INTERNATIONAL STANDARD

ISO 11992-2

Second 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11992-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This second edition cancels and replaces the first edition (ISO 11992-2:1998), reviewed in the light of changing legislative requirements and which has been technically revised.

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

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

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

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

Part 4, *Diagnostics*, is under preparation.

Introduction

This part of ISO 11992 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 previous versions. In particular, it may become necessary to standardize new parameters and parameter groups. ISO members can request that such new parameters and parameter groups be included in future editions of ISO 11992 by completing the *Parameter identification form* in Annex A and submitting it to ISO/TC 22/SC 3.

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 ABS (anti-lock braking systems) and for running gear equipment (i.e. systems for steering, suspension and tyres), to ensure the interchange of digital information between road vehicles with a maximum authorized total mass greater than 3 500 kg, and their towed vehicles, including communication between towed vehicles.

The objective of the data structure is to optimize the use of the interface, while preserving a sufficient reserve capacity for future expansion.

2 Normative references

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

ISO 11898:1993[1)], *Road vehicles — Interchange of digital information — Controller area network (CAN) for high-speed communication*

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

3 Terms and definitions

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

4 Abbreviations

ABS	Anti-lock Braking System
ASR	Anti Spin Regulation (traction control system)
CAN	Controller Area Network

1) Amended in 1995. Under revision.

DA	Destination Address
DP	Data Page
EBS	Electronically controlled Braking System
ECU	Electronic Control Unit
GE	Group Extension
MSB	Most Significant Byte
P	Priority
PDU	Protocol Data Unit
PF	PDU Format
PGN	Parameter Group Number
PS	PDU Specific
R	Reserved
RGE	Running Gear Equipment
ROP	Roll Over Prevention
SA	Source Address
VDC	Vehicle Dynamic Control
YC	Yaw Control

5 General specifications

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

To minimize bus loading on the towing/towed vehicle interface, appropriate messages are specified. These messages may be filtered by a device (node) on each vehicle that shall also provide address assignment and electrical isolation from the in-vehicle subnetwork.

The architecture was chosen to allow any combination of new and old towing and towed vehicles. 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 Message frame format

6.1.1 General

The application layer provides a string of information that is assimilated into a protocol data unit (PDU). The PDU provides a framework for organizing the information which will be sent by the CAN data frame.

The 29 bit identifier shall be in accordance with ISO 11898.

The PDU shall consist of seven fields in addition to the specific CAN fields (see Figure 1).

The PDU fields are Priority (P), Reserved (R), Data Page (DP), PDU Format (PF), PDU Specific (PS) — which can be a Destination Address (DA) or a Group Extension (GE) — Source Address (SA) and data field.

	P	R	DP	PF	PS	SA		Data field
Bits	3	1	1	8	8	8		0 to 64

Figure 1 — 29-bit CAN identifier

6.1.2 Priority

The three priority bits are used to optimize message latency for transmission onto the bus only. They shall be globally masked off by the receiver (ignored). The priority of any message may be set from highest, 0 (000_2), to lowest, 7 (111_2). The default for all control oriented messages is 3 (011_2). The default of all other informational messages is 6 (110_2).

6.1.3 Reserved bit (R)

The reserved bit is reserved for future expansion. This bit shall be set to zero for transmitted messages.

6.1.4 Data page (DP)

The DP bit selects an auxiliary page of parameter group descriptions.

6.1.5 PDU format (PF)

The PF field is an eight-bit field that determines the PDU format and is one of the fields used to determine the parameter group number assigned to the data field. Parameter group numbers shall be used to identify or label a set of commands and data.

6.1.6 PDU specific (PS)

6.1.6.1 General

The PDU-specific field is an eight-bit field and depends on the PDU format. Depending on the PDU format, it can be a destination address or a group extension. If the value of the PDU format (PF) field is below 240, then the PDU-specific field is a destination address. If the value of the PF field is 240 to 255, then the PDU-specific field contains a group extension (GE) value (see Table 1).

Table 1 — PDU-specific field

	PDU format (PF) field	PDU-specific (PS) field
PDU 1 field	0 to 239	Destination address
PDU 2 field	240 to 255	Group extension

6.1.6.2 Destination address (DA)

The DA field contains the specific address of the towing or towed vehicle to which the message is being sent. The global destination address (255) requires all devices to listen.

6.1.6.3 Group extension (GE)

The GE field, in conjunction with the four least significant bits of the PDU format field provide for 4 096 parameter groups per data page.

When the four most significant bits of the PDU format field are set, it indicates that the PS field is a group extension.

6.1.7 Source address (SA)

The SA field is eight bits long. There shall only be one device on the network with a given SA. Therefore, the SA field assures that the CAN identifier will be unique, as required by CAN.

6.1.8 Data field

A single CAN data frame provides a maximum of eight data bytes. All eight bytes shall be used, even if fewer than eight bytes are required for expressing a given parameter group number. This provides a means to easily add parameters, while remaining compatible with previous revisions which only specify part of the data field.

6.1.9 Parameter group number (PGN)

The PGN is a 24-bit number which contains: Reserved bit, Data page bit, PDU Format field (eight bits) and PDU-specific field (eight bits) (see Table 2).

If the PF value is less than 240 ($F0_{16}$; PDU 1 type message), then the lowest byte of the PGN is set to zero.

Table 2 — Content of the parameter group number

Byte 1 (MSB)			Byte 2	Byte 3
Bits 8 ...3	Bit 2	Bit 1		
000000_2	Reserved	Data Page	PDU format	PDU-specific

6.1.10 PDU 1 format

The PDU 1 format allows for applicable messages to be sent to either a specific or global destination. PDU 1 format messages are determined by the PF field. When the message's PF field value is 0 to 239, the message is a PDU 1 format.

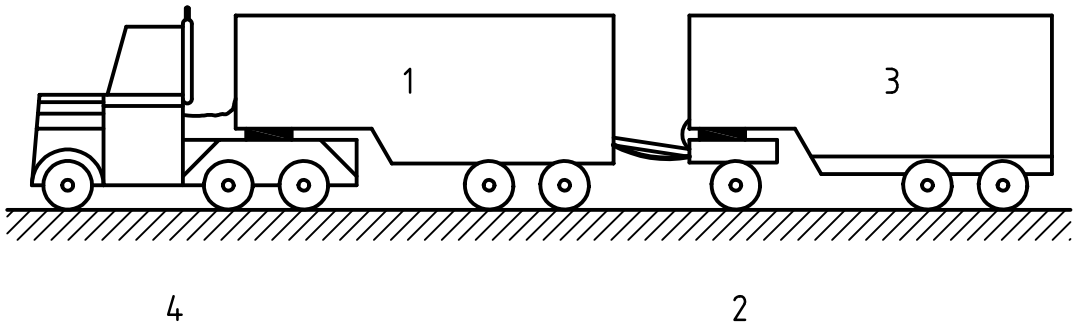
6.1.11 PDU 2 format

The PDU 2 format may only be used to communicate global messages. PDU 2 format messages are those where the PF value is equal to 240 to 255.

6.2 Address assignment

A road train consists of one commercial vehicle and one or more towed vehicles. Dolly axles within the road train are treated as additional towed vehicles (see Figure 2).

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 towed vehicle: position #1
2 towed vehicle: position #2
3 towed vehicle: position #3
4 commercial vehicle

Figure 2 — Example of possible road train configuration

The address of the commercial vehicle is fixed.

The respective address of a towed vehicle corresponds to its position within the road train and has to be newly assigned each time

— communication starts, or

— a towed vehicle has been connected.

For towing vehicle/towed vehicle communication, the addresses shown in Table 3 shall be used as SAs and DAs. To avoid any transmission conflict during the dynamic address assignment phase (power-up), the PDU 2 type message shall have even PS (GE) in the predecessor transmission direction and odd PS (GE) in the successor transmission direction. If the same message has to be sent in both transmission directions, two PSs (GE) are necessary.

The dynamic address assignment shall be handled by the respective towing vehicle/towed vehicle node and concerns the determination of the individual position within the road train. The global destination address shall only be used by the commercial vehicle to broadcast information to all towed vehicles simultaneously.

The dynamic address assignment is based on the transmission of the standard initialization message (see 6.5) 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 standard address for the standard initialization message (see Table 3). A powered-up towed vehicle node shall use the towed vehicle #1 address as the default address for transmitting available information, until the standard initialization has been received and a valid address can be assigned.

Table 3 — Commercial vehicle/towed vehicle addresses

Name	Address	Predecessor	Successor
Commercial vehicle (position #0)	32 = 20_{16}	Not applicable	Towed vehicle position #1
Towed vehicle position #1	200 = $C8_{16}$	Commercial vehicle (position #0)	Towed vehicle position #2
Towed vehicle position #2	192 = $C0_{16}$	Towed vehicle position #1	Towed vehicle position #3
Towed vehicle position #3	184 = $B8_{16}$	Towed vehicle position #2	Towed vehicle position #4
Towed vehicle position #4	176 = $B0_{16}$	Towed vehicle position #3	Towed vehicle position #5
Towed vehicle position #5	168 = $A8_{16}$	Towed vehicle position #4	Undefined
Global destination address	255 = FF_{16}	Undefined	Undefined

This allows the towed vehicle 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 has been completed.

An assigned address based on a received predecessor address shall be valid as long as the towed vehicle is powered and no message from the predecessor with a different SA is received.

To provide address assignment for itself and for possible successors, a node shall be capable of continuously sending the standard initialization message with its own SA (see Figure 3).

Continuous sending of the initialization message is necessary to allow immediate towed vehicle address assignment at any time a towed vehicle might be connected.

In addition, a towed vehicle node shall be capable of

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

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

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

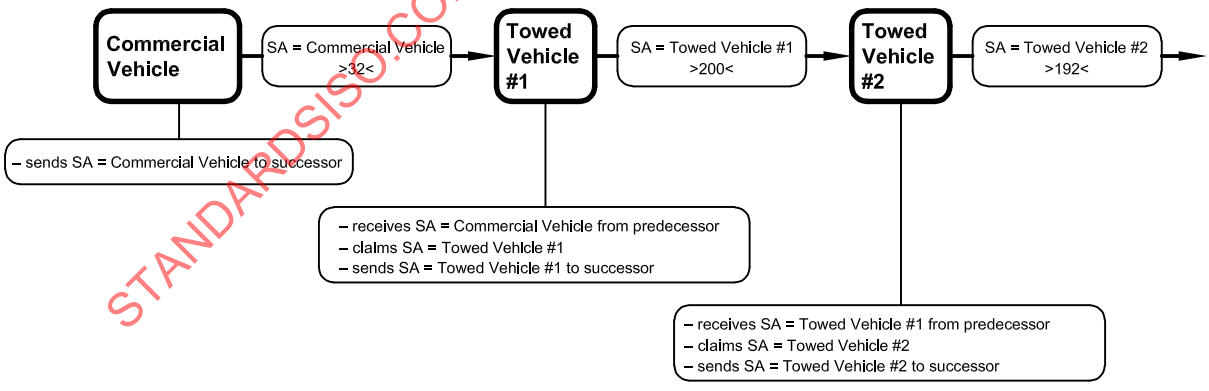


Figure 3 — Address assignment

6.3 Message routing

If there is no provision for a successor, the message routing function is not required.

To allow communication between 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 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,

— routing all 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 higher or equal to its own, or if the SA of a message received from its *successor* corresponds to a road train position lower or equal to its own.

Figures 4 to 9 illustrate the PDU type message sent in different directions.

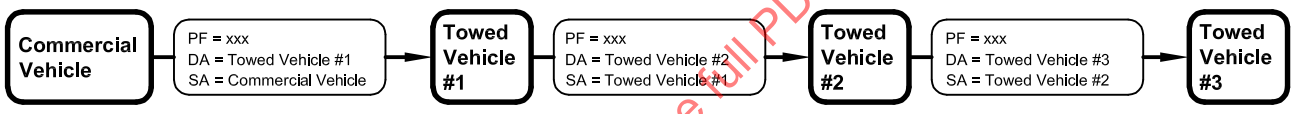


Figure 4 — Example of PDU 1 type messages from towing vehicles to succeeding towed vehicles

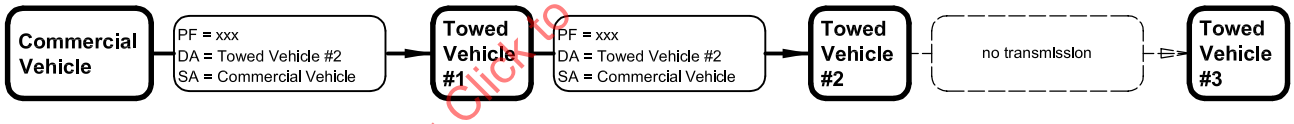


Figure 5 — Example of PDU 1 type message from commercial vehicle to towed vehicle #2

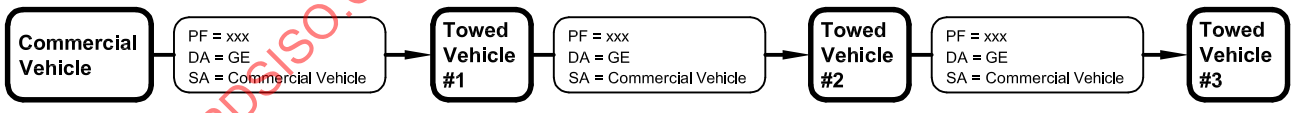


Figure 6 — Example of PDU 2 type message from commercial vehicle to all towed vehicles

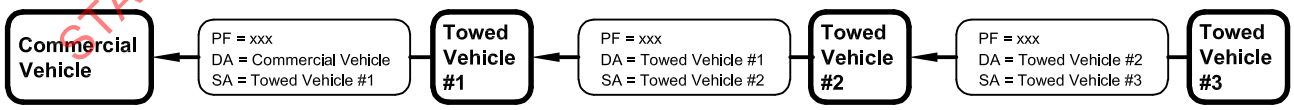


Figure 7 — Example of PDU 1 type messages from towed vehicles to preceding towing vehicles

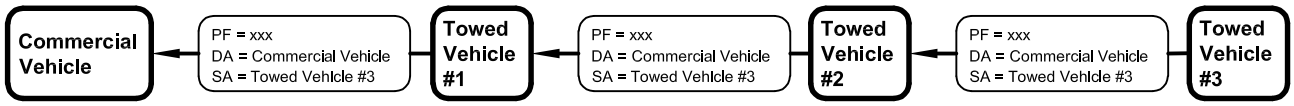


Figure 8 — Example of PDU 1 type message from towed vehicle #3 to commercial vehicle

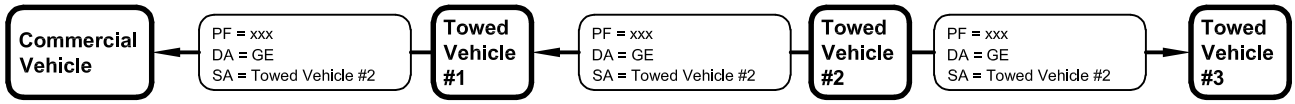


Figure 9 — Example of PDU 2 type message from towed vehicle #2

6.4 Parameters

6.4.1 Parameter ranges

Table 4 specifies the ranges used to determine the validity of transmitted signals.

Table 5 specifies the ranges used to denote the state of a discrete parameter and Table 6 specifies the ranges used to denote the state 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 is not currently available, owing to some type of error in the sensor, subsystem or module. Additional information about the failure may be available using diagnostic requests.

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.

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

If a component failure prevents the transmission of valid data for a parameter, the error indicator, as specified in Tables 4 and 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 word (16 bit) parameter shall be sent least significant byte first, most significant byte second.

Table 4 — Transmitted signal ranges

Parameter	Unit	Value range	
		1 byte	2 bytes
Signal range	Dec	0 to 250	0 to 64 255
	Hex	00_{16} to FA_{16}	0000_{16} to $FAFF_{16}$
Reserved range for future indicator bits	Dec	251 to 253	64 256 to 65 023
	Hex	FB_{16} to FD_{16}	$FB00_{16}$ to $FDFF_{16}$
Error indicator	Dec	254	65 024 to 65 279
	Hex	FE_{16}	$FExx_{16}$
Not available or not requested	Dec	255	65 280 to 65 535
	Hex	FF_{16}	$FFxx_{16}$

Table 5 — Transmitted values for discrete parameters (measured)

Range name	Transmitted value
Disabled (off, passive, insufficient)	00
Enabled (on, active, sufficient)	01
Error indicator	10
Not available or not installed	11

Table 6 — Transmitted values for control requests (status)

Range name	Transmitted value
Request to disable function (turn off, etc.)	00
Request to enable function (turn on, etc.)	01
Reserved	10
Don't care/ take no action (leave function as it is)	11

6.4.2 Parameter specifications

6.4.2.1 General

A description of each parameter is given in 6.4.2.2 and 6.4.2.3. The description includes data length, data type, resolution and range for reference.

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

Status 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.

A negative signed torque parameter indicates deceleration, whereas positive signed torque indicates acceleration in accordance with the drive line of the vehicle.

6.4.2.2 Parameters for braking systems

6.4.2.2.1 General

In the following, the parameters for electronically controlled braking systems are specified.

6.4.2.2.2 Park brake demand value

The requested brake pressure value of the parking brake as a percentage of maximum.

Data length: 1 byte

Resolution: 0,4 %/bit gain, 0 % offset

Data range: 0 % to 100 %

Type: Status

6.4.2.2.3 Retarder demand value

The demanded value of the retarder on the towed vehicle(s) as a percentage of the absolute peak torque of retarder.

Data length: 1 byte

Resolution: 1 %/bit gain, – 125 % offset

Data range: – 125 % to 125 %

Operating range: – 125 % to 0 %

Type: Status

NOTE Retarder demand torque is specified in indicated torque as a percentage of peak retarder torque.

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

EXAMPLE Retarder demand value = 75 % × absolute peak torque of retarder.

Calculation:

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

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

b) Second step: measured (Actual) Retarder Torque (ART)

$$DC = \frac{ART - Offset}{Resolution} = 50$$

ART = DC × resolution + offset

ART = 50 × 1 % + (– 125 %)

ART = – 75 %

6.4.2.2.4 Service brake demand value

The requested brake pressure value of the service brake demanded by the driver.

Data length: 2 bytes

Resolution: 5/256 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 1 255 kPa

Type: Status

This value may be modified by the coupling force control function, which has been specified by UNECE Regulation No. 13[1].

NOTE 1 bar = 10^5 Pa.

6.4.2.2.5 Wheel-based vehicle speed (from braking system)

Actual speed of the vehicle (positive value 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.

Data length: 2 bytes

Resolution: 1/256 km/h/bit gain, 0 km/h offset

Data range: 0 km/h to 250 km/h

Type: Measured

6.4.2.2.6 Reference retarder torque

This parameter is the 100 % reference value for all specified indicated retarder torque parameters. It is only specified once and does not change if a different retarder torque map becomes valid.

Data length: 2 bytes

Resolution: 1 N · m/bit gain, 0 N · m offset

Data range: 0 N · m to 64 255 N · m

Type: Measured

6.4.2.2.7 Actual percentage of retarder peak torque

Actual torque of the retarder as negative percentage of maximum.

Data length: 1 byte

Resolution: 1 %/bit gain, − 125 % offset

Data range: − 125 % to + 125 %

Operating range: − 125 % to 0 %

Type: Measured

6.4.2.2.8 Axle load sum

Sum of the static vertical loads of the vehicle axles.

Data length: 2 bytes

Resolution: 2 kg/bit gain, 0 kg offset

Data range: 0 kg to 128 510 kg

Type: Measured

6.4.2.2.9 Pneumatic supply pressure

Actual supply pressure of the reservoir of the braking system.

Data length: 1 byte

Resolution: 5 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 1 250 kPa

Type: Measured

NOTE 1 bar = 10^5 Pa.

6.4.2.2.10 Tyre/wheel identification

Identification number of the tyre or wheel. The identification number specifies 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 10).

The identification number is used in conjunction with all tyre, wheel or wheel-end related information in the message. The identification number "0" shall be used if the position of the tyre, wheel, wheel-end or axle cannot be identified.

Data length: 1 byte

Resolution: 1/bit gain, 0 offset

Data range: Low bits

0 wheel position cannot be identified

1 to 15 wheel position

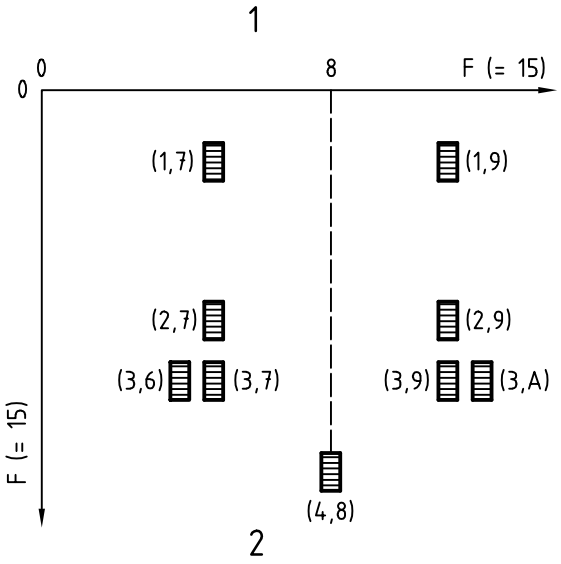
High bits

0 axle position cannot be identified

1 to 15 axle position

Type: Measured

The tyre/wheel identification is 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 one wheel on the centre line.



Key

1 front of vehicle

2 rear of vehicle

Figure 10 — Tyre/wheel and axle position

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

In situations where 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 where the wheel definition is shared, within the same message, with another parameter or parameters, the wheel-end may be specified as a wheel position 1 to 7 left or 9 to 15 right, as required by the other parameter or parameters.

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

6.4.2.2.11 Brake lining

Actual relative value of brake lining of a specific brake.

Data length:	1 byte
Resolution:	0,4 %/bit gain, 0 % offset
Data range:	0 % to 100 %
Type:	Measured

6.4.2.2.12 Brake temperature

Actual brake temperature.

Data length: 1 byte

Resolution: 10 °C/bit gain, 0 % offset

Data range: 0 °C to 2 500 °C

Type: Measured

6.4.2.2.13 Tyre pressure

Actual tyre pressure without corrections.

Data length: 1 byte

Resolution: 10 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 2 500 kPa

Type: Measured

6.4.2.2.14 Vehicle retarder control active/passive

This signal indicates the active/passive state in all cases when the installed retarder is applied by the driver's demand or by other systems (brakes).

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

00 — Retarder passive

01 — Retarder active

Type: Measured

6.4.2.2.15 Vehicle service brake active/passive

Signal indicating the service brake of the towed vehicle is active/passive, by observing the brake pressure.

00 — Vehicle service brake passive

01 — Vehicle service brake active

Type: Measured

6.4.2.2.16 Automatic towed vehicle braking active/passive

Signal indicating the automatic towed vehicle braking is active/passive. This function will occur when the pneumatic supply is insufficient or not connected.

00 — Vehicle automatic braking passive

01 — Vehicle automatic braking active

Type: Measured

NOTE According to UNECE Regulation No. 13[1], the brake pressure in the trailer may be suppressed under certain conditions in case of an automatic braking. This parameter reflects the different conditions as follows:

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

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

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

This parameter should be used for driver information.

6.4.2.2.17 Vehicle ABS active/passive

Signal indicating the ABS is active/passive. The signal is set *active* when the ABS starts to modulate the wheel brake pressure, and is 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 retarder).

00 — Vehicle ABS passive, but installed

01 — Vehicle ABS active

Type: Measured

NOTE Active does not mean “installed” or “enabled”, but indicates an actual ABS situation. In the case of at least one wheel speed error, the error indicator shall have priority (see Table 5).

6.4.2.2.18 Vehicle electrical supply sufficient/insufficient

Signal indicating the actual supply voltage is sufficient/insufficient for proper brake function (including overvoltage).

00 — Vehicle electrical supply insufficient

01 — Vehicle electrical supply sufficient

Type: Measured

6.4.2.2.19 Vehicle pneumatic supply sufficient/insufficient

Signal indicating the actual supply pressure of the reservoir of the braking system is insufficient or sufficient.

00 — Vehicle pneumatic supply insufficient

01 — Vehicle pneumatic supply sufficient

Type: Measured

NOTE This parameter is required by UNECE Regulation No. 13 [1].

6.4.2.2.20 Spring brake installed

Signal indicating the vehicle has one or more axles fitted with spring brakes.

00 — Vehicle without spring brakes

01 — Vehicle with spring brakes

Type: Measured

6.4.2.2.21 Electrical load proportional function

Signal indicating the vehicle is equipped with an electrical load proportional function.

00 — Vehicle without electrical load proportional function

01 — Vehicle with electrical load proportional function

Type: Measured

6.4.2.2.22 ABS off-road request

Request to activate the ABS off-road function. The switch signal is independent of an actual ABS control situation.

00 — ABS off-road switch off

01 — ABS off-road switch on

Type: Status

6.4.2.2.23 ASR brake control active/passive

Signal which indicates that ASR brake control is active/passive. *Active* means that ASR actually controls wheel brake pressure at one or more wheels of the driven axles.

NOTE Active does not mean “installed” or “enabled”, but indicates an actual ASR situation.

00 — ASR brake control passive, but installed

01 — ASR brake control active

Type: Measured

6.4.2.2.24 ASR engine control active/passive

Signal which indicates that ASR engine control is active/passive. *Active* means that ASR actually tries to control the engine. This status is independent of other control commands to the engine (e.g. from the transmission) which may have higher priority.

NOTE Active does not mean “installed” or “enabled”, but indicates an actual ASR situation.

00 — ASR engine control passive, but installed

01 — ASR engine control active

Type: Measured

6.4.2.2.25 Pneumatic control line

Signal which indicates that the towing vehicle has a pneumatic control line for the towed vehicle service braking system.

NOTE This parameter is required by UNECE Regulation No. 13 [1].

00 — Towing vehicle without pneumatic control line

01 — Towing vehicle with pneumatic control line

Type: Measured

6.4.2.2.26 Two electrical circuits brake demand value

Signal which indicates that the service brake demand value sent by the towing vehicle can be generated by one or two independent electrical braking circuits.

NOTE This parameter is required by UNECE Regulation No. 13 [1].

00 — One electrical circuit brake available

01 — Two electrical circuit brake available

Type: Measured

6.4.2.2.27 Tyre pressure sufficient/insufficient

Signal which indicates that the tyre pressure is insufficient, i.e. out of a pressure range recommended by the tyre or vehicle manufacturer to ensure an optimized operation with regard to fuel consumption of the vehicle and life time of the tyre.

00 — Tyre pressure insufficient

01 — Tyre pressure sufficient

Type: Measured

6.4.2.2.28 Brake lining sufficient/insufficient

Signal which indicates that the brake lining is sufficient/insufficient.

00 — Brake linings insufficient

01 — Brake linings sufficient

Type: Measured

6.4.2.2.29 Brake temperature status

Signal which indicates that the brake temperature is higher than a specific level.

00 — Brake temperature out of range

01 — Brake temperature normal

Type: Measured

6.4.2.2.30 Brake light switch

Signal which indicates that the brake pedal is being pressed.

00 — Brake light switch off

01 — Brake light switch on

Type: Measured

6.4.2.2.31 Vehicle type

Information to identify a dolly axle within the road train.

00 — Towing or towed vehicle

01 — Dolly axle

Type: Measured

6.4.2.2.32 Red warning signal request

Request from the towed vehicle to the commercial vehicle to activate the red warning signal on the commercial vehicle, which indicates certain specified failures within the braking equipment of the towed vehicles.

NOTE This parameter is required by UNECE Regulation No. 13 [1].

00 — No towed vehicle failure to be indicated by the red warning signal

01 — Towed vehicle failure to be indicated by the red warning signal

Type: Status

6.4.2.2.33 Amber warning signal request

Request from the towed vehicle to the commercial vehicle to activate the amber warning signal on the commercial vehicle.

00 — No towed vehicle failure to be indicated by the amber warning signal

01 — Towed vehicle failure to be indicated by the amber warning signal

Type: Status

6.4.2.2.34 Electrical supply of non-braking systems

Signal which indicates the status of the supply of non-braking systems.

00 — Supply of non-braking systems switched off

01 — Supply of non-braking systems switched on

Type: Measured

6.4.2.2.35 Loading ramp approach assistance

The parameter indicates 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.

00 — Loading ramp approach assistance not active

01 — Loading ramp approach assistance active

Type: Measured

6.4.2.2.36 VDC active

Signal which indicates that Vehicle Dynamic Control (VDC) is active/passive. VDC contains Roll Over Prevention (ROP) or Yaw Control (YC) or both. *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.

00 — VDC passive, but installed

01 — VDC active

Type: Measured

NOTE Active does not mean “installed” or “enabled”, but indicates an actual VDC situation.

6.4.2.2.37 Road curvature

Estimated value of the current road curvature. Positive values are used for left curves.

Data length: 2 bytes

Resolution: 1/128 1/km/bit gain, – 250 1/km offset

Data range: – 250 1/km to 250 1/km

Type: Measured

6.4.2.2.38 Wheel speed difference main axle

Difference between the wheel speed at the right side and 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.

Data length: 2 bytes

Resolution: 1/256 km/h/bit gain, – 125 km/h offset

Data range: – 125 km/h to 125 km/h

Type: Measured

6.4.2.2.39 Supply line braking request

Signal indicating the trailer is requesting to be braked by the commercial vehicle by means of bleeding the pneumatic supply line.

00 — No supply line braking request

01 — Supply line braking request

Type: Status

6.4.2.2.40 Spring brake engaged

Signal indicating the vehicle spring brake is engaged.

00 — Vehicle spring brake is released (is not braking the vehicle)

01 — Vehicle spring brake is engaged (is braking the vehicle)

Type: Measured

6.4.2.3 Parameters for running gear equipment

6.4.2.3.1 General

In the following the parameters for running gear equipment are specified.

6.4.2.3.2 Driven axle load (commercial vehicle)

Actual static vertical load on driven axle of the commercial vehicle. In the case of more than one driven axle, the value of the axle with the highest vertical load is transmitted.

Data length: 2 bytes

Resolution: 2 kg/bit gain, 0 kg offset

Data range: 0 kg to 128 510 kg

Type: Measured

6.4.2.3.3 Nominal vehicle body level, front axle

Actual nominal vehicle body height. In case of regulation by “level change request, front axle” (see 6.4.2.3.9), this value is the actual vehicle body height at the front axle referred to ground.

Data length: 2 bytes

Resolution: 1 mm/bit gain, 0 mm offset

Data range: 0 mm to 64 255 mm

Type: Measured

6.4.2.3.4 Nominal vehicle body level, rear axle

Actual nominal vehicle body height. In case of regulation by “level change request, rear axle” (see 6.4.2.3.10), this value is the actual vehicle body height at the rear axle referred to ground.

Data length: 2 bytes

Resolution: 1 mm/bit gain, 0 mm offset

Data range: 0 mm to 64 255 mm

Type: Measured

6.4.2.3.5 Relative vehicle body level, front axle

Actual nominal vehicle body height. In case of regulation by “level change request, front axle” (see 6.4.2.3.9), this value is the actual vehicle body height at the front axle referred to ride height normal level 1.

Data length: 2 bytes

Resolution: 1 mm/bit gain, – 32 000 mm offset

Data range: – 32 000 mm to 32 255 mm

Type: Measured

6.4.2.3.6 Relative vehicle body level, rear axle

Actual nominal vehicle body height. In case of regulation by “level change request, rear axle” (see 6.4.2.3.10), this value is the actual vehicle body height at the rear axle referred to ride height normal level 1.

Data length: 2 bytes

Resolution: 1 mm/bit gain, – 32 000 mm offset

Data range: – 32 000 mm to 32 255 mm

Type: Measured

6.4.2.3.7 Level control request

Command signal 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 6.4.2.3.8).

00 — Disable level control

01 — Enable level control

11 — Take no action

Type: Status

6.4.2.3.8 Level control

Signal which indicates that the automatic level control is enabled or disabled.

EXAMPLE Under braking conditions, the level control is disabled.

00 — Level control disabled

01 — Level control enabled

Type: Measured

6.4.2.3.9 Level change request, front axle

Command signal to control the body height [up (lifting)/down (lowering)] for the front axle.

This request shall to be sent as long as a lifting/lowering proceeds.

00 — Vehicle body up (lifting)

01 — Vehicle body down (lowering)

11 — Take no action

Type: Status

6.4.2.3.10 Level change request, rear axle

Command signal to control the body height [up (lifting)/down (lowering)] for the rear axle.

This request shall be sent as long as a lifting/lowering proceeds.

00 — Vehicle body up (lifting)

01 — Vehicle body down (lowering)

11 — Take no action

Type: Status

6.4.2.3.11 Level change, front axle

Signal that indicates the level change of the body height at the front axle due to any external requests.

00 — Vehicle body lifting/lowering not active

01 — Vehicle body lifting/lowering active

Type: Measured

6.4.2.3.12 Level change, rear axle

Signal that indicates the level change of the body height at the rear axle due to any external requests.

00 — Vehicle body lifting/lowering not active

01 — Vehicle body lifting/lowering active

Type: Measured

6.4.2.3.13 Lift axle 1 position request

Command signal to control the lift axle position/tag axle load condition.

A request 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 6.4.2.3.15).

00 — Lift axle position down/tag axle laden

01 — Lift axle position up/tag axle unladen

11 — Take no action

Type: Status

NOTE Numbering of lift axles starts at the front axle.

6.4.2.3.14 Lift axle 2 position request

Command signal to control the lift axle position/tag axle load condition.

A request 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 6.4.2.3.16).

00 — Lift axle position down/tag axle laden

01 — Lift axle position up/tag axle unladen

11 — Take no action

Type: Status

NOTE Numbering of lift axles starts at the front axle.

6.4.2.3.15 Lift axle 1 position

Signal that indicates the lift axle position/tag axle load condition.

00 — Lift axle position down/tag axle laden

01 — Lift axle in position up/tag axle unladen

Type: Measured

NOTE Numbering of lift axles starts at the front axle.

6.4.2.3.16 Lift axle 2 position

Signal that indicates the lift axle position/tag axle load condition.

00 — Lift axle position down / tag axle laden

01 — Lift axle in position up / tag axle unladen

Type: Measured

NOTE Numbering of lift axles starts at the front axle.

6.4.2.3.17 Steering axle locking request

Command signal to lock the steering axle.

A request to lock or to 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 through “steering axle locking” (see 6.4.2.3.18).

00 — Unlock steering axle

01 — Lock steering axle

11 — Take no action

Type: Status

6.4.2.3.18 Steering axle locking

Signal that indicates the actual steering axle locking status.

00 — Steering axle unlocked

01 — Steering axle locked

Type: Measured

6.4.2.3.19 Traction help (load transfer) request

Command signal to control the lift axle position/tag axle load condition to transfer more load on the driven axle of the commercial vehicle.

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 6.4.2.3.20).

00 — No traction help request

01 — Traction help request

11 — Take no action

Type: Status

6.4.2.3.20 Traction help (load transfer)

Signal which indicates that a load transfer is active.

00 — Traction help (load transfer) inactive

01 — Traction help (load transfer) active

Type: Measured

6.4.2.3.21 Ride height request

Command signal to activate a normal ride body height. The normal levels 1 and 2 are trailer specific body heights.

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 6.4.2.3.22).

00 — Normal level 1

01 — Normal level 2

11 — Take no action

Type: Status

6.4.2.3.22 Levelling control system, ride height level

Signal that indicates the body height position of the vehicle as an answer to “ride height request” (see 6.4.2.3.21).

00 — Vehicle body not at requested normal level

01 — Vehicle body at requested normal level

Type: Measured

6.4.2.3.23 Normal level

Signal that indicates the normal levels of the vehicle independently of a specific request.

00 — Normal level 1

01 — Normal level 2

11 — Not available

Type: Measured

In case of no corresponding body height position the bit combination “11” shall be sent.

6.4.2.3.24 Ramp level request

Command signal to control the body height to a level programmed and memorized in the ECU.

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 6.4.2.3.25).

00 — Ramp level 1

01 — Ramp level 2

11 — Take no action

Type: Status

6.4.2.3.25 Ramp level

Signal that indicates the level of the body height as an answer to “ramp level request” (see 6.4.2.3.24).

00 — Vehicle body not at requested ramp level

01 — Vehicle body at requested ramp level

Type: Measured

6.4.2.3.26 Ramp level position

Signal that indicates the ramp level positions of the vehicle independently of a specific request.

00 — Ramp level 1

01 — Ramp level 2

11 — Not available

Type: Measured

In case there is no corresponding body position, the bit combination “11” shall be sent.

6.4.2.3.27 Ramp level storage request

Command signal to store the actual body height level as new programmed and memorized ramp levels 1 or 2 in the ECU.

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 6.4.2.3.28).

00 — Store ramp level 1

01 — Store ramp level 2

11 — Take no action

Type: Status

6.4.2.3.28 Ramp level storage

Signal that indicates the storage of a new ramp level in the ECU.

00 — No new ramp level storage request

01 — New ramp level stored

Type: Measured

6.4.2.3.29 Stop level change request

Command signal to stop immediately any change of the actual body height level.

This request shall be sent until the receiver acknowledges via “stop acknowledge” (see 6.4.2.3.30).

00 — No stop request

01 — Stop request

11 — Take no action

Type: Status

6.4.2.3.30 Stop level change acknowledge

Signal that indicates the stop of any level change due to a “stop request” (see 6.4.2.3.29).

00 — No stop request

01 — Level change stopped

Type: Measured

6.4.2.3.31 Parking and trailer air pressure

The pneumatic pressure in the circuit or reservoir for the parking brake and the trailer supply.

Data length: 1 byte

Resolution: 8 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 2 000 kPa

Type: Measured

6.4.2.3.32 Auxiliary equipment supply pressure

The pneumatic pressure in the auxiliary circuit.

Data length: 1 byte

Resolution: 8 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 2 000 kPa

Type: Measured

6.4.2.3.33 Tyre pressure threshold detection

Signal indicating the pressure level of the tyre.

000 — Extreme over pressure

001 — Over pressure

010 — No warning pressure

011 — Under pressure

100 — Extreme under pressure

101 — Not defined

110 — Error indicator

111 — Not available

Type: Measured

NOTE The levels specified represent different pressure conditions of the tyre. See Table 7.

Table 7 — Pressure conditions of the tyre

Extreme overpressure	The tyre pressure is at a level where the safety of the vehicle may be jeopardised.
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 underpressure	The tyre pressure is at a level where the safety of the vehicle may be jeopardized.

6.4.2.3.34 Air leakage detection

The pressure loss of a tyre.

Data length: 2 bytes

Resolution: 0,1 Pa/s/bit gain, 0 Pa/s offset

Data range: 0 Pa/s to 6 425,5 Pa/s

Type: Measured

6.4.2.3.35 Tyre temperature

The temperature measured by the tyre module.

Data length: 2 bytes

Resolution: 0,03125 °C/bit gain, – 273 °C offset

Data range: – 273 °C to 1 735 °C

Type: Measured

6.4.2.3.36 Tyre module power supply

Signal indicating the power supply of the tyre module is sufficient to achieve the specified performance of the module.

00 — Insufficient power supply

01 — Sufficient power supply

Type: Measured

6.5 Messages

6.5.1 General

The following specifies the messages for use on the electrical connection between towing and towed vehicles.

All undefined bits shall be transmitted with a value of “1”. All undefined bits shall be treated as “don’t care” (either masked out or ignored). This permits them to be defined and used in the future without causing any incompatibilities.

A message 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:

— towing to towed vehicle, 1

— towed to towing vehicle, 2

The second is the message number.

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 lowest 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 lowest transmission repetition time, shall be sent continuously.

For PDU 1 type and PDU 2 type messages, see Tables 8 and 9.

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 RGE 11 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 EBS 11 and EBS 21 are to be transmitted only between two directly coupled vehicles for optimal brake control between these two units. Since EBS 21 also contains information that is relevant to the commercial vehicle (warning information to the driver) this information is also mapped into the message EBS 22.

Table 8 — PDU 1 type messages

Repetition time	Data specification	P	R	DP	PF	PS	PGN	Remarks
< 100 ms	Electronic brake #1/1 — EBS 11	3	0	0	2	DA	000200_{16}	
< 100 ms	Electronic brake #2/1 — EBS 21	3	0	0	3	DA	000300_{16}	
⩾ 100 ms	Running gear #1/1 — RGE 11	6	0	0	228	DA	$00E400_{16}$	Replaces GFM 12 of ISO 11992-3:1998
⩾ 100 ms	Running gear #2/1 — RGE 21	6	0	0	229	DA	$00E500_{16}$	Replaces GFM 22 of ISO 11992-3:1998

Table 9 — PDU 2 type messages

Repetition time	Data specification	P	R	DP	PF	PS (GE)	PGN	Remarks
⩾ 100 ms	Electronic brake #1/2 — EBS 12	6	0	0	254	201	$00FEC9_{16}$	
⩾ 100 ms	Electronic brake #2/2 — EBS 22	6	0	0	254	196	$00FEC4_{16}$	
⩾ 100 ms	Electronic brake #2/3 — EBS 23	6	0	0	254	198	$00FEC6_{16}$	
⩾ 100 ms	Running gear #2/2 — RGE 22	6	0	0	254	92	$00FE5C_{16}$	
⩾ 1000 ms	Running gear #2/3 — RGE 23	6	0	0	254	94	$00FE5E_{16}$	

6.5.2 Message specifications, transmission direction from towing to towed vehicle

6.5.2.1 Towing vehicle message, electronic brake system #1/1, EBS 11

This message is specified as the standard initialization message for address assignment of the receiving vehicle. Sending of this message is required.

Transmission repetition time:	10 ms ± 1 ms
Data length:	8 bytes
Data page:	0
PDU format:	2
PDU specific:	address of the successor
Default priority:	3

Byte	1	Towing vehicle system status 1	Bits	1 to 2	Vehicle ABS active/passive	(see 6.4.2.2.17)
			Bits	3 to 4	Vehicle retarder control active/passive	(see 6.4.2.2.14)
			Bits	5 to 6	ASR brake control active/passive	(see 6.4.2.2.23)
			Bits	7 to 8	ASR engine control active/passive	(see 6.4.2.2.24)
Byte	2	Towing vehicle system status 2	Bits	1 to 2	Brake light switch	(see 6.4.2.2.30)
			Bits	3 to 4	Vehicle type	(see 6.4.2.2.31)
			Bits	5 to 8	Not defined	
Bytes	3 to 4	Service brake demand value				(see 6.4.2.2.4)
Byte	5	Park brake demand value				(see 6.4.2.2.2)
Byte	6	Retarder demand value				(see 6.4.2.2.3)
Bytes	7 to 8	Not defined				

6.5.2.2 Towing vehicle message, electronic brake system #1/2, EBS 12

Sending of this message is required.

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	254
PDU specific:	201
Default priority:	6

Byte	1	Towing vehicle system status 3	Bits	1 to 2	Vehicle retarder control active/passive	(see 6.4.2.2.14)
			Bits	3 to 8	Not defined	
Byte	2	Towing vehicle system status 4			Not defined	
Byte	3	Towing vehicle recognition 1	Bits	1 to 2	Two electrical circuits brake demand value	(see 6.4.2.2.26)
			Bits	3 to 4	ABS off-road request	(see 6.4.2.2.22)
			Bits	5 to 6	Pneumatic control line	(see 6.4.2.2.25)
			Bits	7 to 8	Not defined	
Byte	4	Towing vehicle recognition 2			Not defined	
Bytes	5 to 6	Road curvature				(see 6.4.2.2.37)
Bytes	7 to 8	Not defined				

6.5.2.3 Towing vehicle message, running gear equipment #1/1, RGE 11

Transmission repetition time: 100 ms ± 10 ms

Data length: 8 bytes

Data page: 0

PDU format: 228

PDU specific: Destination address

Default priority: 6

Byte	1	Towing vehicle running gear functions 1	Bits	1 to 2	Ride height request	(see 6.4.2.3.21)
			Bits	3 to 4	Level change request, front axle	(see 6.4.2.3.9)
			Bits	5 to 6	Level change request, rear axle	(see 6.4.2.3.10)
			Bits	7 to 8	Traction help request	(see 6.4.2.3.19)
Byte	2	Towing vehicle running gear functions 2	Bits	1 to 2	Lift axle 1 position request	(see 6.4.2.3.13)
			Bits	3 to 4	Lift axle 2 position request	(see 6.4.2.3.14)
			Bits	5 to 6	Steering axle locking request	(see 6.4.2.3.17)
			Bits	7 to 8	Ramp level request	(see 6.4.2.3.24)
Byte	3	Towing vehicle running gear functions 3	Bits	1 to 2	Level control request	(see 6.4.2.3.7)
			Bits	3 to 4	Ramp level storage request	(see 6.4.2.3.27)
			Bits	5 to 6	Stop level change request	(see 6.4.2.3.29)
			Bits	7 to 8	Not defined	
Bytes	4 to 5	Driven axle load				(see 6.4.2.3.2)
Byte	6	Parking and trailer air pressure				(see 6.4.2.3.31)
Byte	7	Auxiliary equipment supply pressure				(see 6.4.2.3.32)
Byte	8	Not defined				

6.5.3 Message specifications, transmission direction from towed to towing vehicle

6.5.3.1 Towed vehicle message, electronic brake system #2/1, EBS 21

Sending this message is required.

Transmission repetition time:	10 ms ± 1 ms
Data length:	8 bytes
Data page:	0
PDU format:	3
PDU specific:	Address of the predecessor
Default priority:	3

Byte	1	Towed vehicle system status 1	Bits	1 to 2	Vehicle ABS active/passive	(see 6.4.2.2.17)
			Bits	3 to 4	Vehicle retarder control active/passive	(see 6.4.2.2.14)
			Bits	5 to 6	Vehicle service brake active/passive	(see 6.4.2.2.15)
			Bits	7 to 8	Automatic towed vehicle braking active/passive	(see 6.4.2.2.16)
Byte	2	Towed vehicle system status 2	Bits	1 to 2	VDC active	(see 6.4.2.2.36)
			Bits	3 to 8	Not defined	
Bytes	3 to 4	Wheel based vehicle speed				(see 6.4.2.2.5)
Byte	5	Actual percentage of retarder peak torque				(see 6.4.2.2.7)
Bytes	6 to 7	Wheel speed difference main axle				(see 6.4.2.2.38)
Byte	8	Not defined				

6.5.3.2 Towed vehicle message, electronic brake system #2/2, EBS 22

Sending this message is required.

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	254
PDU specific:	196
Default priority:	6