Manual BN71, BN90 and BN100
PNEUMATIC BRAKES - BN SERIES

WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS BRAKE. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE BRAKE.

ATEX II Cat. 2 G&D T4

Via Calari, 16
40069 Zola Predosa
BOLOGNA-ITALIA
Tel. +39 051 590900
Fax +39 051 592293
Website:www.tsabologna.com
E-mail:tsa@tsabologna.com

General

TSA BN brakes are fail-safe brakes (spring engaged, air released). They can be used as a static brake and under certain conditions in dynamic applications.(Please contact your supplier about this application)

The brake module bolts directly onto the motor mounting face with an EIC or NEMA connection flange. The brakes are certified according to the European Explosive Directive ATEX II cat. 2 G&D T4 (in static applications only).

The advantages of the BN brakes include:

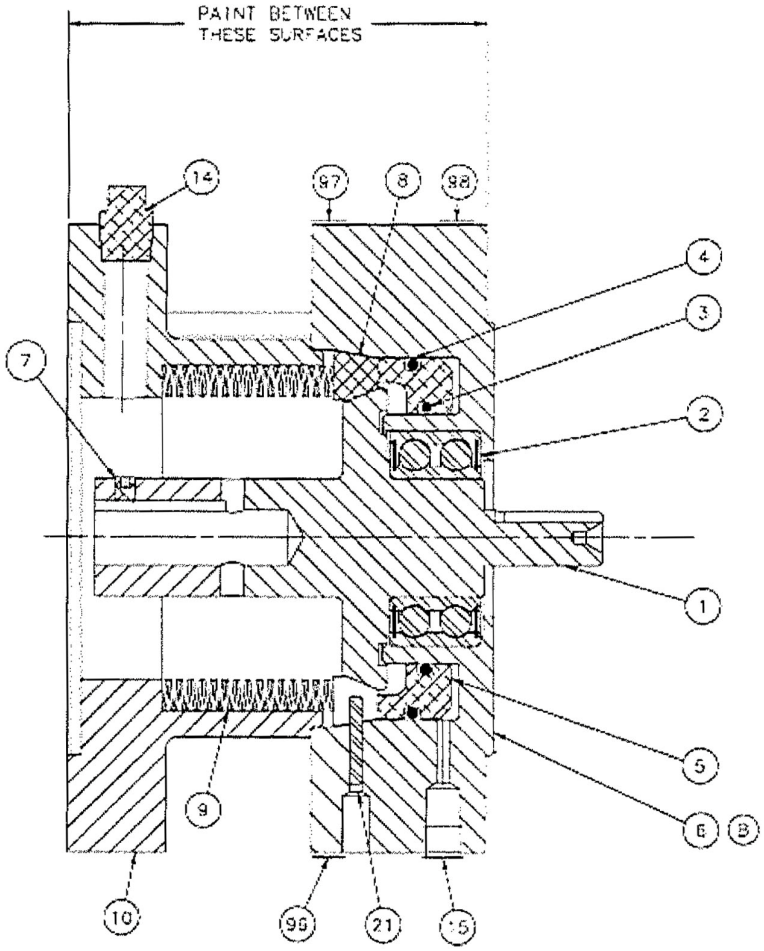
- Brake can be used in static applications;
- Field serviceable;
- Easy flange connection according to IEC and NEMA standards;
- Low maintenance because very few parts are exposed to wear;
- Compact design;
- Easy interchangeable because of independent brake module;
- Cast-iron housing and excellent thermal capacity for use in harsh environments;
- Long life-time;
- Certified according to the European Explosive Directive ATEX II cat. 2 G&D T4;

WARNING:

BN brakes are only for use with air.
Do not lubricate the brake.

Characteristics

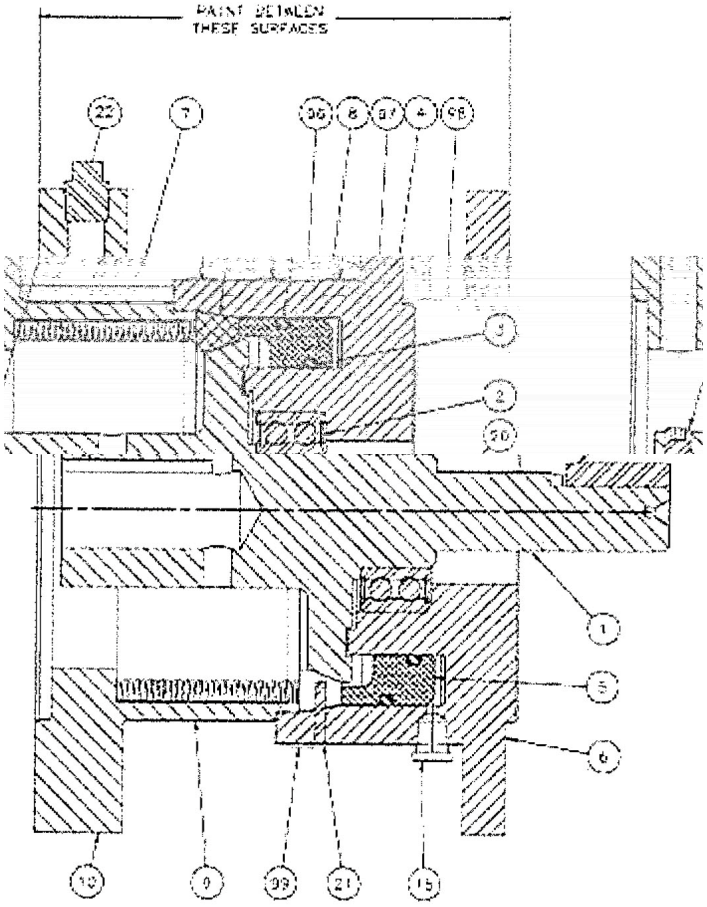
BN IEC 71 Brake



Item	Quantity	Description
1	1	Shaft, output, SBP4, 14X30, CC
2	1	Ball-bearing
3	1	Seal, O-ring, Viton
4	1	Seal, O-ring, Viton
5	1	Piston, SBP4
6	1	Air chamber, SBP4, 80/115
7	1	Set screw
8	1	Facing, Friction
9	1	Spring, Wave
10	1	Flange, Input, SBP4,80MM Pilot,CC
11	4	Screw, Cap, SKT HD
14	1	Non returne valve
15	1	Closure, Plug, Vinyl
20	1	Key, Square
21	1	Pin, Dowel

Characteristics

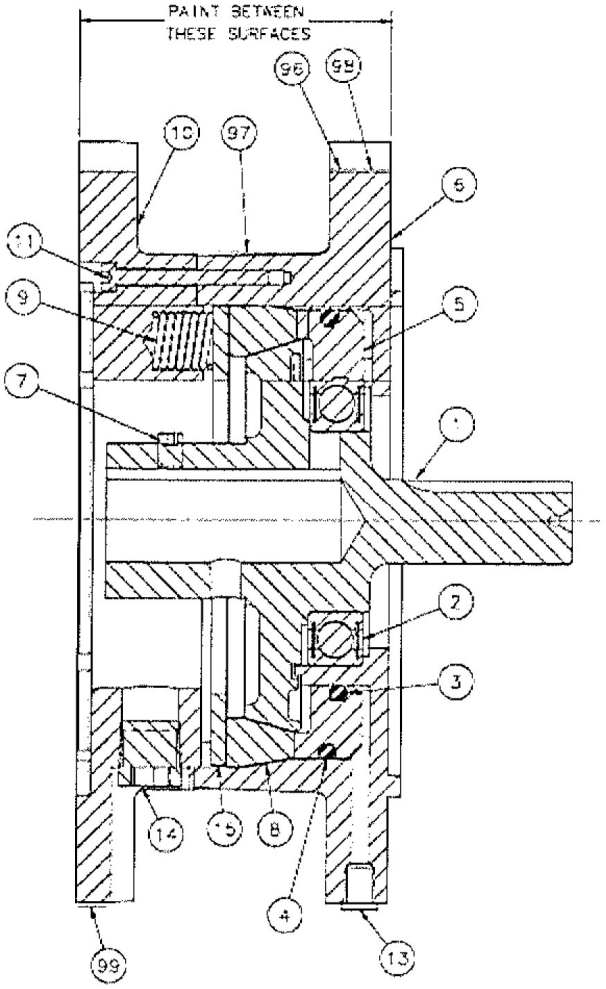
BN IEC 90 Brake



Item	Quantity	Description
1	1	Shaft, output, SBP4, CC
2	1	Ball-bearing
3	1	Seal, O-ring, Viton
4	1	Seal, O-ring, Viton
5	1	Piston, SBP5
6	1	Air chamber, IEC-90 Frame
7	1	Set screw
8	1	Facing, Friction
9	1	Spring, Wave
10	1	Flange, Input, IEC-90 Frame, CC
11	4	Screw, Cap, SKT HD
14	2	Fitting, Plug
15	1	Closure, Plug, Vinyl
20	1	Key
21	1	Pin, Dowel
22	1	Non returne valve
24	1	Fitting, Air inlet
25	1	Adapter, Air inlet

Characteristics

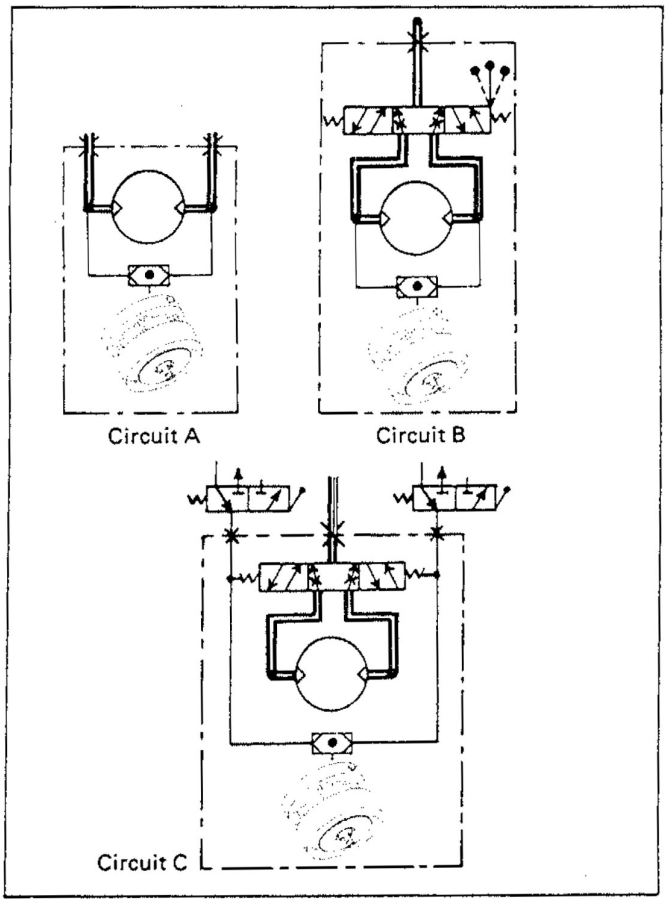
BN IEC 100 Brake



Item	Quantity	Description
1	1	Shaft
2	1	Ball-bearing
3	1	Seal, O-ring
4	1	Seal, O-ring
5	1	Piston, SBP7-11
6	1	Air chamber, IEC-100/112
7	1	Set screw
8	1	Facing, Friction
9	6	Spring, Die
10	1	Flange, Input, IEC-100/112
11	8	Screw, Cap, SKT HD
12	2	Key, Rect
13	1	Closure, Plug, Vinyl
14	2	Non returne valve
15	1	Backing plate, Spring
25	1	Adapter, Air inlet

Installation options

The brake releases with pneumatic pressure. When the pneumatic pressure drops below a pre-set air pressure the brake engages.



CIRCUIT (A): installation without control valve. The shuttle valve allows brake operation for dual rotation.

CIRCUIT (B): installation with hand control valve (HCV). The HCV controls the rotation direction of the output shaft. The shuttle valve allows brake operation for dual rotation.

CIRCUIT (C): installation with remote controlled valve (RCV). The RCV makes it possible to change the rotation direction of the shaft from a distance. The shuttle valve allows brake operation for dual rotation.

Special requirements for operation in explosion hazardous enviroments

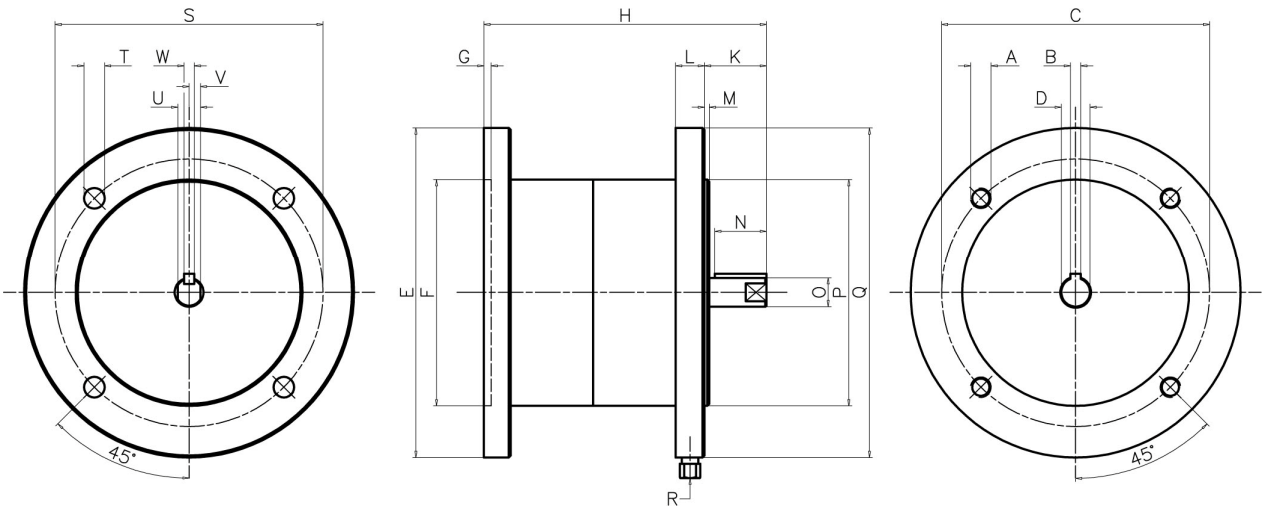
In order to comply to ATEX Group II category 2 G&D c T4 always make sure that:

- The brake is mounted on earth connected baseplate/gearbox etc.
- When air motor is executed with brake, note that is a parking brake. It can be used under certain conditions in dynamic applications. For dynamic applications consult supplier.
- When the air motor is running, the air pressure in the airline to the brake must be at least 3.4 bar.
- Always mount between the motor and brake and between brake and gearbox the supplied gasket.

To prevent the motor unit from malfunction always apply the following precautions:

Description	Quantity	Expected/rare malfunction	Measures applied to prevent the malfunction
Ball bearing	1	Worn/no grease	Check every 2.500 operation hours.
Facing friction	1	Worn	Check when the holding torque is reduced. Check every 500 operating hours.

BN Series - IEC mounting



MOD.	A Ø	B	C Ø	D Ø	E Ø	F Ø	G	H	K	L	M	N	O Ø	P Ø	Q Ø	R	S Ø	T Ø	U	V	W
BN71	M10	5	130	14H7	160	110H7	3,5	137	30	44,6	2,3	25	14H7	110H7	160	1/8NPT	130	10	11	5,5	5
BN90	M10	8	165	24H7	200	130H7	5	195	50	13	3,5	45	24H7	130H7	200	1/4BSP	165	12	18	9	8
BN100	M12	8	215	28H7	250	180H7	5	163	60	19	4	55	28H7	180H7	250	1/4BSP	215	14	20,6	10,3	8

MODEL	FLANGE TYPE	HOLDING TORQUE	RELEASE PRESSARE
BN71	IEC 71 (B5)	14Nm	3,4bar
BN90	IEC 90 (B5)	29Nm	3,4bar
BN100	IEC 100 (B5)	75Nm	3,4bar

Installation onto motor shaft

Caution: Do not lubricate either the clamping collar on the shaft. Any lubricant on the contact surfaces could result in torque transfer failure. If necessary, clean the shaft with a non-petroleum based solvent, such as isopropyl alcohol, and wipe dry before assembly.

1. Insert a gasket between the motor and BN brake.

2. Slide the motor shaft into the input (female) end of the output shaft (item 1) until flanges of the motor and brake come together.

3. Using four customer supplied socket head cap screws (see table 2) bolt the flanges together. Tighten the cap screws to the recommended torques listed in table 2 (Page 3).

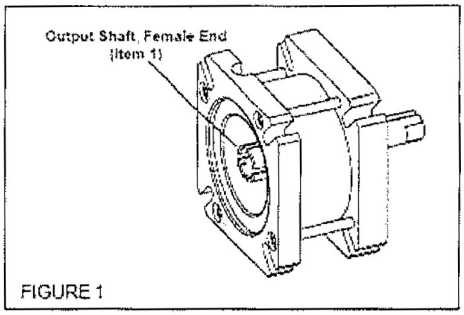


FIGURE 1

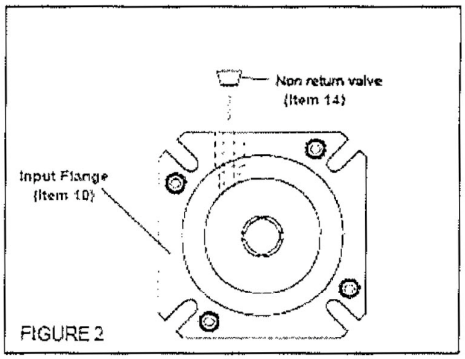


FIGURE 2

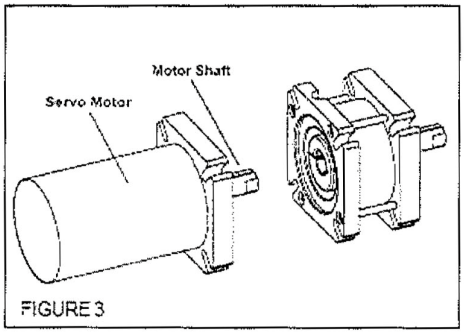


FIGURE 3

DANGER

Support the load before disengaging the brake.
Failure to support the load could result in serious bodily injury.

Mounted between a gear reducer and a motor

Note: **Refer to figure 5**

1. To mount the servo brake to the motor, follow steps on the previous page.
2. Insert the brake into the customer supplied gear reducer coupling. Use the supplied key (item 20) (if required).
3. Insert a gasket between the BN brake and the gear reducer.
4. Use customer supplied screw, washer and nuts to bolt the flanges together. Apply Loctite 242 to the threads of the screw. For recommended torque values, refer to table 2.
5. Tighten the coupling. Refer to the instructions that are supplied with the gear reducer.
6. Install any plugs or related items that are detailed in the gear reducer instructions.

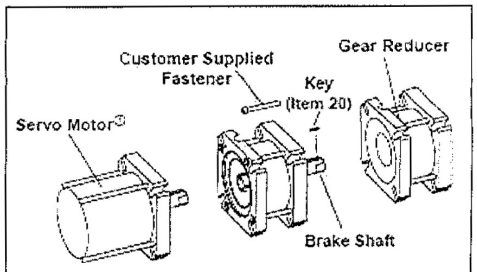


FIGURE 5

TABLE 1

Brake Model	Cap Screw	Recommended Collar Screw Torque
Size 2	M5	9.5 Nm [84.1 in-lb]
Size 3	M6	16 Nm [142.0 in-lb]
Size 4	M6	16 Nm [142.0 in-lb]
Size 5	M6	16 Nm [142.0 in-lb]

TABLE 2

Brake Model	Socket Head Cap Screw (Customer Supplied)	Recommended Fastening Torque
Size 2	M5	7 Nm [63 in-lb]
Size 3	M6	12 Nm [107 in-lb]
Size 4 BN 71	M8	29 Nm [260 in-lb]
Size 5 BN 90	M10	58 Nm [520 in-lb]

DANGER

Support the load before disengaging the brake.
Failure to support the load could result in serious bodily injury.

Air preparation

For long life, the brake requires clean and pressure regulated air (filtered to five microns or better9. TSA does not recommend lubricated air for this product.

BRAKE ASSEMBLY

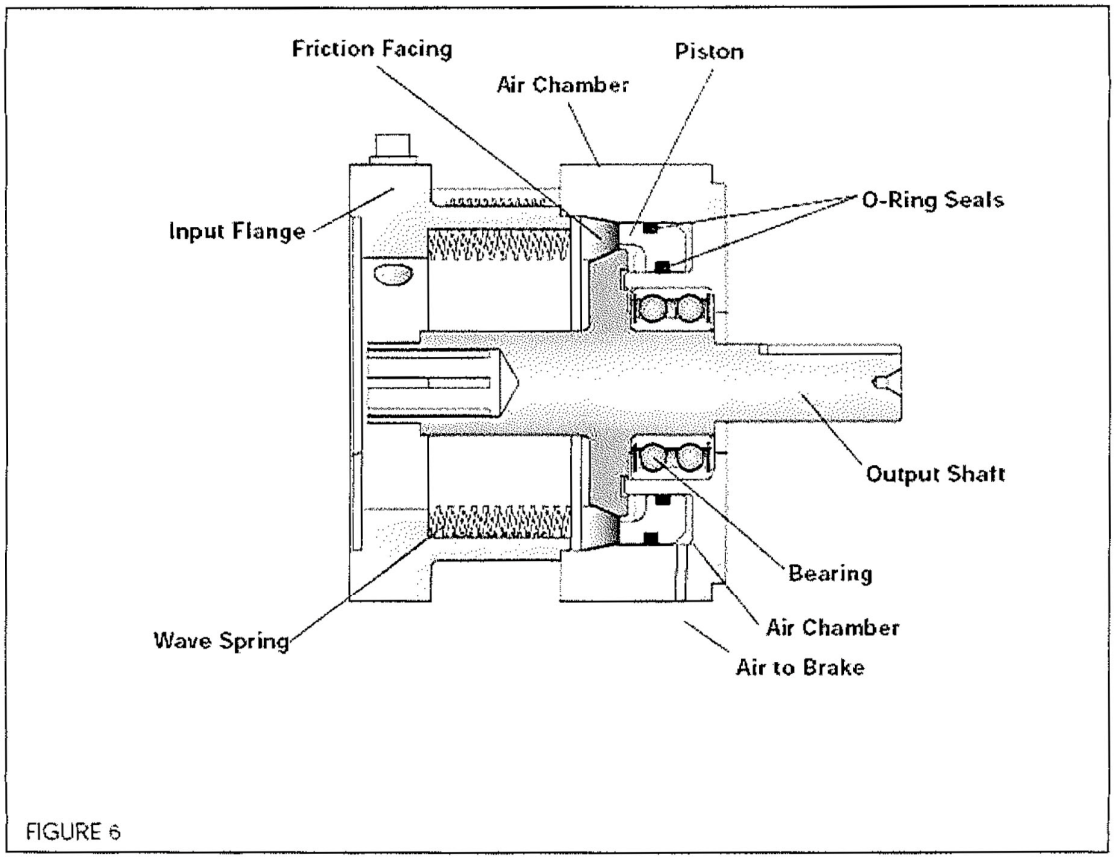


FIGURE 6

Brake assembly

Note: Refer to figure 7 & 8

1. Alternately and evenly, remove the four socket head cap screws (item11) and separate the air chamber (item6) from the input flange (item10).
2. Remove the output shaft (item 1) from the ball bearing (item 2) by pressing in on the output shaft. Remove the dowel pin (item21) by pressing the dowel pin into the air chamber.
3. Remove the piston (item5) from the air chamber (item 6). You may need to apply compressed air to the air inlet to remove the piston.
4. Remove the old O-ring seal Items 3, 4) from the piston.
5. Press the bearing (item 2) out of the air chamber (item 6).
6. Clean the bearing bore of the air chamber (item 6) with fresh solvent, removing old Loctite.
7. Apply a continuous bead of Loctite 680 around the inner circumference of the air chamber (item 6) bearing bore.
8. Carefully align the outer race of the new bearing (item 2) with the bore of the air chamber (item 6).
9. Supporting the air chamber (item 6) and pressing on the outer race of the new bearing (item 2) press the new bearing into the air chamber.
10. Visually inspect the inner diameter grooves and the outer diameter grooves of the piston (item 5) for debris clean as necessary.
11. Coat the O-ring contact surface of the air chamber (item 6), the piston (item 5), and the O-ring seals (item 3, 4) with a thin film of O-ring lubricant and install the new O-ring seals.
12. Slide the piston (item 5) into the air chamber (item 6).

DANGER

Working with spring or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

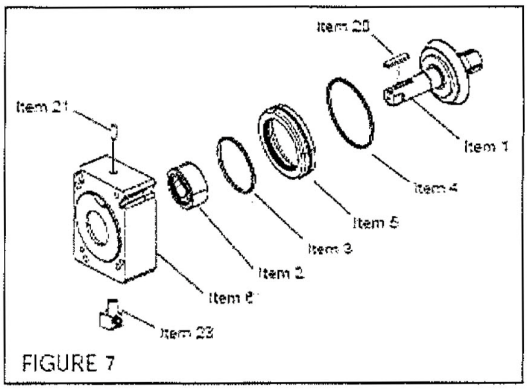


FIGURE 7

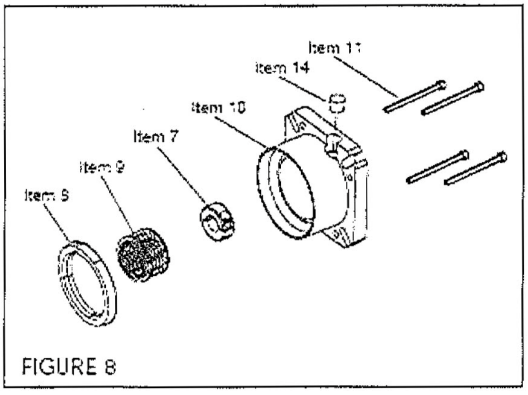


FIGURE 8

Brake assembly

13. Clean the friction surface of the air chamber (item 6) and output shaft (item 1) with solvent.
14. Reinstall dowel pin (item 21) by pressing into air chamber (item 6) unit flush with the outside surface.
15. Position friction facing on top of the piston with the narrow end of the taper pointing down and the anti-rotation facing slot aligned with the dowel pin (item 21). Use care to ensure that the friction facing is concentric to the piston, as this will aid in the installation of the output shaft in step 16.
16. Support the inner race of the new ball bearing (item 2) and press the output shaft (item 1) into the new bearing (item 29 and air chamber (item 6).
17. Replace the wave spring (item 9) and input flange (item 10).

NOTE: On the size 2 spring, one end will be fused, be sure that the fused end is down and makes contact with the facing (item 8).

18. Apply a drop of Loctite 242 to the threads of the socket head cap screws (item 11).
19. Reinstall and tighten the four socket head cap screws (item 11), securing the air chamber (item 69 to the input flange (item 10). Alternate as you tighten the four socket head cap screws so that the input flange remains evenly parallel to the air chamber. Refer to table 4 for the recommended assembly torque values.

TABLE 4

Brake Model	Socket Head Cap Screw (Item 11)	Recommended Assembly Torque
Size 2	M4	4.2-5.4 Nm [37-48 in-lb]
Size 3	M5	7.0-9.2 Nm [62-81 in-lb]
Size 4 IEC 71	M6	9.2-11.9 Nm [81-105 in-lb]
Size 5 IEC 90	M8	26.2-34.0 Nm [232-301 in-lb]

TROUBLESHOOTING

Problem	Probable Cause	Solution
Failure to engage (brake).	Weak or broken spring.	Replace broken spring.
Failure to disengage (1).	Control valve malfunction - air not getting to the brake.	Check for low air pressure or replace the control valve. **NOTE:** Unit is designed to release at 3.4 bar (50 psi). Required disengagement pressure higher than 3.4 bar (50 psi) may indicate improper assembly.
Failure to disengage (2).	Air is leaking around the O-ring seals.	Replace the O-rings.
Loss of torque.	Friction Facing is worn or dirty.	Replace the Friction Facing.

Replacement parts list

To order replacement parts, indicate servo brake model size, item number, item description and quantity. Replacement parts are available through your local TSA distributor.

NOTE: Item *6 *10 are round on model IEC 71 and IEC 90

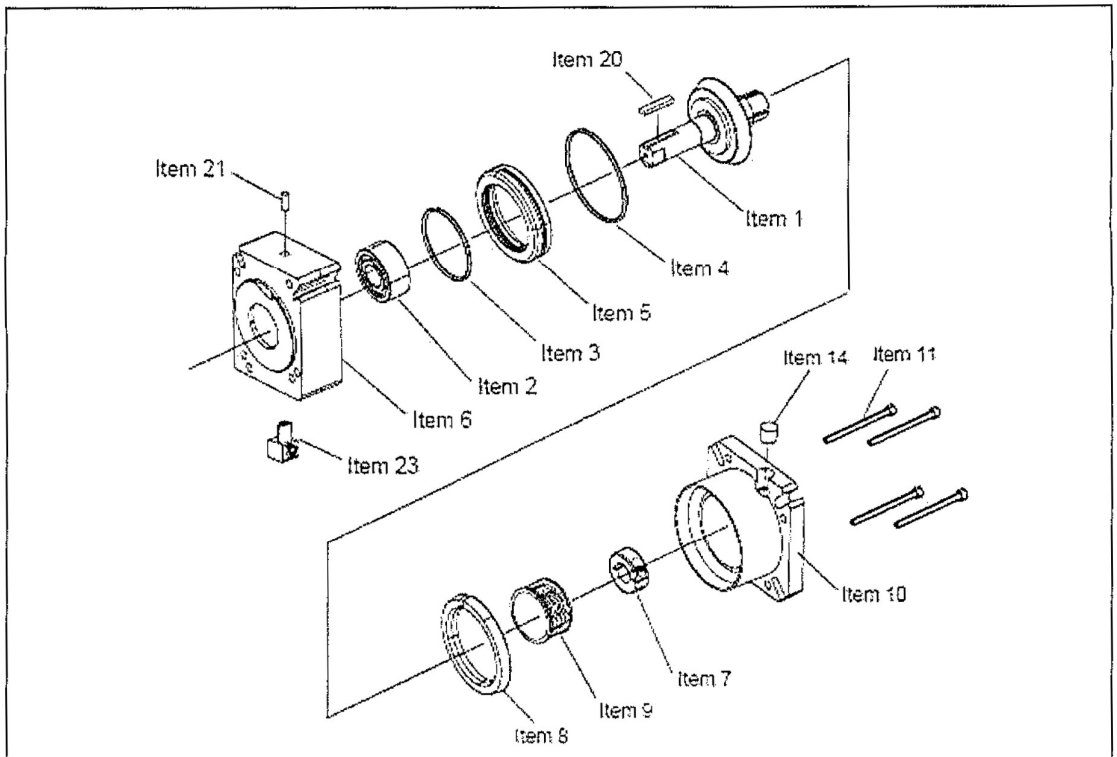


FIGURE 9

ITEM	DESCRIPTION	QTY
1	Output Shaft	1
2	Ball Bearing	1
3	O-ring Seal	1
4	O-ring Seal	1
5	Piston	1
6	Air Chamber	1
7	Clamping Collar	1
8	Friction Facing	1
9	Wave Spring	1
10	Input Flange	1
11	Socket Head Cap Screw	4
12	Solenoid Valve (Optional)	1
14	Non Return Valve	1
20	Square Key	1
21	Dowel Pin	1
23	Quick Exhaust Valve, Eclipse	1

Specifications

Size	Min Holding Torque	Max RPM	Torsional Rigidity	Inertia w/ coupling	Overhung Load	Weight
2	2.35 Nm [20 in-lb]	10,000	6,180 Nm/rad [4,550 ft-lb/rad]	.5 kg-cm² [.0004 in-lb-s²]	833 N [190 lbs]	1.1 kg [2.4 lbs]
3	8 Nm [70 in-lb]	10,000	9,613 Nm/rad [7,090 ft-lb/rad]	.77 kg-cm² [.0007 in-lb-s²]	1,070 N [240 lbs]	1.5 kg [3.2 lbs]
4 IEC 71	14 Nm [200 in-lb]	4,000	23,810 Nm/rad [17,550 ft-lb/rad]	6.7 kg-cm² [.0059 in-lb-s²]	2,334 N [525 lbs]	3.9 kg [8.5 lbs]
5 IEC 90	29 Nm [256 in-lb]	3,000	22,562 Nm/rad [16,640 ft-lb/rad]	15 kg-cm² .0133 in-lb-s²]	2,447 N [662 lbs]	6.3 kg [13.8 lbs]