TailGUARD™

FOR TRUCK & BUS APPLICATIONS

SYSTEM DESCRIPTION

WABCO

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You will find the current version on the internet at
http://www.wabco.info/i/1534

1 General information

Abbreviations

ABBREVIATION	MEANING
ABS	Anti-Lock Braking System
ALS	(German: Automatischer Blockierverhinderer); Automatic Anti-Lock System
LSV	Automatic load-sensing valve
EBS	Electronic Braking System
ESD	Electrostatic Discharge
GIO	Generic Input/Output
LIN	Local Interconnect Network; specification for a serial communication system, also LIN bus; ultrasonic sensor interface
PLC	Power Line Communication; data communication via cable for power supply
TEBS	Electronic Braking System for Trailers

Purpose of this document

This document is directed toward vehicle manufacturers and workshops.

Symbols used

! Important information, instructions and/or tips that you must always observe.

Reference to information on the internet

– Action step

⇨ Consequence of an action

■ List

Technical documents

WABCO Customer Center
http://www.wabco.info/i/1365

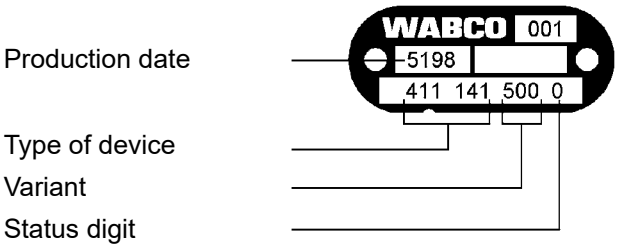
! Please note that the publications are not always available in all language versions.

DOCUMENT TITLE	DOCUMENT NUMBER
TailGUARD for Truck & Bus applications – System Description	815 XX0 211 3
Test report EB181.2 of TÜV Nord	On request
Trailer Remote Control – Operating Manual	815 990 212 3
Trailer Remote Control – Installation and Connection Instructions	815 XX0 195 3
TEBS E system description	815 XX0 093 3
Coupling Catalogue – Push-In, Standard, Conventional, Accessories	815 XX0 080 3

*Language code XX: 01 = English, 02 = German, 03 = French, 04 = Spanish, 05 = Italian, 06 = Dutch, 07 = Swedish, 08 = Russian, 09 = Polish, 10 = Croatian, 11 = Romanian, 12 = Hungarian, 13 = Portuguese (Portugal), 14 = Turkish, 15 = Czech, 16 = Chinese, 17 = Korean, 18 = Japanese, 19 = Hebrew, 20 = Greek, 21 = Arabic, 24 = Danish, 25 = Lithuanian, 26 = Norwegian, 27 = Slovenian, 28 = Finnish, 29 = Estonian, 30 = Latvian, 31 = Bulgarian, 32 = Slovakian, 34 = Portuguese (Brazil), 98 = multilingual, 99 = non-verbal

Structure of the WABCO product number

WABCO product numbers consist of 10 digits.



0 = New device (complete device); 1 = New device (subassembly);
2 = Repair kit or subassembly; 4 = Component part;
7 = Replacement device; R = Reman

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WABCO Contact
http://www.wabco.info/i/1489

2 Safety information

2.1 General safety instructions

Observe all necessary regulations and instructions:

- Read this document carefully.
- Adhere to all instructions, information and safety information to prevent injury to persons and damage to property.
- WABCO will only guarantee the safety, reliability and performance of their products and systems if all the information in this publication is adhered to.
- Always abide by the vehicle manufacturer's specifications and instructions.
- Observe all accident regulations of the respective company as well as regional and national regulations.

Make provisions for a safe work environment:

- Only trained and qualified technicians may carry out work on the vehicle.
- Use personal protective equipment if required (protective goggles, respiratory protection, ear protectors, safety shoes).
- Pedal actuations can lead to severe injuries if persons are in the vicinity of the vehicle. Make sure that pedals cannot be actuated as follows:
  - Switch the transmission to "neutral" and actuate the park brake.
  - Secure the vehicle with brake wedges.
  - Fasten a visible note to the steering wheel indicating that work is being performed on the vehicle and that the pedals are not to be actuated.

Avoid electrostatic charge and uncontrolled discharging (ESD):

Note during construction and building the vehicle:

- Prevent potential differences between components (e.g. axles) and the vehicle frame (chassis).
- Make sure that the resistance between metallic parts of the components and the vehicle frame is less than 10 ohms.
- Establish an electrically conductive connection between moving or insulated vehicle parts, such as axles, and the frame.
- Prevent potential differences between the towing vehicle and the trailer.
- Make sure that an electrically conductive connection is made between metal parts in the towing vehicle and the coupled trailer via the coupling (king pin, fifth wheel, claws with pins), even without a cable being connected.
- Use electrically conductive bolted connections when fastening the ECUs to the vehicle frame.
- Run the cable in metallic casing if at all possible (e.g. inside the U-beam) or behind metallic and grounded protective plating to minimise the influence of electro-magnetic fields.
- Avoid the use of plastic materials if they can cause electrostatic charging.

While carrying out repair or welding work on the vehicle, observe the following:

- Disconnect the battery (if installed in the vehicle).
- Disconnect cable connections to devices and components and protect connectors and ports against contamination.
- Always connect the grounding electrode directly with the metal next to the welding point when welding to prevent magnetic fields and current flow via the cable or components.
- Make sure that current is well conducted by removing paint or rust.
- Prevent heat influences on devices and cabling when welding.

2.2 Summary of the safety instructions from the chapters

Observe the following safety instructions for interventions in the braking system:

- Observe the specifications of the vehicle manufacturer.
- Deactivation when the supply pressure is too low: Switch the system off if the vehicle's supply pressure is too low.
- Only intervene with the braking system if you have sufficient knowledge of the braking system and know and can take responsibility for the effect of your actions and all their consequences.
- The braking system is under pressure. Before intervening with the braking system, make sure all reservoirs and lines are pressureless.
- With braking interventions **via separately installed valves**, the front axle must not be braked. Make sure that the vehicle's front axle can NOT be braked by the system. Braking intervention must only occur via the rear axle(s).

To avoid any accidents, observe the following safety instructions for operating the vehicle and as information for the driver:

- Risk of injury due to system failure in extreme weather conditions: Extreme weather conditions e.g. heavy rain or snowfall, can lead to the restricted functionality.
- Objects with very soft surfaces cannot be detected under all circumstances.
- TailGUARD is a reversing assistance system that helps the driver while reversing by alerting him to approaching objects and braking independently to prevent a collision when this becomes necessary.
- The driver, however, remains fully responsible for vehicle movement and any damage that results from operating the vehicle.
- WABCO cannot hold liable for an accident that is caused despite of using this system; this is a support system only.
- TailGUARD does not release the driver of his obligations under legal or company regulations, such as support of reversing by a person giving directions.

To avoid any accidents, observe the following safety instructions for vehicles with braking intervention through TailGUARD:

- Because the stopping distance becomes longer with heavily laden vehicles - in particular when it is equipped with EBS - the settings (parameter setting / pressure limiting valve) must enable sufficient deceleration for the fully laden vehicle.
- Note pulsed braking when reversing too fast:
  - TailGUARD can assist only with reversing speeds below max. 9 km/h.
  - TailGUARD will trigger short brake pulses when a critical speed is reached to alert the driver.
  - If the driver accelerates further, TailGUARD deactivates itself and outputs a fault message.
- In the case of EBS vehicles with brake intervention **via separately installed valves,** ABS functions are not available during TailGUARD braking. Even at the low speed range at which TailGUARD is active, the wheels might lock on slippery surfaces.
- Speed signal faults due to incorrect or unprofessional connection can significantly impair vehicle safety.
- **Vehicles with a prepared interface for TailGUARD:** TailGUARD may not brake if the vehicle's EBS system has a fault.

Observe the following safety instructions for handling cables:

- Water that enters the cable core or cable sleeve can damage electronic control units. Cables with open ends should therefore always be connected in the driver's cab to ensure that no water can enter them. Where this is not possible, use a suitable cable joint box, e.g. AK 190. **This applies in particular when using the prepared brake interface on the Daimler Econic Euro 6.**
- Plan your installation position so that cables cannot become kinked.
- Fasten the cables and connectors so that the plug connections are not subjected to any tensile stress or lateral forces.
- Never route cables over sharp edges or in the vicinity of aggressive media (e.g. acids).
- Route the cable to the connections so that no water can enter the connector.
- Fasten the cable ties so that the cable is not damaged.
- When using tools, please note the instructions of the cable-tie manufacturer.
- If the cables are too long, do not wind them up but lay them in loops.

Observe the following safety instructions for handling ultrasonic sensors:

- The surface to which the ultrasonic sensor is mounted must be even and must be at least 2 mm larger than the ultrasonic sensor (this is required to protect the drainage holes in the rear against direct high-pressure cleaning).
- Ultrasonic sensors must not to be mounted in a U-profile because this could cause reflections. WABCO recommends to mount the ultrasonic sensors mechanically protected to avoid damage.
- The ability to detect objects largely depends on the ultrasonic sensors' positioning on the vehicle. Make sure that the ultrasonic sensors are installed at a height of at least 40 cm.
- No other vehicle components should be installed within the ultrasonic sensor's range of vision.
- The rate of detection depends on object surfaces:
  - Ultrasound is best reflected by smooth surfaces that are positioned at a right angle to the sound's direction.
  - Small and unfavourable surfaces such as meshed structures, furry or hairy surfaces at an oblique angle to the sound's direction are not detected so easily.

3 Introduction

TailGUARD reduces risk when reversing by detecting stationary and moving objects in the blind spot behind the vehicle and independently stopping the vehicle at a safe distance from the object.

TailGUARD reduces stress for the driver while reversing and helps to avoid collisions with pedestrians, loading ramps, barriers, trees, forklifts, cars and other objects behind the vehicle.

TailGUARD is activated automatically when the reverse gear is engaged.

TailGUARD stops the vehicle automatically if it approaches an object within a configurable distance between 50 and 200 cm.

After TailGUARD has braked the vehicle, the driver can start slowly reversing again in order to continue rearward movement towards a ramp, after stopping for example.

TailGUARD complies with the following regulations:

- 72/245/EEC – EMC – Electromagnetic Compatibility
- ECE-R10 – Electromagnetic Compatibility
- ECE-R13 – Braking Systems for Commercial Vehicles
- Test report TÜH – TB 2016 – 045.00 – Electronic Extension Module Stand Alone

4 Vehicle requirements

Any commercial vehicle with a 24 V supply voltage can be equipped.

Commercial vehicles with 12 V can be equipped if a permanent supply voltage of more than 11.5 V is ensured.

TailGUARD is approved for application in vehicles of classes M3, N2 and N3 with compressed air systems in accordance with regulations in 71/320/EEC or ECE-R13.

The extension for implementing autonomous braking can be applied as follows:

- Software version from EX010314 (as of 15/ 2014)
  Conventionally braked vehicles with or without ABS, but not vehicles with an electronic braking system (EBS).
  The braking system must be equipped with an ALS system according to regulations mentioned above.
- Software version from EX010405 (as of 41/ 2015)
  Additional vehicles with an electronic braking system (EBS) from WABCO up to EBS3.
- Software version from EX010453
  Additional braking via the EBS system in the towing vehicle (via TailGUARD interface): Daimler Econic Euro 6, optional extra
  - Input for control of the towing vehicle brake via digital signal
  - Ignoring the control signal of the towing vehicle brake at > 15 km/h through the towing vehicle
  - Provision of a feedback status signal that brake control is executed by the towing vehicle
  - Warning lamp for indicating a fault

Braking via separate valves:
When connecting TailGUARD to the braking system, it must be ensured, for example, that the system's response times continue to meet legal requirements.
The permissible braking system pressure for TailGUARD with autonomous braking must not exceed 13 bar.
The speed signal in accordance with ISO 16844-2 (C3 signal) must be provided in the vehicle as information on the current vehicle speed. The vehicle manufacturer must not have prohibited use of this signal for external systems.

ECE-R13 approval of the system is only possible in combination with an indication of the distance to objects and the system status. The Trailer Remote Control (display and control unit) can be installed for this purpose (**standard for braking intervention via separate valves**). Alternatively the system status can be indicated by means of the TailGUARD warning lamp and the distance to an object by means of a display in the instrument panel or via separately installed indicator lamps (**standard for brake intervention via the TailGUARD interface in the truck**).

Vehicles equipped to draw a trailer must also be equipped with a control unit for permanent deactivation of the system.

If the towing vehicle is equipped with the Trailer Remote Control for indicating the distances of objects in accordance with the approval report, a towed vehicle must not access the Trailer Remote Control. The Trailer Remote Control must be connected in a way that rules out any communication between the trailer’s Electronic Extension Module and the Trailer Remote Control (install throttle lines to suppress signals from the trailer or – if the towing vehicle always drives with the same trailer – or deactivate communication with Trailer Remote Control in the trailer parameters.)

5 System and function

This chapter provides you with a general overview of function and structure of the systems.

With TailGUARD for Truck and Bus there are the following options for autonomous braking:

Braking via separate valves:
Safe operation of the braking system is ensured by the design with a two-way valve if the system is in a fault-free state.

Braking via a prepared interface for TailGUARD:
The system does not have direct access to the vehicle brake and sends braking requests to the vehicle's braking system via a TailGUARD interface. This function will be available in some towing vehicles from 2017.

To avoid any accidents, observe the following safety instructions for vehicles with braking intervention through TailGUARD:

- **Vehicles with a prepared interface for TailGUARD:** TailGUARD may not brake if the vehicle's EBS system has a fault.

5.1 Functional description

TailGUARD is activated by shifting into reverse gear.

The ultrasonic sensors and valves are tested for proper function and the TailGUARD system's readiness for operation is signalled to the driver.

If an object is identified while reversing and the distance becomes less than the configured stopping distance, the vehicle will be braked for 3 seconds before the brake is released again. The stopping distance can be configured via parameters (between 50 and 200 cm).

While the signal for braking is being given, another signal is available to avoid simultaneous acceleration of the vehicle. This signal can be used to reset an accelerator pedal to neutral or to shift a transmission to neutral.

! This signal must only be used to trigger vehicle functions that prevent acceleration of the vehicle. The signal must not be used to trigger a brake intervention.

At speeds above 9 km/h the deceleration defined for TailGUARD may not suffice to stop the vehicle within the configured stopping distance.

If the vehicle moves backward at 9 km/h or more, TailGUARD triggers short brake pulses to notify the driver of the excessive speed. TailGUARD here regulates the speed down to 7 km/h. If these warning brake actions are ignored and the speed continues to increase, the system is switched off at 12 km/h. Following an autonomous braking procedure, the driver can start driving again and continue to reverse.

Silent mode: If a buzzer is connected, it can be deactivated temporarily by engaging the reverse gear twice (within 3 seconds), e.g. when making deliveries in residential areas.

Depending on the parameter settings, the entire TailGUARD function can be deactivated temporarily by engaging the reverse gear twice.

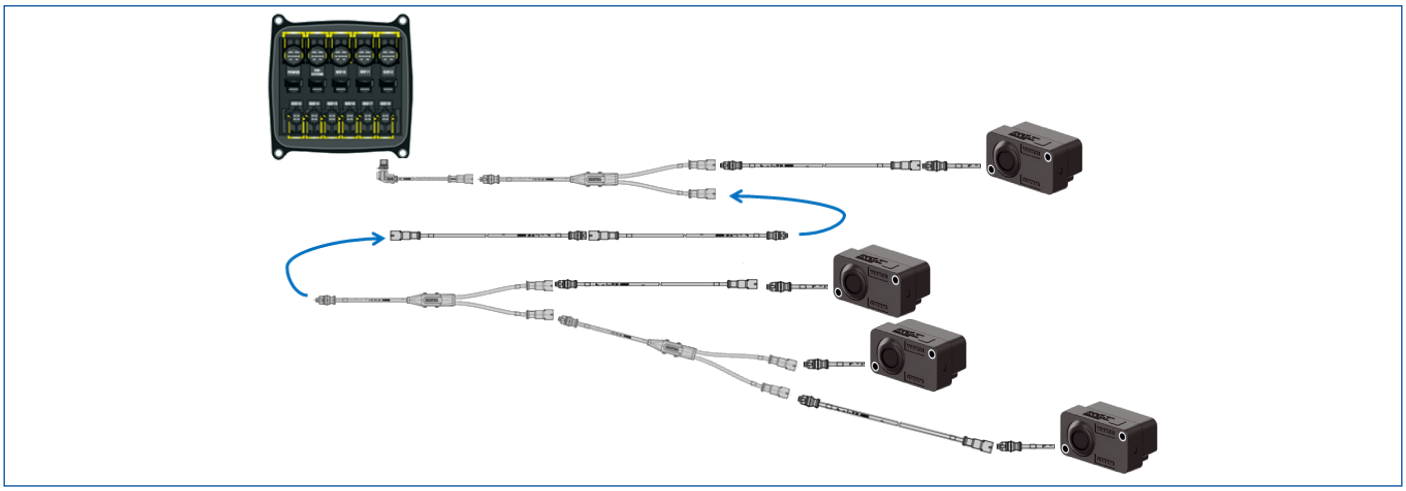
The distance information is indicated to the driver in accordance with the respective system configuration as soon as an object is detected within 3 metres of the rear of the vehicle.

Vehicles with Trailer Remote Control: The distance to the object is indicated in green, yellow or red bars and a tone whose frequency changes with the distance.

Braking via a prepared interface for TailGUARD:
Indication is implemented via the instrument panel.

Vehicles with option: Indication via flashing rear outline marker lamps.

5.2 Reverse monitoring system



The ultrasonic sensors transmit ultrasonic waves to the area behind the vehicle. If an object or a person reflects these sonic waves, the ultrasonic sensors receive an echo. The distance to the object is calculated from the time the ultrasonic waves take from transmission to reception of the echo.

The distance to detected objects is indicated by means of LED bars in the driver's cabin. Alternatively, the distance can be indicated by a flashing frequency of the rear outline marker lamps or an additional lamp in the instrument panel.

TailGUARD can support up to 6 sensors. Each ultrasonic sensor monitors an area that is similar in shape to a flattened club. By arranging the ultrasonic sensors on the vehicle accordingly, objects near the roof area or the ground, for example, can also be identified.

All ultrasonic sensors are connected to one input on the electronic control unit as a LIN (Local Interconnect Network), which connects all ultrasonic sensors as a tree structure.

Each ultrasonic sensor is assigned its own LIN address so that its data can be evaluated separately within this network.

The maximum permitted cable length between ECU and the last ultrasonic sensor is 40 m.

5.3 Autonomous braking with separate valves

When TailGUARD detects an object, it can act on the compressed-air braking system of the vehicle, thus braking independently.

Active braking is only permitted if the reservoir pressure on the brake valve (2) is at least 7.3 bar. This is ensured by a charging valve (3). A pressure limiting valve (4) is used to define the pressure for active braking and thus for deceleration.

After approaching an object within a critical distance, the Electronic Extension Module (1) starts the brake action, controlling two solenoid valves (5) and (6) via two independent circuits. A braking pressure is only fed if both solenoid valves switch simultaneously. This rules out a braking process being initiated by an electrical fault.

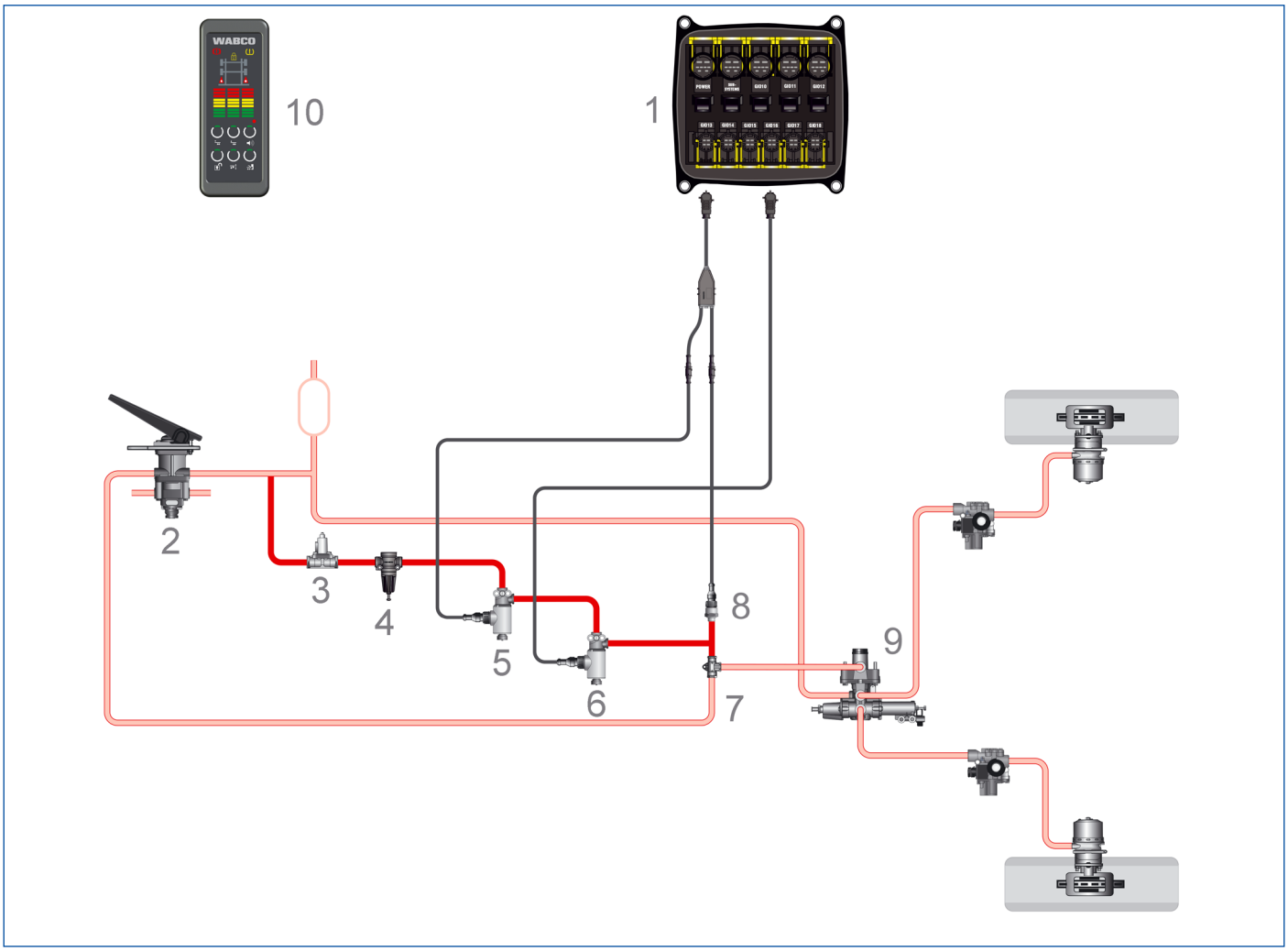
A pressure sensor (8) monitors the pressure applied by the solenoid valves.

The service brake is operated by means of a two-way valve (Select-High valve, 7).

The braking pressure on the brake cylinders is adjusted relative to the respective load because this pressure is fed by the automatic load-sensing valve (9).

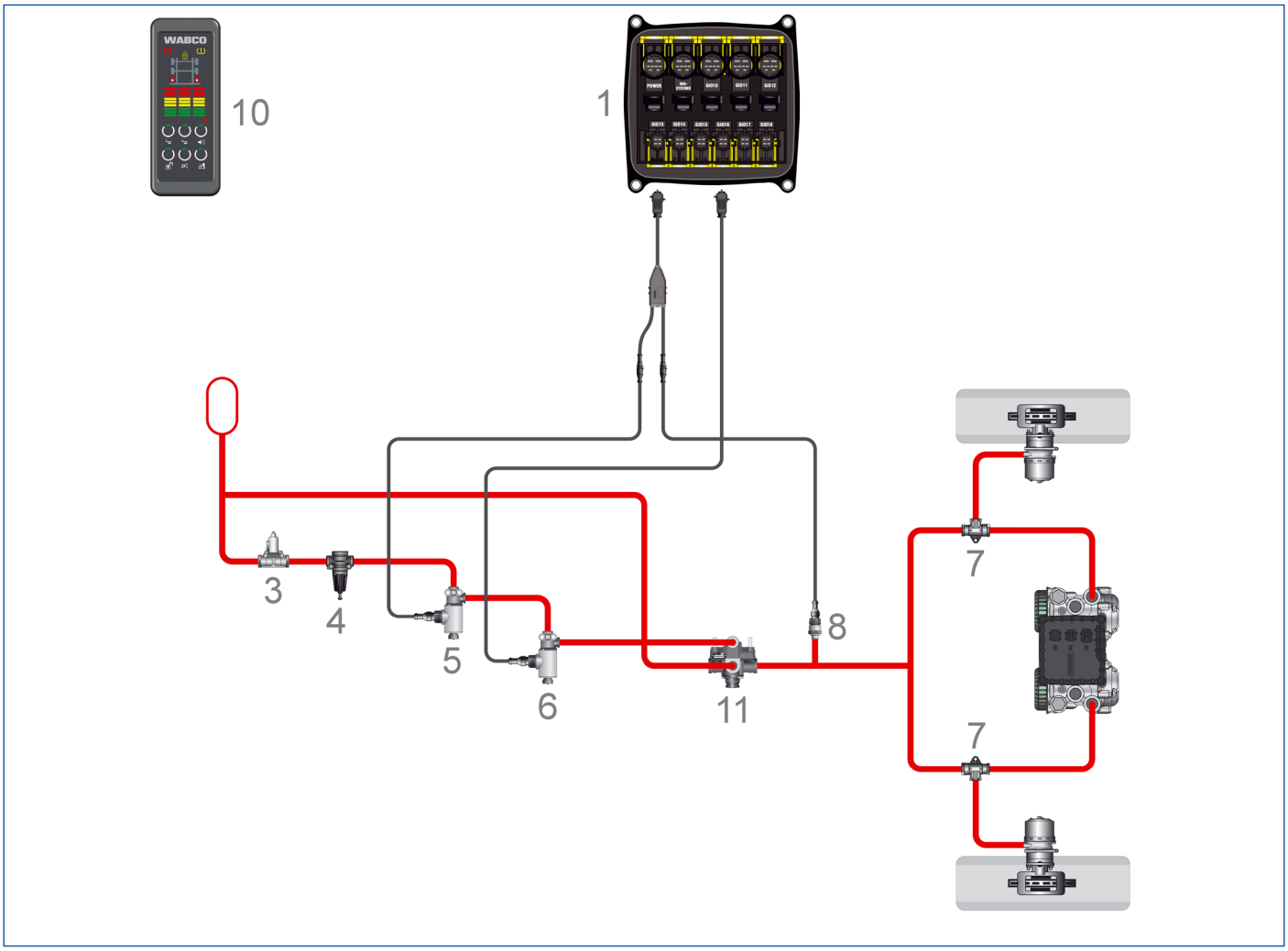
The Electronic Extension Module switches on the stop light during autonomous braking. If a fault monitoring system is installed for the stop light, it may need to be adjusted. If the stop lights are monitored for faults: Fault monitoring must only be active while the pedal is operated by the driver and LED stop lights must not be installed.

Brake intervention for vehicles with ABS



ITEM	DESCRIPTION
1	Electronic Extension Module (electronic control unit)
2	Brake valve
3	Charging valve
4	Pressure limiting valve
5	Solenoid valve
6	Solenoid valve
7	Select High valve
8	Pressure sensor
9	Automatic load-sensing valve
10	Trailer Remote Control

Braking intervention for vehicles with EBS (braking via separate valves)



ITEM	DESCRIPTION
1	Electronic Extension Module (electronic control unit)
3	Charging valve
4	Pressure limiting valve
5	Solenoid valve
6	Solenoid valve
7	2-way directional control valve
8	Pressure sensor
10	Trailer Remote Control
11	Relay valve

! If the autonomous braking application is retrofitted, the system must be submitted to an acceptance procedure and an entry in the vehicle documents is required.

The approval report EB181.2 of TÜV Nord should be submitted when the vehicle is presented.

5.4 Braking via a prepared interface for TailGUARD

To avoid any accidents, observe the following safety instructions for vehicles with braking intervention through TailGUARD:

- **Vehicles with a prepared interface for TailGUARD:**
  TailGUARD may not brake if the vehicle's EBS system has a fault.

Several vehicles from Daimler do not require an intervention into the pneumatic braking system. In addition, functional data such as speed, driving direction and distance to an object are electronically exchanged. With these vehicles the Electronic Extension Module is connected to the prepared interface for TailGUARD at the underside of the vehicle by three cables.

This vehicle configuration also does not require use of the Trailer Remote Control, because the system's readiness for operation and the distance information is displayed via the instrument panel.

Circuit diagram 841 802 360 0 "Braking by Truck EBS" ▸ Chapter "11.1 Circuit diagrams", page 47

6 Components

6.1 Basic configuration for identification and warning and for braking intervention via a prepared interface for TailGUARD on the vehicle

COMPONENT / PART NUMBER	COMMENT
Electronic Extension Module 446 122 070 0 	■ Control electronics ■ When used with autonomous braking: *Vehicles with ABS:* The production date must be 01/2014 or later. *Vehicles with EBS:* The production date must be 41/2015 or later.
"Supply" cable 449 305 100 0 	■ Length: 10 m (other lengths on request) ■ Connection to the Electronic Extension Module "Power" and the vehicle's fuse box ■ Pink: Terminal 30 ■ Black: Terminal 15 ■ White: Ground ■ White-green: CAN1 High (optional) ■ White-brown: CAN1 Low (optional)
Connecting cable for monitoring the reverse gear, stop light control of rear outline marker lamps 449 908 100 0 	■ Length: 10 m (further lengths on request) ■ Connection "stop light cabling" to the Electronic Extension Module "GIO12" ■ Pink: Pickup, reversing light ■ Black: Input, stop light left ■ Brown: Input, stop light right ■ Yellow-brown: Output, stop light right ■ Yellow-black: Output, stop light left
"Diagnostic connection" cable 449 605 020 0 	■ Length: 2 m (further lengths on request) ■ Connection to the Electronic Extension Module "Subsystems", provides the diagnostic port at an easily accessed position on the outside of the vehicle.
Ultrasonic sensor 446 122 450 0 	■ With 2.5 m connecting cable ■ 10° basic setting ■ installed horizontally

COMPONENT / PART NUMBER	COMMENT
Ultrasonic sensors: 446 122 401 0 (0°) 446 122 402 0 (15° default: right) 446 122 403 0 (15°) 446 122 404 0 (15° default: left) 	■ out-of-date model, only available for repairs ■ Not for new vehicles or retrofitting ■ Connecting cable 3 m included
"Ultrasonic sensors" connecting cable 449 806 060 0 	■ Length: 6 m ■ Connection to the Electronic Extension Module "GIO18"
Extension cable 449 747 060 0 	■ Length: 6 m ■ Quantity depends on the application
Ultrasonic sensor distributor cable 894 600 024 0 	■ Length: 0.5 m ■ Quantity depends on the application
Trailer Remote Control 446 122 080 0 	■ Connection to terminal 15 and ground in the fuse box ■ Communication to the Electronic Extension Module via PLC ■ Holder and connecting cable included
Optional: Connection of signal lights 449 535 100 0 	■ Use of signal lights instead of the Trailer Remote Control is not covered by the TÜV approval report. ■ **Braking via a prepared interface for TailGUARD:** ‣ see circuit diagram GIO13/14
Connector housing and cabling box	■ The following additional connectors are required for use of the prepared interface for brake intervention with the Daimler Econic Euro 6: ■ Connector X1 (Daimler A056 545 57 28) ■ Connector X2 (Daimler A030 545 88 28) ■ Connector X3 (Daimler A007 545 46 26) ‣ Chapter "11.1 Circuit diagrams", page 47 => Circuit diagram: 841 802 360 0 ■ Cable joint box, e.g. AK 190

6.2 Extension for autonomous braking (via separate valves)

COMPONENT / PART NUMBER	COMMENT
Charging Valve 434 100 033 0 	■ Permits autonomous braking only if sufficient reservoir pressure is available ■ Set pressure: 7.3 bar
Pressure limiting valve 475 010 313 0 	■ Setting the braking pressure ■ Minimum set pressure: 3.2 bar ■ Recommended set pressure: 3.6 bar ■ Maximum permissible pressure: 60 % of the maximum braking pressure on the rear axle.
Solenoid valve 472 170 606 0 	■ 2 units required ■ Installed on the vehicle with the vent pointing downwards ■ Connection to GIO13 and GIO16.
Alternative solenoid valve for 12 V systems 472 170 637 0 	■ 2 units required ■ Connection to GIO13 and GIO16.
Relay valve 973 011 000 0 Alternative: 973 011 004 0 	■ Required for EBS vehicles

Components

COMPONENT / PART NUMBER	COMMENT
Pressure sensor 441 044 101 0 	■ Tests the autonomous brake intervention function when the reverse gear is engaged ■ Connection to GIO13
2-way directional control valve 434 208 027 0 	■ Adjusts the TailGUARD braking pressure level in the braking system
"Solenoid valve" cable 449 443 XXX 0 	■ Connects one of the solenoid valves to the Electronic Extension Module "GIO16"
"Solenoid valve and pressure sensor" cable (distributor) 449 629 022 0 	■ Connects one of the solenoid valves and the pressure sensor to Electronic Extension Module "GIO13"
"Solenoid valve or pressure sensor" cable 449 752 XXX 0 	■ Extension, 2 units required
"Speed signal" cable 449 535 100 0 	■ Length: 10 m (further lengths on request) ■ Connection to Electronic Extension Module "GIO17", pick-up of speed signal with cable colours Red (signal) and Brown (ground) from the trip recorder. ■ Other cable cores are not assigned and must be insulated.
Cabling box "Stop light" 446 122 633 0 	■ Use as required

6.3 Extension for additional buzzer

COMPONENT / PART NUMBER	COMMENT
Buzzer 894 450 000 0 	■ Can output acoustic warning signals in addition to Trailer Remote Control **This extension is not possible for vehicles with a TailGUARD status lamp, as is the case with the prepared interface for TailGUARD in the Daimler Econic Euro 6, for example.**
Connecting cable for buzzer 449 443 XXX 0 	

7 Installation

All system components – except Trailer Remote Control – can be installed outside on the vehicle frame.

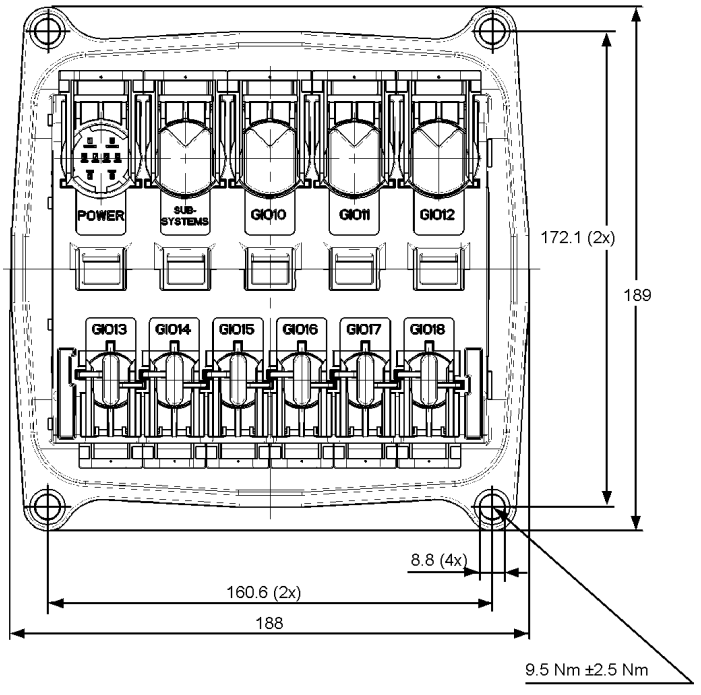
Note the respectively permissible installation position of the components in accordance with the outline drawings.

7.1 Notes on installing the Electronic Extension Module

- Before you start the installation you must note the safety instructions on the subject of ESD, ▸ Chapter "2.1 General safety instructions", page 7.
- The cover of the Electronic Extension Module must be removed for installing/removing the cable.
  - Use a screwdriver (minimum length: 11 cm) to loosen the locking lugs of housing to remove the cover.
- Download the outline drawing from the internet:

Information on the Electronic Extension Module
http://www.wabco.info/i/1488

Installation dimensions of the Electronic Extension Module in mm



- Mount the Electronic Extension Module vertically only, with the cable openings facing the bottom or the side.
- Fasten the connector housing of the 8-pin plug-in connector with cable ties on the respective bracket catch.

- Once the cable has been installed, mount the cover again.
  - Make sure that all catches are firmly in place.
  - The open side must face in the direction of the 4-pin slots.

7.2 Notes on installing the cables / dummy caps

Observe the following safety instructions for handling cables:

- Water that enters the cable core or cable sleeve can damage electronic control units. Cables with open ends should therefore always be connected in the driver's cab to ensure that no water can enter them. Where this is not possible, use a suitable cable joint box, e.g. AK 190. **This applies in particular when using the prepared brake interface on the Daimler Econic Euro 6.**
- Plan your installation position so that cables cannot become kinked.
- Fasten the cables and connectors so that the plug connections are not subjected to any tensile stress or lateral forces.
- Never route cables over sharp edges or in the vicinity of aggressive media (e.g. acids).
- Route the cable to the connections so that no water can enter the connector.
- Fasten the cable ties so that the cable is not damaged.
- When using tools, please note the instructions of the cable-tie manufacturer.
- If the cables are too long, do not wind them up but lay them in loops.

- Open the yellow slider for the lock before you plug the cable end connectors into the respective slot on the ECU frame.
  If the slider is in the locked end position (condition at delivery), you can use a size 13 open-end spanner to release the notch from either the top or from below.
- Then pull out the slider up to the cover end stop by hand in order to permit access to the connector guide.
- Insert the cable end (or dummy cap) perpendicularly into the corresponding slot of the ECU.
  Ensure that the correct polarity and coding (connector to slot) is adhered to. They can only be inserted if the two parts match.
  The black dummy caps for the 4- and 8-pin slots are not coded and match the respective slot.
- Press the cable end into the slot with a little initial force and push the locking slider back to its initial position. In this procedure, the hook of the slider latches in the ECU frame. The correct latching of the slider is confirmed by an audible "click" sound.

7.3 Notes on installing the ultrasonic sensors

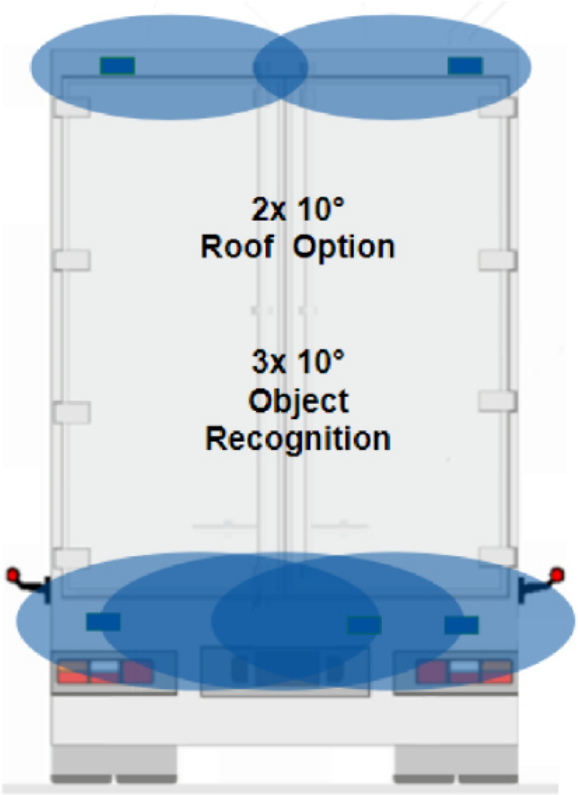
Observe the following safety instructions for handling ultrasonic sensors:

- The surface to which the ultrasonic sensor is mounted must be even and must be at least 2 mm larger than the ultrasonic sensor (this is required to protect the drainage holes in the rear against direct high-pressure cleaning).
- Ultrasonic sensors must not to be mounted in a U-profile because this could cause reflections. WABCO recommends to mount the ultrasonic sensors mechanically protected to avoid damage.
- The ability to detect objects largely depends on the ultrasonic sensors' positioning on the vehicle. Make sure that the ultrasonic sensors are installed at a height of at least 40 cm.
- No other vehicle components should be installed within the ultrasonic sensor's range of vision.
- The rate of detection depends on object surfaces:
  - Ultrasound is best reflected by smooth surfaces that are positioned at a right angle to the sound's direction.
  - Small and unfavourable surfaces such as meshed structures, furry or hairy surfaces at an oblique angle to the sound's direction are not detected so easily.

- Download the outline drawing from the internet.

Information on the ultrasonic sensors
http://www.wabco.info/i/1365

- The position and number of ultrasonic sensors are determined by the area to be monitored and the contour of the rear of the vehicle.
- The TailGUARD system can monitor a maximum of 6 ultrasonic sensors.
- Normally 15° ultrasonic sensors are used at the vehicle sides as the most important position. These ultrasonic sensors are mounted on a vertical surface of the rear and monitor an area between the vehicle's outside edge at the side and the centre of the vehicle through the 15° bend in the housing. When reversing in a narrow alley, only the area behind the vehicle is monitored in this manner, vehicles parking next to the lane for instance, are not.
- A third ultrasonic sensor with a straight housing (0°) can be positioned at the centre to improve monitoring of this vehicle section.
- The figure below, showing only one of many possible ultrasonic sensor positions, illustrates this. The yellow areas represent an example of the area monitored by the ultrasonic sensors.



Sensors are installed horizontally at a height of at least 60 cm. The viewing direction of the sensor membrane is always aligned with the centre of the back of the vehicle.

A central sensor improves the detection quality. Ideally, it should be installed approx. 40 cm off-centre with the viewing direction towards the centre.

The roof sensors are mounted in the roof area on the outside to the left and right.

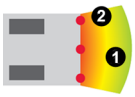
- When planning the routing of cables, note the maximum length of 40 m between the Electronic Extension Module and the last ultrasonic sensor.
- The ultrasonic sensor should not be installed at a distance of more than 35 cm from the rear of the vehicle.

Standard applications

Application of the ultrasonic sensors is possible without extensive experience only in the case of simple rear profiles where no vehicle parts are within the measured area of the ultrasonic sensors.

Tail profiles, such as those of disposal vehicles, require tests by WABCO to rule out faults and malfunctions at a later stage. In such a case, please get in touch with your WABCO partner.

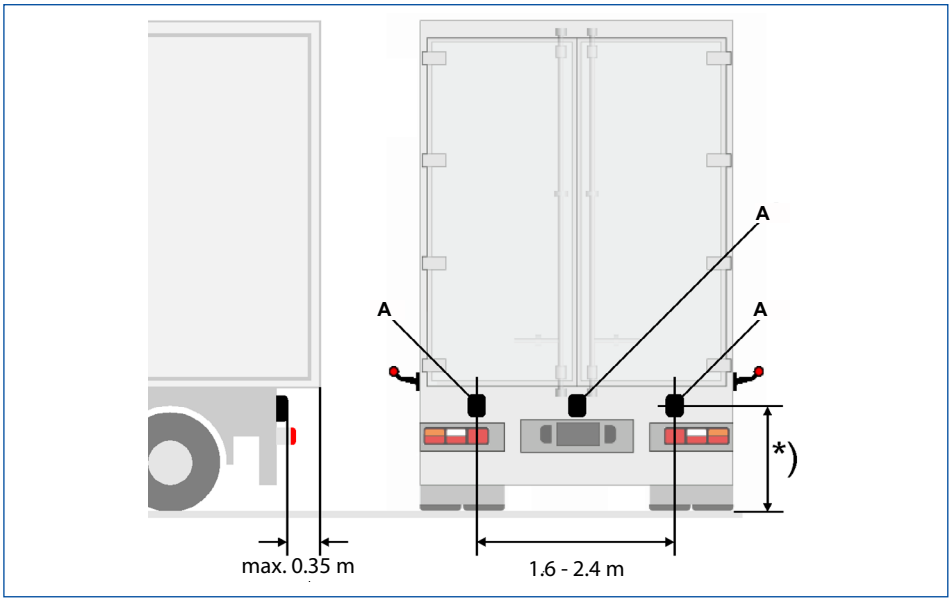
The standard applications listed in the table below are suitable for vehicles with even rear sides.

FEATURES	TailGUARD	TailGUARD ROOF	TailGUARDMAX
Typical logistical environment	Loading ramps and large objects, such as palettes, vehicles and posts of metal or wood that vary in shape and size and are unknown to the driver.	Areas with restricted heights: e.g. warehouses, loading gates, trees and roof constructions.	Areas with small and / or moving objects: e.g. forklift loading, street signs, shops, residential areas. Tested to ISO 12155.
Number of ultrasonic sensors (dot = Ultrasonic sensor)	3x 	5x 	6x 
Areas covered by ultrasonic sensors (View from top of vehicle)	 The entire rear of the vehicle is covered by ultrasonic sensors. 1 and 2 indicate objects behind the vehicle.		
Areas covered by ultrasonic sensors (side view)			
Each bar represents a distance of 50 cm. Red: 0 to 150 cm Yellow: 150 to 300 cm Green: 300 to 400 cm In close proximity (red LEDs) the following also applies: Each LED has 2 states, constant and flashing. This indicates the distance with a precision of 25 cm.	 Indication on the Trailer Remote Control	 Display Floor height  Display Roof height The level with nearest object will be displayed.	 Indication on the Trailer Remote Control
Sensitivity of the ultrasonic sensors	Big moving objects are detected independent of one another and displayed.	Objects at ground level and roof level are detected and displayed, independent of one another.	Small moving objects are detected independent of one another and displayed.
Distance indication (mode)	ISO 12155 or WABCO Standard	ISO 12155 or WABCO Standard	ISO 12155
Ultrasonic sensor position according to drawing	841 802 281 0	841 802 284 0	841 802 282 0

drawings
http://www.wabco.info/i/1365

7.3.1 TailGUARD

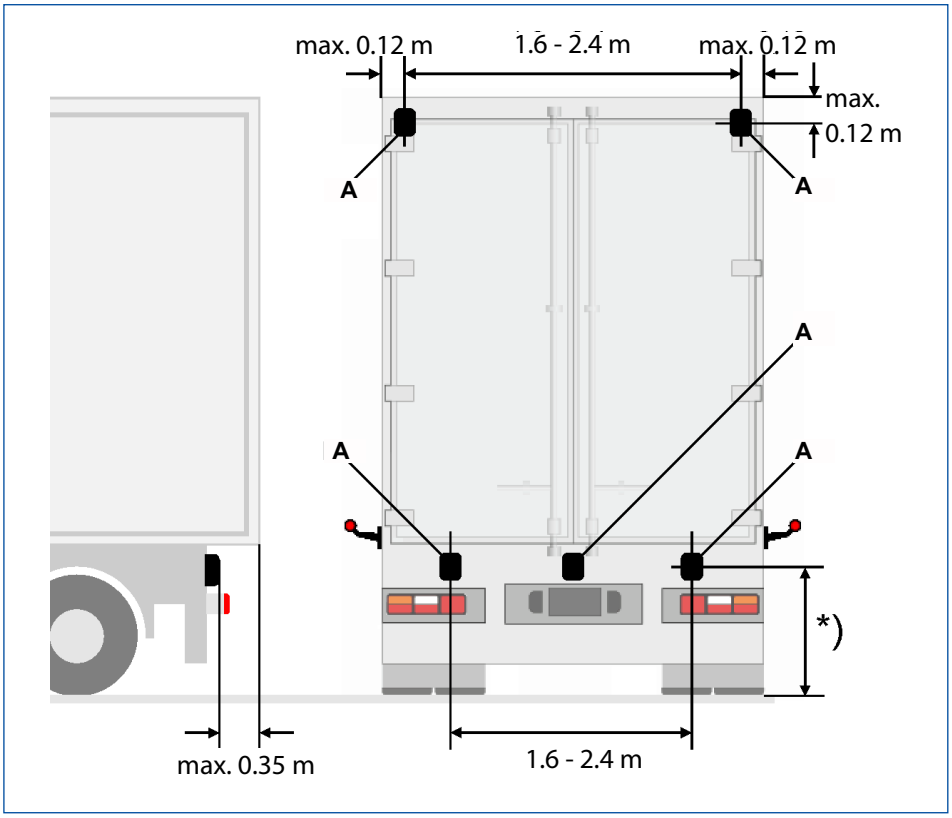
– Mount the outside LIN ultrasonic sensors 446 122 450 0 (10°) inclined horizontally inwards.
– If the middle sensor 446 122 450 0 (10°) is not exactly centred, mount it so that it is inclined in the direction of the farther away outer sensor.
– The parameters for the installation position are configured in the TEBS E diagnostic software.
– Mount the central LIN ultrasonic sensor at max. 15 cm up or down.



A	LIN ultrasonic sensor 10° 446 122 450 0 **Install horizontally!**
*)	Height above ground: between 60 and 90 cm

7.3.2 TailGUARD[Roof]

– Mount the 5 LIN ultrasonic sensors horizontally in 2 levels.
– Mount the outside LIN ultrasonic sensors 446 122 450 0 (10°) inclined horizontally inwards.
– If the middle sensor 446 122 450 0 (10°) is not exactly centred, mount it so that it is inclined in the direction of the farther away outer sensor.
– The designation has to be entered in the TEBS E diagnostic software in tab 10, Electronic Extension Module.



A	LIN ultrasonic sensor 10° 446 122 450 0 **Install horizontally!**
*)	Height above ground: between 60 and 90 cm

7.4 Notes on installing the Trailer Remote Control

- The Trailer Remote Control is mounted on the dashboard by means of the included holder without obstructing the driver's view of the traffic.
- Using the included cable, the Trailer Remote Control is connected to terminal 15 and ground. A 5A fuse (not included) must be integrated into the circuit for protection.
- The Trailer Remote Control power supply can be connected to the same contact together with Electronic Extension Module terminal 15, as in circuit diagram 841 802 344 0 ▸ Chapter "11.1 Circuit diagrams", page 47.
- A commercially available suction cup adapter can also be used instead of the supplied screw adapter since the Trailer Remote Control is equipped with a "Standard" mount.

7.5 Notes on connecting the speed signal

To avoid any accidents, observe the following safety instruction for vehicles with braking intervention through TailGUARD:

- Speed signal faults due to incorrect or unprofessional connection can significantly impair vehicle safety.

- Use of the speed signal is required for autonomous brake intervention.
- Use the pulse signal of the trip recorder ("v pulse output", "trip recorder B7", speed C3") either directly or via a corresponding vehicle interface.
- The speed signal must be picked up according to the vehicle manufacturer's specifications.

7.6 Notes on installing the valves for brake intervention

Observe the following safety instructions for interventions in the braking system:

- Observe the specifications of the vehicle manufacturer.
- Deactivation when the supply pressure is too low: Switch the system off if the vehicle's supply pressure is too low.
- Only intervene with the braking system if you have sufficient knowledge of the braking system and know and can take responsibility for the effect of your actions and all their consequences.
- The braking system is under pressure. Before intervening with the braking system, make sure all reservoirs and lines are pressureless.
- In the case of brake interventions **via separately installed valves**, the front axle must not be braked for vehicles with EBS. Make sure that the vehicle's front axle can NOT be braked by the system. Braking intervention must only occur via the rear axle(s).

- The valves can be grouped on a steel bracket or mounted directly on the frame. A sensible mounting point is near the rear axle so that line lengths to the braking system are kept short.
- Note the following restrictions:
  - Connection reservoir to charging valve: Nominal width 12
  - Connection between the two solenoid valves: Nominal width 8, max. 1 m
  - Connection of solenoid valve to the LSV valve or relay valve: Nominal width 8, max. 5 m
  - Connection between reservoir and relay valve (EBS): Nominal width 12, no longer than the supply line of the axle modulator
  - Connection of relay valve to the two-way valves (EBS): Nominal width 12, max. 5 m.

! After installation, check the system for correct function and leaks.

7.7 Notes on controlling the stop lights

- The stop lights must light up with every brake application in accordance with legal requirements. This also applies for every brake application when reversing.
- The electronic control unit switches on the stop lights using the reverse light power in accordance with the TÜV approval report.
- Make sure that the power supply is adequately dimensioned and the reversing lamp is secured as and additional feed for the stop lights.
- If it is not possible to supply the stop lights via the reversing lamp, they can also be supplied via terminal 15, for example. For this purpose, the TEBS E Diagnostic Software option *No stop light supply via reversing lamp* (up to Diagnosis V5.00) or *Reversing signal input* must be set to *Reversing lamp on GIO 14-3* (as of Diagnosis V5.10) and the reversing signal must be connected via the connection GIO14, pin 3.

Stop light fault monitoring: If a fault monitoring system is installed for the stop light, it may need to be adjusted. If the stop lights are monitored for faults: Fault monitoring must only be active while the pedal is operated by the driver and LED stop lights must not be installed. If necessary, the stop light fault monitoring of the vehicle must be deactivated.

8 Start-up

Start-up requires assembly of the components on the vehicle, connection of the diagnostic computer, supplying the system with power and starting the TEBS E Diagnostic Software.

8.1 Training

TEBS E system training is necessary to create a new parameter set. Only after receiving the PIN 1 are you authorised to make changes to a parameter set using the TEBS E Diagnostic Software.

A parameter set that has been prepared in advance for parameter setting will be sufficient in most cases and will simplify the start-up procedure considerably.

Prepared parameter sets can be requested from your WABCO partner.

Start-up using an already prepared parameter set requires PIN 2, which can be obtained by means of a successfully completed WABCO E-Learning course.

Registration for the WABCO E-Learning course "Trailer EBS E" (with costs)
For further information please visit out digital learning platform:
wbt.wabco.info
Please contact your WABCO partner if you have any questions.

8.2 Diagnostic hardware

Diagnosis according to ISO 11898 (CAN 5 V); via an external diagnostic port

COMPONENT / PART NUMBER	FIGURE
External diagnostic socket with yellow cap	
Diagnostic Interface (DI-2) with USB port (for connection to a PC) 446 301 030 0	
CAN diagnostic cable 446 300 348 0	

8.3 Parameter setting in TEBS E diagnostic software

WABCO offers the electronic control unit "Electronic Extension Module" as a universal system that must be adjusted to the respective vehicle type by means of parameters. TailGUARD will not function without these settings.

The parameters are configured using the TEBS E diagnostic software.
For vehicle series production, prepared parameter sets can be copied into Electronic Extension Module.

Please note that new ECUs respectively require the most recent version of the TEBS E diagnostic software.

Start-up of vehicles with prepared interface for TailGUARD:
The current Diagnostic Software TEBS E (as of version V5.10) is required. The Electronic Extension Module requires a new firmware, which you can obtain via http://wabco.info/i/49. Use the *System => ECU-Update menu* to install this firmware.

User guidance in the TEBS E diagnostic software is based on the required configuration steps. Operation of the software is self-explanatory and comprehensive assistance is also provided within the software.

Ordering the TEBS E diagnostic software

– Open the myWABCO website:
http://www.wabco.info/i/1367

Help on logging in can be obtained by pressing the *Step-by-step instructions* button. After you have successfully logged in, you can order the TEBS E diagnostic software via myWABCO.

Please contact your WABCO partner if you have any questions.

Vehicles with a prepared interface for TailGUARD:

For systems with a prepared interface for TailGUARD in the vehicle, a parameter file (ECU file) is available that is preconfigured to the extent that only the sensor configuration needs to be adjusted. The file is stored in the default read directory of the Diagnostic Software when it is installed; the file name is "TailGUARD_Truck_and_Bus_ESA-R.ECU".

Offline Parameter setting

Defining a parameter set is performed directly on the vehicle because the configured function can be tested straight away. However, a parameter set can also be prepared without a vehicle and stored on the PC for later use.

8.4 Functional test

Setting the parameters is usually followed by the functional test. You can only perform the function test (EOL test) if you have taken part in the TEBS E training course.

All tests are carried out via the *Start initial start-up* menu. The following test steps are only carried out if "autonomous braking" was defined in the parameter setting.

8.4.1 Electronic Extension Module pressure test

The TEBS E Diagnostic Software controls the solenoid valves and measures the pressure regulation by means of a pressure sensor (**braking via separate valves**) or controls a brake request and checks the vehicle's response (**braking via prepared interface for TailGUARD**).

8.4.2 Stop light control

This test measures the correct voltage via the reverse light and the stop light switch and tests the stop light actuation via TailGUARD.

8.4.3 Measured value speed signal Electronic Extension Module

This test evaluates the trip recorder speed signal and the tester must confirm that the speed indicated in the diagnostic software matches the actual speed. For this, the vehicle must be briefly driven.

Another option is to simulate a speed on the trip recorder via diagnosis. This measurement can also be carried out after start-up, but automatic braking is not possible prior to this test.

8.5 Start-up of the ultrasonic sensors

Requirements: For start-up of the ultrasonic sensors and the TailGUARD system, the ignition must be turned on and the reverse gear engaged. Additionally, the diagnostic computer must be connected to the TailGUARD diagnostic port (with yellow cap) and the TEBS E Diagnostic Software started.

8.5.1 Normal EOL test

Initialisation of the ultrasonic sensors is carried out in several steps as part of the end-of-line test:

1. Learning the ultrasonic sensors

The ultrasonic sensors must be learned to detect the position on the vehicle after installation.

If the start-up process (menu *Start-up* => *Start*) was started, the test of the ultrasonic sensors is started automatically, otherwise the test can also be started as follows:

– In the TEBS E Diagnostic Software, click *Measured values* => *TailGUARD*.

– In the *TailGUARD* window, click on the *Begin start-up*button – depending on the respective system configuration the positions of the ultrasonic sensors are assigned automatically or the TEBS E Diagnostic Software prompts you to cover the ultrasonic sensors one after the other, where it is essential to adhere to the following sequence:
Main level: 1-left 2-right 3-middle
Additional level: 4-left 5-right 6-middle

⇨ The ultrasonic sensor to be covered flashes.

⇨ When the ultrasonic sensor was detected and the system is parameterised with automatic brake intervention, the stop lights flash and the next sensor to be learned flashes in the figure (window *TailGUARD*).

– Briefly cover the ultrasonic sensor until it is detected by the system.

! To cover the ultrasonic sensors, a cover cap for drain pipes ("sleeve plug" HTM DN 75) is suitable, for example.

⇨ Now the next ultrasonic sensor that needs to be covered flashes on the diagnosis monitor.

⇨ The procedure is repeated until the last ultrasonic sensor was detected.

– Follow the instructions on the monitor.

2. Reflection test

After the ultrasonic sensors are learned, a test is performed to determine whether reflections occur and the ultrasonic sensors incorrectly detect objects installed on the vehicle as obstructions.

For this test, an area of 2.5 m behind the vehicle and 0.5 m to the side of the vehicle must be kept clear.

If the system now incorrectly detects an object, press the button *Mask reflections* to mask these reflections.

Another measurement is then made to determine whether reflections of other objects have to be masked.

If objects are still detected, the ultrasonic sensors or attachment parts must be positioned differently.

3. Test body detection

If the system is fault-free, an object test is performed.

– For this purpose, place a test specimen, e.g. a plastic pipe (drain pipe, 75 mm diameter), which is higher than the installation height of the ultrasonic sensors at a distance of 0.6 m (+/-0.1 m) in the area behind the vehicle.

– Follow the instructions of the diagnostic computer.

– Repeat the object test with the test specimen placed at a distance of 1.6 m (+/-0.2 m).

– Follow the instructions of the diagnostic computer.

– Confirm the position of the objects with the button *Start measurement*.

⇨ If the test specimen is detected properly, the End-of-Line bit in the Electronic Extension Module is deleted and the system is fault-free. The start-up was successful.

⇨ If the test was not successful, either the ultrasonic sensors are being learned in the wrong position or the parameters for the ultrasonic sensor distance were not entered correctly.

– Check the parameters or the installation position of the sensors and repeat the test.

4. Sensor sensitivity settings

– In the diagnosis, click on *System => Parameter*.

The settings are made via the tab *(10) Electronic Extension Module (System => Parameter)* .

Fine adjustments

The *fine adjustment* can be implemented within the range from 90 % to 130 %. This may be necessary if the selected sensor sensitivity must be adjusted a little. This chiefly concerns vehicles with complex rear body structures.

Sensor sensitivity

The following settings are possible in the area *Sensor sensitivity*:

- *Sensitive:* High detection capability in close proximity (as delivered). Recommended sensor sensitivity for the upper sensor level with TailGUARDMAX and for TailGUARD with low sensor spacing (< 1.5 m).
- *Standard:* The ultrasonic sensor sensitivity is reduced a little at close range to mask out objects that are permanently attached to the trailer and can cause reflections (rubber buffers, etc. for instance). This setting should be used with TailGUARD^{Roof} for the top two ultrasonic sensors.
- *Ground level:* The ultrasonic sensor sensitivity is reduced a little at long range to mask out reflections caused by objects on the ground (curbs for instance). This setting should be used if the ultrasonic sensors are installed lower than 50 cm (e.g. for the lower sensor row with TailGUARDMAX).

! For vehicles with problematic detection rates, WABCO recommends repeating the settings in the open (without reflections from walls or other vehicles).

8.5.2 Reduced EOL test

Under *Options => Settings => Test options* in the diagnostic software, test steps can be deselected under the following conditions:

Requirements for deselecting the object test

- The system has already been successfully adapted and tested on many vehicles of identical design.
- The distance between the left and right ultrasonic sensor is 1.6 - 2.4 m.
- With 3 ultrasonic sensors the middle ultrasonic sensor must be positioned centrally. The maximum deviation from the centre axis is 30 cm.
- The installation depth of the ultrasonic sensors is max 35 cm.

Deselecting the reflections test

If you have sufficient experience with TailGUARD on a recurrent vehicle type, the test for reflections can also be simplified.

After carrying out the test for the first time, the interference echo values must be written to a file (provided interference echoes were found). The content of this file is then copied into the ECU file and transferred to the vehicles that follow.

9 Operation

To avoid any accidents, observe the following safety instructions for operating the vehicle and as information for the driver:

- Risk of injury due to system failure in extreme weather conditions: Extreme weather conditions e.g. heavy rain or snowfall, can lead to the restricted functionality.
- Objects with very soft surfaces cannot be detected under all circumstances.
- TailGUARD is a reversing assistance system that helps the driver while reversing by alerting him to approaching objects and braking independently to prevent a collision when this becomes necessary.
- The driver, however, remains fully responsible for vehicle movement and any damage that results from operating the vehicle.
- WABCO cannot hold liable for an accident that is caused despite of using this system; this is a support system only.
- TailGUARD does not release the driver of his obligations under legal or company regulations, such as support of reversing by a person giving directions.

To avoid any accidents, observe the following safety instructions for vehicles with braking intervention through TailGUARD:

- Because the stopping distance becomes longer with heavily laden vehicles - in particular when it is equipped with EBS - the settings (parameter setting / pressure limiting valve) must enable sufficient deceleration for the fully laden vehicle.
- Note pulsed braking when reversing too fast:
  - TailGUARD can assist only with reversing speeds below max. 9 km/h.
  - TailGUARD will trigger short brake pulses when a critical speed is reached to alert the driver.
  - If the driver accelerates further, TailGUARD deactivates itself and outputs a fault message.
- In the case of EBS vehicles with brake intervention **via separately installed valves,** ABS functions are not available during TailGUARD braking. Even at the low speed range at which TailGUARD is active, the wheels might lock on slippery surfaces.
- Speed signal faults due to incorrect or unprofessional connection can significantly impair vehicle safety.
- **Vehicles with a prepared interface for TailGUARD:**
  TailGUARD may not brake if the vehicle's EBS system has a fault.

9.1 Instructing the driver

Do not counteract TailGUARD braking with the accelerator pedal.

Take your foot from the accelerator pedal as soon as the system detects an object (audio signal and distance indication via the Trailer Remote Control is initiated) so that the system does not brake against the engine.

This system description is primarily directed at vehicle manufacturers and workshops.

Although TailGUARD is easy to operate and does not require any previous knowledge, the operator must be instructed by the vehicle manufacturer or the retrofitting workshop.

WABCO recommends to hand over information from this chapter to the vehicle manufacturer or driver or to enclose it with the operating instructions of the vehicle.

Trailer Remote Control – Driver information
http://www.wabco.info/i/1487

9.2 Activating the system

TailGUARD is activated by shifting into reverse gear. Depending on the parameter setting, the system is also activated when the vehicle starts rolling in neutral gear.

If a Trailer Remote Control is installed:
Following a system check, a short beep tone and the yellow and red LEDs lighting up signals operational readiness to the driver on the Trailer Remote Control. Then the distance is indicated via the LEDs. If no object is detected, the bottom row of green LEDs is lit.

Vehicles with a prepared interface for TailGUARD:
Activation is indicated by the measured object distance being displayed in the instrument panel.

The driver will only be assisted by TailGUARD if the activation messages were signalled when the reverse gear was engaged.

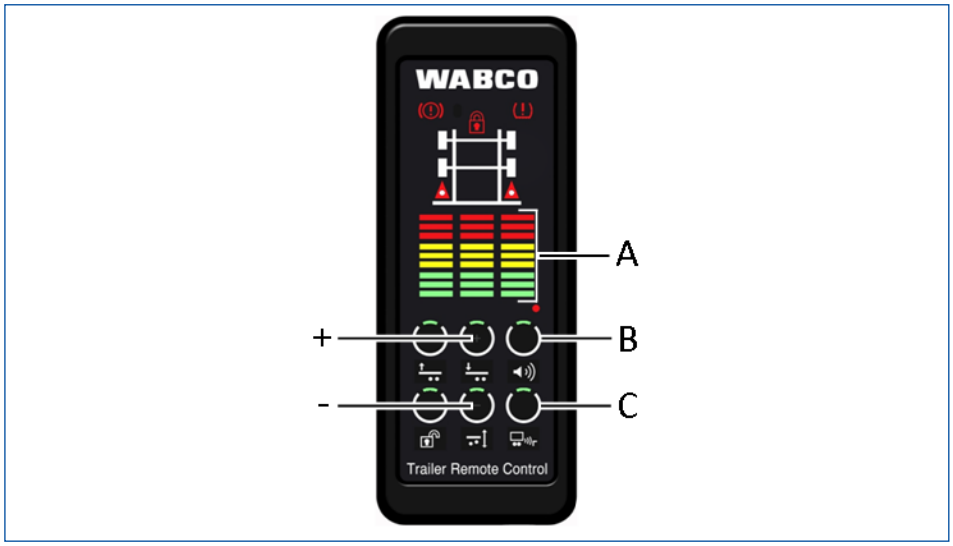
9.3 Deactivation of the system

The function is deactivated by:

- driving forward
- reversing speed > 12 km/h and/or supply pressure lower than 7.3 bar
- temporary deactivation by means of Trailer Remote Control Chapter "9.4 Operation via the Trailer Remote Control", page 41
- temporary deactivation by means of an optional external button
- permanent deactivation of the function by means of an optional external button (pressing longer than 2 seconds)
- engaging the reverse gear twice within 1-3 seconds (configurable)
- a fault

All deactivations are effective until the reverse gear is engaged again.

9.4 Operation via the Trailer Remote Control



ITEM	DESCRIPTION
A	Distance indication (colour bars)
B	Preselection of buzzer volume
C	Temporary TailGUARD deactivation
+	Increase volume
-	Decrease volume

9.4.1 Display

Objects within the monitored area are signalled by colour bars on the Trailer Remote Control.

Each lit bar represents a field of 50 cm in length in which the object is located.

- Red (top 3 bars): 0 to 150 cm
- Yellow (central 3 bars): 150 to 300 cm
- Green (bottom 3 bars): 300 to 450 cm

In close proximity (red LEDs) the following also applies: Each LED has 2 states - constant and flashing. The permanently lit LED represents the distance of 25 cm, the flashing one 50 cm.

9.4.2 Acoustic warnings

! Acoustic warnings are not permitted as exclusive means of indicating distance because system faults are not clearly identifiable.

DISTANCE TO OBJECT	ACOUSTIC SIGNAL
> 3 m	from
3 m - 1.5 m	2 Hz
1.5 m - 0.75 m	4 Hz
< 0.75 m – automatic braking	6 Hz
< automatic (defined) braking distance	permanently on

9.4.3 Adjusting the buzzer volume in the Trailer Remote Control

– Select volume control by pressing button B (> 2 seconds) until the +/- buttons flash.

– Press the +/- buttons to adjust the volume.

9.4.4 Deactivating TailGUARD via Trailer Remote Control

– Press button C.

⇨ TailGUARD is deactivated until the reverse gear is engaged again.

9.5 Distance indication

<table>
<tr><th>DISTANCE TO OBJECT</th><th>TRAILER REMOTE CONTROL / BUZZER</th><th>DISPLAY IN THE INSTRUMENT PANEL</th><th>WARNING LAMP</th></tr>
<tr><td>> 3 m</td><td>Green
off</td><td rowspan="4">Progress bar indicates the distance in cm</td><td rowspan="5">from</td></tr>
<tr><td>3 m - 1.5 m</td><td>Yellow
2 Hz</td></tr>
<tr><td>1.5 m - 0.75 m</td><td>Red
4 Hz</td></tr>
<tr><td>< 0.75 m – automatic braking</td><td>6 Hz</td></tr>
<tr><td>< automatic (defined) braking distance</td><td>permanently on</td><td>Optional indication of brake actuation via a symbol</td></tr>
<tr><td>Activation check after switching on ignition
(only if v < 1.8 km/h)</td><td rowspan="2">0.5 s on</td><td>Brief brake actuation, optionally indicated via a symbol</td><td>3 s on</td></tr>
<tr><td>Activation check after reverse gear is engaged</td><td>Progress bar indicates the distance in cm</td><td>from</td></tr>
<tr><td>Standard fault – first indication for TailGUARD activated via reversing lamp</td><td>Red and Yellow on
Beeper on for 3 s</td><td rowspan="4">Indication of distance is terminated</td><td rowspan="4">on</td></tr>
<tr><td>Standard fault – second indication after reverse gear is disengaged</td><td>Red and Yellow flash for 60 s
Beeper off</td></tr>
<tr><td>Indication of a severe fault</td><td>Red and Yellow on permanently
Beeper on for 3 s</td></tr>
<tr><td>Communication error</td><td>Flashes red and yellow for 5 mins., then flashes briefly every 5 s, then all lights go out.</td></tr>
</table>

9.6 Detection of malfunctions

A malfunction is indicated by a red and yellow LED bar flashing or being lit on the Trailer Remote Control. Additionally, the buzzer of the Trailer Remote Control signals a beep tone for 3 seconds. TailGUARD is now no longer ready for operation.

A fault is also present when the Trailer Remote Control provides no feedback at all by means of colour bars or buzzer when the reverse gear is engaged.

Vehicles with a prepared interface for TailGUARD:
There is no distinction between minor and severe faults in vehicles with a prepared interface for TailGUARD or which do not have a Trailer Remote Control installed. The TailGUARD warning lamp is always on when a fault is present.

If the TailGUARD warning lamp remains activated after the engine is started and does not go out after its activation test that lasts for 3 seconds, turn the ignition off and restart the engine immediately (without any delay between turning on the ignition and starting the engine). If the TailGUARD warning lamp still fails to go out, check the diagnostic memory of the system using the WABCO diagnosis.

9.6.1 Minor faults

In the case of minor faults, fault messages are only output if the reverse gear is engaged. You may be able to eliminate the fault yourself:

Detection and warning:

– Visually inspect the ultrasonic sensors.

– If visibly soiled, clean the ultrasonic sensors.

Additionally with "Autonomous braking" option:

– After a longer period of being stationary (with the ignition turned on) drive ahead a short distance until TailGUARD detects a speed signal.

– Check the system pressure of the braking system in the dashboard. TailGUARD only operates at pressures above 7.3. bar.

– Wait until there is sufficient pressure in the system before you start driving.

If it is not possible to eliminate the fault with these means, you will need to visit a workshop, such as a WABCO Service Partner, in the near future. In this case the system needs to be examined with WABCO system diagnostics (TEBS E).

9.6.2 Severe faults

Severe faults are indicated separately if a Trailer Remote Control is installed: Severe faults are signalled in the same way as minor faults, with the difference that the fault message occurs even when the reverse gear is not engaged and that it continues permanently. In this case there is a problem relating to brake intervention.

The vehicle must be brought to a workshop immediately and with great caution. In this case the system needs to be examined with WABCO system diagnostics (TEBS E).

10 Workshop notes

10.1 Maintenance information

TailGUARD is maintenance-free. In the case of system fault messages or an assumed malfunction, the ultrasonic sensors must be checked for soiling first and cleaned as required.

In the case of a TailGUARD fault message or failure of the indication for operational readiness to appear (▸ Chapter "9 Operation", page 39) after longer periods of being stationary with the ignition turned on, the vehicle must be driven ahead a short distance until TailGUARD detects the speed signal. The next time the reverse gear is engaged, TailGUARD is ready for operation again.

A system diagnostics must be carried out as the next step. Apart from reading out the diagnostic memory, this function can also be used to activate individual TailGUARD components directly to test their function.

10.2 Diagnosis

Carry out a system diagnostics if you notice anything conspicuous or warning lamps / indicators are lit.

Currently present as well as sporadically occurring faults are stored in the diagnostic memory and can be displayed by means of the TEBS E Diagnostic Software. Repair instructions are provided in the diagnostic software.

After faults have been eliminated, the diagnostic memory should always be cleared.

10.3 Repair and replacement

Defective cables and devices must be replaced with original WABCO products of identical part number.

If ultrasonic sensors or the control unit are replaced, a start-up procedure via system diagnostics must be carried out again.

When replacing the electronic control unit, the existing parameter set should be extracted, if possible, and copied to the new control unit.

The cover needs to be removed to replace the electronic control units.

– Use a screwdriver with a minimum length of 11 cm to release the catch on the housing to remove the cover – as illustrated in the figure below.

10.4 Disposal / recycling

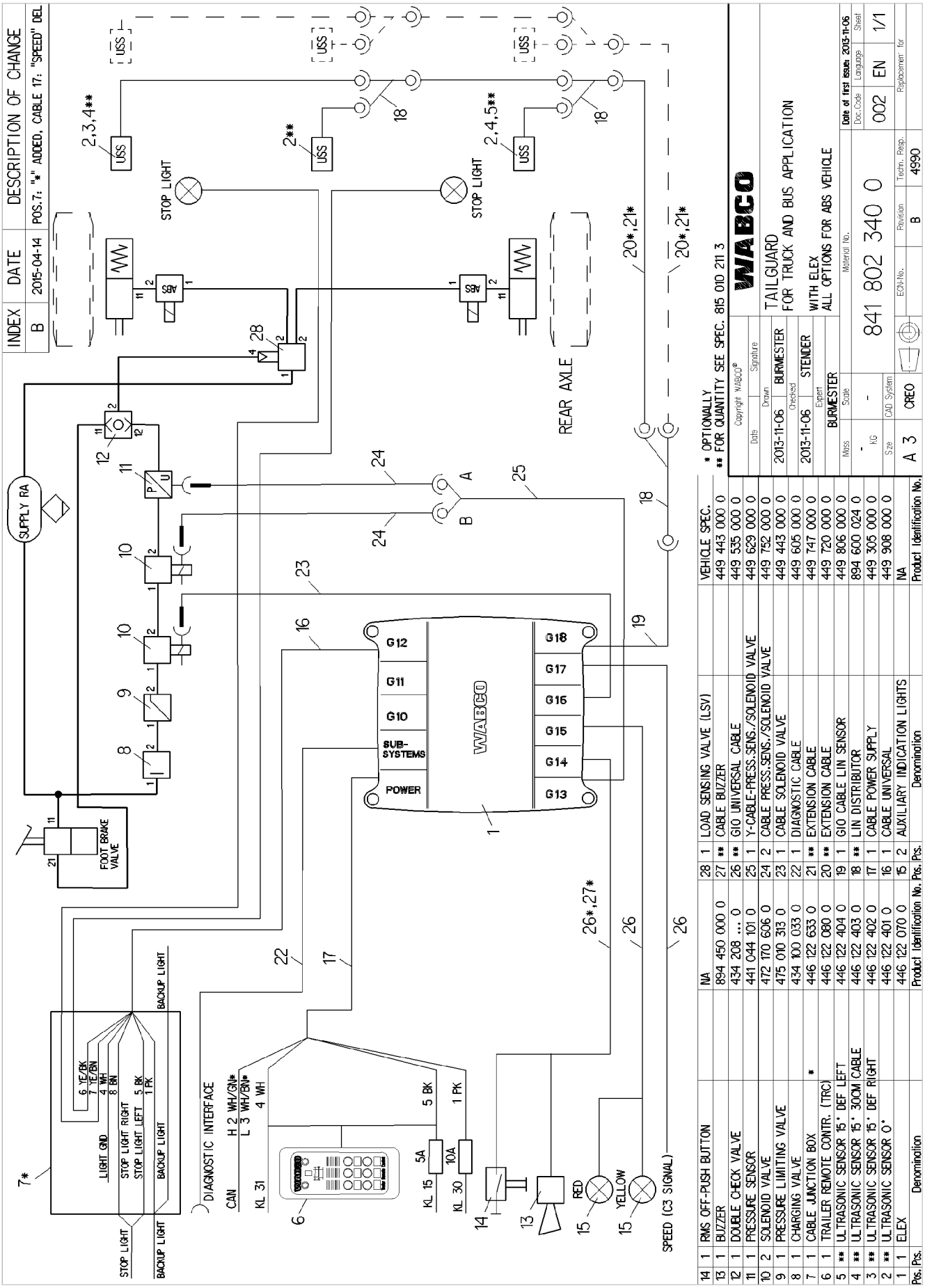
- Do not dispose of electronic devices, batteries, or accumulators together with household refuse. These must instead be handed over to a designated collection point.
- Observe the national and regional regulations.
- Defective WABCO brake units can be returned to WABCO to guarantee the best possible processing.
- Simply contact your WABCO partner if you have any questions.

11 Appendix

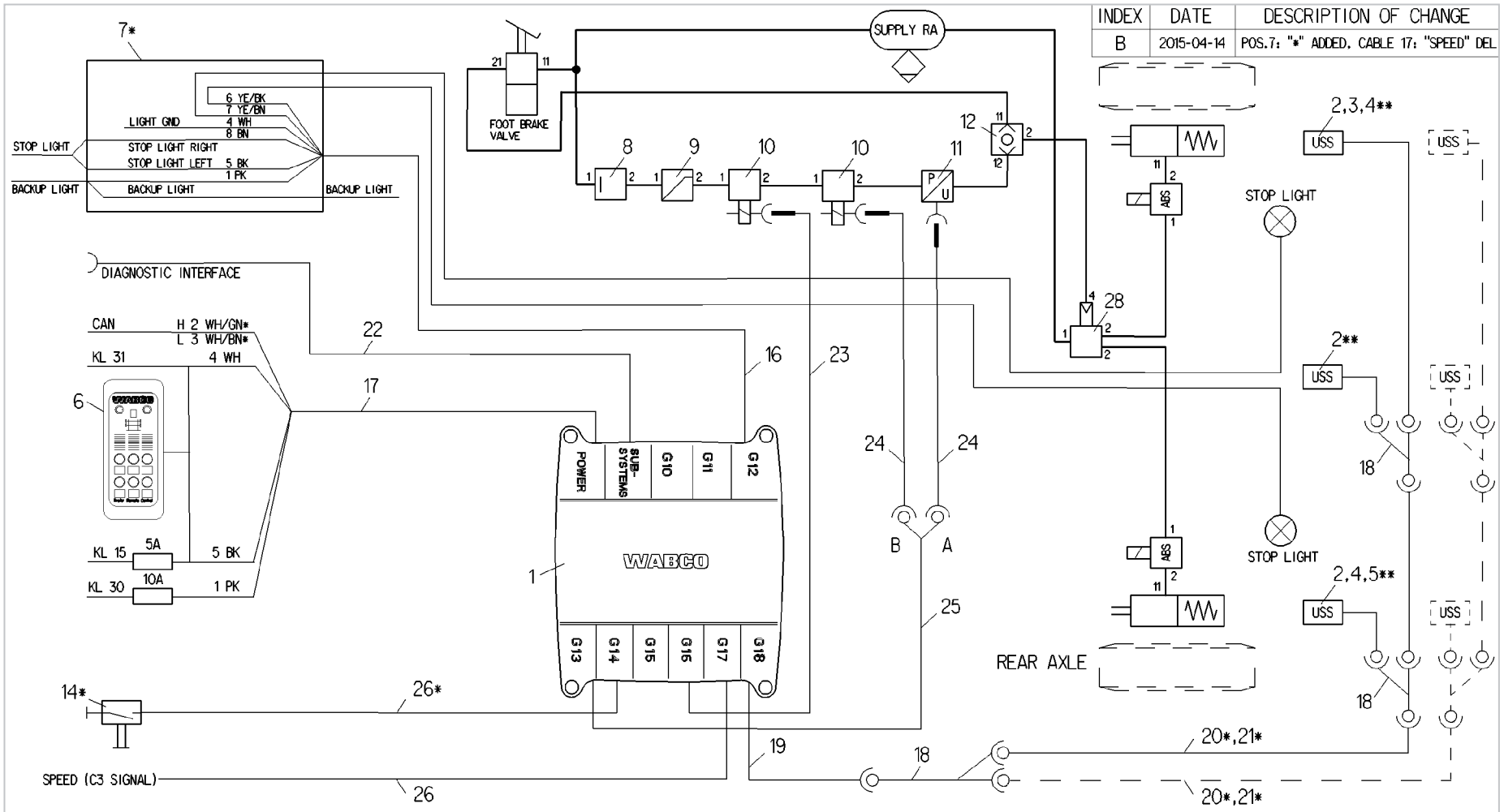
11.1 Circuit diagrams

Access circuit diagrams
http://www.wabco.info/i/1365
Please note that the circuit diagrams are not always available in all language versions.

CIRCUIT DIAGRAM	CIRCUIT DIAGRAM NO.
Complete TailGUARD system with all options for vehicles with ABS system.	841 802 340 0
TailGUARD system with autonomous brake intervention for vehicles with ABS system in accordance with TÜV approval report.	841 802 341 0
TailGUARD system with autonomous brake intervention for vehicles with ABS system. Distance indication via additional light. Stop light actuation via terminal 15.	841 802 342 0
TailGUARD system – for reverse monitoring only.	841 802 343 0
Complete TailGUARD system with all options for vehicles with EBS system.	841 802 344 0
TailGUARD system with autonomous brake intervention for vehicles with EBS system in accordance with TÜV approval report.	841 802 345 0
TailGUARD system with autonomous brake intervention for vehicles with EBS system. Distance indication via additional light. Stop light actuation via terminal 15.	841 802 346 0
As 841 802 345 0 (EBS vehicle), but with deactivation switch for trips with trailer.	841 802 347 0
As 841 802 341 0 (ABS vehicle), but with deactivation switch for trips with trailer.	841 802 348 0
As 841 802 345 0 (EBS vehicle), but for vehicles with 3 axles.	841 802 349 0
TailGUARD system for vehicles with a prepared interface for TailGUARD	841 802 360 0



Pos.	Pcs.	Denomination	Product Identification No.	Pcs.	Pos.	Denomination	Product Identification No.	Pcs.	Pos.	Denomination	VEHICLE SPEC.
14	1	RMS OFF-PUSH BUTTON	NA	1	28	LOAD SENSING VALVE (LSV)					
13	1	BUZZER	894 450 000 0	**	27	CABLE BUZZER	449 443 000 0				
12	1	DOUBLE CHECK VALVE	434 208 ... 0	**	26	GIO UNIVERSAL CABLE	449 535 000 0				
11	1	PRESSURE SENSOR	441 044 101 0	1	25	Y-CABLE-PRESS.SENS./SOLENOID VALVE	449 629 000 0				
10	2	SOLENOID VALVE	472 170 606 0	2	24	CABLE PRESS.SENS./SOLENOID VALVE	449 752 000 0				
9	1	PRESSURE LIMITING VALVE	475 010 313 0	1	23	CABLE SOLENOID VALVE	449 443 000 0				
8	1	CHARGING VALVE	434 100 033 0	1	22	DIAGNOSTIC CABLE	449 605 000 0				
7	1	CABLE JUNCTION BOX *	446 122 633 0	**	21	EXTENSION CABLE	449 747 000 0				
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	**	20	EXTENSION CABLE	449 720 000 0				
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	1	19	GIO CABLE LIN SENSOR	449 806 000 0				
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	**	18	LIN DISTRIBUTOR	894 600 024 0				
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	1	17	CABLE POWER SUPPLY	449 305 000 0				
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	1	16	CABLE UNIVERSAL	449 908 000 0				
1	1	ELEX	446 122 070 0	2	15	AUXILIARY INDICATION LIGHTS	NA				



Pos.	Pcs.	Denomination		Product Identification No.
14	1	RMS OFF-PUSH BUTTON		NA
13				
12	1	DOUBLE CHECK VALVE		434 208 ... 0
11	1	PRESSURE SENSOR		441 044 101 0
10	2	SOLENOID VALVE		472 170 606 0
9	1	PRESSURE LIMITING VALVE		475 010 313 0
8	1	CHARGING VALVE		434 100 033 0
7	1	CABLE JUNCTION BOX	*	446 122 633 0
6	1	TRAILER REMOTE CONTR. (TRC)		446 122 080 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT		446 122 404 0
4	**	ULTRASONIC SENSOR 15° 30CM CABLE		446 122 403 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT		446 122 402 0
2	**	ULTRASONIC SENSOR 0°		446 122 401 0
1	1	ELEX		446 122 070 0

Pos.	Pcs.	Denomination		Product Identification No.
28	1	LOAD SENSING VALVE (LSV)		VEHICLE SPEC.
27				
26	**	GIO UNIVERSAL CABLE		449 535 000 0
25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE		449 629 000 0
24	2	CABLE PRESS.SENS./SOLENOID VALVE		449 752 000 0
23	1	CABLE SOLENOID VALVE		449 443 000 0
22	1	DIAGNOSTIC CABLE		449 605 000 0
21	**	EXTENSION CABLE		449 747 000 0
20	**	EXTENSION CABLE		449 720 000 0
19	1	GIO CABLE LIN SENSOR		449 806 000 0
18	**	LIN DISTRIBUTOR		894 600 024 0
17	1	CABLE POWER SUPPLY		449 305 000 0
16	1	CABLE UNIVERSAL		449 908 000 0
15				

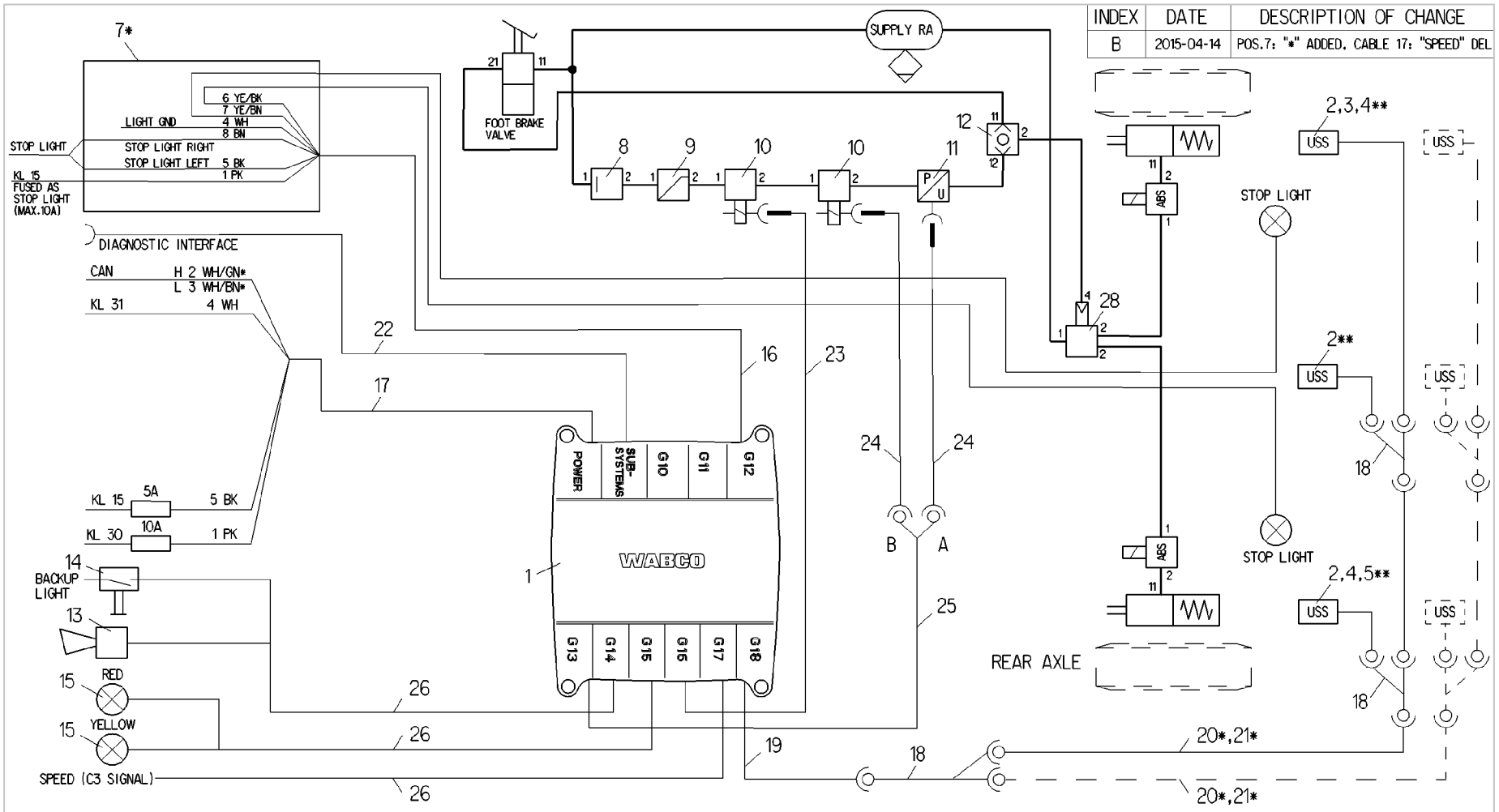
* OPTIONALLY
** FOR QUANTITY SEE SPEC. 815 010 211 3

Date	Signature
Drawn	
2013-11-12	BURMESTER
Checked	
2013-11-12	ALKER
Expert	
BURMESTER	

WABCO

TAILGUARD
FOR TRUCK AND BUS APPLICATION
WITH ELEX
OPTION BRAKE APPLICATION
INDICATION BY TRAILER REMOTE CONTROL

Mass	Scale	Material No.	Date of first issue: 2013-11-12		
- KG	-	841 802 341 0	Doc.Code	Language	Sheet
			002	EN	1/1
Size	CAD System	ECN-No.	Revision	Techn. Resp.	Replacement for
A 3	CREO		B	4990	



INDEX	DATE	DESCRIPTION OF CHANGE
B	2015-04-14	POS.7: "*" ADDED. CABLE 17: "SPEED" DEL

Pos.	Pcs.	Denomination		Product Identification No.
14	1	RMS OFF-SWITCH		NA
13	1	BUZZER		894 450 000 0
12	1	DOUBLE CHECK VALVE		434 208 ... 0
11	1	PRESSURE SENSOR		441 044 101 0
10	2	SOLENOID VALVE		472 170 606 0
9	1	PRESSURE LIMITING VALVE		475 010 313 0
8	1	CHARGING VALVE		434 100 033 0
7	1	CABLE JUNCTION BOX	*	446 122 633 0
6				
5	**	ULTRASONIC SENSOR 15° DEF LEFT		446 122 404 0
4	**	ULTRASONIC SENSOR 15° 300M CABLE		446 122 403 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT		446 122 402 0
2	**	ULTRASONIC SENSOR 0°		446 122 401 0
1	1	ELEX		446 122 070 0

Pos.	Pcs.	Denomination		Product Identification No.
28	1	LOAD SENSING VALVE (LSV)		VEHICLE SPEC.
27				
26	**	GIO UNIVERSAL CABLE		449 535 000 0
25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE		449 629 000 0
24	2	CABLE PRESS.SENS./SOLENOID VALVE		449 752 000 0
23	1	CABLE SOLENOID VALVE		449 443 000 0
22	1	DIAGNOSTIC CABLE		449 605 000 0
21	**	EXTENSION CABLE		449 747 000 0
20	**	EXTENSION CABLE		449 720 000 0
19	1	GIO CABLE LIN SENSOR		449 806 000 0
18	**	LIN DISTRIBUTOR		894 600 024 0
17	1	CABLE POWER SUPPLY		449 305 000 0
16	1	CABLE UNIVERSAL		449 908 000 0
15	2	AUXILIARY INDICATION LIGHTS		NA

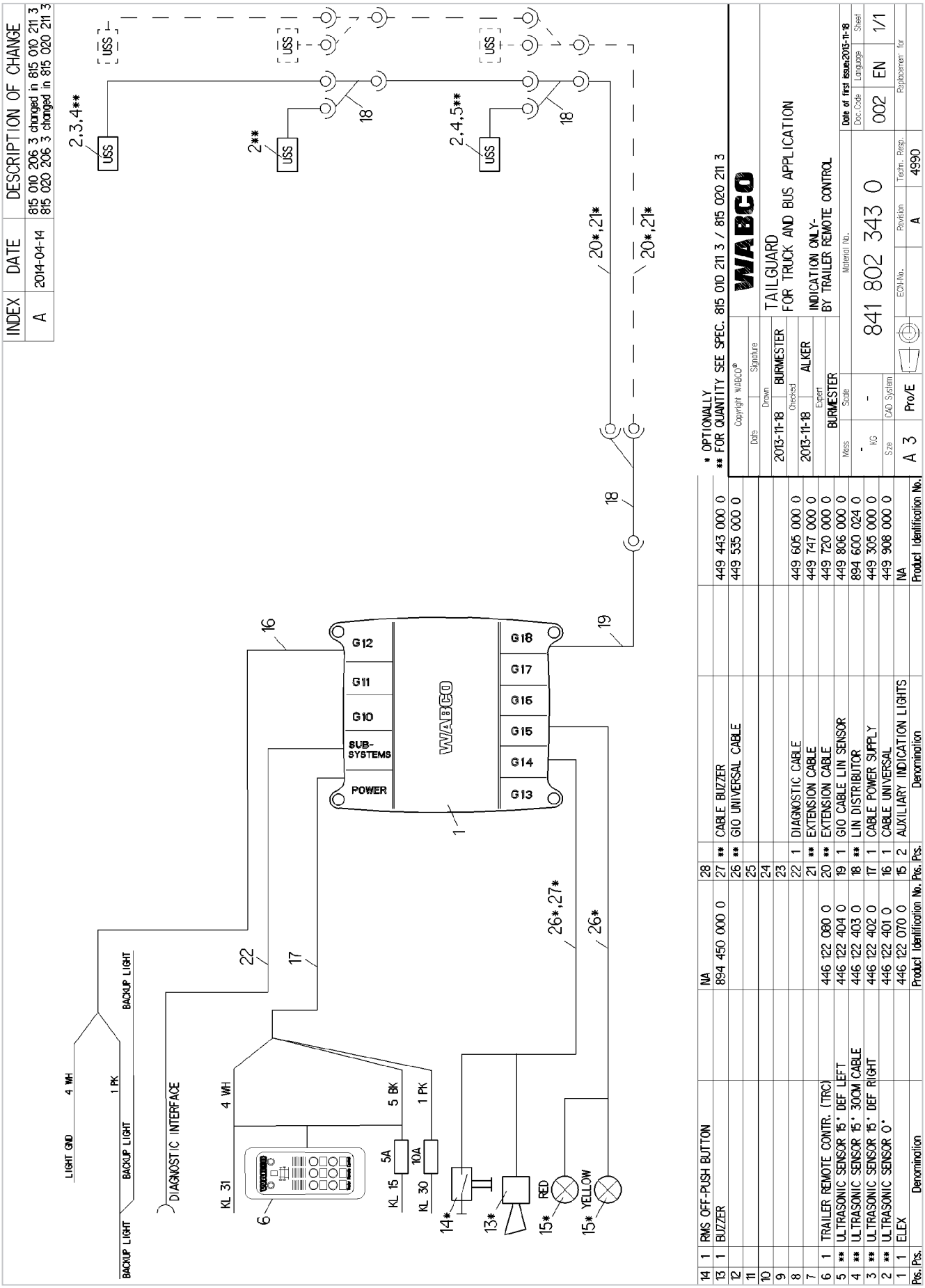
* OPTIONALLY
** FOR QUANTITY SEE SPEC. 815 010 211 3 / 815 020 211 3

Date	Signature
Drawn	
2013-11-20	BURMESTER
Checked	
2013-11-20	ALKER
Expert	
BURMESTER	

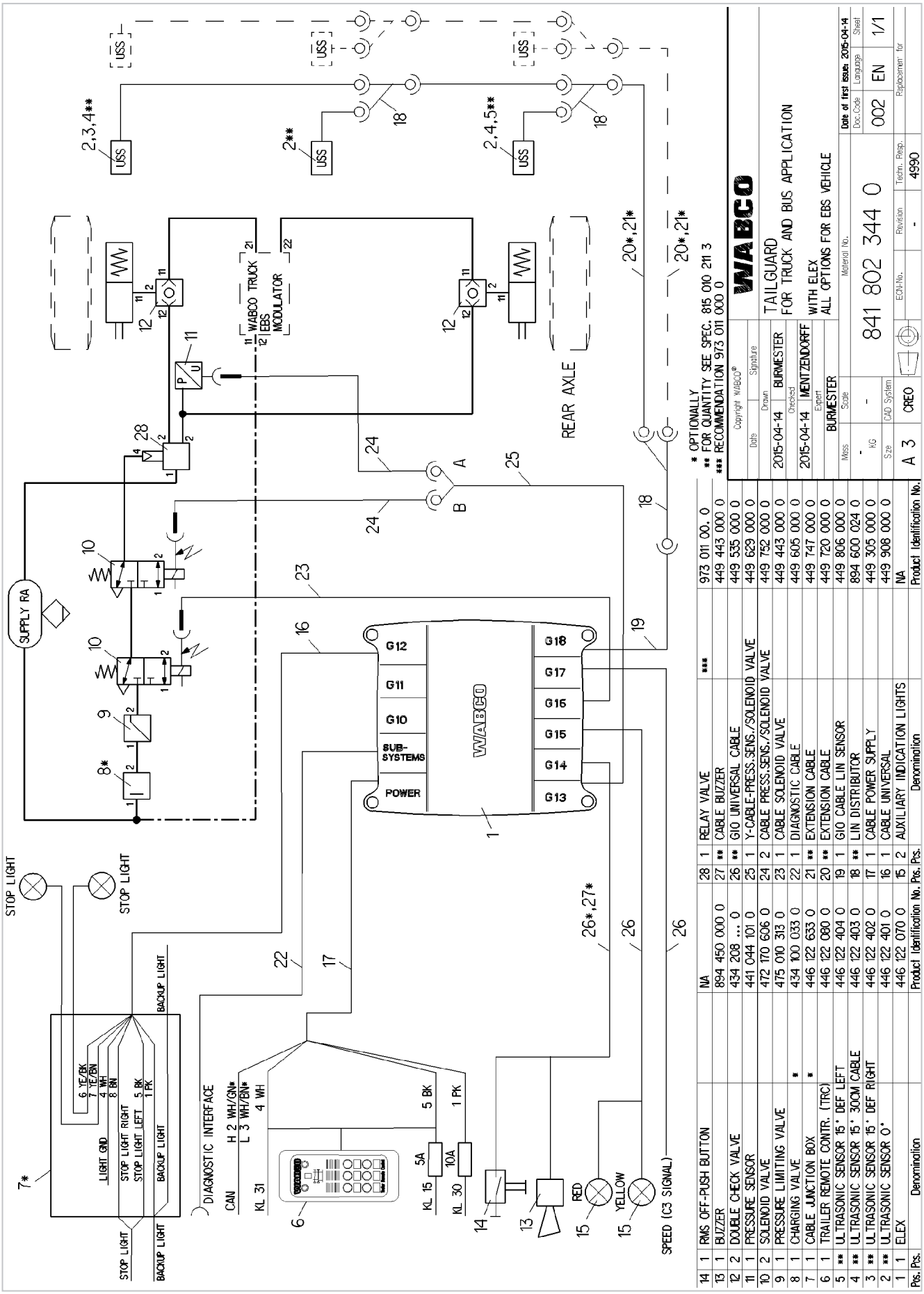
WABCO

TAILGUARD
FOR TRUCK AND BUS APPLICATION
FOR ABS VEHICLE, OPTION BRAKE APPLICATION
INDICATION BY AUXILIARY LIGHTS AND BUZZER
STOP LIGHT SUPPLY BY KL15

Mass	Scale	Material No.	Date of first issue: 2013-11-20		
- KG	-	841 802 342 0	Doc.Code: 002	Language: EN	Sheet: 1/1
Size: A 3	CAD System: CREO	ECN-No.	Revision: B	Techn. Resp.: 4990	Replacement for



Pos.	Pcs.	Denomination	Product identification No.	Pcs.	Pcs.	Denomination	Product identification No.
14	1	RMS OFF-PUSH BUTTON	NA	28			
13	1	BUZZER	894 450 000 0	27	**	CABLE BUZZER	449 443 000 0
12				26	**	G10 UNIVERSAL CABLE	449 535 000 0
11				25			
10				24			
9				23			
8				22	1	DIAGNOSTIC CABLE	449 605 000 0
7				21	**	EXTENSION CABLE	449 747 000 0
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	20	**	EXTENSION CABLE	449 720 000 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	19	1	G10 CABLE LIN SENSOR	449 806 000 0
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	18	**	LIN DISTRIBUTOR	894 600 024 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	17	1	CABLE POWER SUPPLY	449 305 000 0
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	16	1	CABLE UNIVERSAL	449 908 000 0
1	1	ELEX	446 122 070 0	15	2	AUXILIARY INDICATION LIGHTS	NA



Pos.	Pcs.	Denomination	Product Identification No.	Pos.	Pcs.	Denomination	Product Identification No.
14	1	RMS OFF-PUSH BUTTON	446 122 070 0	15	2	AUXILIARY INDICATION LIGHTS	NA
13	1	BUZZER	894 450 000 0	28	1	RELAY VALVE	*** 973 011 00. 0
12	2	DOUBLE CHECK VALVE	434 208 ... 0	27	**	CABLE BUZZER	449 443 000 0
11	1	PRESSURE SENSOR	441 044 101 0	26	**	G10 UNIVERSAL CABLE	449 535 000 0
10	2	SOLENOID VALVE	472 170 606 0	25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE	449 629 000 0
9	1	PRESSURE LIMITING VALVE	475 010 313 0	24	2	CABLE PRESS.SENS./SOLENOID VALVE	449 752 000 0
8	1	CHARGING VALVE *	434 100 033 0	23	1	CABLE SOLENOID VALVE	449 443 000 0
7	1	CABLE JUNCTION BOX *	446 122 633 0	22	1	DIAGNOSTIC CABLE	449 605 000 0
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	21	**	EXTENSION CABLE	449 747 000 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	20	**	EXTENSION CABLE	449 720 000 0
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	19	1	G10 CABLE LIN SENSOR	449 806 000 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	18	**	LIN DISTRIBUTOR	894 600 024 0
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	17	1	CABLE POWER SUPPLY	449 305 000 0
1	1	ELEX	446 122 070 0	16	1	CABLE UNIVERSAL	449 908 000 0

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2015-04-14	BURMESTER
Checked	
2015-04-14	MENTZENDORFF
Expert	
BURMESTER	

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TAILGUARD
FOR TRUCK AND BUS APPLICATION

WITH ELEX
ALL OPTIONS FOR EBS VEHICLE

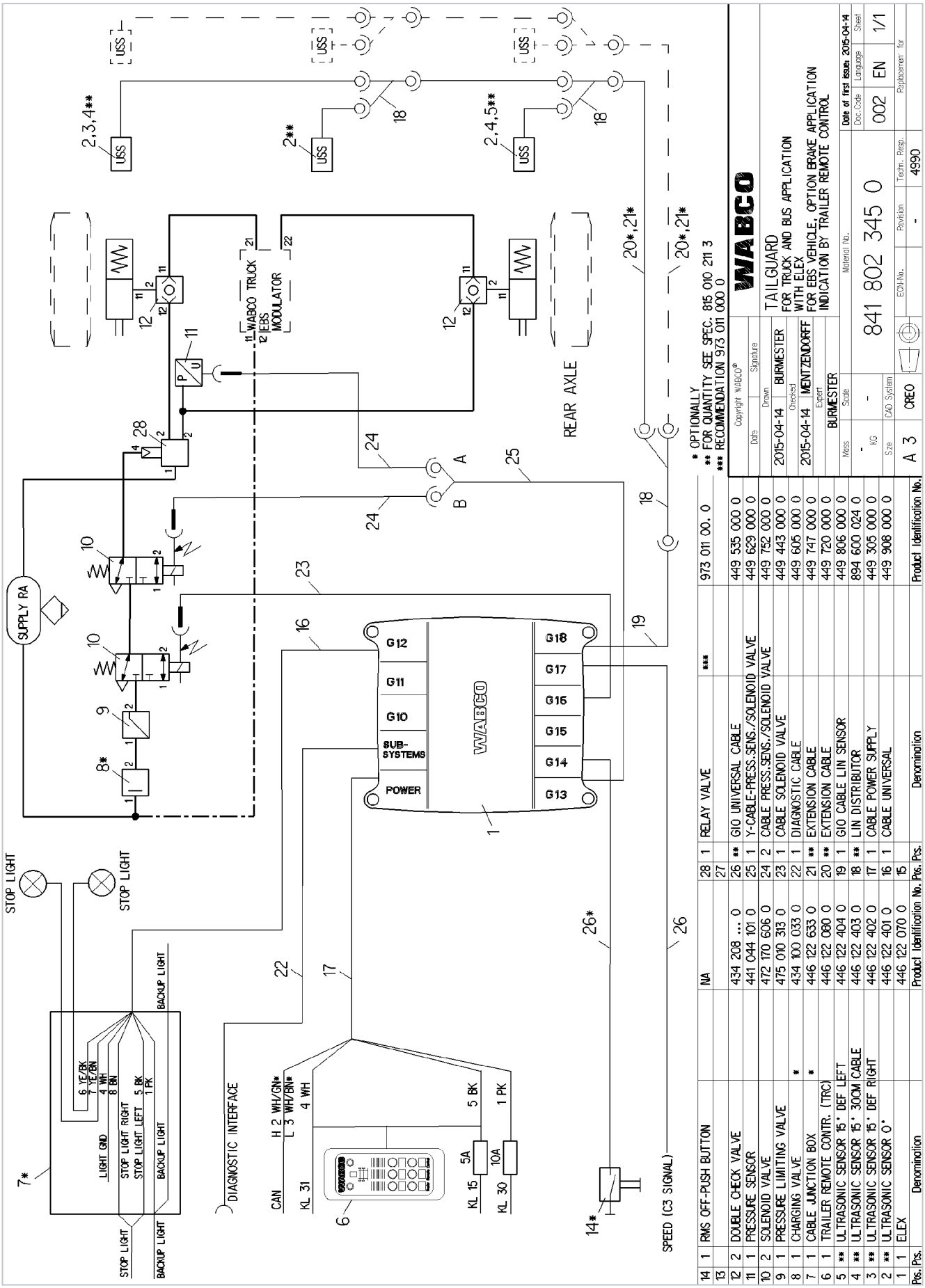
Mass	Scale	Material No.
-	-	841 802 344 0
KG		
Size	CAD System	
A 3	CREO	

EDM-No.	Revision	Techn. Resp.
	-	4990

Date of first issue: 2015-04-14

Doc-Code	Language	Sheet
002	EN	1/1

Replacement for



Pos.	Pcs.	Denomination	Product Identification No.	Pcs.	Pcs.	Denomination	Product Identification No.
14	1	RMS OFF-PUSH BUTTON		28	1	RELAY VALVE	*** 973 011 00. 0
13				27			
12	2	DOUBLE CHECK VALVE	434 208 ... 0	26	**	G10 UNIVERSAL CABLE	449 535 000 0
11	1	PRESSURE SENSOR	441 044 101 0	25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE	449 629 000 0
10	2	SOLENOID VALVE	472 170 606 0	24	2	CABLE PRESS.SENS./SOLENOID VALVE	449 732 000 0
9	1	PRESSURE LIMITING VALVE	475 010 313 0	23	1	CABLE SOLENOID VALVE	449 443 000 0
8	1	CHARGING VALVE *	434 100 033 0	22	1	DIAGNOSTIC CABLE	449 605 000 0
7	1	CABLE JUNCTION BOX *	446 122 633 0	21	**	EXTENSION CABLE	449 747 000 0
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	20	**	EXTENSION CABLE	449 720 000 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	19	1	G10 CABLE LIN SENSOR	449 806 000 0
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	18	**	LIN DISTRIBUTOR	894 600 024 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	17	1	CABLE POWER SUPPLY	449 305 000 0
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	16	1	CABLE UNIVERSAL	449 908 000 0
1	1	ELEX	446 122 070 0	15			

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Date	Signature
2015-04-14	BURMESTER
Checked	
2015-04-14	MENTZENDORFF
Expert	
BURMESTER	

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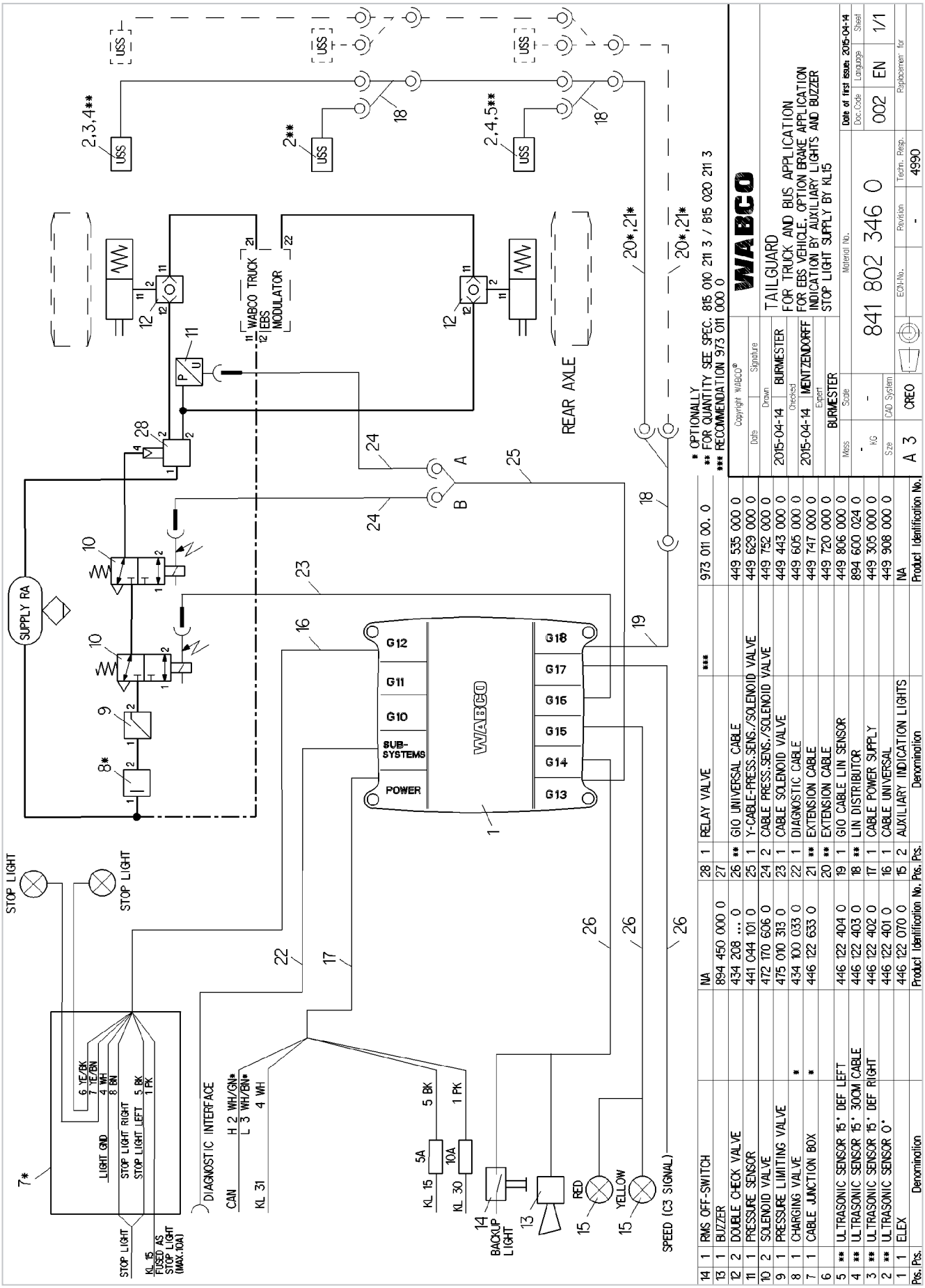
TAILGUARD
FOR TRUCK AND BUS APPLICATION
WITH ELEX
FOR EBS VEHICLE, OPTION BRAKE APPLICATION
INDICATION BY TRAILER REMOTE CONTROL

Mass	Scale	Material No.	Date of first issue: 2015-04-14	
-	-	841 802 345 0	Doc. Code	Language / Sheet
			002	EN 1/1
Size	CAD System	ECN-No.	Revision	Techn. Resp.
A 3	CREO		-	4990

Replacement for



Pos.	Pcs.	Denomination	Product identification No.	Pcs.	Pos.
14	1	RMS OFF-SWITCH	NA	28	1
13	1	BUZZER	894 450 000 0	27	
12	2	DOUBLE CHECK VALVE	434 208 ... 0	26	**
11	1	PRESSURE SENSOR	441 044 101 0	25	1
10	2	SOLENOID VALVE	472 170 606 0	24	2
9	1	PRESSURE LIMITING VALVE	475 010 313 0	23	1
8	1	CHARGING VALVE *	434 100 033 0	22	1
7	1	CABLE JUNCTION BOX *	446 122 633 0	21	**
6				20	**
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	19	1
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	18	**
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	17	1
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	16	1
1	1	ELEX	446 122 070 0	15	2
Pos.	Pcs.	Denomination	Product identification No.	Pcs.	Pos.

28	1	RELAY VALVE	***
27			
26	**	G10 UNIVERSAL CABLE	
25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE	
24	2	CABLE PRESS.SENS./SOLENOID VALVE	
23	1	CABLE SOLENOID VALVE	
22	1	DIAGNOSTIC CABLE	
21	**	EXTENSION CABLE	
20	**	EXTENSION CABLE	
19	1	G10 CABLE LIN SENSOR	
18	**	LIN DISTRIBUTOR	
17	1	CABLE POWER SUPPLY	
16	1	CABLE UNIVERSAL	
15	2	AUXILIARY INDICATION LIGHTS	
Pos.	Pcs.	Denomination	

973 011 00. 0	449 535 000 0
	449 629 000 0
	449 732 000 0
	449 443 000 0
	449 605 000 0
	449 747 000 0
	449 720 000 0
	449 806 000 0
	894 600 024 0
	449 305 000 0
	449 908 000 0
NA	Product identification No.

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Date	Signature
2015-04-14 Drawn	BURMESTER
Checked	
2015-04-14 Expert	MENTZENDORFF
	BURMESTER

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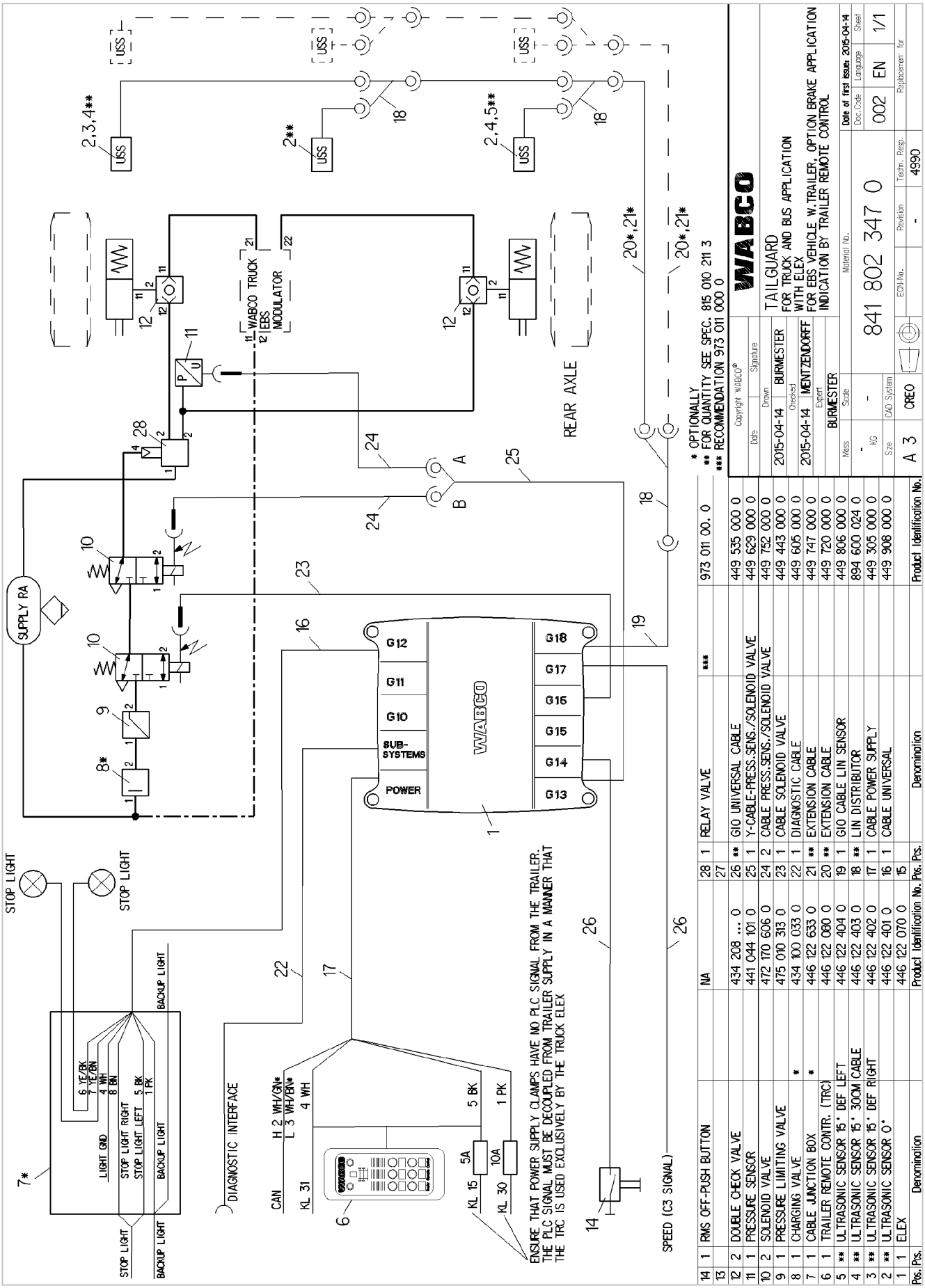
TAILGUARD
FOR TRUCK AND BUS APPLICATION
FOR EBS VEHICLE, OPTION BRAKE APPLICATION
INDICATION BY AUXILIARY LIGHTS AND BUZZER
STOP LIGHT SUPPLY BY KL15

Mass	Scale	Material No.	Date of first issue: 2015-04-14
-	-	841 802 346 0	Doc. Code 002 / Language EN / Sheet 1/1
KG			
Size	CAD System	ECN-No. / Revision	Techn. Resp. / Replacement for
A 3	CREO	-	4990



Pos.	Pcs.	Denomination	Product identification No.	Pcs.	Pcs.	Denomination	Product identification No.
14	1	RMS OFF-PUSH BUTTON		28	1	RELAY VALVE	*** 973 011 00. 0
13				27			
12	2	DOUBLE CHECK VALVE	434 208 ... 0	26	**	G10 UNIVERSAL CABLE	449 535 000 0
11	1	PRESSURE SENSOR	441 044 101 0	25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE	449 629 000 0
10	2	SOLENOID VALVE	472 170 606 0	24	2	CABLE PRESS.SENS./SOLENOID VALVE	449 732 000 0
9	1	PRESSURE LIMITING VALVE	475 010 313 0	23	1	CABLE SOLENOID VALVE	449 443 000 0
8	1	CHARGING VALVE *	434 100 033 0	22	1	DIAGNOSTIC CABLE	449 605 000 0
7	1	CABLE JUNCTION BOX *	446 122 633 0	21	**	EXTENSION CABLE	449 747 000 0
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	20	**	EXTENSION CABLE	449 720 000 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	19	1	G10 CABLE LIN SENSOR	449 806 000 0
4	**	ULTRASONIC SENSOR 15° 300M CABLE	446 122 403 0	18	**	LIN DISTRIBUTOR	894 600 024 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	17	1	CABLE POWER SUPPLY	449 305 000 0
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	16	1	CABLE UNIVERSAL	449 908 000 0
1	1	ELEX	446 122 070 0	15			

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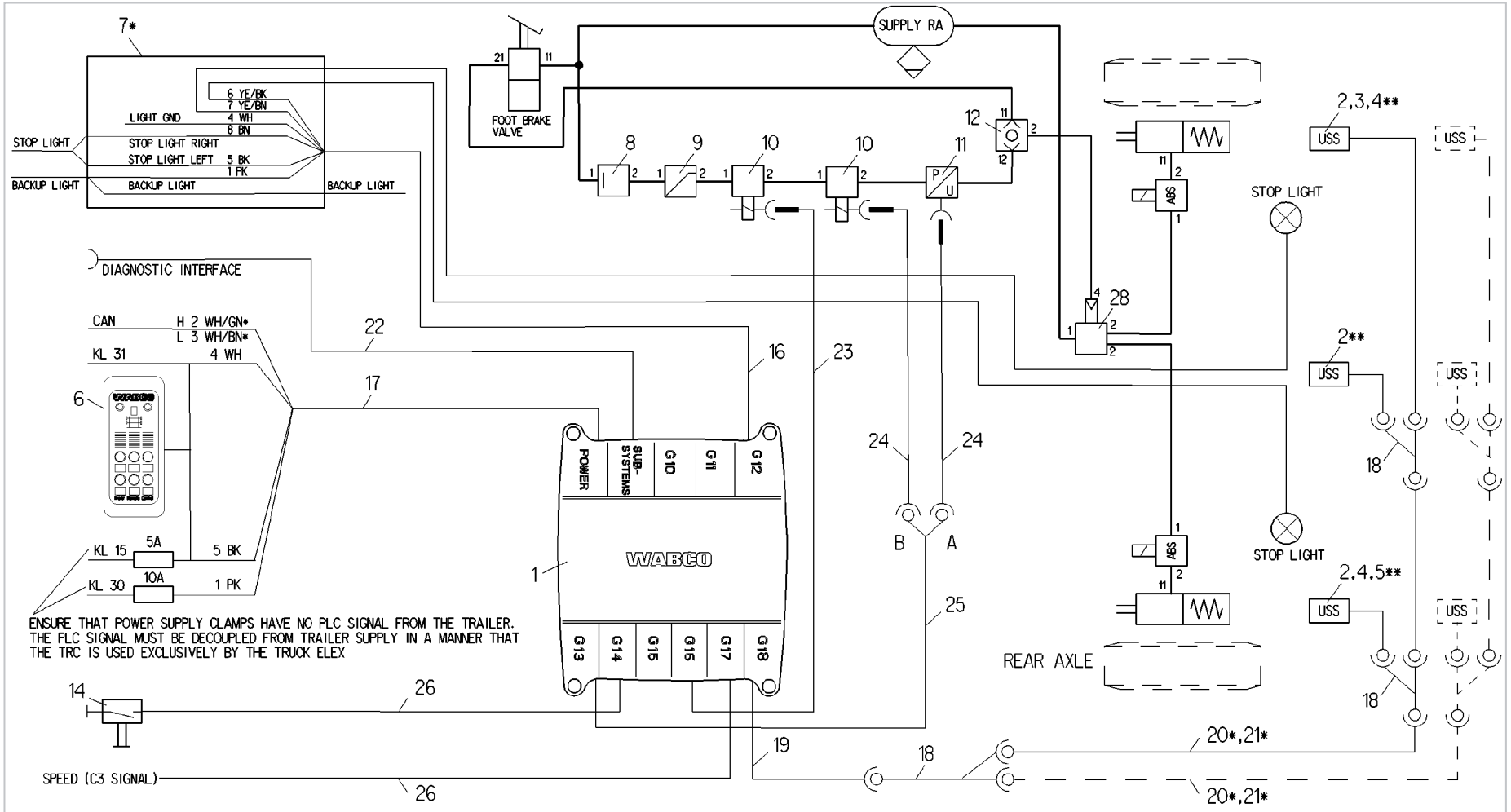
Date	Signature
2015-04-14	BURMESTER
Checked	
2015-04-14	MENTZENDORFF
Expert	
BURMESTER	

WABCO

TAILGUARD
FOR TRUCK AND BUS APPLICATION
WITH ELEX
FOR EBS VEHICLE W.TRAILER, OPTION BRAKE APPLICATION
INDICATION BY TRAILER REMOTE CONTROL

Mass	Scale	Material No.	Date of first issue: 2015-04-14
-	-	841 802 347 0	Doc.Code 002 / Language EN / Sheet 1/1
KG			
Size	CAD System	ECN-No. / Revision	Techn. Resp. / Replacement for
A 3	CREO	-	4990



Pos.	Pcs.	Denomination		Product Identification No.
14	1	RMS OFF-PUSH BUTTON		NA
13				
12	1	DOUBLE CHECK VALVE		434 208 ... 0
11	1	PRESSURE SENSOR		441 044 101 0
10	2	SOLENOID VALVE		472 170 606 0
9	1	PRESSURE LIMITING VALVE		475 010 313 0
8	1	CHARGING VALVE		434 100 033 0
7	1	CABLE JUNCTION BOX	*	446 122 633 0
6	1	TRAILER REMOTE CONTR. (TRC)		446 122 080 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT		446 122 404 0
4	**	ULTRASONIC SENSOR 15° 30CM CABLE		446 122 403 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT		446 122 402 0
2	**	ULTRASONIC SENSOR 0°		446 122 401 0
1	1	ELEX		446 122 070 0

Pos.	Pcs.	Denomination		Product Identification No.
28	1	LOAD SENSING VALVE (LSV)		VEHICLE SPEC.
27				
26	**	GIO UNIVERSAL CABLE		449 535 000 0
25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE		449 629 000 0
24	2	CABLE PRESS.SENS./SOLENOID VALVE		449 752 000 0
23	1	CABLE SOLENOID VALVE		449 443 000 0
22	1	DIAGNOSTIC CABLE		449 605 000 0
21	**	EXTENSION CABLE		449 747 000 0
20	**	EXTENSION CABLE		449 720 000 0
19	1	GIO CABLE LIN SENSOR		449 806 000 0
18	**	LIN DISTRIBUTOR		894 600 024 0
17	1	CABLE POWER SUPPLY		449 305 000 0
16	1	CABLE UNIVERSAL		449 908 000 0
15				

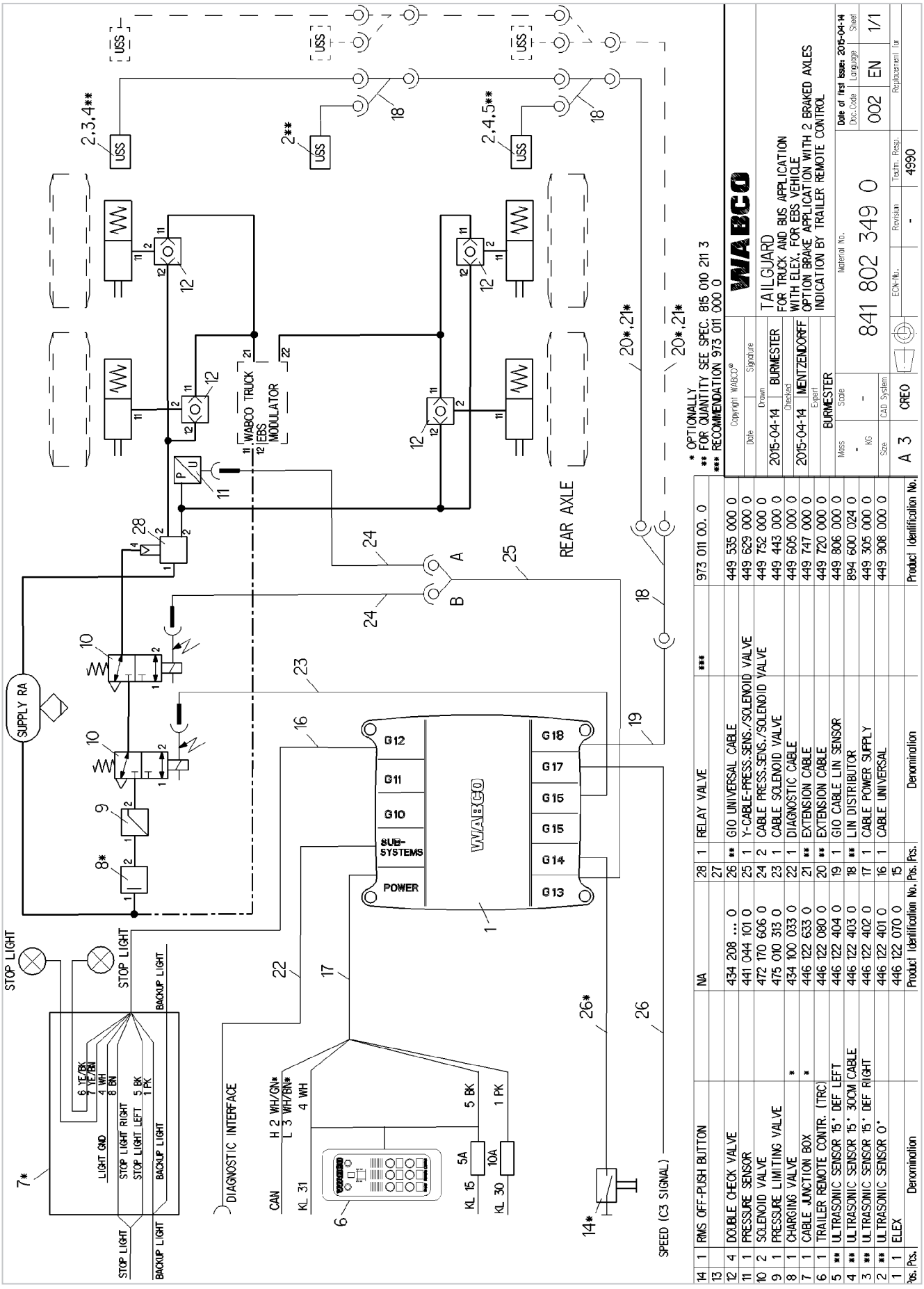
* OPTIONALLY
** FOR QUANTITY SEE SPEC. 815 010 211 3

Date	Signature
Drawn	
2015-04-14	BURMESTER
Checked	
2015-04-14	MENTZENDORFF
Expert	
BURMESTER	

WABCO

TAILGUARD
FOR TRUCK AND BUS APPLICATION
WITH ELEX
FOR ABS VEHICLE W.TRAILER, OPTION BRAKE APPLICATION
INDICATION BY TRAILER REMOTE CONTROL

Mass	Scale	Material No.	Date of first issue :2015-04-14		
- KG	-	841 802 348 0	Doc.Code	Language	Sheet
			002	EN	1/1
Size	CAD System	ECN-No. / Revision / Techn. Resp.	Replacement for		
A 3	CREO	- / 4990			



Pos.	Pcs.	Denomination	Product Identification No.	Pos.	Pcs.	Denomination	Product Identification No.
14	1	RMS OFF-PUSH BUTTON		28	1	RELAY VALVE	*** 973 011 00. 0
13				27			
12	4	DOUBLE CHECK VALVE	434 208 ... 0	26	**	G10 UNIVERSAL CABLE	449 535 000 0
11	1	PRESSURE SENSOR	441 044 101 0	25	1	Y-CABLE-PRESS.SENS./SOLENOID VALVE	449 629 000 0
10	2	SOLENOID VALVE	472 170 606 0	24	2	CABLE PRESS.SENS./SOLENOID VALVE	449 752 000 0
9	1	PRESSURE LIMITING VALVE	475 010 313 0	23	1	CABLE SOLENOID VALVE	449 443 000 0
8	1	CHARGING VALVE *	434 100 033 0	22	1	DIAGNOSTIC CABLE	449 605 000 0
7	1	CABLE JUNCTION BOX *	446 122 633 0	21	**	EXTENSION CABLE	449 747 000 0
6	1	TRAILER REMOTE CONTR. (TRC)	446 122 080 0	20	**	EXTENSION CABLE	449 720 000 0
5	**	ULTRASONIC SENSOR 15° DEF LEFT	446 122 404 0	19	1	G10 CABLE LIN SENSOR	449 806 000 0
4	**	ULTRASONIC SENSOR 15° 30CM CABLE	446 122 403 0	18	**	LIN DISTRIBUTOR	894 600 024 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT	446 122 402 0	17	1	CABLE POWER SUPPLY	449 305 000 0
2	**	ULTRASONIC SENSOR 0°	446 122 401 0	16	1	CABLE UNIVERSAL	449 906 000 0
1	1	ELEX	446 122 070 0	15			

Date	Signature
Drawn	
2015-04-14	BURMESTER
Checked	
2015-04-14	MENTZENDORFF
Expert	
BURMESTER	

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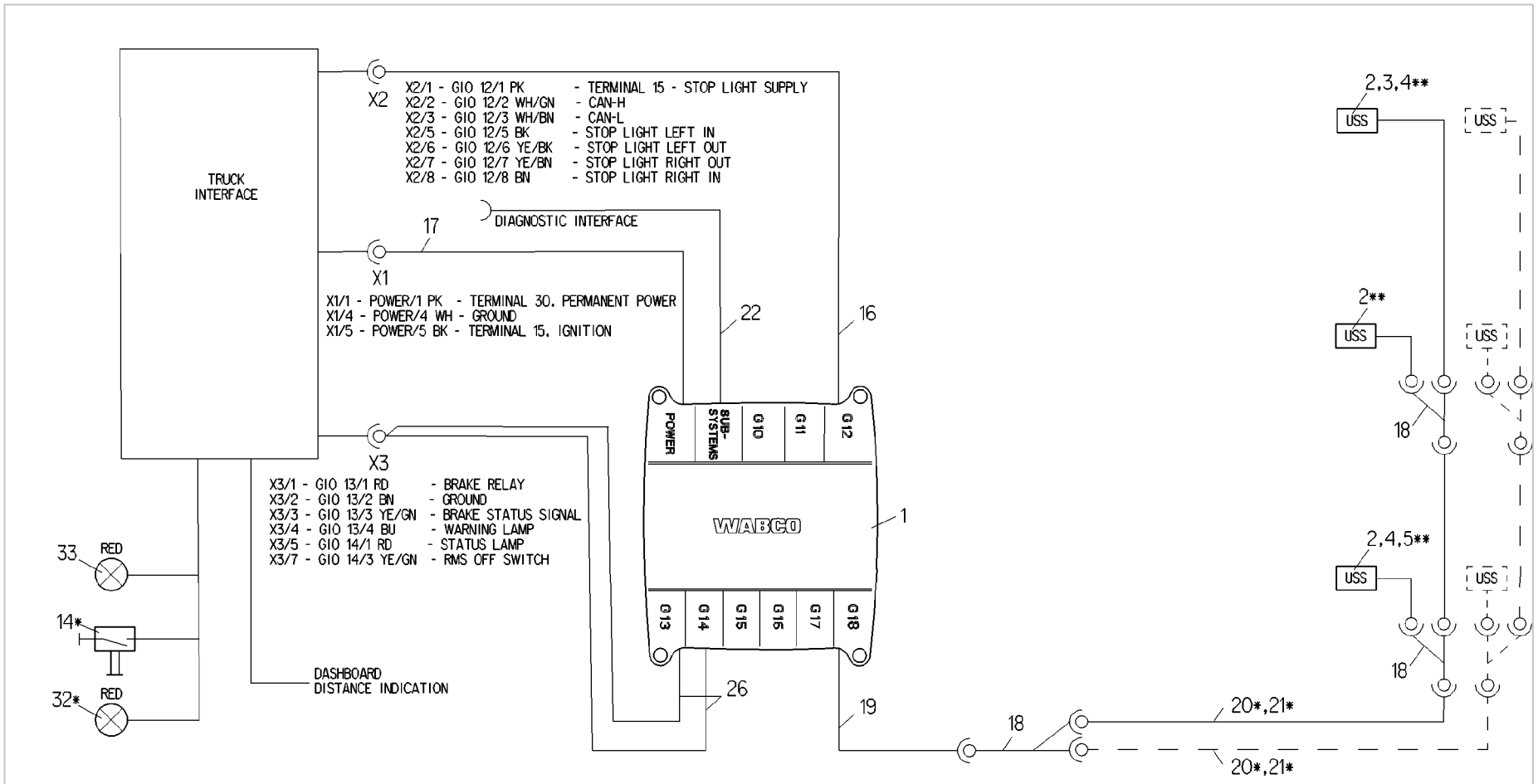
TAILGUARD
FOR TRUCK AND BUS APPLICATION
WITH ELEX, FOR EBS VEHICLE
OPTION BRAKE APPLICATION WITH 2 BRAKED AXLES
INDICATION BY TRAILER REMOTE CONTROL

Mass	Scale	Material No.
-	-	841 802 349 0
KG		
Size	CAD System	ECN-No. / Revision / Techn. Resp.
A 3	CREO	- / - / 4990

Date of first issue: 2015-04-14
Doc. Code 002 | Language EN | Sheet 1/1
Replacement for



* OPTIONALLY
** FOR QUANTITY SEE SPEC. 815 010 211 3 / 815 020 211 3

Pos.	Pcs.	Denomination		Product Identification No.	Pos.	Pcs.	Denomination		Product Identification No.
19	1	GIO CABLE LIN SENSOR		449 806 000 0					
18	**	LIN DISTRIBUTOR		894 600 024 0					
17	1	CABLE POWER SUPPLY		449 305 000 0					
16	1	CABLE UNIVERSAL		449 908 000 0					
33	1	WARNING LAMP		NA					
32	1	STATUS LAMP		NA					
14	1	RMS OFF SWITCH		NA					
5	**	ULTRASONIC SENSOR 15° DEF LEFT		446 122 404 0					
4	**	ULTRASONIC SENSOR 15° 30CM CABLE		446 122 403 0	26	**	GIO UNIVERSAL CABLE		449 535 000 0
3	**	ULTRASONIC SENSOR 15° DEF RIGHT		446 122 402 0	22	1	DIAGNOSTIC CABLE		449 605 000 0
2	**	ULTRASONIC SENSOR 0°		446 122 401 0	21	**	EXTENSION CABLE		449 747 000 0
1	1	ELECTRONIC EXTENSION MODULE		446 122 070 0	20	**	EXTENSION CABLE		449 720 000 0

Date	Signature
Drawn: 2016-01-28	Guemues
Checked: 2016-01-28	Alker
Expert: von der Beeke	

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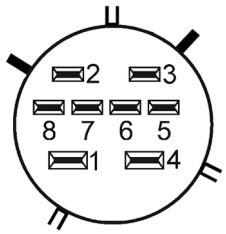
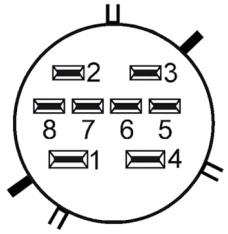
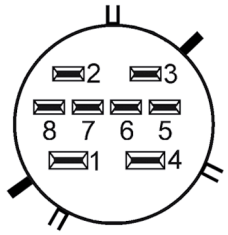
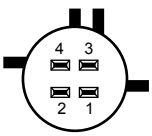
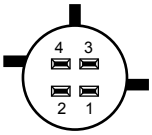
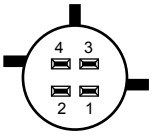
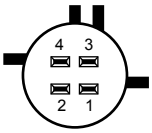
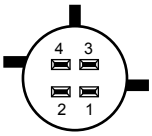
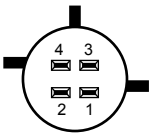
TAILGUARD
FOR TRUCK AND BUS APPLICATION

BRAKING BY TRUCK EBS

Mass	Scale	Material No.	Date of first issue: 2015-11-17		
- KG	-	841 802 360 0	Doc.Code: 002	Language: EN	Sheet: 1/1
Size: A 3	CAD System: Pro/E	ECN-No.	Revision: -	Techn. Resp.: 4990	Replacement for

11.2 Pin assignment "Electronic Extension Module"

CONNECTIONS	PIN	ELECTRONIC EXTENSION MODULE
POWER, 8-pin Code E		
	1	Terminal 30
	2	-
	3	-
	4	Ground
	5	Terminal 15
	6	-
	7	-
	8	-
SUBSYSTEM, 8-pin code C, blue		
	1	Terminal 30-X2
	2	CAN2 High (5 V)
	3	CAN2 Low (5 V)
	4	Ground
	5	-
	6	-
	7	-
	8	-
GIO12, 8-pin code C/B		
	1	Reversing lamp input
	2	CAN3 High (24 V)
	3	CAN3 Low (24 V)
	4	Ground light
	5	Rear outline marker lamps / Stop light left input
	6	Rear outline marker lamps / Stop light left output
	7	Rear outline marker lamps / Stop light right output
	8	Rear outline marker lamps / Stop light right input
GIO13, 4-pin code B		
	1	**Braking via separate valves:** Pressure sensor supply **Braking via a prepared interface for TailGUARD:** Brake Relay
	2	Ground
	3	**Braking via separate valves:** Analogue input 2, pressure sensor signal **Braking via a prepared interface for TailGUARD:** Towing vehicle braking signal
	4	**Braking via separate valves:** Solenoid valve 2 **Braking via a prepared interface for TailGUARD:** TailGUARD warning lamp

CONNECTIONS	PIN	ELECTRONIC EXTENSION MODULE
GIO14, 4-pin code B		
	1	TailGUARD status lamp / additional external buzzer
	2	Ground
	3	Analogue input 1, additional TailGUARD Off button or alternative input reverse gear signal (see separate circuit diagram 841 802 342 0)
	4	-
GIO15, 4-pin code B		
	1	Reverse signal light (optional)
	2	Ground
	3	-
	4	Reverse signal light (optional)
GIO16, 4-pin code B		
	1	Solenoid valve 1
	2	Solenoid valve 1 ground
	3	-
	4	-
GIO17, 4-pin code B		
	1	Tachograph speed signal (C3 / B7)
	2	Tachograph ground
	3	-
	4	-
GIO18, 4-pin code B		
	1	-
	2	LIN ground
	3	LIN ultrasonic sensor
	4	LIN supply voltage

11.3 Checklist TailGUARD Truck & Bus

This checklist is used to define and plan a TailGUARD application.

Vehicle specifications

Intervention into the braking system

- ☐ The system is only designed for monitoring and warning (expert approval is not required).

The vehicle should brake autonomously when approaching obstacles:

- ☐ The vehicle is operated in non-public areas and does not require an expert approval.
- ☐ The vehicle is operated in public areas, but does not require an expert approval.
- ☐ The vehicle requires an expert approval in accordance with ECE-R13 (mandatory in Europe).

Type of braking system

- ☐ The vehicle has a braking system without ABS (TailGUARD is connected to the Automatic Load-Sensing Valve or the relay valve; expert approval must be clarified with the authorities).
- ☐ The vehicle has ABS (TailGUARD is approved for all ABS systems, requires expert approval for each vehicle).
- ☐ The vehicle has WABCO EBS (TailGUARD TÜV approval report July 2015, requires expert approval for each vehicle).
- ☐ The vehicle has a non-WABCO EBS.
- ☐ The vehicle has an interface prepared by the manufacturer.

Visualisation for the driver

- ☐ The distance to the object is indicated through the Trailer Remote Control, as required by the TÜV approval report.
- ☐ Indication of an object is to be implemented via the rear outline marker lamps.
- ☐ Display via instrument panel (only with interface prepared by the manufacturer).

Definition of the area to be monitored

- ☐ The system should detect objects at a distance of approx. 70 cm above the ground.
- ☐ If possible, the system should detect objects in the roof area.
- ☐ If possible, the system should detect objects below 50 cm above the ground.

Information for installation

Moving vehicle parts

- ☐ All protruding vehicle parts or objects carried along at the rear are known.
- ☐ All movements and positions of flexible vehicle parts have been described.

Trailer operation (requires shielding the Trailer Remote Control for the towing vehicle)

- ☐ It should be possible to deactivate TailGUARD on the towing vehicle manually if the trailer is hitched.
- ☐ TailGUARD on the towing vehicle should be deactivated automatically if the trailer is hitched

Stop light control with TailGUARD intervention

- ☐ Stop light is activated through TailGUARD. Type of stop light monitoring through vehicle electronics is known.
- ☐ Stop light is not activated through TailGUARD (expert approval may not be satisfied).

Mechanical installation	
☐	A diagram of photo is available for the ultrasonic sensors' positioning.
☐	It has been clarified where the Electronic Extension Module is to be installed and all cable lengths have been adequately dimensioned.
☐	The Trailer Remote Control location has been defined.
Electrical installation	
☐	A vehicle circuit diagram is available for correct connections at the fuse box.

Information for integration into the braking system

☐	Access to the C3 signal is accepted by the vehicle manufacturer or is documented in his system description.
☐	A pneumatic circuit diagram is available for optimum integration in the pneumatic system.
☐	All threaded connections required to integrate TailGUARD into the existing pipe system are available in accordance with vehicle manufacturer's specifications.

Other subjects for preparing the vehicle

☐	The employees are qualified and the documentation "TailGUARD Truck & Bus System description" is available.
☐	A WABCO Trailer EBS Training with certification for PIN 1 has been completed.
☐	A WABCO Trailer EBS Training with certification for PIN 2 has been completed and a configured parameter set is available to put the system into operation.
☐	A vehicle registration office is within reach and a copy of the TÜV certificate is available (only required if TailGUARD intervenes in the braking system).
☐	The installation has been documented with images.
☐	A test schedule for the installed TailGUARD system is at hand.
☐	A TailGUARD user information has been added to the vehicle operating manual.
☐	A driver trailing is planned after TailGUARD has been installed.

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a WORLD of DIFFERENCE

WABCO (NYSE: WBC) is the world's leading supplier of brake control systems and other advanced technologies to improve the safety, efficiency and connectivity of commercial vehicles. Founded about 150 years ago as Westinghouse Air Brake Company, WABCO is committed to an increasingly autonomous, networked and electrical future for the commercial vehicle industry, true to the motto "Mobilizing Vehicle Intelligence". WABCO continuously drives the development of forward-looking innovations with the aim of setting important technological milestones in the field of autonomous mobility and uses its extensive expertise to integrate complex control and fail-safe systems required for efficient and safe control of vehicle dynamics in every phase of vehicle operation – on the motorway, in the city and in the depot. The world's leading manufacturers of trucks, buses and trailers rely on WABCO's cutting edge technologies. Powered by its vision for accident-free driving and greener transportation solutions, WABCO is also at the forefront of advanced fleet management systems that contribute to commercial fleet efficiency. In 2018, WABCO reported sales of $3.8 billion and has nearly 16,000 employees in more than 40 countries. For more information, visit

www.wabco-auto.com

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