Trailer brake and chassis control
THE MUNICH-BASED KNORR-BREMSE GROUP IS THE WORLD’S LEADING MANUFACTURER OF BRAKING SYSTEMS FOR RAIL AND COMMERCIAL VEHICLES. For more than 100 years the company has pioneered the development, production, marketing and servicing of state-of-the-art braking systems.

Knorr-Bremse Commercial Vehicle Systems supplies customers with braking systems for trucks, buses, trailers and agricultural vehicles. In the case of trailers, the entire spectrum of products from electronic and conventional braking and chassis management systems to wheelend systems is covered. The company’s portfolio ranges from coupling heads, conventional valves, electronic control systems, brake actuators, disc brakes, drum brakes to brake discs. As a systems supplier we regard safety as one of our core competences. Our expertise in complete systems also enables us operate not just as suppliers but also as development partners, collaborating closely with customers from the initial product planning stage right through to the production of installation-ready, customized components and complete system solutions. Our modular approach offers a clear advantage: working with the customer we can select and fine-tune the most appropriate solution.
FOR THE TRAILER SEGMENT KNORR-BREMSE OFFERS:
- A wide-ranging product portfolio
- Robust, reliable systems
- A specific trailer disc brake available for more than ten years
- Customized system solutions
- Continuous product development
- Focused research and development
- Specific testing at Roßfeld near Berchtesgaden, Bayrisches Oberland or in Arjeplog, Northern Sweden
- Local application testing in Victoria, Australia
For years Knorr-Bremse has been the market leader in the field of electronic braking systems for truck/trailer combinations. The latest generation of EBS for trailers is TEBS G2.2. This electronic braking system combines, in one compact assembly, the electronic control unit, the sensor technology and the pneumatic control. The braking functions of anti-lock and load sensing control are both electronically managed within the module as integrated features. This provides more accurate and consistent control of the generated braking force including reduced hysteresis compared to a conventional braking system, thereby improving tractor-trailer braking compatibility, optimising the brake pad wear and helping to reduce the overall operating costs of the trailer.

**CUSTOMER BENEFITS**
- Improved truck/trailer braking compatibility
- Reduced overall operating costs for trailers
- Reduced complexity and greater flexibility of cabling
- Integrated anti-compounding prevents brake force addition of service and parking brake actuators causing damage to the foundation brake
- Optimized pad wear
- Roll Stability Program (RSP) as standard
- Range of additional functions such as automatic lift axle control and traction help.

**EFFICIENCY**
- Minimum downtimes due to wide operating voltage range of 9 - 32V.
- Low weight thanks to optimum product design
- Bundling of these standard components reduces weight by approx. 2.5 kilos

**SAFETY**
- Roll Stability Program available for all trailer and semi-trailer types including roadtrains
- Braking assistant ensures driver always has sufficient braking power available
- Emergency braking/breakaway function integrated into the module
- Special safety functions for tippers

**TEBS FUNCTIONS**
- A range of additional functions – via electrical and pneumatic control
- Easy installation thanks to minimum number of components and separation of pneumatic and electrical connections
- Compatible with all types of tractor vehicles thanks to multi-voltage capability
# OVERVIEW OF TEBS FUNCTIONS

## EFFICIENCY

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>iLvl Intelligent Levelling Control</strong></td>
<td>Enables electronic control of the trailer's air suspension without the need for the usual levelling valves and raise/lower valves. iLvl also enables levels to be pre-programmed and automatically selected at a later point, for example using iTAP.</td>
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<tr>
<td><strong>Lift Axle Control (LAC)</strong></td>
<td>Enables fully-automated control of the lift axle(s) according to the vehicle load.</td>
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<tr>
<td><strong>iCorner</strong></td>
<td>Regulates the trailer suspension system in order to reduce the turning circle and reduce tyre wear.</td>
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<tr>
<td><strong>Operational Data Recorder (ODR)</strong></td>
<td>The trailer's operating data recorder can be accessed via ECUtalk®, iTAP and telematics systems.</td>
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<tr>
<td><strong>Multi-voltage</strong></td>
<td>Voltage range of 9 - 32 V increases possible truck-trailer combinations.</td>
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</table>

## COMFORT

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<td><strong>Traction Help (TH)</strong></td>
<td>Enables lift axles to be raised or lowered in order to increase the imposed load on the towing vehicle’s drive axle, taking into account axle overload and speed restrictions.</td>
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<tr>
<td><strong>Road Layer Function (RLF)</strong></td>
<td>Enables a pre-defined pressure to be set on the trailer brakes.</td>
</tr>
<tr>
<td><strong>iTAP – Intelligent Trailer Access Point</strong></td>
<td>The remote control device for controlling and monitoring trailer functions.</td>
</tr>
<tr>
<td><strong>Speed Pulse (SP)</strong></td>
<td>Automatically resets the ride height according to driving speed.</td>
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SAFETY

**Tyre Pressure Monitoring System (TPMS)**
Warns the driver if tyre pressure is too low or temperature too high (via iTAP or ISO 11992 CAN bus).

**Trailer Suspension Release (TSR)**
Enables brakes to be released in order to avoid tension during raising or lowering.

**Overload Warning**
Improves safety by measuring the bogie load on the trailer.

**Emergency Brake Alert**
Automatically flashes stop lights during hard braking to warn other drivers and avoid rear-end collisions.

**Roll Stability Program (RSP)**
Taking into account current lateral acceleration, vehicle speed and centre of gravity, the program continuously monitors incoming data and recognizes any immediate danger of the trailer tipping over.

**Trailer Roadtrain Module (TRM)**
Amplifies or splits the ISO 11992 CAN bus, enabling the braking signal to be transmitted over a length of more than 40 metres.

**Tilt Angle (TA)**
The brake module sends out a warning signal as soon as a pre-programmed maximum tilt angle has been reached, e.g. for tippers.

**Anti-lock Braking System**
Compares rotation speed of individual wheels and avoids wheel lock under conditions of low friction.

**Steering Axle Lock (SAL)**
Enables the steering axle to be locked during manoeuvring, according to a pre-programmed vehicle speed.
COMMERCIAL VEHICLE SYSTEMS

BRAKE AND CHASSIS CONTROL

BREMS- UND CHASSISSTEUERUNG
iCORNER

On vehicle combinations using semi-trailers the ability to corner is often impaired. When certain lift axle configurations are fitted and activated, meeting the ‘turning corridor’ requirement becomes impossible. iCorner enables a semi-trailer to negotiate tighter curves by continuously monitoring the input from the wheel speed sensors, detecting when the vehicle is entering a tight curve and lowering the lift axle at the front of the bogie.

iCorner is an optional function within Knorr-Bremse’s TEBS G2 braking system which interfaces with the trailer’s air suspension and intelligently manages the pressure in the air bags of an axle. If required, iCorner can independently lower a lift axle or temporarily reduce the air bag pressure in order to reduce the load on the controlled axle(s).

APPLICATION

- Semi-trailers with two to five axles and a single lift axle
- Centre-axle trailers with two or three axles

CUSTOMER BENEFITS

- Reduced tyre wear during cornering
- Function does not have to be especially activated/deactivated by driver
- Flexible use through two different modes of operation (minimizing curve radius/optimizing tyre wear)
- Helps optimize operating costs (longer tyre life, reduced replacement costs)

without iCorner

- axles remain at original height

with iCorner

- iCorner configured to minimize tyre wear
  - Axle 1 raised by iCorner
  - Lift axle control on Axle 1

- iCorner configured to minimize turning circle
  - Axle 1 lowered by iCorner
  - Lift axle control on Axle 1
  - Axle 3 raised by iCorner
  - Lift axle control on Axle 3
In combination with TEBS G2.2, our electronic Intelligent Levelling Control System for trailers offers the driver convenient control of the air suspension and increases the efficiency of vehicle use. TEBS G2.2 serves as the ECU.

**CUSTOMER BENEFITS**
- Wide variety of possible operation
- Available with TEBS G2.2 Premium and TEBS G2.2 Standard Plus
- Simple raising/lowering function even without power supply
- Global use, due to multi-voltage design
- Significant reduction in effort for pneumatic connections
- Reduced complexity through push-to-connect fittings (6x for air suspension bellows) and minimal cabling

**EFFICIENCY**
- Impressive raising/lowering speeds, even for unloaded vehicles
- Easy access to functions – user interface can, for example, be positioned inside the trailer in the case of trailers fitted with bodies
- Reduced air consumption through intelligent control of chassis height
- Pneumatic control enables height adjustment at ramps even without power supply
- Low weight
- Easy raising and lowering as well as use of pre-programmed ramp heights with iTAP

**EASE OF USE**
- Simple user interface
- Possibility of a multi-control user interface
- Automatic height adjustment depending on various external conditions
- Intelligent user interface for suspension release, as iLvl recognizes the need for TSR activation
- Easy, wireless control of pneumatic suspension with iTAP
Knorr-Bremse iTAP (Intelligent Trailer Access Point) enables a wide range of trailer functions to be easily controlled and information clearly displayed using a smartphone or tablet. iTAP communicates by WLAN with the iTAP ECU on the trailer, which passes the control commands via the local 5 V CAN bus to the brake and chassis control.

**CUSTOMER BENEFITS:**

**EFFICIENCY**
- WLAN-access – no problems with electronic control compatibility between truck and trailer
- Intuitive use of ‘App’

**SAFETY**
- Operator located away from danger areas
- Real-time monitoring of tyre pressure and temperature

**EASE OF USE**
- Wireless operation via smartphone
- Flexible platform – easy integration of new functions
CONTROL FUNCTIONS

**iLvl**
Operation of air suspension made easy

**RLF**
Easy activation and setting of road layer function

**Lift axle**
Easy control of lift axle functions

INFORMATION FUNCTIONS

**Load**
Displays bogie load

**Angle**
Displays trailer tilt angle

**Various information**
Displays error memory, supply pressure, voltage and odometer

**TPMS**
Easy monitoring of tyre pressure
The park/shunt valve is designed for use on all trailer types to release the brakes of an uncoupled trailer for shunting purposes. Also referred to as a combined release valve it is used on trailers fitted with spring brake actuators.

CUSTOMER BENEFITS
- Parking valve activates trailer parking brake
- Has integrated charging valve and integrated emergency braking function
- Combines parking, shunting and circuit separation (braking system and auxiliary/air suspension circuit)
- Optimum weight thanks to use of plastic materials
- All push-to-connect fittings of same size (R8x1)
- High corrosion resistance
LEVELLING VALVE

On vehicles fitted with air suspension, levelling valves ensure that the axle suspension maintains a constant ride height (distance between axle and chassis) irrespective of the vehicle load. Levelling valves with the ‘Height Limitation’ feature prevent the chassis height being raised above a set limit. Versions with the ‘Second Ride Height’ feature enable the chassis to be raised to an alternative ride height. Cross-throttling prevents the rapid flow of air between the two outlet ports 21 (left and right side of the vehicle). Ceramic elements ensure the longevity of the valves and push-to-connect fittings enable the valve to be easily installed.

LIFT AXLE VALVE

The TEBS-controlled lift axle valve is used for trailers with electronic braking systems to control the lift axle(s) fully automatically according to the vehicle load. Within the product range there are versions available with a solenoid and those with purely pneumatic control.

CUSTOMER BENEFITS

- Standardised bayonet connector for rapid and safe cable connection
- Pneumatic version can be controlled without cabling
- Electrical versions available with 12 V and 24 V
- Pneumatic version without solenoid
- Use of environmentally-friendly materials
- Easy installation with push-to-connect and bayonet fittings
- Two connection points for the lift axle air bags
- Two connection points for the suspension air bags