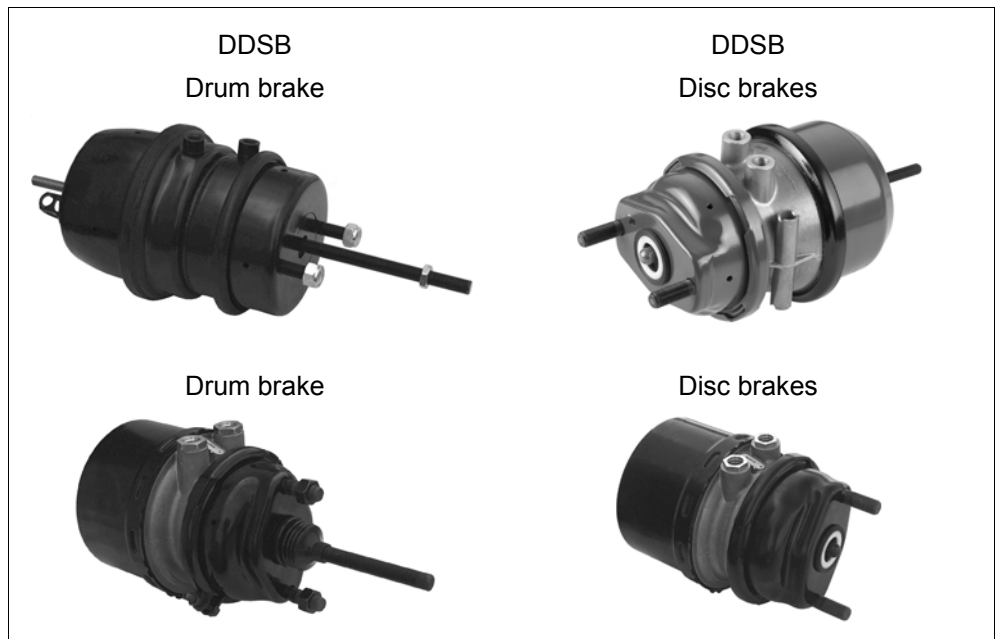


### Tristop® Cylinder 925 ...



#### Application

Utilisation on at least one vehicle axle.

#### Purpose

Combined spring brake - diaphragm brake chambers (Tristop® Cylinders) are used to generate the brake force for the wheel brakes. They consist of the diaphragm portion for the service braking system and the spring-loaded portion for the auxiliary and parking braking systems.

#### Installation instructions for Tristop® cylinders

The approval of the axle manufacturer is necessary for installing Tristop® cylinders. WABCO is available for any enquiries regarding testing methods.

##### Mounting bracket

To ensure enduring bolt tension, the following points must be considered:

- A flat mounting surface (deviation of maximum 0.4 mm) over a breadth of at least 146 mm and a height of at least 40 mm above and below the fastening bolts is necessary.
- The mounting surface of the bracket is only to be primed and not painted.
- Direct contact is required between bracket/cylinder and cylinder/nut.
- Do not use reinforcement strips, intermediate plates, washers, spring lock-washers and other locking elements.

##### Installation

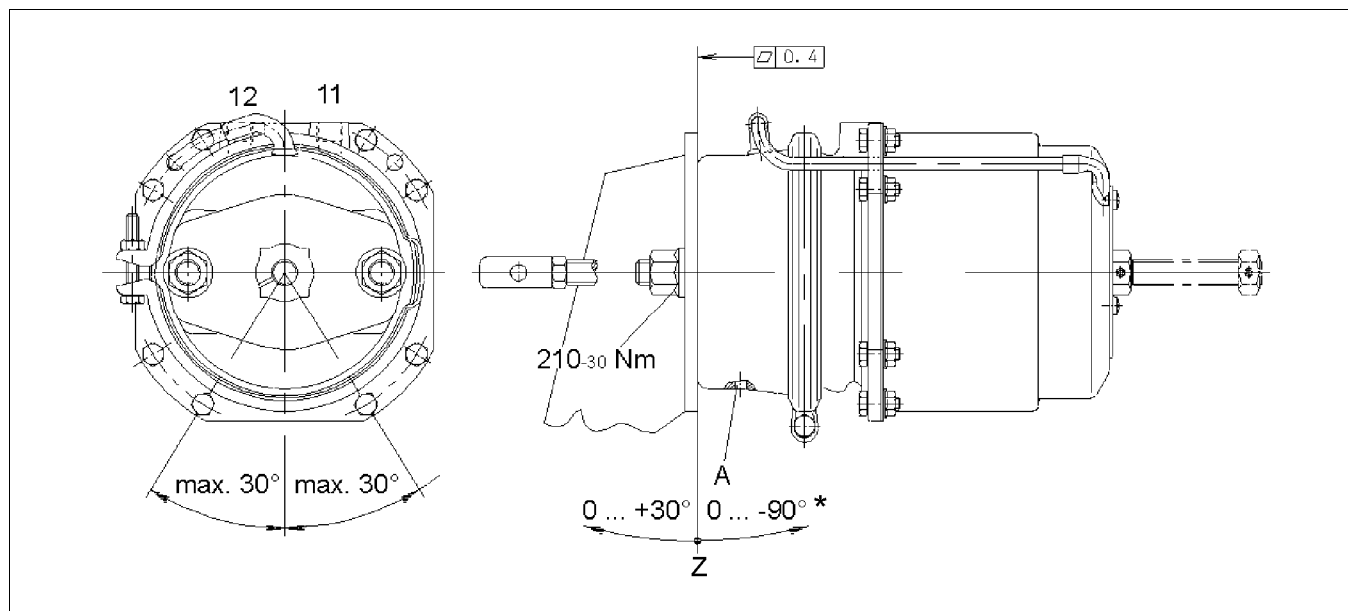
- Install the Tristop® cylinder with up to a 30° slant between horizontal upward facing and vertical downward facing piston rod.

The open drain/breather hole must point downwards (maximum permissible deviation  $\pm 30^\circ$ ).

**!** Install the Tristop® cylinder with gaiter seal with the piston rod at a maximum of a 60° downward angle.

## Device description

- Seal additional drain holes (exception TSL cylinder!).
  - Seal the opening for the release screw.
- The bleed line between the service brake part and the spring brake part must run in the area of the upper half of the Tristop® cylinder.
- The maximum permitted displacement of the piston rod is 3° on all sides.



### Key

<b>A</b>	Drain hole	<b>Z</b>	Permissible fitting position	*	0 to -60° using Tristop® cylinder with gaiter
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### Fastening

Fastening the Tristop® cylinder requires the use of nuts M 16x1.5 – strength class 8 – DIN EN 28673, ISO 8673 (in accessories pack, WABCO No. 423 903 532 2).

- Thread on both nuts by hand until the Tristop® cylinder makes full contact.
- Tighten the nuts to approximately 120 Nm (e.g. with an impact wrench).
- Tighten the nuts to 210 Nm (tolerance -30 Nm) using a torque wrench.  
Increase the tightening torque appropriately when using self-locking nuts.
- Check the tightening torque of 210 Nm in accordance with the maintenance intervals of the axle manufacturer.

### ! Steering axle specifics

When installing Tristop® cylinders on steering axles, ask the axle manufacturer about the respective installation situation.

### Spare

When replacing a brake chamber, check the bracket for any damage and replace according to the axle manufacturer's recommendations if necessary.

### Installing a larger cylinder than type 30/30

Types 36/36 and 36/30 are not to be mounted using horizontally positioned fastening bolts. In this case, a vertical position with a deviation of  $\pm 30^\circ$  is permitted.

### General

WABCO Tristop® cylinders are delivered with the springs under tension. Release the springs before commissioning the vehicle.

With the TSL types, fasten the release screw in the hole provided on the side. Close the hole, on the cover with the cap attached to the device.

## Installation instructions for Tristop® cylinders (disc brake)

### Installation

- Install the Tristop® cylinder horizontally.  
Permissible deviation: 10° with push rod showing upward and 30° showing downwards.  
The open drain/breather hole must point downwards (maximum permissible deviation  $\pm 30^\circ$ ).
- Remove the lower plastic plug.  
The connecting line between the service brake part and the spring brake part must run in the area of the upper half of the Tristop® cylinder.

### Fastening

Fastening the Tristop® cylinder requires using nuts M 16x1.5 – Strength class 8 – DIN 934 (WABCO No. 810 304 031 4).

- Thread on both nuts by hand until the Tristop® cylinder makes full contact.  
Make sure that the piston rod goes into the calotte of the brake lever.  
Make sure that the flange surfaces and sealing surfaces of the cylinder and the disc brake are clean and undamaged.  
Make sure that the gaiters are not damaged and are seated properly together with the back-up ring.
- Tighten both nuts to approximately 120 Nm (e.g. with an impact wrench).
- Tighten both nuts to 210 Nm (tolerance -30 Nm) using a torque wrench.
- Move the release bolt to drive position after fastening (secure with  $25^{+20}$  Nm).

## Install dimensions - Double diaphragm spring brake actuator for S-cam drum brake



### Outline drawing with install dimensions

Open the WABCO website [www.wabco-auto.com](http://www.wabco-auto.com).

Click on *Product Catalogue INFORM* => *Product number*.

Enter the order number of the desired double diaphragm spring brake actuator into the search field.

Click the *Start* button.

## Technical Data - Double diaphragm spring brake actuator for S-cam drum brake

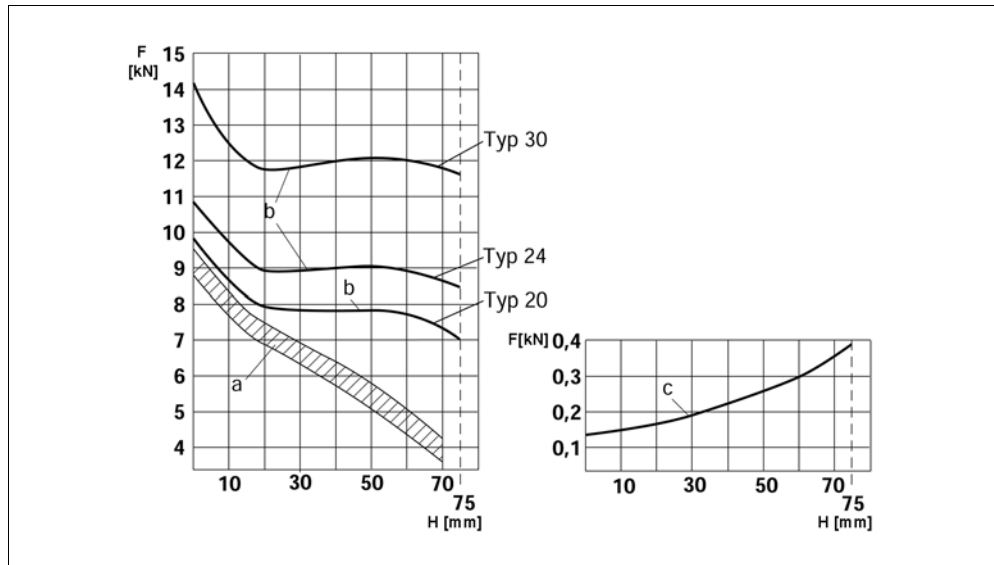
Order number	Type	Max. stroke [mm] Brake chamber and spring chamber cylinder	Displacement of push rod in any direction	Volume-stroke of the brake chamber at 2/3 stroke [litres]	Volume stroke of the spring brake cylinder [litres]	Max. operating pressure [bar]	Thermal range of applica- tion	Install dimensions D [mm]	Weight [kg]
925 375 100 0	20/30	75	6°	0,9	2,12	8,5	-40 °C to +80 °C	149	9,2
925 376 100 0	24/30	75	6°	1,9	2,12			162	9,7
925 376 101 0	24/30	75	6°	1,09	2,12			162	9,7
925 376 103 0	24/30	75	6°	1,09	2,12			162	9,9
925 376 106 0	24/30	75	6°	1,16	2,12			162	10,3
925 376 107 0	24/30	75	6°	1,09	2,12			162	9,9
925 376 110 0	24/30	75	6°	1,09	2,12			162	9,9

## Device description

Order number	Type	Max. stroke [mm] Brake chamber and spring chamber cylinder	Displacement of push rod in any direction	Volume-stroke of the brake chamber at 2/3 stroke [litres]	Volume stroke of the spring brake cylinder [litres]	Max. operating pressure [bar]	Thermal range of applica- tion	Install dimensions D [mm]	Weight [kg]
925 376 200 0	24/30	64	6°	0,9	1,92			161	9,3
925 377 100 0	30/30	75	6°	1,32	2,12			182	10
925 377 101 0	30/30	75	6°	1,32	2,12			182	10
925 377 102 0	30/30	75	6°	1,32	2,12			182	10
925 377 103 0	30/30	75	6°	1,32	2,12			182	10,2
925 377 105 0	30/30	75	6°	1,32	2,12			182	10,2

**423 903 535 2 Yoke end without fastening nut / 423 903 532 2 Yoke end with nut**

### Pressure diagrams - Double diaphragm spring brake actuator for S-cam drum brake



#### Key

- |   |  |          |        |
|---|--|----------|--------|
| a | Output force of the spring chamber, release pressure $p_e = 4.6 \pm 0.3$ bar | <b>F</b> | Force  |
| b | Output force of the service brake part at $p_e = 6.5$ bar                    | <b>H</b> | Stroke |
| c | Return-spring force of the service brake part                                |          |        |

# Device description

## Technical data – Tristop® Cylinder (cam)

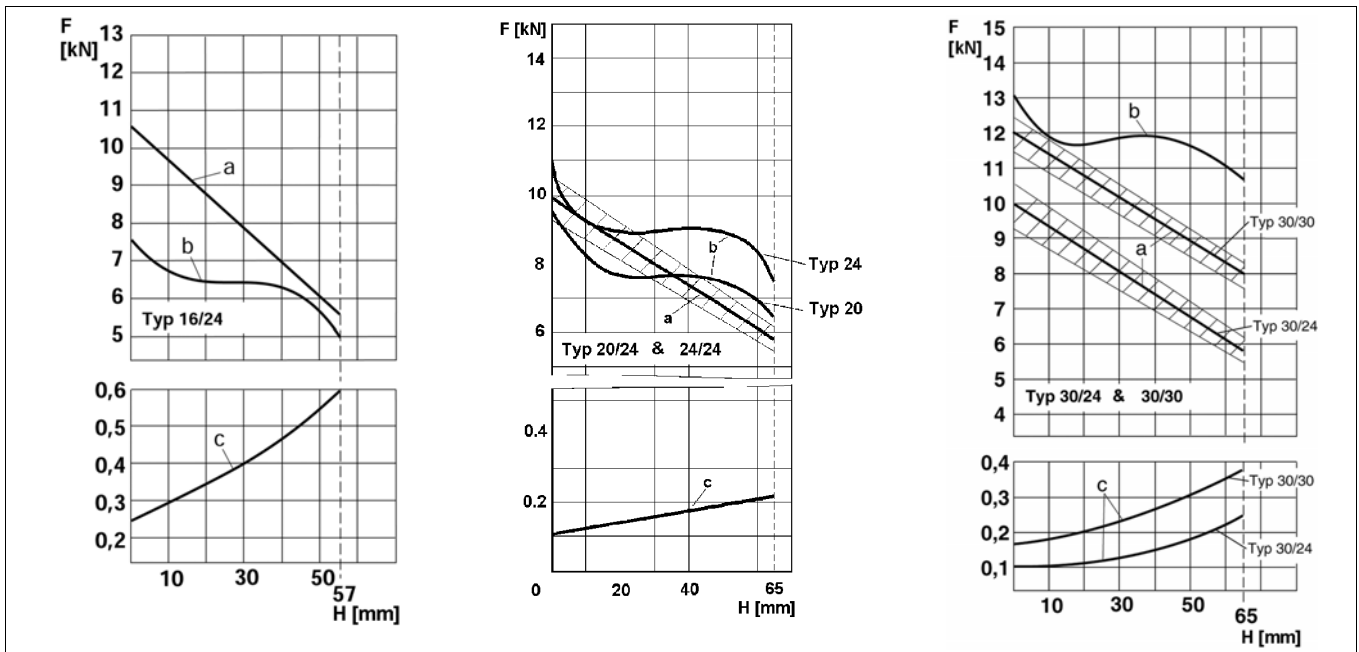
Order number	Type	Max. stroke [mm] Brake chamber and spring chamber cylinder	Release torque [Nm] release mechanism Tightening torque [Nm]		Displacement of push rod in any direction	Volume-stroke of the brake chamber at 2/3 stroke [litres]	Volume stroke of the spring brake cylinder [litres]	Max. operating pressure	Thermal range of applica- tion	Weight [kg]
925 494 041 0	16/24	65	15 <sup>+20</sup>	25 <sup>+20</sup>	3°	1,13	1,8			
925 490 105 0	20/24	65	15 <sup>+20</sup>	70	3°	0,8	1,4	9,8		
925 491 114 0	24/24	65	15 <sup>+20</sup>	70	3°	0,8	1,4	9,8		
925 491 111 0	24/30	65	15 <sup>+20</sup>	70	3°	0,8	1,4	9,9		
925 492 204 0 *	30/24	65	15 <sup>+20</sup>	70	3°	1,13	1,4	9,2		
925 492 208 0	30/30	65	15 <sup>+20</sup>	70	3°	1,13	1,8	11,5		
925 492 300 0**	30/30	65	15 <sup>+20</sup>	70	3°	1,13	1,8	9,9		

### Key

\* Install position +90° / -30°

\*\* Install position +50° / -10°

## Pressure diagrams – Tristop® Cylinder (cam lobe)



### Key

- a Output force of the spring chamber, release pressure  $p_e = 4.6 \pm 0.3$  bar
- b Output force of the service brake part at  $p_e = 6.5$  bar
- c Return-spring force of the service brake part

F Force  
H Stroke

# Device description

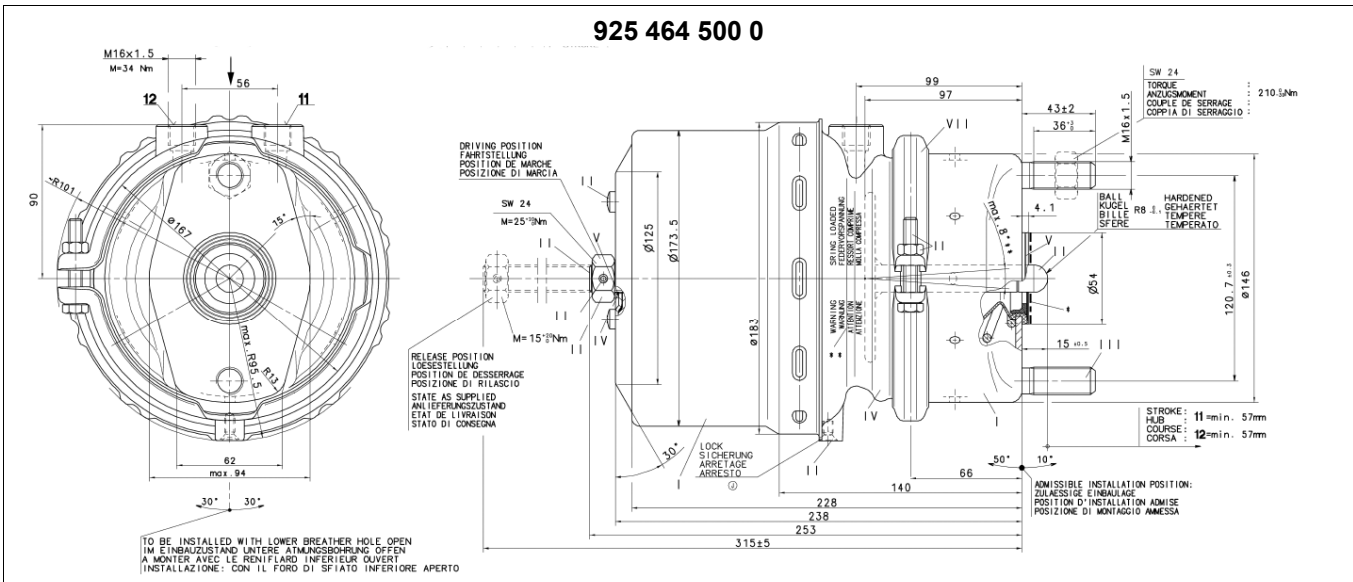
## Technical data

Order number	Type	Max. stroke [mm]
925 384 001 0	16/24	57
925 380 101 0	20/24	64

Max. operating pressure	8.5 bar
Volume-stroke of the brake chamber at 2/3 stroke [litres]	0,51
Volume stroke of the spring brake cylinder [litres]	0,754
Min. nominal diameter	Ø 11.5
Thermal range of application	-40 °C to +80 °C
Weight	6,6 kg

## Install dimensions – Tristop® Cylinder (disc brake)



Port threads	Key
M 16x1.5	<b>A</b> In mounted position lower breather hole ± 30° <b>B</b> Sphere <b>C</b> Out of plane <b>D</b> Release position as supplied <b>E</b> Permissible fitting position <b>H</b> Stroke <b>L</b> Left <b>R</b> Right

Type	Install dimensions [mm]													
	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>	L <sub>8</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	R <sub>1</sub>	α	β
16/16	320	252	237	227	64	90	96	90	146	167	158,5	101	45°	90°
16/24	318	253	237	227	64	92	96	90	146	167	173,5	101	45°	90°
18/24	328	258	243	233	65	96	99	90	153	175	173,5	106	36°	90°
20/24*	328	258	243	233	65	96	99	90	153	175	173,5	106	45°	90°
20/24**	320	253	238	229	65	92	98	90	153	175	173,5	106	90°	110°

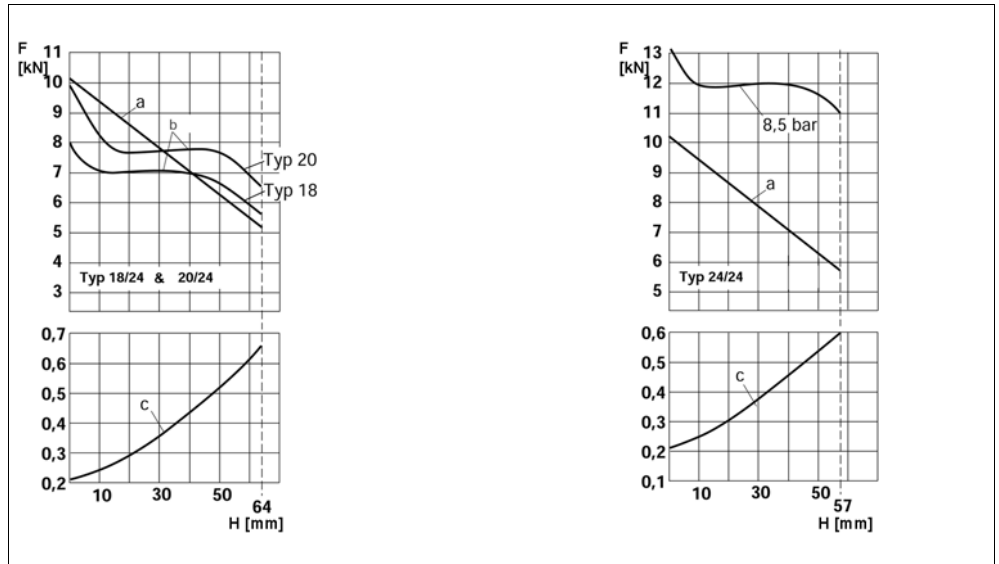
Key	
*	925 480 960 0
**	925 460 032 0

# Device description

## Technical data – Tristop® Cylinder (disc brake)

$\alpha = \text{right}$ $\beta = \text{left}$	Order number		Type	Max. stroke [mm]	Volume-stroke of the brake chamber at 2/3 stroke [litres]	Volume stroke of the spring brake cylinder [litres]	Max. operating pressure Service brake system Spring brake cylinder	Thermal range of application	Weight [kg]
	$\alpha = \text{left}$ $\beta = \text{right}$	Universal: Ports upwards $\beta = \text{left}$							
925 464 450 0	925 464 451 0	925 464 452 0	16/16	57	0,54	1,2	8,5 bar	-40 °C to +80 °C	7,0
925 464 461 0 $\alpha = 90^\circ, \beta = 70^\circ$			16/16	57	0,54	1,2			7,0
925 464 500 0	925 464 501 0		16/24	57	0,54	1,4			8,0
925 463 500 0	925 463 501 0	925 463 502 0	18/24	64	0,8	1,4			9,1
925 460 100 0	925 460 101 0	925 480 960 0	20/24	64	0,8	1,4			9,2
		925 460 032 0	20/24	57	0,6	1,4			8,0
925 461 050 0	925 461 051 0	925 461 052 0	24/24	64	0,8	1,4			9,2

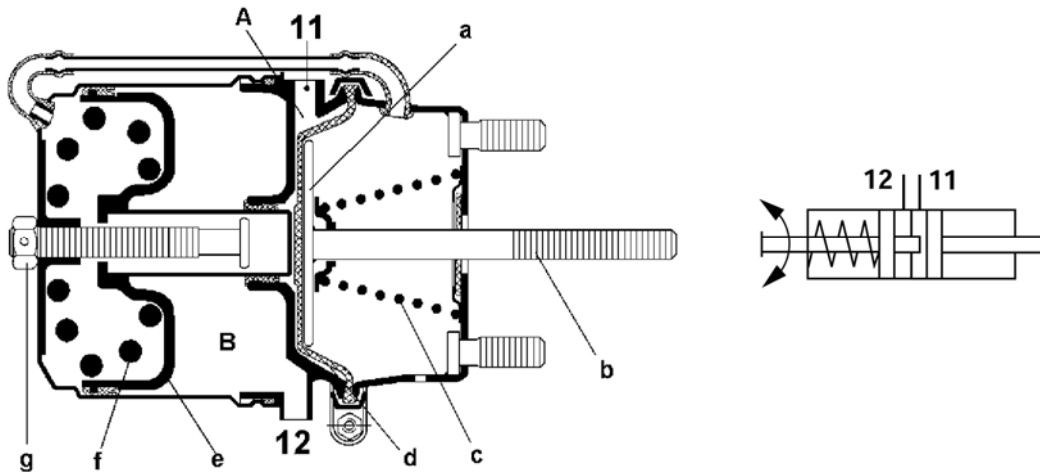
## Pressure diagram – Tristop® Cylinder (disc brake)



### Key

<b>H</b>	Stroke	<b>F</b>	Force
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### Operation



#### Service brake system

When the service braking system is actuated, compressed air flows into Chamber A via Port 11, acting on diaphragm (d) and forcing piston (a) to the right against compression spring (c). Via piston rod (b), the force generated acts on the slack adjuster and thus on the wheel brake. When the pressure in Chamber A is reduced, compression spring (c) moves piston (a) and diaphragm (d) back into their original positions. The brake chamber of the Tristop® Spring Brake Actuator operates independent of its spring-loaded portion.

#### Parking brake system

When the parking brake system is actuated, the pressure in chamber B is partially or totally relieved via port 12. In this instance, the force of the released pressure spring (f) is placed on the wheel brake via piston (e) and push-rod (b).

The maximum braking force of the spring-loaded portion is achieved when chamber B is pressureless. Since this braking force is achieved exclusively by mechanical means, i. e. by compression spring (f), the spring-loaded portion may be used for the parking brake. When the brake is released, the pressure is once again increased in chamber B via port 12.

#### Mechanical release mechanism

For emergencies, the Tristop® cylinder has a mechanical release mechanism for its spring-loaded portion. Should the pressure at port 12 fall to zero, the hexagon head screw (g) wrench size 24 can be screwed out to release the parking brake.

! Legal provisions for spring brakes in trailers please refer to 98/12/EC (annex IV / 1.3.1, annex V / 2.4. & 2.5)