



T Division – Commercial Vehicle Technology

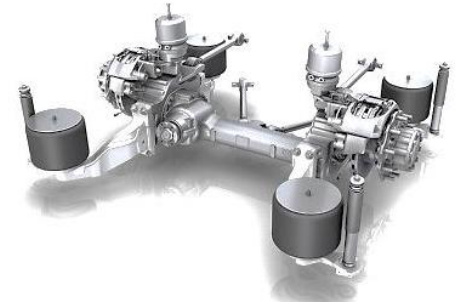
TU Business Unit – Bus Rear Axle Systems

Referent | Abteilung | Division



Milestones for the Low-Floor Portal Axle

- 1982 Development of the AV 130 portal axle
- 1983 First delivery
- 1988 Development of the second generation, the AV 131 (drum)
- 1994 Development of the third generation, the AV 132 (drum/disk)
- 1996 Volume production of the AV 132
- 2003 Facelift for the AV 132, weight optimization, compact bearings in the wheel head
- 2007 Development of AV 132 II, driveline reinforcement for Euro 6
- 2011 Start of volume production for AV 132 II
- 2015 Development of the fourth generation, the AV 133
- 2015 Development of the AV 110 for midibuses



AV 133 for city buses

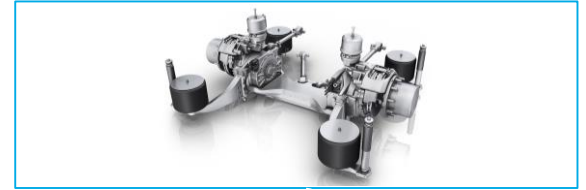


AV 110 for midibuses

The Most Important Products

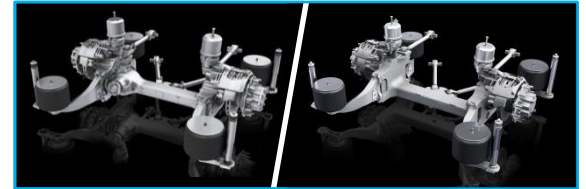
AxTrax AVE: see separate module topic

Vehicle widths: 2,300 mm – 2,600 mm



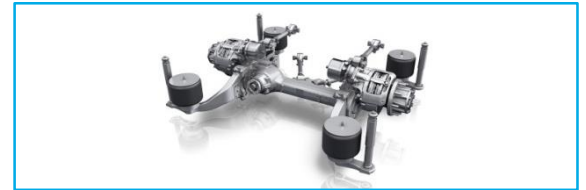
AV 133 / AVN 132

Vehicle widths: 2,300 mm – 2,600 mm



AV 110

Vehicle widths: 2,450 mm – 2,600 mm



A 132

Vehicle widths: 2,500 mm – 2,600 mm



Technical Data

AV 133 / AVN 132

Stepless go-arounds with the market leader in low-floor technology

	AV 133 / 80° Portal axle Driven	AV 133 / 87° Portal axle Driven	AV 133 / 90° Portal axle Driven	AVN 132 Portal axle Non-driven
Vehicle width [mm]	2,300 – 2,600			
Max. axle load [kg]	11,500 – 13,000			11,500
Max. output torque [Nm]	50,000			-
Max. engine power [kW]	300			-
Lateral collection angle ¹⁾	6°	6.5°	6°	-
Ratios	5.12 / 5.73 / 6.19 / 9.81 ²⁾	5.30 / 5.76 / 6.20 ²⁾	5.12 / 5.73 / 6.19 ²⁾	-
Tire size ¹⁾	275/70 R22.5 twin tires			
Rim size ¹⁾	22.5" x 8.25"			
Disc brake	Knorr SB 7000			
Axle weight (with oil filling) from	767 ³⁾			589 ³⁾
Axle system weight [kg]	973 ⁴⁾			799 ⁴⁾

1) Standard design

2) Other ratios upon request

3) Axle total weight depends on customer specification

4) Weight of axle with disk brake, incl. spring carriers, longitudinal rods, v-rods, air springs, and shock absorbers



Technical Data

AV 110

Low-floor design for midibus as well

	AV 110 / 80° Portal axle Driven	AV 110 / 87° Portal axle Driven	AV 110 / 90° Portal axle Driven
Vehicle width [mm]	2,450 – 2,600		
Max. axle load [kg]	9,000 – 11,500		
Max. output torque [Nm]	35,000		
Max. engine power [kW]	200		
Lateral collection angle ¹⁾	6°	6.5°	6°
Ratios	4.02 / 4.50 / 4.86 / 5.78 / 7.71 ²⁾	4.17 / 4.52 / 4.87 / 5.78 ²⁾	4.02 / 4.50 / 4.86 / 5.78 ²⁾
Tire size ¹⁾	285/70 R19.5 twin tires		
Rim size ¹⁾	19.5" x 7.5"		
Disc brake	Knorr SN6 / Meritor ELSA 195		
Axle weight (with oil filling) from	737 ³⁾		
Axle system weight [kg]	950 ⁴⁾		

1) Standard design

2) Other ratios upon request

3) Axle total weight depends on customer specification

4) Weight of axle with disk brake, incl. spring carriers, longitudinal rods, v-rods, air springs, and shock absorbers



Technical Data

A 132

Centrally placed input shaft in low entry city buses

A 132 **Hypoid Direct Drive Axle**

Vehicle width [mm]	2,500 – 2,600
Max. axle load [kg]	13,000
Max. output torque [Nm]	50,000
Max. engine power [kW]	400
Lateral input	4° ¹⁾
Ratios	2.93 / 3.23 / 3.54 / 5.22 ²⁾
Tire size (standard)	295/80 R22.5 twin tires
Rim size (standard)	22.5" x 8.25"
Disc brake	Knorr SN7
Axle weight (with oil filling) from	689 ³⁾
Axle system weight [kg]	998 ⁴⁾

1) Standard design

2) Other ratios upon request

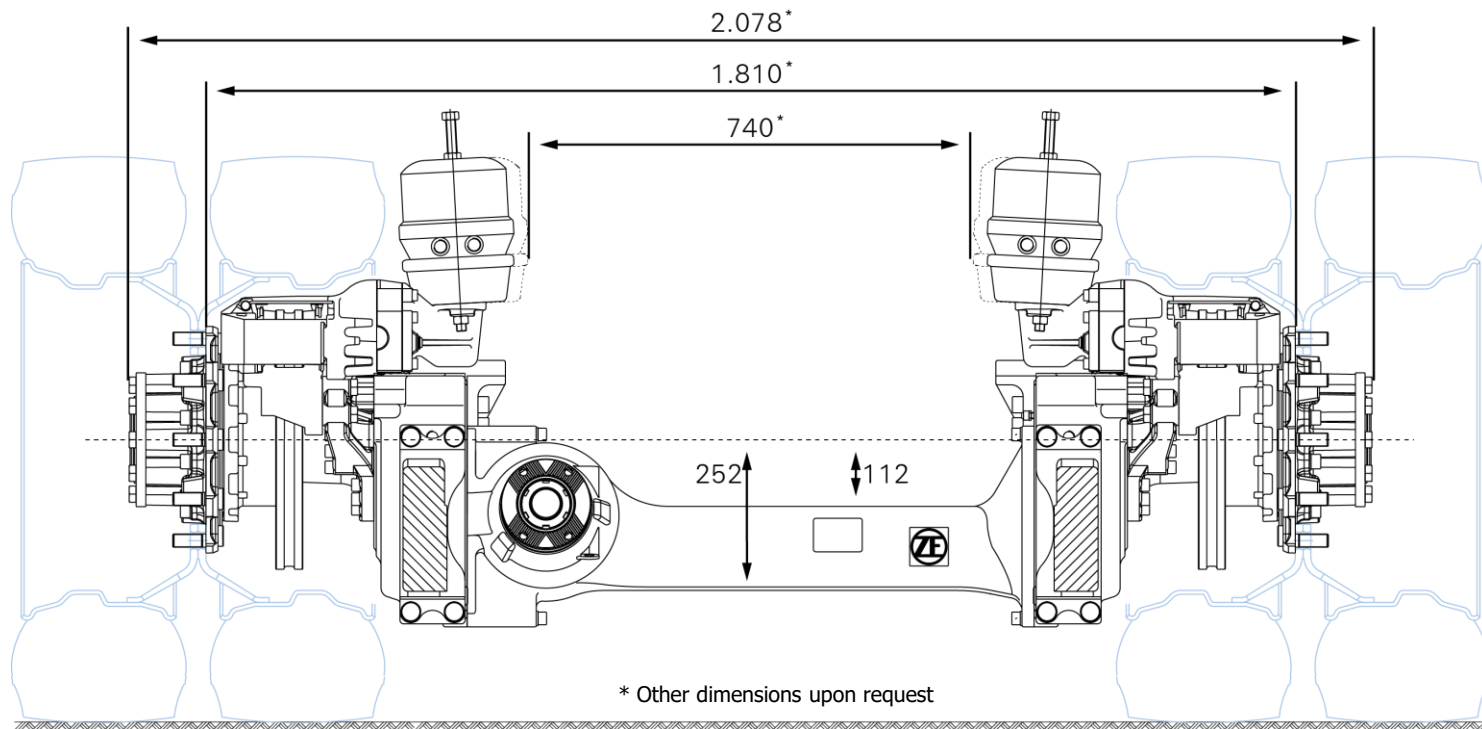
3) Axle total weight depending on customer specification

4) Weight of axle, incl. spring carriers, longitudinal rods, v-rods, air springs, and dampers



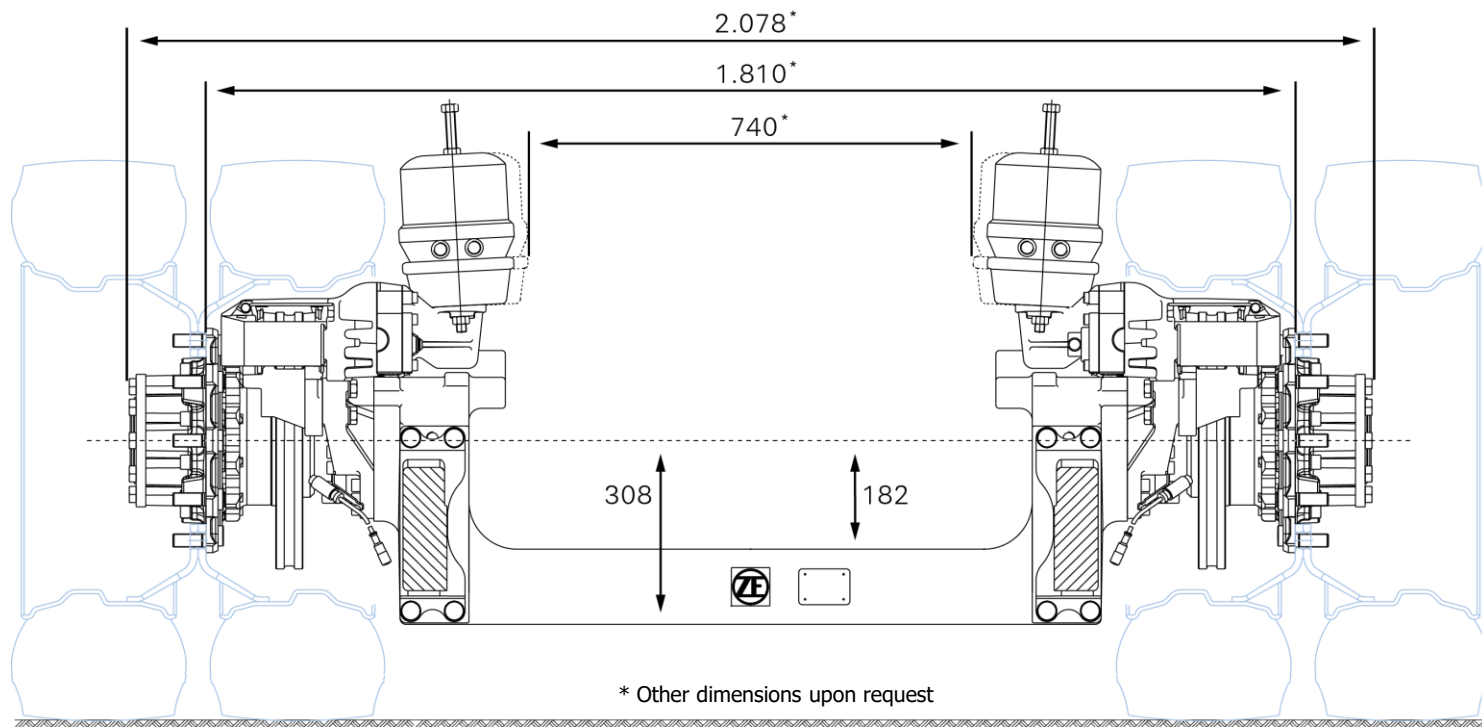
Installation Drawing

AV 133



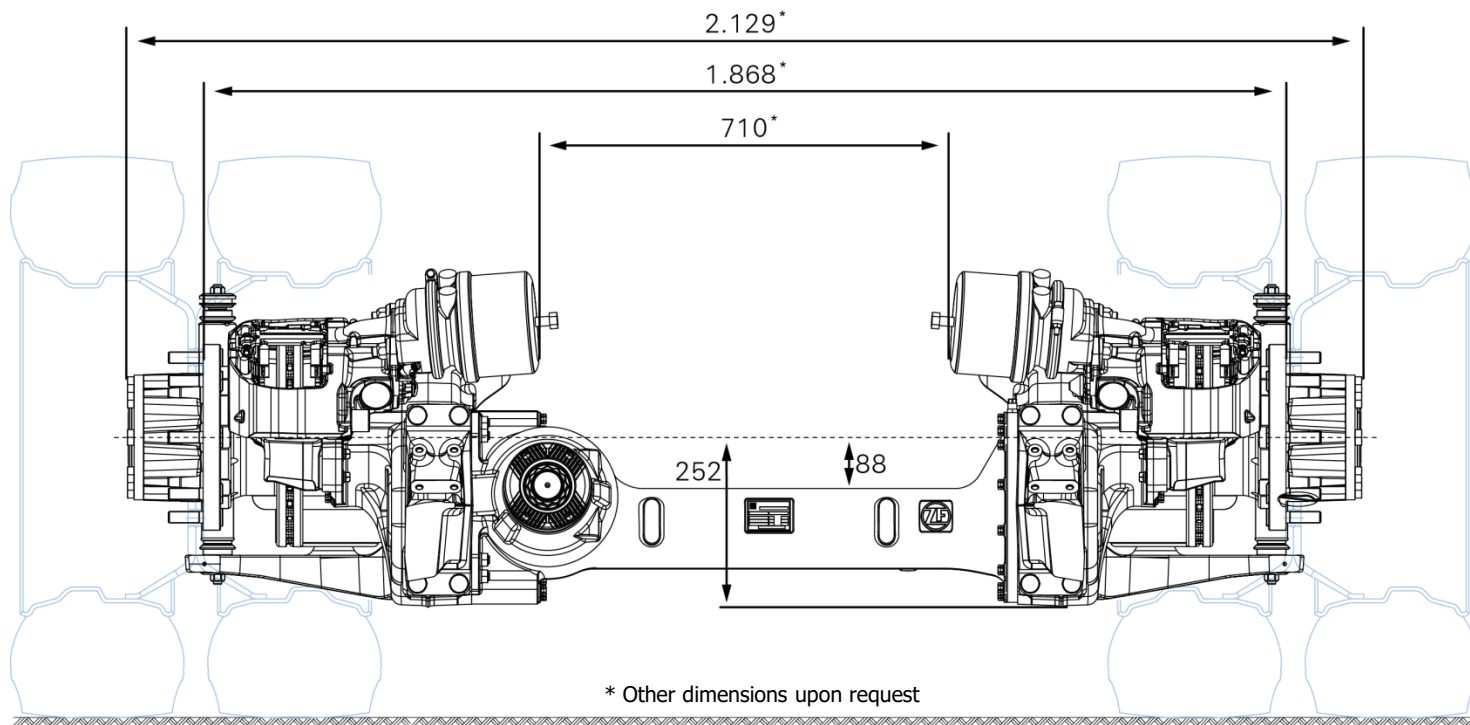
Installation Drawing

AVN 132



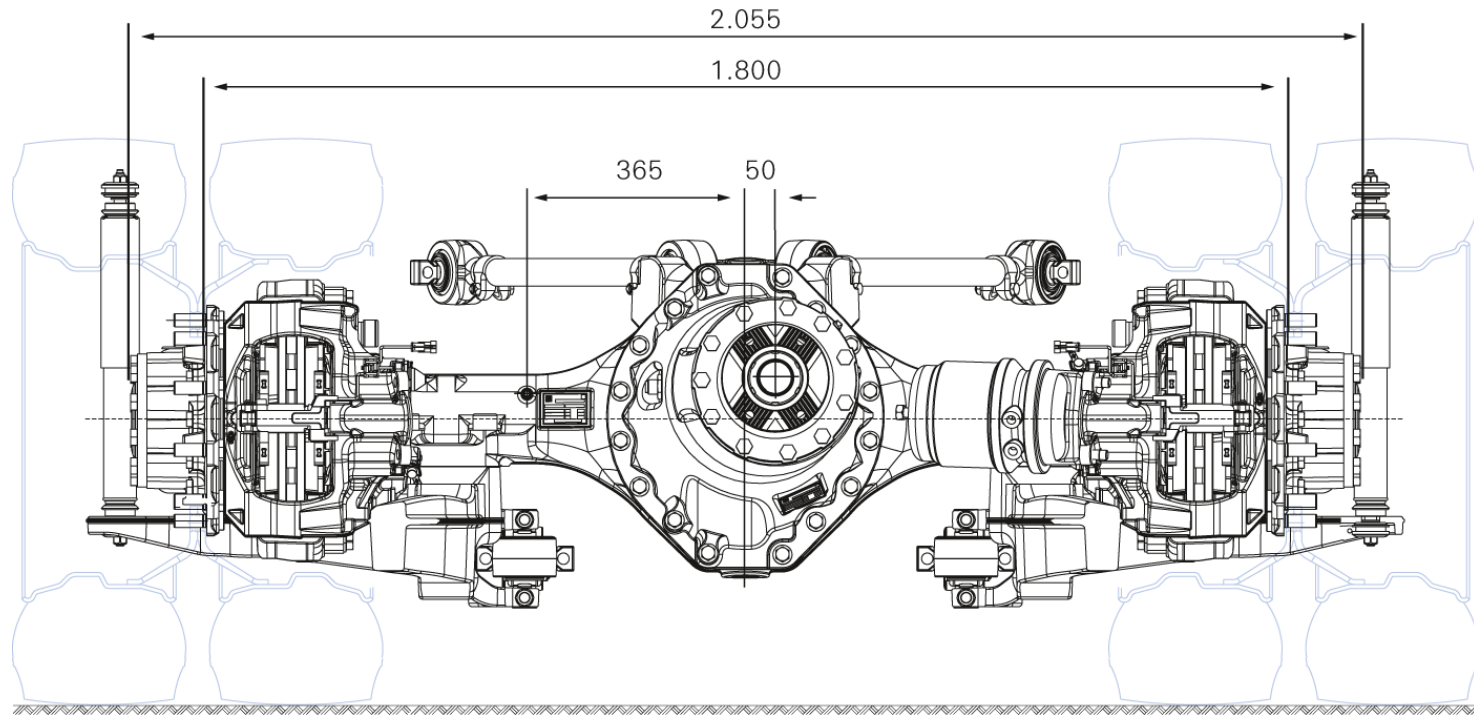
Installation Drawing

AV 110



Installation Drawing

A 132



The Highlights (Technology)

Bus rear axle systems – faster and easier through the traffic

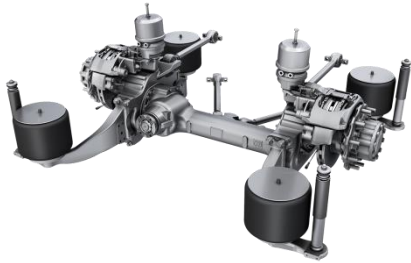
- Comfortable, step-free entry
- Better driving comfort
- Good maneuverability
- Greater freedom in chassis design
- Optimal anti-roll support and damping
- Active driving safety
- Low noise development



Bus Driveline Technology

Rear Axles for Low-Flow City Buses

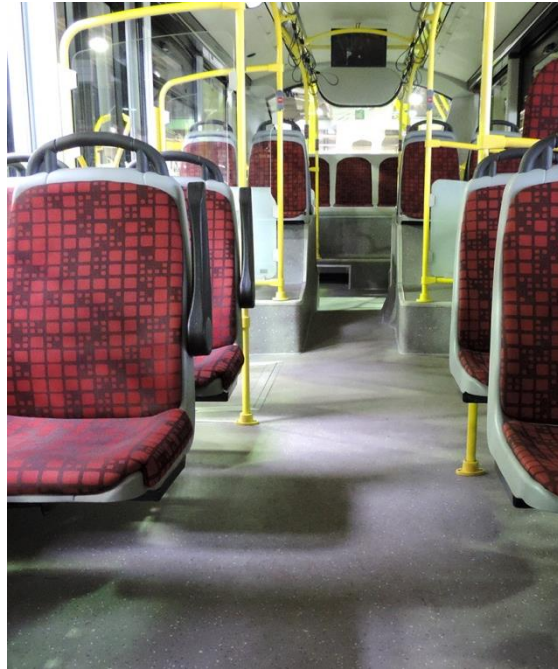
Advantages for customers and manufacturers: step-free movement through the low-floor



AV 133



AVN 132



- Comfortable entry
- Quicker boarding and exiting
- Increased freedom of movement in the center aisle
- Low noise level
- Proven technology
- Reduced maintenance
- Available for right-hand drive vehicles and as "T-Drive" version for centrally placed input shaft
- Additionally:
AVN 132 as non-driven portal axle for articulated trolleybuses

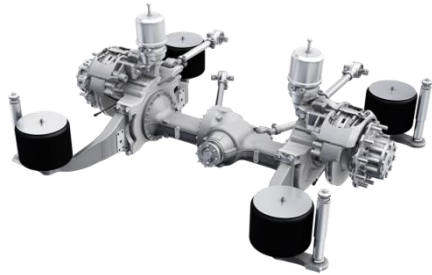
Bus Driveline Technology

Rear Axles for Low-Entry City Buses

Advantages for customers and manufacturers: centrally positioned input shaft in low-entry city buses



A 132



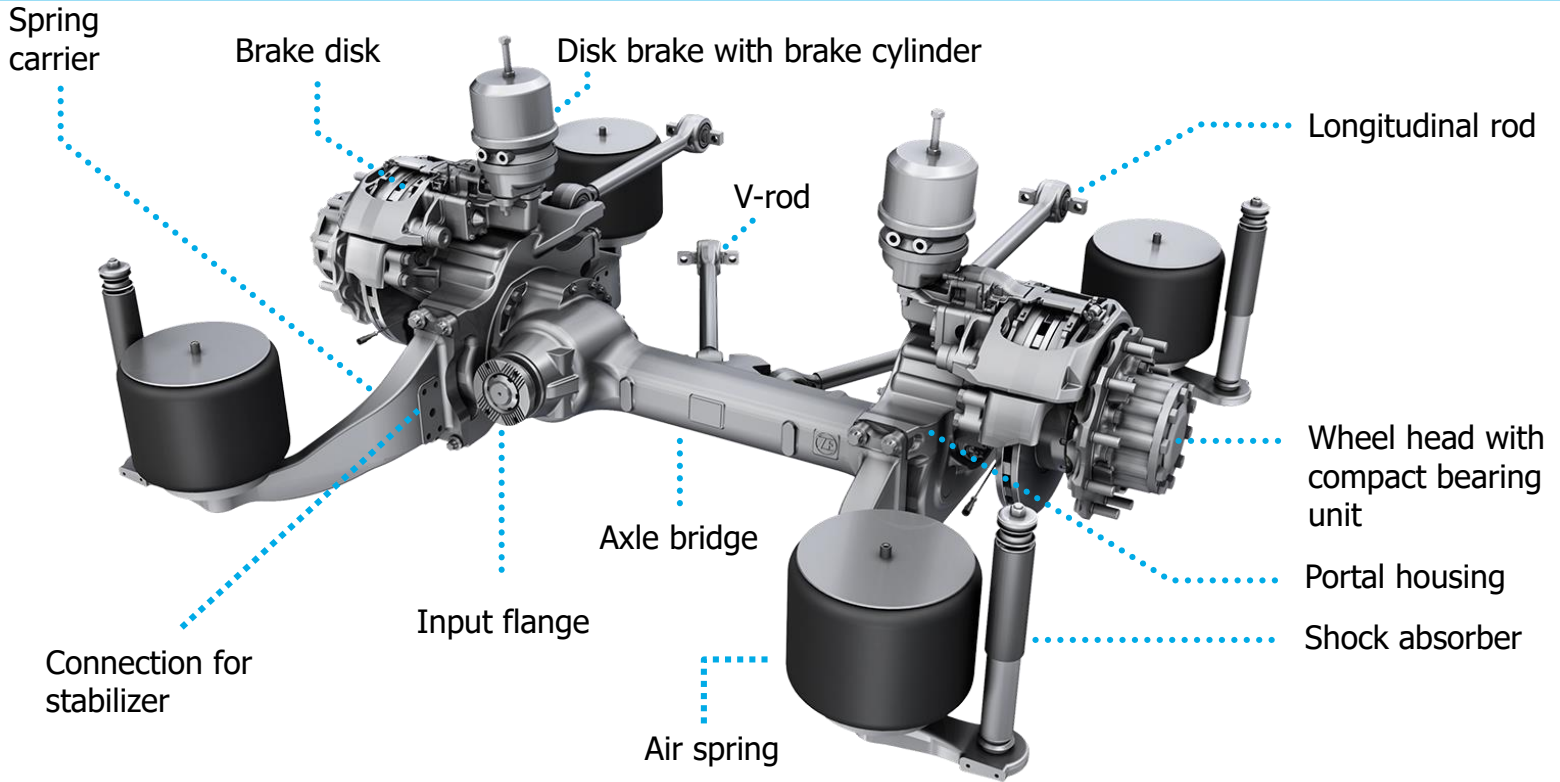
AV 132 T



- Comfortable entry
- Reduced weight
- Minimum noise level
- Reduced maintenance
- Easy to maintain
- Complete systems approach incl. suspension available

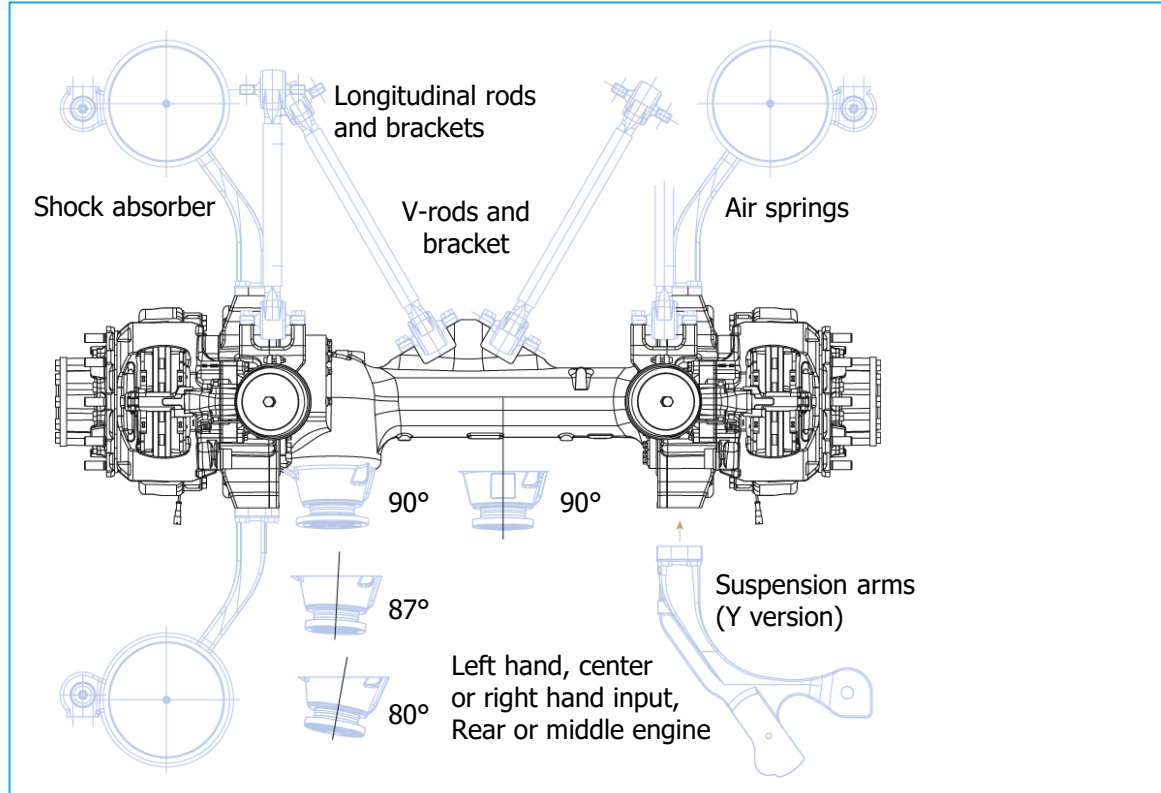
Axle Systems in City and Intercity Buses

Axle Structure



Axle Systems in City Buses

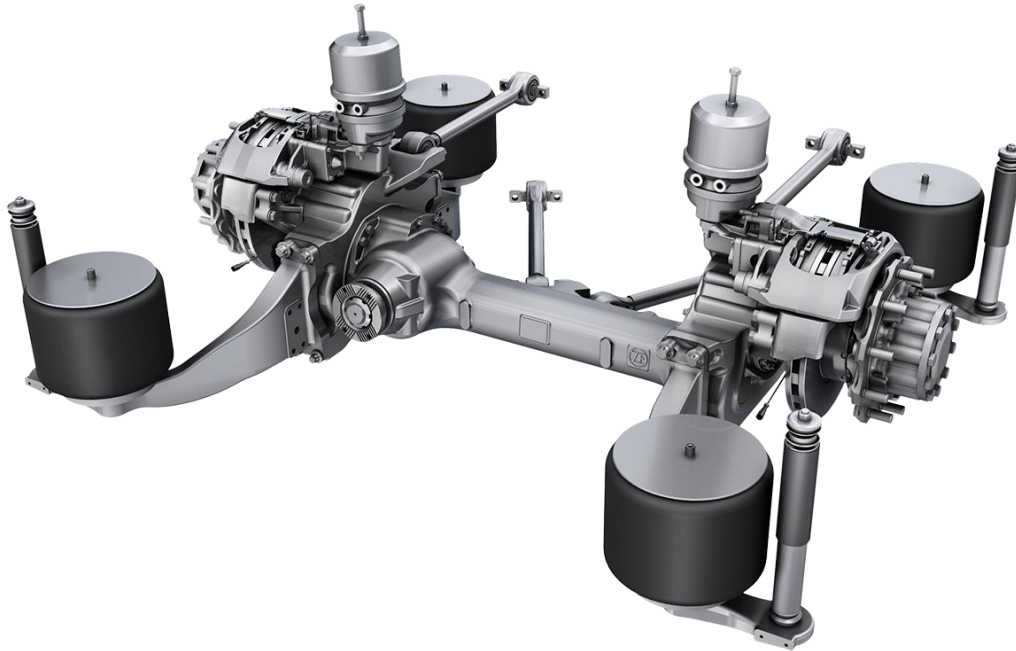
AV 132 (AV 132 T) / AVN 132 Modular Design



- Different designs available for all existing vehicles and driveline arrangements
- Complete system scope of supply includes (depending on customer requirements):
 - Spring carrier
 - Air spring
 - Shock absorber
 - Control arm
 - Disk brakes

AV 133 - Driven Axle for City and Intercity Buses

System Overview

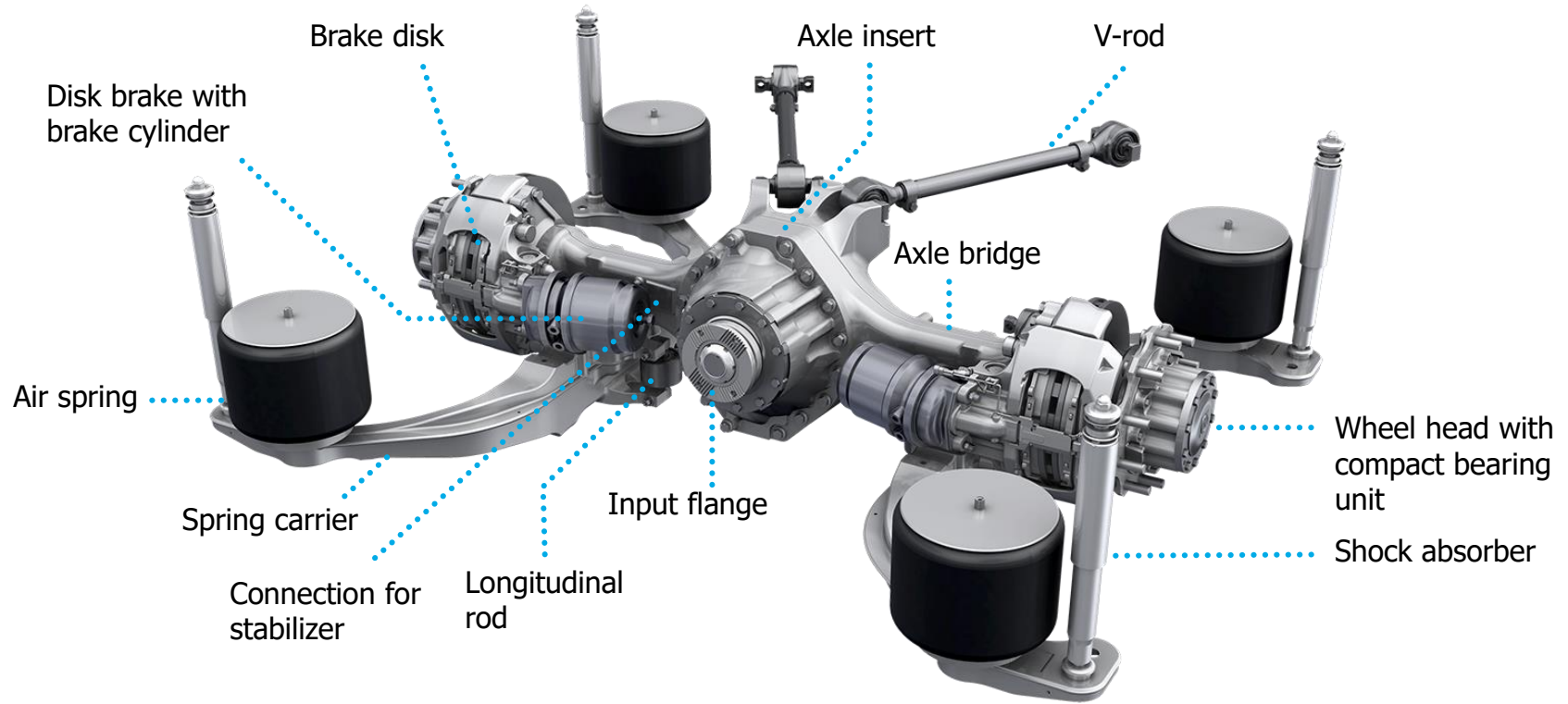


Design features:

- Weight optimization in cast housing and (optionally) aluminum spring carriers
- Integrated v-rod connection
- Low v-rod connection for low-floor applications
- Silent helical toothed bevel gears
- Wide spring track:
Optimal roll stiffness
- Wide spectrum of gear ratios,
even for trolleybuses

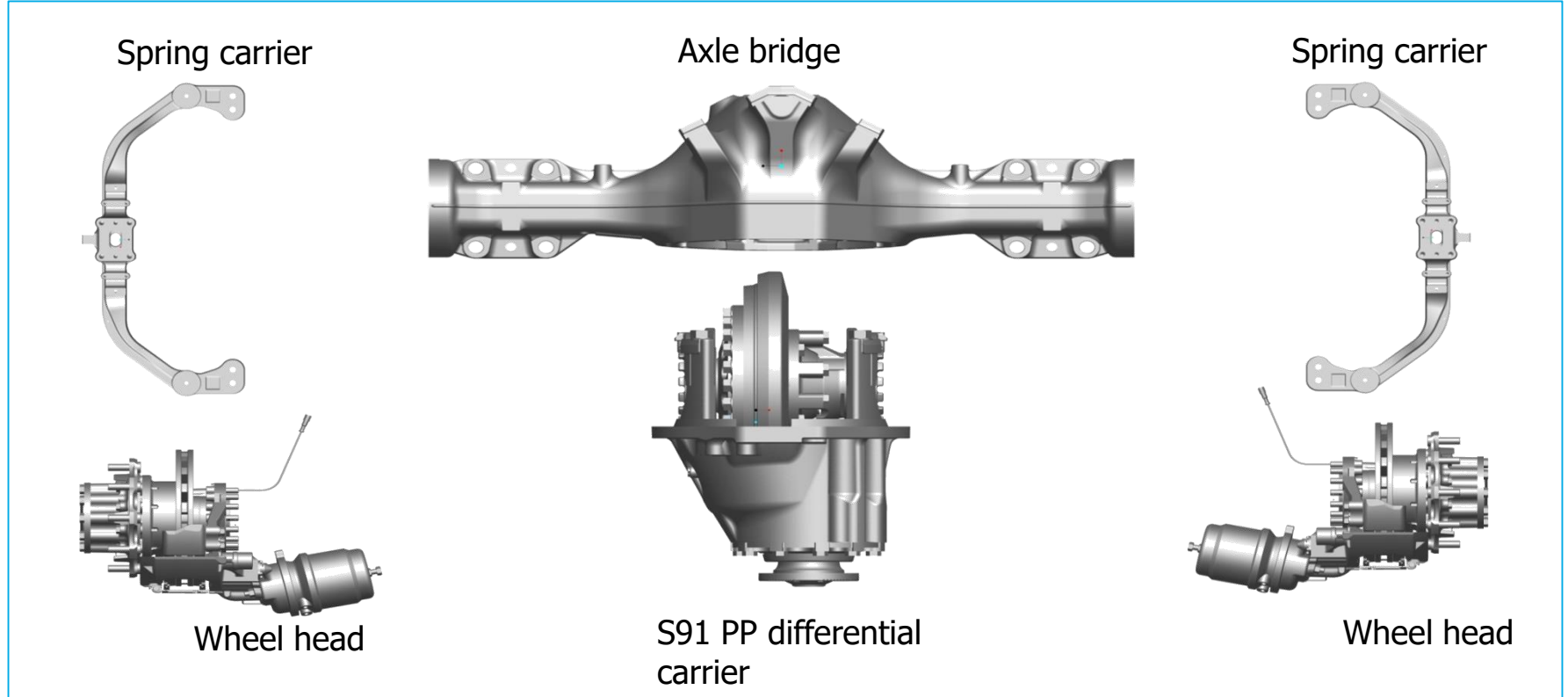
Axle Systems in Coaches

Axle Structure



Axle Systems for Coaches

Modular Design



A 132 - Driven Axle for Coaches

System Overview



Design features:

- Weight-optimized cast housing
- Integrated v-rod connection
- Low v-rod connection for semi-low-floor applications
- Silent ground bevel gears
- Two shock absorber connections
- Wide spring track:
Optimal roll stiffness

Axle Systems in Midibuses

Axle Structure

