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Third edition
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Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 2: Application layer for brakes and running gear

Véhicules routiers — Échange d'informations numériques sur les connexions électriques entre véhicules tracteurs et véhicules tractés —

Partie 2: Couche d'application pour les équipements de freinage et les organes de roulement

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This third edition cancels and replaces the second edition (ISO 11992-2:2003), which has been technically revised. It also replaces ISO 11992-2:2003/Amd 1:2007.

ISO 11992 consists of the following parts, under the general title *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles*:

— *Part 1: Physical and data-link layers*

— *Part 2: Application layer for brakes and running gear*

— *Part 3: Application layer for equipment other than brakes and running gear*

— *Part 4: Diagnostic communication*

Introduction

This part of ISO 11992 has been established in order to define the data interchange between a commercial vehicle and its towed vehicle(s), including the communication between towed vehicles, using a Controller Area Network (CAN) serial data link as specified in ISO 11992-1 for control and status data related to electronically controlled braking and running gear applications.

It is subject to additions which will become necessary in order to keep pace with experience and technical advances. Care has been taken to ensure that these additions can be introduced in a compatible way, and care will have to be taken in the future so that such additions remain compatible with the previous versions. In particular, it can become necessary to standardize new parameters and parameter groups. ISO members can request that such new parameters and parameter groups are to be included in the future editions of ISO 11992.

Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 2: Application layer for brakes and running gear

1 Scope

This part of ISO 11992 specifies the parameters and messages for electronically controlled braking systems, including anti-lock braking systems (ABS) and vehicle dynamics control systems (VDC), as well as for running gear equipment (i.e. systems for steering, suspension, and tyres), to ensure that the data communication interchange of information between road vehicles with a maximum authorized total mass greater than 3 500 kg and their towed vehicles, including the communication between (several) towed vehicles, on a dedicated network. It does not include any other communication on that network that is not related to the communication between those vehicles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7638 (all parts), *Road vehicles — Connectors for the electrical connection of towing and towed vehicles*

ISO 11898-1, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 11992-1, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 1: Physical and data-link layers*

ISO 11992-4, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 4: Diagnostic communication*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11898-1, ISO 11992-1, and the following apply.

3.1
anti-lock braking system
ABS
control function which automatically modulates the pressure producing the braking forces at the wheels to limit the degree of wheel slip, or a system that provides an anti-lock braking function

3.2
anti-spin regulation
ASR
control function which automatically modulates the engine torque or the pressure producing the braking forces at the wheels to limit the degree of wheel spin, or a system that provides an anti-spin control

3.3
center-axle trailer
towed vehicle equipped with a rigid towing device, and in which the axle(s) is (are) positioned close to the centre of gravity of the vehicle

3.4
commercial vehicle
motor vehicle which, on account of its design and appointments, is used mainly for conveying goods and which can also tow a trailer

3.5
converter dolly
dolly unit that couples to a semi-trailer with a fifth-wheel coupling and thereby "converts" the semi-trailer to a full trailer

3.6
electronic braking system
EBS
braking system in which control is generated and processed as an electrical signal in the control transmission

3.7
electronic control unit
ECU
electronic item consisting of a combination of basic parts, subassemblies, and assemblies packaged together as a physically independent entity

3.8
full trailer
towed vehicle equipped with a towing device which can move vertically (in relation to the trailer), and in which the axle(s) is (are) positioned less close to the centre of gravity of the vehicle

3.9
gateway
unit connecting different networks or parts of one network and performing any necessary protocol translation

3.10
link trailer
towed vehicle with a fifth-wheel coupling, designed for towing a semi-trailer

3.11
network segment
part of a network that is within the domain of a single link layer

3.12
node
device capable of sending or receiving data whose identification will be unambiguous for authentication purposes

3.13
running rear equipment
RGE
equipment of a vehicle, including steering, suspension, and tyres

3.14
roll-over prevention/protection
ROP
control function to prevent roll-over situations of a vehicle

Note 1 to entry: ROP is part of a *VDC* (3.20) function.

Note 2 to entry: In UNECE Regulation No. 13, roll-over prevention is referred to as “roll-over control”.

3.15
semi-trailer
trailer which is designed to be coupled to a semi-trailer towing vehicle and to impose a substantial part of its total weight on the towing vehicle

3.16
towed vehicle
non-power-driven road vehicle which, on account of its design and appointments, is used to transport persons or goods and is intended to be towed by a motor vehicle

3.17
towing full trailer
towed vehicle equipped with a towing device which can move vertically (in relation to the trailer), and in which the axle(s) is (are) positioned less close to the centre of gravity of the vehicle that is capable of towing another vehicle

3.18
towing semi-trailer
trailer which is designed to be coupled to a semi-trailer towing vehicle and to impose a substantial part of its total weight on the towing vehicle that is capable of towing another vehicle

3.19
towing vehicle
motor vehicle or non-power-driven vehicle which tows a succeeding vehicle

3.20
vehicle dynamic control
VDC
control function as part of the braking system that reacts to stabilize the vehicle during dynamic manoeuvres

Note 1 to entry: VDC has the possible sub-functions *ROP* (3.14) and *YC* (3.21).

3.21
yaw control
YC
control function to reduce an unwanted lateral movement of a vehicle

Note 1 to entry: Yaw control is part of a *VDC* (3.20) function.

Note 2 to entry: In UNECE Regulation No. 13, YC is referred to as “directional control”.

4 Symbols and abbreviated terms

CAN	Controller Area Network
CAN-ID	CAN identifier
DA	destination address
DLC	data length code
DP	data page
EDP	extended data page
GE	group extension
LSB	least significant byte (or bit)
MSB	most significant byte (or bit)
P	priority
PDU	Protocol Data Unit
PF	PDU format
PGN	parameter group number
PS	PDU specific
SA	source address
TOS	type of service
UTC	Universal Time Coordinate

5 General Specifications

The data link shall be in accordance with ISO 11898-1. The physical layer shall be in accordance with ISO 11992-1.

Appropriate PDUs are specified to structure the communication between the towing and towed vehicles' interface(s). These PDUs shall be transmitted between the electronic devices (nodes) at the towing vehicle and each towed vehicle, as defined in the following sections.

Each node at a vehicle shall provide logical separation between the network segments and any in-vehicle networks and act as a gateway to forward the messages, as specified in the following sections.

Any combination of new and old towing and towed vehicles is allowed. Multiple towed vehicles can be connected in any combination. The network shall be capable of addressing any towed vehicle, including dollies. The truck operator can disconnect and connect towed vehicles at any time and any order, and the network shall adjust and respond accordingly.

6 Application layer

6.1 Protocol Data Unit (PDU) specification

6.1.1 General

The application layer provides a string of information that is assembled as a PDU. The PDU provides a framework for organizing the information sent by means of CAN data frames.

All transmitted CAN data frames shall use the extended data frame format with a 29-bit CAN-ID as defined in ISO 11898-1. The PDU framework for the normal and diagnostic communications between the commercial vehicles and towed vehicles is the same as defined in Reference [1] and is specified in 6.1.2. Diagnostic communication between the towed vehicles shall use the subnet addressing PDU format as specified in 6.1.3.

6.1.2 PDU format for normal communication and diagnostic communication (PDU1 and PDU2)

The PDU1 and PDU2 shall consist of the following fields as shown in Figure 1:

— a 29-bit CAN-ID with the subfields priority (P), extended data page (EDP), data page (DP), PDU format (PF), PDU specific (PS) [which can be a destination address (DA) or a group extension (GE)], and source address (SA);

— a 64-bit data field.

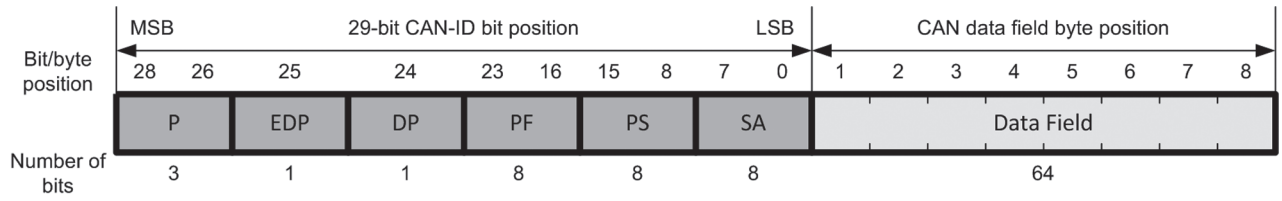


Figure 1 — PDU1 and PDU2 structure

Depending on the contents of the subfields, the PDUs are classified as PDU1 or PDU2 frames as given in the following definitions.

6.1.3 PDU format for subnet addressing communication (PDU3)

The PDU3 shall consist of the following fields as shown in Figure 2:

— a 29-bit CAN-ID with the subfields priority (P), extended data page (EDP), data page (DP), type of service (TOS), destination address (DA) and source address (SA);

— a 64-bit data field.

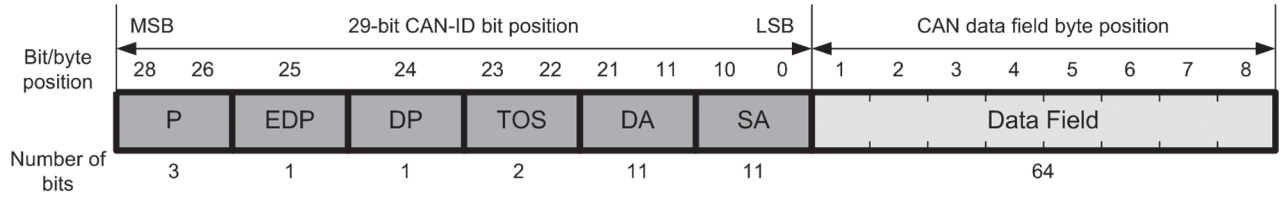


Figure 2 — PDU3 structure

The fields P, EDP, and DP shall be used as given in the following definitions. All other fields shall be used as defined in ISO 11992-4.

6.1.4 Priority (P)

This 3-bit subfield shall be used to optimize the PDU frame latency for transmission onto the bus only and shall have no other specific meaning. It shall not be used for message validation on the receiver side and should be globally masked off by the receiver (ignored). The priority of any PDU can be set from highest, 0_{10} (000_2), to lowest, 7_{10} (111_2), and will use the following default values.

— The default for all control-oriented PDUs shall be 3_{10} (011_2).

— The default of all other informational PDUs shall be 6_{10} (110_2).

— The default for diagnostic PDUs shall be 7_{10} (111_2).

6.1.5 Extended data page (EDP)

This 1-bit subfield shall be used in conjunction with the DP subfield to select an auxiliary range of PGNs or to select subnet addressing diagnostic messages. The definition of a PGN is given in 6.2. The definition of CAN frames for subnet addressing diagnostic messages is given in 6.6.

6.1.6 Data page (DP)

This 1-bit subfield shall be used in conjunction with the EDP subfield to select an auxiliary range of PGNs or to select subnet addressing diagnostic messages. The definition of a PGN is given in 6.2. The definition of CAN frames for subnet addressing diagnostic messages is given in 6.6.

6.1.7 PDU format (PF)

This 8-bit subfield shall determine the PDU format and the transmission method as specified in Table 1.

— If the value of the PDU format field is below 240, then the PDU format is of type PDU1 and the PDU-specific field contains a destination address.

— If the value of the PDU format field is 240 to 255, then the PDU format is of type PDU2 and the PDU-specific field contains a group extension.

Table 1 — PDU definition

PF value	PDU format	PS	Transmission method
0 to 239	PDU1	DA	This PDU 1 format shall be used for messages to be sent directly to either a specific or a global destination.
240 to 255	PDU2	GE	This PDU 2 format shall only be used to communicate global (broadcast) messages.

6.1.8 PDU specific (PS)

6.1.8.1 General

This 8-bit subfield shall depend on the PDU format. For a PDU1 format, the PDU specific (PS) subfield is a destination address (DA), for a PDU2 format, the PS subfield is a group extension (GE) (see Table 1).

6.1.8.2 Destination address (DA)

The DA shall contain the specific address of the towing or towed vehicle to which the PDU is being sent. If the global destination address (255_{10} = FF_{16}) is sent, all nodes shall process the PDU.

6.1.8.3 Group extension (GE)

The GE in conjunction with the four least significant bits of the PF subfield shall be used as part of the specific PGN.

6.1.9 Source address (SA)

This 8-bit subfield shall provide the source address (SA) of the node that transmits the PDU. Therefore the SA subfield ensures that the CAN-ID is unique on all network segments.

6.1.10 Data field

All CAN data frames shall use a data field length of 8 byte, i.e. DLC = 8. If less than 8 byte are required by the defined PGN, all non-used bits shall be transmitted with all bits set to "1".

6.2 Parameter group number (PGN)

This 24-bit number shall be used in all cases where a group of parameters assembled in the PDU1 or PDU2 data field needs to be identified. A PGN is built from the CAN-ID subfields EDP, DP, PF, and PS as specified in Figure 3 and is used to identify or label a group of parameters. It is independent of the remaining fields of the CAN-ID.

The upper bits 18 to 23 are reserved and shall always be set to zero (0). For a PDU1 message, i.e. if the PS field is a DA, the least significant byte (LSB) of the PGN shall always be set to zero (0).

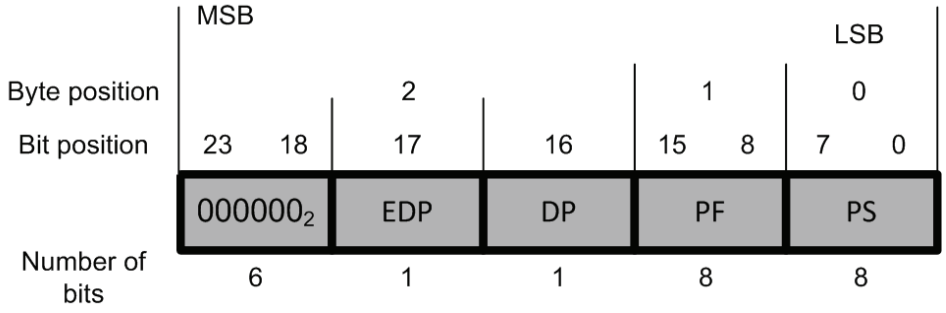


Figure 3 — PGN subfield definition

NOTE To reduce the effort of exchanging PDUs between the ISO 11992-2 communication and any in-vehicle network, the PGNs within this International Standard are harmonized with those used in SAE J1939.

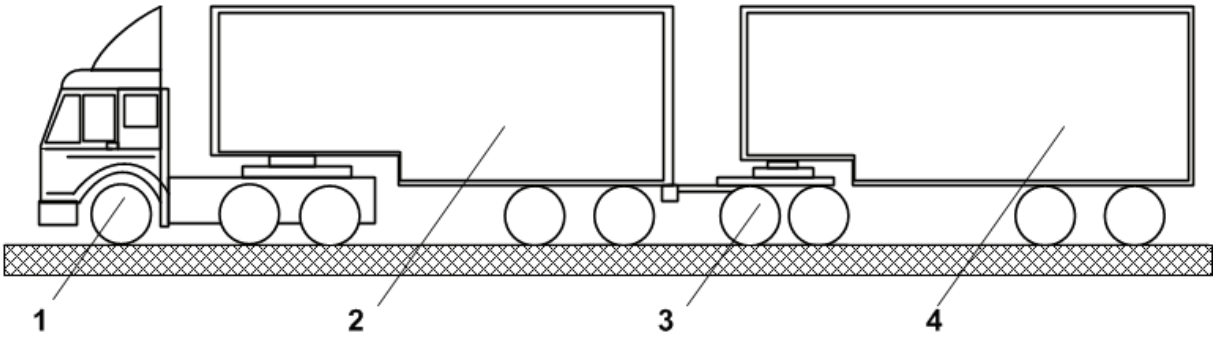
EXAMPLE For a message with CAN-ID $18FEC920_{16}$ (PDU2 format), the subfields are P = 110_2, EDP = 0_2, DP = 0_2, PF = FE_{16}, PS = $C9_{16}$, and SA = 20_{16}. The corresponding PGN is $00FEC9_{16}$ (65225_{10}).

6.3 Address assignment

6.3.1 Address usage

A road train consists of one truck (commercial vehicle) and one or more trailer(s) (towed vehicles). Dollies within the road train shall be treated as additional towed vehicles (see Figure 4).

The commercial vehicle is the towing vehicle of towed vehicle #1; towed vehicle #1 is the towing vehicle of towed vehicle #2; and so on.



Key

1 truck/commercial vehicle (position #0)
2 trailer/towed vehicle position #1
3 converter dolly/towed vehicle position #2
4 trailer/towed vehicle position #3

Figure 4 — Example of a possible road train configuration

For the towing vehicle/towed vehicle communication, each node shall use only the addresses given in Table 2 as SA and DA for all messages.

Table 2 — Commercial vehicle/towed vehicle addresses

Name	Address			Predecessor	Successor
commercial vehicle (#0)	32_{10}	/	20_{16}	n/a	towed vehicle #1
towed vehicle #1	200_{10}	/	$C8_{16}$	commercial vehicle (#0)	towed vehicle #2
towed vehicle #2	192_{10}	/	$C0_{16}$	towed vehicle #1	towed vehicle #3
towed vehicle #3	184_{10}	/	$B8_{16}$	towed vehicle #2	towed vehicle #4
towed vehicle #4	176_{10}	/	$B0_{16}$	towed vehicle #3	towed vehicle #5
towed vehicle #5	168_{10}	/	$A8_{16}$	towed vehicle #4	undefined
global destination address	255_{10}	/	FF_{16}	undefined	undefined

The global destination address shall only be used by the commercial vehicle to broadcast information to all the towed vehicles simultaneously.

6.3.2 Address assignment procedure

The address of the commercial vehicle is fixed. The respective address of a towed vehicle corresponds to its position within the road train and shall be (re)assigned each time

— a communication starts or

— the towed vehicle has been connected to the road train.

The dynamic address assignment shall be handled by the respective towing/towed vehicle's node and concerns the determination of the individual position within the road train. It is based on the transmission of the general initialization message (see 6.6.4.1) by the respective predecessor within the road train.

Within a road train, the address assignment procedure shall be initiated by the commercial vehicle, using its default address for the general initialization message. A powered-up towed vehicle's node shall use the address of towed vehicle #1 as the default address for transmitting the available information until the general initialization message has been received from the towing vehicle and a valid address can be assigned.

Each towed vehicle's node shall use the general initialization message received at the towing vehicle's network interface to determine its own address. It shall use the successor's address of that message's SA as its own address. This requires that a towed vehicle's node shall be capable of

— identifying its predecessor by the SA of the general initialization message,

— assigning its own address based on the predecessors address, and

— identifying the potential receiver(s) by the destination address and by the message type.

An assigned address shall be valid as long as the towed vehicle is powered and no message from the predecessor with a different SA is received. If a different SA is received, the assignment procedure shall be restarted.

To provide the address assignment for itself and for possible successors, a node shall be capable of continuously sending the general initialization message with its dynamically assigned own SA as illustrated in Figure 5.

This addressing method allows the towed vehicle's node to communicate and to identify its presence to its predecessor immediately after power-up. This means that several towed vehicles can use the same address until the address assignment procedure is completed. Continuous sending of the general initialization message is necessary to allow immediate towed vehicle address assignment at any time a towed vehicle should be connected.

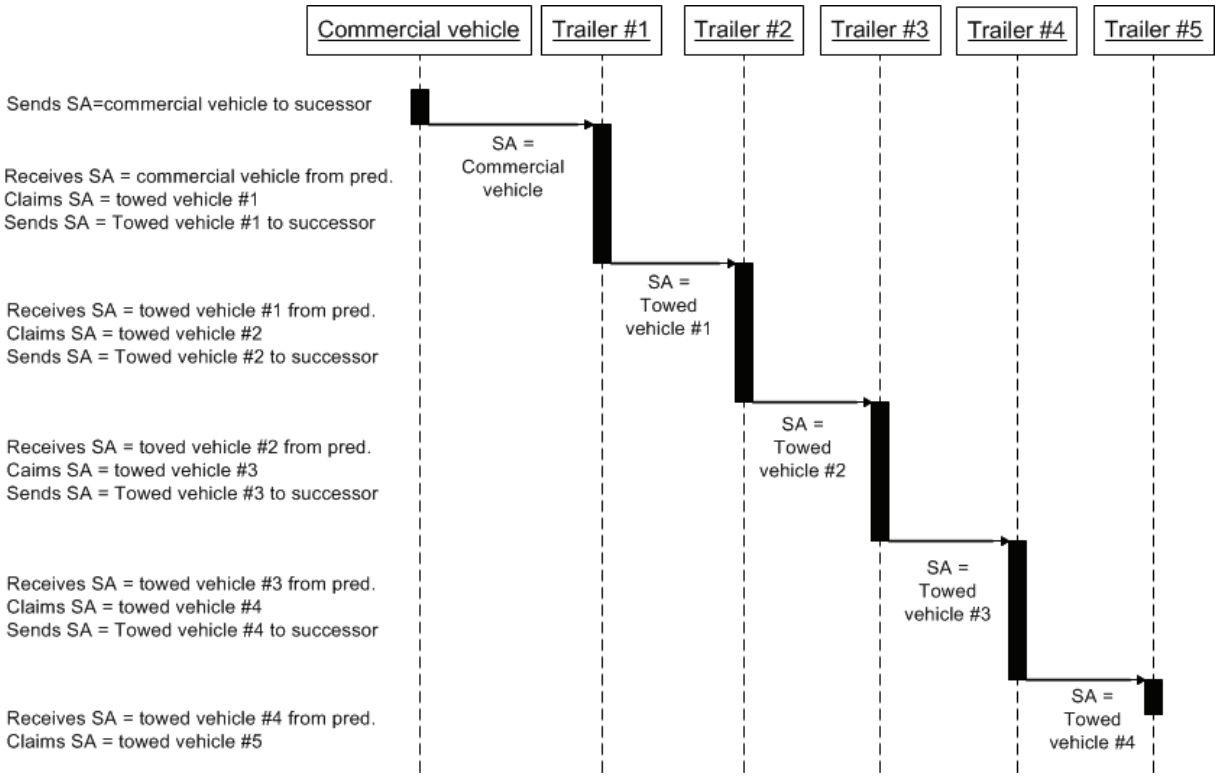


Figure 5 — Address assignment procedure

6.4 Message routing

If a vehicle has no provision for a successor, the message routing function is not required by the vehicle's node.

To allow communication between the towing and towed vehicles, a node shall be capable of

— receiving messages from its predecessor and successor within the road train,

— identifying receiver(s) by the destination address (PDU 1 type messages) or the PDU format (PDU 2 type messages),

— routing all applicable messages from its predecessor(s) to its successor(s) within the road train by sending them with the unchanged SA and DA to its successor within a maximal delay time of t_d = 13 ms, and

— routing all applicable messages from its successor(s) to its predecessor(s) within the road train by sending them with the unchanged SA and DA to its predecessor within a maximal delay time of t_d = 13 ms.

A towed vehicle node shall not route messages to its successor or predecessor within the road train

— if the SA of a message received from its predecessor corresponds to a road train position closer or equal to its own from the commercial vehicle or

— if the SA of a message received from its successor corresponds to a road train position more distant or equal to its own from the commercial vehicle.

EXAMPLE Figure 6 shows some examples of the message flow between vehicles.

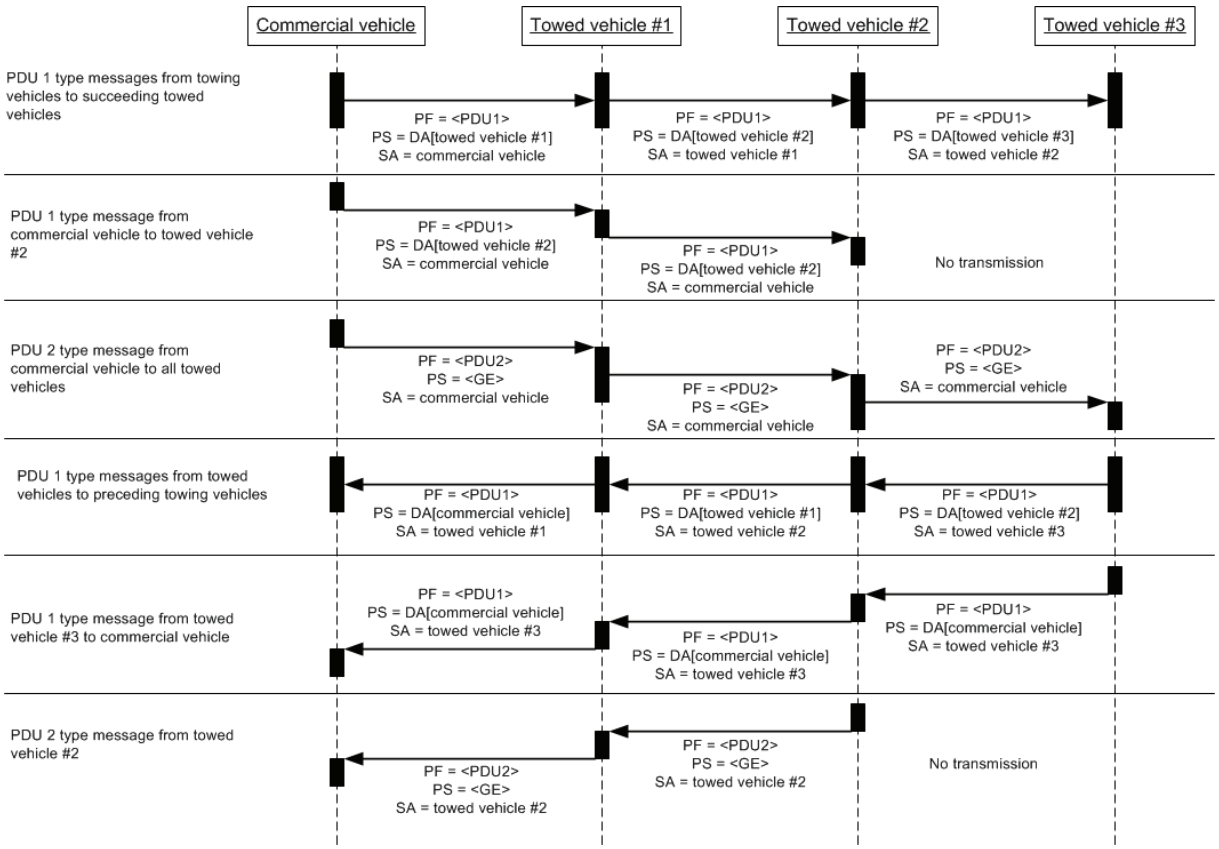


Figure 6 — Example of the message flow between vehicles

6.5 Parameters

6.5.1 Generic data ranges

Each defined parameter shall comply with one of the defined parameter types.

— Table 3 specifies the ranges used to determine the validity of the transmitted signals.

— Table 4 specifies the ranges used to denote the status of a discrete parameter.

— Table 5 specifies the ranges used to denote the status of a control mode command.

The values in the range "error indicator" provide a means for a module to immediately indicate that valid parameter data are not currently available, owing to some type of error in the sensor, subsystem, or module. Additional information about the failure can be obtained using the diagnostic communication.

The values in the range "not available" provide a means for a module to transmit a parameter that is not available or not supported in that module. This value does not replace the "error indicator".

The values in the range "not requested" provide a means for a device to transmit a command message and identify those parameters where no response is expected from the receiving device.

The values in the range of "special function" are reserved for the definition of parameter-specific functionalities.

For some parameters, non-generic definitions are given in the following sections. These are not defined here. Examples are encoded table values, where each value is assigned to one specific meaning.

After power-on, a node shall internally set the "availability bits" of the received parameters as "not available" and operate with the default values until valid data are received. When transmitting, undefined bytes shall be sent as 255_{10} (FF_{16}) and undefined bits shall be sent as "1".

If a failure of a function or device prevents the transmission of valid data for a parameter, the error indicator, as specified in Table 3, Table 4, or Table 5, shall be used in place of that parameter data. However, if the measured or calculated data has yielded a value that is valid yet exceeds the defined parameter range, the error indicator shall not be used. The data shall be transmitted using the appropriate minimum or maximum parameter value.

A 2-byte (16-bit) parameter shall be sent (least significant byte first, most significant byte second).

Table 3 — Transmitted signal ranges

Range name	1 byte	2 byte
valid signal	0_{10} to 250_{10} 0_{16} to FA_{16}	0_{10} to 64255_{10} 0_{16} to $FAFF_{16}$
reserved for future indicators	251_{10} to 253_{10} FB_{16} to FD_{16}	64256_{10} to 65023_{10} $FB00_{16}$ to $FDFF_{16}$
error indicator	254_{10} FE_{16}	65024_{10} to 65279_{10} $FE00_{16}$ to $FEFF_{16}$
not available or not requested	255_{10} FF_{16}	65280_{10} to 65535_{10} $FF00_{16}$ to $FFFF_{16}$

Table 4 — Transmitted values for discrete parameters (measured)

Range name	Transmitted value
disabled (off, passive, insufficient)	00_2
enabled (on, active, sufficient)	01_2
error indicator	10_2
not available or not installed	11_2

Table 5 — Transmitted values for control requests (status)

Range name	Transmitted value
command to disable function (turn off, etc.)	00_2
command to enable function (turn on, etc.)	01_2
special function (parameter specific)	10_2
don't care/take no action (leave function as it is)	11_2

6.5.2 General parameter specification

A description of each parameter is given in 6.5.3, 6.5.4, and 6.5.5. The description includes data length, data type, resolution, and range for reference.

The type of data shall also be identified for each parameter. Data can be either status or measured.

— Status data specifies a command requesting an action to be performed by the receiving node. Examples of status-type data are "service brake demand value" and "ride height request".

— Measured data conveys the current value of a parameter as measured or observed by the transmitting node to determine the condition of the defined parameter. Examples of measured-type data are "wheel-based vehicle speed" and "lift axle 1 position". Note that a measured-type parameter can indicate the condition of the defined parameter, even if no measurement has been taken. For example, the measured-type parameter can indicate that a solenoid has been activated, even if no measurement has been taken to ensure the solenoid accomplished its function.

For each parameter, the attributes given in Table 6 shall apply.

Table 6 — Attribute definition

Attribute	Definition
data length	required number of bits/bytes of the parameter
resolution	weight of a bit in physical unit
offset	value of the binary value 0 (zero) in physical unit
data range	physical range of data that the parameter is able to hold
operating range	physical range of data that can be used
type	type of data as specified in this section

The PGN reference attribute is informative. The PGN parameters are specified in 6.6.

6.5.3 System independent parameters

6.5.3.1 Tyre/wheel identification

This parameter shall indicate the identification number of the tyre or wheel. The identification number shall specify the tyre or wheel position on each axle (bit 1 to bit 4) and the number of axles starting from the front of the respective towed vehicle (bit 5 to bit 8) (see Figure 7).

The tyre/wheel identification shall only be used as complementary information in conjunction with all the tyre, wheel, or wheel-end related information in the PGN's message and shall be ignored if those parameters are not supported. The identification number "0" shall be used if the position of the tyre, wheel, wheel-end, or axle cannot be identified. Table 7 specifies the parameter description.

Table 7 — Specification of the parameter "tyre/wheel identification"

Attribute	Value
data length	1 byte
resolution	encoded table value
	bit 1 to bit 4 0000_2 – wheel position undefined 0001_2 to 1111_2 – wheel position 1 to 15 bit 5 to bit 8 0000_2 – axle position undefined 0001_2 to 1111_2 – axle position 1 to 15
type	measured

Assignment rules

— The tyre/wheel identification shall be assigned sequentially from the vehicle's centre line, starting from "9" incrementing on the right side and from "7" decrementing on the left side, in the normal direction of travel. "8" is used for the one wheel on the centre line as illustrated in Figure 7.

— It is assumed that each wheel rim has one and only one tyre.

— In situations when the number of wheels on each wheel-end cannot be identified, or the wheel-end alone is to be identified, the parameters shall be identified using the default wheel position 7 left and 9 right in the normal direction of travel.

— In cases when the wheel definition is shared, within the same PGN, with another parameter or parameters, the wheel-end can be specified as a wheel position 1 to 7 on the left-hand side or 9 to 15 on the right-hand side, as required by the other parameter or parameters.

— In situations when more than 15 axles are present on the vehicle, the first 15 axles shall be identified using this procedure; the additional axles shall then be identified with the axle identification "0" together with the respective wheel identification.

NOTE Due to the parameter definition, there is an ambiguity between "parameter not supported" (255_{10}) and wheel = 15_{10} and axle = 15_{10}. As the identification number serves only as complementary information for other parameters, the value of 255_{10} identifies only a valid position if those parameters are supported.

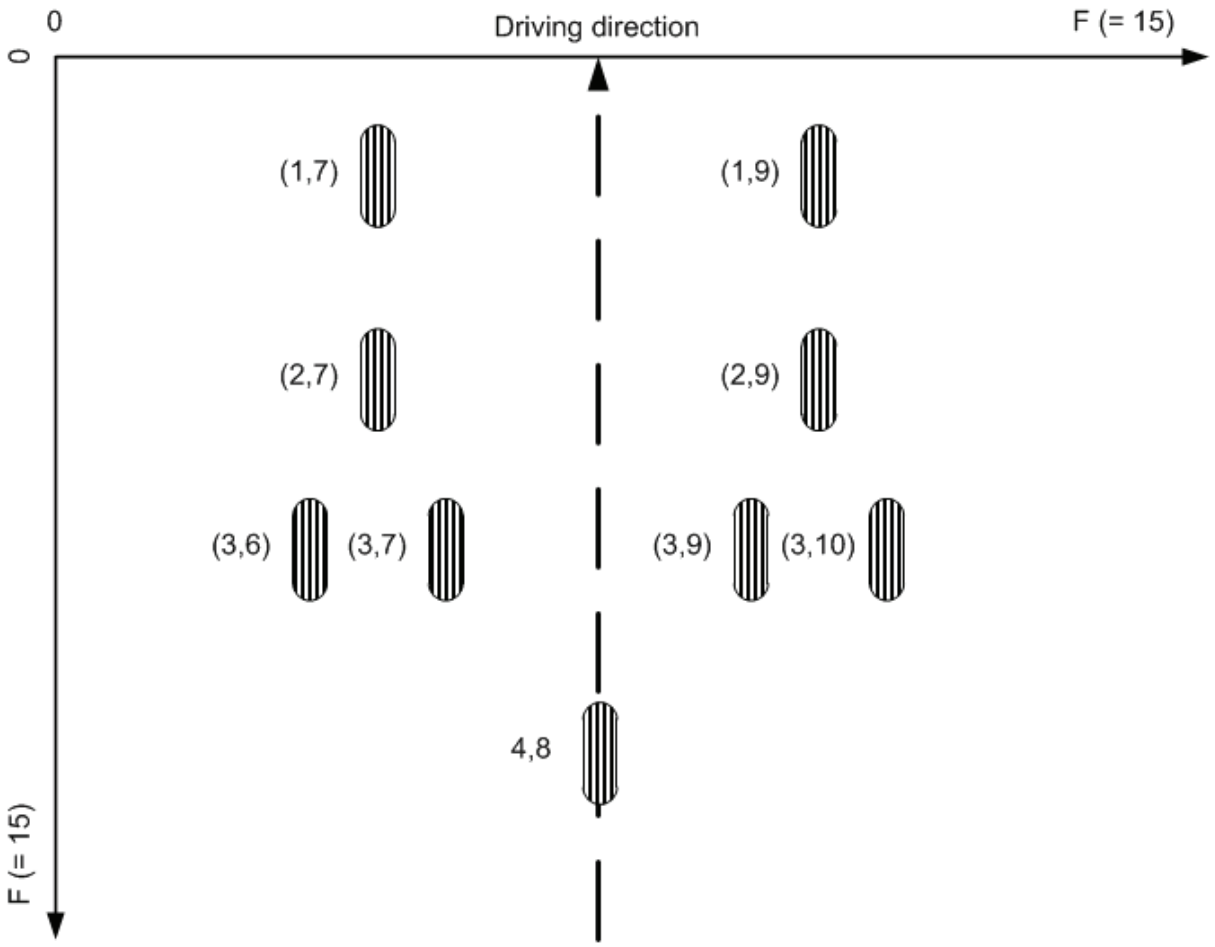


Figure 7 — Tyre/wheel and axle position

6.5.3.2 Seconds

This parameter shall indicate the component "seconds" of the current time of day. This should be reported as the seconds of the current time at UTC; however, it can be reported as the component seconds of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8 and 6.5.3.9) are used to indicate if the time of day is the current UTC time or a local time zone time. Table 8 specifies the parameter description.

Table 8 — Specification of the parameter "seconds"

Attribute	Value
data length	1 byte
resolution	0,25 s/bit
offset	0 s
data range	0 s to 62,5 s
operating range	0 s to 59,75 s
type	measured

6.5.3.3 Minutes

This parameter shall indicate the component "minutes" of the current time of day. This should be reported as the minutes of the current time at UTC; however, it can be reported as the component minutes of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8 and 6.5.3.9) are used

to indicate if the time of day is the current UTC time or a local time zone time. Table 9 specifies the parameter description.

Table 9 — Specification of the parameter "minutes"

Attribute	Value
data length	1 byte
resolution	1 min/bit
offset	0 min
data range	0 min to 250 min
operating range	0 min to 59 min
type	measured

6.5.3.4 Hours

This parameter shall indicate the component "hour" of the current time of day. This should be reported as the hours of the current time at UTC; however, it can be reported as the component hours of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8 and 6.5.3.9) are used to indicate if the time of day is the current UTC time or a local time zone time. Table 10 specifies the parameter description.

Table 10 — Specification of the parameter "hours"

Attribute	Value
data length	1 byte
resolution	1 h/bit
offset	0 h
data range	0 h to 250 h
operating range	0 h to 23 h
type	measured

6.5.3.5 Day

This parameter shall indicate the component "day" of the current time of day. This should be reported as the day of the current time at UTC; however, it can be reported as the component day of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8 and 6.5.3.9) are used to indicate if the time of day is the current UTC time or a local time zone time. Table 11 specifies the parameter description.

Table 11 — Specification of the parameter "day"

Attribute	Value
data length	1 byte
resolution	0,25 day/bit
offset	0 day
data range	0 day to 62,50 days
operating range	0,25 day to 31,75 days
type	measured

NOTE A value of 0 for the day is null. The values 1, 2, 3, and 4 indicate the first day of a month; the values 5, 6, 7, and 8 indicate the second day of the month, etc.

6.5.3.6 Month

This parameter shall indicate the component "month" of the current time of day. This should be reported as the month of the current time at UTC; however, it can be reported as the component month of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8 and 6.5.3.9) are used to indicate if the time of day is the current UTC time or a local time zone time. Table 12 specifies the parameter description.

Table 12 — Specification of the parameter "month"

Attribute	Value
data length	1 byte
resolution	1 mo/bit
offset	0 mo
data range	0 mo to 250 mo
operating range	1 mo to 12 mo
type	measured

NOTE A value of 0 is null. A value of 1 identifies January, 2 identifies February, etc.

6.5.3.7 Year

This parameter shall indicate the component "year" of the current time of day. This should be reported as the year of the current time at UTC; however, it can be reported as the component year of the current time at a local time zone. The local hour/minute offset parameters (6.5.3.8, 6.5.3.9) are used to indicate if the time of day is the current UTC time or a local time zone time. Table 13 specifies the parameter description.

Table 13 — Specification of the parameter "year"

Attribute	Value
data length	1 byte
resolution	1 y/bit
offset	1985 y
data range	1985 y to 2235 y
operating range	1985 y to 2235 y
type	measured

NOTE A value of 0 identifies year 1985, 1 identifies year 1986, etc.

6.5.3.8 Local minute offset

This parameter shall indicate the component "minute" of the offset between the UTC time and date and a local time zone time and date and is defined as the number of minutes to add to the UTC time and date to convert it into the time and date of a local time zone.

— The local offset is a positive value for time zones east of the prime meridian to the international date line.

— The local offset is a negative value for time zones west of the prime meridian to the international date line.

The local minute offset is only applicable when the time and date parameters are reported as UTC time and date. Table 14 specifies the parameter description.

Table 14 — Specification of the parameter "local minute offset"

Attribute	Value
data length	1 byte
resolution	1 min/bit
offset	–125 min
data range	–125 min to 125 min
operating range	–59 min to 59 min
type	measured

6.5.3.9 Local hour offset

This parameter shall indicate the component "hour" of the offset between the UTC time and date and a local time zone time and date and is defined as the number of hours to add to the UTC time and date to convert it into the time and date of a local time zone.

— The local offset is a positive value for time zones east of the prime meridian to the international date line.

— The local offset is a negative value for time zones west of the prime meridian to the international date line.

The local hour offset is only applicable when the time and date parameters are reported as UTC time and date. Table 15 specifies the parameter description.

Table 15 — Specification of the parameter "local hour offset"

Attribute	Value
data length	1 byte
resolution	1 h/bit
offset	–125 h
data range	–125 h to 125 h
operating range	–23 h to 23 h
type	measured

6.5.3.10 Identification data index

This parameter shall be used as an index to an array of identification data as defined by the parameter "identification data content" (6.5.3.11) and shall not be used without that context. Table 16 specifies the parameter description.

Table 16 — Specification of the parameter "identification data index"

Attribute	Value
data length	1 byte
resolution	1/bit
offset	0
data range	0 to 250
operating range	0 to 250
type	measured

6.5.3.11 Identification data content

This parameter shall be interpreted as an array of identification data that is indexed by the parameter "identification data index" (6.5.3.10). Table 17 and Table 18 specify the parameter description.

Table 17 — Specification of the parameter "identification data"

Attribute	Value
data length	1 byte
resolution	1/bit
offset	0
data range	0 to 250
operating range	0 to 250
type	measured

Table 18 — Specification of the parameter "identification data content"

Index	Attribute	Value
0 to 16	parameter	VIN
	content	vehicle identification number
	resolution	ASCII
	data range	ASCII
17 to 250	reserved by document	

6.5.4 Parameters for braking systems

6.5.4.1 Park brake demand relative pressure

This parameter shall command the requested brake pressure for the parking brake as a percentage of the maximum pressure. Table 19 specifies the parameter description.

Table 19 — Specification of the parameter "park brake demand relative pressure"

Attribute	Value
data length	1 byte
resolution	0,4 %/bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	status

6.5.4.2 Retarder demand relative torque

This parameter shall command the requested torque of the retarder on the towed vehicle(s) as a percentage of the absolute peak torque of the retarder. Table 20 specifies the parameter description.

Table 20 — Specification of the parameter "retarder demand relative torque"

Attribute	Value
data length	1 byte
resolution	1 %/bit
offset	–125 %
data range	–125 % to 125 %
operating range	–125 % to 0 %
type	status

In the definition of power train speed/torque, the retarder torque reaction is a deceleration specified by a negative signed parameter.

EXAMPLE Given a retarder demand relative torque = 75 % × the absolute peak torque of the retarder, calculation steps are the following.

a) First step [Data Content (DC) of Retarder Demand Value (RDV)]

$$DC = \frac{RDV - Offset}{Resolution} = \frac{-75\,\% - (-125\,\%)}{1\,\%/bit} = 50 \quad (1)$$

b) Second step [measured Actual Retarder Torque (ART)]

$$DC = \frac{ART - Offset}{Resolution} = 50 \quad (2)$$

$$ART = DC^{*}\,Resolution + Offset$$

$$ART = 50^{*}1\% + (-125\%)$$

$$ART = 75\%$$

6.5.4.3 Service brake demand pressure

This parameter shall command the requested brake pressure value of the service brake demanded by the driver. Table 21 specifies the parameter description.

Table 21 — Specification of the parameter "service brake demand pressure"

Attribute	Value
data length	2 byte
resolution	5/256 kPa/bit
offset	0 kPa
data range	0 kPa to 1 255 kPa
operating range	0 kPa to 1 255 kPa
type	status

NOTE This value can be modified by the coupling force control function, which has been specified by UNECE Regulation No. 13.

6.5.4.4 Braking system wheel-based vehicle speed

This parameter shall indicate the absolute value of the actual speed of the vehicle (i.e. positive values for forward and backward speeds) calculated as the average of the wheel speeds of one axle influenced by slip and filtered by a frequency range of 5 Hz to 20 Hz. Table 22 specifies the parameter description.

Table 22 — Specification of the parameter "braking system wheel-based vehicle speed"

Attribute	Value
data length	2 byte
resolution	1/256 km/h/bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.5.4.5 Retarder reference torque

This parameter shall indicate the 100 % reference value for all the specified indicated retarder torque parameters. It shall be specified only once and shall not change if a different retarder torque map becomes valid. Table 23 specifies the parameter description.

Table 23 — Specification of the parameter "retarder reference torque"

Attribute	Value
data length	2 byte
resolution	1 Nm/bit
offset	0 Nm
data range	0 Nm to 64 255 Nm
operating range	0 Nm to 64 255 Nm
type	measured

6.5.4.6 Retarder relative peak torque

This parameter shall indicate the actual torque of the retarder as a negative percentage of the maximum. Table 24 specifies the parameter description.

Table 24 — Specification of the parameter "retarder relative peak torque"

Attribute	Value
data length	1 byte
resolution	1 %/bit
offset	–125 %
data range	–125 % to 125 %
operating range	–125 % to 0 %
type	measured

6.5.4.7 Axle load sum

This parameter shall indicate the sum of the static vertical loads of the vehicle axles. Table 25 specifies the parameter description.

Table 25 — Specification of the parameter "axle load sum"

Attribute	Value
data length	2 byte
resolution	2 kg/bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.5.4.8 Pneumatic supply pressure

This parameter shall indicate the actual pneumatic supply pressure of the reservoir of the braking system. Table 26 specifies the parameter description.

Table 26 — Specification of the parameter "pneumatic supply pressure"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.9 Brake lining

This parameter shall indicate the actual relative value of the brake lining of a specific brake. High values indicate new linings, small values indicate worn linings. Table 27 specifies the parameter description.

Table 27 — Specification of the parameter brake lining"

Attribute	Value
data length	1 byte
resolution	0,4 %/bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	measured

6.5.4.10 Brake temperature

This parameter shall indicate the actual temperature of a specific brake. Table 28 specifies the parameter description.

Table 28 — Specification of the parameter "brake temperature"

Attribute	Value
data length	1 byte
resolution	10 °C/bit
offset	0 °C
data range	0 °C to 2 500 °C
operating range	0 °C to 2 500 °C
type	measured

6.5.4.11 Tyre pressure

This parameter shall indicate the actual tyre pressure of a specific wheel without any corrections. Table 29 specifies the parameter description.

Table 29 — Specification of the parameter "tyre pressure"

Attribute	Value
data length	1 byte
resolution	10 kPa/bit
offset	0 kPa
data range	0 kPa to 2 500 kPa
operating range	0 kPa to 2 500 kPa
type	measured

6.5.4.12 Vehicle retarder control status

This parameter shall indicate the current status in all cases the retarder functionality is applied by the driver's demand or by other systems (e.g. brakes). Table 30 specifies the parameter description.

Table 30 — Specification of the parameter "vehicle retarder control status"

Attribute	Value
data length	2 bit
data range	00_2 — retarder passive 01_2 — retarder active
type	measured

NOTE "Applied" means that the retarder starts to increase its torque and decelerates the vehicle.

6.5.4.13 Vehicle service brake status

This parameter shall indicate the current status of the vehicle's service brake by observing the brake pressure. Table 31 specifies the parameter description.

Table 31 — Specification of the parameter "vehicle service brake status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle service brake passive 01_2 — vehicle service brake active
type	measured

6.5.4.14 Automatic towed vehicle braking status

This parameter shall indicate the current status of the automatic towed vehicle braking. This function is active when the pneumatic supply is insufficient or not connected. This parameter should be used for driver information. Table 32 specifies the parameter description.

Table 32 — Specification of the parameter "automatic towed vehicle braking status"

Attribute	Value
data length	2 bit
data range	00_2 — automatic vehicle braking passive 01_2 — automatic vehicle braking active
type	measured

NOTE According to Reference [2], the brake pressure in the trailer can be suppressed under certain conditions in case of an automatic braking. This parameter reflects the following different conditions.

— 00_2 — the pneumatic supply is insufficient or not connected, the brake pressure is suppressed.

— 01_2 — the pneumatic supply is insufficient or not connected, the brake pressure is not suppressed, and i.e. the trailer is really braked.

— 11_2 — the pneumatic supply is sufficient and connected, the automatic braking function is not available.

6.5.4.15 Vehicle ABS status

This parameter shall indicate the current status of the anti-lock braking function or system. The signal shall be set active when the ABS starts to modulate the wheel brake pressure and shall be reset to passive when all wheels are in stable condition for a certain time period. The signal can also be set active when driven wheels are in high slip (e.g. caused by the retarder).

In the case of at least one wheel speed error, the error indicator for the parameter shall have priority.

Table 33 specifies the parameter description.

Table 33 — Specification of the parameter "vehicle ABS status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle ABS passive, but installed 01_2 — vehicle ABS active
type	measured

NOTE Active does not mean "installed" or "enabled", but indicates an actual ABS situation.

6.5.4.16 Vehicle electrical supply status

This parameter shall indicate if the current status of the supply voltage is sufficient or insufficient for a proper braking function. This shall also include overvoltage conditions. Table 34 specifies the parameter description.

Table 34 — Specification of the parameter "vehicle electrical supply status"

Attribute	Value
data length	2 bit
data range	00_2 — electrical supply insufficient 01_2 — electrical supply sufficient
type	measured

6.5.4.17 Vehicle pneumatic supply status

This parameter shall indicate if the current status of the pneumatic supply pressure of the reservoir of the braking system is insufficient or sufficient for a proper braking function. Table 35 specifies the parameter description.

Table 35 — Specification of the parameter "vehicle pneumatic supply status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle pneumatic supply insufficient 01_2 — vehicle pneumatic supply sufficient
type	measured

6.5.4.18 Spring brake installation status

This parameter shall indicate if the vehicle is equipped with one or more axles fitted with spring brakes. Table 36 specifies the parameter description.

Table 36 — Specification of the parameter "spring brake installation status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle without spring brakes 01_2 — vehicle with spring brakes
type	measured

6.5.4.19 Electrical load proportional function installation status

This parameter shall indicate if the vehicle is equipped with an electrical load proportional function. Table 37 specifies the parameter description.

Table 37 — Specification of the parameter "electrical load proportional function installation status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle without electrical load proportional function 01_2 — vehicle with electrical load proportional function
type	measured

6.5.4.20 Load proportional function installation status

This parameter shall indicate if the vehicle is equipped with a load proportional function. Table 38 specifies the parameter description.

Table 38 — Specification of the parameter "load proportional function installation status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle without load proportional function 01_2 — vehicle with load proportional function
type	measured

6.5.4.21 ABS off-road request

This parameter shall command the requested operating mode for the ABS off-road function. This parameter shall be independent of the current ABS control situation. Table 39 specifies the parameter description.

Table 39 — Specification of the parameter "ABS off-road request"

Attribute	Value
data length	2 bit
data range	00_2 — ABS off-road request off 01_2 — ABS off-road request on
type	status

6.5.4.22 ASR brake control status

This parameter shall indicate the current status of the ASR brake control function. ASR active shall indicate that the ASR function actually controls the wheel brake pressure at one or more wheels of the driven axles and does not indicate "installed" or "enabled". Table 40 specifies the parameter description.

Table 40 — Specification of the parameter "ASR brake control status"

Attribute	Value
data length	2 bit
data range	00_2 — ASR brake control passive 01_2 — ASR brake control active
type	measured

6.5.4.23 ASR engine control status

This parameter shall indicate the current status of the ASR engine control function. ASR active shall indicate that the ASR function tries to control the engine torque and does not indicate "installed" or "enabled". This status shall be independent of other control commands influencing the engine torque (e.g. transmission control requests), which can have higher priority. Table 41 specifies the parameter description.

Table 41 — Specification of the parameter "ASR engine control status"

Attribute	Value
data length	2 bit
data range	00_2 — ASR engine control passive 01_2 — ASR engine control active
type	measured

6.5.4.24 Pneumatic control line status

This parameter shall indicate that the towing vehicle has a pneumatic control line for the towed vehicle service braking system. Table 42 specifies the parameter description.

Table 42 — Specification of the parameter "pneumatic control line status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle without pneumatic control line 01_2 — vehicle with pneumatic control line
type	measured

6.5.4.25 Two electrical circuits brake demand status

This parameter shall indicate that the service brake demand value sent by the towing vehicle can be generated by one or two independent electrical braking circuits. Table 43 specifies the parameter description.

Table 43 — Specification of the parameter "two electrical circuits brake demand status"

Attribute	Value
data length	2 bit
data range	00_2 — one electrical braking circuit available 01_2 — two electrical braking circuits available
type	measured

6.5.4.26 Tyre pressure status

This parameter shall indicate the current status of the tyre pressure. An insufficient tyre pressure shall be indicated, if the pressure is outside of a pressure range recommended by the tyre or vehicle manufacturer, to ensure an optimized operation with regard to the fuel consumption of the vehicle and life time of the tyre. Table 44 specifies the parameter description.

Table 44 — Specification of the parameter "tyre pressure status"

Attribute	Value
data length	2 bit
data range	00_2 — tyre pressure insufficient 01_2 — tyre pressure sufficient
type	measured

6.5.4.27 Brake lining status

This parameter shall indicate the current status of the brake linings. An insufficient brake lining status shall be indicated if the linings are worn out. Table 45 specifies the parameter description.

Table 45 — Specification of the parameter "brake lining status"

Attribute	Value
data length	2 bit
data range	00_2 — brake linings insufficient 01_2 — brake linings sufficient
type	measured

6.5.4.28 Brake temperature status

This parameter shall indicate the current status of the temperature of the brakes. A brake temperature out of range value shall be indicated if the brake temperature is higher than a specific level for proper operation. Table 46 specifies the parameter description.

Table 46 — Specification of the parameter "brake temperature status"

Attribute	Value
data length	2 bit
data range	00_2 — brake temperature out of range 01_2 — brake temperature inside normal range
type	measured

6.5.4.29 Brake light switch

This parameter shall indicate that the brake pedal is currently being pressed. Table 47 specifies the parameter description.

Table 47 — Specification of the parameter "brake light switch"

Attribute	Value
data length	2 bit
data range	00_2 — brake light switch off 01_2 — brake light switch on
type	measured

6.5.4.30 Vehicle type

This parameter shall indicate if a vehicle is a converter dolly or a towing or towed vehicle. Table 48 specifies the parameter description.

Table 48 — Specification of the parameter "vehicle type"

Attribute	Value
data length	2 bit
data range	00_2 — towing or towed vehicle 01_2 — converter dolly axle
type	measured

NOTE This parameter definition is redundant to the definitions given in the parameter "geometric data indexed content" (6.5.4.47) and is kept for backward compatibility.

6.5.4.31 Red warning signal request

This parameter shall command the request from a towed vehicle to the commercial vehicle to activate the red warning signal, which indicates certain specified failures within the braking equipment of the towed vehicle. Table 49 specifies the parameter description.

Table 49 — Specification of the parameter "red warning signal request"

Attribute	Value
data length	2 bit
data range	00_2 — red warning signal off 01_2 — red warning signal on
type	status

6.5.4.32 Amber warning signal request

This parameter shall command the request from a towed vehicle to the commercial vehicle to activate the amber warning signal, which indicates certain specified events within the braking equipment of the towed vehicle. A flashing warning signal can be used to signal fault conditions that are related to non-braking systems, e.g. auxiliary equipment. It shall not be used to signal braking system-relevant faults or status. Table 50 specifies the parameter description.

Table 50 — Specification of the parameter "amber warning signal request"

Attribute	Value
data length	2 bit
data range	00_2 — amber warning signal off 01_2 — amber warning signal on 10_2 — amber warning signal flashing
type	status

The amber warning signal request shall be regarded as providing the same information as the yellow warning signal, activated by the trailer on pin five of the electric connector conforming to ISO 7638, as specified in UNECE Regulation 13.

Implementation of a flashing signal is left open to the vehicle integrator of the commercial vehicle. As a recommendation, a frequency of about 1 to 1,5 Hz should be used.

6.5.4.33 Electrical supply of non-braking systems status

This parameter shall indicate the current status of the supply voltage of non-braking systems. Table 51 specifies the parameter description.

Table 51 — Specification of the parameter "electrical supply of non-braking systems status"

Attribute	Value
data length	2 bit
data range	00_2 — supply of non-braking systems off 01_2 — supply of non-braking systems on
type	measured

6.5.4.34 Loading ramp approach assistance status

This parameter shall indicate whether the loading ramp approach assistance is activated. The loading ramp approach assistance measures the distance to the loading ramp while reversing and applies the vehicle brakes accordingly. Table 52 specifies the parameter description.

Table 52 — Specification of the parameter "loading ramp approach assistance status"

Attribute	Value
data length	2 bit
data range	00_2 — loading ramp approach assistance not active 01_2 — loading ramp approach assistance active
type	measured

6.5.4.35 VDC active

This parameter shall indicate the current status of the VDC function. Active means that VDC actually controls the engine torque (in the case of a commercial vehicle) or the wheel brake pressure at one or more wheels and does not mean "installed" or "enabled". The parameter "VDC active" shall only be set to active when a vehicle stability function event occurs where the intent is to impact on vehicle stability. Interventions by the vehicle stability function in any process designed to determine the physical characteristics of the vehicle are not considered to be "VDC active" events. Table 53 specifies the parameter description.

Table 53 — Specification of the parameter "VDC active"

Attribute	Value
data length	2 bit
data range	00_2 — VDC passive 01_2 — VDC active
type	measured

UNECE Regulation 13 requires that a VDC active state shall be present to the commercial vehicle from all towed vehicles. As this parameter is mapped to a message that is only sent between directly coupled vehicles, each towing vehicle shall combine the sources, i.e. the local control system and the parameter received from the successor, and forward a VDC active if set from at least one source.

6.5.4.36 Road curvature

This parameter shall indicate the estimated value for the current road curvature. Positive values shall be used for left-hand curves. Table 54 specifies the parameter description.

Table 54 — Specification of the parameter "road curvature"

Attribute	Value
data length	2 byte
resolution	1/128 km^{-1}/bit
offset	–250 km^{-1}
data range	–250 km^{-1} to 250 km^{-1}
operating range	–250 km^{-1} to 250 km^{-1}
type	measured

6.5.4.37 Wheel speed difference main axle

This parameter shall indicate the difference between the wheel speed on the right side and on the left side of the main axle, calculated as $V_{difference} = V_{right} - V_{left}$ and filtered by a frequency range of 5 Hz to 20 Hz. Table 55 specifies the parameter description.

Table 55 — Specification of the parameter "wheel speed difference main axle"

Attribute	Value
data length	2 byte
resolution	1/256 km/h/bit
offset	–125 km/h
data range	–125 km/h to 125 km/h
operating range	–125 km/h to 125 km/h
type	measured

6.5.4.38 Supply line braking

This parameter commands a request from the towed vehicle to be braked by the commercial vehicle by means of venting the pneumatic supply line. Table 56 specifies the parameter description.

Table 56 — Specification of the parameter "supply line braking"

Attribute	Value
data length	2 bit
data range	00_2 — supply line braking not requested 01_2 — supply line braking requested
type	status

6.5.4.39 Spring brake status

This parameter shall indicate the current status of the vehicle spring brake(s). Table 57 specifies the parameter description.

Table 57 — Specification of the parameter "spring brake status"

Attribute	Value
data length	2 bit
data range	00_2 — spring brake is released (is not braking the vehicle) 01_2 — spring brake is engaged (is braking the vehicle)
type	measured

6.5.4.40 Relative brake demand for front or left vehicle side

This parameter shall command the requested percentage of the service brake demand value which has to be applied to the steering axle wheels or to the wheels on the left-hand side of the vehicle. If brake force distribution is supported, full trailers shall support axle-wise distribution and semi-trailers shall support side-wise distribution. Table 58 specifies the parameter description.

Table 58 — Specification of the parameter "relative brake demand for front or left vehicle side"

Attribute	Value
data length	1 byte
resolution	0,4 %/bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	status

6.5.4.41 Relative brake demand for rear or right vehicle side

This parameter shall command the requested percentage of the service brake demand value which has to be applied to the wheels of the rear axle(s) or to the wheels on the right-hand side of the vehicle. If brake force distribution is supported, full trailers shall support axle-wise distribution and semi-trailers shall support side-wise distribution. Table 59 specifies the parameter description.

Table 59 — Specification of the parameter "relative brake demand for rear or right vehicle side"

Attribute	Value
data length	1 byte
resolution	0,4 %/bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	status

6.5.4.42 Support of side- or axle-wise brake force distribution

This parameter shall indicate whether the functionality of an axle- or side-wise brake force distribution is enabled. If brake force distribution is supported, full trailers shall support axle-wise distribution and semi-trailer shall support side-wise distribution. Table 60 specifies the parameter description.

Table 60 — Specification of the parameter "support of side- or axle-wise brake force distribution"

Attribute	Value
data length	2 bit
data range	00_2 — side- or axle-wise brake force distribution disabled 01_2 — side- or axle-wise brake force distribution enabled
type	measured

6.5.4.43 Lateral acceleration

This parameter shall indicate the actual lateral acceleration of the vehicle. A positive lateral acceleration value shall be used when the vehicle is accelerated to the left. Table 61 specifies the parameter description.

Table 61 — Specification of the parameter "lateral acceleration"

Attribute	Value
data length	1 byte
resolution	1/10 m/s^2/bit
offset	–12,5 m/s^2
data range	–12,5 m/s^2 to 12,5 m/s^2
operating range	–12,5 m/s^2 to 12,5 m/s^2
type	measured

6.5.4.44 Stop lamps request

This parameter shall command the request from the towed vehicle to the commercial vehicle to illuminate the stop lamps. Table 62 specifies the parameter description.

Table 62 — Specification of the parameter "stop lamps request"

Attribute	Value
data length	2 bit
data range	00_2 — stop lamps illumination not request 01_2 — stop lamps illumination requested
type	status

6.5.4.45 Braking via electric control line support

This parameter shall indicate whether the vehicle supports braking via the electrical control or not. Table 63 specifies the parameter description.

Table 63 — Specification of the parameter "braking via electrical control line support"

Attribute	Value
data length	2 bit
data range	00_2 — braking via electrical control line not supported 01_2 — braking via electrical control line supported
type	measured

6.5.4.46 Geometric data index

This parameter shall be used as an index to an array of geometric data as defined by the parameter "geometric data indexed content" (6.5.4.47) and shall not be used without that context. Table 64 specifies the parameter description.

Table 64 — Specification of the parameter "geometric data index"

Attribute	Value
data length	1 byte
data range	enumeration as given in Table 66, column index
type	measured

6.5.4.47 Geometric data indexed content

This parameter shall be interpreted as an array of geometric data indexed by the parameter "geometric data index" (6.5.4.46). Table 65 and Table 66 specify the parameter description. Vehicle geometrical data and keys are defined in Annex A.

Table 65 — Specification of the parameter "geometric data indexed content"

Attribute	Value
data length	1 byte
data range	as specified in Table 66
type	measured

Table 66 — Content specification of the parameter "geometric data indexed content"

Index	Attribute	Value
0	parameter	extended vehicle type
	content	indicates the type of the towed vehicle
	data range	0 to 250
	operating range	0 — semi-trailer 1 — centre-axle trailer 2 — full trailer 3 — converter dolly 4 — link trailer 5 — towing semi-trailer 6 — towing centre-axle trailer 7 — towing full trailer 8 to 249 — reserved by document 250 — unknown vehicle type
1	parameter	length, l_1
	content	length between the coupling point and the middle of the first axle
	resolution	0,1 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
2	parameter	track width, w
	content	distance between the centre of the wheels at the same axle
	resolution	10 mm/bit
	offset	0 mm to 2 500 mm
	data range	0 mm to 2 500 mm
	operating range	0 mm to 2 500 mm
3	parameter	axle count
	content	total number of axles
	resolution	1/bit
	offset	0
	data range	0 to 250
	operating range	1 to 250
4	parameter	front axle count
	content	total number of axles attached to the drawbar, applicable in the case of full trailers
	resolution	1/bit
	offset	0
	data range	0 to 250
	operating range	1 to 250, 0 indicates "no front axle"
5	parameter	lift axle count
	content	total number of liftable axles
	resolution	1/bit
	offset	0
	data range	0 to 250
	operating range	1 to 250, 0 indicates "no liftable axle"

Table 66 *(continued)*

Index	Attribute	Value
6 to 10	parameter	lift axle n position
	content	position (axle number) of lift axle 1 to 5, with axle number (m) counting from the front to the rear and starting with 1
	resolution	1/bit
	offset	0
	data range	0 to 250
	operating range	1 to 250, 0 indicates “no liftable axle”
11 to 29	parameter	wheel base m
	content	Wheel base of axle (m) to axle (m+1), with axle index m = 1 to 19 counting from the front to the rear
	resolution	0,1 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
30	parameter	coupling point distance, l_{cc}
	content	distance between the first coupling point and the second coupling, applicable in the case of a towing trailer or converter dolly
	resolution	0,1 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
31	parameter	vehicle length, l_{tot}
	content	total length of towed vehicle
	resolution	0,1 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
32	parameter	coupling height 1, h_1
	content	nominal coupling height over ground for the first coupling point for an unloaded towed vehicle
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m
33	parameter	coupling height 2, h_2
	content	nominal coupling height over ground for the second coupling point for an unloaded towing vehicle applicable in the case of a converter dolly, link trailer or towing semi-trailer data is dynamic and shall indicate the current coupling point height
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m

Table 66 *(continued)*

Index	Attribute	Value
34	parameter	loading height rear, h_3
	content	height over ground for the floor inside the towed vehicle at the rear end of the floor not applicable in the case of a converter dolly
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m
35	parameter	loading height front, h_4
	content	height over ground for the floor inside the towed vehicle at the front end of the floor applicable in the case of a centre-axle, full or towing full trailer
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 2,0 m
	operating range	0 m to 5,0 m
36	parameter	total height over ground front
	content	total height over ground of the towed vehicle at the front of the towed vehicle applicable in the case of a centre-axle, full or towing full trailer
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m
37	parameter	chassis height, h_6
	content	height from the bottommost point of the chassis to the topmost point of the towed vehicle at the front of the towed vehicle applicable in the case of a semi-trailer or towing semi-trailer
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m
38	parameter	vehicle height rear, h_7
	content	total height over ground of the towed vehicle at the rear of the towed vehicle (not in the case of a converter dolly) for a towing semi-trailer, this refers to the rear end of the cargo put directly on the towing semi-trailer; this data is dynamic and shall indicate the current rear total height.
	resolution	0,02 m/bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 5,0 m
39 to 250		reserved by document

NOTE Information about “normal trailer” or “converter dolly” is also available with the parameter “vehicle type” (6.5.4.30) and is supported for backward compatibility.

6.5.4.48 Brake cylinder pressure first axle, left wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the left wheel of the first axle. In the case of a full trailer, "first axle" means the steering axle. Table 67 specifies the parameter description.

Table 67 — Specification of the parameter "brake cylinder pressure first axle, left wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.49 Brake cylinder pressure first axle, right wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the right wheel of the first axle. In the case of a full trailer, "first axle" means the steering axle. Table 68 specifies the parameter description.

Table 68 — Specification of the parameter "brake cylinder pressure first axle, right wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.50 Brake cylinder pressure second axle, left wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the left wheel of the second axle. Table 69 specifies the parameter description.

Table 69 — Specification of the parameter "brake cylinder pressure second axle, left wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.51 Brake cylinder pressure second axle, right wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the right wheel of the second axle. Table 70 specifies the parameter description.

Table 70 — Specification of the parameter "brake cylinder pressure second axle, right wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.52 Brake cylinder pressure third axle, left wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the left wheel of the third axle. Table 71 specifies the parameter description.

Table 71 — Specification of the parameter "brake cylinder pressure third axle, left wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.53 Brake cylinder pressure third axle, right wheel

This parameter shall indicate the actual pressure of the wheel-brake actuator at the right wheel of the third axle. Table 72 specifies the parameter description.

Table 72 — Specification of the parameter "brake cylinder pressure third axle, right wheel"

Attribute	Value
data length	1 byte
resolution	5 kPa/bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.5.4.54 Wheel speed first axle, left wheel

This parameter shall indicate the unbalanced and unfiltered speed of the left wheel on the first axle. The definition of axle positions shall be as follows:

— In the case of a full trailer, the first axle shall be the steering axle.

— In the case of a semi-trailer, the first non-lifting axle equipped with the wheel speed measuring sensors shall be used. Both sensors shall be on the same axle.

Table 73 specifies the parameter description.

Table 73 — Specification of the parameter "wheel speed first axle, left wheel"

Attribute	Value
data length	2 byte
resolution	1/256 km/h/bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.5.4.55 Wheel speed first axle, right wheel

This parameter shall indicate the unbalanced and unfiltered speed of the left wheel on the first axle. The definition of axle positions shall be as follows.

— In the case of a full trailer, the first axle shall be the steering axle.

— In the case of a semi-trailer, the first non-lifting axle equipped with wheel speed measuring sensors shall be used. Both sensors shall be on the same axle.

Table 74 specifies the parameter description.

Table 74 — Specification of the parameter "wheel speed first axle, right wheel"

Attribute	Value
data length	2 byte
resolution	1/256 km/h/bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.5.4.56 ROP system status

This parameter shall indicate whether the ROP system is currently enabled or disabled. Table 75 specifies the parameter description.

Table 75 — Specification of the parameter "ROP system status"

Attribute	Value
data length	2 bit
data range	00_2 — ROP system disabled 01_2 — ROP system enabled
type	measured

6.5.4.57 YC system status

This parameter shall indicate whether the YC system is currently enabled or disabled. Table 76 specifies the parameter description.

Table 76 — Specification of the parameter "YC system status"

Attribute	Value
data length	2 bit
data range	00_2 — YC system disabled 01_2 — YC system enabled
type	measured

6.5.4.58 Trailer ROP system request

This parameter shall command the request to enable or disable the trailer ROP system. Table 77 specifies the parameter description.

Table 77 — Specification of the parameter "trailer ROP system request"

Attribute	Value
data length	2 bit
data range	00_2 — disable trailer ROP system 01_2 — enable trailer ROP system
type	status

6.5.4.59 Trailer YC system request

This parameter shall command the request to enable or disable the trailer YC system. Table 78 specifies the parameter description.

Table 78 — Specification of the parameter "trailer YC system request"

Attribute	Value
data length	2 bit
data range	00_2 — disable trailer YC system 01_2 — enable trailer YC system
type	status

6.5.4.60 Vehicle combination ABS status

This parameter shall indicate the current status of the anti-lock braking function or system including the status of additional towed vehicles. The parameter shall be set active if there is an ABS-related fault condition detected at the local vehicle or any of the towed vehicles and shall also consider the status of the trailer detection specified in 6.5.4.61. Table 79 specifies the parameter description.

Table 79 — Specification of the parameter "vehicle combination ABS status"

Attribute	Value
data length	2 bit
data range	00_2 — no ABS-related fault condition detected up to the end of the vehicle combination (i.e. all ABS systems from this to the last trailer are fully operational) 01_2 — ABS-related fault condition detected in the vehicle combination (i.e. either in this or in one of the following trailers or a following trailer without ABS detected) 10_2 — ABS status unclear (i.e. no ABS fault set but one of the following trailers does not have a trailer detection therefore there should be an undetected additional trailer)
type	measured

6.5.4.61 Towed vehicle detection status

This parameter shall be provided by any towed vehicle and shall indicate

— if an additional towed vehicle has been detected (parameter “vehicle status”),

— which type of brake system has been detected at that vehicle (parameter “brake system type”),

— if that vehicle is equipped with a CAN communication link (parameter “CAN interface available”), and

— if that vehicle is able to detect an additional trailer (trailer detection support).

Table 80 specifies the parameter description.

Table 80 — Specification of the parameter “towed vehicle detection status”

Attribute	Value				
data length	4 bit				
	Value	**vehicle status**	**Brake system type**	**CAN interface available**	**Trailer detection support**
data range	0000_2	detected	none	n/a	n/a
	0001_2	detected	ABS	no	no
	0010_2	detected	ABS	no	yes
	0011_2	detected	ABS	yes	no
	0100_2	detected	ABS	yes	yes
	0101_2	detected	EBS	yes	no
	0110_2	detected	EBS	yes	yes
	0111_2	reserved by document			
	1000_2	not detected	n/a	n/a	n/a
	1001_2	reserved by document			
	1010_2	reserved by document			
	1011_2	reserved by document			
	1100_2	reserved by document			
	1101_2	reserved by document			
	1110_2	error indicator, trailer detection not possible			
	1111_2	not available, no trailer detection installed			
type	measured				

6.5.4.62 Reverse gear status

This parameter shall indicate if the reverse gear at the gearshift box of the commercial vehicle is engaged or not. Table 81 specifies the parameter description.

Table 81 — Specification of the parameter “reverse gear status”

Attribute	Value
data length	2 bit
data range	00_2 — reverse gear not engaged 01_2 — reverse gear engaged
type	measured

6.5.4.63 External brake request status

This parameter shall indicate if a brake request neither from EBS nor from VDC/ROP/YC is currently active. Table 82 specifies the parameter description.

Table 82 — Specification of the parameter "external brake request status"

Attribute	Value
data length	2 bit
data range	00_2 — no external brake request active 01_2 — external brake request active
type	measured

NOTE The parameter can be used to inform the driver of an active brake request (e.g. ramp approach system). Within the truck there is a similar parameter XBR defined with the same functionality.

6.5.4.64 Emergency braking status

This parameter shall indicate if there is an active emergency braking request at the commercial vehicle. Table 83 specifies the parameter description.

Table 83 — Specification of the parameter "emergency braking status"

Attribute	Value
data length	2 bit
data range	00_2 — no emergency braking active 01_2 — emergency braking active
type	measured

NOTE The conditions for activation are specified in Reference [2].

6.5.5 Parameters for running gear equipment

6.5.5.1 Driven axle load (commercial vehicle)

This parameter shall indicate the current static vertical load on the driven axle of the commercial vehicle. In case the vehicle is equipped with more than one driven axle, the value of the axle with the highest vertical load shall be transmitted. Table 84 specifies the parameter description.

Table 84 — Specification of the parameter "driven axle load (commercial vehicle)"

Attribute	Value
data length	2 byte
resolution	2 kg/bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.5.5.2 Nominal vehicle body level, front axle

This parameter shall indicate the current nominal vehicle body height. In cases when controlled by "level change request, front axle" (see 6.5.5.8), this value shall be the current vehicle body height at the front axle referred to ground level. Table 85 specifies the parameter description.

Table 85 — Specification of the parameter "nominal vehicle body level, front axle"

Attribute	Value
data length	2 byte
resolution	1 mm/bit
offset	0 mm
data range	0 mm to 64 255 mm
operating range	0 mm to 64 255 mm
type	measured

6.5.5.3 Nominal vehicle body level, rear axle

This parameter shall indicate the current nominal vehicle body height. In cases when controlled by "level change request, rear axle" (see 6.5.5.9), this value shall be the current vehicle body height at the rear axle referred to ground level. Table 86 specifies the parameter description.

Table 86 — Specification of the parameter "nominal vehicle body level, rear axle"

Attribute	Value
data length	2 byte
resolution	1 mm/bit
offset	0 mm
data range	0 mm to 64 255 mm
operating range	0 mm to 64 255 mm
type	measured

6.5.5.4 Relative vehicle body level, front axle

This parameter shall indicate the current nominal vehicle body height. In cases when controlled by "level change request, front axle" (see 6.5.5.8), this value shall be the current vehicle body height at the front axle referred to the ride height normal level 1. Table 87 specifies the parameter description.

Table 87 — Specification of the parameter "relative vehicle body level, front axle"

Attribute	Value
data length	2 byte
resolution	1 mm/bit
offset	–32 000 mm
data range	–32 000 mm to 32 255 mm
operating range	–32 000 mm to 32 255 mm
type	measured

6.5.5.5 Relative vehicle body level, rear axle

This parameter shall indicate the current nominal vehicle body height. In cases when controlled by "level change request, rear axle" (see 6.5.5.9), this value shall be the current vehicle body height at the rear axle referred to ride height normal level 1. Table 88 specifies the parameter description.

Table 88 — Specification of the parameter "relative vehicle body level, rear axle"

Attribute	Value
data length	2 byte
resolution	1 mm/bit
offset	–32 000 mm
data range	–32 000 mm to 32 255 mm
operating range	–32 000 mm to 32 255 mm
type	measured

6.5.5.6 Level control request

This parameter shall command a request to enable or disable the automatic level control. A request to enable or to disable the level control shall be sent in five successive messages followed by messages with "level control request" set to "take no action". Less than five messages are allowed if the receiver acknowledges through "level control" (see 6.5.5.7). Table 89 specifies the parameter description.

Table 89 — Specification of the parameter "level control request"

Attribute	Value
data length	2 bit
data range	00_2 — level control disabled 01_2 — level control enabled 11_2 — take no action
type	status

6.5.5.7 Level control status

This parameter shall indicate the current status of the level control function. Table 90 specifies the parameter description.

Table 90 — Specification of the parameter "level control status"

Attribute	Value
data length	2 bit
data range	00_2 — level control disabled 01_2 — level control enabled
type	measured

6.5.5.8 Level change request, front axle

This parameter shall command a request to control the body height for the front axle [lifting (up)/ lowering (down)]. This value of the parameter shall be sent as long as the lifting/lowering procedure lasts. Table 91 specifies the parameter description.

Table 91 — Specification of the parameter "level change request, front axle"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body up (lifting) 01_2 — vehicle body down (lowering) 11_2 — take no action
type	status

6.5.5.9 Level change request, rear axle

This parameter shall command a request to control the body height for the rear axle [lifting (up)/ lowering (down)]. This value of the parameter shall be sent as long as the lifting/lowering procedure lasts. Table 92 specifies the parameter description.

Table 92 — Specification of the parameter "level change request, rear axle"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body up (lifting) 01_2 — vehicle body down (lowering) 11_2 — take no action
type	status

6.5.5.10 Level change status, front axle

This parameter shall indicate the current status of the level change of the body height at the front axle due to any external control request. Table 93 specifies the parameter description.

Table 93 — Specification of the parameter "level change status, front axle"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body lifting/lowering not active 01_2 — vehicle body lifting/lowering active
type	Measured

6.5.5.11 Level change status, rear axle

This parameter shall indicate the current status of the level change of the body height at the rear axle due to any external control request. Table 94 specifies the parameter description.

Table 94 — Specification of the parameter "level change status, rear axle"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body lifting/lowering not active 01_2 — vehicle body lifting/lowering active
type	measured

6.5.5.12 Lift axle 1 position request

This parameter shall command a request to control the position of the first lift axle or the load condition of the first tag axle. Table 95 specifies the parameter description. Numbering of lift axles shall start from the front axle position.

A command to control the lift axle position/tag axle load condition shall be sent in five successive messages followed by messages with "lift axle position request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "Lift axle 1 position" (see 6.5.5.17).

Table 95 — Specification of the parameter "lift axle 1 position request"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen 11_2 — take no action
type	status

6.5.5.13 Lift axle 2 position request

This parameter shall command a request to control the position of the second lift axle or the load condition of the second tag axle. Table 96 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

A command to control the lift axle position/tag axle load condition shall be sent in five successive messages followed by messages with "lift axle position request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "Lift axle 2 position" (see 6.5.5.18).

Table 96 — Specification of the parameter "lift axle 2 position request"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen 11_2 — take no action
type	status

6.5.5.14 Lift axle 3 position request

This parameter shall command a request to control the position of the third lift axle or the load condition of the third tag axle. Table 97 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

A command to control the lift axle position/tag axle load condition shall be sent in five successive messages followed by messages with "lift axle position request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "Lift axle 3 position" (see 6.5.5.19).

Table 97 — Specification of the parameter "lift axle 3 position request"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen 11_2 — take no action
type	status

6.5.5.15 Lift axle 4 position request

This parameter shall command a request to control the position of the fourth lift axle or the load condition of the fourth tag axle. Table 98 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

A command to control the lift axle position/tag axle load condition shall be sent in five successive messages followed by messages with "lift axle position request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "Lift axle 4 position" (see 6.5.5.20).

Table 98 — Specification of the parameter "lift axle 4 position request"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen 11_2 — take no action
type	status

6.5.5.16 Lift axle 5 position request

This parameter shall command a request to control the position of the fifth lift axle or the load condition of the fifth tag axle. Table 99 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

A command to control the lift axle position/tag axle load condition shall be sent in five successive messages followed by messages with "lift axle position request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "Lift axle 5 position" (see 6.5.5.21).

Table 99 — Specification of the parameter "lift axle 5 position request"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen 11_2 — take no action
type	status

6.5.5.17 Lift axle 1 position

This parameter shall indicate the position of the first lift axle or the load condition of the first tag axle. Table 100 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

Table 100 — Specification of the parameter "lift axle 1 position"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen
type	measured

6.5.5.18 Lift axle 2 position

This parameter shall indicate the position of the second lift axle or the load condition of the second tag axle. Table 101 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

Table 101 — Specification of the parameter "lift axle 2 position"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen
type	measured

6.5.5.19 Lift axle 3 position

This parameter shall indicate the position of the third lift axle or the load condition of the third tag axle. Table 102 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

Table 102 — Specification of the parameter "lift axle 3 position"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen
type	measured

6.5.5.20 Lift axle 4 position

This parameter shall indicate the position of the fourth lift axle or the load condition of the fourth tag axle. Table 103 specifies the parameter description. The numbering of lift axles shall start from the front axle position.

Table 103 — Specification of the parameter "lift axle 4 position"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen
type	measured

6.5.5.21 Lift axle 5 position

This parameter shall indicate the position of the fifth lift axle or the load condition of the fifth tag axle. Table 104 specifies the parameter description. The numbering of the lift axles shall start from the front axle position.

Table 104 — Specification of the parameter "lift axle 5 position"

Attribute	Value
data length	2 bit
data range	00_2 — lift axle position down/tag axle laden 01_2 — lift axle position up/tag axle unladen
type	measured

6.5.5.22 Steering axle locking request

This parameter shall command a request to lock the steering axle. Table 105 specifies the parameter description.

A command to lock or unlock the steering axle shall be sent in five successive messages followed by messages with "steering axle locking request" set to "take no action". Less than five messages are allowed if the receiver acknowledges via "steering axle locking" (see 6.5.5.23).

Table 105 — Specification of the parameter "steering axle locking request"

Attribute	Value
data length	2 bit
data range	00_2 — unlock steering axle 01_2 — lock steering axle 11_2 — take no action
type	status

6.5.5.23 Steering axle locking status

This parameter shall indicate the current steering axle locking status. Table 106 specifies the parameter description.

Table 106 — Specification of the parameter steering axle locking status

Attribute	Value
data length	2 bit
data range	00_2 — steering axle unlocked 01_2 — steering axle locked
type	measured

6.5.5.24 Traction help (load transfer) request

This parameter shall command a request to control the lift axle position or tag axle load condition to transfer more load on the driven axle of the commercial vehicle. Table 107 specifies the parameter description.

A request to switch the traction help on or off shall be sent in five successive messages followed by messages with "traction help request" set to "take no action". Less than five messages are allowed if the receiver acknowledges through "traction help" (see 6.5.5.25).

Table 107 — Specification of the parameter "traction help (load transfer) request"

Attribute	Value
data length	2 bit
data range	00_2 — traction help not requested 01_2 — traction help requested 11_2 — take no action
type	status

6.5.5.25 Traction help (load transfer) status

This parameter shall indicate the current status of the traction help function. Table 108 specifies the parameter description.

Table 108 — Specification of the parameter "traction help (load transfer) status"

Attribute	Value
data length	2 bit
data range	00_2 — traction help (load transfer) inactive 01_2 — traction help (load transfer) active
type	measured

6.5.5.26 Ride height request

This parameter shall command a request to activate a normal ride body height. The normal levels 1 and 2 shall be trailer-specific body heights. Table 109 specifies the parameter description.

A request to activate a normal level shall be sent in five successive messages followed by messages with "ride height request" set to "take no action". Less than five messages are allowed if the receiver already acknowledges through "levelling control system, ride height level" (see 6.5.5.27).

Table 109 — Specification of the parameter "ride high request"

Attribute	Value
data length	2 bit
data range	00_2 — normal level 1 requested 01_2 — normal level 2 requested 11_2 — take no action
type	status

6.5.5.27 Ride height level

This parameter shall indicate the current body height position status of the vehicle as a response to the "ride height request". Table 110 specifies the parameter description.

Table 110 — Specification of the parameter "ride height level"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body not at requested normal level 01_2 — vehicle body at requested normal level
type	measured

6.5.5.28 Normal level

This parameter shall indicate the current state of the body height normal positions independent of a specific level request. Table 111 specifies the parameter description.

In the case when there's no corresponding body height position, the value "not available" shall be transmitted.

Table 111 — Specification of the parameter "normal level status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body height at normal level 1 01_2 — vehicle body height at normal level 2 11_2 — not available, unknown body height level
type	measured

6.5.5.29 Ramp level request

This parameter shall command a request to control the body height to a level programmed and memorized in the levelling control system. Table 112 specifies the parameter description.

A request to activate one ramp level shall be sent in five successive messages followed by messages with "ramp level request" set to "take no action". Less than five messages are allowed if the receiver acknowledges through "ramp level" (see 6.5.5.30).

Table 112 — Specification of the parameter "ramp level request"

Attribute	Value
data length	2 bit
data range	00_2 — ramp level 1 requested 01_2 — ramp level 2 requested 11_2 — take no action
type	status

6.5.5.30 Ramp level

This parameter shall indicate the current status of the body height as a response to the "ramp level request" (see 6.5.5.29). Table 113 specifies the parameter description.

Table 113 — Specification of the parameter "ramp level status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body not at the requested ramp level 01_2 — vehicle body at the requested ramp level
type	measured

6.5.5.31 Ramp level position

This parameter shall indicate the current state of the body height ramp level positions independent of a specific level request. Table 114 specifies the parameter description.

In cases when there is no corresponding body height position, the value "not available" shall be transmitted.

Table 114 — Specification of the parameter "ramp level status"

Attribute	Value
data length	2 bit
data range	00_2 — vehicle body height at ramp level 1 01_2 — vehicle body height at ramp level 2 11_2 — not available, unknown body height level
type	measured

6.5.5.32 Ramp level storage request

This parameter shall command a request to store the current body height as the newly programmed and memorized ramp levels 1 or 2 in the levelling control system. Table 115 specifies the parameter description.

A request to store a ramp level shall be sent in five successive messages followed by messages with "ramp level storage request" set to "take no action". Less than five messages are allowed if the receiver acknowledges through "ramp level storage" (see 6.5.5.33).

Table 115 — Specification of the parameter "ramp level storage request"

Attribute	Value
data length	2 bit
data range	00_2 — store ramp level 1 request 01_2 — store ramp level 2 request 11_2 — take no action
type	status

6.5.5.33 Ramp level storage status

This parameter shall indicate the current status of the ramp level storage in the levelling control system as a response to the "ramp level storage request". Table 116 specifies the parameter description.

Table 116 — Specification of the parameter "ramp level storage status"

Attribute	Value
data length	2 bit
data range	00_2 — no new ramp level stored 01_2 — new ramp level stored
type	measured

6.5.5.34 Stop level change request

This parameter shall command to immediately stop any change of the actual body height level. This request shall be sent until the receiver acknowledges via "stop acknowledge" (see 6.5.5.35). Table 117 specifies the parameter description.

Table 117 — Specification of the parameter "stop level change request"

Attribute	Value
data length	2 bit
data range	00_2 — no stop request 01_2 — stop requested 11_2 — take no action
type	status

6.5.5.35 Stop level change request acknowledge

This parameter shall indicate the current status of the levelling control system as a response to the "Stop level change request". Table 118 specifies the parameter description.

Table 118 — Specification of the parameter "stop level change request acknowledge"

Attribute	Value
data length	2 bit
data range	00_2 — no stop request 01_2 — stop request accepted
type	measured

6.5.5.36 Parking and trailer air pressure

This parameter shall indicate the current pneumatic pressure on the circuit or reservoir for the parking brake and the trailer supply. Table 119 specifies the parameter description.

Table 119 — Specification of the parameter "parking and trailer air pressure"

Attribute	Value
data length	1 byte
resolution	8 kPa/bit
offset	0 kPa
data range	0 kPa to 2 000 kPa
operating range	0 kPa to 2 000 kPa
type	measured

6.5.5.37 Auxiliary equipment supply pressure

This parameter shall indicate the current pneumatic pressure in the auxiliary equipment supply circuit. Table 120 specifies the parameter description.

Table 120 — Specification of the parameter "auxiliary equipment supply pressure"

Attribute	Value
data length	1 byte
resolution	8 kPa/bit
offset	0 kPa
data range	0 kPa to 2 000 kPa
operating range	0 kPa to 2 000 kPa
type	measured

6.5.5.38 Tyre pressure threshold detection

This parameter shall indicate the pressure level of one specific tyre. This parameter is used in conjunction with the tyre/wheel identification. Table 121 specifies the parameter description. The levels specified in Table 121 shall represent the different pressure conditions of the tyre as specified in Table 122.

Table 121 — Specification of the parameter "tyre pressure threshold detection status"

Attribute	Value
data length	3 bit
data range	000_2 — extreme over pressure 001_2 — over pressure 010_2 — no warning pressure 011_2 — under pressure 100_2 — extreme under pressure 101_2 — not defined 110_2 — error indicator 111_2 — not available
type	measured

Table 122 — Specification of the pressure conditions of the tyre

Value	Description
extreme over pressure	The tyre pressure is at a level where the safety of the vehicle can be jeopardized.
over pressure	The tyre pressure is higher than the pressure specified by the vehicle or tyre manufacturer.
no warning pressure	The tyre pressure is within the thresholds specified by the vehicle or tyre manufacturer.
under pressure	The tyre pressure is lower than the pressure specified by the vehicle or tyre manufacturer.
extreme under pressure	The tyre pressure is at a level where the safety of the vehicle can be jeopardized.

6.5.5.39 Air leakage detection

This parameter shall indicate the current air leakage (pressure loss) of a tyre. This parameter is used in conjunction with the tyre/wheel identification. Table 123 specifies the parameter description.

Table 123 — Specification of the parameter "air leakage detection"

Attribute	Value
data length	2 byte
resolution	0,1 Pa/s/bit
offset	0 Pa/s
data range	0 Pa/s to 6 425,5 Pa/s
operating range	0 Pa/s to 6 425,5 Pa/s
type	measured

6.5.5.40 Tyre temperature

This parameter shall indicate the current temperature of a tyre. This parameter is used in conjunction with the tyre/wheel identification. Table 124 specifies the parameter description.

Table 124 — Specification of the parameter "tyre temperature"

Attribute	Value
data length	2 byte
resolution	0,031 25 °C/bit
offset	−273 °C
data range	−273 °C to 1 735 °C
operating range	−273 °C to 1 735 °C
type	measured

6.5.5.41 Tyre module power supply status

This parameter shall indicate the current status of the power supply of the tyre module. It shall indicate whether it is sufficient to achieve the specified performance of the module. This parameter is used in conjunction with the tyre/wheel identification. Table 125 specifies the parameter description.

Table 125 — Specification of the parameter "tyre module power supply status"

Attribute	Value
data length	2 bit
data range	00_2 — insufficient power supply 01_2 — sufficient power supply
type	measured

6.5.5.42 Axle load

This parameter shall indicate the static vertical load of a vehicle axle identified by a tyre/wheel identification parameter (see 6.5.3.1). Table 126 specifies the parameter description.

Table 126 — Specification of the parameter "axle load"

Attribute	Value
data length	2 byte
resolution	0,5 kg/bit
offset	0 kg
data range	0 kg to 32 127,5 kg
operating range	0 kg to 32 127,5 kg
type	measured

6.5.5.43 Axle load calibration data storage request

This parameter shall command the request to store the following axle load calibration data in the ECU:

— the supplied externally measured axle load;

— the internally measured axle load of the axle identified by the tyre/wheel identification;

— the current date;

There are two types of axle load calibration requests.

— For the first type of calibration (00_2), the external axle loads are provided and stored one axle at a time.

— For the second type of calibration (01_2), the towed vehicle is put on a scale for complete vehicles in a sequence where the entire towed vehicle is put on a scale on the first request, all axles except the first axle on the second request, and so on until the last request with only the last axle of the towed vehicle on a scale. In this type of calibration, the tyre/wheel identification is used to identify which axle that is being calibrated indicates the first axle on a scale, and it is assumed that all the following axles are also on a scale. When an entire sequence has been performed, the towed vehicle can calculate the calibration data for each individual axle and store this data just like the first type of calibration.

A request to store the axle load calibration data is acknowledged by "Axle load calibration data storage" (see 6.5.5.44). Table 127 specifies the parameter description.

Table 127 — Specification of the parameter "axle load calibration data storage request"

Attribute	Value
data length	2 bit
data range	00_2 — store axle load calibration data using the individual axle scale 01_2 — store axle load calibration data using the vehicle scale sequence 11_2 — take no action
type	measured

6.5.5.44 Axle load calibration data storage status

This parameter shall indicate the storage status of a new axle load calibration data in the ECU. Each successful axle load calibration data storage request shall be acknowledged with a "new axle load calibration data stored" even though the actual data storage can be postponed until a complete axle calibration sequence has been performed. Table 128 specifies the parameter description.

Table 128 — Specification of the parameter "axle load calibration data storage status"

Attribute	Value
data length	2 bit
data range	00_2 — no new axle load calibration data storage request 01_2 — new axle load calibration data stored 10_2 — calibration aborted due to timeout or error 11_2 — axle load calibration not supported
type	measured

6.5.5.45 Axle load measured by external scale

This parameter shall indicate the static vertical load, measured by an external scale at the time of the axle load calibration, of one or several vehicle axles identified by the tyre/wheel identification and axle load calibration data storage request.

— If the axle load calibration data storage request is "Store axle load calibration data using individual axle scale", this parameter shall indicate the static vertical load of the vehicle axle identified by the tyre/wheel identification measured by an external scale at the time of the axle load calibration.

— If the axle load calibration data storage request is "Store axle load calibration data using vehicle scale sequence", this parameter shall indicate the total static vertical load of the vehicle axles starting from the vehicle axle identified by the tyre/wheel identification and all the following vehicle axles until the last vehicle axle measured by an external scale at the time of the axle load calibration.

Table 129 specifies the parameter description.

Table 129 — Specification of the parameter "axle load measured by external scale"

Attribute	Value
data length	2 byte
resolution	1 kg/bit
offset	0 kg
data range	0 kg to 64 255 kg
operating range	0 kg to 64 255 kg
type	measured

6.5.5.46 Axle load measured by towed vehicle

This parameter shall indicate the static vertical load, measured by the towed vehicle at the time of the axle load calibration, of one or several vehicle axles identified by the tyre/wheel identification and axle load calibration data storage request. Table 130 specifies the parameter description.

Table 130 — Specification of the parameter "axle load measured by towed vehicle"

Attribute	Value
data length	2 byte
resolution	1 kg/bit
offset	0 kg
data range	0 kg to 64 255 kg
operating range	0 kg to 64 255 kg
type	measured

6.5.5.47 Axle load calibration data load level

This parameter shall indicate the load case the calibration data belongs to. Each axle can be calibrated at one out of the three levels: heavy, medium, and light load. Table 131 specifies the parameter description.

Table 131 — Specification of the parameter "axle load calibration data load level"

Attribute	Value
data length	2 bit
data range	00_2 — axle load calibration data for low load 01_2 — axle load calibration data for heavy load 10_2 — axle load calibration data for medium load 11_2 — axle load calibration not supported
type	measured

6.5.5.48 Axle load calibration type

This parameter shall indicate the type of calibration used. The towed vehicle can choose whether to use or not to use the stored calibration data when calculating the axle load.

— Normally, the towed vehicle does not use the stored calibration data and any external application that wants the calibrated axle loads has to use the stored calibration data to calculate the calibrated axle loads.

— If the towed vehicle has chosen to include the stored calibration data when calculating the axle loads, any external application shall not use the stored calibration data again.

Table 132 specifies the parameter description.

Table 132 — Specification of the parameter "axle load calibration type"

Attribute	Value
data length	2 bit
data range	00_2 — stored calibration data used for axle load output (Stored calibration data shall not be used for external compensation.) 11_2 – stored calibration data not used for axle load output (Stored calibration data can be used for external calculation of the calibrated axle loads.)
type	measured

6.5.5.49 Extended ride height and ramp level storage

This parameter shall indicate whether the towed vehicle supports the storage of four extra drive heights and four extra ramp levels. Table 133 specifies the parameter description.

Table 133 — Specification of the parameter "extended ride height and ramp level storage"

Attribute	Value
data length	2 bit
data range	00_2 — extended ride height and ramp level storage supported (Ride height can be stored in all three sets.) 01_2 — extended ride height and ramp level storage supported (Ride height can only be stored in the two extended sets.) 11_2 — extended drive height and ramp level storage not supported
type	measured

6.5.5.50 Ride height and ramp level set request

This parameter shall command the request for a set of stored ride heights and ramp levels to use in combination with the ride height request, ride height storage request, ramp level request, and ramp level storage request. If extended ride height and ramp level storage is not supported, the default set is used independent of the value of this signal. Table 134 specifies the parameter description.

Table 134 — Specification of the parameter "ride height and ramp level set request"

Attribute	Value
data length	2 bit
data range	00_2 — use the extended set 1 of the stored ride heights and ramp levels 01_2 — use the extended set 2 of the stored ride heights and ramp levels 11_2 — use the default set of the stored ride heights and ramp levels
type	status

6.5.5.51 Ride height storage request

This parameter shall command the request to store the actual body height level as new programmed and memorized ride height 1 or 2 in the requested ride height set in the ECU. A request to store a ride height shall be sent in five successive messages followed by messages with "ride height storage request" set to "take no action". Less than five messages are allowed if the receiver acknowledges through "ride height level storage". Table 135 specifies the parameter description.

Table 135 — Specification of the parameter "ride height storage request"

Attribute	Value
data length	2 bit
data range	00_2 — store ride height 1 01_2 — store ride height 2 11_2 — take no action
type	status

6.5.5.52 Ride height storage

This parameter shall indicate the current status of the ride high storage in the levelling control system as a response to the "ride high storage request". Table 136 specifies the parameter description.

Table 136 — Specification of the parameter "ride height storage"

Attribute	Value
data length	2 bit
data range	00_2 — no new ride height storage request 01_2 — new ride height stored 10_2 — ride height cannot be stored in the requested set
type	measured

6.6 Messages

6.6.1 General

This subclause specifies the PGNs and messages to use on the electrical connection between the towing and towed vehicles.

All undefined/reserved bits shall be transmitted with a value of "1". All undefined/reserved bits shall be treated as "don't care" (either masked out or ignored).

A PGN is described by a short form of the function (e.g. EBS for electronic braking system and RGE for running gear equipment) and two numbers.

The first number stands for the transmission direction,

— "1" for the transmission from the towing to the towed vehicle and

— "2" for the transmission from the towed to the towing vehicle.

The second number is an index number starting with "1".

For the dynamic address assignment, one of the PDU 1 type messages to be sent from the towing vehicle to the towed vehicle with the smallest transmission repetition time is specified as the standard initialization message. This message, as well as one of the PDU 1 type messages to be sent from a towed vehicle to its predecessor with the smallest transmission repetition time, shall be sent continuously. Details are given in the message specification.

Tables 137 and 138 give an overview of the defined PGNs for the PDU 1 and PDU 2 type messages. Annex B gives an (informative) overview of all the messages.

The messages transmitted on the interface are distinguished by their unique identifier. The transmission repetition times are specified for messages with particular identifiers. For example, if there are three towed vehicles, the towing vehicle has to send one RGE11 message (PDU 1 type) to the first towed vehicle, one to the second and one to the third, each with a repetition time of 100 ms.

The repetition time of PDU 2 type messages is independent of the number of towed vehicles.

The messages EBS11 and EBS21 shall be transmitted only between two directly coupled vehicles for optimal brake control between these two units. Since EBS21 also contains information that is relevant to the commercial vehicle (warning information to the driver), this information is also mapped into the message EBS22.

Table 137 — Overview of the PDU1 format messages

P	EDP	DP	PF	PS	PGN	Label	Acronym	Rep' time	Remarks
3	0	0	2	DA	512	electronic brake system #1/1	EBS11	10 ms	
3	0	0	3	DA	768	electronic brake system #2/1	EBS21	10 ms	
6	0	0	228	DA	58 368	running gear equipment #1/1	RGE11	100 ms	replaces GFM 12 of ISO 11992-3:1998
6	0	0	138	DA	35 328	running gear equipment #1/2	RGE12	1 000 ms	added with this revision
6	0	0	229	DA	58 624	running gear equipment #2/1	RGE21	100 ms	replaces GFM 22 of ISO 11992-3:1998
6	0	0	137	DA	35 072	running gear equipment #2/4	RGE24	1 000 ms	added with this revision

Table 138 — Overview of the PDU2 format messages

P	EDP	DP	PF	PS	PGN	Label	Acronym	Rep' time	Remarks
6	0	0	254	201	65 225	electronic brake system #1/2	EBS12	100 ms	
6	0	0	254	196	65 220	electronic brake system #2/2	EBS22	100 ms	
6	0	0	254	198	65 222	electronic brake system #2/3	EBS23	100 ms	
6	0	0	253	154	64 922	electronic brake system #2/4	EBS24	1 000 ms	
6	0	0	240	32	61 472	electronic brake system #2/5	EBS25	100 ms	
3	0	0	240	31	61 471	electronic brake system #2/6	EBS26	10 ms	
6	0	0	254	92	65 116	running gear equipment #2/2	RGE22	100 ms	
6	0	0	254	94	65 118	running gear equipment #2/3	RGE23	1 000 ms	
6	0	0	254	230	65 254	time/date #1/1	TD11	1 000 ms	

NOTE The repetition time of EBS25 was defined as 50 ms in ISO 11992-2:2003, AMD1 and is changed to 100 ms in the third revision.

Additionally, Table 139 gives an overview of the messages defined for the diagnostic communication purposes between the commercial vehicle and any towed vehicle. Table 140 gives an overview of the PDU 3 type messages for the subnet addressing communication purposes between any of the towed vehicles.

Usage and data contents of those messages shall be in accordance with ISO 11992-4.

Table 139 — Overview of the diagnostic PDUs

P	EDP	DP	PF	PS	PGN	Label	Acronym	Rep' time	Remarks
7	0	0	206	DA	52 736	diagnostic channel physical addressing	DCC11	n/a	sent from the towing to the towed vehicle
7	0	0	206	DA	52 736	diagnostic channel physical addressing	DCC21	n/a	sent from the towed to the towing vehicle
7	0	0	205	DA	52 480	diagnostic channel functional addressing	DCC12	n/a	sent from the towing to the towed vehicle
7	0	0	205	DA	52 480	diagnostic channel functional addressing	DCC22	n/a	sent from the towed to the towing vehicle

NOTE DCC11 and DCC21 refer to the same PGN as KWP3 in SAE J1939.

NOTE DCC12 and DCC22 refer to the same PGN as KWP4 in SAE J1939.

Table 140 — Overview of the subnet addressing diagnostic messages

P	EDP	DP	–	–	–	Label	Acronym	Rep' time	Remarks
7	1	1	–	–	–	subnet addressing diagnostic channel	DCCX	n/a	sent from any towed to any other vehicle

For each PGN specified in the following subsections, the attribute and message definitions given in Table 141 and Table 142 shall apply.

Table 141 — PGN attribute definition

Attribute	Definition
transmission repetition time	nominal time and tolerance between two subsequently transmitted messages
data length	number of bytes of the message
extended data page	value of the parameter EDP specified in 6.1
data page	value of the parameter DP specified in 6.1
PDU format	value of the parameter PF specified in 6.1
PDU specific	value of the parameter PS specified in 6.1
default priority	value of the parameter P specified in 6.1
PGN	value of the parameter PGN specified in 6.2

Table 142 — PGN message definition

Column title	Definition
byte pos	byte offset of the specified parameter starting with 1 (one) for the first byte
bit pos	bit offset of the specified parameter starting with 1 (one) for the LSB
parameter	name of the parameter as specified in 6.5
reference	reference to the subsection number of the specified parameter
new	attribute indicating if the parameter has been added with this revision of the document

6.6.2 Message transmission in the case of multiple trailers

If more than one trailer is connected to the commercial vehicle, the number of CAN frames per second needs to be reduced to meet the requirements of the physical data interfaces concerning bus load. In this case, the following restrictions shall apply.

— All messages shall be sent with the repetition rate as defined in this International Standard.

— The messages EBS26 shall only be sent in the case of one trailer. If more than one towed vehicle is present, the message EBS26 shall not been sent at all by all towed vehicle.

6.6.3 System independent PGNs, transmitted from the towing to the towed vehicle

6.6.3.1 PGN 65254 — TD11 — Time/Date #1/1

If supported, this message should be sent by the commercial vehicle and forwarded by the other towing vehicles. Table 143 specifies the PGN attributes. Table 144 specifies the PGN content.

Table 143 — PGN 65254 — TDE11 attribute definition

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 230
default priority	6
PGN	65254_{10}/$00FEE6_{16}$

Table 144 — PGN 65254 — TDE11 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1		seconds	6.5.3.2	
2		minutes	6.5.3.3	
3		hours	6.5.3.4	
4		day	6.5.3.5	
5		month	6.5.3.6	
6		year	6.5.3.7	
7		local minute offset	6.5.3.8	
8		local hour offset	6.5.3.9	

6.6.4 Electronic brake system PGNs, transmitted from the towing to the towed vehicle

6.6.4.1 PGN 512 — EBS11 — Electronic brake system #1/1

This PGN shall be sent by the towing vehicle(s) and shall be transmitted between directly coupled vehicles only. This PGN shall be used as the general initialization message for the address assignment at the receiving vehicle's node. Table 145 specifies the PGN attributes. Table 146 specifies the PGN content.

Table 145 — PGN 511 — EBS11 attribute definition

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	2 (PDU1)
PDU specific	DA (address of the successor)
default priority	3
PGN	$512_{10}/000200_{16}$

Table 146 — PGN 512 — EBS11 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	vehicle ABS status	6.5.4.15	
	3 to 4	vehicle retarder control status	6.5.4.12	
	5 to 6	ASR brake control status	6.5.4.22	
	7 to 8	ASR engine control status	6.5.4.23	
2	1 to 2	brake light switch	6.5.4.29	
	3 to 4	vehicle type	6.5.4.30	
	5 to 6	VDC active	6.5.4.35	
	7 to 8	reserved by document	–	
3 to 4	–	service brake demand pressure	6.5.4.3	
5	–	park brake demand relative pressure	6.5.4.1	
6	–	retarder demand relative torque	6.5.4.2	
7	–	relative brake demand for front or left vehicle side	6.5.4.40	
8	–	relative brake demand for rear or right vehicle side	6.5.4.41	

6.6.4.2 PGN 65225 — EBS12 – Electronic brake system #1/2

This PGN shall be sent by the towing vehicle(s). Table 147 specifies the PGN attributes. Table 148 specifies the PGN content.

Table 147 — PGN 65225 — EBS12 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 201
default priority	6
PGN	65225_{10}/$00FEC9_{16}$

Table 148 — PGN 65225 — EBS12 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	vehicle retarder control status	6.5.4.12	
	3 to 4	ROP system status	6.5.4.56	
	5 to 6	YC system status	6.5.4.57	
	7 to 8	reserved by document	–	
2	1 to 2	trailer ROP system request	6.5.4.58	
	3 to 4	trailer YC system request	6.5.4.59	
	5 to 6	reverse gear status	6.5.4.62	X
	7 to 8	emergency braking status	6.5.4.64	X
3	1 to 2	two electrical circuits brake demand status	6.5.4.25	
	3 to 4	ABS off-road request	6.5.4.21	
	5 to 6	pneumatic control line status	6.5.4.24	
	7 to 8	load proportional function installation status	6.5.4.20	X
4	–	reserved by document	–	
5 to 6	–	road curvature	6.5.4.36	
7 to 8	–	braking system wheel-based vehicle speed	6.5.4.4	

6.6.5 Running gear equipment PGNs, transmitted from the towing to the towed vehicle

6.6.5.1 PGN 58368 — RGE11 — Running gear equipment #1/1

If supported, this PGN should be sent by the towing vehicle(s). It can be sent to each towed vehicle individually and/or to the global address (all towed vehicles). If the global destination address is used, the PGNs shall only be sent to the successor vehicles. Table 149 specifies the PGN attributes. Table 150 specifies the PGN content.

Table 149 — PGN 58368 — RGE11 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	228 (PDU1)
PDU specific	DA (address of the towed vehicle)
default priority	6
PGN	58368_{10}/$00E400_{16}$

Table 150 — PGN 58368 — RGE11 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	ride height request	6.5.5.26	
	3 to 4	level change request, front axle	6.5.5.8	
	5 to 6	level change request, rear axle	6.5.5.9	
	7 to 8	traction help (load transfer) request	6.5.5.24	
2	1 to 2	lift axle 1 position request	6.5.5.12	
	3 to 4	lift axle 2 position request	6.5.5.13	
	5 to 6	steering axle locking request	6.5.5.22	
	7 to 8	ramp level request	6.5.5.29	
3	1 to 2	level control request	6.5.5.6	
	3 to 4	ramp level storage request	6.5.5.32	
	5 to 6	stop level change request	6.5.5.34	
	7 to 8	ride height storage request	6.5.5.51	X
4 to 5	–	driven axle load (commercial vehicle)	6.5.5.1	
6	–	parking and trailer air pressure	6.5.5.36	
7	–	auxiliary equipment supply pressure	6.5.5.37	
8	1 to 2	lift axle 3 position request	6.5.5.14	X
	3 to 4	lift axle 4 position request	6.5.5.15	X
	5 to 6	lift axle 5 position request	6.5.5.16	X
	7 to 8	ride height and ramp level set request	6.5.5.50	X

6.6.5.2 PGN 35328 — RGE12 — Running gear equipment #1/2

If supported, this PGN should be sent by the towing vehicle(s). The parameter identification data index serves as an index to an array of data transmitted in the parameter identification data content and should continuously cycle through all the supported values, but no specific order of index values shall be assumed on the receiver side.

Table 151 specifies the PGN attributes. Table 152 specifies the PGN content.

Table 151 — PGN 35328 — RGE12 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	138 (PDU1)
PDU specific	DA (address of the towed vehicle)
default priority	6
PGN	$35328_{10}/008A00_{16}$

Table 152 — PGN 35328 — RGE12 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	axle load calibration data storage request	6.5.5.43	X
	3 to 8	reserved by document	–	
2	–	tyre/wheel identification	6.5.3.1	X
3 to 4	–	axle load measured by external scale	6.5.5.45	X
5	–	identification data index	6.5.3.10	X
6	–	identification data content	6.5.3.11	X
7 to 8	–	reserved by document	–	

It is recommended that this PGN should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values shall be assumed on the receiver side.

6.6.6 System independent PGNs, transmitted from the towed to the towing vehicle

There are currently no PGNs defined within this group.

6.6.7 Electronic brake system PGNs, transmitted from the towed to the towing vehicle

6.6.7.1 PGN 768 — EBS21 — Electronic brake system #2/1

This PGN shall be sent by the towed vehicle(s). Table 153 specifies the PGN attributes. Table 154 specifies the PGN content.

Table 153 — PGN 768 — EBS21 attribute definition

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	3 (PDU1)
PDU specific	DA (address of the predecessor)
default priority	3
PGN	$768_{10}/000300_{16}$

Table 154 — PGN 768 — EBS21 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	vehicle ABS status	6.5.4.15	
	3 to 4	vehicle retarder control status	6.5.4.12	
	5 to 6	vehicle service brake status	6.5.4.13	
	7 to 8	automatic towed vehicle braking status	6.5.4.14	
2	1 to 2	VDC active	6.5.4.35	
	3 to 4	support of side or axle wise brake force distribution	6.5.4.42	
	5 to 8	reserved by document	–	
3 to 4	–	braking system wheel-based vehicle speed	6.5.4.4	
5	–	retarder relative peak torque	6.5.4.6	
6 to 7	–	wheel speed difference main axle	6.5.4.37	
8	–	lateral acceleration	6.5.4.43	

6.6.7.2 PGN 65220 — EBS22 — Electronic brake system #2/2

This PGN shall be sent by the towed vehicle(s). Table 155 specifies the PGN attributes. Table 156 specifies the PGN content.

Table 155 — PGN 65220 — EBS22 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 196
default priority	6
PGN	65220_{10}/$00FEC4_{16}$

Table 156 — PGN 65220 — EBS22 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	vehicle ABS status	6.5.4.15	
	3 to 4	vehicle retarder control status	6.5.4.12	
	5 to 6	vehicle service brake status	6.5.4.13	
	7 to 8	automatic towed vehicle braking status	6.5.4.14	
2	1 to 2	vehicle electrical supply status	6.5.4.16	
	3 to 4	red warning signal request	6.5.4.31	
	5 to 6	amber warning signal request	6.5.4.32	
	7 to 8	electrical supply of non-braking systems status	6.5.4.33	
3	1 to 2	spring brake installation status	6.5.4.18	
	3 to 4	electrical load proportional function installation status	6.5.4.19	
	5 to 6	vehicle type	6.5.4.30	
	7 to 8	spring brake status	6.5.4.39	
4	1 to 2	loading ramp approach assistance status	6.5.4.34	
	3 to 4	supply line braking	6.5.4.38	
	5 to 6	stop lamps request	6.5.4.44	
	7 to 8	braking via electric control line support	6.5.4.45	
5 to 6	–	axle load sum	6.5.4.7	
7 to 8	–	retarder reference torque	6.5.4.5	

6.6.7.3 PGN 65222 — EBS23 — Electronic brake system #2/3

This PGN shall be sent by the towed vehicle(s). All tyre-related parameters at the data bytes 1, 5, 6, and 7 shall be interpreted in conjunction with the corresponding tyre/wheel identification given in bytes 2, 3, and 4. The tyre/wheel identification shall only be interpreted when the corresponding parameter is supported and has no relevance if the corresponding parameter is not supported. Table 157 specifies the PGN attributes. Table 158 specifies the PGN content.

Table 157 — PGN 65222 — EBS23 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 198
default priority	6
PGN	65222_{10}/$00FEC6_{16}$

Table 158 — PGN 65222 — EBS23 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	tyre pressure status	6.5.4.26	
	3 to 4	brake lining status	6.5.4.27	
	5 to 6	brake temperature status	6.5.4.28	
	7 to 8	vehicle pneumatic supply status	6.5.4.17	
2	–	tyre/wheel identification (for tyre pressure, byte 5)	6.5.3.1	
3	–	tyre/wheel identification (for brake lining, byte 6)	6.5.3.1	
4	–	tyre/wheel identification (for brake temperature, byte 7)	6.5.3.1	
5	–	tyre pressure	6.5.4.11	
6	–	brake lining	6.5.4.9	
7	–	brake temperature	6.5.4.10	
8	–	pneumatic supply pressure	6.5.4.8	

NOTE The definition for the PGN has been revised since the previous version to make clear that the parameters in byte 1 are also tyre/wheel related. As this was not unambiguously defined, the parameters in byte 1 are implemented as an overall system status on some trailer systems. These implementations need to be changed to fulfil this revision of the standard but are in compliance to the previous one.

It is recommended that this PGN should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values shall be assumed on the receiver side.

6.6.7.4 PGN 64922 — EBS24 — Electronic brake system #2/4

If supported, this PGN should be sent by the towed vehicle(s). The parameter “geometric data index” serves as an index to an array of data transmitted in the parameter “geometric data indexed content” and should continuously cycle through all supported values, but no specific order of index values shall be assumed on the receiver side. Table 159 specifies the PGN attributes. Table 160 specifies the PGN contents.

Table 159 — PGN 64922 — EBS24 attribute definition

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	253 (PDU2)
PDU specific	GE = 154
default priority	6
PGN	64922_{10}/$00FD9A_{16}$

Table 160 — PGN 64922 — EBS24 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	–	geometric data index	6.5.4.46	
2	–	geometric data indexed content	6.5.4.47	
3	1 to 4	towed vehicle detection status	6.5.4.61	X
	5 to 6	vehicle combination ABS status	6.5.4.60	X
	7 to 8	reserved by document	–	
4 to 8	–	reserved by document	–	

6.6.7.5 PGN 61472 — EBS25 — Electronic brake system #2/5

This PGN shall be sent by the towed vehicle(s). Table 161 specifies the PGN attributes. Table 162 specifies the PGN contents.

Table 161 — PGN 61472 — EBS25 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 173
default priority	6
PGN	61472_{10}/$00F020_{16}$

Table 162 — PGN 61472 — EBS25 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	–	brake cylinder pressure first axle, left wheel	6.5.4.48	
2	–	brake cylinder pressure first axle, right wheel	6.5.4.49	
3	–	brake cylinder pressure second axle, left wheel	6.5.4.50	
4	–	brake cylinder pressure second axle, right wheel	6.5.4.51	
5	–	brake cylinder pressure third axle, left wheel	6.5.4.52	
6	–	brake cylinder pressure third axle, right wheel	6.5.4.53	
7	1 to 2	ROP system status	6.5.4.56	
	3 to 4	YC system status	6.5.4.57	
	5 to 6	external brake request status	6.5.4.63	X
	7 to 8	reserved by document	–	
8	–	reserved by document	–	

NOTE The transmission repetition time was defined as 50 ms in ISO 11992-2:2003, AMD1 and is changed to 100 ms in the third revision.

6.6.7.6 PGN 61471 — EBS26 — Electronic brake system #2/6

If supported, this PGN should be sent by the first towed vehicle. It shall not be sent by any towed vehicle if the road train consists of multiple towed vehicles. Table 163 specifies the PGN attributes. Table 164 specifies the PGN contents.

Table 163 — PGN 61471 — EBS26 attribute definition

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 110
default priority	3
PGN	61471_{10}/$00F01F_{16}$

Table 164 — PGN 61471 — EBS26 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1 to 2	–	wheel speed first axle, left wheel	6.5.4.54	
3 to 4	–	wheel speed first axle, right wheel	6.5.4.55	
5 to 8	–	reserved by document	–	

6.6.8 Running gear equipment PGNs, transmitted from towed to towing vehicle

6.6.8.1 PGN 58624 — RGE21 — Running gear equipment #2/1

If supported, this PGN should be sent by the towed vehicle(s) to the commercial vehicle. Table 165 specifies the PGN attributes. Table 166 specifies the PGN contents.

Table 165 — PGN 58624 — RGE21 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	229 (PDU1)
PDU specific	DA (address of the commercial vehicle)
default priority	6
PGN	58624_{10}/$00E500_{16}$

Table 166 — PGN 58624 — RGE21 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	1 to 2	ride height level	6.5.5.27	
	3 to 4	level control status	6.5.5.7	
	5 to 6	traction help (load transfer) status	6.5.5.25	
	7 to 8	ramp level position	6.5.5.31	
2	1 to 2	lift axle 1 position	6.5.5.17	
	3 to 4	lift axle 2 position	6.5.5.18	
	5 to 6	steering axle locking status	6.5.5.23	
	7 to 8	reserved by document[a]	–	
3	1 to 2	ride height storage[b]	6.5.5.52	X
	3 to 4	ramp level storage status	6.5.5.33	
	5 to 6	level change status, front axle	6.5.5.10	
	7 to 8	level change status, rear axle	6.5.5.11	
4	1 to 2	stop level change acknowledge	6.5.5.35	
	3 to 4	normal level	6.5.5.28	
	5 to 6	ramp level	6.5.5.30	
	7 to 8	extended ride height and ramp level storage	6.5.5.49	X
5 to 6	–	nominal vehicle body level, front axle	6.5.5.2	
7 to 8	–	nominal vehicle body level, rear axle	6.5.5.3	

[a] Former “ODD status” in ISO 11992-3:1998. If the parameter is implemented as defined in the first edition, it can lead to incompatibilities.

[b] Former “Anti-theft device” in ISO 11992-3:1998. If the parameter is implemented as defined in the first edition, it can lead to incompatibilities.

6.6.8.2 PGN 65116 — RGE22 — Running gear equipment #2/2

If supported, this PGN should be sent by the towed vehicle(s). All tyres-related parameters shall be interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification shall only be interpreted if the corresponding parameter is supported.

Table 167 specifies the PGN attributes. Table 168 specifies the PGN contents.

Table 167 — PGN 65116 — RGE22 attribute definition

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 92
default priority	6
PGN	65116_{10}/$00FE5C_{16}$

Table 168 — PGN 65116 — RGE22 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1 to 2	–	relative vehicle body level, front axle	6.5.5.4	
3 to 4	–	relative vehicle body level, rear axle	6.5.5.5	
5	–	tyre/wheel identification for the parameter “axle load”	6.5.3.1	
6 to 7	–	axle load	6.5.5.42	
8	–	reserved by document	–	

It is recommended that this PGN should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values shall be assumed on the receiver side.

6.6.8.3 PGN 65118 — RGE23 — Running gear equipment #2/3

If supported, this PGN should be sent by the towed vehicle(s). All tyres-related parameters shall be interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification shall only be interpreted when the corresponding parameter is supported.

Table 169 specifies the PGN attributes. Table 170 specifies the PGN contents.

Table 169 — PGN 65118 — RGE23 attribute definition

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 94
default priority	6
PGN	65118_{10}/$00FE5E_{16}$

Table 170 — PGN 65118 — RGE23 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	–	tyre/wheel identification	6.5.3.1	
2 to 3	–	tyre temperature	6.5.5.40	
4 to 5	–	air leakage detection	6.5.5.39	
6	1 to 3	tyre pressure threshold detection	6.5.5.38	
	4 to 5	tyre module power supply status	6.5.5.41	
	6 to 8	reserved by document	–	
7	–	identification data index	6.5.3.10	X
8	–	identification data content	6.5.3.11	X

It is recommended that this PGN should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values shall be assumed on the receiver side.

6.6.8.4 PGN 35072 — RGE24 — Running gear equipment #2/4

If supported, this PGN should be sent by the towed vehicle(s) to the commercial vehicle. All tyres-related parameters shall be interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification shall only be interpreted when the corresponding parameter is supported. Table 171 specifies the PGN attributes. Table 172 specifies the PGN contents.

Table 171 — PGN 35072 — RGE24 attribute definition

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	137 (PDU1)
PDU specific	DA (address of the commercial vehicle)
default priority	6
PGN	$35072_{10}/008900_{16}$

Table 172 — PGN 35072 — RGE24 parameter description

Byte pos	Bit pos	Parameter	Reference	New
1	–	tyre/wheel identification	6.5.3.1	X
2 to 3	–	axle load measured by towed vehicle	6.5.5.46	X
4 to 5	–	axle load measured by external scale	6.5.5.45	X
6	1 to 2	axle load calibration data load level	6.5.5.47	X
	3 to 4	axle load calibration type	6.5.5.48	X
	5 to 6	axle load calibration data storage	6.5.5.44	X
	7 to 8	reserved by document	–	
7	–	year	6.5.3.7	X
8	–	month	6.5.3.6	X

It is recommended that this PGN should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values shall be assumed on the receiver side.

7 Conformance tests

7.1 General

The conformance tests specify the methods for checking the message transmission of the towing and towed vehicles to ensure compatibility. The data content of the parameters is not part of the conformance tests. A test arrangement as shown in Figure 8 shall be used. The test device shall at least perform the required communication with the ECU, in accordance with this part of ISO 11992.

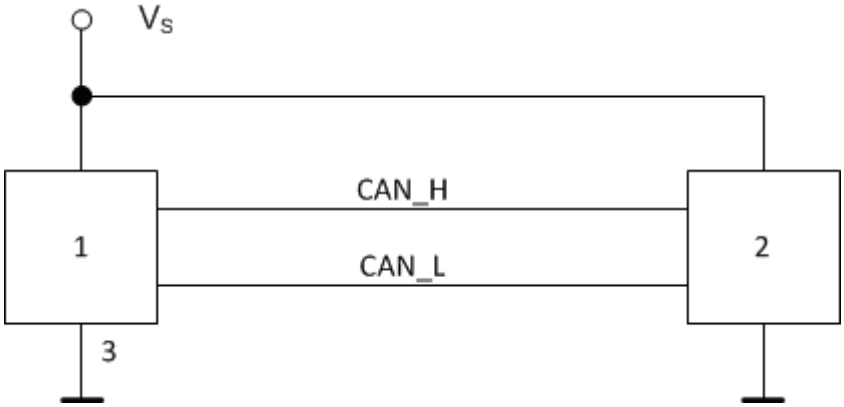
7.2 Conformance tests for commercial vehicles

7.2.1 Test of presence of required messages

After power-on, the test device shall communicate with the ECU to verify that all the required messages are transmitted by the ECU at least once.

7.2.2 Test of correct repetition time for all transmitted messages

The test device (see Figure 8) shall be configured to receive all the messages from the ECU. After receiving the messages under test, the repetition time (time between the start or end of one message and the next message with the same identifier) is measured for 101 messages. Each measured repetition time shall be between 70 % and 130 % of the nominal specified value. The average of the repetition times measured shall be between 90 % and 110 % of the nominal specified value.



Key

1 ECU
2 test device
3 ground

Figure 8 — Test arrangement

7.2.3 Test of absence of non-standardized messages

The test device shall check that there are no messages present other than those specified in this part of ISO 11992. Starting with power-up, the test and logging shall be performed for a minimum time of 10 s.

7.3 Conformance tests for towed vehicles

7.3.1 General

The test specified in 7.2 shall also be performed with the ECUs of the towed vehicles.

The following test procedure applies to the predecessor data connection of a towed vehicle's ECU. If provided for, it also applies to the successor data connection.

7.3.2 Procedure

After power-on, the test device shall send the standard initialization message with the SA corresponding to position #0.

Check the SA of the messages sent by the ECU on the predecessor data connection and, if provided for, also on the successor data connection.

After power-on, check that the ECU sends all the messages with the SA corresponding to position #1.

After reception of at least five of these messages, the test device shall start to send the standard initialization message with the SA corresponding to position #0 via the predecessor data connection.

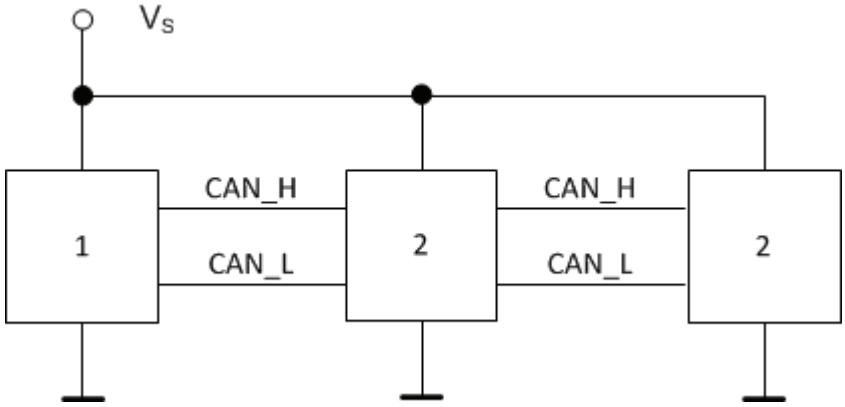
The test device shall then check that the ECU sends all the messages with the SA corresponding to position #1.

After reception of at least five of these messages, the test device shall start to send the standard initialization message with the SA corresponding to the next position. The test device shall then check that the ECU sends all the messages with the SA corresponding to the next higher position.

Continue this procedure until the ECU has sent all the messages with the SA corresponding to position #5.

7.3.3 Message routing test

This test applies only to ECUs with provision for a successor. The test arrangement shall be as shown in Figure 9. A bus load of at least 50 % on both data connections during each 10 ms time slot shall be present.



Key

1 test device

2 ECU

Figure 9 — Test arrangement

The ECU tested with the configuration corresponding to position #1 shall route the messages from the two test devices within the delay time, t_d, specified in 6.4.

Annex A
(normative)

Geometric data

This annex defines the geometric data used in this International Standard. Table A.1 defines the used geometrical data.

Table A.1 — Geometrical data

Key	Definition
w	track width, distance between the centre of the wheels at the same axle
l_1	length between the coupling point and the middle of the first axle
l_2	distance between the first axle and the second axle in the wheel base
l_3	distance between the second axle and the third axle in the wheel base
l_{tot}	total length of the towed vehicle
l_{cc}	distance between the first coupling point and the second coupling point of the towing semi-trailer
h_1	nominal coupling height over ground for the first coupling point
h_2	nominal coupling height over ground for the second coupling point
h_3	rear loading height
h_4	front loading height
h_5	total height over ground at the front of the towed vehicle
h_6	chassis height at the front of the towed vehicle
h_7	total height over ground at the rear of the towed vehicle

The following figures define the location of the defined geometrical data for the different vehicle types. For simplification, all figures for semi-trailer, full trailer, and centre-axle trailer are shown with a second coupling point but cannot be available on individual vehicles.

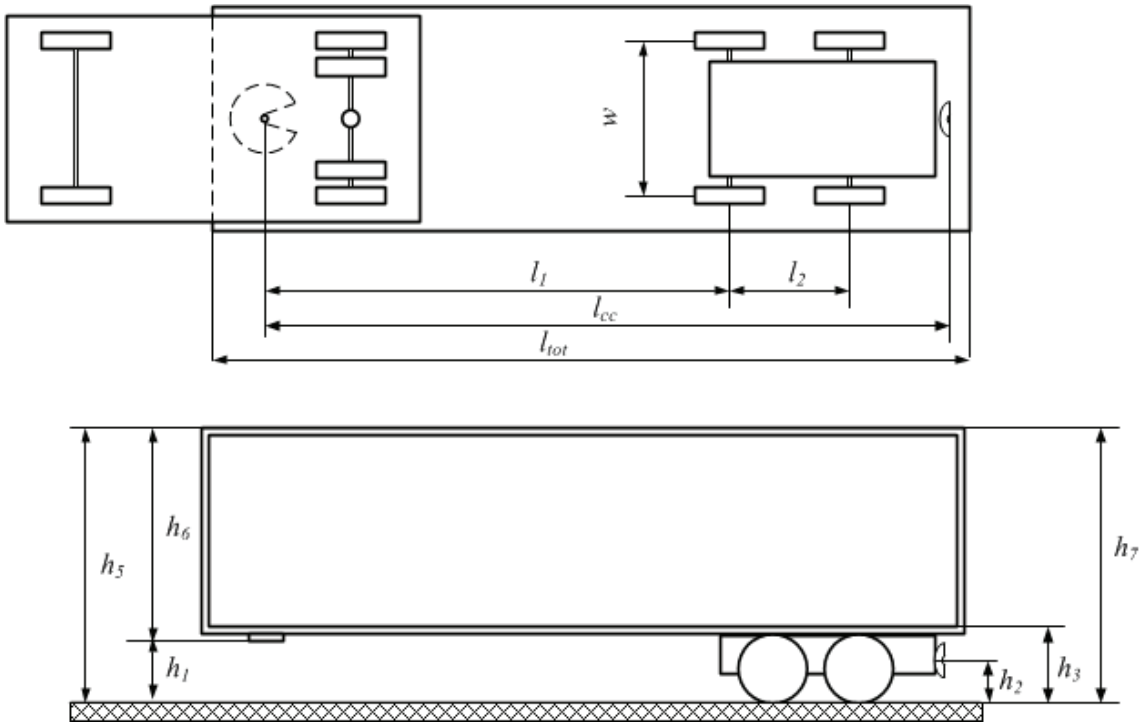


Figure A.1 — Semi-trailer

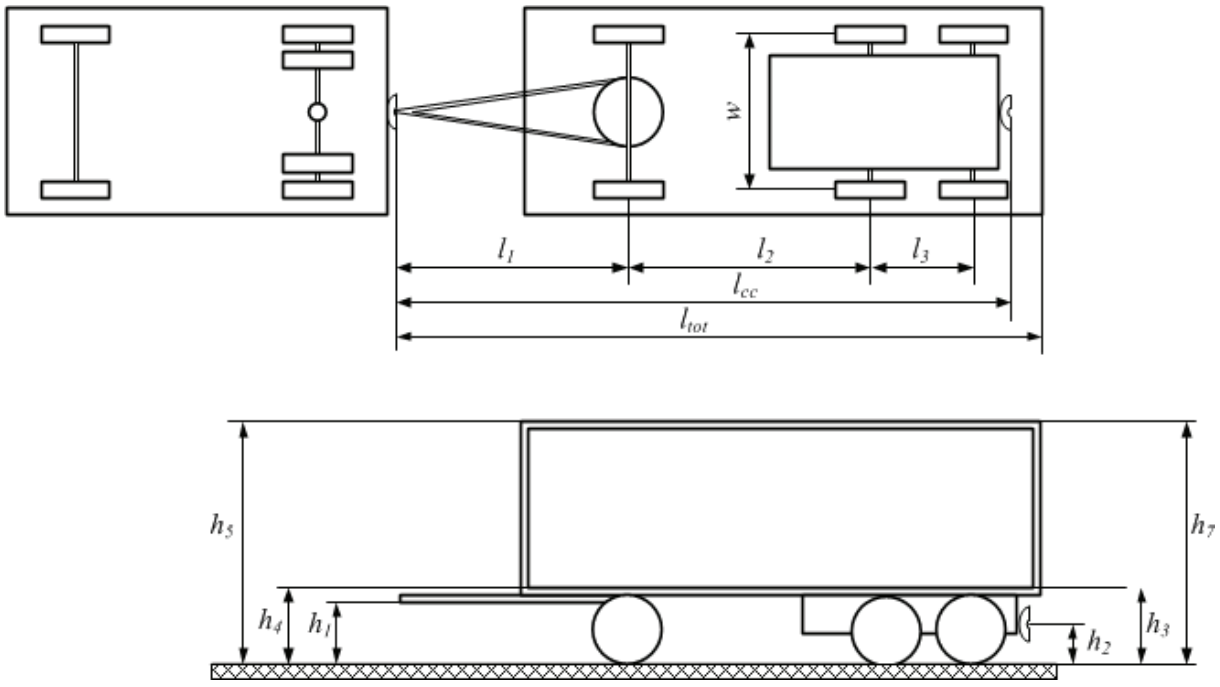


Figure A.2 — Full trailer

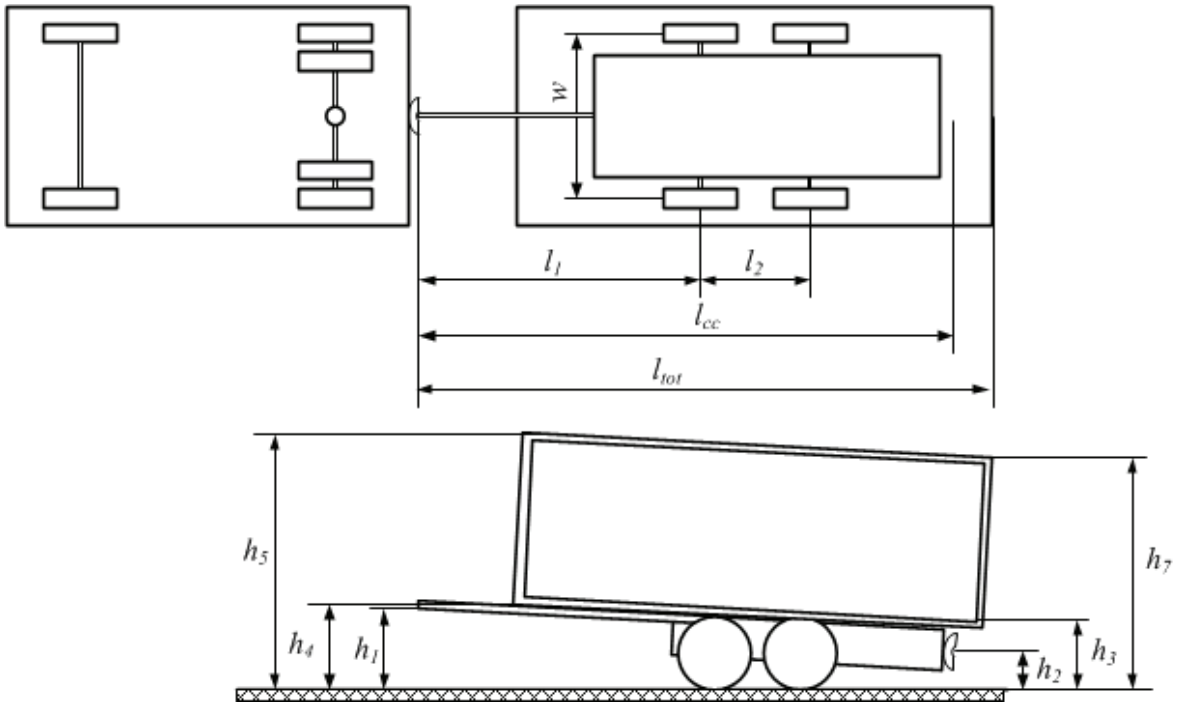


Figure A.3 — Center-axle trailer

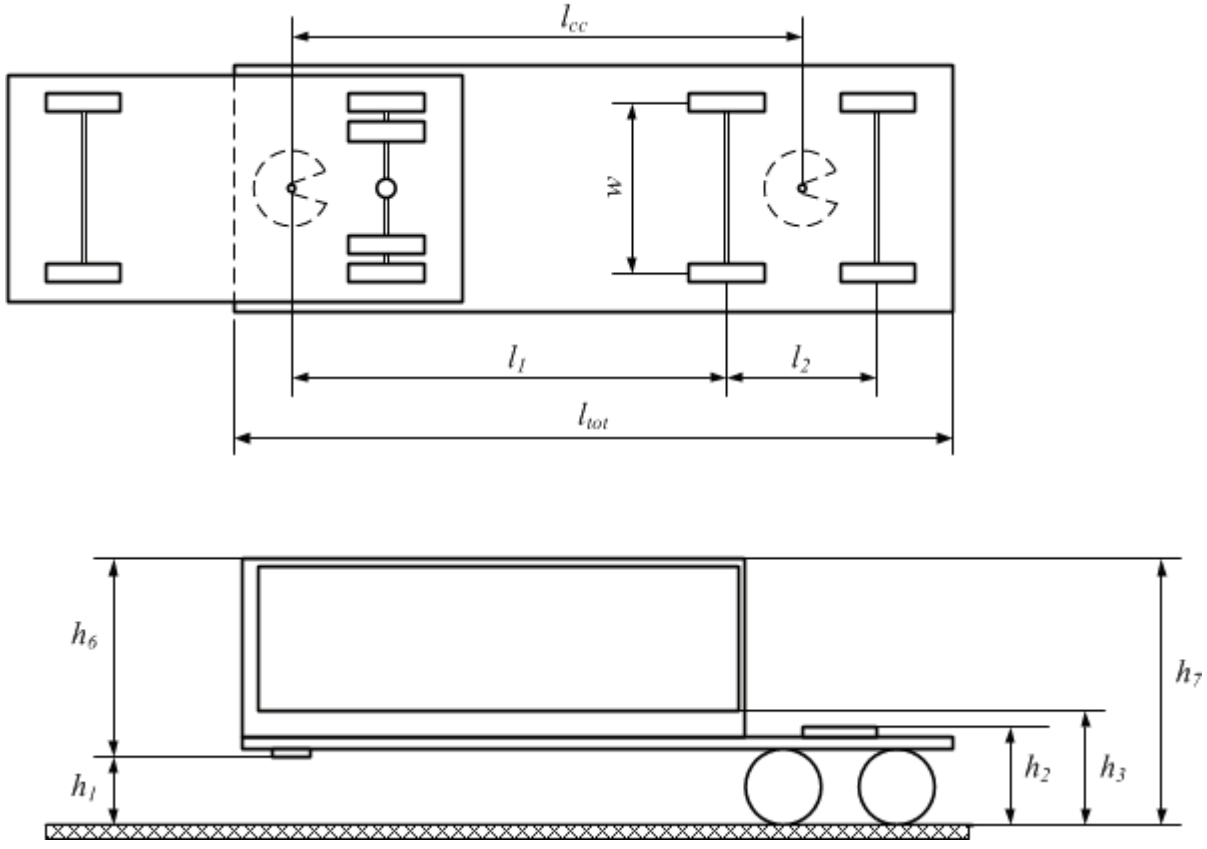


Figure A.4 — Link trailer

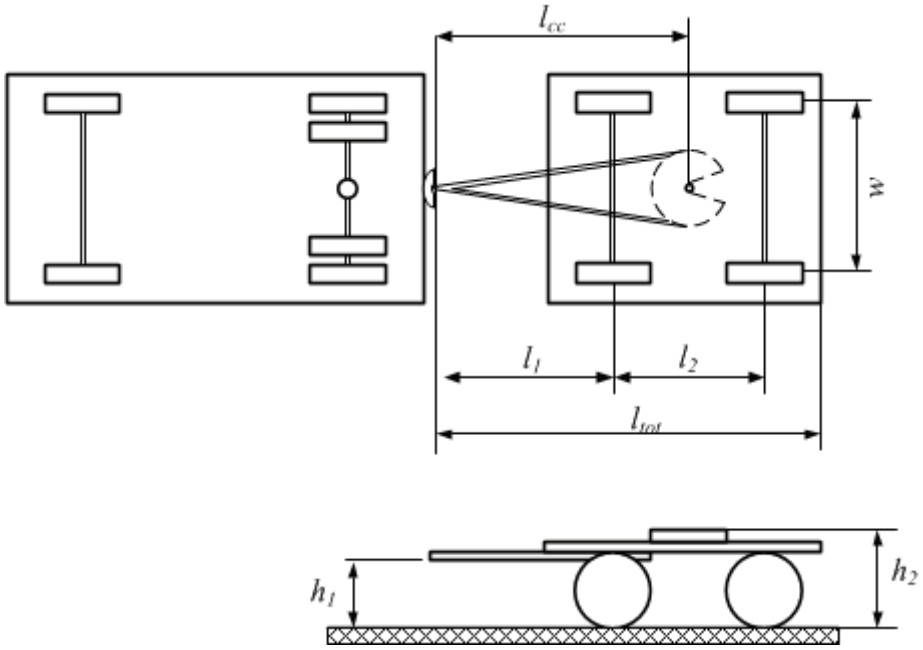


Figure A.5 — Converter dolly

Annex B
(informative)

Message flow

This annex describes the flow of messages as defined in ISO 11992-2 and this amendment.

Tables B.1, B.2, B.3, and B.4 use the following key:

— Gateway, forwards messages (G);

— Sender (S);

— Receiver (R).

Table B.1 — Message flow part 1

Msg	Tractor		Trailer #1		Trailer #2		Trailer #3		Trailer #4		Trailer #5	CAN-ID	Comment
EBS11	S	→	R									0C 02 C8 20	only sent between directly coupled vehicles
			S	→	R							0C 02 C0 C8	
					S	→	R					0C 02 B8 C0	
							S	→	R			0C 02 B0 B8	
									S	→	R	0C 02 A8 B0	
EBS12	S	→	R/G	→	R/G	→	R/G	→	R/G	→	R	18 FE C9 20	
			S	→	R/G	→	R/G	→	R/G	→	R	18 FE C9 C8	
					S	→	R/G	→	R/G	→	R	18 FE C9 C0	
							S	→	R/G	→	R	18 FE C9 B8	
									S	→	R	18 FE C9 B0	

Table B.2 — Message flow part 2

Msg	Tractor		Trailer #1		Trailer #2		Trailer #3		Trailer #4		Trailer #5	CAN-ID	Comment
EBS21	R	←	S									0C 03 20 C8	only sent between directly coupled vehicles
			R	←	S							0C 03 C8 C0	
					R	←	S					0C 03 C0 B8	
							R	←	S			0C 03 B8 B0	
									R	←	S	0C 03 B0 A8	
EBS22	R	←	S									18 FE C4 C8	
	R	←	G/R	←	S							18 FE C4 C0	
	R	←	G/R	←	G/R	←	S					18 FE C4 B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 FE C4 B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 FE C4 A8	

Table B.2 *(continued)*

Msg	Tractor		Trailer #1		Trailer #2		Trailer #3		Trailer #4		Trailer #5	CAN-ID	Comment
EBS23	R	←	S									18 FE C6 C8	
	R	←	G/R	←	S							18 FE C6 C0	
	R	←	G/R	←	G/R	←	S					18 FE C6 B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 FE C6 B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 FE C6 A8	
EBS24	R	←	S									18 FD 9A C8	
	R	←	G/R	←	S							18 FD 9A C0	
	R	←	G/R	←	G/R	←	S					18 FD 9A B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 FD 9A B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 FD 9A A8	
EBS25	R	←	S									18 F0 20 C8	
	R	←	G/R	←	S							18 F0 20 C0	
	R	←	G/R	←	G/R	←	S					18 F0 20 B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 F0 20 B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 F0 20 A8	
EBS26	R	←	S									0C F0 1F C8	only sent in the case of one towed vehicle

Table B.3 — Message flow part 3

Msg	Tractor		Trailer #1		Trailer #2		Trailer #3		Trailer #4		Trailer #5	CAN-ID	Comment
RGE11	S	→	R									18 E4 C8 20	
	S	→	G	→	R							18 E4 C0 20	
	S	→	G	→	G	→	R					18 E4 B8 20	
	S	→	G	→	G	→	G	→	R			18 E4 B0 20	
	S	→	G	→	G	→	G	→	G	→	R	18 E4 A8 20	
			S	→	R							18 E4 C0 C8	
			S	→	G	→	R					18 E4 B8 C8	
			S	→	G	→	G	→	R			18 E4 B0 C8	
			S	→	G	→	G	→	G	→	R	18 E4 A8 C8	
					S	→	R					18 E4 B8 C0	
					S	→	G	→	R			18 E4 B0 C0	
					S	→	G	→	G	→	R	18 E4 A8 C0	
							S	→	R			18 E4 B0 B8	
							S	→	G	→	R	18 E4 A8 B8	
									S	→	R	18 E4 A8 B0	
	S	→	R/G	→	R/G	→	R/G	→	R/G	→	R	18 E4 FF 20	to be sent to global, but only from the towing to the towed vehicle
			S	→	R/G	→	R/G	→	R/G	→	R	18 E4 FF C8	
					S	→	R/G	→	R/G	→	R	18 E4 FF C0	
							S	→	R/G	→	R	18 E4 FF B8	
									S	→	R	18 E4 FF B0	
RGE12	S	→	R									18 8A C8 20	
	S	→	G	→	R							18 8A C0 20	
	S	→	G	→	G	→	R					18 8A B8 20	
	S	→	G	→	G	→	G	→	R			18 8A B0 20	
	S	→	G	→	G	→	G	→	G	→	R	18 8A A8 20	
			S	→	R							18 8A C0 C8	
			S	→	G	→	R					18 8A B8 C8	
			S	→	G	→	G	→	R			18 8A B0 C8	
			S	→	G	→	G	→	G	→	R	18 8A A8 C8	
					S	→	R					18 8A B8 C0	
					S	→	G	→	R			18 8A B0 C0	
					S	→	G	→	G	→	R	18 8A A8 C0	
							S	→	R			18 8A B0 B8	
							S	→	G	→	R	18 8A A8 B8	

Table B.4 — Message flow part 4

Msg	Tractor		Trailer #1		Trailer #2		Trailer #3		Trailer #4		Trailer #5	CAN-ID	Comment
RGE21	R	←	S									18 E5 20 C8	
	R	←	G	←	S							18 E5 20 C0	
	R	←	G	←	G	←	S					18 E5 20 B8	
	R	←	G	←	G	←	G	←	S			18 E5 20 B0	
	R	←	G	←	G	←	G	←	G	←	S	18 E5 20 A8	
RGE22	R	←	S									18 FE 5C C8	
	R	←	G/R	←	S							18 FE 5C C0	
	R	←	G/R	←	G/R	←	S					18 FE 5C B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 FE 5C B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 FE 5C A8	
RGE23	R	←	S									18 FE 5E C8	
	R	←	G/R	←	S							18 FE 5E C0	
	R	←	G/R	←	G/R	←	S					18 FE 5E B8	
	R	←	G/R	←	G/R	←	G/R	←	S			18 FE 5E B0	
	R	←	G/R	←	G/R	←	G/R	←	G/R	←	S	18 FE 5E A8	
RGE24	R	←	S									18 89 20 C8	
	R	←	G	←	S							18 89 20 C0	
	R	←	G	←	G	←	S					18 89 20 B8	
	R	←	G	←	G	←	G	←	S			18 89 20 B0	
	R	←	G	←	G	←	G	←	G	←	S	18 89 20 A8	
TD11	S	→	R/G	→	R/G	→	R/G	→	R/G	→	R	18 FE E6 20	

Bibliography

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[2] REGULATION UNECE 13: *Uniform provisions concerning the approval of vehicles of categories M, N, and O with regard to braking*

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