BS ISO 11992-3:2021

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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

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# National foreword

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INTERNATIONAL STANDARD

# ISO 11992-3

Third edition
2021-05

# 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).

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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.

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# 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.

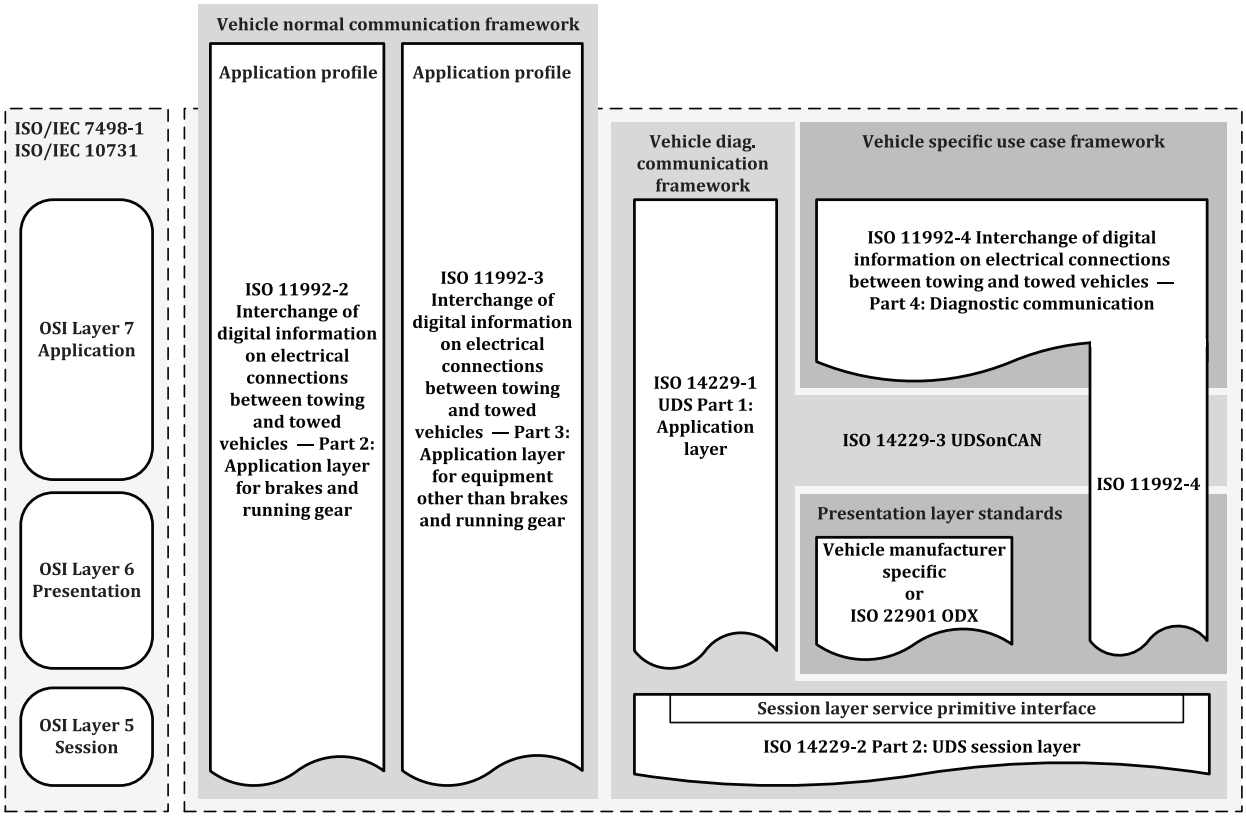


**Figure 1 — ISO 11992 documents reference according to the OSI model**


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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

## 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.

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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 |


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| | |
|---|---|
| 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 |
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| |
|---|
| 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<br>$01_2$: 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. | |


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**Table 4 — Anti-theft device – Status request attributes**

| Attribute | Value |
|---|---|
| Data length | 2 bit |
| Data range | $00_2$: off<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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)<br>$01_2$: trailer |

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**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<br>1: central-axle trailer<br>2: full trailer<br>3: converter dolly<br>4: link trailer<br>5 to 7: reserved by this document<br>8: semi-trailer towing another trailer<br>9: central-axle trailer towing another trailer<br>10: full trailer towing another trailer<br>11: converter dolly towing another trailer<br>12: link-trailer towing another trailer<br>13 to 15: reserved by this document<br>16: tractor for semi-trailer<br>17: platform truck<br>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


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$P_{Clutch_Slip}$ 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).<br>NOTE 1 Negative values are reverse gears, positive values are forward gears, zero is neutral.<br>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<br>$01_2$: 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<br>$01_2$: allowed |
| Type | measured |

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## 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<br>$01_2$: 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). | |


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## 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 |

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**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<br>$001_2$: pre-warning<br>$010_2$: warning<br>$011_2$ 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. | |


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**Table 17 — Engine propulsion system oil pressure warning attributes**

| Attribute | Value |
|---|---|
| Data length | 2 bit |
| Data range | $00_2$: no warning<br>$01_2$: 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 |

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**Table 19** *(continued)*

| Attribute | Value |
|---|---|
| Data range | $000_2$: no warning<br>$001_2$: pre-warning<br>$010_2$: warning<br>$011_2$ 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<br>$01_2$: 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 |


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**Table 22** *(continued)*

| Attribute | Value |
|---|---|
| Data range | $00_2$: not engaged<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: limits activated |

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**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<br>$01_2$: 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<br>$01_2$: 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. | |


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**Table 28 — First clutch-dependent PTO Switch attributes**

| Attribute | Value |
|---|---|
| Data length | 2 bit |
| Data range | $00_2$: off<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: on |

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**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<br>$01_2$: 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<br>$01_2$: 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 |


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**Table 34** *(continued)*

| Attribute | Value |
|---|---|
| Data range | $00_2$: off<br>$01_2$: 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<br>$01_2$: 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 $min^{-1}$ |

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**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<br>$01_2$: on |
| Type | measured |


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## 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<br>$01_2$: active |
| Type | measured |

## 5.54 Requested engine propulsion system speed

This parameter indicates the requested engine propulsion system Speed at 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 |

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## 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: lit |
| Type | measured |


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## 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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. | |

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

| Attribute | Value |
|---|---|
| Data length | 2 bit |
| Data range | $00_2$: not lit<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: lit |


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**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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: lit |
| Type | measured |

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## 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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. | |


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

| Attribute | Value |
|---|---|
| Data length | 2 bit |
| Data range | $00_2$: not lit<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: lit |

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**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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: lit |
| Type | measured |


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## 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). | |

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## 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<br>$01_2$: on |
| Type | status |


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## 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<br>$01_2$: 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<br>$01_2$: lit |
| Type | measured |

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## 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<br>$01_2$: 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<br>$01_2$: 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<br>$01_2$: 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. | |


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**Table 76 — ODM Version Information attributes**

| Attribute | Value |
|---|---|
| Data length | 4 bit (enumeration) |
| Data range | 0: no OD available<br>1: compatible with this document<br>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.<br>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;<br>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. | |

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**Table 79 — Velocity and yaw rate confidence level attributes**

| Attribute | Value |
|---|---|
| Data length | 4 bit (enumeration) |
| Data range | 0: invalid<br>1: inaccurate<br>2: $\sigma v < 2$ m/s; $\sigma\omega < 4°/s$<br>3: $\sigma v < 1$ m/s; $\sigma\omega < 2°/s$<br>4: $\sigma v < 0{,}5$ m/s; $\sigma\omega < 1°/s$<br>5: $\sigma v < 0{,}25$ m/s; $\sigma\omega < 0{,}5°/s$<br>6: $\sigma v < 0{,}1$ m/s; $\sigma\omega < 0{,}25°/s$<br>7: $\sigma v < 0{,}05$ m/s; $\sigma\omega < 0{,}1°/s$<br>8 to 13: reserved by this document<br>14: error<br>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)<br>1: temporarily not available (e.g. initialisation)<br>2: degraded (e.g. for warning only, no automated functions)<br>3: ready (single trailer)<br>4: multiple trailers (e.g. for warning only)<br>5 to 13: reserved by this document<br>14: error<br>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) |
|---|---|


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