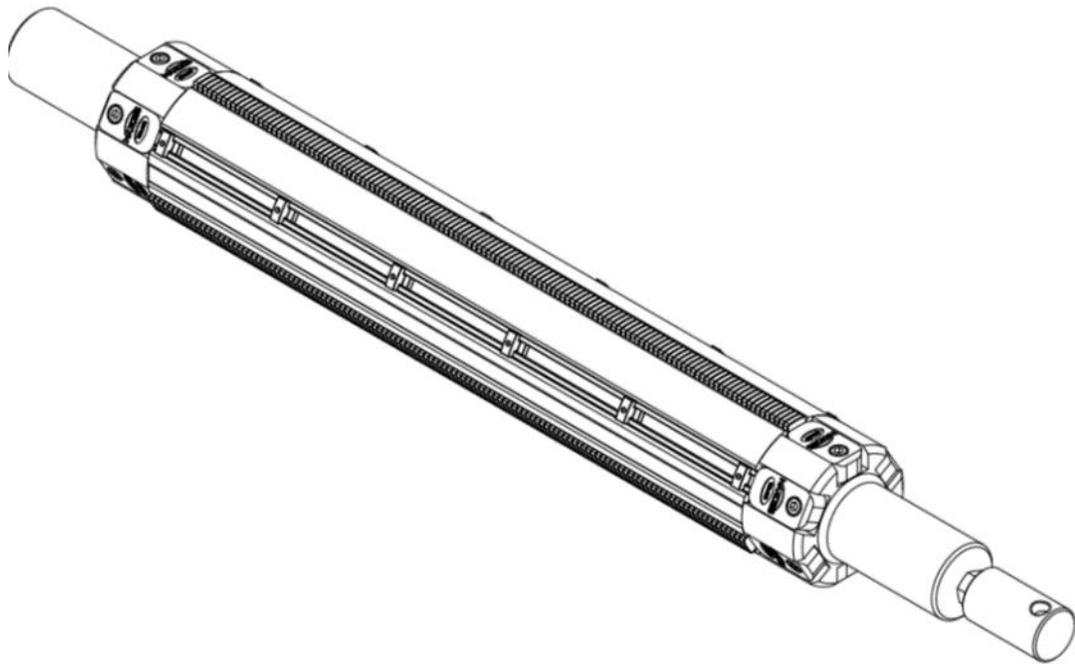




TIDLAND WINDING SOLUTIONS

A **MAXCESS**® BRAND

D6X Differential Air Shaft Installation, Operation and Maintenance Manual



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Important Safety Instructions

When using this product, basic safety precautions should always be followed to reduce the risk of personal injury. When using this product with any other equipment or machinery, all safety requirements stipulated by that equipment or machinery manufacturer must be followed. Compliance with local, state, and federal safety requirements is your responsibility. Be familiar with the hazards and safety requirements in your work environment and always work safely.

Read and understand all instructions and shaft design application limits before operation. Never use this product for a purpose or in a machine it was not specifically designed for. See Product Safety Data Sheet (PSDS) for more information.

- 1) Do not exceed the operation loads for this shaft as noted on its PSDS.
- 2) Follow all warnings and instructions marked on the product and on the PSDS.
- 3) Do not use fingers or other objects to deflate the shaft; Tidland recommends using the Tidland Air Release Tool.
- 4) Inspect the shaft for wear and/or other safety and functional deficiencies before each use.
- 5) Wear safety glasses or proper eye protection when operating the air system.
- 6) Do not remove or otherwise alter any setscrews or fastening devices prior to using this product.
- 7) Do not operate this product if any setscrews or fastening devices are missing.
- 8) Do not lift shaft manually if it is beyond your capacity. Loads over 1/3 your body weight may be prohibitive. Consult your company safety policy.
- 9) When lifting a shaft, use proper lifting techniques, keeping back straight and lifting with the legs.
- 10) Do not carry or lift this product over wet or slippery surfaces.
- 11) Use appropriate mechanical lifting devices, such as a hoist or shaft puller, for heavier shafts. When performing maintenance or repair procedures, do not pressurize the shaft if journal setscrews are loose or missing.
- 12) When performing maintenance procedures, do not pressurize the shaft if the journal is missing.
- 13) All replacement parts used on this product should be made to original Tidland specifications. All maintenance and repair procedures performed on this product should be done to Tidland specifications by qualified personnel.



If shafts with rubber air systems are stored longer than two weeks - store them completely deflated, away from electric motors, away from direct sunlight or florescent light, and in temperatures not exceeding 85°F (29°C).

When storing shafts with constant air pressure, the rubber air systems are subject to distortion or cold flow.

Recommended Tools

- 1) Clean, dry, non-lubricated air supply: 80-120 psi for proper operation.
- 2) Tidland Inflation Tool (Part No. 27L128052)
- 3) Tidland Air Release Tool (Part No. 27L111630)
- 4) Pincers for removing hose clamps, if installed.
- 5) Dow Corning Molykote® 55 O-ring grease
- 6) Low-strength thread locker (Loctite® 222 or equivalent)
- 7) Thread sealant (Loctite® 545 or equivalent)

For more accessories to help with your winding processes, visit www.maxcessintl.com.

General Shaft Care

Maintenance Schedule

- During operation shifts, use compressed air to keep shaft free from dust and debris.
- As needed, remove sticky residue. Use a soft cloth damp with a mild solvent, such as rubbing alcohol.

Shaft Care

- Clean shaft with a soft cloth.
- Mild solvents may be used sparingly; make sure shaft slot and all parts are wiped completely dry of solvents before beginning reassembly.
- Apply a lubricant if needed to aid assembly. Avoid grease, dry, or penetrating lubricants

Polyurethane Bladders

To help ensure leak free operation when replacing bladders:

- Measure the length carefully so that bladder will be secured under the element end clamps.
- Always cut the bladders square across the end; bladders cut at an angle are at risk for leaks.
- Ensure that the element end clamp screws are tightened to recommended torque specifications. Use LOCTITE 242 on screw threads when reinstalling.

Foam Springs

- The foam material attached to the tension segment strip is fragile – use care when handling the strip.
- A torn or broken strip can function, but such damage may result in the loss of tension segments when the strip is outside of the tray.
- Tape can be used across top side of tension segments as temporary support during disassembly or assembly.
- Strips with missing tension segments will prevent proper shaft operation. Do not use.

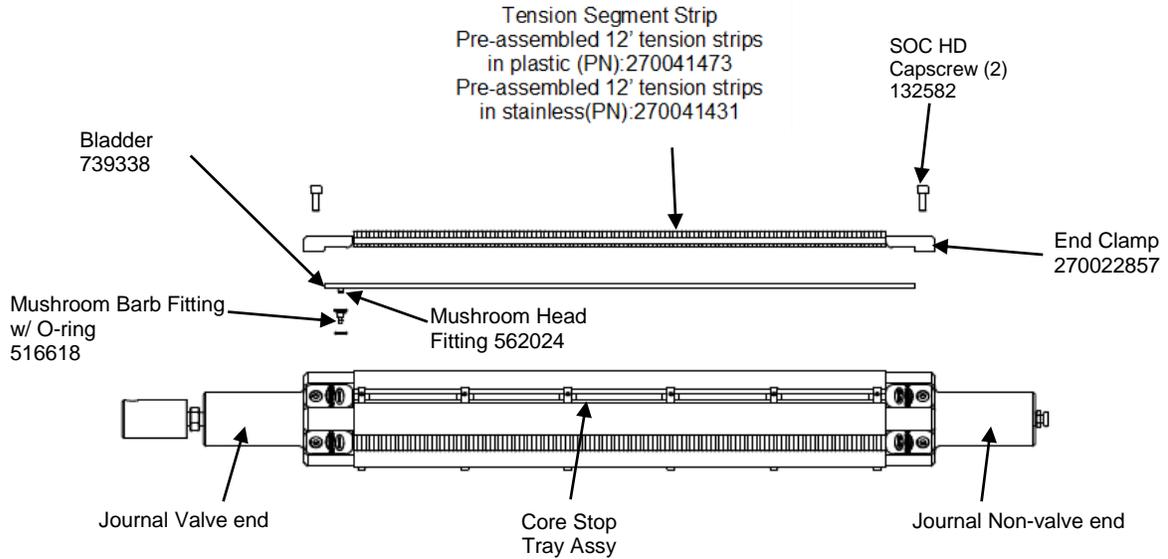


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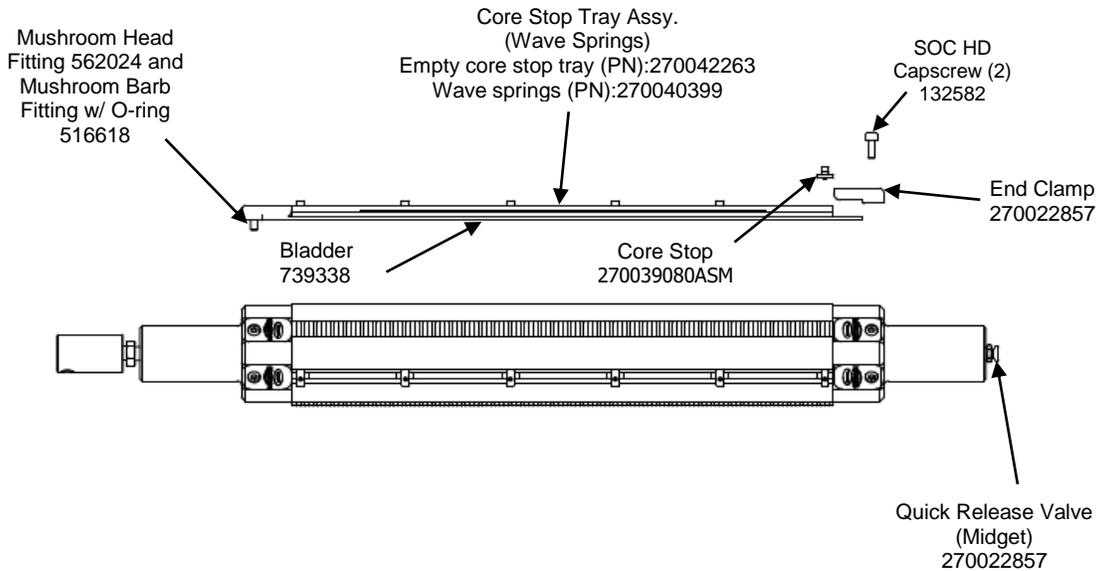
D6X Differential Air Shaft

Part Identification

TENSION SEGMENT COMPONENTS



CORE STOP TRAY COMPONENTS



Pressure Control Valve System

NOTICE Before beginning the winding operation, please read and understand the following.

Successful operation of the Tidland Differential Shaft series depends upon proper internal air pressure

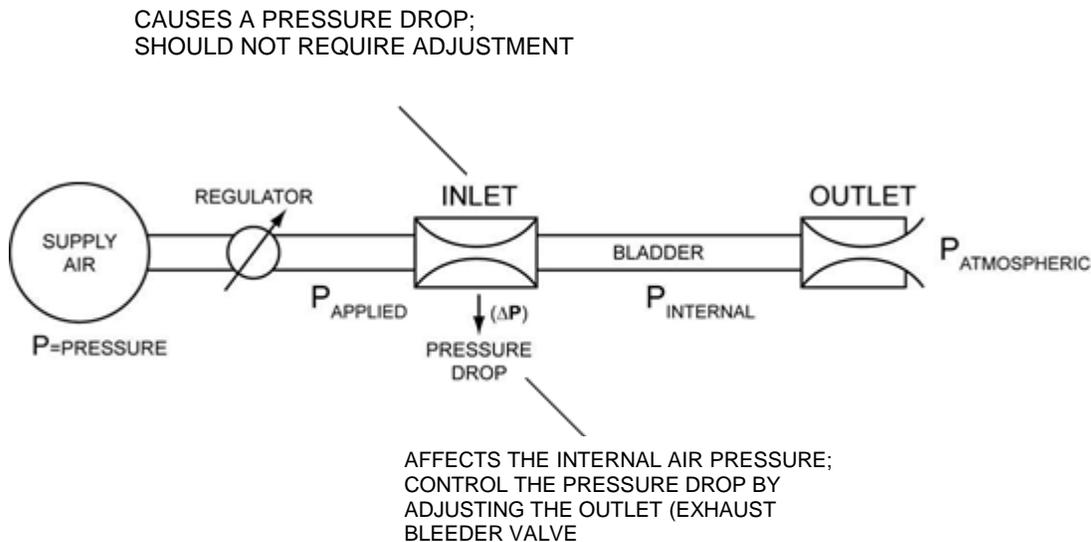
Variable pressure is required in order to control the air pressure on the tension segments as the roll diameter increases. As the roll diameter grows, the required rate of pressure increase will diminish due to the weight of the roll and friction between the roll and shaft. These parameters will vary based on your application.

For low-tension winding applications, each of the Differential Shaft models can be equipped with a pressure control system comprising two bleeder valves. Used with your applied air pressure, these valves allow the operator to adjust and maintain internal air pressure where the required internal pressure is very low and the pressure range is very small.

How it Works

As operating air pressure is applied to the shaft, the factory-set inlet valve causes a drop in pressure as air enters the bladder. The exhaust bleeder valve controls the amount of that pressure drop. The larger the exhaust opening, the greater the pressure drop, resulting in lower internal bladder pressure. Reducing the exhaust opening increases the internal air pressure.

If you are unable to achieve optimal tension control by adjusting your applied air pressure, use the exhaust bleeder valve to improve the resolution of your tension controller.

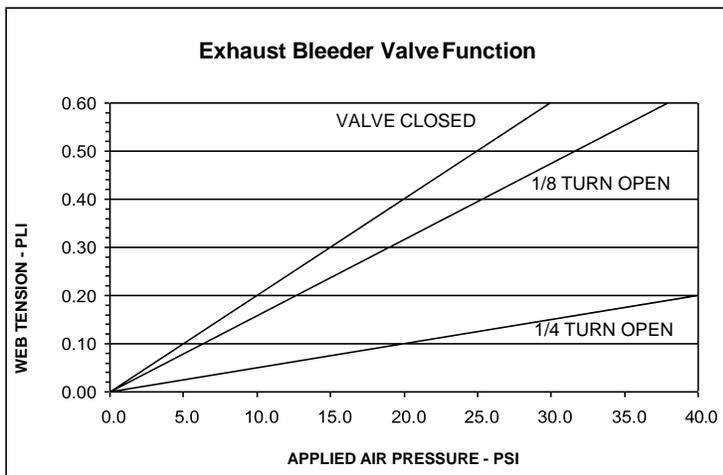


D6X Differential Air Shaft

As operating air pressure is applied to the shaft, the factory-set inlet valve causes a drop in pressure as air enters the bladder. The exhaust bleeder valve controls the amount of that pressure drop. The larger the exhaust opening, the greater the pressure drop, resulting in lower internal bladder pressure. Reducing the exhaust opening increases the internal air pressure.

- Both valves are factory-set according to customer operating specifications: roll specs (width, diameter and weight), and web tension (PLI).
- If you are unable to achieve optimal tension control by adjusting your applied air pressure, use the exhaust bleeder valve to improve the resolution of your tension controller. For the majority of applications, no adjustment is required for the exhaust bleeder valve. For higher internal pressure, adjust to a smaller opening in the valve. For lower internal pressure, adjust to a larger opening. Adjustments are made with a 1/8" hex key.
- The restrictor valve at the inlet should not require adjustment.
- Do not operate shaft with missing valves.
- A muffler may be installed* on the exhaust bleeder valve outlet to reduce noise. A slight hiss may be audible: this indicates that the Pressure Control Valve System is functioning, allowing air to escape from the shaft as designed. The muffler must be removed (12 mm socket) before attempting to adjust or remove the bleeder valve. (See Bleeder Valve Maintenance, page 13.)

*Not available on all Differential shaft designs.



- The purpose of this graph is to illustrate the characteristics of bleeder valve function. The tension values displayed are arbitrary.
- Actual winding tension will differ by variables such as bladder length, shaft speed, roll specs (width, diameter and weight), and core material.

- 1) Stop winding operation and shaft rotation.
- 2) To adjust the internal air pressure, turn the valve in 1/8 turn increments using a 1/8" hex drive wrench.

NOTICE

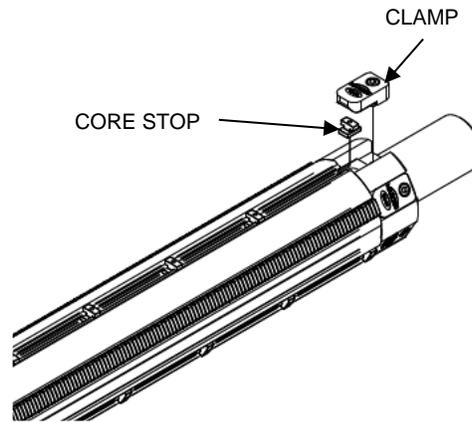
DO NOT perform Adjustment while shaft is spinning

- To increase the pressure, turn the valve Clockwise.
- To decrease pressure, turn the valve Counterclockwise.

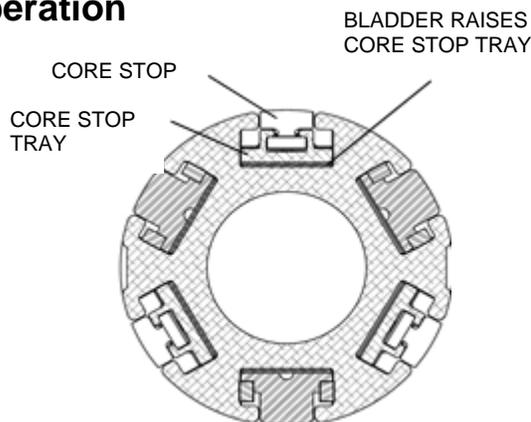
To clean or replace the valve, see pages 13 and 14.

Installation

- 1) Install shaft as required for your application.
- 2) Determine how many core stops are required. (2 per core in each tray)
- 3) Remove excess core stops or move them to the end of the tray. Ensure all core stop screws are tight to prevent motion while machine is running.
- 4) Load cores.



Operation



- Valve locations for the D6X shaft vary according to customer specifications.
- The shaft body may be stamped **1** or **2** at each valve location to aid with inflation sequence.

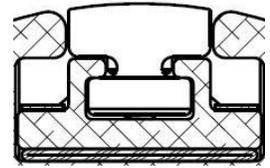


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D6X Differential Air Shaft

Step 1 – Set the Core Stops

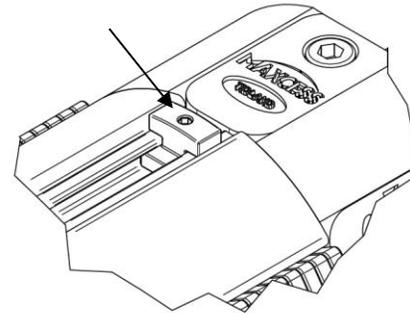
Position core stops in each tray so that the core will have one stop on either side of the core per tray.



Step 2 – Lock Sequence

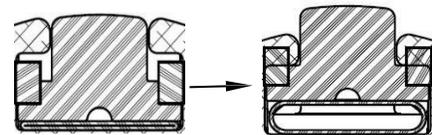
Use SET SCREW (M4 X 0.7mm) to lock the core stop in place axially. Torque SET SCREW to 1.5 Nm. Shaft is ready for operation.

SET SCREW

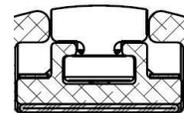


Step 3

Gradually inflate the tension segment bladder to achieve required tension. Do not exceed 80 psi (5.5 bar). See Pressure Control System (page 7)



To remove cores, deflate tension segment bladder to drop the core stop tray. Core stops will remain locked in position in the core stop tray.

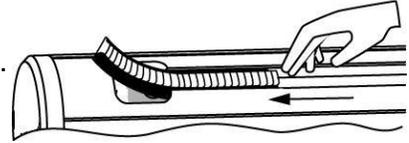


To Replace Bladders

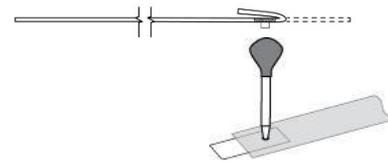
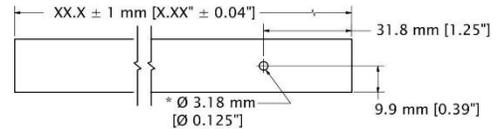
- Bladder material supplied for replacement may be longer than the required finished length. Do not cut to length until instructed.
- Use a small amount of LOCTITE 222 on the threads of all screws and tighten to torque specifications noted in brackets.

Under Tension Segments

1. Remove all end clamps from the journal valve end slot. (SOC HD CPSCR M5 x0.8x14mm)
2. Push – and pull **gently** – on each foam spring and tension segment strip, to remove them from the slot one at a time. Tape may be used across the top of segments as temporary support.
3. Remove the mushroom head fittings from the bladder in the shaft slot.
4. Lift the bladder out of the slot and remove the mushroom barb fitting and O-ring from the bladder.



5. Clean the shaft slot with rubbing alcohol and dry thoroughly.
6. Cut square across one end of the new bladder and install it in the slot, lined up near the edges of the air fitting holes.
7. On the bladder, mark the location of the center of the air fitting hole, as shown.
8. Using the Tidland Hole Punch Tool, punch a hole in one wall only of the bladder. Use a small piece of plastic in the bladder to prevent punching through both sides.
9. Fold the bladder ends as shown, reinstall the bladder in the shaft slot and seat the air fitting in the hole.
10. Install the mushroom head fitting, then install the bladder end clamp with one socket headed capscrew (M5 x0.8x14mm), securing the bladder underneath. [55-60 in-lbs / 6.2-6.8 Nm]
11. Apply a lubricant if needed to aid assembly. Avoid grease, dry, or penetrating lubricants.
12. Reinstall the tension segment strips with the foam spring into the slot, taking care not to tear the foam spring. Tape may be used across the top as temporary support. Push together to eliminate any gap between strips.
13. Trim the bladder by cutting the free end square if the bladder material was longer than the required finished length.
14. Fold the other end of the bladder as shown.
15. Install the other bladder end clamp with one socket headed capscrew (M5 x0.8x14mm), securing the bladder underneath. [55-60 in-lbs / 6.2-6.8 Nm]

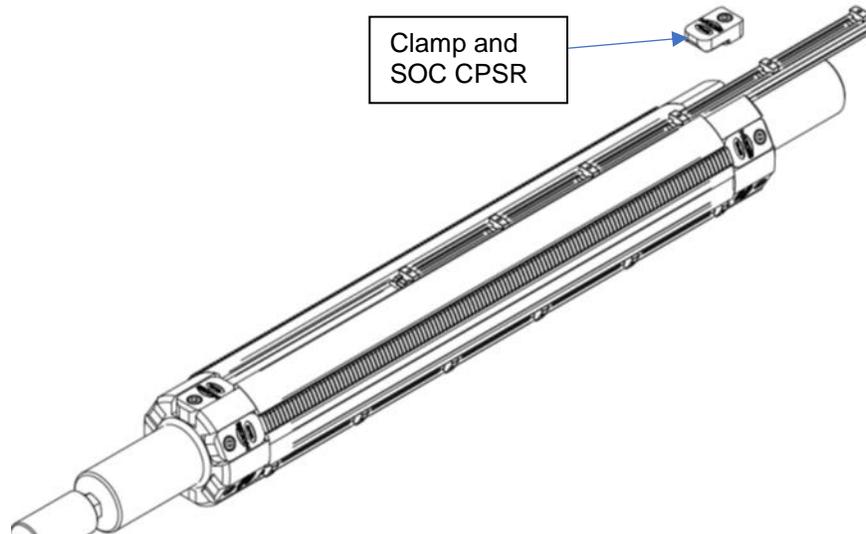


- **Note:** Test the bladder for air leaks at 80 psi (5.5 bar). Spray soapy water onto bladder end clamps and air fittings and watch for bubbles. When inflated, the bladder should raise the tension segments.

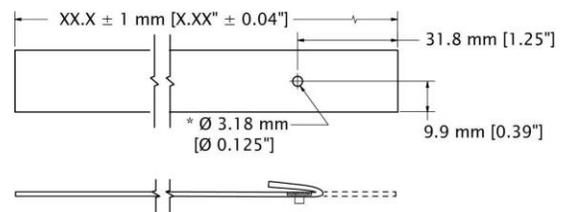
D6X Differential Air Shaft

- Bladder material supplied for replacement may be longer than the required finished length. Do not cut to length until instructed.
- Use a small amount of LOCTITE 222 on the threads of all screws and tighten to torque specifications noted in brackets.

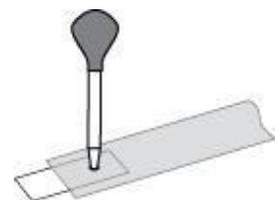
- 1) Remove both end clamps from the journal valve end alloy slot (SOC HD CPSCR M5 x0.8x14mm).
- 2) Slide core stop tray and wave springs out of the shaft.



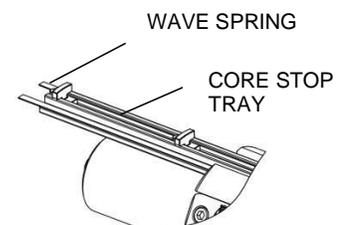
- 3) Remove the mushroom head fittings from the bladder in the shaft slot.
- 4) Lift the bladder out of the slot and remove the mushroom barb fitting and O-ring from the bladder.
- 5) Clean the shaft slot with rubbing alcohol and dry thoroughly.



- 6) Cut square across one end of the new bladder and install it in the slot, lined up near the edges of the air fitting holes, as shown above.
- 7) On the bladder, mark the location of the center of the air fitting.
- 8) Using the Tidland Hole Punch Tool, punch a hole in one wall only of the bladder and insert the air fitting into the bladder. Use a small piece of plastic in the bladder to prevent punching through both sides.
- 9) Insert the mushroom barb fitting into the bladder and install the O-ring.
- 10) Fold the bladder ends as shown, reinstall the bladder in the shaft slot and seat the air fitting in the hole.



- 11) Install the bladder end clamp with one socket headed capscrew (M5 x0.8x14mm), securing the bladder underneath. [55-60 in·lbs / 6.2-6.8 Nm]





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D6X Differential Air Shaft

- 12) Apply lubricant as needed. Avoid grease, dry or penetrating lubricants.
- 13) Slide the core stop tray with the wave spring into the slot.
- 14) Trim the bladder by cutting the free end square if the bladder material was longer than the required finished length.
- 15) Fold the other end of the bladder as shown.
- 16) Install the bladder end clamp with one socket head capscrews, securing the bladder underneath. [40 in·lbs / 4.5 Nm]

Note: Test the bladder for air leaks at 80 psi (5.5 bar). Spray soapy water onto bladder end clamps and air fittings and watch for bubbles. When inflated, the bladder should raise the core stop tray.

Maintenance

CORE STOP TRAY

To swap core stop trays without changing the bladder, follow these steps:

- 1) Remove one end clamp (SOC HD CPSCR M5x0.8x14mm).
- 2) Slide core stop tray and wave springs out of the shaft.
- 3) Apply lubricant as needed. Avoid grease, dry or penetrating lubricants.
- 4) Slide replacement core stop tray into the slot.
- 5) Slide the wave springs into the slot so they are between the core stop tray and the underside of the T-slot
- 6) Fold the bladder as shown.
- 7) Install the bladder end clamp with one socket head capscrew, securing the bladder underneath. [40 in·lbs. / 4.5 Nm]

Bleeder Valves

- If maintaining low tension during winding becomes difficult, the bleeder valve may require adjustment or cleaning.

Note:

- The fine threads on the needle and the housing are easy to damage. Use care when working with these components.
- Do not attempt to remove the bleeder valve housing from the shaft. If repair is necessary, return the shaft to Maxcess (see Service at end of document).
- Location of valve varies due to custom shaft configurations.

Do not operate the shaft if:

- The valve is missing.
- The orifice is otherwise plugged.

Cleaning the Exhaust Bleeder Valve

- 1) Stop the winding operation and shaft rotation.
- 2) Locate the bleeder valve at the end or on the side of the shaft.
- 3) Using a 12 mm socket, carefully remove muffler*, if installed.



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D6X Differential Air Shaft

- 4) Using a 1/8" hex drive, carefully back the needle valve all the way out of its housing (counterclockwise).
- 5) Using compressed air, blow dust and debris out of the valve.
- 6) Carefully reinstall the needle valve in the housing.
- 7) Close the valve down until it just bottoms out in the housing, and then adjust as required for your application.
- 8) Resume winding operation.
- 9) Adjust the bleeder valve incrementally to achieve required internal pressure.

Replacing the Exhaust Bleeder Valve

- 1) Stop the winding operation and shaft rotation.
- 2) Locate the bleeder valve at the end or on the side of the shaft.
- 3) Using a 12 mm socket, carefully remove muffler, if installed.
- 4) Using a 1/8" hex drive, carefully back the needle all the way out of its housing (counterclockwise).
- 5) Carefully reinstall the needle valve in the housing.
- 6) Close the valve down until it just bottoms out in the housing, and then adjust as required for your application.
- 7) Resume winding operation.
- 8) Adjust the bleeder valve incrementally to achieve required internal pressure.



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D6X Differential Air Shaft

Troubleshooting

| Problem | Possible Cause | Recommended Solution |
|--|---|--|
| Core stop tray does not lift when air is applied. | Leak or obstruction in air system. | Remove core stop tray from shaft. Check bladder for holes, deformation or debris around air fittings. |
| | Air tubing not connected under core stop tray cover. | Remove cover from core stop tray and reconnect the air tubing to the air fittings. Check the tubing for holes or obstructions. |
| Core stops move axially in tray. | Fasteners are loose. | Hand tighten fasteners. |
| Different tension from individual shafts (Duplex Winder) | Leak or obstruction in air system | Check all bladders for holes, deformation or debris around air fittings. |
| | Exhaust Bleeder Valve not adjusted correctly. | Match tensions by adjusting Pressure Control System in each Shaft. |
| Excessive core dust | Excessive tension crushing core | Reduce winding speed: 5% overspeed recommended Lower the range tension pressure or adjust taper tension. Check Bleeder Valve adjustment. |
| | Core crushed by web shrinkage (e.g., stretchable materials) | Cut web and core from shaft, consider using higher strength cores. |
| | Core residue binding core to shaft | Cut web and core from shaft. Use a rag damp with small amount of mild solvent, such as rubbing alcohol, to clean the shaft. Let shaft dry completely before reloading cores. |
| | Damaged tension segments are not retracting | Cut web and core from shaft; replace tension segment strip. |

Service

If you have any questions about one of our products or need to speak with a Customer Service representative, please use the contact information below.



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