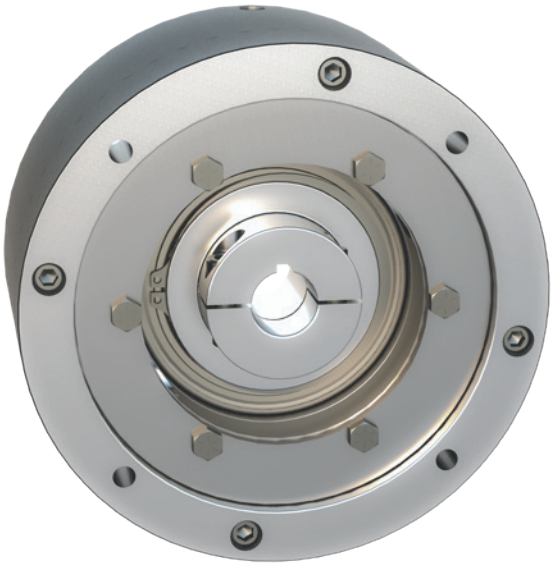
nexen

ROTARY MOTION CONTROL PRODUCTS

User Manual



ZSE, Zero-Backlash Spring Engaged Shaft Brake

Sizes 450, 600, 800 and 1000

CE

RoHS compliant

FORM NO. L-21288-C-0319

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
(651) 484-5900

www.nexengroup.com

DANGER

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.

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.

Nexen Group, Inc.
560 Oak Grove Parkway
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ISO 9001 Certified

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GENERAL SPECIFICATIONS

TABLE 1

Size	Min Holding Torque	Torsional Rigidity[1] (Estimated)	Inertia (Calculated)	Weight	Min. Disengagement Air Pressure	Maximum RPM
Size 450	32 Nm [23.6 ft*lb]	198,104 Nm/RAD [146,114 ft*lb/RAD]	307.5 to 325.4 kg*mm^2 [1.05 to 1.11 lb*in^2]	3.0 kg [6.6 lbs]	5.5 bar [80 psi]	5,000
Size 600	75 Nm [55.3 ft*lb]	357,811 Nm/RAD [263,908 ft*lb/RAD]	1,162 to 1,248 kg*mm^2 [3.97 to 4.27 lb*in^2]	5.9 kg [13.0 lbs]	5.5 bar [80 psi]	5,000
Size 800	175 Nm [129.1 ft*lb]	709,904 Nm/RAD [523,598 ft*lb/RAD]	4,388 to 4,622 kg*mm^2 [15 to 15.8 lb*in^2]	15.6 kg [34.3 lbs]	5.5 bar [80 psi]	5,000
Size 1000	300 Nm [221.3 ft*lb]	1,343,928 Nm/RAD [991,229 ft*lb/RAD]	18,799 to 20,177 kg*mm^2 [64 to 69 lb*in^2]	27.6 kg [60.8 lbs]	5.5 bar [80 psi]	4,000

[1] Torsional rigidity varies with bore size

GENERAL SAFETY PRECAUTIONS

⚠ CAUTION

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

⚠ CAUTION

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

⚠ WARNING

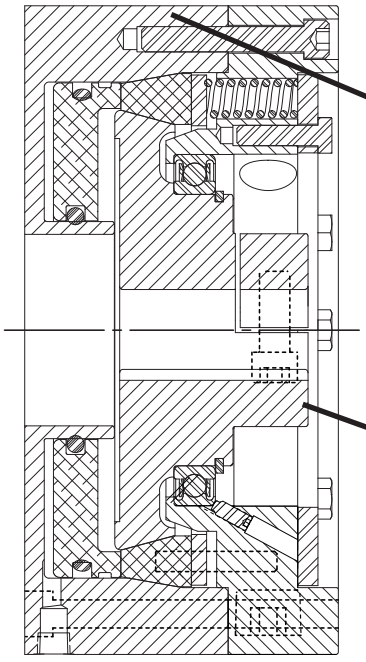
Ensure proper guarding of the product is used. Nexen recommends the machine builder design guarding in compliance with OSHA 29 CFR 1910 “Occupational Safety and Health Hazards”.

⚠ 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: Time=Volume/(Power*Wear Rate).

⚠ WARNING

Never exceed maximum operating speeds listed for your product. (See Table 1).



⚠ CAUTION

The temperature limits for this product line 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 ONTO SHAFT

NOTE: Refer to **Figures 1, 2 & 3**.

1. Remove the Access Plugs (Item 17) from the Input Flange (Item 2). Apply minimum 80 PSI air pressure to air inlet and rotate the Hub Assembly (Item 1) until its screws are lined up with the access holes.

2. Loosen Screws (Item 13) slightly so that Hub Clamping-Collar Half (Item 1-B) is loose on Hub (Item 1-A) *(A Ball-End Allen Wrench/Hex Socket may be needed for some units.)*

CAUTION: Do not lubricate either the Clamping Collar or 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.

3. Slide the ZSE Brake unit onto the Shaft. Install a Key if needed. Shaft should meet the specifications in **Figure 2**. *Note: Using a key is recommended for dynamic cycling of the brake. (Utilize a trapped keyway on shaft.)*

4. Using four customer-supplied Socket Head Cap Screws (See **Table 3**), bolt the Input Flange (Item 2) to an Anti-Rotation Mounting Surface that meets the specifications in **Figure 3**. Tighten the Cap Screws finger tight, so that the brake is tight to the Anti-Rotation Plate.

5. Using Allen Wrench (Hex Socket) (or two of them if available), tighten the two Socket Head Cap Screws (Item 13) in the Hub & Clamp Collar (Item 1) to the recommended torque listed in **Table 2**.

CAUTION: Under tightening the Hub Clamping Collar may cause slippage between the Brake and the Shaft. This can cause damage to the Brake, Shaft or Both, and result in low Braking Torque.

6. Tighten the four Socket Head Cap Screws from Step 4 evenly to the recommended torques listed in **Table 3**.

7. Reinstall the Access Plugs (Item 17) into the access holes on the Input Flange (Item 2).

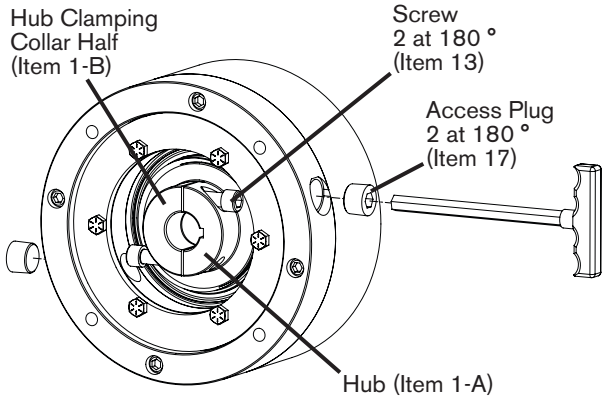


FIGURE 1 *CLAMP COLLAR TIGHTENING*

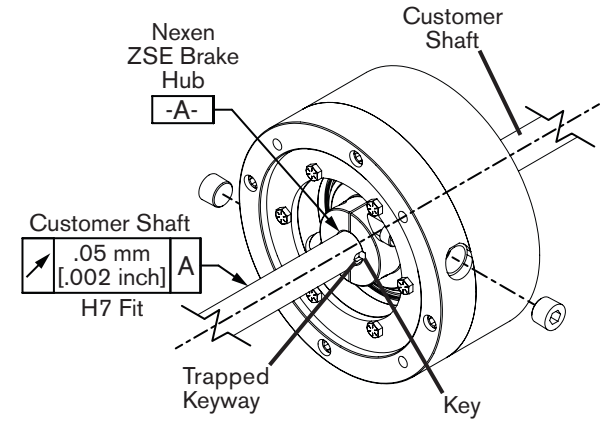


FIGURE 2 *CUSTOMER SHAFT MOUNTING*

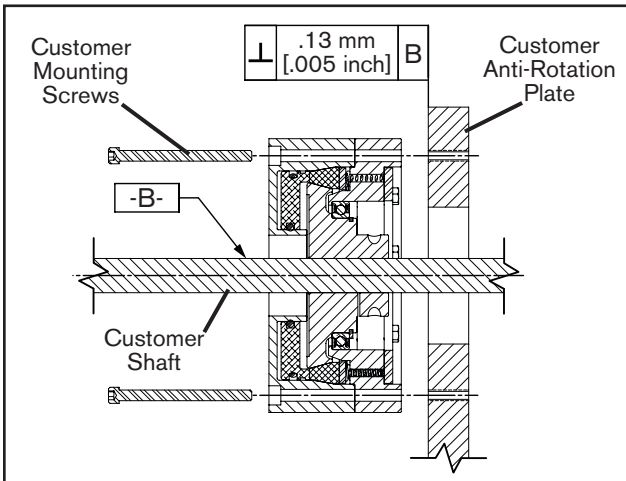


FIGURE 3 *CUSTOMER ANTI-ROTATION PLATE*

⚠ DANGER

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

TABLE 2

HUB CLAMP COLLAR SCREWS			
Brake Model	Shaft Size	Cap Screw	Recommended Collar Screw Torque
Size 450	15.875 to 25.400 mm [0.625] to [1.000] inch	1/4-20 (3/16 Hex Socket)	11.3 Nm [100 in-lbs]
Size 600	19.050 to 34.925 mm [0.750] to [1.375] inch	5/16-18 (1/4 Hex Socket)	36.7 Nm [325 in-lbs]
Size 800	25.400 to 49.2125 mm [1.000] to [1.9375] inch	3/8-16 (5/16 Hex Socket)	65.5 Nm [580 in-lbs]
Size 1000	34.925 to 74.6125 mm [1.375] to [2.9375] inch	7/16-14 (3/8 Hex Socket)	104.5 Nm [925 in-lbs]

TABLE 3

CUSTOMER BRAKE MOUNTING SCREWS		
Brake Model	**Socket Head Cap Screw** (Customer Supplied)	**Recommended Fastening Torque**
Size 450	#10 Screw, 2.4375" Long Minimum	7.5 Nm [66 in-lbs]
Size 600	1/4 inch Screw, 2.875" Long Minimum	11.3 Nm [100 in-lbs]
Size 800	5/16 inch Screw, 3.875" Long Minimum	36.7 Nm [325 in-lbs]
Size 1000	1/2 inch Screw, 4.4375" Long Minimum	161 Nm [1425 in-lbs]

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.

⚠ DANGER

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

1. **Basic Configuration:**

   Attach a Standard Air Fitting to the Brake. Use Teflon tape and/or pipe sealant on the threads. This configuration will have slower response times.

   Standard Configuration:

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

ZSE Unit Size	Quick Exhaust Valve Part Number
450, 600, 800	945100 (.125-27 NPT)
1000	945125 (.250-18 NPT)

   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. Refer to **Figure 5**.

   ⚠ CAUTION

   The 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 brake is disengaged.

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

2. Attach the air supply line to the air inlet, the quick exhaust valve, or the solenoid valve, depending on configuration selected in **Step 1**.
3. 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 **Table 4**, to the appropriate power supply, see **Table 5**.

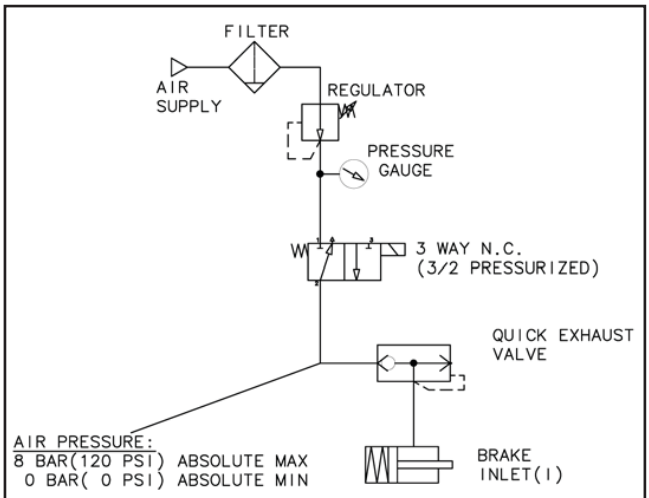


FIGURE 4 *AIR CONNECTIONS SCHEMATIC*

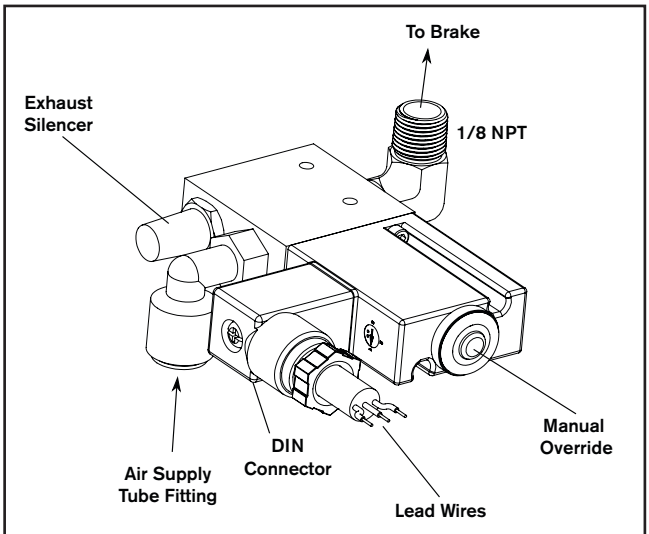


FIGURE 5 *Optional Solenoid Valve Part #964650.*

Table 4

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

Table 5

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.

FORM NO. L-21288-C-0319

AIR LUBRICATION

NOTE

Nexen pneumatically actuated devices require clean, pressure regulated air for maximum performance and life. Nexen pneumatically operated devices pneumatic seals 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.

LUBRICATOR DRIP RATE SETTINGS

⚠ CAUTION

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

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.

ZSE-S SENSOR WIRING

THIS SECTION ONLY APPLIES TO ZSE-S BRAKES

The Smart ZSE Brake (ZSE-S) includes a factory installed proximity sensor and thermal sensor, all packaged inside the sensor housing with connectors for simplified wiring (See **Figure 6**). The proximity sensor monitors the disengagement status, and the thermal sensor monitors the internal temperature of the brake.

TEMPERATURE SENSOR

The Platinum Resistive Temperature Device (RTD) is a 100Ω sensor compliant with DIN 4376, often referred to as PT100. There are many compatible PT100 signal conditioner/amplifiers available. The ZSES can be used with 2, 3 or 4 wire sensing options.

Note:
The 3 and 4 wire sensing options are capable of accurately measuring over extended distances. Two wire operation should only be used for cables shorter than 1.8 m [6 ft]

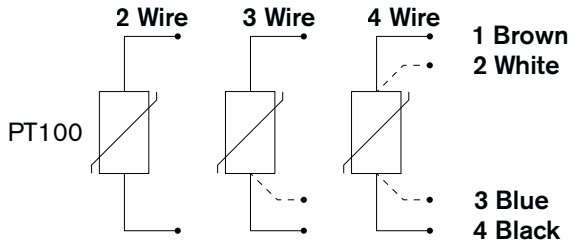


FIGURE 7 *TYPICAL SIGNAL CONDITIONER WIRING EXAMPLES*

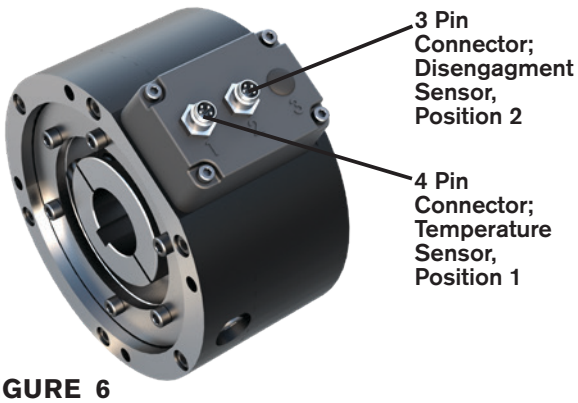


FIGURE 6
ZSE-S BRAKE CONNECTORS

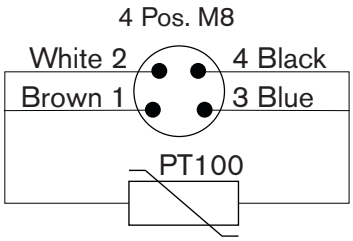


FIGURE 8 *TYPICAL SIGNAL CONDITIONER WIRING EXAMPLES*

DISENGAGEMENT SENSOR

The ZSE-S Brake's Disengagement Sensor is an Inductive Proximity Sensor, that is capable of operating in two modes:

PNP Mode (default)
The Disengagement Sensor is a Normally Open (N.O.) PNP type Sourcing Output, as detailed in **Figure 9**. Typically this will be matched with a PLC Sinking Input, as illustrated in **Figure 11**.

IO-Link Mode
IO-Link is an industry standard communication protocol for simple sensors and actuators. It allows for monitoring sensor operation, diagnostics and warnings. If sensor is connected to an IO-Link hub, then the IO-Link functionality is automatically enabled, otherwise the sensor acts in the PNP mode (see above). Follow IO-Link hub manufacturer's literature for setup. The IO-Link Device Description file (IODD) is provided by www.contrinex.com (see **Figure 9**).

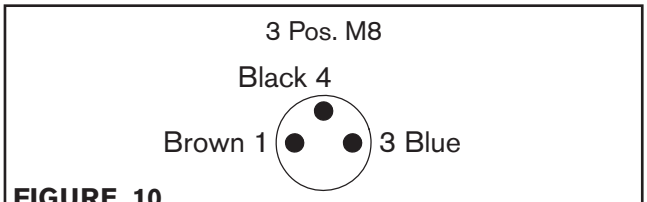
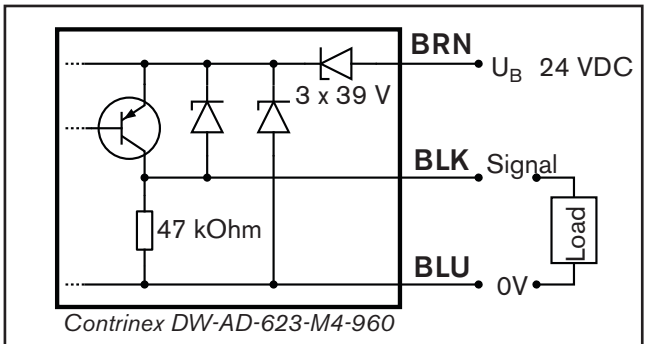


FIGURE 10
DISENGAGEMENT SENSOR CONNECTOR



Contrinex DW-AD-623-M4-960

FIGURE 9
DISENGAGEMENT SENSOR OUTPUT

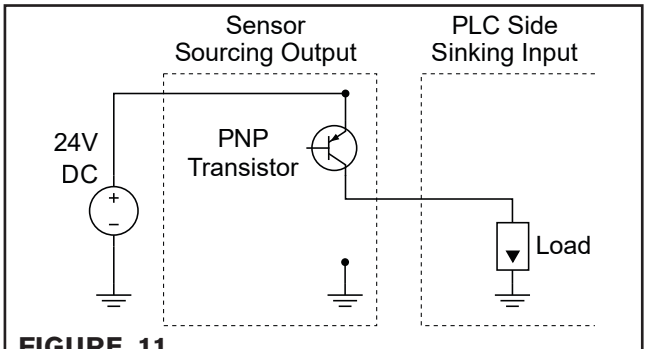


FIGURE 11
TYPICAL PNP SENSOR CONFIGURATION

FORM NO. L-21288-C-0319

BRAKE ASSEMBLY

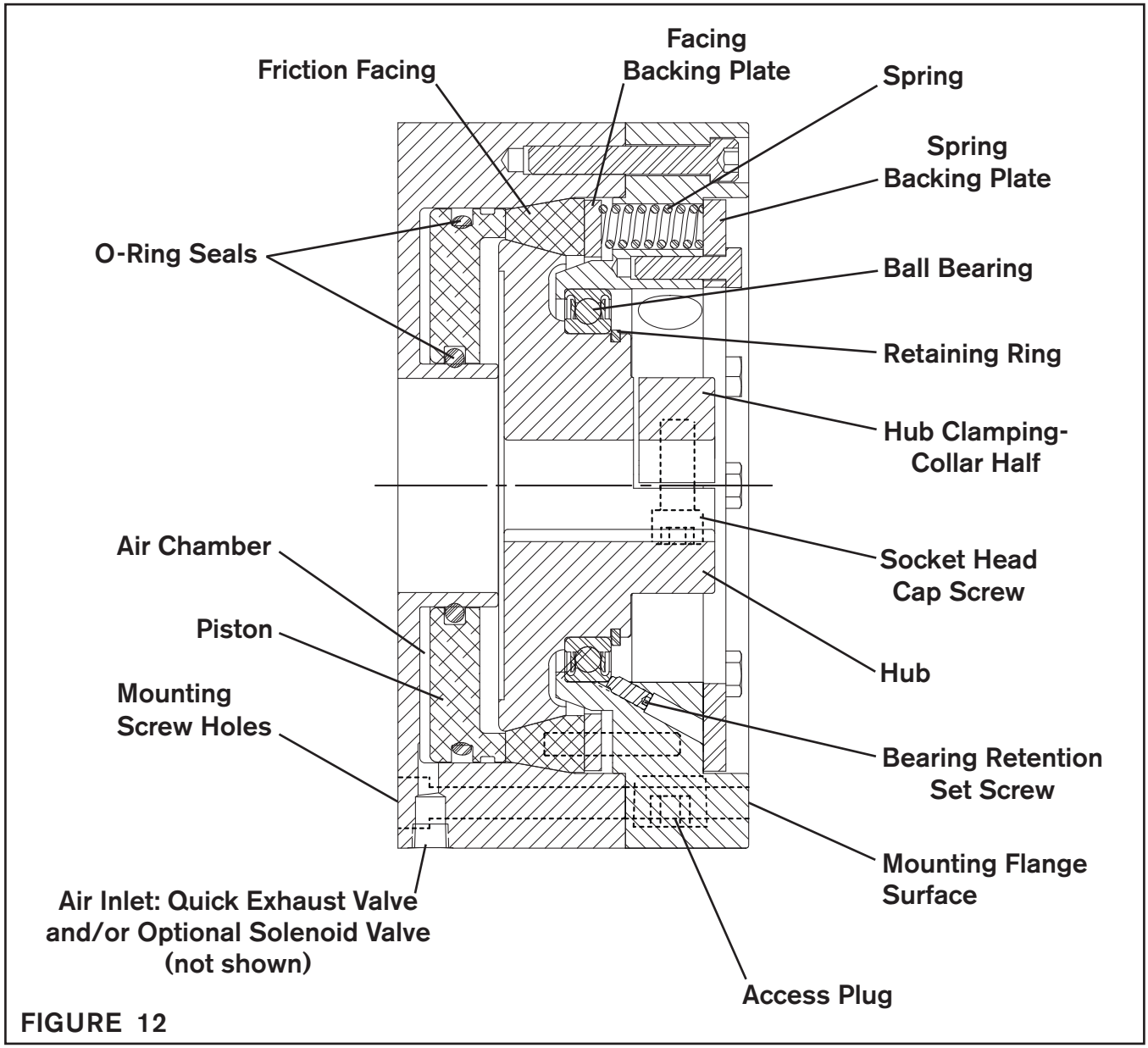


FIGURE 12

BRAKE UNIT REBUILD: DISASSEMBLY

DISASSEMBLY; **TERMINAL BOX REMOVAL**
ONLY APPLIES TO ZSE-S BRAKES

NOTE: Refer to **Figures 6 & 22**

In order to disassemble ZSE-S Brakes; the Terminal Box (Item 20) must be removed.

1. Remove the two Sensor Connector Nuts from the Terminal Box (Item 20).
2. Remove the four Socket Head Cap Screws (Item 21).
3. Gently pull the Terminal Box (Item 20) away from the Brake, and push the Sensor connectors out of the Terminal Box.

Notes: The sensors are not serviceable. Take care not to damage Disengagement Sensor Sub-Assy (Item 22) when disassembling or reassembling the brake.

DISASSEMBLY; **SPRING REMOVAL:**

NOTE: Refer to **Figure 13**

1. Un-install ZSE brake from shaft and remove air pressure.
2. Loosen each Hex Head Cap Screw (Item 15) one turn at a time, moving in a circular pattern until the Springs (Item 7) reach free height and there is no load on the Spring Backing Plate (Item 11). *HEX HEAD CAP SCREWS (ITEM 15) MUST BE REMOVED EVENLY, FAILURE TO DO SO MAY RESULT IN VIOLENT RELEASE OF THE SPRING BACKING PLATE (ITEM 11) AND SPRINGS (ITEM 7)*
3. Remove the Springs (Item 7) from the Input Flange (Item 2).

DISASSEMBLY; **O-RING SEAL REMOVAL:**

NOTE: Refer to **Figure 14**

1. Remove the four Socket Head Cap Screws (Item 14) and separate the Input Flange (Item 2) from the Air Chamber (Item 3).
2. Remove the Piston (Item 4) from the Air Chamber (Item 3).
3. Remove the old O-Ring Seals (Items 8 and 9) from the Piston (Item 4).

DISASSEMBLY; **FRICTION FACING, BALL BEARING AND HUB REMOVAL:**

NOTE: Refer to **Figures 15, 16, 17, 18** & **Table 6**

1. Remove Retaining Ring (Item 12) from Hub (Item 1)
2. Place Shim(s) in-between Hub Clamping-Collar Half (Item 1-B) and Hub (Item 1-A). Hand tighten Screws (Item 13) to secure Hub Clamping-Collar Half (Item 1-B) to Hub (Item 1-A). See Shim Selection **Table 6**.
3. With the Input Flange (Item 2) fully supported, press the Hub (Item 1) out of the Input Flange (Item 2).
4. Remove Friction Facing (Item 5) and Facing Backing Plate (Item 10) from Hub (Item 1).
5. Remove Bearing Retention Set Screws (Item 19) from Input Flange (Item 2).
6. Press the Ball Bearing (Item 6) out of the Input Flange (Item 2). This may damage the OLD Ball Bearing (Item 6).
7. Clean the bearing bore of the Input Flange (Item 2) with fresh solvent, removing old Loctite®.

⚠ CAUTION

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

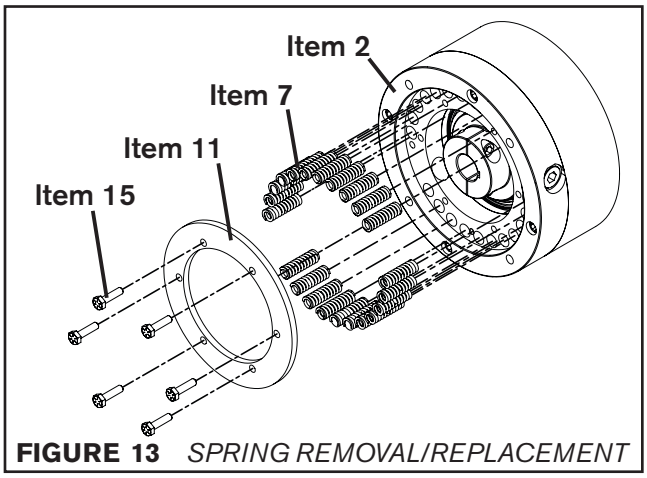


FIGURE 13 *SPRING REMOVAL/REPLACEMENT*

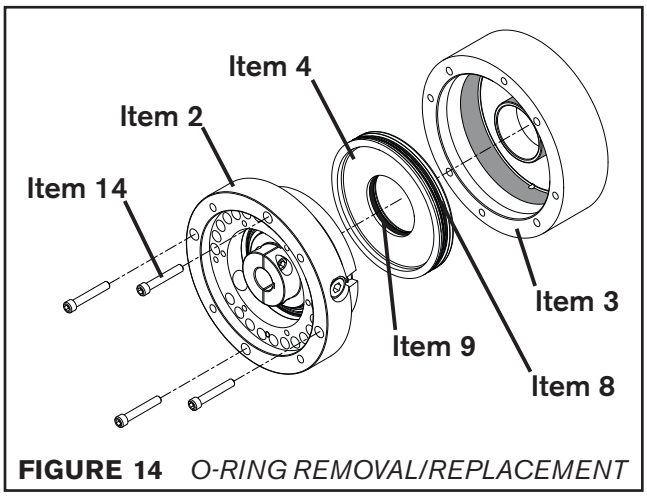


FIGURE 14 *O-RING REMOVAL/REPLACEMENT*

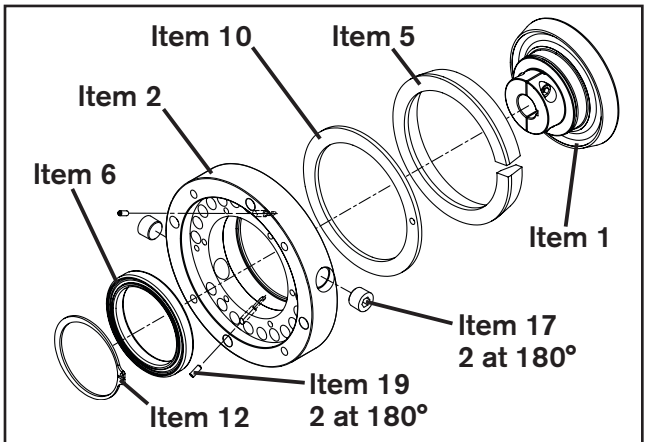


FIGURE 15 *BEARING REMOVAL/REPLACEMENT*

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REASSEMBLY; **BEARING INSTALLATION:**

NOTE: Refer to **Figure 15, 19** & **Table 7**

1. Apply a continuous bead of Loctite® 680 (green) around the outer circumference of the replacement bearing (Item 6).
2. Carefully align the outer race of the NEW replacement Bearing (Item 6) with the bearing bore of the Input Flange (Item 2).
3. Supporting the Input Flange (Item 2) and pressing on the **outer race** of the NEW replacement Ball Bearing (Item 6), press the new Bearing into the Input Flange (Item 2). Ensure Ball Bearing (Item 6) is fully seated against Input Flange (Item 2) Bearing Land. See **Table 7** for Press Tool Sizing.

REASSEMBLY; **FACING INSTALLATION:**

NOTE: Refer to **Figure 18**

1. Clean the friction surface of the Hub (Item 1) with solvent. Ensure that it is clean and dry before installing the Friction Facing (Item 5).
2. Place Facing Backing Plate (Item 10) and then the Friction Facing (Item 5) on the Input Flange (Item 2) as shown in **Figure 18**. *The hole in Facing Backing Plate (Item 10) fits over Anti-Rotation Pin (Item 16).* Ensure *Friction Facing (Item 5) is orientated such that it's taper is the same direction as the taper on* Hub (Item 1). *Rotate Friction Facing (Item 5) so that Anti-Rotation Pin (Item 16) fits in facing gap.*

REASSEMBLY; **HUB INSTALLATION:**

NOTE: Refer to **Figure 18, 19** & **Table 7**

1. Apply a continuous bead of Loctite® **648** (green) around the inner circumference of the NEW replacement Ball Bearing (Item 6) and the Bearing Land of Hub (Item 1).
2. While supporting the inner race of the NEW replacement Ball Bearing (Item 6), press the Hub (Item 1) into the NEW replacement Ball Bearing (Item 6) and Input Flange (Item 2). See **Table 7** for Support Jig Sizing.
3. Re-Install the Retaining Ring (Item 12) onto Hub (Item 1).
4. Apply a drop of Loctite® 242 (blue) to the threads of the two Bearing Retention Set Screws (Item 19) and re-install them in Input Flange (Item 2). Tighten Bearing Retention Set Screws (Item 19) until contact is felt.

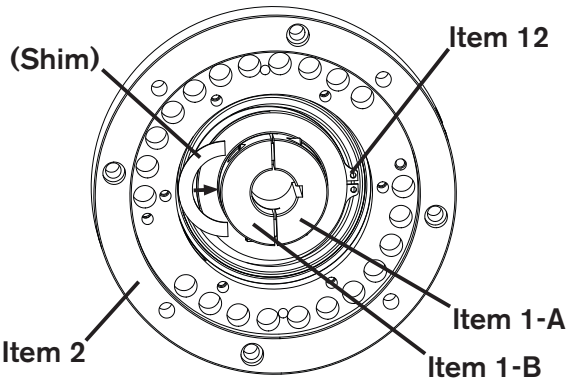

FIGURE 16 *HUB SHIMMING/REMOVAL*

TABLE 6

SHIM SPECIFICATIONS	
Brake Model	Shim Thickness
Size 450 Size 600 Size 800	0.060 inch
Size 1000	0.125 inch

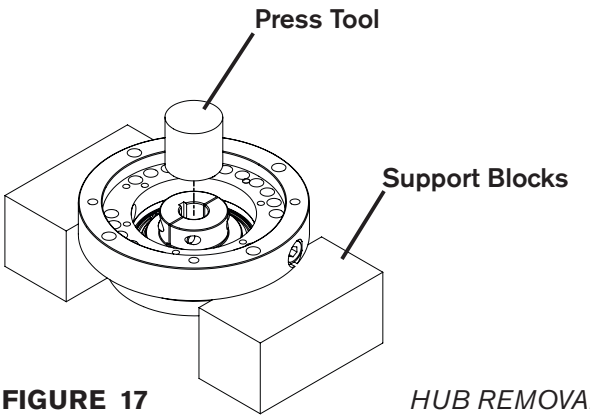

FIGURE 17 *HUB REMOVAL*

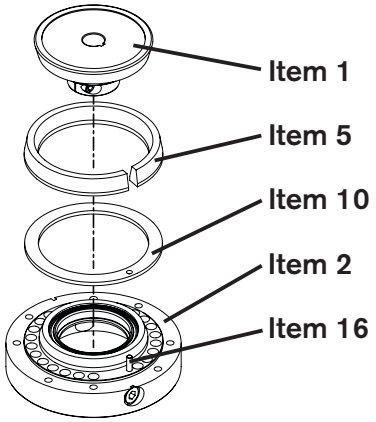

FIGURE 18 *FRICTION FACING RE-INSTALLATION*

(continued)

REASSEMBLY; **PISTON INSTALLATION:**

NOTE: Refer to **Figure 14, 20**

1. Visually inspect the inner diameter grooves and the outer diameter grooves of the Piston (Item 4) for debris. Visually inspect the inner and outer diameters of the Air Chamber (Item 3) that contact the O-Ring Seals (Items 8 and 9) for debris. Clean all surfaces of piston, and all inside surfaces of Air Chamber (Item 3) of OLD O-Ring lube with fresh solvent, then wipe dry.
2. Install the NEW replacement O-Ring Seals (Items 8 and 9) onto Piston (Item 4). DO NOT LUBRICATE O-RING SEALS OR PISTON.
3. Apply a thin film of O-Ring lubricant to the inside surfaces of Air Chamber (Item 3) that come in contact with O-Ring Seals (Items 8 and 9). Air Chamber/O-Ring Contact Surfaces are shown shaded gray in **Figures 14 & 20.**
4. Slide the Piston (Item 4) into the Air Chamber (Item 3).

REASSEMBLY; **BRAKE BODY/SPRINGS:**

NOTE: Refer to **Figures 13, 14** & **Tables 8, 9**

1. Clean the friction surface of the Air Chamber (Item 3) with solvent. Ensure that it is clean and dry.
2. Drop Input Flange/Hub Assembly into Air Chamber. Ensure assembly screw holes line up between Air Chamber and Input Flange.
3. Apply a drop of Loctite® 242 (blue) to the threads of the four Socket Head Cap Screws (Item 14). Reinstall and tighten the four Socket Head Cap Screws (Item 14), securing the Input Flange (Item 2) to the Air Chamber (Item 3). Alternately tighten the four Socket Head Cap Screws (Item 14). Refer to **Table 8** for recommended assembly torque.
4. Place all of the NEW replacement Springs (Item 7) into the Input Flange's (Item 2) Spring Pockets.
5. Apply a drop of Loctite® 242 (blue) to the threads of the six Hex Head Cap Screws (Item 15). Reinstall and tighten the six Hex Head Cap Screws (Item 15), securing the Spring Backing Plate (Item 11) to the Input Flange (Item 2). Alternately tighten the six Hex Head Cap Screws (Item 15) so the Spring Backing Plate (Item 11) stays parallel to the Input Flange (Item 2) and does not pinch any of the Springs (Item 7). *HEX HEAD CAP SCREWS (ITEM 15) MUST BE REMOVED/INSTALLED EVENLY, FAILURE TO DO SO MAY RESULT IN VIOLENT RELEASE OF THE SPRING BACKING PLATE (ITEM 11) AND SPRINGS (ITEM 7)* Refer to **Table 9** for the recommended assembly torque.

REASSEMBLY; **TERMINAL BOX INSTALLATION:**
ONLY APPLIES TO ZSE-S BRAKES

NOTE: Refer to **Figures 6 & 22**

After ZSE-S Brake is otherwise fully assembled:

1. Place the Sensor Connectors into Terminal Box (Item 20)
   a. The Four Pin Sensor Connector goes in Position "1" of the Terminal Box (Item 20).
   b. The Three Pin Sensor Connector goes in Position "2" of the Terminal Box (Item 20).
2. Torque the Sensor Connector Nuts hand tight.
3. Apply a drop of Loctite® 242 (blue) to the threads of the four Socket Head Cap Screws (Item 21) and reinstall them hand tight.

⚠ CAUTION

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

FIGURE 19
BEARING & HUB INSTALLATION TOOL

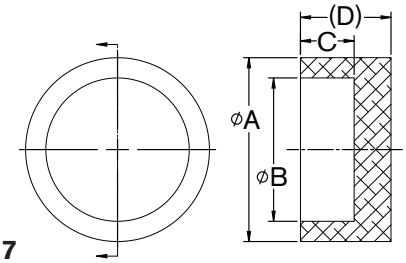

TABLE 7

HUB INSTALLATION SUPPORT JIG*				
Brake Model	**A** [O.D.]	**B** [I.D.]	**C** [Depth]	**D** [Length]
Size 450	ø 2.540"	ø 1.985"	0.893" +	1.375" +
Size 600	ø 3.330"	ø 2.575"	1.083" +	1.750" +
Size 800	ø 4.315"	ø 3.365"	1.260" +	1.625" +
Size 1000	ø 5.885"	ø 4.725"	1.535" +	2.250" +

TABLE 8

SCREWS: MOUNTING FLANGE TO AIR CHAMBER CONNECTION		
Brake Model	Screw Size (Item 14)	Recommended Assembly Torque
Size 450	#8-32 (9/64 inch Hex Socket)	5.1 Nm [45 in-lbs]
Size 600	#10-24 (5/32 inch Hex Socket)	7.5 Nm [66 in-lbs]
Size 800	5/16-18 (1/4 inch Hex Socket)	36.7 Nm [325 in-lbs]
Size 1000	3/8-16 (5/16 inch Hex Socket)	65.5 Nm [580 in-lbs]

TABLE 9

SCREWS: SPRING RETAINING PLATE		
Brake Model	Hex or Socket Head Cap Screw (Item 15) Size	Recommended Assembly Torque
Size 450	#8-32 SHCS (9/64 inch Hex Socket)	5.1 Nm [45 in-lbs]
Size 600	#10-24 SHCS (5/32 inch Hex Socket)	7.5 Nm [66 in-lbs]
Size 800	1/4-20 HHCS (7/16 inch Socket)	15.0 Nm [133 in-lbs]
Size 1000	1/4-20 HHCS (7/16 inch Socket)	15.0 Nm [133 in-lbs]

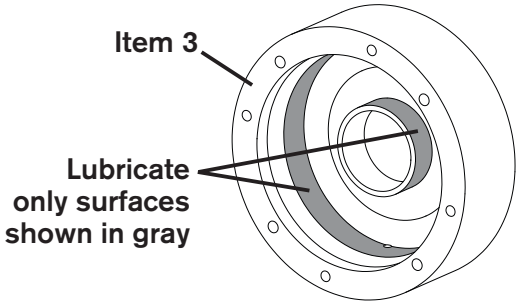

FIGURE 20 *AIR CHAMBER LUBRICATION*

REPLACEMENT PARTS LIST, STANDARD ZSE BRAKE

The item or balloon number for all Nexen products is used for part identification on all product parts lists, product price lists, 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.

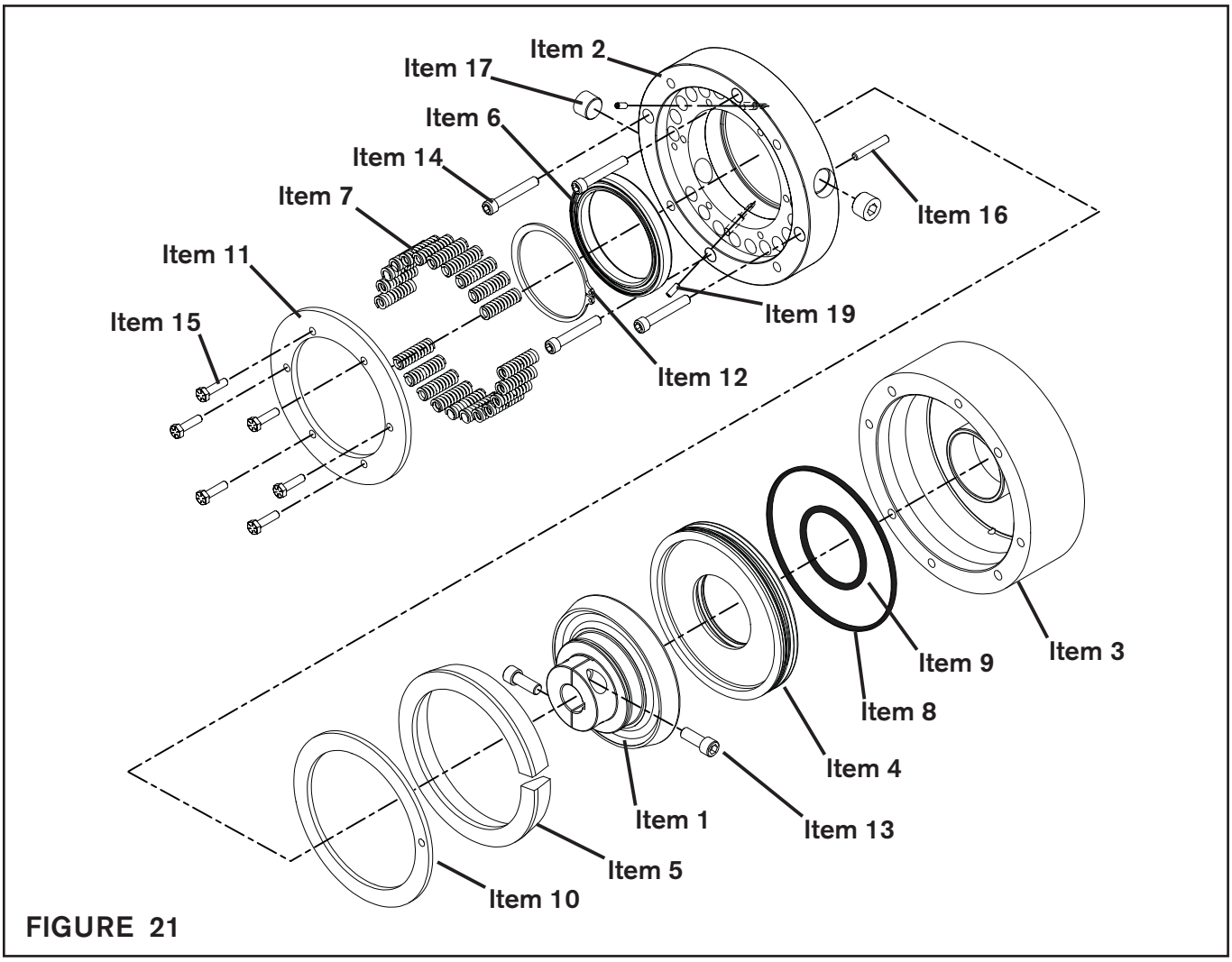

FIGURE 21

ITEM	DESCRIPTION		QTY
1	Hub		1
2	Input Flange		1
3	Air Chamber		1
4	Piston		1
5	Friction Facing		1
6	Ball Bearing		1
7	Springs:	Size: 450	18
		Size: 600	20
		Size: 800	20
		Size: 1000	12

ITEM	DESCRIPTION	QTY
8	O-Ring Seal	1
9	O-Ring Seal	1
10	Plate, Backing, Facing	1
11	Plate, Backing, Spring	1
12	Retaining Ring	1
13	Socket Head Cap Screw	2
14	Socket Head Cap Screw	4
15	Socket/Hex Head Cap Screw	6
16	Dowel Pin	1
17	Access Plug	2
19	Set Screw	2

REPLACEMENT PARTS LIST; ZSE-S BRAKE

The item or balloon number for all Nexen products is used for part identification on all product parts lists, product price lists, 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.

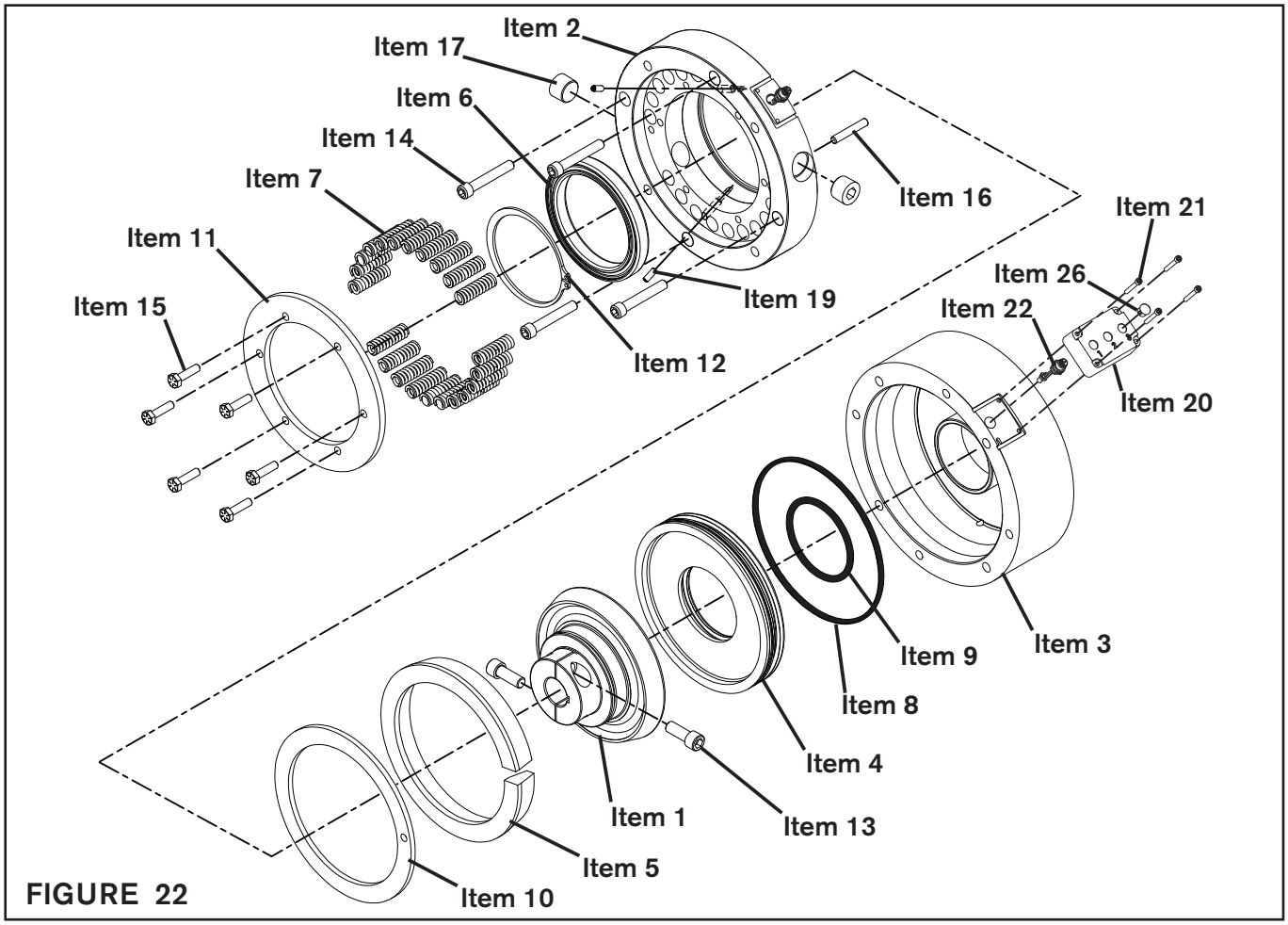

FIGURE 22

ITEM	DESCRIPTION		QTY
1	Hub		1
2	Input Flange		1
3	Air Chamber		1
4	Piston		1
5	Friction Facing		1
6	Ball Bearing		1
7	Springs:	Size: 450	18
		Size: 600	20
		Size: 800	20
		Size: 1000	12
8	O-Ring Seal		1
9	O-Ring Seal		1
10	Plate, Backing, Facing		1

ITEM	DESCRIPTION	QTY
11	Plate, Backing, Spring	1
12	Retaining Ring	1
13	Socket Head Cap Screw	2
14	Socket Head Cap Screw	4
15	Socket/Hex Head Cap Screw	6
16	Dowel Pin	1
17	Access Plug	2
19	Set Screw	2
20	Box, Terminal (ZSES ONLY)	1
21	Socket Head Cap Screw	4
22	Engagement Sensor Assembly	1
26	Plastic Plug	1

TROUBLESHOOTING

Failure to engage (brake).	Weak or broken springs.	Replace broken springs.
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 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.	Friction Facing is worn or dirty.	Replace the Friction Facing.

FORM NO. L-21288-C-0319

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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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