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

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

Partie 3: Couche d'application pour les équipements autres que les équipements de freinage et les organes de roulement

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This third edition cancels and replaces the second edition (ISO 11992-3:2003), which has been technically revised. It also incorporates the Amendment ISO 11992-3:2003/Amd. 1:2008.

The main changes compared to the previous edition are as follows:

— introduced requirements structure;

— Clause 7: added new parameters;

— Clause 8: added new messages;

— added Annex A (informative) object detection (OD) sensor states; and

— added Annex B (informative) message flow.

A list of all parts in the ISO 11992 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 11992 series specifies the interchange of digital information between road vehicles with a maximum authorised total mass greater than 3 500 kg, and towed vehicles, including communication between towed vehicles in terms of parameters and requirements of the lower OSI layers (physical and data link layer) of the electrical connection used to connect the electrical and electronic systems.

This document is structured according to the Open Systems Interconnection (OSI) Basic Reference Model, in accordance with ISO/IEC 7498-1 and ISO/IEC 10731 [5], which structures communication systems into seven layers. When mapped on this model, the application layer protocol and data link layer framework requirements specified/referenced in the ISO 11992 series are structured according to Figure 1.

Figure 1 illustrates a simplified communication framework:

— vehicle normal communication framework,

— vehicle diagnostic communication framework,

— vehicle-specific use case framework, and the

— vehicle lower-layers framework.

The vehicle normal communication framework is composed of ISO 11992-2 and ISO 11992-3.

The vehicle diagnostic communication framework is composed of ISO 14229-1 [8], ISO 14229-2 [9], ISO 14229-3 [10] and ISO 11992-4 [6].

The vehicle-specific use case framework is composed of ISO 11992-4 [6], ISO 22901-1 [13] or vehicle manufacturer-specific diagnostic data definition.

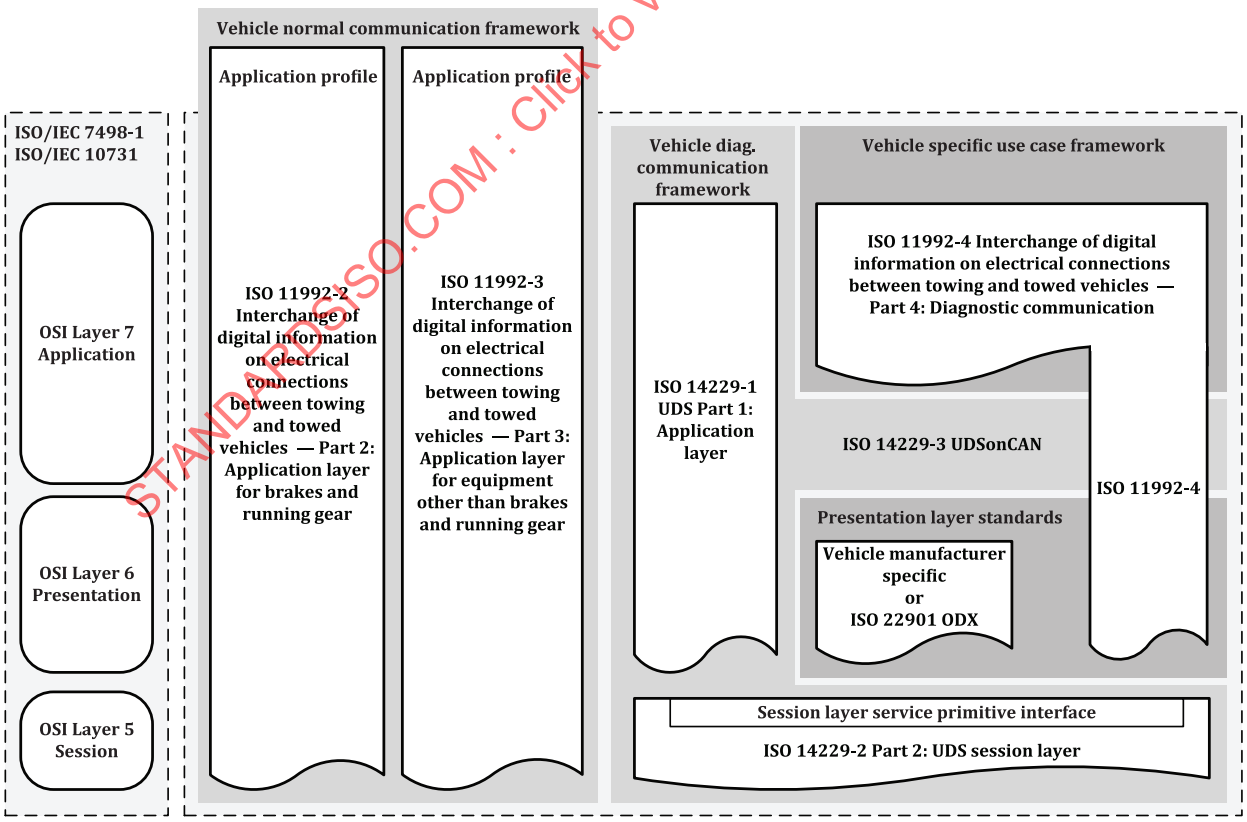


Figure 1 — ISO 11992 documents reference according to the OSI model

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

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

1 Scope

This document specifies the application layer, the payload of messages, and parameter groups for equipment other than brakes and running gears, 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.

This document supports the parameters and message sets for object detection (OD). The installation of the object detection (OD) device compliant to this document in the towed vehicle is identified by a dedicated message.

Additionally, some lighting parameters and messages are specified.

The conformance and interoperability test plans are not part of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 612, *Road vehicles — Dimensions of motor vehicles and towed vehicles — Terms and definitions*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO 11992-2, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 2: Application layer for brakes and running gear*

ISO 80000-1, *Quantities and units — Part 1: General*

SAE J1939-21, *Data Link Layer*

SAE J1939-71:2020, *Vehicle Application Layer*

SAE J1939-DA, *J1939 Digital Annex*

SAE J1850, *Class B Data Communications Network Interface*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11992-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
mean value
sum of all sample values divided by the number of samples

Note 1 to entry: to entry:

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i}{N}$$

where

$\{x_1, x_2, \ldots x_N\}$ are the observed values of the sample items;

N is the number of observations in the sample.

3.2
standard deviation
positive square root of the variance

Note 1 to entry: to entry:

$$s = \sqrt{\frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N-1}}$$

where

x is the sample value;

$\bar{x}$ is the mean value;

i is the sample counter;

N is the number of observations in the sample.

[SOURCE: IEC Electropedia, 103-08-13, modified — Note 1 to entry has been added.]

3.3
trailer
towed or towing vehicle but not a commercial vehicle

4 Abbreviated terms

ABS	anti-lock braking system
APP	application
ASR	anti-spin regulation (traction control system)
CAN	controller area network
DA	destination address

DP	data page
ECU	electronic control unit
ERR	error
GE	group extension
GPM	general purpose messages
MSB	most significant bit/byte
N/A	not applicable
OD	object detection
ODM	object detection message
ODD	obstacle detection device
P	priority
PDU	protocol data unit
PDU1	PDU send in unicast
PDU2	PDU send in broadcast/multicast
PF	PDU format
PGN	parameter group number
PS	PDU-specific
PTO	power take-off
R	reserved
SA	source address
SLOT	scaling, limit, offset and transfer function
SNA	signal not available
SPN	suspect parameter number

5 APP – Parameter specification

5.1 General definitions

Interpretation of suspect parameter values are specified in SAE J1939-71. Parameter ranges are of 1-byte, 2-byte, and 4-byte in size. Discrete and control command (status) parameters are coded as 2-bit values.

5.2 Rear obstacle distance

This parameter indicates the actual distance between the back of the towed vehicle and any obstacle.

REQ	7.1 APP – Parameter specification – Rear obstacle distance

Table 1 specifies the parameter attributes.

Table 1 — Rear obstacle distance attributes

Attribute	Value
Data length	1 byte
Resolution	2 cm per bit
Offset	0 cm
Data range	0 cm to 500 cm
Type	measured

5.3 Thermal body temperature

This parameter indicates the actual temperature in a thermal body on the towed vehicle.

REQ	7.2 APP – Parameter specification – Thermal body
Table 2 specifies the parameter attributes.	

Table 2 — Thermal body attributes

Attribute	Value
Data length	1 byte
Resolution	1 °C per bit
Offset	-125 °C
Data range	-125 °C to +125 °C
Type	measured

5.4 Obstacle detection device (ODD) request

This parameter indicates the command signal to switch on or off the ODD.

REQ	7.3 APP – Parameter specification – Obstacle detection device (ODD) request
Table 3 specifies the parameter attributes.	

Table 3 — Obstacle detection device (ODD) request attributes

Attribute	Value
Data length	2 bit
Data range	00_2: ODD off 01_2: ODD on
Type	status

5.5 Anti-theft device – Status request

This parameter indicates the command signal to activate the anti-theft device.

REQ	7.4 APP – Parameter specification – Anti-theft device – Status request
Table 4 specifies the parameter attributes.	

Table 4 — Anti-theft device – Status request attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	status

5.6 Obstacle detection device (ODD) active

This parameter indicates that an ODD is active/inactive.

REQ	7.5 APP – Parameter specification – Obstacle detection device (ODD) active
Table 5 specifies the parameter attributes.	

Table 5 — Obstacle detection device (ODD) active attributes

Attribute	Value
Data length	2 bit
Data range	00_2: inactive 01_2: active
Type	measured

5.7 Anti-theft device – Measured

This parameter indicates that the anti-theft device is switched on or off.

REQ	7.6 APP – Parameter specification – Anti-theft device – Measured
Table 6 specifies the parameter attributes.	

Table 6 — Anti-theft device – Measured attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.8 Vehicle type

This parameter indicates the information to identify a dolly axle within a road train.

REQ	7.7 APP – Parameter specification – Vehicle type
Table 7 specifies the parameter attributes.	

Table 7 — Vehicle type attributes

Attribute	Value
Data length	2 bit
Data range	00_2: towing (tractor) or towed (trailer) 01_2: trailer

Table 7 *(continued)*

Attribute	Value
Type	measured

5.9 Detailed vehicle type

This parameter indicates the information about detailed vehicle type within a road train.

REQ	7.8 APP – Parameter specification – Detailed vehicle type
Table 8 specifies the parameter attributes.	

Table 8 — Detailed vehicle type attributes

Attribute	Value
Data length	6 bit (enumeration)
Data range	0: semi-trailer 1: central-axle trailer 2: full trailer 3: converter dolly 4: link trailer 5 to 7: reserved by this document 8: semi-trailer towing another trailer 9: central-axle trailer towing another trailer 10: full trailer towing another trailer 11: converter dolly towing another trailer 12: link-trailer towing another trailer 13 to 15: reserved by this document 16: tractor for semi-trailer 17: platform truck 18 to 63: reserved by this document
Type	measured

5.10 Percent clutch slip

This parameter indicates the signal that represents the ratio of input shaft speed to current engine speed. Formula (1) specifies the calculation of percent clutch slip.

NOTE Not all vehicles use a clutch and gears for propulsion, i.e. electric vehicles with direct drive.

REQ	7.9 APP – Parameter specification – Percent clutch
The percent clutch attributes are specified in SAE J1939-DA (SPN 522).	

$$P_{\text{Clutch\_Slip}} = \frac{E_{\text{Engine\_Speed}} - I_{\text{Input\_Shaft\_Speed}}}{E_{\text{Engine\_Speed}}} \times 100 \quad (1)$$

where

P_{Clutch_Slip} is the percent clutch slip;

E_{Engine_Speed} is the rounds per minute engine rotation;

$I_{Input\_Shaft\_Speed}$ is the rounds per minute input shaft speed.

5.11 Current gear

This parameter indicates the gear currently engaged in the transmission or the last gear engaged while the transmission is in process of shifting to the new or selected gear. Transitions toward a destination gear will not be indicated. Once the selected gear has been engaged the current gear will reflect that gear.

REQ	7.10 APP – Parameter specification – Current gear
The current gear attributes are specified in SAE J1939-DA (SPN 523).	
NOTE 1 Negative values are reverse gears, positive values are forward gears, zero is neutral.	
NOTE 2 The parameter-specific indicator 251 (FB_{16}) is used to indicate that the vehicle is parked.	

5.12 Accelerator pedal low idle switch

This parameter indicates the switch signal that indicates whether the accelerator pedal low idle switch is opened or closed.

REQ	7.11 APP – Parameter specification – Accelerator pedal low idle switch
Table 9 specifies the parameter attributes.	

Table 9 — Accelerator pedal low idle switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not in low idle condition 01_2: in low idle condition
Type	measured

5.13 Engine propulsion system control allowed

This parameter indicates the switch signal, which indicates that engine propulsion system control is allowed.

REQ	7.12 APP – Parameter specification – Engine propulsion system control allowed
Table 10 specifies the parameter attributes.	

Table 10 — Engine propulsion system control allowed attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not allowed 01_2: allowed
Type	measured

5.14 PTO control allowed

This parameter indicates the switch signal, which indicates that PTO control is allowed.

REQ	7.13 APP – Parameter specification – PTO control allowed
Table 11 specifies the parameter attributes.	

Table 11 — PTO control allowed attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not allowed 01_2: allowed
Type	measured

5.15 Tachograph vehicle speed

This parameter indicates the speed of vehicle as calculated from tail shaft speed or taken from tachograph.

REQ	7.14 APP – Parameter specification – Tachograph vehicle speed
The tachograph vehicle attributes are specified in SAE J1939-DA (SPN 1624).	

5.16 Engine propulsion system speed measured

This parameter indicates the actual engine propulsion system speed measured.

REQ	7.15 APP – Parameter specification – Engine propulsion system speed measured
Table 12 specifies the parameter attributes.	

Table 12 — Engine propulsion system speed measured attributes

Attribute	Value
Data length	2 byte
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}
Type	measured

5.17 Driver's demand engine propulsion system – Percent torque

This parameter indicates the torque output of the engine propulsion system requested by the driver. The data is transmitted in indicated torque as a percentage of the indicated peak engine propulsion system torque.

REQ	7.16 APP – Parameter specification – Driver's demand engine propulsion system – Percent torque
The driver's demand engine propulsion system – percent attributes are specified in SAE J1939-DA (SPN 512).	

5.18 Actual engine propulsion system – Percent torque

This parameter indicates the calculated output torque of the engine propulsion system. The data is transmitted in indicated torque as a percentage of the reference engine propulsion system torque.

REQ	7.17 APP – Parameter specification – Actual engine propulsion system – Percent torque
The actual engine propulsion system – percent torque attributes are specified in SAE J1939-DA (SPN 523).	

5.19 Transmission reference torque

This parameter indicates the 100 % reference value for all specified indicated engine propulsion system torque parameters.

REQ	7.18 APP – Parameter specification – Transmission reference torque
The transmission reference attributes are specified in SAE J1939-DA (SPN 7778).	

5.20 Engine propulsion system percent load at current speed

This parameter indicates the ratio of actual engine propulsion system percent torque to maximum indicated torque available at the current engine propulsion system speed, clipped to zero torque during engine propulsion system braking.

REQ	7.19 APP – Parameter specification – Engine propulsion system percent load at current speed
The engine propulsion system percent load at current attributes are specified in SAE J1939-DA (SPN 92).	

5.21 Maximum vehicle speed limit

This parameter indicates the maximum vehicle velocity allowed.

REQ	7.20 APP – Parameter specification – Maximum vehicle speed limit
Table 13 specifies the parameter attributes.	

Table 13 — Maximum vehicle speed limit attributes

Attribute	Value
Data length	1 byte
Resolution	1 km/h per bit
Offset	0 km/h
Data range	0 km/h to 250 km/h
Type	measured

5.22 Engine propulsion system speed upper limit

This parameter indicates the engine propulsion system speed, which cannot be exceeded.

REQ	7.21 APP – Parameter specification – Engine propulsion system speed upper limit
Table 14 specifies the parameter attributes.	

Table 14 — Engine propulsion system speed upper limit attributes

Attribute	Value
Data length	2 byte

Table 14 *(continued)*

Attribute	Value
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}
Type	measured

5.23 Engine propulsion system speed lower limit

This parameter indicates the minimum engine propulsion system speed, which the engine propulsion system is allowed to reach.

REQ	7.22 APP – Parameter specification – Engine propulsion system speed lower limit
Table 15 specifies the parameter attributes.	

Table 15 — Engine propulsion system speed lower limit attributes

Attribute	Value
Data length	2 byte
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}
Type	measured

5.24 Engine propulsion system coolant temperature warning

This parameter indicates that the engine propulsion system coolant temperature reaches its warning level.

REQ	7.23 APP – Parameter specification – Engine propulsion system coolant temperature warning
Table 16 specifies the parameter attributes.	

Table 16 — Engine propulsion system coolant temperature warning attributes

Attribute	Value
Data length	3 bit
Data range	000_2: no warning 001_2: pre-warning 010_2: warning 011_2 to 101_2: not defined
Type	measured

5.25 Engine propulsion system oil pressure warning

This parameter indicates that the engine propulsion system oil pressure reaches its warning level.

REQ	7.24 APP – Parameter specification – Engine propulsion system oil pressure warning
Table 17 specifies the parameter attributes.	

Table 17 — Engine propulsion system oil pressure warning attributes

Attribute	Value
Data length	2 bit
Data range	00_2: no warning 01_2: warning
Type	measured

5.26 Engine propulsion system oil temperature

This parameter indicates the temperature of the engine propulsion system lubricant.

REQ	7.25 APP – Parameter specification – Engine propulsion system oil temperature
Table 18 specifies the parameter attributes.	

Table 18 — Engine propulsion system oil temperature attributes

Attribute	Value
Data length	2 byte
Resolution	0,031 25 °C per bit
Offset	-273 °C
Data range	-273 °C to +1 735 °C
Type	measured

5.27 Engine propulsion system coolant temperature

This parameter indicates the temperature of the liquid in the engine propulsion system cooling system.

REQ	7.26 APP – Parameter specification – Engine propulsion system coolant temperature
The Engine Propulsion System Coolant Temperature attributes are specified in SAE J1939-DA (SPN 110).	

5.28 Engine propulsion system oil pressure

This parameter indicates the gauge pressure of the oil in the engine propulsion system lubrication system as provided by the oil pump.

REQ	7.27 APP – Parameter specification – Engine propulsion system oil pressure
the engine propulsion system oil pressure attributes are specified in SAE J1939-DA (SPN 100).	

5.29 Torque converter oil temperature warning

This parameter indicates that the torque converter oil temperature has reached its warning level.

REQ	7.28 APP – Parameter specification – Torque converter oil temperature warning
Table 19 specifies the parameter attributes.	

Table 19 — Torque converter oil temperature warning attributes

Attribute	Value
Data length	3 bit

Table 19 *(continued)*

Attribute	Value
Data range	000_2: no warning 001_2: pre-warning 010_2: warning 011_2 to 101_2: not defined
Type	measured

5.30 Torque converter oil temperature

This parameter indicates the temperature of the torque converter lubricant.

REQ	7.29 APP – Parameter specification – Torque converter oil temperature
Table 20 specifies the parameter attributes.	

Table 20 — Torque converter oil temperature attributes

Attribute	Value
Data length	2 byte
Resolution	0,03125 °C per bit
Offset	-273 °C
Data range	-273 °C to +1 735 °C
Type	measured

5.31 First clutch-dependent PTO feedback

This parameter indicates the current state of the first clutch-dependent PTO feedback.

REQ	7.30 APP – Parameter specification – First clutch-dependent PTO feedback
Table 21 specifies the parameter attributes.	

Table 21 — First clutch-dependent PTO feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not engaged 01_2: engaged
Type	measured

5.32 Second clutch-dependent PTO feedback

This parameter indicates the current state of the second clutch-dependent PTO feedback.

REQ	7.31 APP – Parameter specification – Second clutch-dependent PTO feedback
Table 22 specifies the parameter attributes.	

Table 22 — Second clutch-dependent PTO feedback attributes

Attribute	Value
Data length	2 bit

Table 22 *(continued)*

Attribute	Value
Data range	00_2: not engaged 01_2: engaged
Type	measured

5.33 Clutch-independent PTO feedback

This parameter indicates the current state of the clutch-independent PTO feedback.

REQ	7.32 APP – Parameter specification – Clutch-independent PTO feedback
Table 23 specifies the parameter attributes.	

Table 23 — Clutch-independent PTO Feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not engaged 01_2: engaged
Type	measured

5.34 First engine propulsion system-mounted PTO feedback

This parameter indicates the current state of the first engine propulsion system-mounted PTO feedback.

REQ	7.33 APP – Parameter specification – First engine propulsion system-mounted PTO feedback
Table 24 specifies the parameter attributes.	

Table 24 — First engine propulsion system-mounted PTO feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: limits not activated 01_2: limits activated
Type	measured

5.35 Second engine propulsion system-mounted PTO feedback

This parameter indicates the current state of the second engine propulsion system-mounted PTO feedback.

REQ	7.34 APP – Parameter specification – Second engine propulsion system-mounted PTO feedback
Table 25 specifies the parameter attributes.	

Table 25 — Second engine propulsion system-mounted PTO feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: limits not activated 01_2: limits activated

Table 25 *(continued)*

Attribute	Value
Type	measured

5.36 Starter active

This parameter indicates whether the starter is in use.

REQ	7.35 APP – Parameter specification – Starter active
Table 26 specifies the parameter attributes.	

Table 26 — Starter active attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not active 01_2: active
Type	measured

5.37 Engine propulsion system running

This parameter indicates whether the engine propulsion system is running.

REQ	7.36 APP – Parameter specification – Engine propulsion system running
Table 27 specifies the parameter attributes.	

Table 27 — Engine propulsion system running attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not running 01_2: running
Type	measured

5.38 Engine propulsion system torque mode

This parameter indicates which engine propulsion system torque mode is currently generating, limiting or controlling the torque. Not all modes are relevant for all devices.

REQ	7.37 APP – Parameter specification – Engine propulsion system torque mode
The engine propulsion system torque mode attributes are specified in SAE J1939-DA (SPN 899).	

5.39 First clutch-dependent PTO switch

This parameter indicates the state of the first clutch-dependent PTO switch.

REQ	7.38 APP – Parameter specification – First clutch-dependent PTO switch
Table 28 specifies the parameter attributes.	

Table 28 — First clutch-dependent PTO Switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.40 Second clutch-dependent PTO switch

This parameter indicates the state of the second clutch-dependent PTO switch.

REQ	7.39 APP – Parameter specification – Second clutch-dependent PTO switch
Table 29 specifies the parameter attributes.	

Table 29 — Second clutch-dependent PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.41 Clutch-independent PTO switch

This parameter indicates the state of the clutch-independent PTO switch.

REQ	7.40 APP – Parameter specification – Clutch-independent PTO switch
Table 30 specifies the parameter attributes.	

Table 30 — Clutch-independent PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.42 First engine propulsion system-mounted PTO switch

This parameter indicates the state of the first engine propulsion system-mounted PTO switch.

REQ	7.41 APP – Parameter specification – First engine propulsion system-mounted PTO switch
Table 31 specifies the parameter attributes.	

Table 31 — First engine propulsion system-mounted PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on

Table 31 *(continued)*

Attribute	Value
Type	measured

5.43 Second engine propulsion system-mounted PTO switch

This parameter indicates the state of the second engine propulsion system-mounted PTO switch.

REQ	7.42 APP – Parameter specification – Second engine propulsion system-mounted PTO switch
Table 32 specifies the parameter attributes.	

Table 32 — Second engine propulsion system-mounted PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.44 Requested percent clutch slip

This parameter indicates the requested percent clutch slip.

REQ	7.43 APP – Parameter specification – Requested percent clutch slip
The requested percent clutch slip attributes are specified in SAE J1939-DA (SPN 648).	

5.45 Starter lockout switch

This parameter indicates the state of the starter lockout switch.

REQ	7.44 APP – Parameter specification – Starter lockout switch
Table 33 specifies the parameter attributes.	

Table 33 — Starter lockout switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.46 Engine propulsion system start switch

This parameter indicates the state of the engine propulsion system start switch.

REQ	7.45 APP – Parameter specification – Engine propulsion system start switch
Table 34 specifies the parameter attributes.	

Table 34 — Engine propulsion system start switch attributes

Attribute	Value
Data length	2 bit

Table 34 *(continued)*

Attribute	Value
Data range	00_2: off 01_2: on
Type	measured

5.47 Engine propulsion system stop switch

This parameter indicates the state of the Engine propulsion system stop switch.

REQ	7.46 APP – Parameter specification – Engine propulsion system stop switch
Table 35 specifies the parameter attributes.	

Table 35 — Engine propulsion system stop switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.48 Requested engine propulsion system speed upper limit

This parameter indicates the requested engine propulsion system speed upper limit.

REQ	7.47 APP – Parameter specification – Requested engine propulsion system speed upper limit
Table 36 specifies the parameter attributes.	

Table 36 — Requested engine propulsion system speed upper limit attributes

Attribute	Value
Data length	2 byte
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}
Type	status

5.49 Requested engine propulsion system speed lower limit

This parameter indicates the requested minimum engine propulsion system speed.

REQ	7.48 APP – Parameter specification – Requested engine propulsion system speed lower limit
Table 37 specifies the parameter attributes.	

Table 37 — Requested engine propulsion system speed lower limit attributes

Attribute	Value
Data length	2 byte
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}

Table 37 *(continued)*

Attribute	Value
Type	status

5.50 Requested engine propulsion system torque limit

This parameter indicates the requested engine propulsion system torque limit, which is indicated as a ratio of the reference engine (propulsion system) torque.

REQ	7.49 APP – Parameter specification – Requested engine propulsion system torque limit
Table 38 specifies the parameter attributes.	

Table 38 — Requested engine propulsion system torque limit attributes

Attribute	Value
Data length	1 byte
Resolution	1 % per bit
Offset	-125 %
Data range	-125 % to +125 %
Type	status

5.51 Requested vehicle speed limit

This parameter indicates the requested vehicle speed limit that the vehicle is not allowed to exceed.

REQ	7.50 APP – Parameter specification – Requested vehicle speed limit
Table 39 specifies the parameter attributes.	

Table 39 — Requested vehicle speed limit attributes

Attribute	Value
Data length	1 byte
Resolution	1 km/h per bit
Offset	0 km/h
Data range	0 km/h to 250 km/h
Type	status

5.52 Refuse packer step switch

This parameter indicates the state of the refuse packer step switch.

REQ	7.51 APP – Parameter specification – Refuse packer step switch
Table 40 specifies the parameter attributes.	

Table 40 — Refuse packer step switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.53 Operating panel active

This parameter indicates that the operating panel active.

REQ	7.52 APP – Parameter specification – Operating panel active
Table 41 specifies the parameter attributes.	

Table 41 — Operating panel active attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not active 01_2: active
Type	measured

5.54 Requested engine propulsion system speed

This parameter indicates the requested engine propulsion system Speedat which the engine is expected to operate.

REQ	7.53 APP – Parameter specification – Requested engine propulsion system speed
Table 42 specifies the parameter attributes.	

Table 42 — Requested engine propulsion system speed attributes

Attribute	Value
Data length	2 byte
Resolution	0,125 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 8 031,875 min^{-1}
Type	status

5.55 Accelerator pedal position

This parameter indicates the ratio of actual accelerator pedal position to maximum pedal position.

REQ	7.54 APP – Parameter specification – Accelerator pedal position
Table 43 specifies the parameter attributes.	

Table 43 — Accelerator pedal position attributes

Attribute	Value
Data length	1 byte
Resolution	0,4 % per bit
Offset	0 %
Data range	0 % to 100 %
Type	measured

5.56 Ambient air temperature

This parameter indicates the ambient air temperature surrounding vehicle.

REQ	7.55 APP – Parameter specification – Ambient air temperature
The ambient air temperature attributes are specified in SAE J1939-DA (SPN 171).	

5.57 Fuel level warning

This parameter indicates the decrease of the fuel level to a certain minimum.

REQ	7.56 APP – Parameter specification – Fuel level warning
Table 44 specifies the parameter attributes.	

Table 44 — Fuel level warning attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.58 Towed vehicle left-hand stop light(s)

This parameter indicates the state of the towed vehicle left-hand stop light(s).

REQ	7.57 APP – Parameter specification – Towed vehicle left-hand stop light(s)
Table 45 specifies the parameter attributes.	

Table 45 — Towed vehicle left-hand stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.59 Towed vehicle right-hand stop light(s)

This parameter indicates the state of the towed vehicle right-hand stop light(s).

REQ	7.58 APP – Parameter specification – Towed vehicle right-hand stop light(s)
Table 46 specifies the parameter attributes.	

Table 46 — Towed vehicle right-hand stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.60 Towed vehicle left-hand direction indicator light(s)

This parameter indicates the state of the towed vehicle left-hand direction indicator light(s).

REQ	7.59 APP – Parameter specification – Towed vehicle left-hand direction indicator light(s)
Table 47 specifies the parameter attributes.	

Table 47 — Towed vehicle left-hand direction indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.61 Towed vehicle right-hand direction indicator light(s)

This parameter indicates the state of the towed vehicle right-hand direction indicator light(s).

REQ	7.60 APP – Parameter specification – Towed vehicle right-hand direction indicator light(s)
Table 48 specifies the parameter attributes.	

Table 48 — Towed vehicle right-hand direction indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.62 Towed vehicle left-hand rear light(s)

This parameter indicates the state of the towed vehicle left-hand rear light(s).

REQ	7.61 APP – Parameter specification – Towed vehicle left-hand rear light(s)
Table 49 specifies the parameter attributes.	

Table 49 — Towed vehicle left-hand rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.63 Towed vehicle right-hand rear position light(s)

This parameter indicates the state of the towed vehicle right-hand rear position light(s).

REQ	7.62 APP – Parameter specification – Towed vehicle right-hand rear position light(s)
Table 50 specifies the parameter attributes.	

Table 50 — Towed vehicle right-hand rear position light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.64 Towed vehicle left-hand rear fog light(s)

This parameter indicates the state of the towed vehicle left-hand rear fog light(s).

REQ	7.63 APP – Parameter specification – Towed vehicle left-hand rear fog light(s)
Table 51 specifies the parameter attributes.	

Table 51 — Towed vehicle left-hand rear fog light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.65 Towed vehicle right-hand rear fog light(s)

This parameter indicates the state of the towed vehicle right-hand rear fog light(s).

REQ	7.64 APP – Parameter specification – Towed vehicle right-hand rear fog light(s)
Table 52 specifies the parameter attributes.	

Table 52 — Towed vehicle right-hand rear fog light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.66 Towed vehicle left-hand reversing light(s)

This parameter indicates the state of the towed vehicle left-hand reversing light(s).

REQ	7.65 APP – Parameter specification – Towed vehicle left-hand reversing light(s)
Table 53 specifies the parameter attributes.	

Table 53 — Towed vehicle left-hand reversing light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit

Table 53 *(continued)*

Attribute	Value
Type	measured

5.67 Towed vehicle right-hand reversing light(s)

This parameter indicates the state of the towed vehicle right-hand reversing light(s).

REQ	7.66 APP – Parameter specification – Towed vehicle right-hand reversing light(s)
Table 54 specifies the parameter attributes.	

Table 54 — Towed vehicle right-hand reversing light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.68 Towed vehicle left-hand side marker light(s)

This parameter indicates the state of the towed vehicle left-hand side marker light(s).

REQ	7.67 APP – Parameter specification – Towed vehicle left-hand side marker light(s)
Table 55 specifies the parameter attributes.	

Table 55 — Towed vehicle left-hand side marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.69 Towed vehicle right-hand side marker light(s)

This parameter indicates the state of the towed vehicle right-hand side marker light(s).

REQ	7.68 APP – Parameter specification – Towed vehicle right-hand side marker light(s)
Table 56 specifies the parameter attributes.	

Table 56 — Towed vehicle right-hand side marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.70 Towed vehicle left-hand rear width indicator light(s)

This parameter indicates the state of the towed vehicle left-hand rear width indicator light(s).

REQ	7.69 APP – Parameter specification – Towed vehicle left-hand rear width indicator light(s)
Table 57 specifies the parameter attributes.	

Table 57 — Towed vehicle left-hand rear width indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.71 Towed vehicle right-hand rear width indicator light(s)

This parameter indicates the state of the towed vehicle right-hand rear width indicator light(s).

REQ	7.70 APP – Parameter specification – Towed vehicle right-hand rear width indicator light(s)
Table 58 specifies the parameter attributes.	

Table 58 — Towed vehicle right-hand rear width indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.72 Towed vehicle left-hand corner marker light(s)

This parameter indicates the state of the towed vehicle left-hand corner marker light(s).

REQ	7.71 APP – Parameter specification – Towed vehicle left-hand corner marker light(s)
Table 59 specifies the parameter attributes.	

Table 59 — Towed vehicle left-hand corner marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.73 Towed vehicle right-hand corner marker light(s)

This parameter indicates the state of the towed vehicle right-hand corner marker light(s).

REQ	7.72 APP – Parameter specification – Towed vehicle right-hand corner marker light(s)
Table 60 specifies the parameter attributes.	

Table 60 — Towed vehicle right-hand corner marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.74 Towed vehicle left-hand rear registration-plate light(s)

This parameter indicates the state of the towed vehicle left-hand rear registration-plate light(s).

REQ	7.73 APP – Parameter specification – Towed vehicle left-hand rear registration-plate light(s)
Table 61 specifies the parameter attributes.	

Table 61 — Towed vehicle left-hand rear registration-plate light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.75 Towed vehicle right-hand rear registration-plate light(s)

This parameter indicates the state of the towed vehicle right-hand rear registration-plate light(s).

REQ	7.74 APP – Parameter specification – Towed vehicle right-hand rear registration-plate light(s)
Table 62 specifies the parameter attributes.	

Table 62 — Towed vehicle right-hand rear registration-plate light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.76 Towed vehicle rear warning light(s)

This parameter indicates the state of the towed vehicle rear warning light(s).

REQ	7.75 APP – Parameter specification – Towed vehicle rear warning light(s)
Table 63 specifies the parameter attributes.	

Table 63 — Towed vehicle rear warning light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit

Table 63 *(continued)*

Attribute	Value
Type	measured

5.77 Towed vehicle rotating identification light(s)

This parameter indicates the state of the towed vehicle rotating identification Light(s).

REQ	7.76 APP – Parameter specification – Towed vehicle rotating identification light(s)
Table 64 specifies the parameter attributes.	

Table 64 — Towed vehicle rotating identification light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.78 Towed vehicle interior light(s)

This parameter indicates the state of the towed vehicle interior light(s).

REQ	7.77 APP – Parameter specification – Towed vehicle interior light(s)
Table 65 specifies the parameter attributes.	

Table 65 — Towed vehicle interior light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.79 Towed vehicle work light(s)

This parameter indicates the state of the towed vehicle work light(s).

REQ	7.78 APP – Parameter specification – Towed vehicle work light(s)
Table 66 specifies the parameter attributes.	

Table 66 — Towed vehicle work light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.80 Body fluid level

This parameter indicates the actual fluid level in a body on the towed vehicle.

REQ	7.79 APP – Parameter specification – Body fluid level
Table 67 specifies the parameter attributes.	

Table 67 — Body fluid level attributes

Attribute	Value
Data length	2 byte
Resolution	2 l per bit
Offset	0 l
Data range	0 l to 128 510 l
Type	measured

5.81 Actual pressure

This parameter indicates the actual pressure in a body on the towed vehicle.

REQ	7.80 APP – Parameter specification – Actual pressure
Table 68 specifies the parameter attributes.	

Table 68 — Actual pressure attributes

Attribute	Value
Data length	1 byte
Resolution	10 kPa per bit
Offset	0 kPa
Data range	0 kPa to 2 500 kPa
Type	measured

5.82 Towed vehicle rear black-out marker select light(s)

This parameter indicates the command signal to activate the towed vehicle rear black-out marker select light(s).

REQ	7.81 APP – Parameter specification – Towed vehicle rear black-out marker select light(s)
The Towed Vehicle Rear Black-out Marker Select Light(s) attributes are specified in SAE J1939-DA (SPN 1840).	

5.83 Towed vehicle front black-out marker lamp select

This parameter indicates the command signal to activate the towed vehicle front black-out marker lamp select.

REQ	7.82 APP – Parameter specification – Towed vehicle front black-out marker lamp select
The Towed Vehicle Front Black-out Marker Lamp Select attributes are specified in SAE J1939-DA (SPN 1839).	

5.84 Towed vehicle convoy lamp select

This parameter indicates the command signal to activate the towed vehicle convoy lamp select light(s).

REQ	7.83 APP – Parameter specification – Towed vehicle convoy lamp select
The towed vehicle convoy lamp select attributes are specified in SAE J1939-DA (SPN 1838).	

5.85 Towed vehicle convoy driving lamp select

This parameter indicates the command signal to activate the towed vehicle convoy driving lamp select light(s).

REQ	7.84 APP – Parameter specification – Towed vehicle convoy driving lamp select
The towed vehicle convoy driving lamp select attributes are specified in SAE J1939-DA (SPN 1847).	

5.86 Towed vehicle black-out brake/stop lamp select

This parameter indicates the command signal to activate the towed vehicle black-out brake/stop lamp select light(s).

REQ	7.85 APP – Parameter specification – Towed vehicle black-out brake/stop lamp select
The towed vehicle black-out brake/stop lamp select attributes are specified in SAE J1939-DA (SPN 1841).	

5.87 Towed vehicle night vision illuminator select

This parameter indicates the command signal to activate the towed vehicle night vision illuminator select.

REQ	7.86 APP – Parameter specification – Towed vehicle night vision illuminator select
The towed vehicle night vision illuminator select attributes are specified in SAE J1939-DA (SPN 1843).	

5.88 Towed vehicle black-out work lamp select

This parameter indicates the command signal to activate the towed vehicle black-out work lamp select light(s).

REQ	7.87 APP – Parameter specification – Towed vehicle black-out work lamp select
Table 69 specifies the parameter attributes.	

Table 69 — Towed vehicle black-out work lamp select attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	status

5.89 Towed vehicle operators black-out intensity selection

This parameter indicates the command signal to activate the towed vehicle operators black-out intensity selection. This parameter provides the operators selected illumination intensity as a percentage of available full scale.

REQ	7.88 APP – Parameter specification – Towed vehicle operators black-out intensity selection
Table 70 specifies the parameter attributes.	

Table 70 — Towed vehicle operators black-out intensity selection attributes

Attribute	Value
Data length	8 bit
Resolution	0,4 % per bit
Offset	0 %
Data range	0 % to 100 %
Operational range	10 % to 100 %
Type	status

5.90 Towed vehicle left hand black-out rear light(s)

This parameter indicates the state of the towed vehicle left hand black-out rear light(s).

REQ	7.89 APP – Parameter specification – Towed vehicle left hand black-out rear light(s)
Table 71 specifies the parameter attributes.	

Table 71 — Towed vehicle left hand black-out rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.91 Towed vehicle right-hand black-out rear light(s)

This parameter indicates the state of the towed vehicle right-hand black-out rear light(s).

REQ	7.90 APP – Parameter specification – Towed vehicle right-hand black-out rear light(s)
Table 72 specifies the parameter attributes.	

Table 72 — Towed vehicle right-hand black-out rear Light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.92 Towed vehicle left-hand black-out brake/stop light(s)

This parameter indicates the state of the towed vehicle left-hand black-out brake/stop light(s).

REQ	7.91 APP – Parameter specification – Towed vehicle left-hand black-out brake/stop light(s)
Table 73 specifies the parameter attributes.	

Table 73 — Towed vehicle left-hand black-out brake/stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.93 Towed vehicle right-hand black-out brake/stop light(s)

This parameter indicates the state of the towed vehicle right-hand black-out brake/stop light(s).

REQ	7.92 APP – Parameter specification – Towed vehicle right-hand black-out brake/stop light(s)
Table 74 specifies the parameter attributes.	

Table 74 — Towed vehicle right-hand black-out brake/stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.94 Towed vehicle rear convoy light(s)

This parameter indicates the state of the towed vehicle rear convoy light(s).

REQ	7.93 APP – Parameter specification – Towed vehicle rear convoy light(s)
Table 75 specifies the parameter attributes.	

Table 75 — Towed vehicle rear convoy light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.95 ODM version information

This parameter indicates the ODM version which is used to negotiate the implemented version of the OD interface.

REQ	7.94 APP – Parameter specification – ODM version information
Table 76 specifies the parameter attributes.	

Table 76 — ODM Version Information attributes

Attribute	Value
Data length	4 bit (enumeration)
Data range	0: no OD available 1: compatible with this document 2 to 15: reserved by this document
Type	status

5.96 Identification data index

This parameter indicates the index of the transmitted VIN digit within the VIN string of the towed vehicle (see 5.97).

REQ	7.95 APP – Parameter specification – Identification data index
Table 77 specifies the parameter attributes. The value shall increase by 1 with every transmission until the maximum of 16 is reached and then it shall restart at zero.	

Table 77 — Identification data index attributes

Attribute	Value
Data length	8 bit
Data range	0 to 16 (17 to 255 shall not be used)
Type	status

5.97 Identification data content

This parameter indicates the VIN digit of the towed vehicle. The VIN shall be given in digits according to ISO/IEC 8859-1.

REQ	7.96 APP – Parameter specification – Identification data content
Table 78 specifies the parameter attributes.	

Table 78 — Identification data content attributes

Attribute	Value
Data length	8 bit
Data range	Encoding according to ISO/IEC 8859-1; Allowed characters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, T, U, V, W, X, Y, Z.
Type	status

5.98 Velocity and yaw rate confidence level

This parameter indicates the velocity and yaw rate confidence level parameter which is used to indicate the current quality of the OD input information sent from the towing vehicle to the towed vehicle. This input information is the longitudinal and lateral velocity of the towing vehicle at the towing point as well as the towing vehicle's yaw-rate.

REQ	7.97 APP – Parameter specification – Velocity and yaw rate confidence level
Table 79 specifies the parameter attributes.	

Table 79 — Velocity and yaw rate confidence level attributes

Attribute	Value
Data length	4 bit (enumeration)
Data range	0: invalid 1: inaccurate 2: σv < 2 m/s; $\sigma\omega$ < 4°/s 3: σv < 1 m/s; $\sigma\omega$ < 2°/s 4: σv < 0,5 m/s; $\sigma\omega$ < 1°/s 5: σv < 0,25 m/s; $\sigma\omega$ < 0,5°/s 6: σv < 0,1 m/s; $\sigma\omega$ < 0,25°/s 7: σv < 0,05 m/s; $\sigma\omega$ < 0,1°/s 8 to 13: reserved by this document 14: error 15: SNA (signal not available)
Type	status

5.99 OD status indicator

This parameter indicates the OD status indicator which is used to indicate the current availability of the OD status sensors.

REQ	7.98 APP – Parameter specification – OD status indicator
Table 80 specifies the parameter attributes.	

Table 80 — OD status indicator attributes

Attribute	Value
Data length	4 bit (enumeration)
Data range	0: not available (e.g. disabled) 1: temporarily not available (e.g. initialisation) 2: degraded (e.g. for warning only, no automated functions) 3: ready (single trailer) 4: multiple trailers (e.g. for warning only) 5 to 13: reserved by this document 14: error 15: status not available
Type	status

5.100 Cyclic redundancy check (CRC8)

This parameter indicates the computed cyclic redundancy check (CRC8) for the payload of its PDU. It is utilized to detect corruption of the payload data during transmission.

REQ	7.99 APP – Parameter specification – Cyclic redundancy check (CRC8)

The parameter attributes shall be implemented according to SAE J1939-DA (SLOT = SAEct03). The parameter value shall be computed according to the algorithm in SAE J1850 over all data bytes within the PDU, except the CRC byte itself (e.g. byte position 2 to byte position 8). Unused or reserved bits shall be set to 1 prior to CRC computation.

$$P(x)=x^8+x^4+x^3+x^2+1 \quad (2)$$

where

$P(x)$ is the polynomial;

x is the byte position value.

Table 81 — Parameters for CRC8 check

Parameter	Value
Generator polynomial	$1D_{16}$, see Formula (2)
Initial value	FF_{16}
Final XOR value	FF_{16}

A pseudo code implementation for the cyclic redundancy check with the parameters specified in Table 81 is given:

```
FUNCTION crc8(BYTE[] data)
BYTE crc := 0xFF
FOR EACH BIT b IN data DO
      IF b EQUALS MSB OF crc
         crc := 2 * crc
      ELSE
         crc := (2 * crc) XOR 0x1D
      END IF
END FOR
RETURN crc XOR 0xFF
```

In this context, MSB refers to the most significant bit. The overflow, which might occur when multiplying the CRC value by 2 is intended and the overflow bit is ignored. Examples of payload data bytes and the corresponding CRC are listed in Table 82.

Table 82 — Examples of PDU with the appropriate CRC byte

Byte position							
1	2	3	4	5	6	7	8
CRC	**Payload data bytes**						
59_{16}	00_{16}	00_{16}	00_{16}	00_{16}	00_{16}	---	---
37_{16}	$F2_{16}$	01_{16}	83_{16}	---	---	---	---
79_{16}	$0F_{16}$	AA_{16}	00_{16}	55_{16}	---	---	---
$B8_{16}$	00_{16}	FF_{16}	55_{16}	11_{16}	---	---	---
$B0_{16}$	33_{16}	22_{16}	55_{16}	AA_{16}	BB_{16}	CC_{16}	DD_{16}
$8C_{16}$	92_{16}	$6B_{16}$	55_{16}	---	---	---	---
74_{16}	FF_{16}	FF_{16}	FF_{16}	FF_{16}	---	---	---

5.101 Sequence counter

This parameter indicates the sequence counter value of the PDU.

REQ	7.100 APP – Parameter specification – Sequence counter

The parameter attributes shall be implemented according to SAE J1939-DA (SLOT = SAEct08). The parameter value shall increase by 1 between two successive messages with the same identifier, until the value 15 is sent. In case the previously sent value is 15, it shall return to 0.

5.102 Longitudinal speed

This parameter indicates the absolute longitudinal speed of the towing vehicle at the coupling point. The speed is referred to the rotational reference system of the towing vehicle.

REQ	7.101 APP – Parameter specification – Longitudinal speed
Table 83 specifies the parameter attributes.	

Table 83 — Longitudinal speed attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m/s per bit
Offset	-321,28 m/s
Data range	-321,28 m/s to +321,27 m/s
Type	measured

5.103 Lateral speed

This parameter indicates the absolute lateral speed of the towing vehicle at the coupling point. The speed is referred to the rotational reference system of the towing vehicle.

REQ	7.102 APP – Parameter specification – Lateral speed
Table 84 specifies the parameter attributes.	

Table 84 — Lateral speed attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m/s per bit
Offset	-321,28 m/s
Data range	-321,28 m/s to +321,27 m/s
Type	measured

5.104 Yaw rate

This parameter indicates the rate of rotation about the vertical axis (i.e. the z-axis). A positive yaw rate signal results when the vehicle turns counter-clockwise. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule. The Z-Up axis system has positive X directed forward, positive Y to the left, and positive Z directed up.

REQ	7.103 APP – Parameter specification – Yaw rate
Table 85 specifies the parameter attributes.	

Table 85 — Yaw rate attributes

Attribute	Value
Data length	2 byte
Resolution	1/8192 rad/s per bit
Offset	-3,92 rad/s
Data range	-3,92 rad/s to +3,92 rad/s
Type	measured

5.105 Articulation angle

This parameter indicates the angle between the towing and the towed vehicle. Positive values are referred to anticlockwise articulation of the towing vehicle or the dolly relative to the towed vehicle when seen from above.

REQ	7.104 APP – Parameter specification – Angle between towing and towed vehicle
Table 86 and Figure 2 specify the parameter attributes.	

This parameter indicates the angle between the towing vehicle and the drawbar of the towed vehicle. The same orientation as in REQ 7.105 is used.

REQ	7.105 APP – Parameter specification – Angle between towing vehicle and drawbar
Table 86 and Figure 2 specify the parameter attributes.	

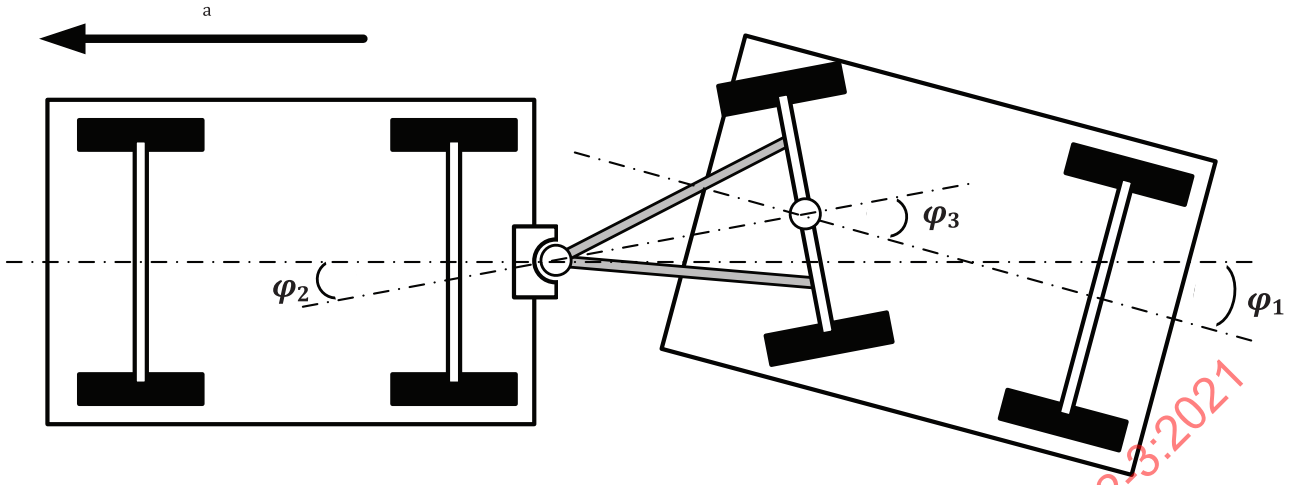
This parameter indicates the angle between the drawbar of the towed vehicle and the towed vehicle. The same orientation as in REQ 7.105 is used.

REQ	7.106 APP – Parameter specification – Angle between drawbar and towed vehicle
The parameter attributes shall be implemented according to SAE J1939-DA (SLOT = SAEad07) and according to Figure 2.	

Table 86 — Articulation angle attributes

Attribute	Value
Data length	2 byte
Resolution	1/256° per bit
Offset	-125°
Data range	-125° to +125°
Type	Measured

Figure 2 shows the articulation angle between towing and towed vehicle (full trailer).

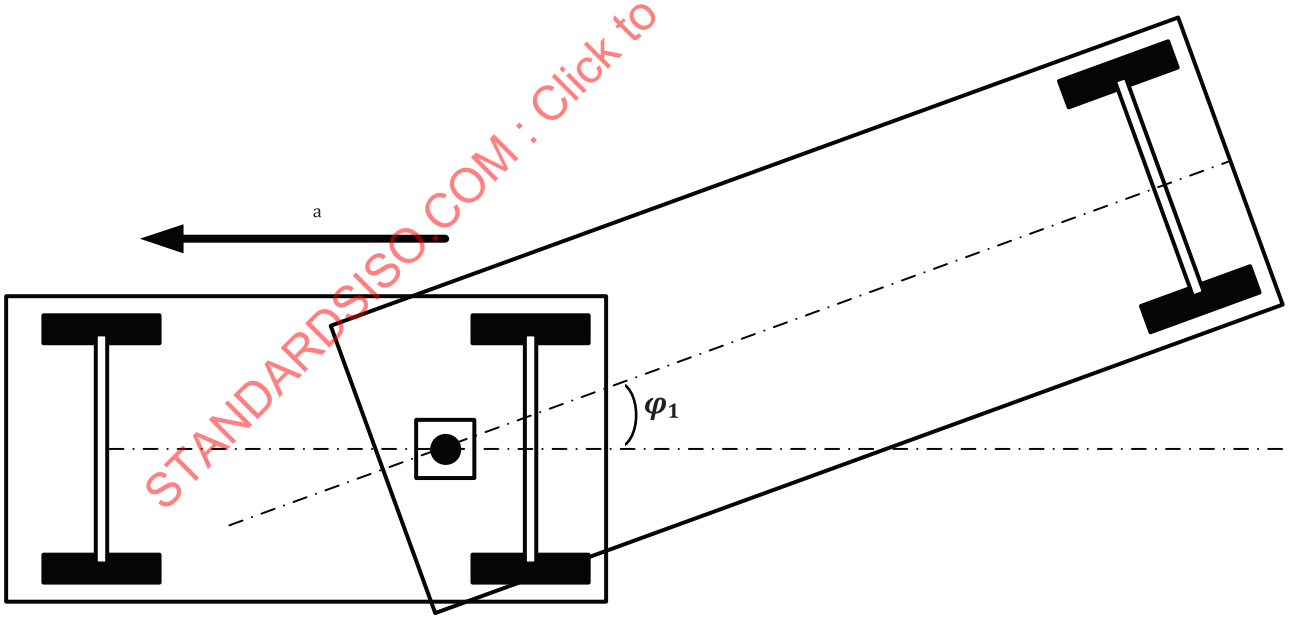


Key

φ_1 articulation angle between towing and towed vehicle, see REQ 7.104
φ_2 articulation angle between towing vehicle and drawbar, see REQ 7.105
φ_3 articulation angle between drawbar and towed vehicle, see REQ 7.106
a Forward driving direction.

Figure 2 — Articulation angles between towing and towed vehicle (full trailer)

For semi-trailer and centre-axle-trailer the articulation angle between towing and towed vehicle and the articulation angle between towing vehicle and drawbar are equal. The articulation angle between drawbar and towed vehicle is zero. Figure 3 shows the articulation angles between towing and towed vehicle (full trailer).

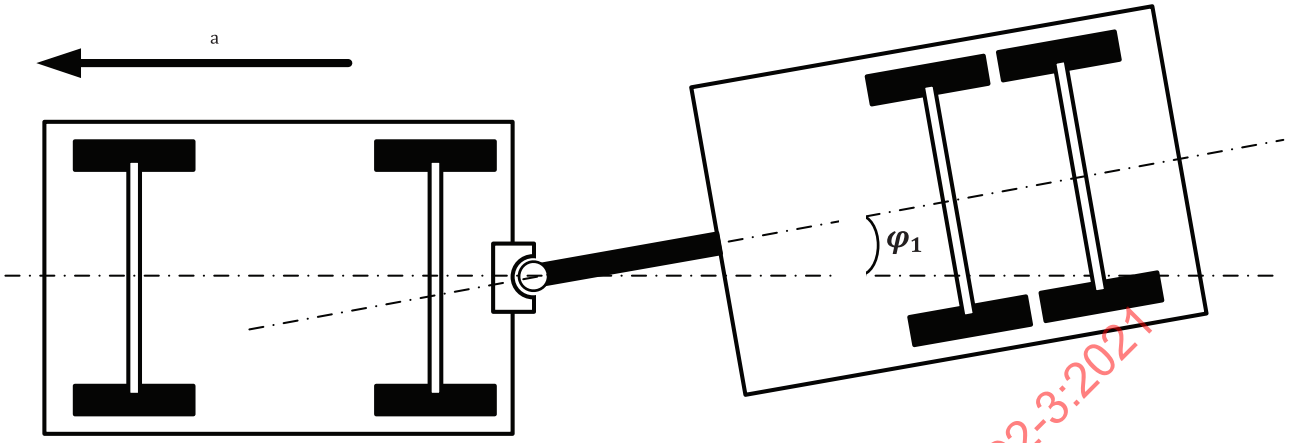


Key

$\varphi_1 = \varphi_2$ articulation angle between towing and towed vehicle, see REQ 7.104
φ_3 does not exist (articulation angle is zero)
a Forward driving direction.

Figure 3 — Articulation angles between towing and towed vehicle (semi-trailer)

Figure 4 shows the articulation angles between towing and towed vehicle (centre-axle trailer).



Key

$\varphi_1 = \varphi_2$	articulation angle between towing and towed vehicle, see REQ 7.104
φ_3	does not exist (articulation angle is zero)
a	Forward driving direction.

Figure 4 — Articulation angles between towing and towed vehicle (centre-axle trailer)

5.106 OD longitudinal distance object

This parameter indicates the relative longitudinal distance between the detected object and the junction point between towing vehicle and towed vehicle, where the objects are referred to the rotational reference system of the towing vehicle. Positive longitudinal distances are referring to the forward moving direction object locations from the junction point and negative values as reverse direction positions. As a reference point on the object the point with the smallest distance to the trailer is chosen. In case there are multiple points with the same minimum distance, the centre of these points is chosen.

REQ	7.107 APP – Parameter specification – OD longitudinal distance object
Table 87 specifies the parameter attributes.	

Table 87 — OD longitudinal distance object attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m per bit
Offset	-321,28 m
Data range	-321,28 m to +321,27 m
Type	measured

5.107 OD lateral distance object

This object indicates the relative lateral distance between the detected object and the junction point between towing vehicle and towed vehicle, where the objects are referred to the rotational reference system of the towing vehicle. Positive lateral distances are referring to left side direction object locations from the junction point and negative values as right-side direction positions relative to the forward moving direction of the towing vehicle. As a reference point on the object the point with the

smallest distance to the trailer is chosen. In case there are multiple points with the same minimum distance, the centre of these points is chosen.

REQ	7.108 APP – Parameter specification – OD lateral distance object
Table 88 specifies the parameter attributes.	

Table 88 — OD lateral distance object attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m per bit
Offset	-321,28 m
Data range	-321,28 m to +321,27 m
Type	measured

5.108 OD absolute longitudinal speed object

This object indicates the absolute longitudinal speed of the detected object, where the objects are referred to the same reference system as for the longitudinal distance. If the object is moving in the same driving direction as the trailer the longitudinal speed is positive. If the object is moving in the opposite direction of the trailer's driving direction the longitudinal speed is negative.

REQ	7.109 APP – Parameter specification – OD absolute longitudinal speed object
Table 89 specifies the parameter attributes.	

Table 89 — OD absolute longitudinal speed object attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m/s per bit
Offset	-321,28 m/s
Data range	-321,28 m/s to +321,27 m/s
Type	measured

5.109 OD absolute lateral speed object

This object indicates the absolute lateral speed of the detected object, where the objects are referred to the same reference system as for the longitudinal distance. Thus, objects moving to the left direction have a positive lateral speed and objects moving to the right direction have a negative lateral speed.

REQ	7.110 APP – Parameter specification – OD absolute lateral speed object
Table 90 specifies the parameter attributes.	

Table 90 — OD absolute lateral speed object attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m/s per bit
Offset	-321,28 m/s
Data range	-321,28 m/s to +321,27 m/s
Type	measured

5.110 OD standard deviation of longitudinal and lateral distance

This object indicates the value which describes the normal deviation of the detected position of an object. The normal deviations are provided separately for both longitudinal and lateral directions. The error of the position may exceed the corresponding ±7 σ only with a probability less than 10^{-7} h^{-1} (following ISO 26262-5). Longitudinal and lateral values are given separately in a form of a nibble data (4 bit each).

REQ	7.111 APP – Parameter specification – OD standard deviation of longitudinal and lateral distance
Table 91 specifies the parameter attributes. If the confidence levels cannot be assured an error shall be indicated.	

Table 91 — OD standard deviation of longitudinal and lateral distance attributes

Attribute	Value
Data length	4 bit (enumeration)
Data range	0: unspecific or > 10m 1: ≤10 m 2: ≤7,5 m 3: ≤5 m 4: ≤2,5 m 5: ≤1 m 6: ≤0,75 m 7: ≤0,5 m 8: ≤0,25 m 9: ≤0,1 m 10: ≤0,075 m 11: ≤0,05 m 12: reserved by this document 13: reserved by this document 14: error 15: SNA (signal not available)
Type	measured

Only if no object is detected all objects are set to SNA.

5.111 OD normal deviation of longitudinal and lateral speed

This object indicates the value which describes the normal deviation of the detected speed of an object. The normal deviations are provided separately for both longitudinal and lateral directions. The error of the speed may exceed the corresponding ±7 σ only with a probability less than 10^{-7} h^{-1} (following ISO 26262-5). Longitudinal and lateral values are given separately in a form of a nibble data (4 bit each).

REQ	7.112 APP – Parameter specification – OD normal deviation of longitudinal and lateral speed
Table 92 specifies the parameter attributes. If the confidence levels cannot be assured, an error shall be indicated.	

Table 92 — OD normal deviation of longitudinal and lateral speed attributes

Attribute	Value
Data length	1 byte (enumeration)
Data range	0: unspecific or > 10 m/s 1: ≤10 m/s 2: ≤7,5 m/s 3: ≤5 m/s 4: ≤2,5 m/s 5: ≤1 m/s 6: ≤0,75 m/s 7: ≤0,5 m/s 8: ≤0,25 m/s 9: ≤0,1 m/s 10: ≤0,075 m/s 11: ≤0,05 m/s 12: reserved by this document 13: reserved by this document 14: error 15: SNA (signal not available)
Type	measured

Even if the probability of an object is very low, it shall be considered as output in the object list. In this case the confidence level should be the lowest valid level. If the certainty of an object detection increases or the object is detected multiple times the confidence level may increase. If the certainty of object detection decreases, the confidence level may decrease. The indicated confidence level is as high as possible and matches the values in Table 92.

Only if no object is detected all objects are set to SNA.

5.112 Track ID

This parameter indicates the Track ID, which provides a unique identifier for a certain object.

REQ	7.113 APP – Parameter specification – Track ID
Table 93 specifies the parameter attributes.	

Table 93 — Track ID attributes

Attribute	Value
Data length	8 bit
Data range	1 to 250
Type	status

5.113 Lane curve coefficients

This parameter indicates the four coefficients of a 3rd degree polynomial. The polynomial describes the plane mid curve geometry of detected lane markings of the lane the vehicle is currently following.

REQ	7.114 APP – Parameter specification – Lane curve coefficients

A lane marker (or line) shall be modelled with a 3rd-degree polynomial model that describes a function (see Formula (3)). The origin of the coordinate system shall be the junction point between towing vehicle and towed vehicle. The coordinate system shall be aligned with a rotational reference system of the towing vehicle. Positive longitudinal distances shall be referring to the forward moving direction object locations from the junction point and negative values as reverse direction positions.

$$y(x)=a_0+a_1\times x+a_2\times x^2+a_3\times x^3 \quad (3)$$

where

$y(x)$ is the result of the lane curvature;

y is the lateral distance;

x is the longitudinal distance;

a_0, a_1, a_2, a_3 are the lane curve coefficients given in Table 94 to Table 97.

$$H_{\text{Heading\_Angle}}=\arctan\left(\frac{d}{dx}y(x)\right) \quad (4)$$

where

$H_{\text{Heading\_Angle}}$ is the heading angle in rad;

d is the differential;

dx is the differential of variable x;

y is the lateral distance;

x is the longitudinal distance.

$$C_{\text{Curvature}}=\left(\frac{d^2}{dx^2}y(x)\right) \quad (5)$$

where

$C_{\text{Curvature}}$ is the curvature in m^{-1};

d is the differential;

dx is the differential of variable x;

y is the lateral distance;

x is the longitudinal distance.

Table 94 — Lane curve coefficients a_0 attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m per bit
Offset	-321,28 m
Data range	-321,28 m to +321,27 m
Type	measured

Table 95 — Lane curve coefficients a_1 attributes

Attribute	Value
Data length	2 byte
Resolution	0,000 025 rad/s per bit
Offset	-0,803 2 rad/s
Data range	-0,832 rad/s to +0,803 175 rad/s
Type	measured

Table 96 — Lane curve coefficients a_2 attributes

Attribute	Value
Data length	2 byte
Resolution	0,000 001 m^{-1} per bit
Offset	-0,032 128 m^{-1}
Data range	-0,032 128 m^{-1} to +0,032 127 m^{-1}
Type	measured

Table 97 — Lane curve coefficients a_3 attributes

Attribute	Value
Data length	2 byte
Resolution	0,000 000 01 m^{-2} per bit
Offset	-0,000 321 28 m^{-2}
Data range	-0,000 321 28 m^{-2} to +0,000 321 27 m^{-2}
Type	measured

5.114 Lane curve validity interval

This parameter indicates the lane curve validity interval, which describes the inclusive interval in longitudinal direction where the polynomial describes the validity of the lane marker/line.

REQ	7.115 APP – Parameter specification – Lane curve validity interval
Table 98 specifies the parameter attributes.	

Table 98 — Lane curve validity interval attributes

Attribute	Value
Data length	2 byte
Resolution	0,01 m per bit
Offset	-321,28 m
Data range	-321,28 m to +321,27 m
Type	measured

5.115 Lane marker width

This parameter indicates the physical width of the lane marker.

REQ	7.116 APP – Parameter specification – Lane marker width
Table 99 specifies the parameter attributes.	

Table 99 — Lane marker width attributes

Attribute	Value
Data length	1 byte
Resolution	0,01 m per bit
Offset	0 m
Data range	0 m to 2,5 m
Type	measured

5.116 Standard deviation of lane information error

This parameter indicates the standard deviation of lane information error, which describes the standard deviation of the error when approximating the lane marker/line with the given polynomial. This is an indication of the quality of the polynomial approximating the lane marker/line.

REQ	7.117 APP – Parameter specification – Standard deviation of lane information error
Table 100 specifies the parameter attributes.	

Table 100 — Standard deviation of lane information error attributes

Attribute	Value
Data length	4 bit
Data range	see Table 91
Type	measured

5.117 Lane marker type

This parameter indicates the type of the lane marker.

REQ	7.118 APP – Parameter specification – Lane marker type
Table 101 specifies the parameter attributes.	

Table 101 — Lane marker type attributes

Attribute	Value
Data length	4 bit (enumeration)
Data range	0: not detected 1: solid 2: dashed 3: road edge 4: double lane mark 5: Botts' dots 6 to 13: reserved by this document 14: error 15: SNA
Type	measured

5.118 Object width (dimension in lateral direction)

This parameter indicates the object width (dimension in lateral direction), which provides information about the lateral dimension of a detected object.

REQ	7.119 APP – Parameter specification – Object width (dimension in lateral direction)
Table 102 specifies the parameter attributes.	

Table 102 — Object width (dimension in lateral direction) attributes

Attribute	Value
Data length	2 bit (enumeration)
Data range	00_2: object width ≤ 1 m 01_2: object width > 1 m and ≤ 3 m 10_2: object width > 3 m 11_2: unknown width
Type	measured

5.119 Object length (dimension in longitudinal direction)

This parameter indicates the object length (dimension in longitudinal direction), which provides information about the longitudinal dimension of a detected object.

REQ	7.120 APP – Parameter specification – Object length (dimension in longitudinal direction)
Table 103 specifies the parameter attributes.	

Table 103 — object length (dimension in longitudinal direction) attributes

Attribute	Value
Data length	2 bit (enumeration)
Data range	0: object length ≤ 3 m 1: object length > 3 m and ≤ 7 m 2: object length > 7 m 3: unknown length
Type	measured

5.120 Object classification

This parameter indicates the object classification, which provides information about the type of a detected object.

REQ	7.121 APP – Parameter specification – Object classification
Table 104 specifies the parameter attributes.	

Table 104 — Object classification attributes

Attribute	Value
Data length	4 bit (enumeration)

Table 104 *(continued)*

Attribute	Value
Data range	0: unknown moving 1: vehicle 2: commercial vehicle 3: cyclist (motorcycle/bicycle) 4: human (adult/child) 5: reserved by this document 6: reserved by this document 7: reserved by this document 8: unknown stationary 9: construction (building/wall/fence/...) 10: pole (reflector points/traffic sign) 11: nature (vegetation/terrain) 12: reserved by this document 13: reserved by this document 14: reserved by this document 15: SNA (signal not available)
Type	measured

5.121 Geometric distance

This parameter indicates different geometric distances for the correct interpretation of the sensor data.

REQ	7.122 APP – Parameter specification – Geometric distance
Table 105 specifies the geometric distance attributes. Table 106 specifies the geometric distances that are transmitted multiplexed. The reference point shall be the rear centre of the trailer body. The distance to the coupling point (first articulation point) is positive, if the coupling point is in the front of the trailer body (e.g. full trailer) and it is negative, if the coupling point is under the body of the trailer (e.g. semi-trailer). The maximum front longitudinal coverage shall be positive if the coverage overlaps the front of the trailer and it shall be negative if there is an unobserved area laterally next to the trailer front. The trailer body work length and width shall be provided according to ISO 612.	

Table 105 — Specification of parameter geometric distance attributes

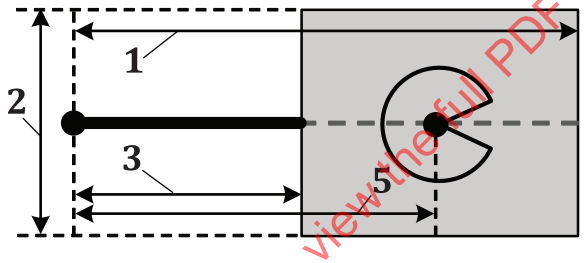
Attribute	Value
Data length	2 byte
Resolution	0,01 m per bit
Offset	-321,28 m
Data range	-321,28 m to +321,27 m
Type	status

The geometric information for the towed vehicle is provided. It is multiplexed based on the sequence counter, because only three items can fit in one message. Thus, with the given sequence numbers in Table 106 the corresponding items #1, #2 and #3 are transmitted.

Table 106 — Multiplexing rules for geometric distances

Sequence counter	Item	Parameter
0 or 8	#1	towed vehicle bodywork length
0 or 8	#2	distance to coupling point (first articulation point)
0 or 8	#3	distance to second articulation point
1 or 9	#1	distance to rear coupling point
1 or 9	#2	distance to centre of rotation
1 or 9	#3	towed vehicle width
2 or 10	#1	minimum rear longitudinal coverage
2 or 10	#2	maximum rear longitudinal coverage
2 or 10	#3	minimum lateral coverage
3 or 11	#1	maximum lateral coverage
3 or 11	#2	maximum front longitudinal coverage
3 or 11	#3	reserved by this document
4 to 7, 12 to 15	#1 to #3	reserved by this document

Figure 5 shows the geometric information of a converter dolly.

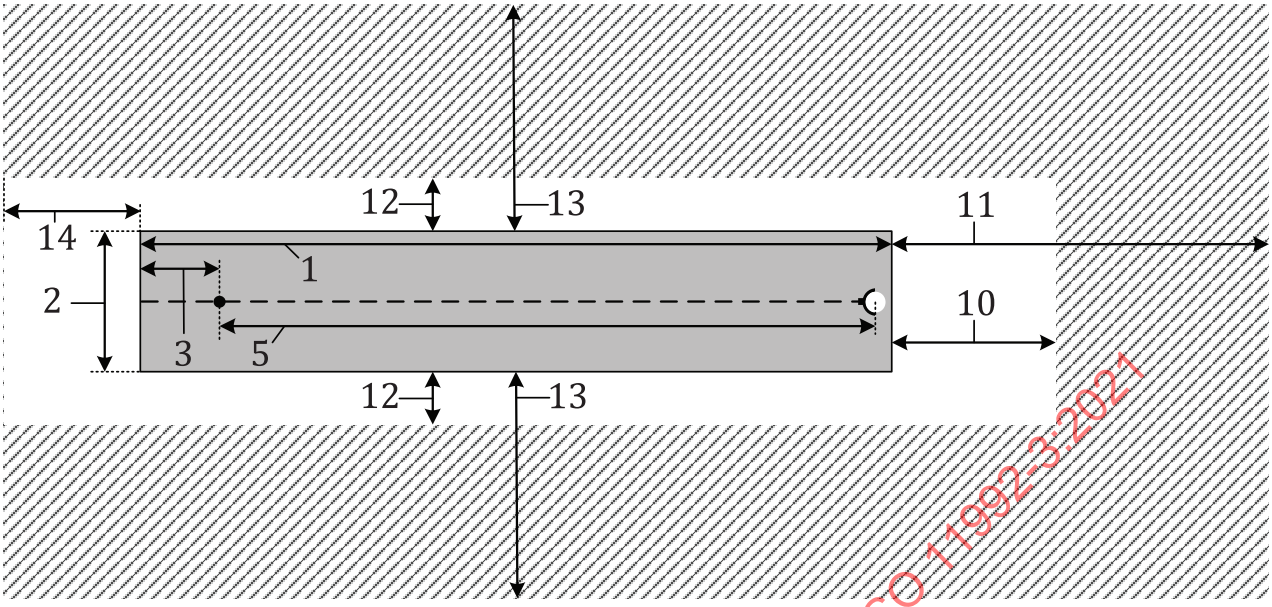


Key

1 full trailer body length
2 full trailer body width
3 distance to coupling point (first articulation point)
5 distance to rear coupling point

Figure 5 — Geometric information of a converter dolly

Figure 6 shows the geometric information of a semi-trailer.

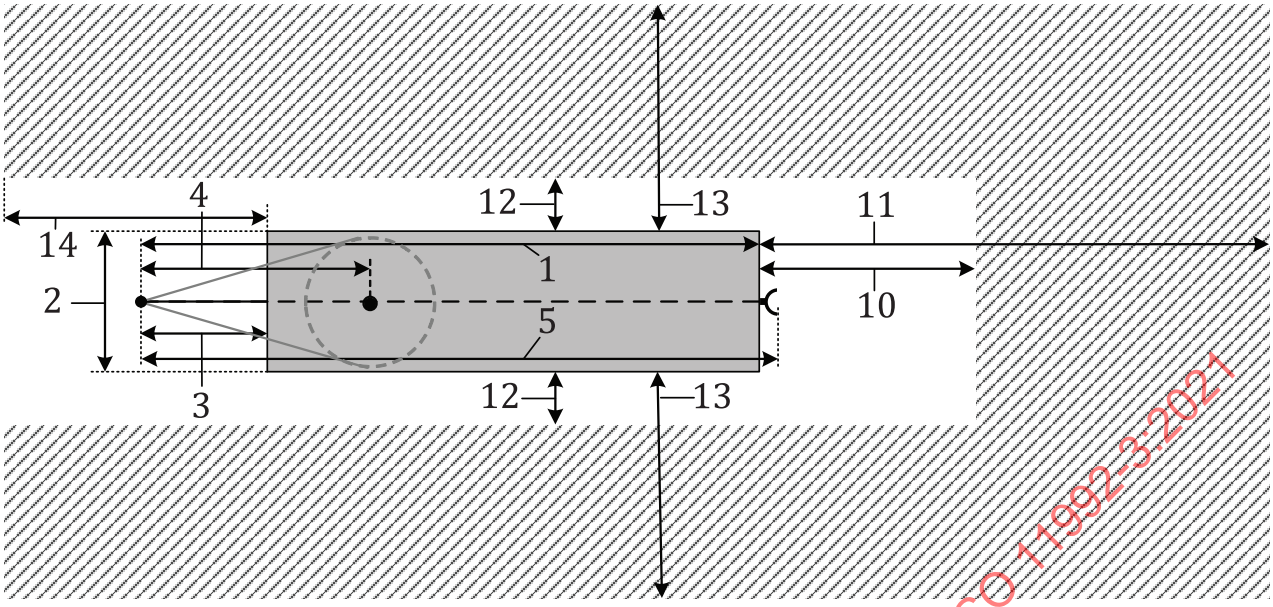


Key

1 full trailer body length
2 full trailer body width
3 distance to coupling point (first articulation point)
5 distance to rear coupling point
10 minimum rear longitudinal coverage
11 maximum rear longitudinal coverage
12 minimum lateral coverage
13 maximum lateral coverage
14 maximum front longitudinal coverage

Figure 6 — Geometric information of a semi-trailer

Figure 7 shows the geometric information of a full trailer.

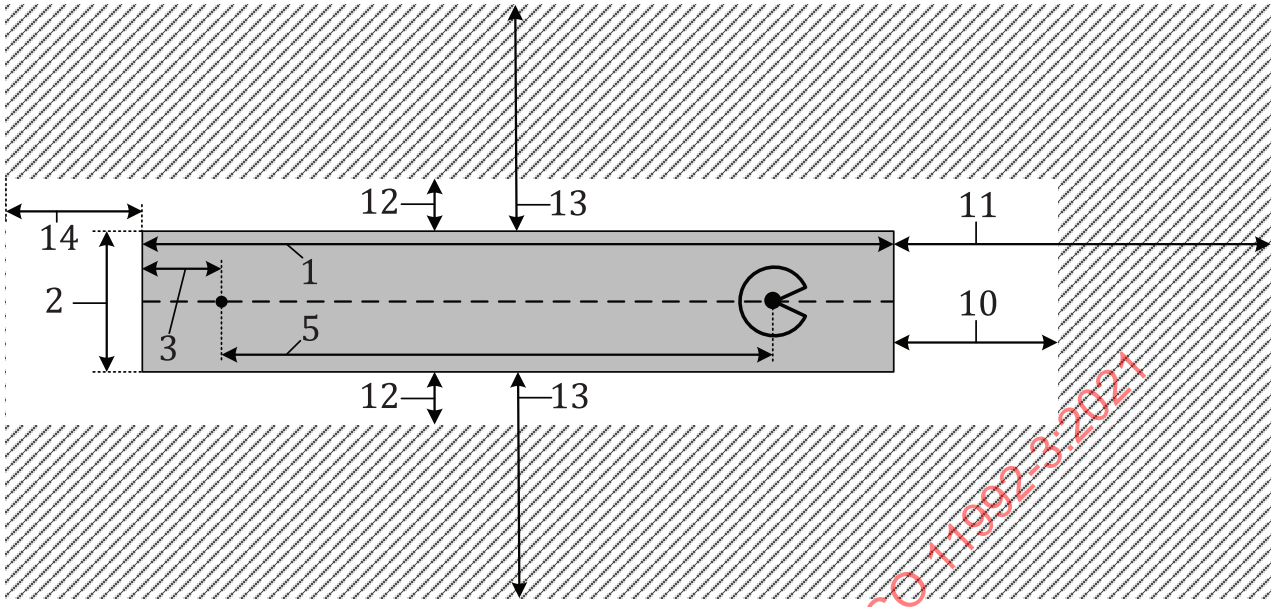


Key

1 full trailer body length
2 full trailer body width
3 distance to coupling point (first articulation point)
4 distance to second articulation point
5 distance to rear coupling point
10 minimum rear longitudinal coverage
11 maximum rear longitudinal coverage
12 minimum lateral coverage
13 maximum lateral coverage
14 maximum front longitudinal coverage

Figure 7 — Geometric information of a full trailer

Figure 8 shows the geometric information of a link trailer.

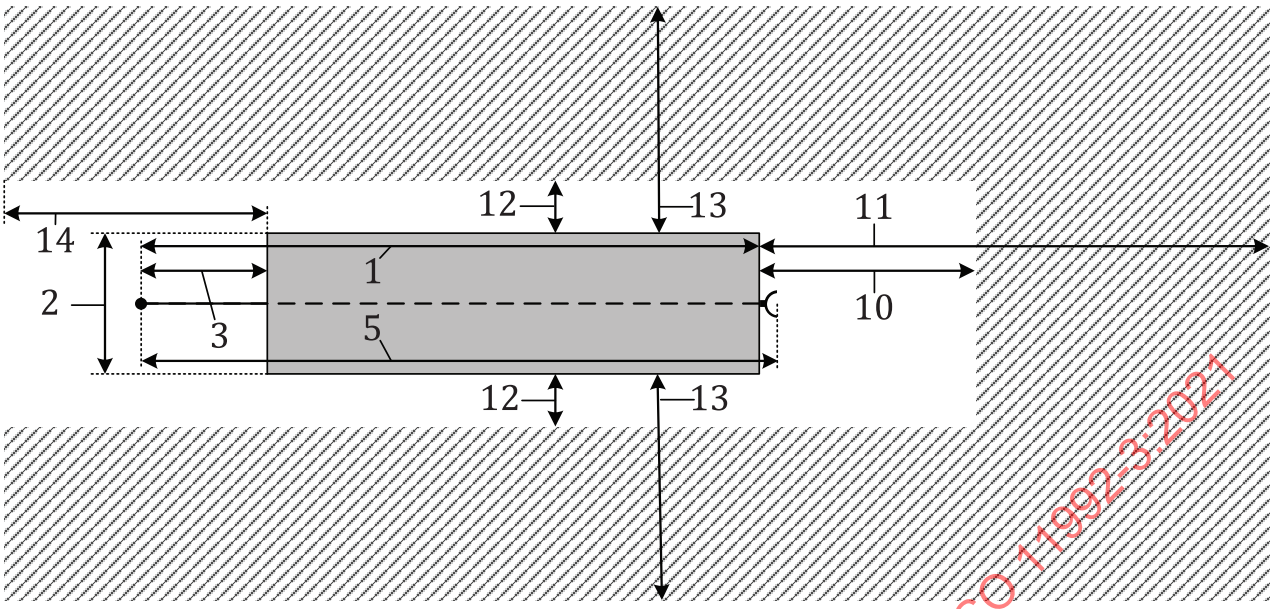


Key

1 full trailer body length
2 full trailer body width
3 distance to coupling point (first articulation point)
5 distance to rear coupling point
10 minimum rear longitudinal coverage
11 maximum rear longitudinal coverage
12 minimum lateral coverage
13 maximum lateral coverage
14 maximum front longitudinal coverage

Figure 8 — Geometric information of a link trailer

Figure 9 shows the geometric information of a central axle trailer.



Key

1 full trailer body length
2 full trailer body width
3 distance to coupling point (first articulation point)
5 distance to rear coupling point
10 minimum rear longitudinal coverage
11 maximum rear longitudinal coverage
12 minimum lateral coverage
13 maximum lateral coverage
14 maximum front longitudinal coverage

Figure 9 — Geometric information of a central axle trailer

5.122 Towed vehicle rear IR-black-out marker select

This parameter indicates the command signal to activate the towed vehicle rear IR-black-out marker select.

REQ	7.123 APP – Parameter specification – Towed vehicle rear IR-black-out marker select
Table 107 specifies the parameter attributes.	

Table 107 — Towed vehicle rear IR-black-out marker select attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	status

5.123 Towed vehicle IR-black-out stop lamp select

This parameter indicates the command signal to activate the towed vehicle IR-black-out stop lamp select.

REQ	7.124 APP – Parameter specification – Towed vehicle IR-black-out stop lamp select
Table 108 specifies the parameter attributes.	

Table 108 — Towed vehicle IR-black-out stop lamp select attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	status

5.124 Towed vehicle IR-convoy light ('Leitkreuz') select

This parameter indicates the command signal to activate the towed vehicle IR-convoy light ('Leitkreuz') select.

REQ	7.125 APP – Parameter specification – Towed vehicle IR-convoy light ('Leitkreuz') select
Table 109 specifies the parameter attributes.	

Table 109 — Towed vehicle IR-convoy light ('Leitkreuz') select attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	status

5.125 Towed vehicle right-hand IR-black-out rear light(s)

This parameter indicates the state of the towed vehicle right-hand IR-black-out rear light(s).

REQ	7.126 APP – Parameter specification – Towed vehicle right-hand IR-black-out rear light(s)
Table 110 specifies the parameter attributes.	

Table 110 — Towed vehicle right-hand IR-black-out rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.126 Towed vehicle left-hand IR-black-out rear light(s)

This parameter indicates the state of the towed vehicle left-hand IR-black-out rear light(s).

REQ	7.127 APP – Parameter specification – Towed vehicle left-hand IR-black-out rear light(s)

Table 111 specifies the parameter attributes.

Table 111 — Towed vehicle left-hand IR-black-out rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.127 Towed vehicle right-hand IR-black-out stop light(s)

This parameter indicates the state of the towed vehicle right-hand IR-black-out stop light(s).

REQ	7.128 APP – Parameter specification – Towed vehicle right-hand IR-black-out stop light(s)
Table 112 specifies the parameter attributes.	

Table 112 — Towed vehicle right-hand IR-black-out stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.128 Towed vehicle left-hand IR-black-out stop light(s)

This parameter indicates the state of the towed vehicle left-hand IR-black-out stop light(s).

REQ	7.129 APP – Parameter specification – Towed vehicle left-hand IR-black-out stop light(s)
Table 113 specifies the parameter attributes.	

Table 113 — Towed vehicle left-hand IR-black-out stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.129 Towed vehicle IR-convoy light ('Leitkreuz')

This parameter indicates the state of the towed vehicle IR-convoy light ('Leitkreuz').

REQ	7.130 APP – Parameter specification – Towed vehicle IR-convoy light ('Leitkreuz')
Table 114 specifies the parameter attributes.	

Table 114 — Towed vehicle IR-convoy light ('Leitkreuz') attributes

Attribute	Value
Data length	2 bit

Table 114 *(continued)*

Attribute	Value
Data range	00_2: not lit 01_2: lit
Type	measured

5.130 Towed vehicle black-out work lamp(s)

This parameter indicates the state of the towed vehicle black-out work lamp(s).

REQ	7.131 APP – Parameter specification – Towed vehicle black-out work lamp(s)
Table 115 specifies the parameter attributes.	

Table 115 — Towed vehicle black-out work lamp(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not lit 01_2: lit
Type	measured

5.131 Seconds

This parameter indicates the state of the seconds.

REQ	7.132 APP – Parameter specification – Seconds
Table 116 specifies the parameter attributes.	

Table 116 — Seconds attributes

Attribute	Value
Data length	1 byte
Resolution	0,25 s per bit
Offset	0 s
Data range	0 s to 59,75 s
Type	measured

5.132 Minutes

This parameter indicates the state of the minutes.

REQ	7.133 APP – Parameter specification – Minutes
Table 117 specifies the parameter attributes.	

Table 117 — Minutes attributes

Attribute	Value
Data length	1 byte
Resolution	1 min^{-1} per bit
Offset	0 min^{-1}
Data range	0 min^{-1} to 59 min^{-1}

Table 117 *(continued)*

Attribute	Value
Type	measured

5.133 Hours

This parameter indicates the state of the hours.

REQ	7.134 APP – Parameter specification – Hours
Table 118 specifies the parameter attributes.	

Table 118 — Hours attributes

Attribute	Value
Data length	1 byte
Resolution	1 h per bit
Offset	0 h
Data range	0 h to 23 h
Type	measured

5.134 Day

This parameter indicates the state of the day.

REQ	7.135 APP – Parameter specification – Day
Table 119 specifies the parameter attributes.	

Table 119 — Day attributes

Attribute	Value
Data length	1 byte
Resolution	0,25 days per bit
Offset	0 day
Data range	0 day to 31,75 days
Type	measured

NOTE 1 A value of 0 for the day is null. The values 1, 2, 3, and 4 are used to identify the first day of the month, 5, 6, 7 and 8 identify the second day of the month and so forth.

NOTE 2 This parameter does not influence or change the hours parameter above.

5.135 Month

This parameter indicates the state of the month.

REQ	7.136 APP – Parameter specification – Month
Table 120 specifies the parameter attributes.	

Table 120 — Month attributes

Attribute	Value
Data length	1 byte

Table 120 *(continued)*

Attribute	Value
Resolution	1 month per bit
Offset	0 month
Data range	1 month to 12 months
Type	measured

NOTE A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

5.136 Year

This parameter indicates the state of the year.

REQ	7.137 APP – Parameter specification – Year
Table 121 specifies the parameter attributes.	

Table 121 — Year attributes

Attribute	Value
Data length	1 byte
Resolution	1 year per bit
Offset	1985 years
Data range	1985 years to 2235 years
Type	measured

NOTE A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

5.137 Local minute offset

This parameter indicates the state of the local minute offset.

REQ	7.138 APP – Parameter specification – Local minute offset
Table 122 specifies the parameter attributes.	

Table 122 — Local minute offset attributes

Attribute	Value
Data length	1 byte
Resolution	1 min^{-1} per bit
Offset	-125 min^{-1}
Data range	-59 min^{-1} to +59 min^{-1}
Type	measured

5.138 Local hour offset

This parameter indicates the state of the local hour offset.

REQ	7.139 APP – Parameter specification – Local hour offset
Table 123 specifies the parameter attributes.	

Table 123 — Local hour offset attributes

Attribute	Value
Data length	1 byte
Resolution	1 h per bit
Offset	-125 h
Data range	-24 h to +23 h
Type	measured

5.139 Trailer left-hand stop light(s)

This parameter indicates the command signal to activate the trailer left-hand stop light(s).

REQ	7.140 APP – Parameter specification – Trailer left-hand stop light(s)
Table 124 specifies the parameter attributes.	

Table 124 — Trailer left-hand stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.140 Trailer right-hand stop light(s)

This parameter indicates the command signal to activate the trailer right-hand stop light(s).

REQ	7.141 APP – Parameter specification – Trailer right-hand stop light(s)
Table 125 specifies the parameter attributes.	

Table 125 — Trailer right-hand stop light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.141 Trailer left-hand direction indicator light(s)

This parameter indicates the command signal to activate the trailer left-hand direction indicator light(s).

REQ	7.142 APP – Parameter specification – Trailer left-hand direction indicator light(s)
Table 126 specifies the parameter attributes.	

Table 126 — Trailer left-hand direction indicator light(s) attributes

Attribute	Value
Data length	2 bit

Table 126 *(continued)*

Attribute	Value
Data range	00_2: off 01_2: on
Type	commanded status

5.142 Trailer right-hand direction indicator light(s)

This parameter indicates the command signal to activate the trailer right-hand direction indicator light(s).

REQ	7.143 APP – Parameter specification – Trailer right-hand direction indicator light(s)
Table 127 specifies the parameter attributes.	

Table 127 — Trailer right-hand direction indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.143 Trailer left-hand rear light(s)

This parameter indicates the command signal to activate the trailer left-hand rear light(s).

REQ	7.144 APP – Parameter specification – Trailer left-hand rear light(s)
Table 128 specifies the parameter attributes.	

Table 128 — Trailer left-hand rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.144 Trailer right-hand rear light(s)

This parameter indicates the command signal to activate the trailer right-hand rear light(s).

REQ	7.145 APP – Parameter specification – Trailer right-hand rear light(s)
Table 129 specifies the parameter attributes.	

Table 129 — Trailer right-hand rear light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.145 Trailer left-hand rear fog light(s)

This parameter indicates the command signal to activate the trailer left-hand rear fog light(s).

REQ	7.146 APP – Parameter specification – Trailer left-hand rear fog light(s)
Table 130 specifies the parameter attributes.	

Table 130 — Trailer left-hand rear fog light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.146 Trailer right-hand rear fog light(s)

This parameter indicates the command signal to activate the trailer right-hand rear fog light(s).

REQ	7.147 APP – Parameter specification – Trailer right-hand rear fog light(s)
Table 131 specifies the parameter attributes.	

Table 131 — Trailer right-hand rear fog light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.147 Trailer left-hand reversing light(s)

This parameter indicates the command signal to activate the trailer left-hand reversing light(s).

REQ	7.148 APP – Parameter specification – Trailer left-hand reversing light(s)
Table 132 specifies the parameter attributes.	

Table 132 — Trailer left-hand reversing light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.148 Trailer right-hand reversing light(s)

This parameter indicates the command signal to activate the trailer right-hand reversing light(s).

REQ	7.149 APP – Parameter specification – Trailer right-hand reversing light(s)
Table 133 specifies the parameter attributes.	

Table 133 — Trailer right-hand reversing light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.149 Trailer left-hand side marker light(s)

This parameter indicates the command signal to activate the trailer left-hand side marker light(s).

REQ	7.150 APP – Parameter specification – Trailer left-hand side marker light(s)
Table 134 specifies the parameter attributes.	

Table 134 — Trailer left-hand side marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.150 Trailer right-hand side marker light(s)

This parameter indicates the command signal to activate the trailer right-hand side marker light(s).

REQ	7.151 APP – Parameter specification – Trailer right-hand side marker light(s)
Table 135 specifies the parameter attributes.	

Table 135 — Trailer right-hand side marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.151 Trailer left-hand rear width indicator light(s)

This parameter indicates the command signal to activate the trailer left-hand rear width indicator light(s).

REQ	7.152 APP – Parameter specification – Trailer left-hand rear width indicator light(s)
Table 136 specifies the parameter attributes.	

Table 136 — Trailer left-hand rear width indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on

Table 136 *(continued)*

Attribute	Value
Type	commanded status

5.152 Trailer right-hand rear width indicator light(s)

This parameter indicates the command signal to activate the trailer right-hand rear width indicator light(s).

REQ	7.153 APP – Parameter specification – Trailer right-hand rear width indicator light(s)
Table 137 specifies the parameter attributes.	

Table 137 — Trailer right-hand rear width indicator light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.153 Trailer left-hand corner marker light(s)

This parameter indicates the command signal to activate the trailer left-hand corner marker light(s).

REQ	7.154 APP – Parameter specification – Trailer left-hand corner marker light(s)
Table 138 specifies the parameter attributes.	

Table 138 — Trailer left-hand corner marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.154 Trailer right-hand corner marker light(s)

This parameter indicates the command signal to activate the trailer right-hand corner marker light(s).

REQ	7.155 APP – Parameter specification – Trailer right-hand corner marker light(s)
Table 139 specifies the parameter attributes.	

Table 139 — Trailer right-hand corner marker light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.155 Trailer left-hand rear registration-plate light(s)

This parameter indicates the command signal to activate the trailer left-hand rear registration-plate light(s).

REQ	7.156 APP – Parameter specification – Trailer left-hand rear registration-plate light(s)
Table 140 specifies the parameter attributes.	

Table 140 — Trailer left-hand rear registration-plate light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.156 Trailer right-hand rear registration-plate light(s)

This parameter indicates the command signal to activate the trailer right-hand rear registration-plate light(s).

REQ	7.157 APP – Parameter specification – Trailer right-hand rear registration-plate light(s)
Table 141 specifies the parameter attributes.	

Table 141 — Trailer right-hand rear registration-plate light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.157 Trailer rear warning light(s)

This parameter indicates the command signal to activate the trailer rear warning light(s).

REQ	7.158 APP – Parameter specification – Trailer rear warning light(s)
Table 142 specifies the parameter attributes.	

Table 142 — Trailer rear warning light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.158 Trailer rotating identification light(s)

This parameter indicates the command signal to activate the trailer rotating identification light(s).

REQ	7.159 APP – Parameter specification – Trailer rotating identification light(s)

Table 143 specifies the parameter attributes.

Table 143 — Trailer rotating identification light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.159 Trailer interior light(s)

This parameter indicates the command signal to activate the trailer interior light(s).

REQ	7.160 APP – Parameter specification – Trailer interior light(s)
Table 144 specifies the parameter attributes.	

Table 144 — Trailer interior light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.160 Trailer work light(s)

This parameter indicates the command signal to activate the trailer work light(s).

REQ	7.161 APP – Parameter specification – Trailer work light(s)
Table 145 specifies the parameter attributes.	

Table 145 — Trailer work light(s) attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.161 Trailer left-hand stop light(s) redundancy function

This parameter indicates the command signal to activate the trailer left-hand stop light(s) redundancy function.

REQ	7.162 APP – Parameter specification – Trailer left-hand stop light(s) redundancy function
Table 146 specifies the parameter attributes.	

Table 146 — Trailer left-hand stop light(s) redundancy function attributes

Attribute	Value
Data length	2 bit

Table 146 *(continued)*

Attribute	Value
Data range	00_2: not activated 01_2: activated
Type	measured

5.162 Trailer right-hand stop light(s) redundancy function

This parameter indicates the command signal to activate the trailer right-hand stop light(s) redundancy function.

REQ	7.163 APP – Parameter specification – Trailer right-hand stop light(s) redundancy function
Table 147 specifies the parameter attributes.	

Table 147 — Trailer right-hand stop light(s) redundancy function attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not activated 01_2: activated
Type	measured

5.163 Trailer left-hand direction indicator light(s) redundancy function

This parameter indicates the command signal to activate the trailer left-hand direction indicator light(s) redundancy function.

REQ	7.164 APP – Parameter specification – Trailer left-hand direction indicator light(s) redundancy function
Table 148 specifies the parameter attributes.	

Table 148 — Trailer left-hand direction indicator light(s) redundancy function attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not activated 01_2: activated
Type	measured

5.164 Trailer right-hand direction indicator light(s) redundancy function

This parameter indicates the command signal to activate the trailer right-hand direction indicator light(s) redundancy function.

REQ	7.165 APP – Parameter specification – Trailer right-hand direction indicator light(s) redundancy function
Table 149 specifies the parameter attributes.	

Table 149 — Trailer right-hand direction indicator light(s) redundancy function attributes

Attribute	Value
Data length	2 bit

Table 149 *(continued)*

Attribute	Value
Data range	00_2: not activated 01_2: activated
Type	measured

5.165 Trailer left-hand rear light(s) redundancy function

This parameter indicates the command signal to activate the trailer left-hand rear light(s) redundancy function.

REQ	7.166 APP – Parameter specification – Trailer left-hand rear light(s) redundancy function
Table 150 specifies the parameter attributes.	

Table 150 — Trailer left-hand rear light(s) redundancy function attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not activated 01_2: activated
Type	measured

5.166 Trailer right-hand rear light(s) redundancy function

This parameter indicates the command signal to activate the trailer right-hand rear light(s) redundancy function.

REQ	7.167 APP – Parameter specification – Trailer right-hand rear light(s) redundancy function
Table 151 specifies the parameter attributes.	

Table 151 — Trailer right-hand rear light(s) redundancy function attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not activated 01_2: activated
Type	measured

5.167 Trailer left-hand reversing light(s) redundancy function

This parameter indicates the command signal to activate the trailer left-hand reversing light(s) redundancy function.

REQ	7.168 APP – Parameter specification – Trailer left-hand reversing light(s) redundancy Function
Table 152 specifies the parameter attributes.	

Table 152 — Trailer left-hand reversing light(s) redundancy function attributes

Attribute	Value
Data length	2 bit

Table 152 *(continued)*

Attribute	Value
Data range	00_2: not activated 01_2: activated
Type	measured

5.168 Trailer right-hand reversing light(s) redundancy function

This parameter indicates the command signal to activate the trailer right-hand reversing light(s) redundancy function.

REQ	7.169 APP – Parameter specification – Trailer right-hand reversing light(s) redundancy function
Table 153 specifies the parameter attributes.	

Table 153 — Trailer right-hand reversing light(s) redundancy function attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not activated 01_2: activated
Type	measured

5.169 Transmission output shaft PTO feedback

This parameter indicates the command signal to activate the transmission output shaft PTO feedback.

REQ	7.170 APP – Parameter specification – Transmission output shaft PTO feedback
Table 154 specifies the parameter attributes.	

Table 154 — Transmission output shaft PTO feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not engaged 01_2: engaged
Type	measured

5.170 Transfer case output shaft PTO feedback

This parameter indicates the command signal to activate the transfer case output shaft PTO feedback.

REQ	7.171 APP – Parameter specification – Transfer case output shaft PTO feedback
Table 155 specifies the parameter attributes.	

Table 155 — Transfer case output shaft PTO feedback attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not engaged 01_2: engaged

Table 155 *(continued)*

Attribute	Value
Type	measured

5.171 At least one PTO engaged

This parameter indicates the command signal to activate the at least one PTO engaged.

REQ	7.172 APP – Parameter specification – At least one PTO engaged
Table 156 specifies the parameter attributes.	

Table 156 — At least one PTO engaged attributes

Attribute	Value
Data length	2 bit
Data range	00_2: not engaged 01_2: engaged (at least one)
Type	measured

5.172 Transmission output shaft PTO switch

This parameter indicates the command signal to activate the transmission output shaft PTO switch.

REQ	7.173 APP – Parameter specification – Transmission output shaft PTO switch
Table 157 specifies the parameter attributes.	

Table 157 — Transmission output shaft PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.173 Transfer case output shaft PTO switch

This parameter indicates the command signal to activate the transfer case output shaft PTO switch.

REQ	7.174 APP – Parameter specification – Transfer case output shaft PTO switch
Table 158 specifies the parameter attributes.	

Table 158 — Transfer case output shaft PTO switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.174 First clutch-dependent PTO engagement consent

This parameter indicates the command signal to activate the first clutch-dependent PTO engagement consent.

REQ	7.175 APP – Parameter specification – First clutch-dependent PTO engagement consent
Table 159 specifies the parameter attributes.	

Table 159 — First clutch-dependent PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.175 Second clutch-dependent PTO engagement consent

This parameter indicates the command signal to activate the second clutch-dependent PTO engagement consent.

REQ	7.176 APP – Parameter specification – Second clutch-dependent PTO engagement consent
Table 160 specifies the parameter attributes.	

Table 160 — Second clutch-dependent PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.176 Clutch-independent PTO engagement consent

This parameter indicates the command signal to activate the clutch-independent PTO engagement consent.

REQ	7.177 APP – Parameter specification – Clutch-independent PTO engagement consent
Table 161 specifies the parameter attributes.	

Table 161 — Clutch-independent PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.177 First engine propulsion system mounted PTO engagement consent

This parameter indicates the command signal to activate the first engine propulsion system mounted PTO engagement consent.

REQ	7.178 APP – Parameter specification – First engine propulsion system mounted PTO engagement consent
Table 162 specifies the parameter attributes.	

Table 162 — First engine propulsion system mounted PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.178 Second engine propulsion system mounted PTO engagement consent

This parameter indicates the command signal to activate the second engine propulsion system mounted PTO engagement consent.

REQ	7.179 APP – Parameter specification – Second engine propulsion system mounted PTO engagement consent
Table 163 specifies the parameter attributes.	

Table 163 — Second engine propulsion system mounted PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.179 Transmission output shaft PTO engagement consent

This parameter indicates the command signal to activate the transmission output shaft PTO engagement consent.

REQ	7.180 APP – Parameter specification – Transmission output shaft PTO engagement consent
Table 164 specifies the parameter attributes.	

Table 164 — Transmission output shaft PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.180 Transfer case output shaft PTO engagement consent

This parameter indicates the command signal to activate the transfer case output shaft PTO engagement consent.

REQ	7.181 APP – Parameter specification – Transfer case output shaft PTO engagement consent
Table 165 specifies the parameter attributes.	

Table 165 — Transfer case output shaft PTO engagement consent attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.181 First clutch-dependent PTO engagement consent – Trailer

This parameter indicates the command signal to activate the first clutch-dependent PTO engagement consent – trailer.

REQ	7.182 APP – Parameter specification – First clutch-dependent PTO engagement consent – Trailer
Table 166 specifies the parameter attributes.	

Table 166 — First clutch-dependent PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.182 Second clutch-dependent PTO engagement consent – Trailer

This parameter indicates the command signal to activate the second clutch-dependent PTO engagement consent – trailer.

REQ	7.183 APP – Parameter specification – Second clutch-dependent PTO engagement consent – Trailer
Table 167 specifies the parameter attributes.	

Table 167 — Second clutch-dependent PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.183 Clutch-independent PTO engagement consent – Trailer

This parameter indicates the command signal to activate the clutch-independent PTO engagement consent – trailer.

REQ	7.184 APP – Parameter specification – Clutch-independent PTO engagement consent – Trailer
Table 168 specifies the parameter attributes.	

Table 168 — Clutch-independent PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.184 First engine propulsion system mounted PTO engagement consent – Trailer

This parameter indicates the command signal to activate the first engine propulsion system mounted PTO engagement consent – trailer.

REQ	7.185 APP – Parameter specification – First engine propulsion system mounted PTO engagement consent – Trailer
Table 169 specifies the parameter attributes.	

Table 169 — First engine propulsion system mounted PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.185 Second engine propulsion system mounted PTO engagement consent – Trailer

This parameter indicates the command signal to activate the second engine propulsion system mounted PTO engagement consent – trailer.

REQ	7.186 APP – Parameter specification – Second engine propulsion system mounted PTO engagement consent – Trailer
Table 170 specifies the parameter attributes.	

Table 170 — Second engine propulsion system mounted PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.186 Transmission output shaft PTO engagement consent – Trailer

This parameter indicates the command signal to activate the transmission output shaft PTO engagement consent – trailer.

REQ	7.187 APP – Parameter specification – Transmission output shaft PTO engagement consent – Trailer
Table 171 specifies the parameter attributes.	

Table 171 — Transmission output shaft PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.187 Transfer case output shaft PTO engagement consent – Trailer

This parameter indicates the command signal to activate the transfer case output shaft PTO engagement consent – trailer.

REQ	7.188 APP – Parameter specification – Transfer case output shaft PTO engagement consent – Trailer
Table 172 specifies the parameter attributes.	

Table 172 — Transfer case output shaft PTO engagement consent – Trailer attributes

Attribute	Value
Data length	2 bit
Data range	00_2: consent not given – not engaged 01_2: consent given – engaged
Type	measured

5.188 Cargo hold temperature 1

This parameter indicates the value of the cargo hold temperature 1 measured by the temperature recorder.

REQ	7.189 APP – Parameter specification – Cargo hold temperature 1
Table 173 specifies the parameter attributes.	

Table 173 — Cargo hold temperature 1 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.189 Cargo hold temperature 2

This parameter indicates the value of the cargo hold temperature 2 measured by the temperature recorder.

REQ	7.190 APP – Parameter specification – Cargo hold temperature 2
Table 174 specifies the parameter attributes.	

Table 174 — Cargo hold temperature 2 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.190 Cargo hold temperature 3

This parameter indicates the value of the cargo hold temperature 3 measured by the temperature recorder.

REQ	7.191 APP – Parameter specification – Cargo hold temperature 3
Table 175 specifies the parameter attributes.	

Table 175 — Cargo hold temperature 3 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.191 Cargo hold temperature 4

This parameter indicates the value of the cargo hold temperature 4 measured by the temperature recorder.

REQ	7.192 APP – Parameter specification – Cargo hold temperature 4
Table 176 specifies the parameter attributes.	

Table 176 — Cargo hold temperature 4 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.192 Cargo hold temperature 5

This parameter indicates the value of the cargo hold temperature 5 measured by the temperature recorder.

REQ	7.193 APP – Parameter specification – Cargo hold temperature 5
Table 177 specifies the parameter attributes.	

Table 177 — Cargo hold temperature 5 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.193 Cargo hold temperature 6

This parameter indicates the value of the cargo hold temperature 6 measured by the temperature recorder.

REQ	7.194 APP – Parameter specification – Cargo hold temperature 6
Table 178 specifies the parameter attributes.	

Table 178 — Cargo hold temperature 6 attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	measured

5.194 Reefer unit battery voltage

This parameter indicates the value of the reefer unit battery voltage.

REQ	7.195 APP – Parameter specification – Reefer unit battery voltage
Table 179 specifies the parameter attributes.	

Table 179 — Reefer unit battery voltage attributes

Attribute	Value
Data length	2 bytes
Resolution	0,01 V per bit gain
Offset	0 V
Data range	0 V to 642,55 V
Type	measured

5.195 Reefer unit fuel tank level

This parameter indicates the value of the reefer unit fuel tank level.

REQ	7.196 APP – Parameter specification – Reefer unit fuel tank level
Table 180 specifies the parameter attributes.	

Table 180 — Reefer unit fuel tank level attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.196 Requested evaporator 1 set-point

This parameter indicates the value of the requested evaporator 1 set-point.

REQ	7.197 APP – Parameter specification – Requested evaporator 1 set-point
Table 181 specifies the parameter attributes.	

Table 181 — Requested evaporator 1 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-50 °C
Data range	-50 °C to +50 °C
Type	commanded status

5.197 Requested evaporator 2 set-point

This parameter indicates the value of the requested evaporator 2 set-point.

REQ	7.198 APP – Parameter specification – Requested evaporator 2 set-point
Table 182 specifies the parameter attributes.	

Table 182 — Requested evaporator 2 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-50 °C
Data range	-50 °C to +50 °C
Type	commanded status

5.198 Requested evaporator 3 set-point

This parameter indicates the value of the requested evaporator 3 set-point.

REQ	7.199 APP – Parameter specification – Requested evaporator 3 set-point
Table 183 specifies the parameter attributes.	

Table 183 — Requested evaporator 3 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-40 °C
Data range	-40 °C to +40 °C
Type	commanded status

5.199 Evaporator 1 set-point

This parameter indicates the value of the evaporator 1 set-point.

REQ	7.200 APP – Parameter specification – Evaporator 1 set-point
Table 184 specifies the parameter attributes.	

Table 184 — Evaporator 1 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-50 °C
Data range	-50 °C to +50 °C
Type	measured

5.200 Evaporator 2 set-point

This parameter indicates the value of the evaporator 2 set-point.

REQ	7.201 APP – Parameter specification – Evaporator 2 set-point
Table 185 specifies the parameter attributes.	

Table 185 — Evaporator 2 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-50 °C
Data range	-50 °C to +50 °C
Type	measured

5.201 Evaporator 3 set-point

This parameter indicates the value of the evaporator 3 set-point.

REQ	7.202 APP – Parameter specification – Evaporator 3 set-point
Table 186 specifies the parameter attributes.	

Table 186 — Evaporator 3 set-point attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 °C per bit gain
Offset	-50 °C
Data range	-50 °C to +50 °C
Type	measured

5.202 Compartment 1 humidity

This parameter indicates the value of the compartment 1 humidity.

REQ	7.203 APP – Parameter specification – Compartment 1 humidity
Table 187 specifies the parameter attributes.	

Table 187 — Compartment 1 humidity attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.203 Compartment 2 humidity

This parameter indicates the value of the compartment 2 humidity.

REQ	7.204 APP – Parameter specification – Compartment 2 humidity
Table 188 specifies the parameter attributes.	

Table 188 — Compartment 2 humidity attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.204 Compartment 3 humidity

This parameter indicates the value of the compartment 3 humidity.

REQ	7.205 APP – Parameter specification – Compartment 3 humidity
Table 189 specifies the parameter attributes.	

Table 189 — Compartment 3 humidity attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.205 Compartment 1 oxygen concentration

This parameter indicates the value of the compartment 1 oxygen concentration.

REQ	7.206 APP – Parameter specification – Compartment 1 oxygen concentration
Table 190 specifies the parameter attributes.	

Table 190 — Compartment 1 oxygen concentration attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.206 Compartment 2 oxygen concentration

This parameter indicates the value of the compartment 2 oxygen concentration.

REQ	7.207 APP – Parameter specification – Compartment 2 oxygen concentration
Table 191 specifies the parameter attributes.	

Table 191 — Compartment 2 oxygen concentration attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.207 Compartment 3 oxygen concentration

This parameter indicates the value of measured compartment 3 oxygen concentration.

REQ	7.208 APP – Parameter specification – Compartment 3 oxygen concentration
Table 192 specifies the parameter attributes.	

Table 192 — Compartment 3 oxygen concentration attributes

Attribute	Value
Data length	1 byte
Resolution	0,5 % per bit gain
Offset	0 %
Data range	0 % to 125 %
Type	measured

5.208 Reefer unit alarm status

This parameter indicates the reefer unit alarm status.

REQ	7.209 APP – Parameter specification – Reefer unit alarm status
Table 193 specifies the parameter attributes.	

Table 193 — Reefer unit alarm status attributes

Attribute	Value
Data length	3 bit (enumeration)
Data range	0: warning/alarm off 1: warning on 2: shutdown alarm on 3 to 7: reserved by document
Type	measured

5.209 Status evaporator 1

This parameter indicates the status evaporator 1.

REQ	7.210 APP – Parameter specification – Status evaporator 1
Table 194 specifies the parameter attributes.	

Table 194 — Status evaporator 1 attributes

Attribute	Value
Data length	3 bit (enumeration)
Data range	0: standby 1: cooling 2: heating 3: defrost 4 to 7: reserved by document
Type	measured

5.210 Status evaporator 2

This parameter indicates the status evaporator 2.

REQ	7.211 APP – Parameter specification – Status evaporator 2
Table 195 specifies the parameter attributes.	

Table 195 — Status evaporator 2 attributes

Attribute	Value
Data length	3 bit (enumeration)
Data range	0: standby 1: cooling 2: heating 3: defrost 4 to 7: reserved by document
Type	measured

5.211 Status evaporator 3

This parameter indicates the status evaporator 3.

REQ	7.212 APP – Parameter specification – Status evaporator 3
Table 196 specifies the parameter attributes.	

Table 196 — Status evaporator 3 attributes

Attribute	Value
Data length	3 bit (enumeration)
Data range	0: standby 1: cooling 2: heating 3: defrost 4 to 7: reserved by document
Type	measured

5.212 Reefer unit status

This parameter indicates the reefer unit status.

REQ	7.213 APP – Parameter specification – Reefer unit status
Table 197 specifies the parameter attributes.	

Table 197 — Reefer unit status attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	measured

5.213 Reefer unit start/stop operating hours

This parameter indicates the total number of hours the reefer unit start/stop operating hours mode is in.

REQ	7.214 APP – Parameter specification – Reefer unit start/stop operating hours
Table 198 specifies the parameter attributes.	

Table 198 — Reefer unit start/stop operating hours attributes

Attribute	Value
Data length	3 byte
Resolution	1 h per bit gain
Offset	0 h
Data range	0 h to 16 449 535 h
Type	measured

5.214 Reefer unit diesel engine propulsion system operating hours

This parameter indicates the total number of hours of the reefer unit diesel engine propulsion system operating mode.

REQ	7.215 APP – Parameter specification – Reefer unit diesel engine propulsion system operating hours
Table 199 specifies the parameter attributes.	

Table 199 — Reefer unit diesel engine propulsion system operating hours attributes

Attribute	Value
Data length	3 byte
Resolution	1 h per bit gain
Offset	0 h
Data range	0 h to 16 449 535 h
Type	measured

5.215 Reefer unit line supply operating hours

This parameter indicates the total number of hours of the reefer unit line supply operating mode.

REQ	7.216 APP – Parameter specification – Reefer unit line supply operating hours
Table 200 specifies the parameter attributes.	

Table 200 — Reefer unit line supply operating hours attributes

Attribute	Value
Data length	3 byte
Resolution	1 h per bit gain
Offset	0 h
Data range	0 h to 16 449 535 h
Type	measured

5.216 Reefer unit generator operating hours

This parameter indicates the total number of hours of the reefer unit generator operating mode.

REQ	7.217 APP – Parameter specification – Reefer unit generator operating hours
Table 201 specifies the parameter attributes.	

Table 201 — Reefer unit generator operating hours attributes

Attribute	Value
Data length	3 byte
Resolution	1 h per bit gain
Offset	0 h
Data range	0 h to 16 449 535 h
Type	measured

5.217 Reefer unit on/off

This parameter indicates the on/off status of the reefer unit.

REQ	7.218 APP – Parameter specification – Reefer unit on/off
Table 202 specifies the parameter attributes.	

Table 202 — Reefer unit on/off attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.218 Reefer unit defrost cycle on/off

This parameter indicates the on/off status of the reefer unit defrost cycle.

REQ	7.219 APP – Parameter specification – Reefer unit defrost cycle on/off
Table 203 specifies the parameter attributes.	

Table 203 — Reefer unit defrost cycle on/off attributes

Attribute	Value
Data length	2 bit
Data range	00_2: off 01_2: on
Type	commanded status

5.219 Cargo hold door 1 contact switch

This parameter indicates the closed/open status of the cargo hold door 1 contact switch.

REQ	7.220 APP – Parameter specification – Cargo hold door 1 contact switch
Table 204 specifies the parameter attributes.	

Table 204 — Cargo hold door 1 contact switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: door closed 01_2: door open
Type	measured

5.220 Cargo hold door 2 contact switch

This parameter indicates the closed/open status of the cargo hold door 2 contact switch.

REQ	7.221 APP – Parameter specification – Cargo hold door 2 contact switch
Table 205 specifies the parameter attributes.	

Table 205 — Cargo hold door 2 contact switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: closed 01_2: open
Type	measured

5.221 Cargo hold door 3 contact switch

This parameter indicates the closed/open status of the cargo hold door 3 contact switch.

REQ	7.222 APP – Parameter specification – Cargo hold door 3 contact switch
Table 206 specifies the parameter attributes.	

Table 206 — Cargo hold door 3 contact switch attributes

Attribute	Value
Data length	2 bit
Data range	00_2: closed 01_2: open
Type	measured

6 PG specification

6.1 Towing vehicle

6.1.1 General requirements

The general requirements specify details of the messages for use on the electrical connection between towing and towed vehicles.

A message is described by a short form of the function (e.g. GPM for General Purpose Message) and two numbers. The first number of the message indicates the direction (towing to towed vehicle) and is always '1'. The second number is the message number.

REQ	7.223 PG specification – Towing vehicle – Undefined bits
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).	

REQ	7.224 PG specification – Towing vehicle – Coupled vehicle messages
The messages GPM11 and GPM21 shall be transmitted only between two coupled vehicles.	

REQ	7.225 PG specification – Towing vehicle – Message direction
All towing vehicle messages shall be transmitted in the direction from towing to towed vehicle.	

REQ	7.226 PG specification – Towing vehicle – Single message transmission rate tolerance
The single message transmission rate of a towing vehicle message shall meet the nominal transmission rate with a tolerance of ±30 % as specified in Table 207 and Table 208.	

REQ	7.227 PG specification – Towing vehicle – Average transmission rate tolerance
The average transmission rate within 5 min of a towed vehicle message shall meet the nominal transmission rate with a tolerance of ±10 % as specified in Table 207 and Table 208.	

6.1.2 Overview of towing vehicle PGs

Table 207 and Table 208 show an overview of PDU1 and PDU2.

Table 207 — Overview of PDU1

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS (GE)	PGN	Remarks
GPM11	100 ms	6	0	0	226	DA	$00E200_{16}$	N/A
GPM18	5 000 ms	6	0	0	154	DA	$009A00_{16}$	N/A

Table 208 — Overview of PDU 2

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS (GE)	PGN	Remarks
GPM12	500 ms	6	0	0	254	93	$00FE5D_{16}$	N/A
GPM13	50 ms	3	0	0	254	95	$00FE5F_{16}$	N/A
GPM14	100 ms	6	0	0	254	97	$00FE61_{16}$	N/A
GPM15	1 000 ms	6	0	0	254	99	$00FE63_{16}$	N/A
GPM16	1 000 ms	6	0	0	254	101	$00FE65_{16}$	N/A
GPM17	10 ms	3	0	0	240	27	$00F01B_{16}$	N/A
GPM19	100 ms	6	0	0	253	80	$00FD50_{16}$	N/A
TD11	1 000 ms	6	0	0	254	230	$00FEE6_{16}$	see SAE J1939-DA: PGN 65254
ODM11	50 ms	1	0	0	250	215	$00FAD7_{16}$	N/A
MAM11	100 ms	6	0	0	253	221	$00FDDD_{16}$	N/A

Figure 10 shows the communication sequence chart.

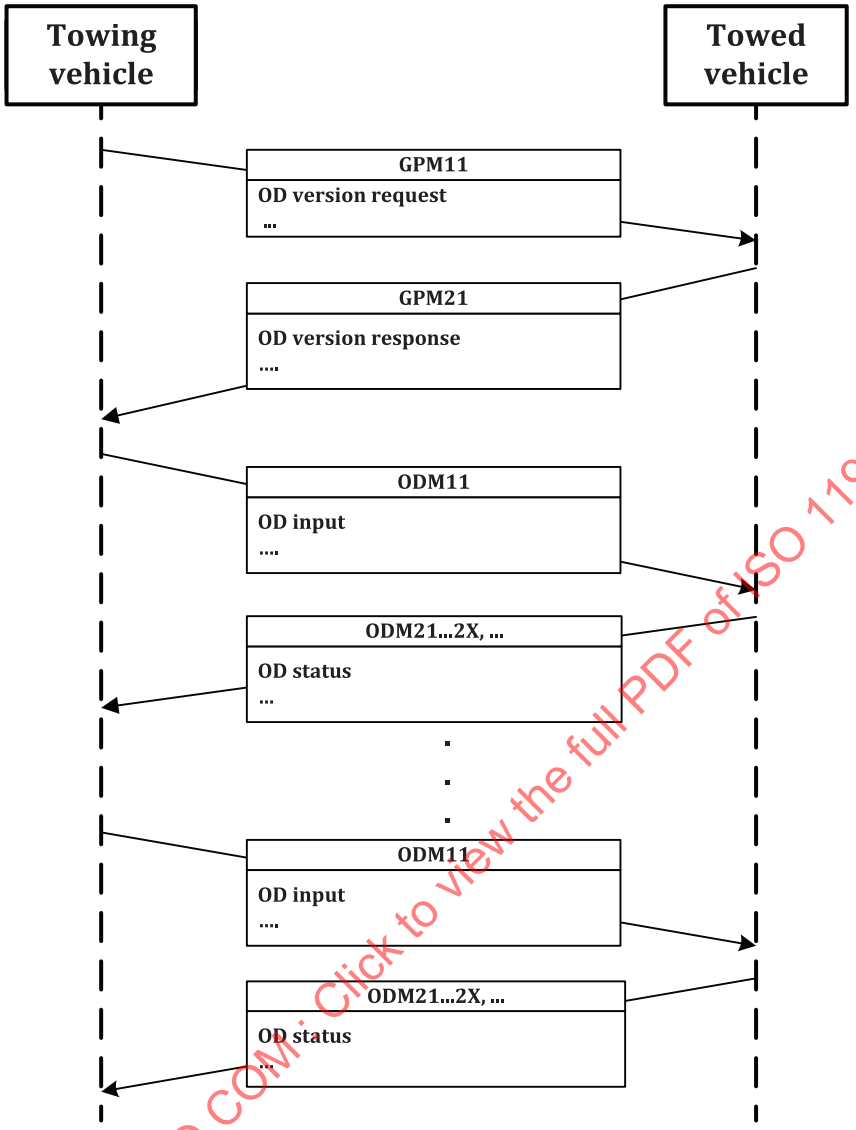


Figure 10 — Communication sequence chart

6.1.3 CANopen messages

Table 209 specifies the PGs reserved for mapping CANopen SDO communication services. The data content of these PGs is specified in EN 50325-4.

Table 209 — CANopen messages

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS (GE)	PGN	Remarks
CANopen Application Message #1/1 CAM11	50 ms	7	0	0	5	DA	000500_{16}	N/A
CANopen Application Message #2/1 CAM21	50 ms	7	0	0	6	DA	000600_{16}	N/A

6.1.4 General purpose message #1/1 (GPM11)

This PG provides information about vehicle type, anti-theft device request, ODD, ODM version, and articulation angle between towing and towed vehicle. For the dynamic address assignment, one of the PDU1s is sent from the towing vehicle to the towed vehicle with the lowest transmission rate is specified as the normal initialisation message.

REQ	7.228 PG specification – Towing vehicle – Normal initialisation message
To initialise the communication the message GPM11 shall be sent according to REQ 7.229.	

REQ	7.229 PG specification – Towing vehicle – General purpose message #1/1 (GPM11)
This message shall be supported and shall be implemented as specified in Table 210 and Table 211. The towing vehicle shall send the general purpose message #1/1 (GPM11) to the towed vehicle.	

Table 210 — Specification of GPM11 attributes

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	226
PDU specific	address of the successor
Default priority	6

Table 211 — SP mapping of GPM11

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Vehicle type	5.8
	3 to 8	Detailed vehicle type	5.9
2	1 to 2	Anti-theft device request	5.5
	3 to 4	ODD request	5.4
	5 to 8	ODM version request	5.95
3 to 4	1 to 16	Articulation angle between towing and towed vehicle	5.105
5 to 6	1 to 16	Articulation angle between towing vehicle and drawbar	5.105
7 to 8	1 to 16	Articulation angle between drawbar and towed vehicle	5.105

6.1.5 General purpose message #1/2 (GPM12)

This PG is used to transmit information about speed limits from the towing vehicle to the towed vehicle.

REQ	7.230 PG specification – Towing vehicle – General purpose message #1/2 (GPM12)
This message shall provide the general purpose message #1/2 (GPM12) attributes as specified in Table 212. Table 213 specifies the GPM12 parameter mapping.	

Table 212 — SP mapping of GPM12

Attribute	Value
Transmission rate	500 ms ±50 ms
Data length	8 byte
Data page	0

Table 212 *(continued)*

Attribute	Value
PDU format	254
PDU specific	93
Default priority	6

Table 213 — GPM12 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 2	---	Engine propulsion system speed upper limit	5.22
3 to 4	---	Engine propulsion system speed lower limit	5.23
5	---	Maximum vehicle speed limit	5.21
6 to 8	---	Reserved by this document: Set to FF FF FF_{16}	---

6.1.6 General purpose message #1/3 (GPM13)

Information about the engine propulsion system torque and speed is sent to the towed vehicle.

REQ	7.231 PG specification – Towing vehicle – General purpose message #1/3 (GPM13)
If this message is supported, it shall be implemented as specified in Table 214 and Table 215.	

Table 214 — SP mapping of GPM13

Attribute	Value
Transmission rate	50 ms ±5 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	95
Default priority	3

Table 215 — GPM13 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 4	Engine propulsion system torque mode	5.38
	5 to 6	Engine propulsion system control allowed	5.13
	7 to 8	Engine propulsion system running	5.37
2	1 to 8	Driver's demand engine propulsion system percent torque	5.17
3	1 to 8	Actual engine propulsion system percent torque	5.18
4 to 5	1 to 16	Engine propulsion system speed	5.16
6	1 to 8	Percent load at current speed	5.20
7 to 8	1 to 16	Vehicle speed	5.15

6.1.7 General purpose message #1/4 (GPM14)

This PG provides information about PTO, clutch slip and auxiliary components.

REQ	7.232 PG specification – Towing vehicle – General purpose message #1/4 (GPM14)
If this message is supported, it shall be implemented as specified in Table 216 and Table 217.	

Table 216 — SP mapping of GPM14

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	97
Default priority	6

Table 217 — GPM14 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 8	Percent clutch slip	5.10
2	1 to 8	Current gear	5.11
3	1 to 2	First clutch-dependent PTO feedback	5.31
	3 to 4	Second clutch-dependent PTO feedback	5.32
	5 to 6	Clutch-independent PTO feedback	5.33
	7 to 8	First engine propulsion system-mounted PTO feedback	5.34
4	1 to 2	Second engine propulsion system-mounted PTO feedback	5.35
	3 to 4	PTO control allowed	5.14
	5 to 7	Torque converter oil temperature warning	5.29
	8	Reserved by this document	---
5 to 6	1 to 16	Torque converter oil temperature	5.30
7	1 to 2	Starter active	5.36
	3 to 4	Accelerator pedal low idle switch	5.12
	5 to 8	Reserved by this document	---
8	1 to 8	Accelerator pedal position	5.55

6.1.8 General purpose message #1/5 (GPM15)

This PG is used to transmit information about the condition of the operation materials like oil, fuel and cooling water.

REQ	7.233 PG specification – Towing vehicle – General purpose message #1/5 (GPM15)
If this message is supported, it shall be implemented as specified in Table 218 and Table 219.	

Table 218 — SP mapping of GPM15

Attribute	Value
Transmission rate	1 000 ms ±100 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	99
Default priority	6

Table 219 — GPM15 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 2	1 to 16	Engine propulsion system oil temperature	5.26
3	1 to 8	Engine propulsion system coolant temperature	5.27
4	1 to 8	Engine propulsion system oil pressure	5.28
5	1 to 3	Engine propulsion system coolant warning	5.24
	4 to 5	Engine propulsion system oil pressure warning	5.25
	6 to 7	Fuel level warning	5.57
	8	Reserved by this document	---
6 to 7	1 to 16	Reference engine propulsion system torque	5.19
8	1 to 8	Reserved by this document: Set to FF_{16}	---

6.1.9 General purpose message #1/6 (GPM16)

This PG is used to transmit the ambient air temperature of the towed vehicle.

REQ	7.234 PG specification – Towing vehicle – General purpose message #1/6 (GPM16)
If this message is supported, it shall be implemented as specified in Table 220 and Table 221.	

Table 220 — SP mapping of GPM16

Attribute	Value
Transmission rate	1 000 ms ±100 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	101
Default priority	6

Table 221 — GPM16 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 2	1 to 16	Ambient air temperature	5.56
3 to 8	1 to 50	Reserved by this document: Set to FF FF FF FF FF FF_{16}	---

6.1.10 General purpose message #1/7 (GPM17)

REQ	7.235 PG specification – Towing vehicle – General purpose message #1/7 (GPM17)
If this message is supported, it shall be implemented as specified in Table 222 and Table 223.	

Table 222 — SP mapping of GPM17

Attribute	Value
Transmission rate	10 ms ±1 ms
Data length	8 byte
Data page	0
PDU format	240
PDU specific	27
Default priority	3

Table 223 — GPM17 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Trailer left-hand stop light(s)	5.139
	3 to 4	Trailer right-hand stop light(s)	5.140
	5 to 6	Trailer left-hand direction indicator light(s)	5.141
	7 to 8	Trailer right-hand direction indicator light(s)	5.142
2	1 to 2	Trailer left-hand rear light(s)	5.143
	3 to 4	Trailer right-hand rear light(s)	5.144
	5 to 6	Trailer left-hand rear fog light(s)	5.145
	7 to 8	Trailer right-hand rear fog light(s)	5.146
3	1 to 2	Trailer left-hand Reversing Light(s)	5.147
	3 to 4	Trailer right-hand reversing light(s)	5.148
	5 to 6	Trailer left-hand side marker light(s)	5.149
	7 to 8	Trailer right-hand side marker light(s)	5.150
4	1 to 2	Trailer left-hand rear width indicator light(s)	5.151
	3 to 4	Trailer right-hand rear width indicator light(s)	5.152
	5 to 6	Trailer left-hand corner marker light(s)	5.153
	7 to 8	Trailer right-hand corner marker light(s)	5.154
5	1 to 2	Trailer left-hand rear registration-plate light(s)	5.155
	3 to 4	Trailer right-hand rear registration-plate light(s)	5.156
	5 to 6	Trailer rear warning light(s)	5.157
	7 to 8	Trailer rotating identification light(s)	5.158
6	1 to 2	Trailer interior light(s)	5.159
	3 to 4	Trailer work light(s)	5.160
	5 to 8	Reserved by this document	---
7 to 8	---	Reserved by this document: Set to FF FF_{16}	---

6.1.11 General purpose message #1/8 (GPM18)

REQ	7.236 PG specification – Towing vehicle – General purpose message #1/8 (GPM18)
If this message is supported, it shall be implemented as specified in Table 224 and Table 225.	

Table 224 — SP mapping of GPM18

Attribute	Value
Transmission rate	5 000 ms ±500 ms or on change (but not less than 100 ms intervals)
Data length	8 byte
Data page	0
PDU format	154
PDU specific	address of the successor
Default priority	6

Table 225 — GPM18 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Reefer unit on/off	5.217
	3 to 4	Reefer unit defrost cycle on/off	5.218
	5 to 8	Reserved by this document	---

Table 225 *(continued)*

Byte pos.	Bit pos.	Parameter	Reference
2	---	Status evaporator 1	5.209
3	---	Status evaporator 2	5.210
4	---	Status evaporator 3	5.211
5 to 8	---	Reserved by this document: Set to FF FF FF FF_{16}	---

6.1.12 General purpose message #1/9 (GPM19)

REQ	7.237 PG specification – Towing vehicle – General purpose message #1/9 (GPM19)
If this message is supported, it shall be implemented as specified in Table 226 and Table 227.	

Table 226 — SP mapping of GPM19

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	80
Default priority	6

Table 227 — GPM19 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Transmission output shaft PTO feedback	5.169
	3 to 4	Transfer case output shaft PTO feedback	5.170
	5 to 6	At least one PTO engaged	5.171
	7 to 8	First clutch-dependent PTO engagement consent	5.174
2	1 to 2	Second clutch-dependent PTO engagement consent	5.175
	3 to 4	Clutch-independent PTO engagement consent	5.176
	5 to 6	First engine propulsion system mounted PTO engagement consent	5.177
	7 to 8	Second engine propulsion system mounted PTO engagement consent	5.178
3	1 to 2	Transmission output shaft PTO engagement consent	5.179
	3 to 4	Transfer case output shaft PTO engagement consent	5.180
	5 to 8	Reserved by this document	---
4 to 8	---	Reserved by this document: Set to FF FF FF FF FF_{16}	---

6.1.13 Military application message #1/1 (MAM11)

The PG is used to control the military light application on the towed vehicle.

REQ	7.238 PG specification – Towing vehicle – Military application message #1/1 (MAM11)
If this message is supported, it shall be implemented as specified in Table 228 and Table 229. The towing vehicle shall send the military application message #1/1 (MAM11) to the towed vehicle to control military specific lights.	

Table 228 — SP mapping of MAM11

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	221
Default priority	6

Table 229 — MAM11 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Towed vehicle rear black-out marker select light(s)	5.82
	3 to 4	Towed vehicle convoy lamp select	5.84
	5 to 6	Towed vehicle black-out brake/stop lamp select	5.86
	7 to 8	Reserved by this document	---
2	1 to 2	Reserved by this document	---
	3 to 4	Towed vehicle front black-out marker lamp select	5.83
	5 to 6	Reserved by this document	---
	7 to 8	Towed vehicle convoy driving lamp select	5.85
3	1 to 2	Towed vehicle rear IR-black-out marker select	5.122
	3 to 4	Towed vehicle IR-black-out stop lamp select	5.123
	5 to 6	Towed vehicle IR-convoy light ('Leitkreuz') select	5.124
	7 to 8	Reserved by this document	---
4	1 to 2	Towed vehicle night vision illuminator select	5.87
	3 to 6	Reserved by this document	---
	7 to 8	Towed vehicle black-out work lamp select	5.88
5 to 7	1 to 24	Reserved by this document: Set to FF FF FF_{16}	---
8	1 to 8	Towed vehicle operators black-out intensity selection	5.89

6.1.14 Time/Date message #1/1 (TD11)

REQ	7.239 APP – Parameter specification – Time/Date message #1/1 (TD11)
If this message is supported, it shall be implemented as specified in SAE J1939-DA: PG TD (Time/Date) with PGN 65254.	

6.1.15 Object detection message #1/1 (ODM11)

With this PG, relevant information for the automated steering function is sent from the towing vehicle to the towed vehicle.

REQ	7.240 PG specification – Towing vehicle – Object detection message #1/1 (ODM11)
If this message is supported, it shall be implemented as specified in Table 230 and Table 231.	

Table 230 — SP mapping of ODM11

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte (see Table 231)

Table 230 *(continued)*

Attribute	Value
Data page	0
PDU format	250
PDU specific	215
Default priority	1

Table 231 — ODM11 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	CRC	5.100
2	1 to 4	Sequence counter	5.101
	5 to 8	ODM input	5.98
3 to 4	---	Longitudinal speed	5.102
5 to 6	---	Lateral speed	5.103
7 to 8	---	Yaw rate	5.104

6.2 Towed vehicle

6.2.1 General requirements

The general requirements specify details of the messages for use on the electrical connection between towing and towed vehicles.

A message is described by a short form of the function (e.g. GPM for general purpose message) and two numbers. The first number of the message indicates the direction (from towed to towing vehicle) and is always '2'. The second number is the message number.

REQ	7.241 PG specification – Towed vehicle – Undefined bits
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).	

REQ	7.242 PG specification – Towing vehicle – Normal initialisation message
The message GPM21 shall be sent according to Table 232.	

REQ	7.243 PG specification – Towing vehicle – Coupled vehicle messages
The messages GPM11 and GPM21 shall be transmitted only between two coupled vehicles.	

REQ	7.244 PG specification – Towed vehicle – Message direction indication by number
All towed vehicle messages shall be transmitted in the direction from towed to towing vehicle.	

REQ	7.245 PG specification – Towed vehicle – Single message transmission rate tolerance
The single message transmission rate of a towed vehicle message shall meet the nominal transmission rate with a tolerance of ±30 % as specified in Table 232 and Table 233.	

REQ	7.246 PG specification – Towed vehicle – Average transmission rate tolerance
The average transmission rate within 5 min of a towed vehicle message shall meet the nominal transmission rate with a tolerance of ±10 % as specified in Table 232 and Table 233.	

6.2.2 Overview of towed vehicle messages

Table 232 and Table 233 show the PDU1 and PDU2.

The parameter groups transmitted on the data link and physical layer are distinguished by their unique PGN. Each parameter group has its nominal transmission rates.

Table 232 — PDU1 parameter groups

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS	PGN	Remarks
GPM21	100 ms	6	0	0	225	DA	$00E100_{16}$	Replaces GFM21 of ISO 11992-3:1998

Table 233 — PDU2 parameter groups

Acronym	Nominal transmission rate	P	R	DP	PF	PS (GE)	PGN	Remarks
GPM22	100 ms	6	0	0	254	200	$00FEC8_{16}$	Replaces GFM24 of ISO 11992-3:1998
GPM23	100 ms	3	0	0	254	96	$00FE60_{16}$	---
GPM24	100 ms	3	0	0	254	98	$00FE62_{16}$	---
GPM25	100 ms	6	0	0	254	100	$00FE64_{16}$	---
GPM26	5 000 ms	6	0	0	253	79	$00FD4F_{16}$	N/A
GPM27	5 000 ms	6	0	0	253	78	$00FD4E_{16}$	N/A
GPM28	5 000 ms	6	0	0	253	77	$00FD4D_{16}$	N/A
GPM29	10 000 ms	6	0	0	253	76	$00FD4C_{16}$	N/A
GPM210	10 000 ms	6	0	0	253	75	$00FD4B_{16}$	N/A
GPM211	5 000 ms	6	0	0	253	74	$00FD4A_{16}$	N/A
ODM21	50 ms	1	0	0	250	216	$00FAD8_{16}$	---
ODM22	50 ms	1	0	0	250	217	$00FAD9_{16}$	---
ODM23	50 ms	1	0	0	250	218	$00FADA_{16}$	---
ODM24	50 ms	1	0	0	250	219	$00FADB_{16}$	---
ODM25	50 ms	1	0	0	250	220	$00FADC_{16}$	---
ODM26	50 ms	1	0	0	250	221	$00FADD_{16}$	---
ODM27	50 ms	1	0	0	250	222	$00FADE_{16}$	---
ODM28	50 ms	1	0	0	250	223	$00FADF_{16}$	---
ODM29	50 ms	1	0	0	250	224	$00FAE0_{16}$	---
ODM210	50 ms	1	0	0	250	225	$00FAE1_{16}$	---
ODM211	50 ms	1	0	0	250	226	$00FAE2_{16}$	---
ODM212	50 ms	1	0	0	250	227	$00FAE3_{16}$	---
ODM213	50 ms	1	0	0	250	228	$00FAE4_{16}$	---
ODM214	50 ms	1	0	0	250	229	$00FAE5_{16}$	---
ODM215	50 ms	1	0	0	250	230	$00FAE6_{16}$	---
ODM216	50 ms	1	0	0	250	231	$00FAE7_{16}$	---

Table 233 *(continued)*

Acronym	Nominal transmission rate	P	R	DP	PF	PS (GE)	PGN	Remarks
ODM217	100 ms	3	0	0	250	232	$00FAE8_{16}$	---
ODM218	100 ms	3	0	0	250	233	$00FAE9_{16}$	---
ODM219	100 ms	3	0	0	250	234	$00FAEA_{16}$	---
ODM220	100 ms	3	0	0	250	235	$00FAEB_{16}$	---
ODM221	100 ms	3	0	0	250	236	$00FAEC_{16}$	---
MAM21	100 ms	6	0	0	253	222	$00FDDE_{16}$	---

6.2.3 General purpose message #2/1 (GPM21)

REQ	7.247 PG specification – Towed vehicle – General purpose message #2/1 (GPM21)
If this message is supported it shall be implemented as specified in Table 234, Table 235.	

Table 234 — SP mapping of GPM21

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	225
PDU specific	address of the predecessor
Default priority	6

Table 235 — GPM21 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Vehicle type	5.8
	3 to 8	Detailed vehicle type	5.9
2	1 to 4	Reserved by this document	---
	5 to 8	ODM version information	5.95
3 to 4	1 to 16	Articulation angle between towing and towed vehicle	5.105
5 to 6	1 to 16	Articulation angle drawbar and towed vehicle	5.105
7	1 to 8	Identification data index	5.96
8	1 to 8	Identification data content	5.97

6.2.4 General purpose message #2/2 (GPM22)

REQ	7.248 PG specification – Towed vehicle – General purpose message #2/2 (GPM22)
If this message is supported, it shall be implemented as specified in Table 236 and Table 237.	

Table 236 — SP mapping of GPM22

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	254

Table 236 *(continued)*

Attribute	Value
PDU specific	200
Default priority	6

Table 237 — GPM22 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Obstacle detection device (ODD) active	5.6
	3 to 4	Anti-theft device – measured	5.7
	5 to 8	Reserved by this document	---
2	---	Reserved by this document: Set to FF_{16}	---
3	1 to 8	Rear obstacle distance	5.2
4	1 to 8	Thermal body	5.3
5 to 6	1 to 16	Body fluid level	5.80
7	1 to 8	Actual pressure	5.81
8	---	Reserved by this document: Set to FF_{16}	---

6.2.5 General purpose message #2/3 (GPM23)

REQ	7.249 PG specification – Towed vehicle – General purpose message #2/3 (GPM23)
If this message is supported, it shall be implemented as specified in Table 238 and Table 239.	

Table 238 — SP mapping of GPM23

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	96
Default priority	3

Table 239 — GPM23 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 2	1 to 16	Requested engine propulsion system speed	5.54
3 to 4	1 to 16	Requested engine propulsion system speed upper limit	5.48
5 to 6	1 to 16	Requested engine propulsion system speed lower limit	5.49
7	1 to 8	Requested engine propulsion system torque limit	5.50
8	1 to 8	Requested vehicle speed limit	5.51

6.2.6 General purpose message #2/4 (GPM24)

REQ	7.250 PG specification – Towed vehicle – General purpose message #2/4 (GPM24)
If this message is supported, it shall be implemented as specified in Table 240 and Table 241.	

Table 240 — SP mapping of GPM24

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	254
PDU specific	98
Default priority	3

Table 241 — GPM24 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 8	Requested percent clutch slip	5.44
2	1 to 2	Starter lockout switch	5.45
	3 to 4	Engine propulsion system start switch	5.46
	5 to 6	Engine propulsion system stop switch	5.47
	7 to 8	Reserved by this document	---
3	1 to 2	Refuse packer step switch	5.52
	3 to 4	Operating panel active	5.53
	5 to 6	Reserved by this document	---
	7 to 8	First clutch-dependent PTO switch	5.39
4	1 to 2	Second clutch-dependent PTO switch	5.40
	3 to 4	Clutch-independent PTO switch	5.41
	5 to 6	First engine propulsion system-mounted PTO switch	5.42
	7 to 8	Second engine propulsion system-mounted PTO switch	5.43
5	1 to 2	Transmission output shaft PTO switch	5.172
	3 to 4	Transfer case output shaft PTO switch	5.173
	5 to 6	First clutch-dependent PTO engagement consent – Trailer	5.181
	7 to 8	Second clutch-dependent PTO engagement consent – Trailer	5.182
6	1 to 2	Clutch-independent PTO engagement consent – Trailer	5.183
	3 to 4	First engine propulsion system mounted PTO engagement consent – Trailer	5.184
	5 to 6	Second engine propulsion system mounted PTO engagement consent – Trailer	5.185
	7 to 8	Transmission output shaft PTO engagement consent – Trailer	5.186
7	1 to 2	Transfer case output shaft PTO engagement consent – Trailer	5.187
	3 to 8	Reserved by this document	---
8	---	Reserved by this document: Set to FF_{16}	---

6.2.7 General purpose message #2/5 (GPM25)

REQ	7.251 PG specification – Towed vehicle – General purpose message #2/5 (GPM25)
If this message is supported, it shall be implemented as specified in Table 242 and Table 243.	

Table 242 — SP mapping of GPM25

Attribute	Value
Transmission rate	100 ms ±10 ms

Table 242 *(continued)*

Attribute	Value
Data length	8 byte
Data page	0
PDU format	254
PDU specific	100
Default priority	6

Table 243 — GPM25 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Towed vehicle left-hand stop light(s)	5.58
	3 to 4	Towed vehicle right-hand stop light(s)	5.59
	5 to 6	Towed vehicle left-hand direction indicator light(s)	5.60
	7 to 8	Towed vehicle right-hand direction indicator light(s)	5.61
2	1 to 2	Towed vehicle left-hand rear light(s)	5.62
	3 to 4	Towed vehicle right-hand rear position light(s)	5.63
	5 to 6	Towed vehicle left-hand rear fog light(s)	5.64
	7 to 8	Towed vehicle right-hand rear fog light(s)	5.65
3	1 to 2	Towed vehicle left-hand reversing light(s)	5.66
	3 to 4	Towed vehicle right-hand reversing light(s)	5.67
	5 to 6	Towed vehicle left-hand side marker light(s)	5.68
	7 to 8	Towed vehicle right-hand side marker light(s)	5.69
4	1 to 2	Towed vehicle left-hand rear width indicator light(s)	5.70
	3 to 4	Towed vehicle right-hand rear width indicator light(s)	5.71
	5 to 6	Towed vehicle left-hand corner marker light(s)	5.72
	7 to 8	Towed vehicle right-hand corner marker light(s)	5.73
5	1 to 2	Towed vehicle left-hand rear registration-plate light(s)	5.74
	3 to 4	Towed vehicle right-hand rear registration-plate light(s)	5.75
	5 to 6	Towed vehicle rear warning light(s)	5.76
	7 to 8	Towed vehicle rotating identification light(s)	5.77
6	1 to 2	Towed vehicle interior light(s)	5.78
	3 to 4	Towed vehicle work light(s)	5.79
	5 to 8	Reserved by this document	---
7	1 to 2	Trailer left-hand stop light(s) redundancy function	5.161
	3 to 4	Trailer right-hand stop light(s) redundancy function	5.162
	5 to 6	Trailer left-hand direction indicator light(s) redundancy function	5.163
	7 to 8	Trailer right-hand direction indicator light(s) redundancy function	5.164
8	1 to 2	Trailer left-hand rear light(s) redundancy function	5.165
	3 to 4	Trailer right-hand rear light(s) redundancy function	5.166
	5 to 6	Trailer left-hand reversing light(s) redundancy function	5.167
	7 to 8	Trailer right-hand reversing light(s) redundancy function	5.168

6.2.8 General purpose message #2/6 (GPM26)

REQ	7.252 PG specification – Towed vehicle – General purpose message #2/6 (GPM26)
If this message is supported, it shall be implemented as specified in Table 244 and Table 245.	

Table 244 — SP mapping of GPM26

Attribute	Value
Transmission rate	5 000 ms ±500 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	79
Default priority	6

Table 245 — GPM26 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cargo hold temperature 1	5.188
2	---	Cargo hold temperature 2	5.189
3	---	Cargo hold temperature 3	5.190
4	---	Cargo hold temperature 4	5.191
5	---	Cargo hold temperature 5	5.192
6	---	Cargo hold temperature 6	5.193
7 to 8	---	Ambient air temperature	5.56

6.2.9 General purpose message #2/7 (GPM27)

REQ	7.253 PG specification – Towed vehicle – General purpose message #2/7 (GPM27)
If this message is supported, it shall be implemented as specified in Table 246 and Table 247.	

Table 246 — SP mapping of GPM27

Attribute	Value
Transmission rate	5 000 ms ±500 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	78
Default priority	6

Table 247 — GPM27 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Compartment 1 humidity	5.202
2	---	Compartment 2 humidity	5.203
3	---	Compartment 3 humidity	5.204
4	---	Compartment 1 oxygen concentration	5.205
5	---	Compartment 2 oxygen concentration	5.206
6	---	Compartment 3 oxygen concentration	5.207
7 to 8	---	Reserved by this document: Set to FF FF_{16}	---

6.2.10 General purpose message #2/8 (GPM28)

REQ	7.254 PG specification – Towed vehicle – General purpose message #2/8 (GPM28)

If this message is supported, it shall be implemented as specified in Table 248 and Table 249).

Table 248 — SP mapping of GPM28

Attribute	Value
Transmission rate	5 000 ms ±500 ms or on change, not to exceed 100 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	77
Default priority	6

Table 249 — GPM28 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Reefer unit status	5.212
	3 to 5	Reefer unit alarm status	5.208
	6 to 8	Status evaporator 1	5.209
2	1 to 3	Status evaporator 2	5.210
	4 to 6	Status evaporator 3	5.211
	7 to 8	Reserved by this document	---
3	---	Evaporator 1 set-point	5.199
4	---	Evaporator 2 set-point	5.200
5	---	Evaporator 3 set-point	5.201
6 to 8	---	Reserved by this document: Set to FF FF FF_{16}	---

6.2.11 General purpose message #2/9 (GPM29)

REQ	7.255 PG specification – Towed vehicle – General purpose message #2/9 (GPM29)
If this message is supported, it shall be implemented as specified in Table 250 and Table 251.	

Table 250 — SP mapping of GPM29

Attribute	Value
Transmission rate	10 000 ms ±1 000 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	76
Default priority	6

Table 251 — GPM29 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 3	---	Reefer unit start/stop operating hours	5.213
4 to 6	---	Reefer unit diesel engine propulsion system operating hours	5.214
7	---	Reefer unit fuel tank level	5.195
8	---	Reserved by this document: Set to FF_{16}	---

6.2.12 General purpose message #2/10 (GPM210)

REQ	7.256 PG specification – Towed vehicle – General purpose message #2/10 (GPM210)
If this message is supported, it shall be implemented as specified in Table 252 and Table 253.	

Table 252 — SP mapping of GPM210

Attribute	Value
Transmission rate	10 000 ms ±1 000 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	75
Default priority	6

Table 253 — GPM210 message definition

Byte pos.	Bit pos.	Parameter	Reference
1 to 3	---	Reefer unit line supply operating hours	5.215
4 to 6	---	Reefer unit generator operating hours	5.216
7 to 8	---	Reefer unit battery voltage	5.194

6.2.13 General purpose message #2/11 (GPM211)

REQ	7.257 PG specification – Towed vehicle – General purpose message #2/11 (GPM211)
If this message is supported it shall be implemented as specified in Table 254 and Table 255.	

Table 254 — SP mapping of GPM211

Attribute	Value
Transmission rate	5 000 ms ±500 ms or on change, not to exceed 100 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	74
Default priority	6

Table 255 — GPM211 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Cargo hold door 1 contact switch	5.219
	3 to 4	Cargo hold door 2 contact switch	5.220
	5 to 6	Cargo hold door 3 contact switch	5.221
	7 to 8	Reserved by this document	---
2 to 7	---	Reserved by this document: Set to FF FF FF FF FF FF FF_{16}	---

6.2.14 Military application message #2/1 (MAM21)

REQ	7.258 PG specification – Towed vehicle – Military application message #2/1 (MAM21)

If this message is supported it shall be implemented as specified in Table 256 and Table 257. The towed vehicle shall send the military application message #2/1 (MAM21) as a response message to the towing vehicle.

Table 256 — SP mapping of MAM21

Attribute	Value
Transmission rate	100 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	253
PDU specific	222
Default priority	6

Table 257 — MAM21 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	1 to 2	Towed vehicle left hand black-out rear light(s)	5.90
	3 to 4	Towed vehicle right-hand black-out rear light(s)	5.91
	5 to 6	Towed vehicle left-hand black-out brake/stop light(s)	5.92
	7 to 8	Towed vehicle right-hand black-out brake/stop light(s)	5.93
2	1 to 2	Towed vehicle rear convoy light(s)	5.94
	3 to 8	Reserved by this document	---
3	1 to 2	Towed vehicle right-hand IR-black-out rear light(s)	5.125
	3 to 4	Towed vehicle left-hand IR-black-out rear light(s)	5.126
	5 to 6	Towed vehicle right-hand IR-black-out stop light(s)	5.127
	7 to 8	Towed vehicle left-hand IR-black-out stop light(s)	5.128
4	1 to 2	Towed vehicle IR-convoy light ('Leitkreuz')	5.129
	3 to 8	Reserved by this document	---
5	1 to 6	Reserved by this document	---
	7 to 8	Towed vehicle black-out work lamp(s)	5.130
6 to 8	---	Reserved by this document: Set to FF FF FF_{16}	---

6.2.15 Object detection message #2/1 (ODM21)

REQ	7.259 PG specification – Towed vehicle – Object detection message #2/1 (ODM21)
The towed vehicle position information message for object #1 (ODM21) shall provide the information as specified in Table 259. Table 258 specifies the message attributes of ODM21.	

Table 258 — SP mapping of ODM21

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	216
Default priority	1

Table 259 — ODM21 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD longitudinal distance object	5.106
5 to 6	---	OD lateral distance object	5.107
7	1 to 4	OD standard deviation of longitudinal and lateral distance	5.110
7	5 to 8	Reserved by this document	---
8	1 to 8	Track ID	5.112

6.2.16 Object detection message #2/2 (ODM22)

REQ	7.260 PG specification – Towed vehicle – Object detection message #2/2 (ODM22)
The towed vehicle velocity information message for object #1 (ODM22) shall provide the information as specified in Table 261. Table 260 specifies the message attributes of ODM22.	

Table 260 — SP mapping of ODM22

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	217
Default priority	1

Table 261 — ODM22 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD absolute longitudinal speed object	5.108
5 to 6	---	OD absolute lateral speed object	5.109
7	1 to 4	OD normal deviation of longitudinal and lateral speed	5.111
7	5 to 7	Reserved by this document	---
8	1 to 2	Object width (dimension in lateral direction)	5.118
8	3 to 4	Object length (dimension in longitudinal direction)	5.119
8	5 to 8	Object classification	5.120

6.2.17 Object detection message #2/3 (ODM23)

REQ	7.261 PG specification – Towed vehicle – Object detection message #2/3 (ODM23)
The towed vehicle position information message for object #2 (ODM23) shall provide the information as specified in Table 263. Table 262 specifies the ODM23 attributes.	

Table 262 — SP mapping of ODM23

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	218
Default priority	1

Table 263 — ODM23 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD longitudinal distance object	5.106
5 to 6	---	OD lateral distance object	5.107
7	1 to 4	OD standard deviation of longitudinal and lateral distance	5.110
7	5 to 8	Reserved by this document	---
8	1 to 8	Track ID	5.112

6.2.18 Object detection message #2/4 (ODM24)

REQ	7.262 PG specification – Towed vehicle – Object detection message #2/4 (ODM24)
The towed vehicle velocity information message for object #2 shall provide the information as specified in Table 265. Table 264 specifies the ODM24 attributes.	

Table 264 — SP mapping of ODM24

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	219
Default priority	1

Table 265 — ODM24 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD absolute longitudinal speed object	5.108
5 to 6	---	OD absolute lateral speed object	5.109
7	1 to 4	OD normal deviation of longitudinal and lateral speed	5.111
7	5 to 7	Reserved by this document	---
8	1 to 2	Object width (dimension in lateral direction)	5.118
8	3 to 4	Object length (dimension in longitudinal direction)	5.119

Table 265 *(continued)*

Byte pos.	Bit pos.	Parameter	Reference
8	5 to 8	Object classification	5.120

6.2.19 Object detection message #2/5 (ODM25)

REQ	7.263 PG specification – Towed vehicle – Object detection message #2/5 (ODM25)
The towed vehicle position information message for object #3 shall provide the information as specified in Table 267. Table 266 specifies the ODM25 attributes.	

Table 266 — SP mapping of ODM25

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	220
Default priority	1

Table 267 — ODM25 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD longitudinal distance object	5.106
5 to 6	---	OD lateral distance object	5.107
7	1 to 4	OD standard deviation of longitudinal and lateral distance	5.110
7	5 to 8	Reserved by this document	---
8	1 to 8	Track ID	5.112

6.2.20 Object detection message #2/6 (ODM26)

REQ	7.264 PG specification – Towed vehicle – Object detection message #2/6 (ODM26)
The towed vehicle velocity information message for object #3 shall provide the information as specified in Table 269. Table 268 specifies the ODM26 attributes.	

Table 268 — SP mapping of ODM26

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	221
Default priority	1

Table 269 — ODM26 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD absolute longitudinal speed object	5.108
5 to 6	---	OD absolute lateral speed object	5.109
7	1 to 4	OD normal deviation of longitudinal and lateral speed	5.111
7	5 to 7	Reserved by this document	---
8	1 to 2	Object width (dimension in lateral direction)	5.118
8	3 to 4	Object length (dimension in longitudinal direction)	5.119
8	5 to 8	Object classification	5.120

6.2.21 Object detection message #2/7 (ODM27)

REQ	7.265 PG specification – Towed vehicle – Object detection message #2/7 (ODM27)
The towed vehicle position information message for object #4 shall provide the information as specified in Table 271. Table 270 specifies the ODM27 attributes.	

Table 270 — SP mapping of ODM27

Attribute	Value
Transmission rate	50 ms ±10 ms
Data length	8 byte
Data page	0
PDU format	250
PDU specific	222
Default priority	1

Table 271 — ODM27 message definition

Byte pos.	Bit pos.	Parameter	Reference
1	---	Cyclic redundancy check (CRC8)	5.100
2	1 to 4	Sequence counter	5.101
2	5 to 8	OD status indicator	5.99
3 to 4	---	OD longitudinal distance object	5.106
5 to 6	---	OD lateral distance object	5.107
7	1 to 4	OD standard deviation of longitudinal and lateral distance	5.110
7	5 to 8	Reserved by this document	---
8	1 to 8	Track ID	5.112

6.2.22 Object detection message #2/8 (ODM28)

REQ	7.266 PG specification – Towed vehicle – Object detection message #2/8 (ODM28)
The towed vehicle velocity information message for object #4 shall provide the information as specified in Table 273. Table 272 specifies the ODM28 attributes.	