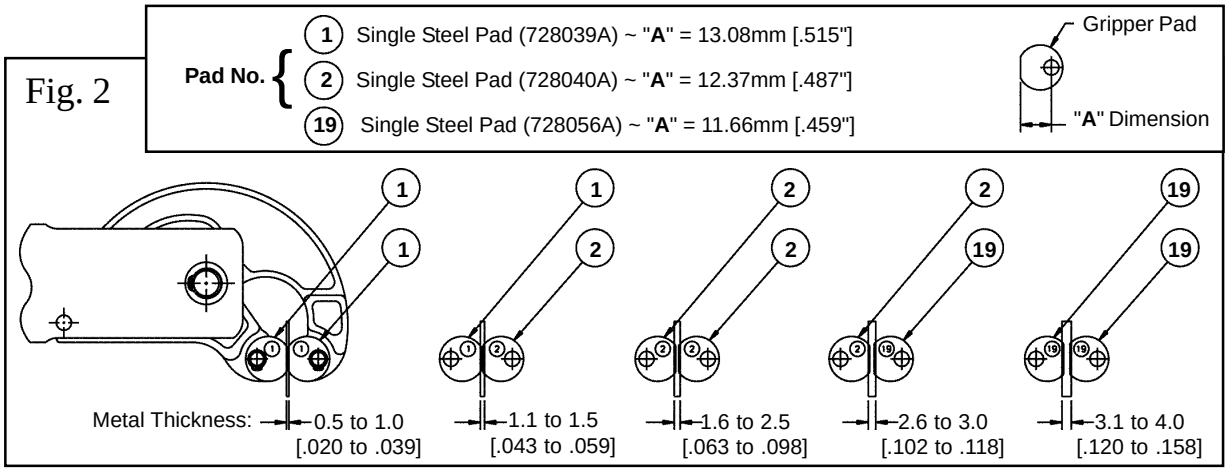
4. Selection of Gripper Pads:

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.

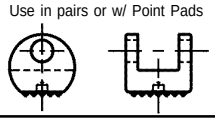
Fig. 2



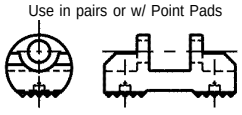
Gripper Pad Color Coding:
[P]=Pink
[W]=White
[Y]=Yellow

Metal Thickness	Pad Nos.	Pad Nos.	Pad Nos.	Pad Nos.	Pad Nos.	Pad Nos.	Color
0.5 to 1.0 [.020 to .039]	1+1	3+3	5+11	7+13	11+11	13+13	Pink
1.1 to 1.5 [.043 to .059]	1+2	3+4	5+12	7+14	11+12	13+14	Pink+White
1.6 to 2.5 [.063 to .098]	2+2	4+4	6+12	8+14	12+12	14+14	White
2.6 to 3.0 [.102 to .118]	2+19	4+20	6+21	8+22	12+21	14+22	White+Yellow
3.1 to 4.0 [.120 to .158]	19+19	20+20			21+21	22+22	Yellow

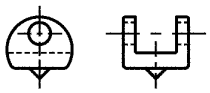
Single Steel Pads
For Material Thickness See Above
1 - No. 728039A [P]
2 - No. 728040A [W]
19 - No. 728056A [Y]
Use in pairs or w/ Point Pads



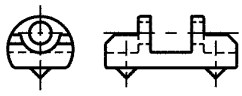
Double Steel Pads
For Material Thickness See Above
3 - No. 728037A [P]
4 - No. 728038A [W]
20 - No. 728055A [Y]
Use in pairs or w/ Point Pads



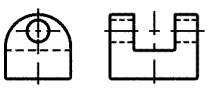
Single Point Pads
For Material Thickness See Above
5 - No. 728043A [P]
6 - No. 728044A [W]
Use w/ Steel or Smooth Pads or Chisel



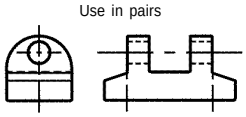
Double Point Pads
For Material Thickness See Above
7 - No. 728041A [P]
8 - No. 728042A [W]
Use w/ Steel or Smooth Pads or Chisel



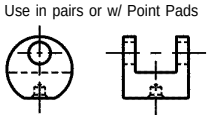
Single Urethane Pads
9/60 - Soft ~ Yellow
No. 728000L
9/90 - Hard ~ Orange
No. 728000J
Use in pairs



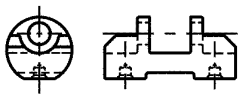
Double Urethane Pads
10/60 - Soft ~ Yellow
No. 728000M
10/90 - Hard ~ Orange
No. 728000K
Use in pairs



Single Smooth Pads
For Material Thickness See Above
11 - No. 728047A [P]
12 - No. 728048A [W]
21 - No. 728057A [Y]
Use in pairs or w/ Point Pads



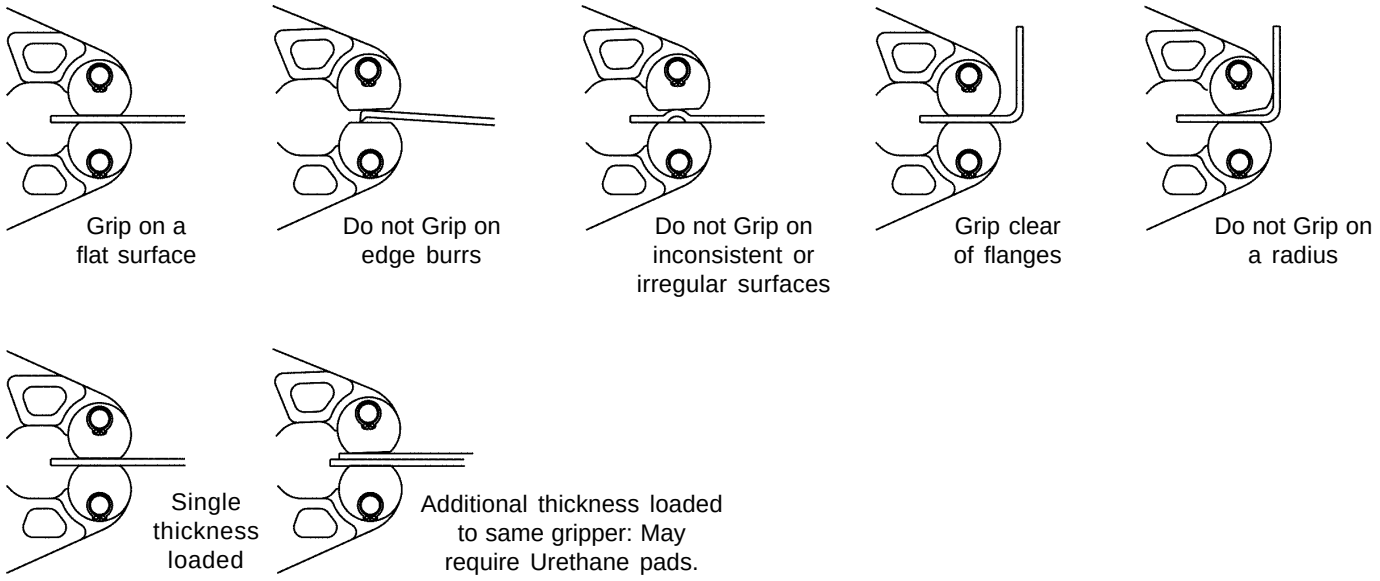
Double Smooth Pads
For Material Thickness See Above
13 - No. 728049A [P]
14 - No. 728050A [W]
22 - No. 728058A [Y]



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.

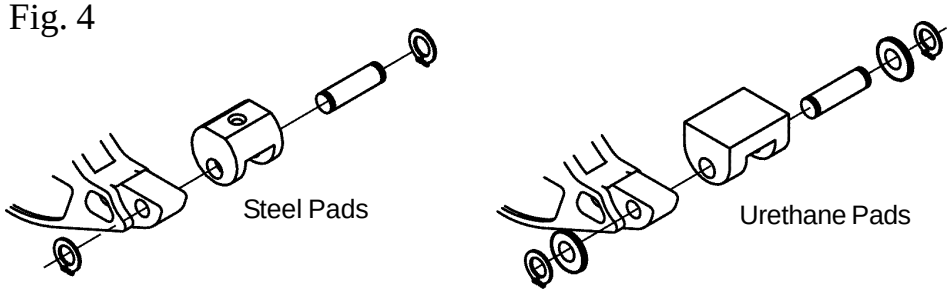
Fig. 3



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.

Fig. 4



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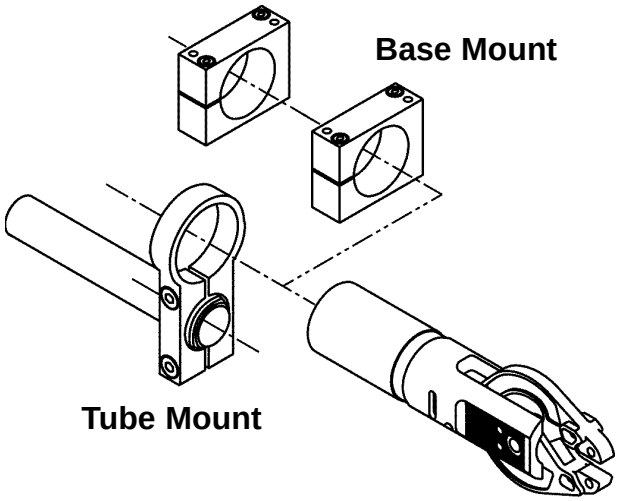
7. Gripper Mounting:

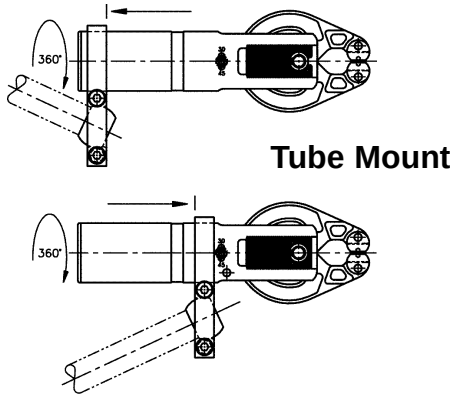
Gripper mounts are available in two styles:

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.

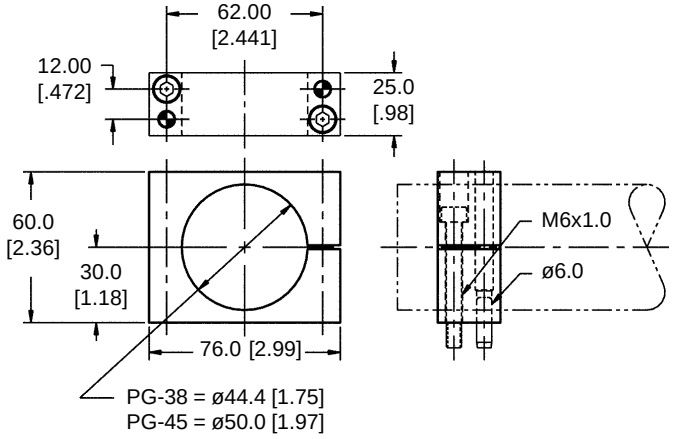
The Tube Mount is generally used on transfer rails or BTM Robot End Arm Effectors. The Tube Mount provides 360° rotation, swiveling and linear adjustment. The 1" tube mount uses a hardened steel swivel with serrated surfaces to provide a positive locked position.



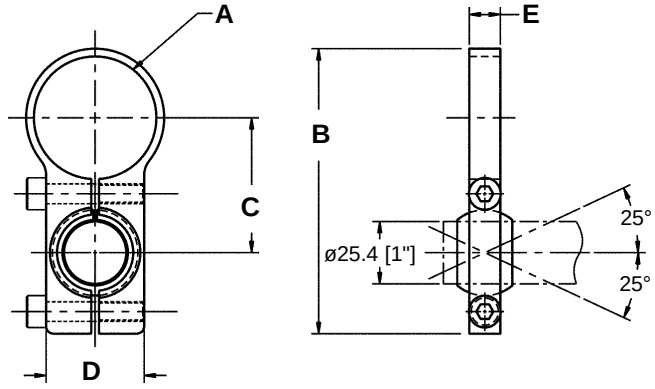
Base Mounts provide 360° rotation and linear adjustment. Tube mounts provide 360° rotation, swiveling and linear adjustment. A shoulder limits the forward mount position to protect the gripper arms.



BM Base Mount
PG-38 ~ No. 730200C • PG-45 ~ No. 728000E



TM Tube Mount
PG-38 ~ No. 708700D • PG-45 ~ No. 728000D



	A	B	C	D	E
PG-38	ø44.4 [1.75]	110.4 [4.35]	52.0 [2.05]	41.7 [1.64]	12.7 [.50]
PG-45	ø50.0 [1.97]	116.2 [4.57]	55.0 [2.17]	41.7 [1.64]	12.7 [.50]

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.

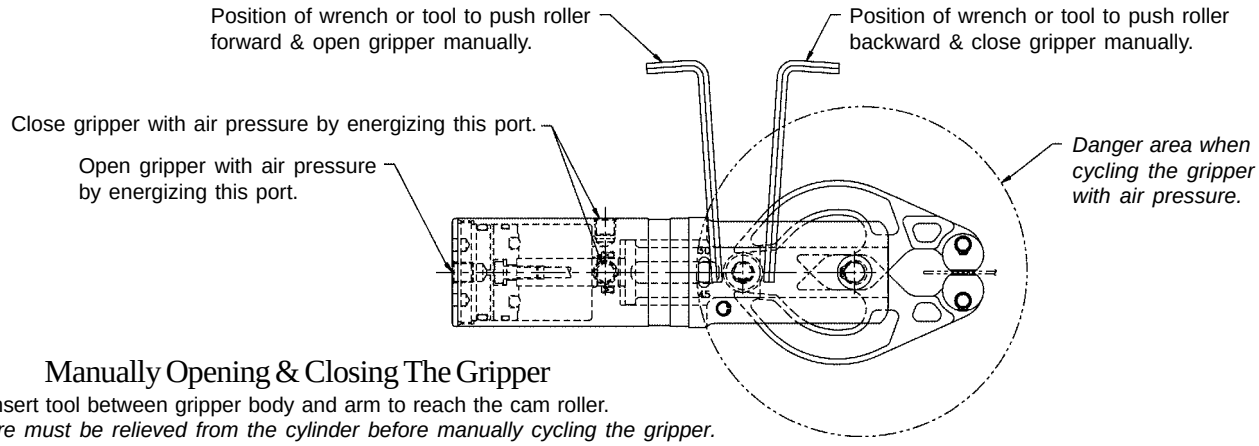
c) Tighten the screws to secure the mounting position. Torque mounting screws to 12 ft. lbs. [16 Nm] on Base Mounts, 29 ft. lbs. [39 Nm] on Tube mounts.

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



Manually Opening & Closing The Gripper

Insert tool between gripper body and arm to reach the cam roller.

All air presure 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.

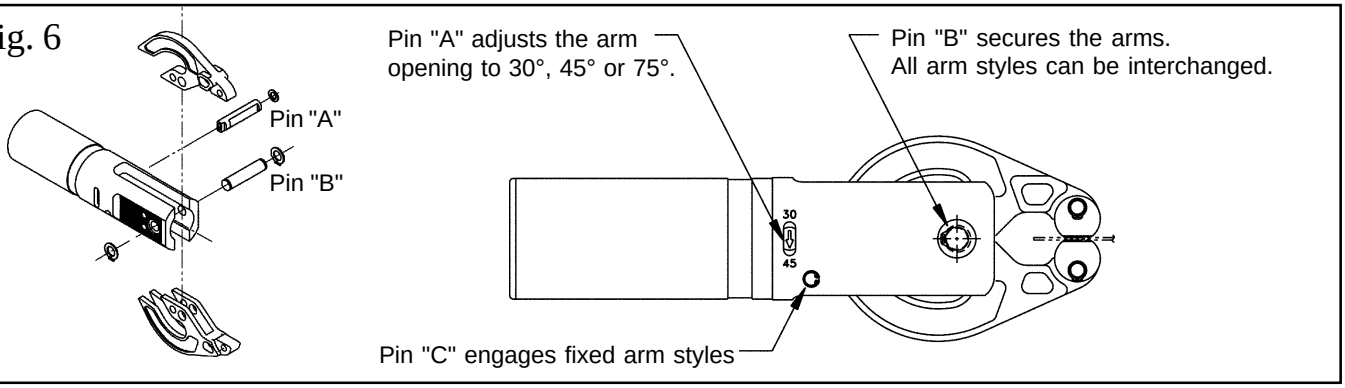
The manual technique shown in fig. 3 is also useful in the event that the gripper becomes locked on the part and will not open under power. This condition can be caused by using the wrong gripper pads for the metal thickness being gripped.

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^{O} or 45^{O}. Remove the pin to achieve the 75^{O} opening. The degree of opening applies to each arm.

Example: 75^{O} opening on double opening gripper styles equals 150^{O} total opening.

Fig. 6



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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 bodys 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)

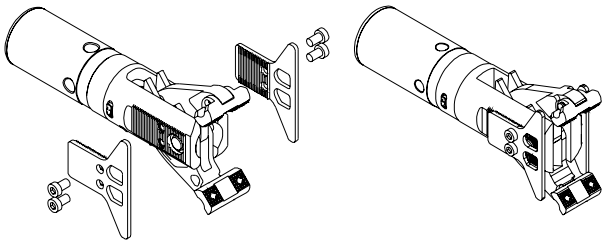


Fig. 7

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.

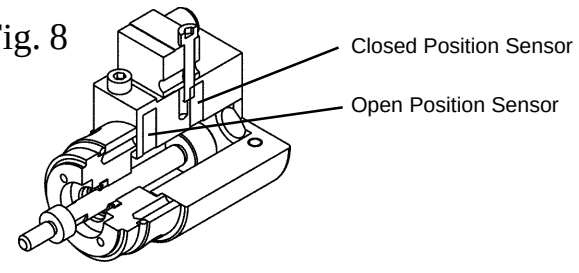
b) Remove the two screws which retain the sensor block to the sensor can.

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*

Fig. 8



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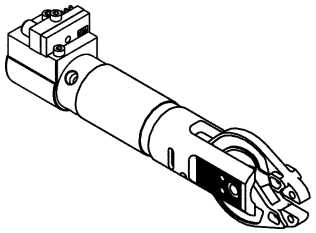
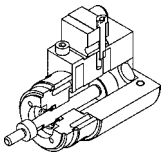
15. Proximity Switch Options

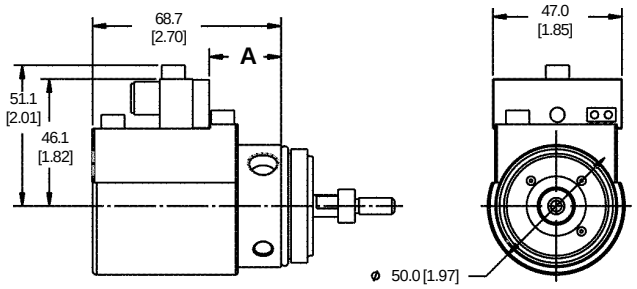


Position Sensors

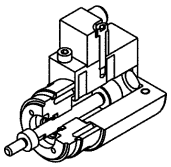
Single Connector Status Controller
AC or DC Proximity Switch
Senses Open & Closed Positions



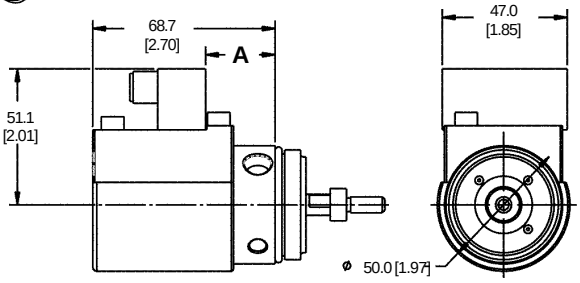
RSPT-DC
Rear Switch Package - Turck DC
(Ni2-Q6.5-AP6-0.20-FS4.4X3-S304)
for PG-38 ~ No. 753700B
for PG-45 ~ No. 753600B



	A
PG-38 w/DC	26.2 [1.03]
PG-45 w/DC	29.0 [1.14]



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

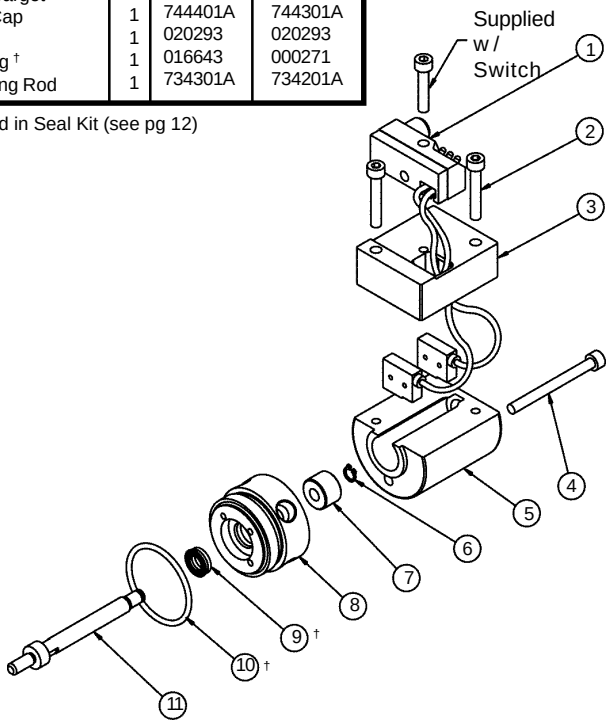


	A
PG-38 w/AC	26.2 [1.03]
PG-45 w/AC	29.0 [1.14]

Components

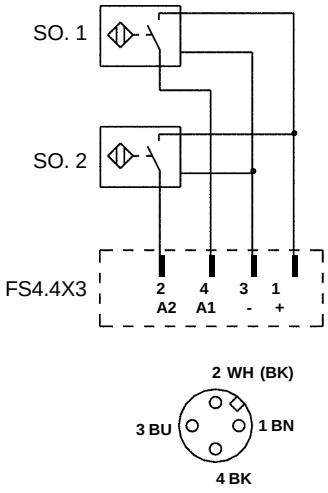
ITEM	DESCRIPTION	QTY	PG-38	PG-45
1	DC Status Controller	1	018426	018426
	AC Status Controller		019328	019328
2	Screw	2	016452	016452
3	Sensor Block	1	753701A	753601A
4	Screw	1	018495	018495
5	Sensor Can	1	744303A	744303A
6	Retainer	1	005241	005241
7	Prox Target	1	739501A	739501A
8	End Cap	1	744401A	744301A
9	Seal †	1	020293	020293
10	O Ring †	1	016643	000271
11	Sensing Rod	1	734301A	734201A

† Included in Seal Kit (see pg 12)



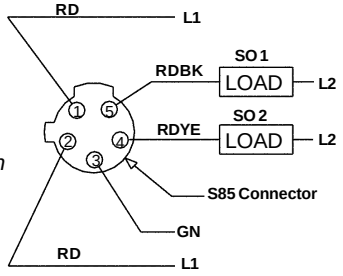
DC ~ Status Controller
Two Sensors
Supply Voltage: 10-30 VDC
Load Current: ≤150mA
Single Connector ~ Conprox®

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



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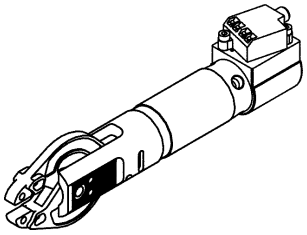
15. Proximity Switch Options



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

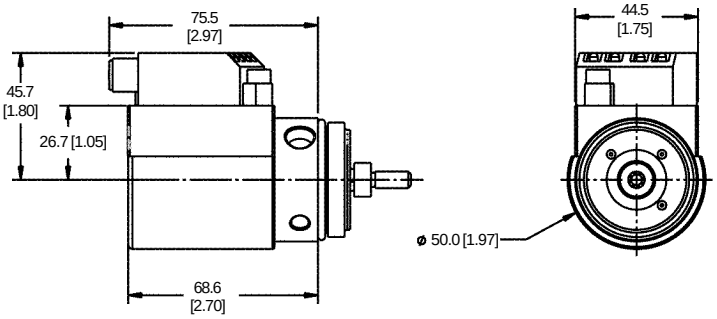
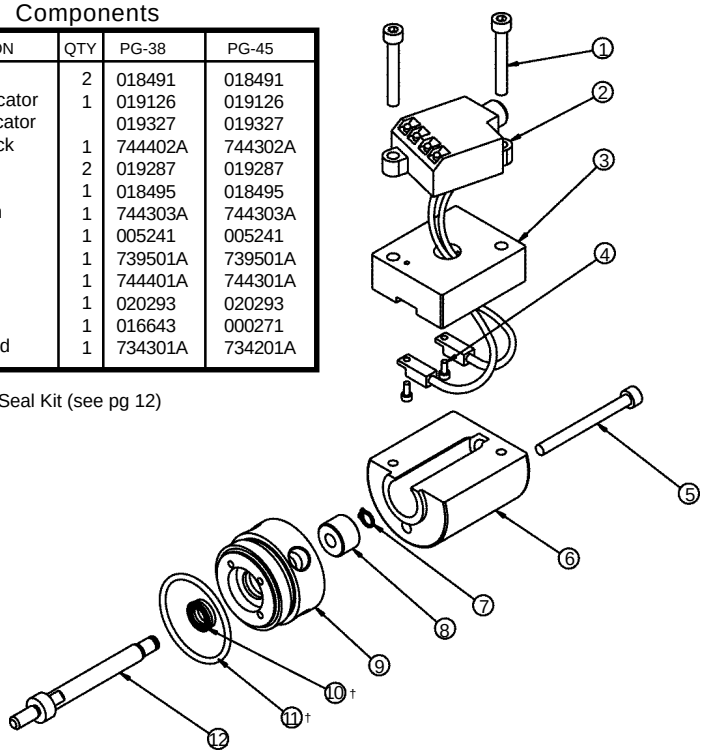


Fig. 9

Components

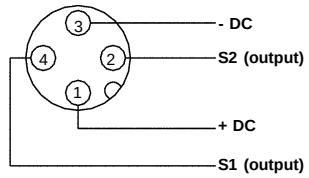
ITEM	DESCRIPTION	QTY	PG-38	PG-45
1	Screw	2	018491	018491
2	DC Cylindicator	1	019126	019126
	AC Cylindicator		019327	019327
3	Sensor Block	1	744402A	744302A
4	Screw	2	019287	019287
5	Screw	1	018495	018495
6	Sensor Can	1	744303A	744303A
7	Retainer	1	005241	005241
8	Prox Target	1	739501A	739501A
9	End Cap	1	744401A	744301A
10	Seal †	1	020293	020293
11	O Ring†	1	016643	000271
12	Sensing Rod	1	734301A	734201A

† Included in Seal Kit (see pg 12)



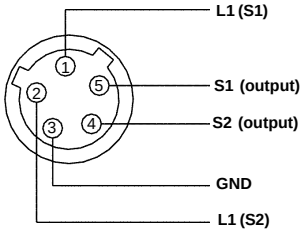
DC ~ Cylindicator
Two 3-Wire Sensors
Supply Voltage: 10-30 VDC
Load Current: 200mA Max.
Single Connector ~ Euro

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



AC ~ Cylindicator
Two Wire
Supply Voltage: 20-150 VAC
Load Current: 200mA Max.
Single Connector ~ Micro

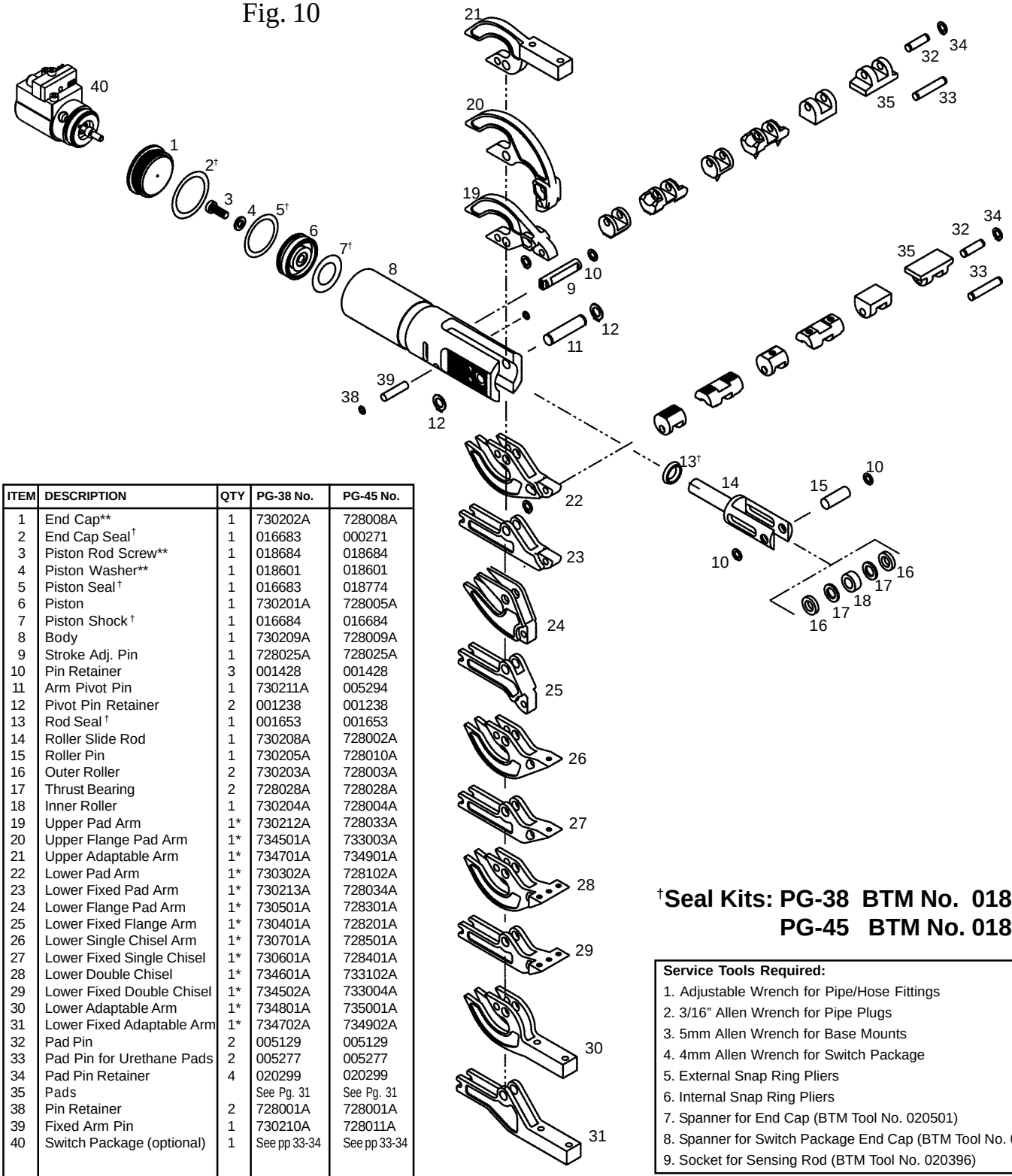
SO. 2 reads the closed position of the gripper.
If SO. 2 is required for the open position (transposed), order: TRSPN-AC



16. Components:

Typical gripper components are depicted here. Individual views for each gripper model are shown in BTM catalog 03-G.

Fig. 10



ITEM	DESCRIPTION	QTY	PG-38 No.	PG-45 No.
1	End Cap**	1	730202A	728008A
2	End Cap Seal†	1	016683	000271
3	Piston Rod Screw**	1	018684	018684
4	Piston Washer**	1	018601	018601
5	Piston Seal†	1	016683	018774
6	Piston	1	730201A	728005A
7	Piston Shock†	1	016684	016684
8	Body	1	730209A	728009A
9	Stroke Adj. Pin	1	728025A	728025A
10	Pin Retainer	3	001428	001428
11	Arm Pivot Pin	1	730211A	005294
12	Pivot Pin Retainer	2	001238	001238
13	Rod Seal†	1	001653	001653
14	Roller Slide Rod	1	730208A	728002A
15	Roller Pin	1	730205A	728010A
16	Outer Roller	2	730203A	728003A
17	Thrust Bearing	2	728028A	728028A
18	Inner Roller	1	730204A	728004A
19	Upper Pad Arm	1*	730212A	728033A
20	Upper Flange Pad Arm	1*	734501A	733003A
21	Upper Adaptable Arm	1*	734701A	734901A
22	Lower Pad Arm	1*	730302A	728102A
23	Lower Fixed Pad Arm	1*	730213A	728034A
24	Lower Flange Pad Arm	1*	730501A	728301A
25	Lower Fixed Flange Arm	1*	730401A	728201A
26	Lower Single Chisel Arm	1*	730701A	728501A
27	Lower Fixed Single Chisel	1*	730601A	728401A
28	Lower Double Chisel	1*	734601A	733102A
29	Lower Fixed Double Chisel	1*	734502A	733004A
30	Lower Adaptable Arm	1*	734801A	735001A
31	Lower Fixed Adaptable Arm	1*	734702A	734902A
32	Pad Pin	2	005129	005129
33	Pad Pin for Urethane Pads	2	005277	005277
34	Pad Pin Retainer	4	020299	020299
35	Pads		See Pg. 31	See Pg. 31
38	Pin Retainer	2	728001A	728001A
39	Fixed Arm Pin	1	730210A	728011A
40	Switch Package (optional)	1	See pp 33-34	See pp 33-34

†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 ommited 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.

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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

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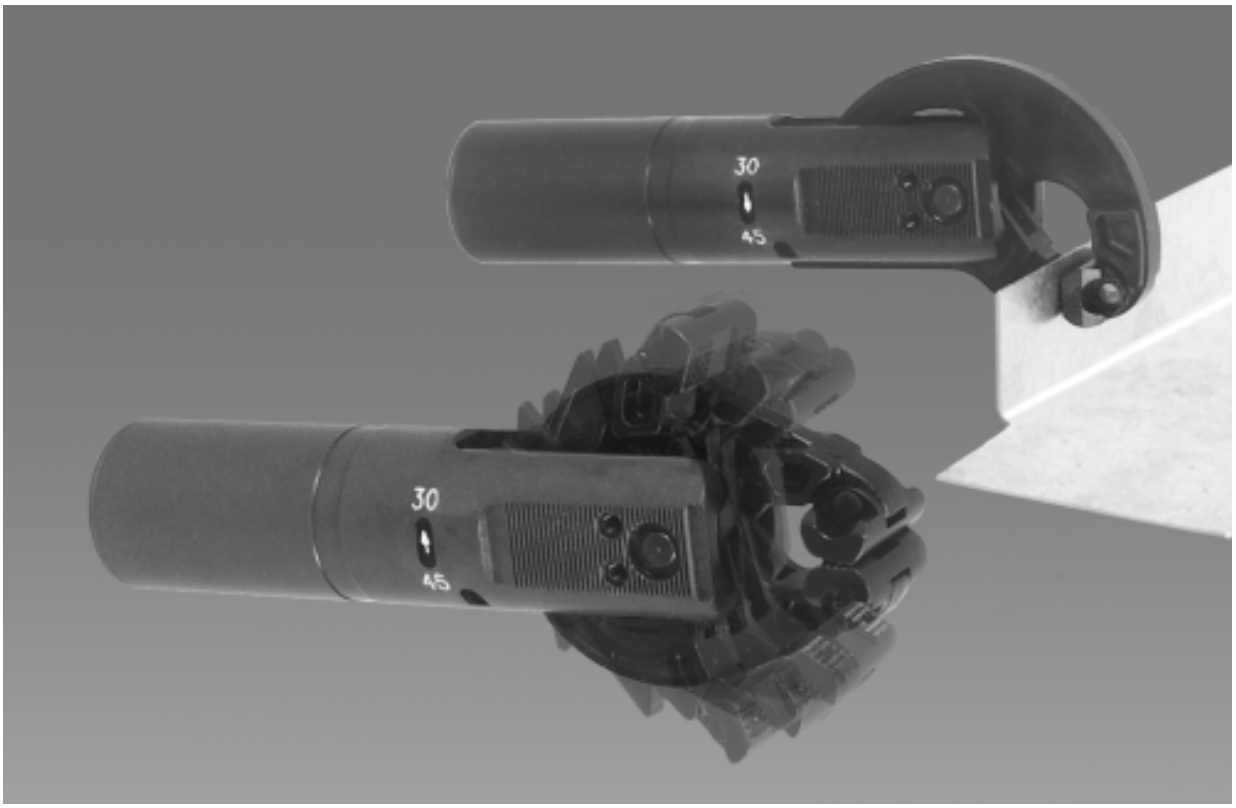
PG-38 & PG-45 Locking grippers
User's Guide



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