



AIR BRAKE ACTUATORS

MAINTENANCE MANUAL



MM2213

WABCO

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You will find the current edition at: <https://zf.com/cvliterature>

General Information

1 General Information

1.1 Symbols Used in this Document

DANGER

Description of an immediate situation which will result in irreversible injury or death if the warning is ignored.

WARNING

Description of a possible situation which may result in irreversible injury or death if the warning is ignored.

CAUTION

Description of a possible situation which may result in irreversible injury if the warning is ignored.

NOTICE

Description of a possible situation which may result in material damage if the warning is ignored.



Important information, notices and/or tips



Reference to information on the Internet

Descriptive text

– Action step

1. Action step 1 (in ascending order)

2. Action step 2 (in ascending order)

• Listing



Indicating the use of a tool / WABCO tool

General Information

1.2 How to Obtain Additional Maintenance, Service and Product Information

If you have any questions about the material covered in this publication, or for more information about the WABCO product line, please contact WABCO Customer Care Center at 855-228-3203, by email at supportwabconacustomercenter@zf.com, or visit our website: www.zf.com/cv.

Refer to the Society of Automotive Engineers (SAE) website to find all current SAE documents and standards applicable to WABCO products (such as SAE J447 and SAE J908 at www.sae.org).

Refer to the National Highway Traffic Safety Administration (NHTSA) website to find all current documents referenced in the manual at www.nhtsa.gov.

1.3 How to Obtain Parts and Kits

Contact the WABCO Customer Care Center at 855-228-3203 (United States and Canada); 800-953-0248 (Mexico). Email: supportwabconacustomercenter@zf.com, supportwabconaorders@zf.com or supportwabconaspecs@zf.com.

1.4 WABCO Academy



www.wabco-academy.com

1.5 WABCO Online Product Catalog



www.wabco-customercenter.com

General Information

1.6 Your Direct Contact to ZF CVS

ZF CV Systems North America LLC

1220 Pacific Drive
Auburn Hills, MI 48326

Customer Care Center: (855) 228-3203

<https://www.zf.com/products/en/cv/home/cv.html>

2 Safety Information

2.1 Provisions for a safer work environment

- Only experienced, trained and qualified automotive technicians should carry out work on the vehicle.
- Read this publication carefully.
- Follow all warnings, notices and instructions to help avoid personal injury and property damage.
- Always abide by the vehicle's Original Equipment Manufacturer (OEM) specifications and instructions.
- Observe all accident regulations of the repair facility as well as regional and national regulations.
- The workplace should be dry, sufficiently lit and ventilated.
- Use personal protective equipment if required (safety shoes, protective goggles, respiratory protection and ear protectors).

Read and observe all Danger, Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

WARNING

To help prevent serious eye injury, always wear eye protection when you perform vehicle maintenance or service.

WARNING

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

WARNING

This product can expose you to chemicals including Nickel, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

2.2 General Guidelines

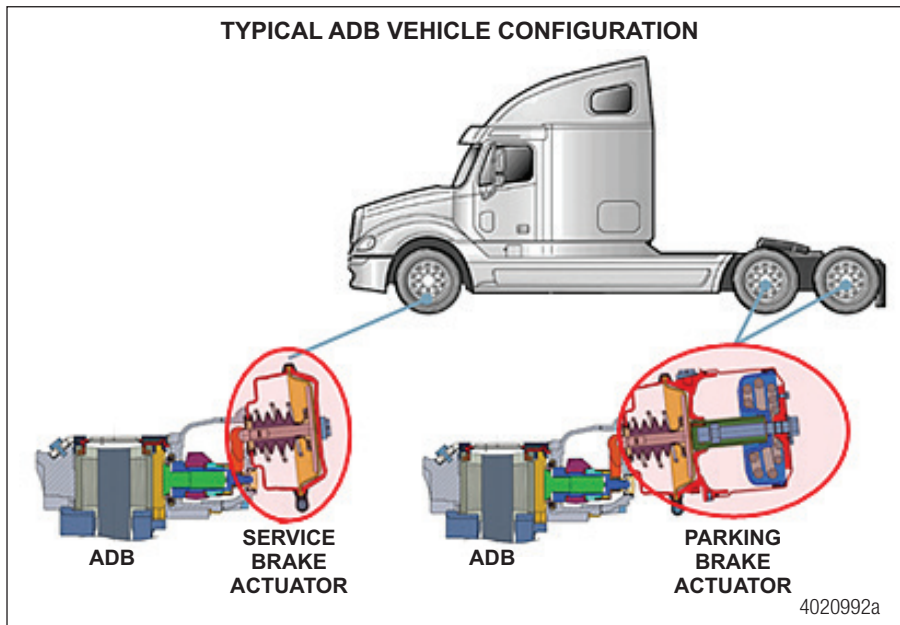
- Use only new fasteners.
- Inspect mounting surfaces for cleanliness and damage.
- Ensure that the chamber is caged prior to removal or installation.
- Inspect the air system for leaks prior to replacing suspect chamber.
- Perform a functionality test on the vehicle to ensure brakes are operational before operating the vehicle on the road.
- DO NOT reuse nuts.
- DO NOT use washers or spacers.
- DO NOT use damaged parts.
- DO NOT attempt to remove the caging bolt from the Tristop Chamber (5 mm pop out).
- DO NOT use air or power tools to cage the parking brake.
- During pre-trip inspection, verify that the dust plug is installed.
- Ensure the dust plug is installed. If the dust plug is missing and you see corrosion build up, replace the chambers.

Introduction

3 Introduction

This manual contains service and maintenance information for ZF's WABCO Air Brake Actuator.

3.1 General Actuator Information and Function



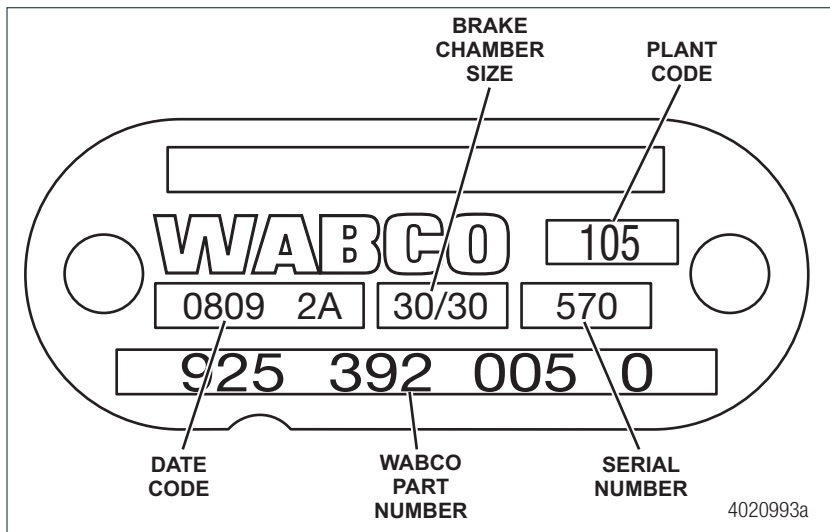
Brake Chamber or Service Brake Actuator

- Does not include a parking actuator
- Generally located on the steer axle

Double Diaphragm Service Brake (DDSB) or Parking Brake Actuator

- Includes parking actuator
- Generally located on the drive axle(s)

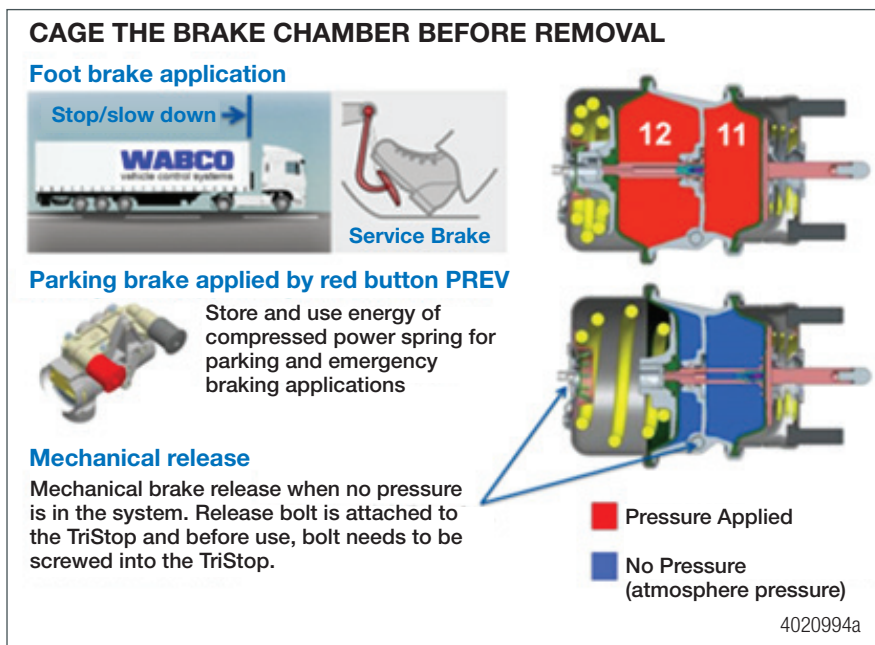
Introduction



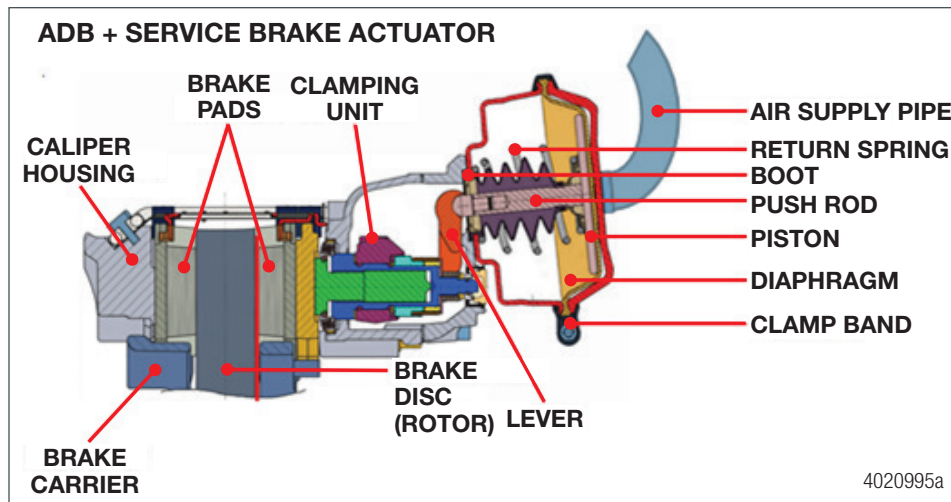
The actuator identification tag provides the following information

- Brake chamber size
- Plant code
- Serial Number
- WABCO Part Number
- Data Code

3.2 Other General Function Diagrams



Introduction



3.3 Service Brake Chambers – Drum and Disc

3.3.1 Drum Variants

3.3.1.1 Chamber Sizing

2.5" Stroke Chamber sizing

- T16, T20, T24, T30
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details

3" Stroke Chamber sizing

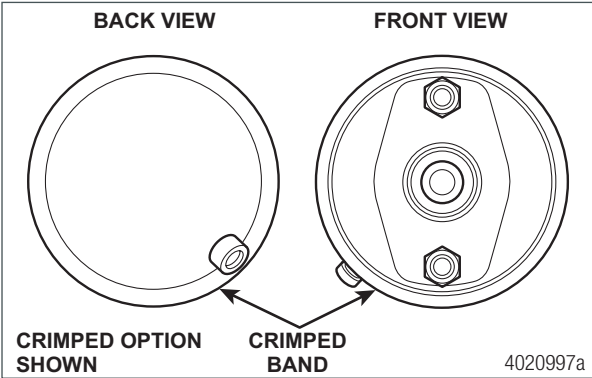
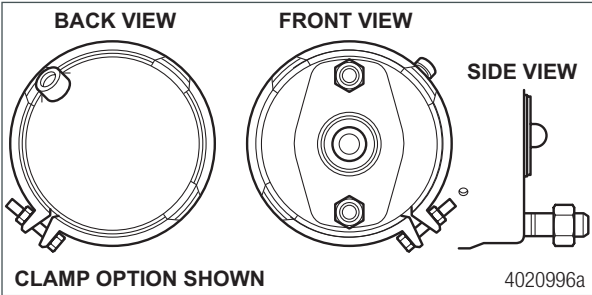
- T24, T30
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details

Other features

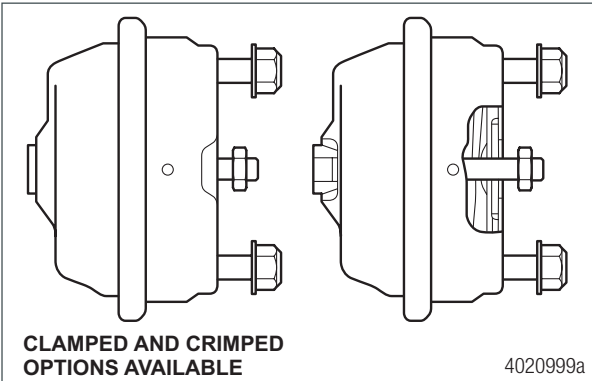
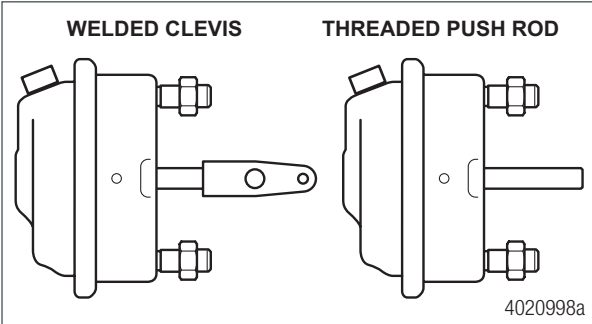
- Band Types: Crimped or Clamped
- Clevis Options: contact your ZF representative or the Customer Care Center for more details
- Push Rod Length: 1"- 6"

Introduction

3.3.2 Port and Clamp Band Position Examples



3.3.3 Drum Brake Push-Rod Options



4 Installation and Maintenance

4.1 How to Install and Maintain

WARNING

Only start installation when you have read and understood all the information required for installation. To help prevent serious injury, only qualified and authorized personnel should carry out the installation.

Follow the specifications and instructions provided by the vehicle manufacturer.

Follow the company's as well as national accident prevention regulations.

Secure the vehicle against rolling away before starting to dismantle or install the brake chamber. Secure the removed brake chamber against rolling away as well.

Attach a clearly marked note on the steering wheel that work is being performed on the vehicle and that the brakes must not be applied.

4.2 Preconditions

Please visit our website for the latest brochures and information.

<https://www.zf.com/products/en/cv/footer/downloads/downloads.html>

4.3 Required Tools

- Torque wrench (15 Nm, 120 Nm, 210 Nm)
- Only use brake chambers approved by the axle or vehicle manufacturer.
- Consult with the axle or vehicle manufacturer concerning installation when mounting brake chambers to steering axles.

4.4 Visual Inspection

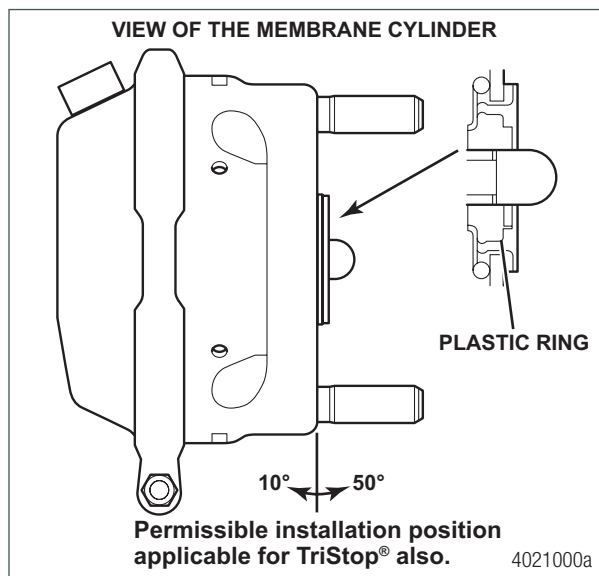
DANGER

DO NOT repair brake chambers with damage on the pressure reservoir with bayonet joint. Dispose of the brake chamber. Parking brake spring on brake chamber is under pre-tension!

- The brake chamber and disc brake sealing surface must be clean and undamaged.
- The bellows must be undamaged and fixed with a plastic ring.
- Replace wearing parts and damaged parts with original WABCO parts only.
- Never clean brake chambers using compressed air – dirt and other contaminants may enter the chamber.
- Workshop air may not be used to pressurize the chamber instead of vehicle air-system. Oil, moisture, and other contaminants may enter the chamber and cause functional issues.

Installation and Maintenance

- Sealing the disc brake against intrusion of water and dirt: Make sure that the sealing surface of the bellows lies fully on the flange of the disc brake.



- You will need a flat contact surface between disc brake and brake chamber and between fastening nuts and disc brake (max. deviation 0.4 mm).
- Do not use reinforcement strips, intermediate plates, washers, spring lock washers, or other locking elements.
- The contact surface of the disc brake must not be painted.

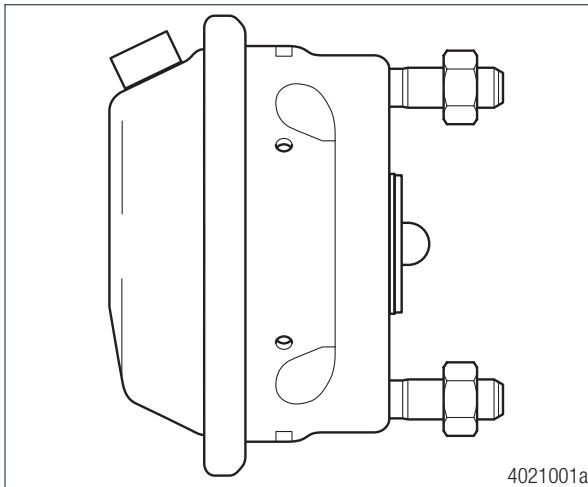
4.5 Disc Variants

4.5.1 Chamber Sizing

0.59" Push-rod Chamber sizing

- T12, T16, T18, T20, T22, T24
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details
- Crimped and clamp band options available

Installation and Maintenance



4.5.2 Troubleshooting and Maintenance

Ensure drain holes are free and clear such that they can properly drain.

Ensure the brake chamber is mounted flush to the mating surface and the mounting washers are behind the mounting nuts.

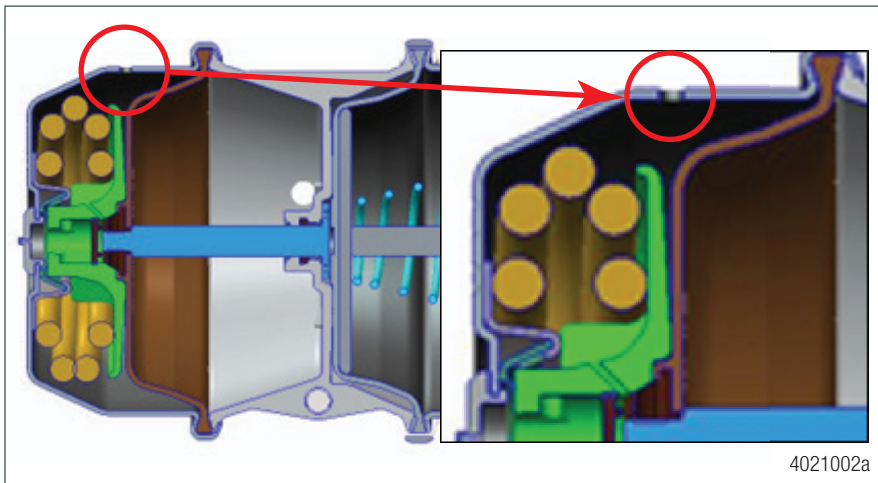
- Any gap between mounting service and brake chamber can decrease brake performance.
- If proper torque values cannot be reached, please ensure the washer is installed on the correct side.
- ZF does not recommend the use of 90-degree fittings.

Installation and Maintenance

4.6 Double Diaphragm Service Brake (DDSB) – Drum and Disc Variants

4.6.1 Included Variants

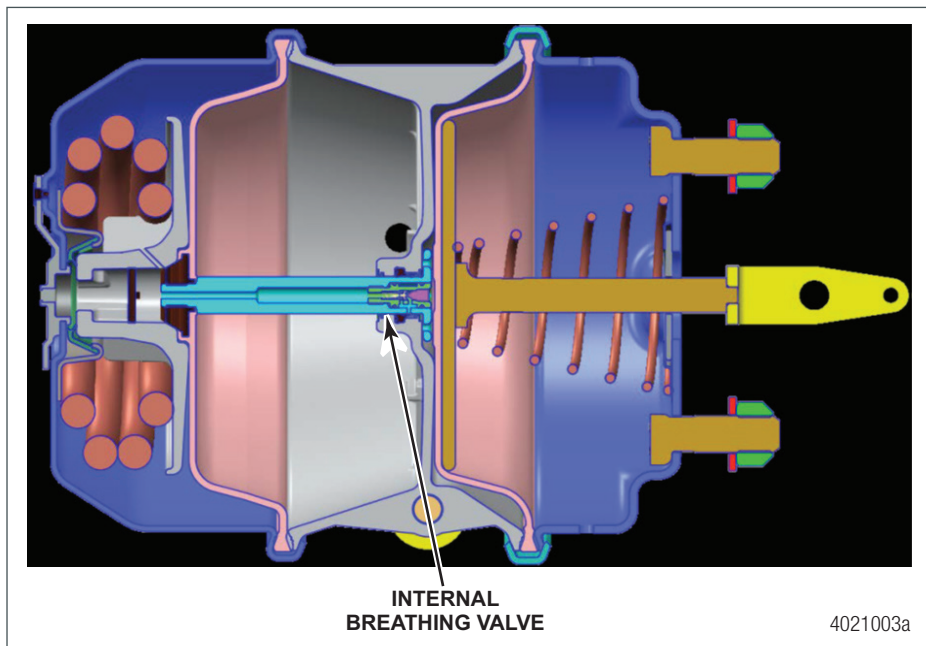
4.6.1.1 Open-Hole (OH)



Shown with IBV

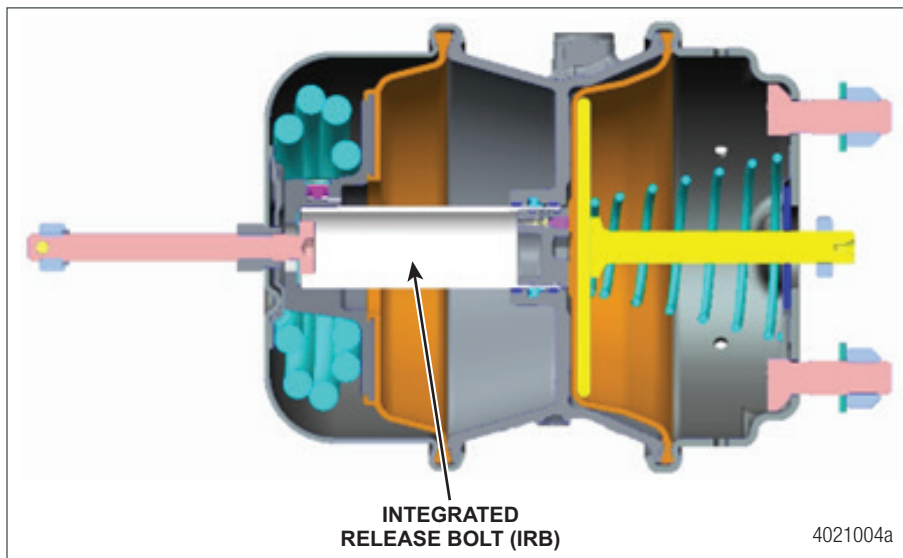
Installation and Maintenance

4.6.1.2 Internal Breather Valve (IBV)



No drain holes shown.

4.6.1.3 Integrated Release Bolt (IRB)



4.6.2 Drum Variants

4.6.2.1 Chamber Sizing

2.5" Stroke Chamber sizing

- T20/24, T24/30, T30/30

Installation and Maintenance

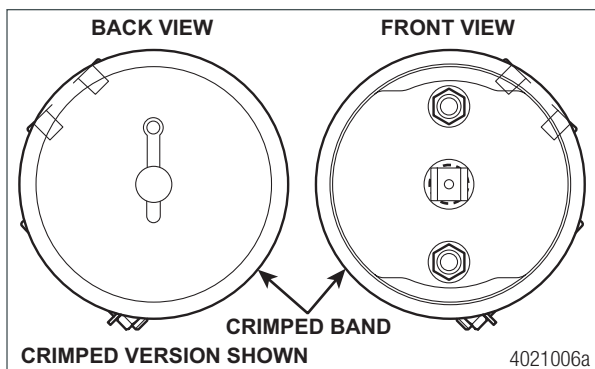
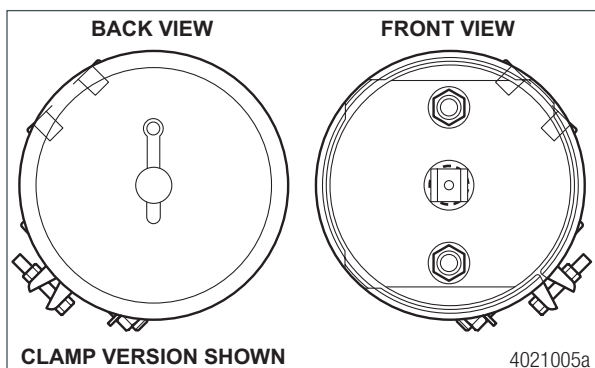
- Example: T20/24: “20” is the service brake diameter and “24” is the parking brake diameter – T(Service diameter)/(Parking Diameter)
- Push Rod lengths: 1"-10", contact your ZF representative or the Customer Care Center for more details.
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details.
- OH and IBV variants available; contact your ZF representative or the Customer Care Center for more details.

3" Stroke Chamber sizing

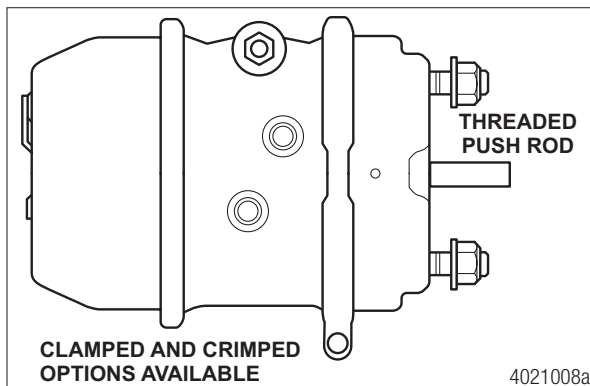
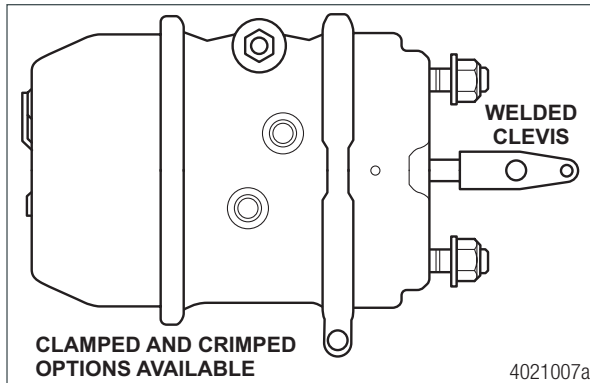
- T24/30, T30/30, T30/36, T36/36
- Push Rod lengths: 1"-10", contact your ZF representative or the Customer Care Center for more details.
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details.
- OH and IBV variants available; contact your ZF representative or the Customer Care Center for more details.

Other features

- Band Types: Crimped or Clamped
- Clevis Options: contact your ZF representative or the Customer Care Center for more details.
- For IRB availability, please contact your ZF representative.



Installation and Maintenance



4.6.3 Disc Variants

4.6.3.1 Chamber Sizing

0.59" Push-Rod with 2.5" Stroke Chamber sizing

- T18/24, T20/24, T24/24
- **Example:** T20/24: "20" is the service brake diameter and "24" is the parking brake diameter – T(Service diameter)/(Parking Diameter)
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details.
- OH and IBV variants available; contact your ZF representative or the Customer Care Center for more details.

0.59" Push-Rod with 2.25" Stroke Chamber sizing

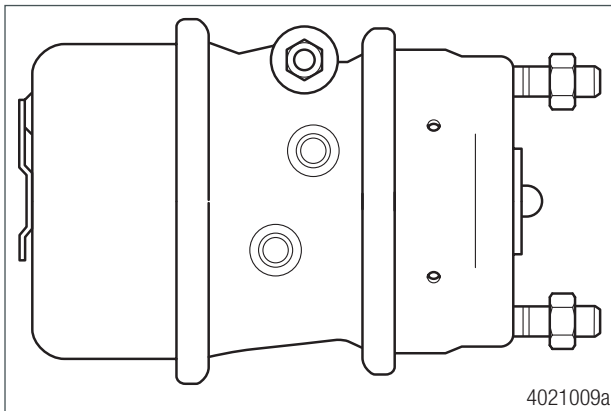
- T16/24 Only
- Multiple port positions; contact your ZF representative or the Customer Care Center for more details.
- OH and IBV variants available; contact your ZF representative or the Customer Care Center for more details.

Other features

- Band Types: Crimped or Clamped

Installation and Maintenance

- Clevis Options: contact your ZF representative or the Customer Care Center for more details.



For IRB availability, please contact your ZF representative.

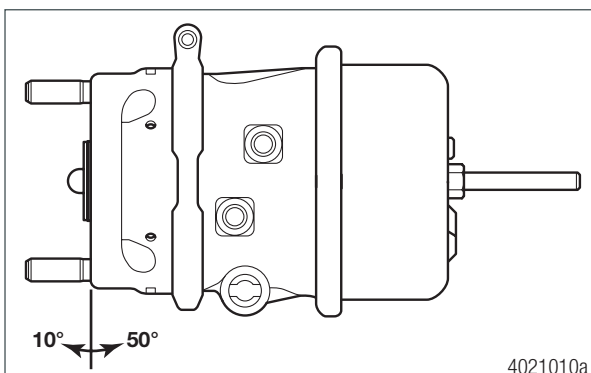
4.7 Installation Instructions

4.7.1 Installation for Both Drum and Disc Variants

- The service side of the DDSB must be unobstructed with one of the four drain holes oriented downward. Maximum permissible deviation of the lower drain hole: $\pm 30^\circ$.
- Remove an existing plug from the lower drain hole opening.
- Install the brake chamber in horizontal position.

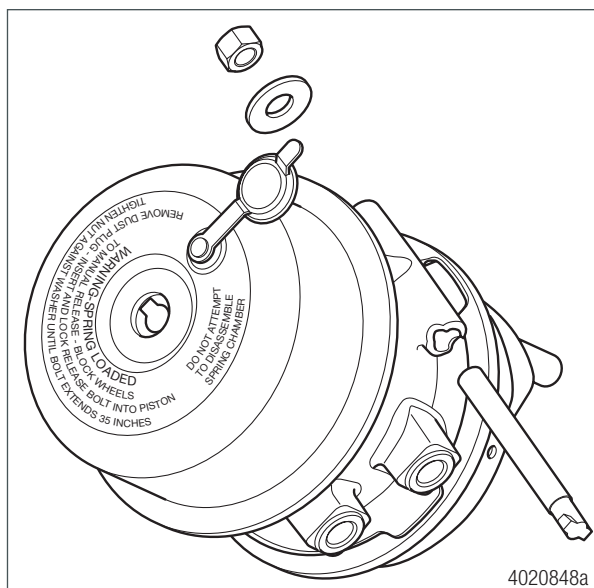
Conditions:

- The brake chamber piston rod must exactly fit into the spherical cap of the brake lever.
- The center axis of the brake chamber may deviate; max. 10° up and max. 50° down from level

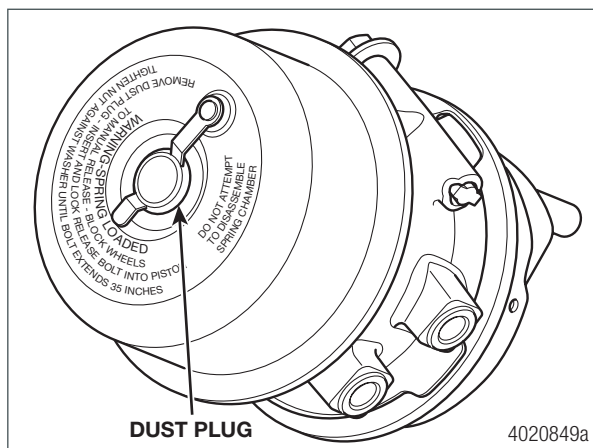


- Maximum permissible piston rod deflection is 4° all-round at 0 mm stroke, relative to the brake chamber axis.

Installation and Maintenance



4. Insert the dust plug in the parking brake side of the chamber.



4.7.2 Performance Test

WARNING

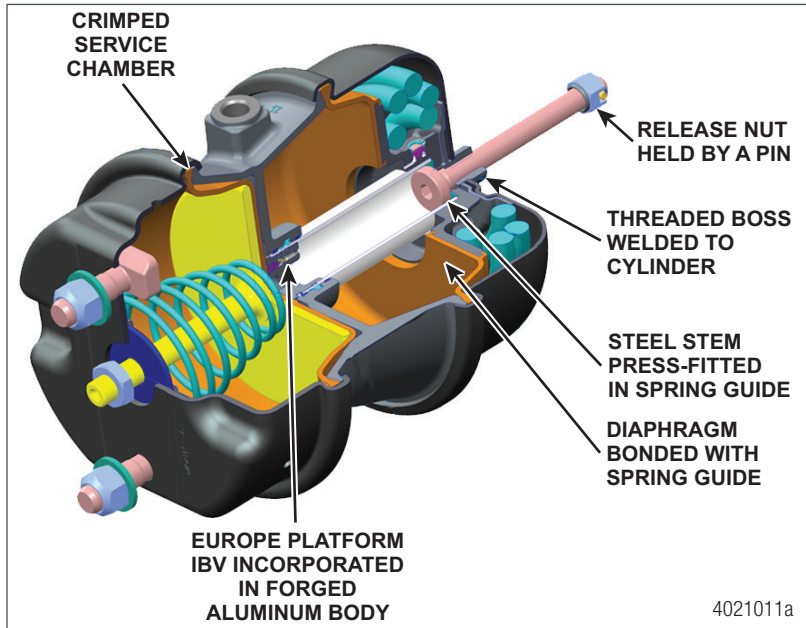
Follow the national laws and specifications of the vehicle manufacturer.

- Perform braking test.
- If needed, see the vehicle manufacturer documentation for brake timing test.
- Only use fastening nuts once.
- When using self-locking fastening nuts, fasten according to the mounting instruction above.
- See mounting instructions for the required torque for the fastening nuts.
- For all other wheel-end components, check the tightening torque according to axle manufacturer's maintenance instruction.

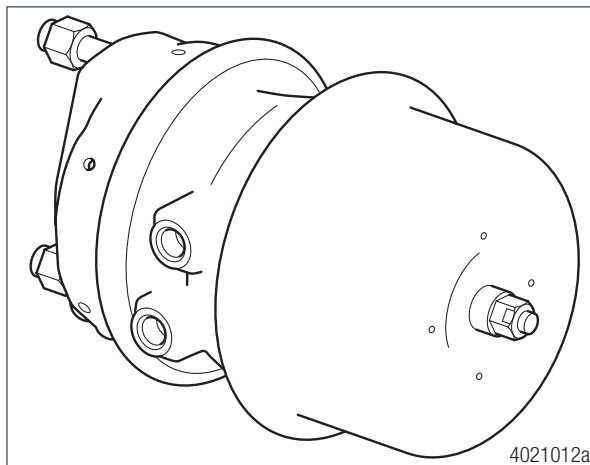
Installation and Maintenance

4.8 Next Generation Actuators with IRB (Integrated Release Bolt)

Contact your ZF representative or the Customer Care Center for more details.



Drum variant shown.



Troubleshooting

- Keep service side drain holes clean and clear of debris.
- DO NOT plug drain holes.
- DO NOT remove the release nut from the integrated release bolt.
- DO NOT remove the release bolt.
- DO NOT disassemble the DDSB.


Installation and Maintenance


4.9 TriStop® Brake Chambers (Disc Only)


4.9.1 Chamber Sizing

- T16/16, T24/24, T30/24
- Other sizing available on request
- Push Rod stroke distance = 2.5"
- Push Rod length = 0.59"
- All variants include IBV
- For additional information, please contact your ZF representative.

Technical Overview TRISTOP™ Ultra Short

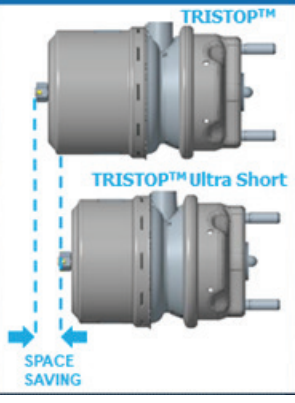
 **PERFORMANCE & ROBUSTNESS**

 **SIZE and WEIGHT REDUCTION**

 **COST EFFICIENT SOLUTION**

Technical Data TRISTOP™ Ultra Short

Actuator Size	24/24
Release Mechanism	Integrated Release Bolt
Connection type – service side	Rolled
Connection type – parking side	Bayonet
Spring type	Premium Clash Coil Free
Other functions	Internal Breathing Valve




TRISTOP™

TRISTOP™ Ultra Short

SPACE SAVING


4021013a

Solutions for Space constraint Applications




Standard Release Bolt

- For standard applications with no space constraints
- Comes out full stroke
- Replaced by HRB in New ACT 4.0 Platform




Half Release Bolt (HRB)

- Best compromise between space and costs
- Great value for money
- Less than half stroke saves space

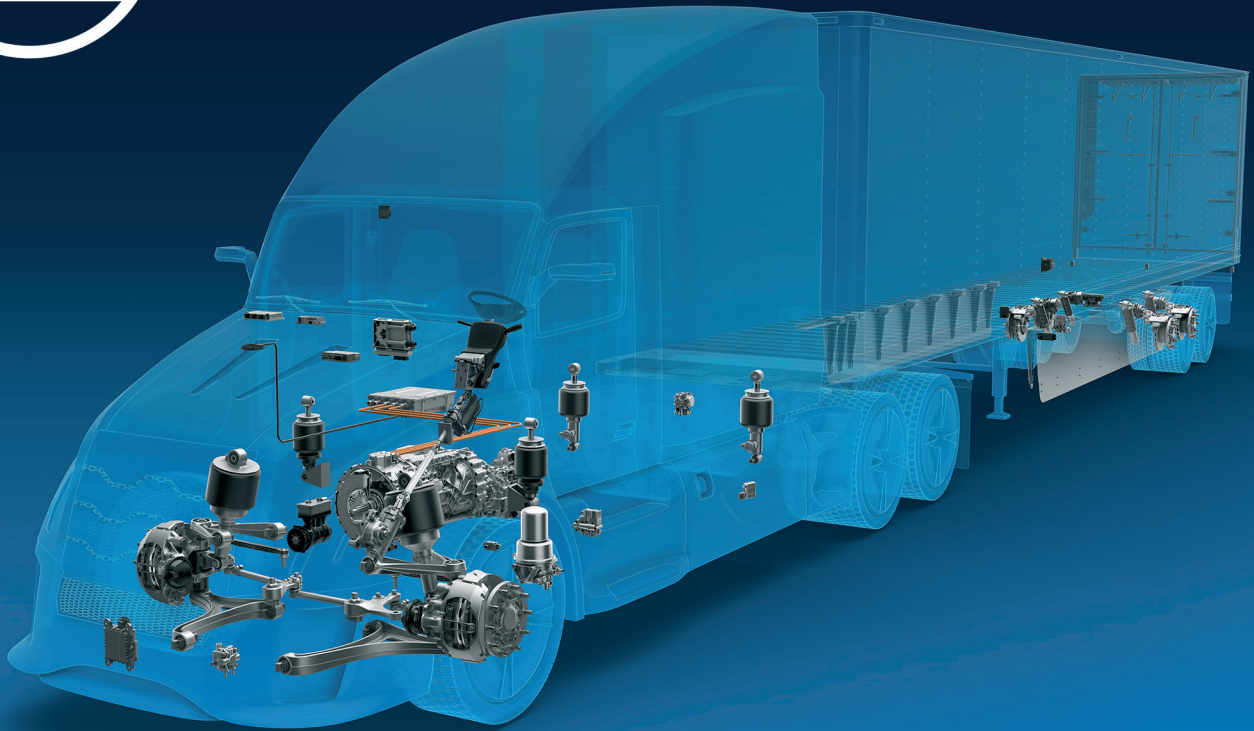


Integrated Release Bolt (IMA)

- For space constraint applications
- Only red pin comes out 5 mm!



4021014a



**For further details, contact the
WABCO Customer Care Center at 855-228-3203.**

About CVS Division

ZF's Commercial Vehicle Solutions (CVS) division is helping shape the future of commercial transportation ecosystems. Our mission is to be the preferred global technology partner to the commercial vehicle industry. Powerfully combining ZF's commercial vehicle systems expertise, extensive technology portfolio and global operations, the division serves the full commercial vehicle industry value chain. As the automotive industry progresses towards an increasingly autonomous, connected, and electrified (ACE) future, ZF's CVS division innovates, integrates and supplies components and advanced control systems that help make commercial vehicles and fleets operate more safely and sustainably. CVS unites ZF's former Commercial Vehicle Technology and Commercial Vehicle Control Systems divisions, the latter being formed following ZF's acquisition of WABCO in Spring 2020.

For more information, visit: www.zf.com/cv

WABCO