

Ball Screw Brake




Sizes 2, 3, 4, 5, and 7



In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

Technical Support: 800-843-7445
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www.nexengroup.com

	<div data-bbox="553 579 850 636"> DANGER</div> <p>Read this manual carefully before installation and operation. Follow Nexen's instructions and integrate this unit into your system with care. This unit should be installed, operated and maintained by qualified personnel ONLY. Improper installation can damage your system, cause injury or death. Comply with all applicable codes.</p>	
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This document is the original, non-translated, version.

Conformity Declaration: In accordance with Appendix II B of CE Machinery Directive (2006/42/EC):

A Declaration of Incorporation of Partly Completed Machinery evaluation for the applicable EU directives was carried out for this product in accordance with the Machinery Directive. The declaration of incorporation is set out in writing in a separate document and can be requested if required.

This machinery is incomplete and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the applicable provisions of the Directive.

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ISO 9001 Certified

Table of Contents


General Specifications	4
General Safety Precautions	4
Installation onto Ball Screw	5
Lubrication	7
Air Connections	7
Operation	8
Brake Assembly	8
Bearing O-Ring, Seals, and Spring Assembly	9
Friction Facing Assembly	10
Troubleshooting	11
Replacement Parts List	12
Warranty	13

GENERAL SPECIFICATIONS

Size	Min Holding Torque	Torsional Rigidity* (Estimated)	Inertia (Calculated)	Weight	Min. Disengagement Air Pressure
BSB 2	2 Nm [20 in-lb]	350 Nm/RAD [258 ft*lb/RAD]	0.00002 kg*m ² [0.0005 lb*ft ²]	1.3 kg [2.9 lbs]	5.5 bar [80 psi]
BSB 3	8 Nm [70 in-lb]	600 Nm/RAD [442 ft*lb/RAD]	0.00006 kg*m ² [0.0014 lb*ft ²]	1.6 kg [3.5 lbs]	5.5 bar [80 psi]
BSB 4	22 Nm [200 in-lb]	9750 Nm/RAD [7191 ft*lb/RAD]	0.00031 kg*m ² [0.00736 lb*ft ²]	3.4 kg [7.6 lbs]	5.5 bar [80 psi]
BSB 5	45 Nm [400 in-lb]	9750 Nm/RAD [7191 ft*lb/RAD]	0.00114 kg*m ² [0.0271 lb*ft ²]	6.6 kg [14.6 lbs]	5.5 bar [80 psi]
BSB 7	125 Nm [1100 in-lb]	10,600 Nm/RAD [7818 ft*lb/RAD]	0.00394 kg*m ² [0.0935 lb*ft ²]	14.7 kg [32.4 lbs]	5.5 bar [80 psi]


*Torsional rigidity of coupling

GENERAL SAFETY PRECAUTIONS




CAUTION

Use lifting aids and proper lifting techniques when installing, removing, or placing this product in service.




CAUTION

Use appropriate guarding for moving components. Failure to guard could result in serious bodily injury.




CAUTION

Watch for sharp features when interacting with this product. The parts have complex shapes and machined edges.




WARNING

This product is capable of emitting a spark if misused, therefore it is not recommended for use in any explosive environment.



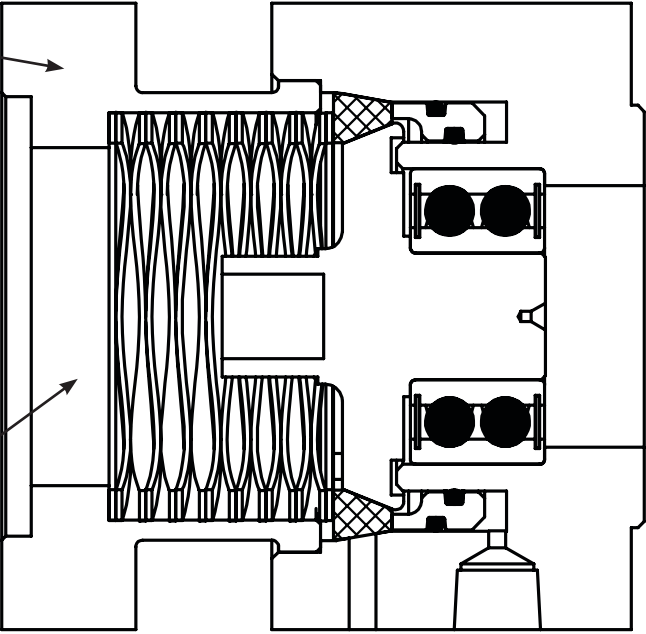
CAUTION

The temperature limits for the product are 4.5-104 degree Celsius (40-220 degree F).



CAUTION

Use appropriate guarding for moving components. Failure to guard could result in serious bodily injury.



INSTALLATION

INSTALLATION ONTO A BALL SCREW

NOTE: The Ball screw Brake coupling consists of a clamping hub and an expanding shaft side connected together with an elastomer insert. Refer to Figures 1, 2, 3, and 4.

The two coupling hubs are concentrically machined to accept an elastomer insert for axial misalignment. One hub has a bore to accept the machined end of a ball screw and a clamping hub with a radial screw. The other side has an expanding shaft and tapered clamping element that expands into the brake bore when a cap screw is tightened.

1. Separate the coupling into two halves. Mount the expansion shaft. Push the coupling shaft into the brake bore and tighten the cap screw to the torque specification in Table 1.

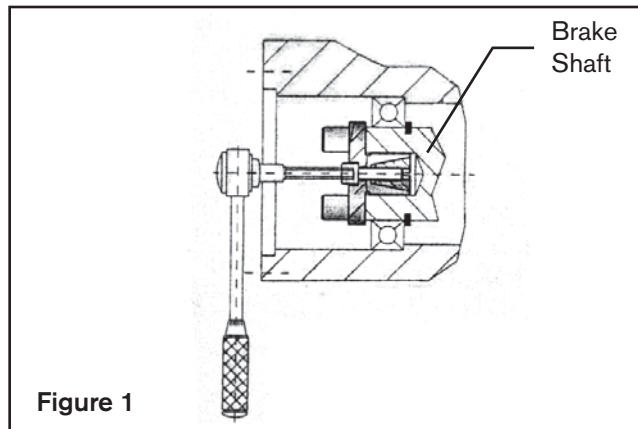


Figure 1

Model	Clamp Collar	Expanding Shaft
BSB 2	2 Nm [18 in-lbs]	2.3 Nm [20 in-lbs]
BSB 3	4 Nm [36 in-lbs]	9 Nm [80 in-lbs]
BSB 4	15 Nm [133 in-lbs]	22 Nm [200 in-lbs]
BSB 5	15 Nm [133 in-lbs]	32 Nm [283 in-lbs]
BSB 7	35 Nm [310 in-lbs]	60 Nm [530 in-lbs]

2. Mount the clamping hub. Slide this coupling half onto the machined end of the ball screw.
3. At the correct axial position, tighten the mounting screw to the torque specification in Table 1.

CAUTION

The elastomer insert must be able to move axially in order to compensate for axial misalignment.

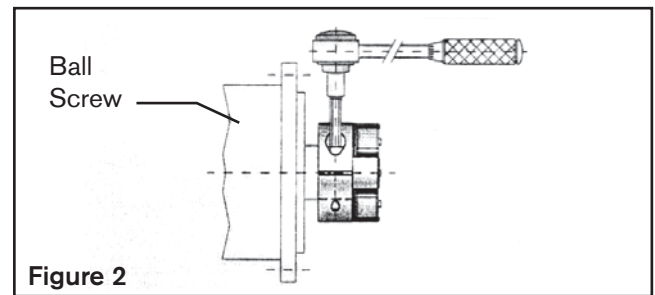


Figure 2

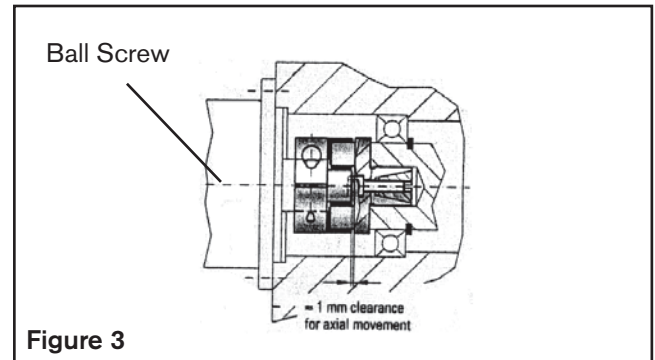


Figure 3

4. Use customer-supplied screws, washer and nuts to bolt the flanges together.
5. Apply Loctite® 242 to the threads of the screws.
6. Torque the screws to the recommended values. Refer to Table 2.

Table 2

Model	Socket Head Cap Screw (Customer Supplied)	Recommended Fastening Torque
BSB 2	M5	7 Nm [63 in-lbs]
BSB 3	M6	12 Nm [107 in-lbs]
BSB 4	M8	29 Nm [260 in-lbs]
BSB 5	M10	58 Nm [520 in-lbs]
BSB 7	M12	158 Nm [1,400 in-lbs]

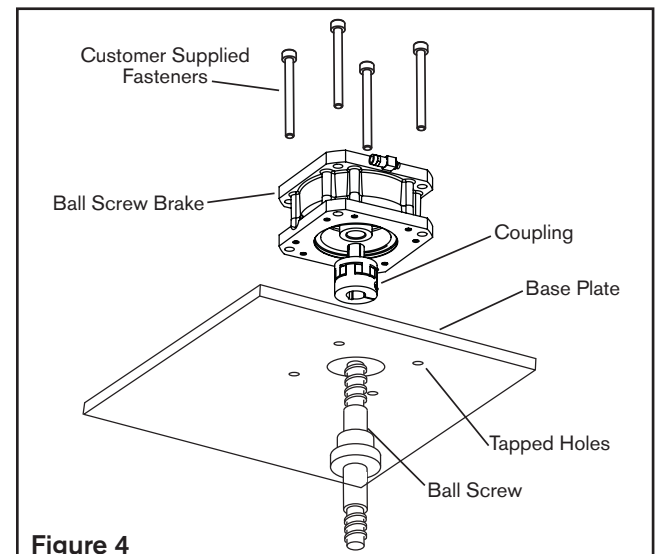



Figure 4



⚠ DANGER


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

7. **Standard Configuration:**

Attach the Quick Exhaust Valve (Item 23) to the brake. Use Teflon tape and/or pipe sealant on the threads.

With Optional Solenoid:

If you are using the optional Solenoid Valve (Nexen Part #964650), the Quick Exhaust Valve is unnecessary. Assemble the optional Solenoid Valve directly to the brake using the supplied fittings. Use Teflon tape and/or pipe sealant on the threads.



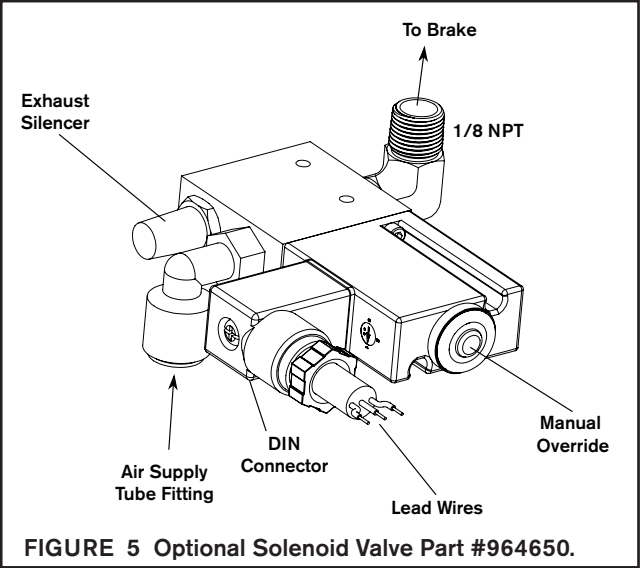
⚠ CAUTION

The Ball Screw Brake will disengage if you depress the domed button at the top of the Solenoid Valve (if air pressure is applied). The LED will illuminate when the Solenoid Valve is actuated and the Ball Screw Brake is disengaged. Pressure needed to disengage should NOT exceed 80 psi.

NOTE: Align the air inlet ports in the down position to allow condensation to drain out of the air chamber.

8. Attach the air line to the valve.


9. If using optional solenoid valve, attach DIN Connector cable to valve by pressing DIN Connector onto valve power pins and tightening DIN Connector fastener. Then connect DIN Connector cable wires using the following chart to the appropriate power supply, see Table 3.



DIN Connector Cable Wire Color	Valve	
	24 VDC	Valve Pin
Brown	+	1
White	-	2
Green	Ground	Ground

Table 3

Optional Solenoid Valve Specifications				
Voltage	Power	Resistance	Current	Cv
24 VDC	4 W	145 ohms	.17 A	.25



⚠ CAUTION

24 VDC valve connector has a suppression diode installed across the coil. Observe proper voltage polarity or connector damage will result.

LUBRICATION

NOTE


Nexen pneumatically actuated devices require clean, pressure regulated air for maximum performance and life. All seals in Nexen Pneumatically operated devices are lubricated for life and do not require additional lubrication.

However, some customers prefer to use an air line lubricator, which injects oil into the pressurized air, forcing an oil mist into the air chamber. This is acceptable, but care must be taken to ensure once an air mist lubrication system is used, it is continually used over the life of the product as the oil mist may wash free the factory installed lubrication.

Locate the lubricator above and within ten feet of the product, and use low viscosity oil such as SAE-10.

Synthetic lubricants are not recommended.

Nexen product's bearings are shielded and pre-lubricated, and require no further lubrication.

	CAUTION These settings are for Nexen supplied lubricators. If you are not using a Nexen lubricator, calibration must follow the manufacturer's suggested procedure.
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LUBRICATOR DRIP RATE SETTINGS


1. Close and disconnect the air line from the unit.
2. Turn the Lubricator Adjustment Knob counterclockwise three complete turns.
3. Open the air line.
4. Close the air line to the unit when a drop of oil forms in the Lubricator Sight Gage.
5. Connect the air line to the unit.
6. Turn the Lubricator Adjustment Knob clockwise until closed.
7. Turn the Lubricator Adjustment Knob counterclockwise one-third turn.
8. Open the air line to the unit.

AIR CONNECTIONS

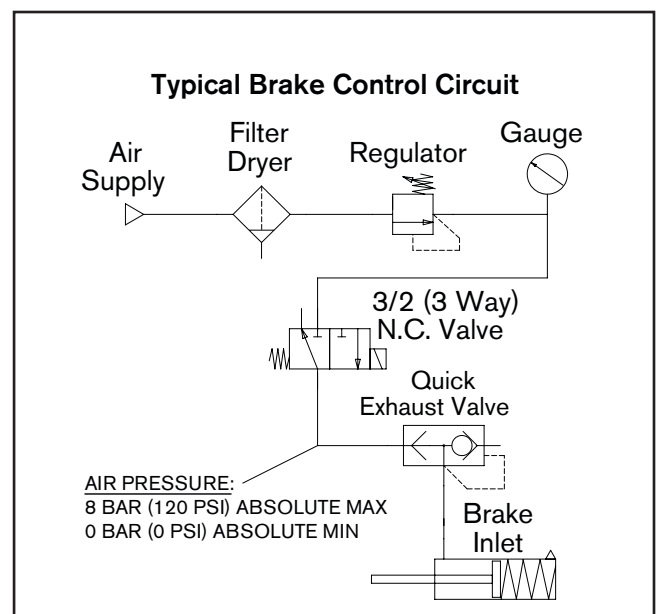
All Nexen pneumatically actuated devices require clean and dry air, which meet or exceeds ISO 8573.1:2001 Class 4.4.3 quality.

NOTE


For quick response, Nexen recommends a quick exhaust valve and short air lines between the Control Valves and the unit. Align the air inlet ports to a down position to allow condensation to drain out of the air chambers of the product.

	CAUTION Low air pressure will cause slippage and overheating. Excessive air pressure will cause abrupt starts and stops, reducing product life.
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The following is a common air supply scheme used with this product. This is an example and not an all-inclusive list. All air circuits to be used with this product must be designed following ISO 4414 guidelines.



OPERATION




WARNING

Never exceed maximum operating speeds listed for your product. (See Table 4).


TABLE 4

Sizes	Max RPM
BSB 2-5	10,000
BSB 7	5,000



CAUTION

Never exceed life of facing material. Facing life depends on the volume of material and the total energy over the life of the unit. Expected life (in hrs) can be found by: $\text{Time} = \text{Volume} / (\text{Power} * \text{Wear Rate})$.



CAUTION

The temperature limits for this product line are 4.5-104 Degree Celsius (40-220 Degree F).

BRAKE ASSEMBLY

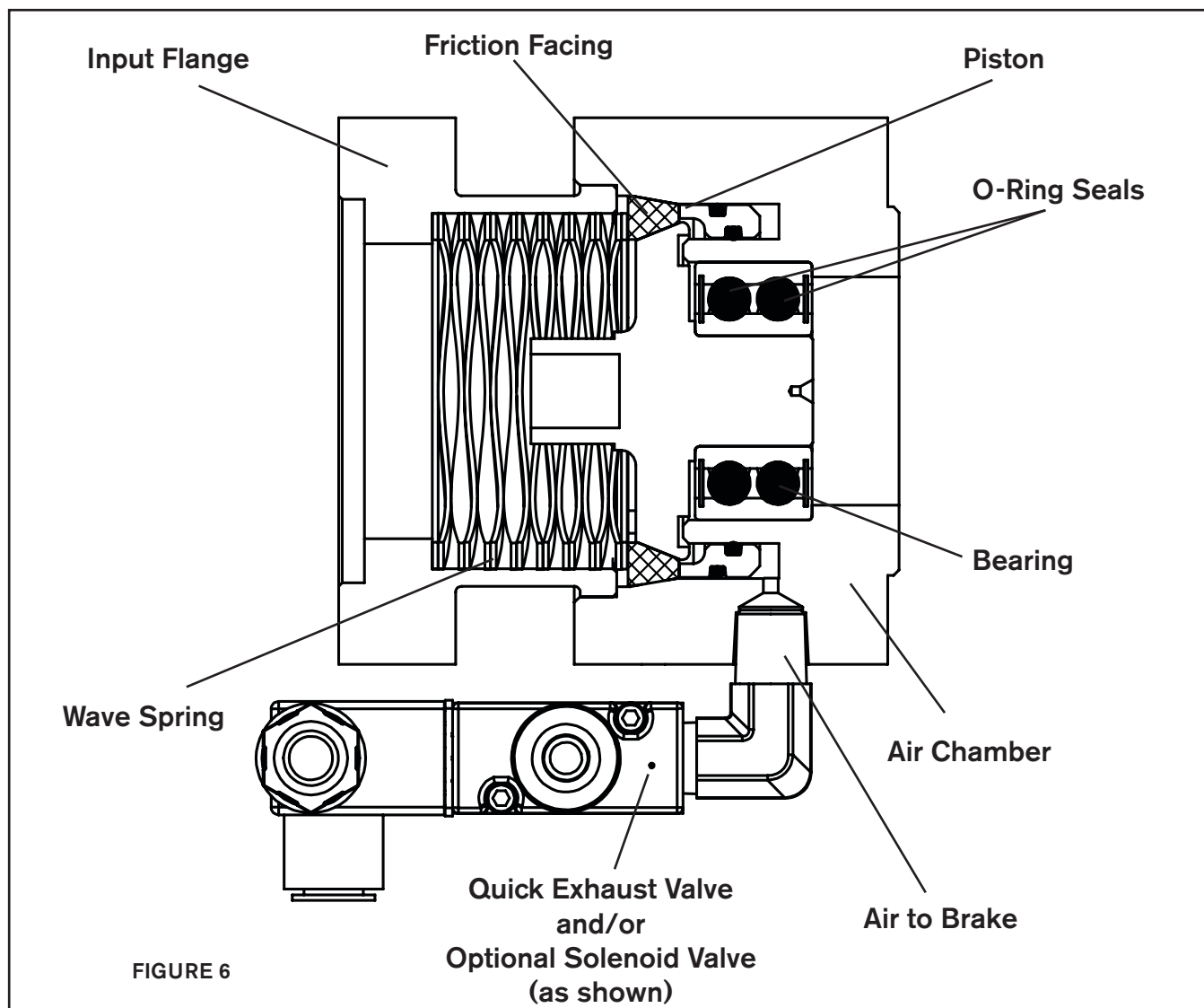
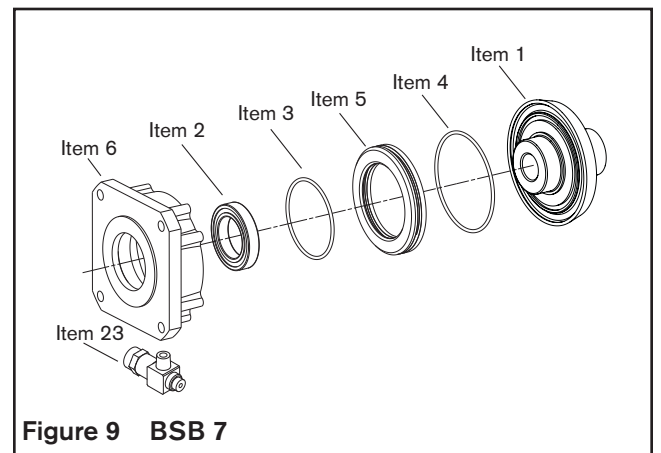
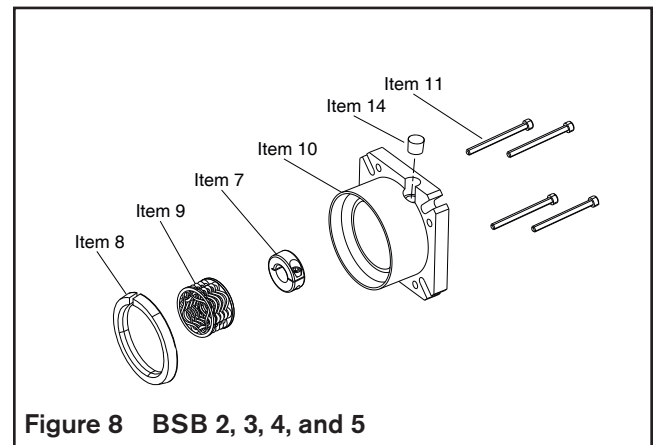
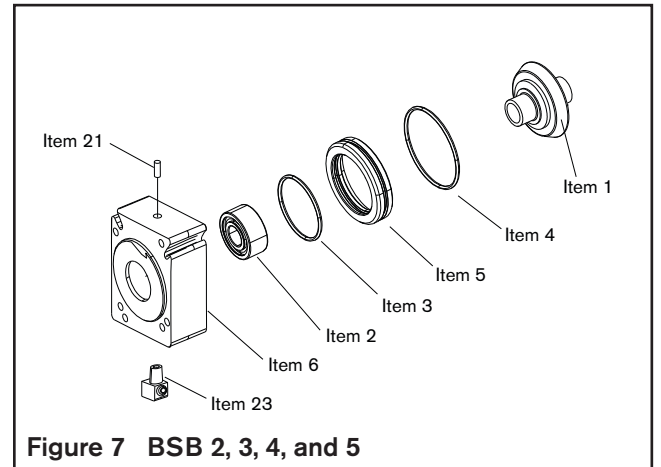
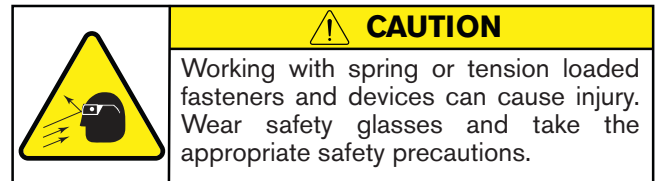


FIGURE 6

BEARING, O-RING, SEALS, AND SPRING ASSEMBLY

NOTE: Refer to Figures 6-9.

1. Alternately and evenly, remove the eight Socket Head Cap Screws (Item 11) and separate the Air Chamber (Item 6) from the Input Flange (Item 10).
2. Remove the Spring Backing Plate (Item 15), Piston (Item 5) and 10 Springs (Item 9) from the Air Chamber (Item 6). You may need to apply compressed air to the air inlet to remove the Piston. **Note: Only BSB 7 has Spring Backing Plate and multiple Springs.**
3. Press in on the Shaft (Item 1) to separate it from the Ball Bearing (Item 2).
4. Remove the old O-ring Seals (Items 3, 4) from the Piston (Item 5).
5. Press the Ball 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 (green) around the inner circumference of the bearing bore of the Air Chamber (Item 6).
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 surfaces of the Air Chamber (Item 6), the Piston (Item 5), and the O-ring Seals (Items 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).
13. Clean the friction surface of the Output Shaft (Item 1) and the Air Chamber (Item 6) with solvent. Ensure that it is clean and dry before installing the Friction Facing (Item 8) in Step 15.
14. While supporting the inner race of the new Ball Bearing (Item 2), press the Output Shaft (Item 1) into the new Bearing (Item 2) and Air Chamber (Item 6).



15. Position Friction Facing (Item 8) in the Air Chamber (Item 6) so the angled surfaces match up with the wall of the Air Chamber and the tapered disc of the Output Shaft (Item 1).
16. Replace the Backing Plate (Item 15), Springs (Item 9) and Input Flange (Item 10). **Note: Only BSB 7 has Spring Backing Plate and multiple Springs.**
17. Apply a drop of Loctite® 242 (blue) to the threads of the eight Socket Head Cap Screws (Item 11).
18. Reinstall and tighten the eight Socket Head Cap Screws (Item 11), securing the Air Chamber (Item 6) to the Input Flange (Item 10). Alternately tighten the eight Cap Screws to keep the input flange parallel to the Air Chamber. Refer to Table 5 for the recommended assembly torque.

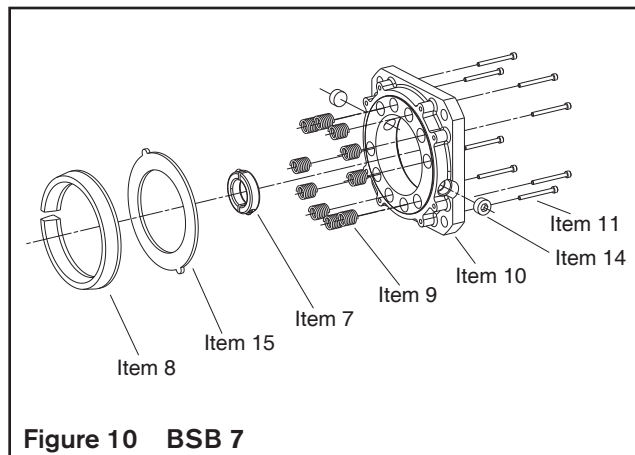


Figure 10 BSB 7

FRICITION FACING ASSEMBLY

NOTE: Refer to Figure 10

1. Alternately and evenly, remove the eight Socket Head Cap Screws (Item 11) and separate the Air Chamber (Item 6) from the Input Flange (Item 10).
2. Remove the Input Flange (Item 10), Backing Plate (Item 15) and ten Springs (Items 9). **Note: Only BSB 7 has Spring Backing Plate and multiple Springs.**
3. Remove and replace the Friction Facing (Item 8) in the Air Chamber (Item 6). Make certain that the angled sides mate with the wall of the Air Chamber and the tapered disc of the Output Shaft (Item 1).
4. Replace the Backing Plate (Item 15), Springs (Item 9) and Input Flange (Item 10). **Note: Only BSB 7 has Spring Backing Plate and multiple Springs.**
5. Apply a drop of Loctite® 242 (blue) to the threads of each of the eight Socket Head Cap Screws (Item 11).
6. Reinstall and tighten the eight Socket Head Cap Screws (Item 11), securing the Air Chamber (Item 6) to the Input Flange (Item 10). Alternately tighten the eight Cap Screws so the Input Flange stays parallel to the Air chamber Item 6) and does not pinch any of the Springs (Item 9). Refer to Table 5 for the recommended assembly torque.

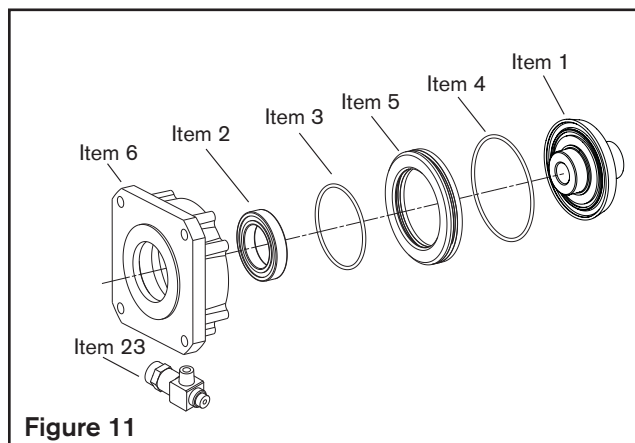
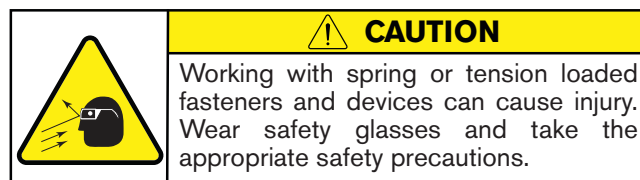


Figure 11

Table 5

Model	Socket Head Cap Screw (Item 11)	Recommended Assembly Torque
BSB 2	M4	4.2 - 5.4 Nm [37 - 48 in-lbs]
BSB 3	M5	7.0 - 9.2 Nm [62 - 81 in-lbs]
BSB 4	M6	9.2 - 1.9 Nm [81 - 105 in-lbs]
BSB 5	M8	26.2 - 34.0 Nm [232 - 301 in-lbs]
BSB 7	M5	7.0 - 9.2 Nm [62 - 81 in-lbs]

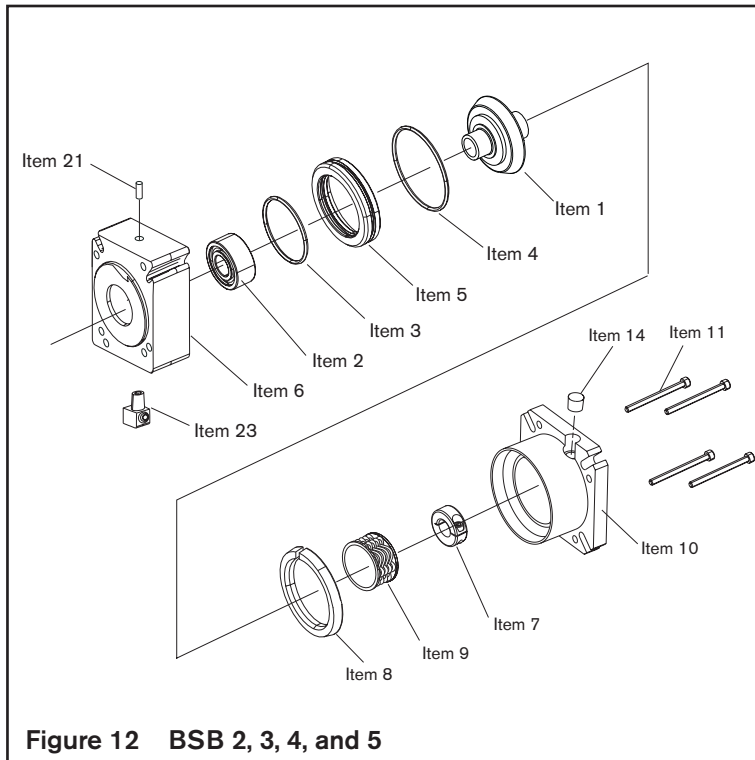
TROUBLESHOOTING

Problem	Probable Cause	Solution
Failure to engage (brake)	Weak or broken springs	Replace broken springs
Failure to disengage (1)	Control valve malfunction - air not getting to brake	Check for low air pressure or replace the control valve. NOTE: The Unit has been designed to release before (at or below) 5.5 bar [80 psi] Required disengagement pressure higher than 5.5 bar [80 psi] may indicate improper assembly.
Failure to disengage (2)	Air is leaking around the O-ring seals.	Replace the O-rings.
Loss of torque	Fraction Facing is worn or dirty.	Replace friction face.

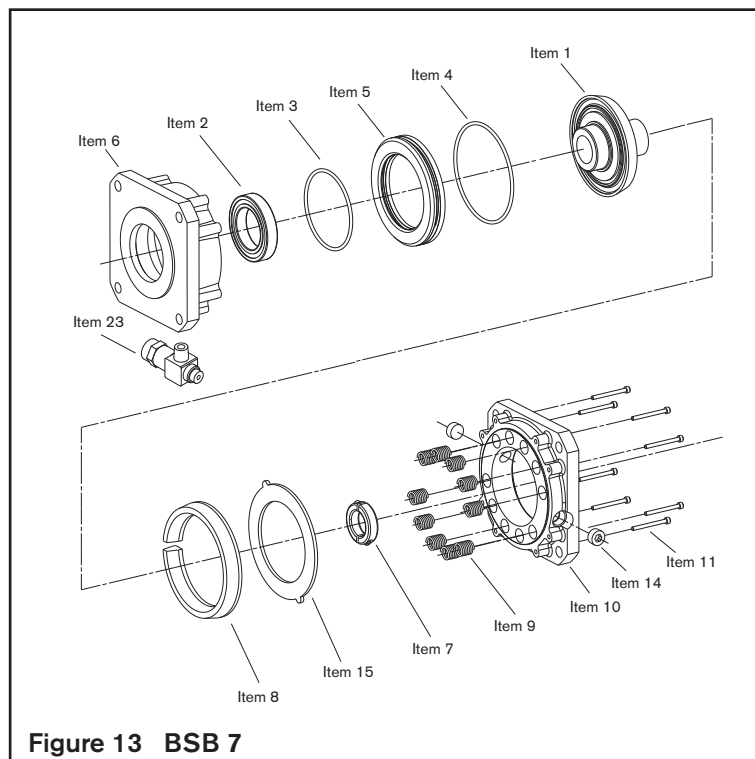
REPLACEMENT PARTS LIST

The Item or "Balloon" Number for all Nexen Products is used for part identification on all Product Parts List, Product Price List, Unit Assembly Drawings, Bills of Materials, and Instruction Manuals.

When ordering replacement parts, specify model designation, item number, part description, and quantity. Purchase replacement parts through your local Nexen Distributor.



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
8	Friction Facing	1
9	Wave Spring	1
10	Input Flange	1
11	Socket Head Cap Screw	4
12	Solenoid Valve (Optional)	1
14	Access Plug	1
21	Dowel Pin	1
23	Quick Exhaust Valve	1



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
8	Friction Facing	1
9	Springs	10
10	Input Flange*	1
11	Socket Head Cap Screw	8
12	Rectangular Key	1
14	Access Plug	2
15	Backing Plate, Spring	1
23	Quick Exhaust Valve	1

*Unpainted if Ordered Separately

WARRANTY

Warranties

Nexen warrants that the Products will (a) be free from any defects in material or workmanship for a period of 12 months from the date of shipment, and (b) will meet and perform in accordance with the specifications in any engineering drawing specifically for the Product that is in Nexen's current product catalogue, or that is accessible at the Nexen website, or that is attached to this Quotation and that specifically refers to this Quotation by its number, subject in all cases to any limitations and exclusions set out in the drawing. NEXEN MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty applies only if: (a) the Product has been installed, used and maintained in accordance with any applicable Nexen installation or maintenance manual for the Product; (b) the alleged defect is not attributable to normal wear and tear; (c) the Product has not been altered, misused or used for purposes other than those for which it was intended; and (d) Buyer has given written notice of the alleged defect to Nexen, and delivered the allegedly defective Product to Nexen, within one year of the date of shipment.

Exclusive Remedy

The exclusive remedy for the Buyer for any breach of any warranties provided in connection with this agreement will be, at the election of Nexen: (a) repair or replacement with new, serviceably used, or reconditioned parts or products; or (b) issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

Agent's Authority

Buyer agrees that no agent, employee or representative of Nexen has authority to bind Nexen to any affirmation, representation, or warranty concerning the Products other than those warranties expressly set forth herein.

Limitation on Nexen's Liability

TO THE EXTENT PERMITTED BY LAW NEXEN SHALL HAVE NO LIABILITY TO BUYER OR ANY OTHER PERSON FOR INCIDENTAL DAMAGES, SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OF ANY KIND OR NATURE WHATSOEVER, WHETHER ARISING OUT OF BREACH OF WARRANTY OR OTHER BREACH OF CONTRACT, NEGLIGENCE OR OTHER TORT, OR OTHERWISE, EVEN IF NEXEN SHALL HAVE BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH POTENTIAL LOSS OR DAMAGE. For all of the purposes hereof, the term "consequential damages" shall include lost profits, penalties, delay damages, liquidated damages or other damages and liabilities which Buyer shall be obligated to pay or which Buyer may incur based upon, related to or arising out of its contracts with its customers or other third parties. In no event shall Nexen be liable for any amount of damages in excess of amounts paid by Buyer for Products or services as to which a breach of contract has been determined to exist. The parties expressly agree that the price for the Products and the services was determined in consideration of the limitation on damages set forth herein and such limitation has been specifically bargained for and constitutes an agreed allocation of risk which shall survive the determination of any court of competent jurisdiction that any remedy herein fails of its essential purpose.

Inspection

Buyer shall inspect all shipments of Products upon arrival and shall notify Nexen in writing, of any shortages or other failures to conform to these terms and conditions which are reasonably discoverable upon arrival without opening any carton or box in which the Products are contained. Such notice shall be sent within 14 days following arrival. All notifications shall be accompanied by packing slips, inspection reports and other documents necessary to support Buyer's claims. In addition to the foregoing obligations, in the event that Buyer receives Products that Buyer did not order, Buyer shall return the erroneously shipped Products to Nexen within thirty (30) days of the date of the invoice for such Products; Nexen will pay reasonable freight charges for the timely return of the erroneously shipped Products, and issue a credit to Buyer for the returned Products at the price Buyer paid for them, including any shipping expenses that Nexen charged Buyer. All shortages, overages and nonconformities not reported to Nexen as required by this section will be deemed waived.

Limitation on Actions

No action, regardless of form, arising out of any transaction to which these terms and conditions are applicable may be brought by the Buyer more than one year after the cause of action has accrued.

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