

---

---

**Road vehicles — Tachograph systems —**  
**Part 6:**  
**Diagnostics**

*Véhicules routiers — Systèmes tachygraphes —*  
*Partie 6: Diagnostic*



STANDARDSISO.COM : Click to view the full PDF of ISO 16844-6:2015



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2015

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

|                                                                   | Page      |
|-------------------------------------------------------------------|-----------|
| Foreword .....                                                    | v         |
| Introduction .....                                                | vi        |
| <b>1 Scope .....</b>                                              | <b>1</b>  |
| <b>2 Normative reference .....</b>                                | <b>1</b>  |
| <b>3 Terms and definitions .....</b>                              | <b>1</b>  |
| <b>4 Abbreviated terms .....</b>                                  | <b>2</b>  |
| <b>5 Overview and conventions .....</b>                           | <b>2</b>  |
| 5.1 Service description conventions .....                         | 2         |
| 5.2 Addresses .....                                               | 2         |
| 5.2.1 General .....                                               | 2         |
| 5.2.2 Functional addresses .....                                  | 2         |
| 5.2.3 Physical addresses .....                                    | 2         |
| 5.3 Parameters .....                                              | 2         |
| <b>6 Diagnostic services implementation .....</b>                 | <b>2</b>  |
| 6.1 General and overview .....                                    | 2         |
| 6.2 Diagnostic and communication management functional unit ..... | 4         |
| 6.2.1 DiagnosticSessionControl service .....                      | 4         |
| 6.2.2 ECUReset service .....                                      | 4         |
| 6.2.3 SecurityAccess service .....                                | 5         |
| 6.2.4 CommunicationControl service .....                          | 5         |
| 6.2.5 SecuredDataTransmission service .....                       | 5         |
| 6.2.6 ResponseOnEvent service .....                               | 5         |
| 6.2.7 LinkControl service .....                                   | 6         |
| 6.3 Data transmission functional unit .....                       | 7         |
| 6.3.1 ReadDataByIdentifier service .....                          | 7         |
| 6.3.2 ReadDataByPeriodicIdentifier service .....                  | 7         |
| 6.3.3 DynamicallyDefineDataIdentifier service .....               | 7         |
| 6.3.4 WriteDataByIdentifier service .....                         | 7         |
| 6.4 Stored data transmission functional unit .....                | 8         |
| 6.4.1 ClearDiagnosticInformation service .....                    | 8         |
| 6.4.2 ReadDTCInformation service .....                            | 8         |
| 6.5 Input/Output control functional unit .....                    | 9         |
| 6.5.1 InputOutputControlByIdentifier service .....                | 9         |
| 6.6 Remote activation of routine functional unit .....            | 9         |
| 6.6.1 RoutineControl service .....                                | 9         |
| <b>7 Application layer requirements .....</b>                     | <b>10</b> |
| 7.1 General .....                                                 | 10        |
| 7.2 Application layer protocol .....                              | 10        |
| 7.2.1 General .....                                               | 10        |
| 7.2.2 Application layer timing .....                              | 10        |
| <b>8 Presentation layer requirements .....</b>                    | <b>10</b> |
| <b>9 Session layer requirements .....</b>                         | <b>10</b> |

|           |                               |           |
|-----------|-------------------------------|-----------|
| <b>10</b> | <b>CAN protocol layers</b>    | <b>11</b> |
| 10.1      | General                       | 11        |
| 10.2      | Transport layer               | 11        |
| 10.3      | Network layer (CAN only)      | 11        |
| 10.3.1    | General                       | 11        |
| 10.3.2    | Communication parameters      | 11        |
| 10.4      | CAN data link layer           | 11        |
| 10.4.1    | General                       | 11        |
| 10.4.2    | Protocol                      | 11        |
| 10.4.3    | Address coding method         | 11        |
| 10.5      | CAN physical layer            | 11        |
| <b>11</b> | <b>K-Line protocol layers</b> | <b>11</b> |
| 11.1      | General                       | 11        |
| 11.2      | K-line data link layer        | 12        |
| 11.2.1    | General                       | 12        |
| 11.2.2    | Protocol specific key bytes   | 12        |
| 11.2.3    | Initialisation                | 12        |
| 11.2.4    | Timing                        | 12        |
| 11.3      | K-line physical layer         | 12        |
| 11.3.1    | General                       | 12        |
| 11.3.2    | Configuration                 | 12        |
|           | <b>Bibliography</b>           | <b>13</b> |

STANDARDSISO.COM : Click to view the full PDF of ISO 16844-6:2015

## 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](http://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](http://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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

This second edition cancels and replaces the first edition (ISO 16844-6:2004), which has been technically revised.

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

ISO 16844 consists of the following parts, under the general title *Road vehicles — Tachograph systems*:

- *Part 1: Electrical connectors*
- *Part 2: Electrical interface with recording unit*
- *Part 3: Motion sensor interface*
- *Part 4: CAN interface*
- *Part 5: Secured CAN interface*
- *Part 6: Diagnostics*
- *Part 7: Parameters*

## Introduction

This International Standard supports and facilitates the communication between electronic control units and a tachograph. The tachograph is based upon the European Council Regulation (EC) No 561/2006<sup>[3]</sup> and (EEC) No 3821/85<sup>[4]</sup> as last amended.

The digital tachograph concept is based upon an RU storing data, related to the activities of the various drivers driving the vehicle, on which it is installed.

During the normal operational status of the RU, data stored in its memory are accessible to different entities (drivers, authorities, workshops, transport companies) in different ways (displayed on a screen, printed by a printing device, downloaded to an external device). Access to stored data is controlled by a smart card inserted in the tachograph.

In order to prevent manipulation of the tachograph system, the speed signal sender (motion sensor) is provided with an encrypted data link.

A typical tachograph system is shown in [Figure 1](#).

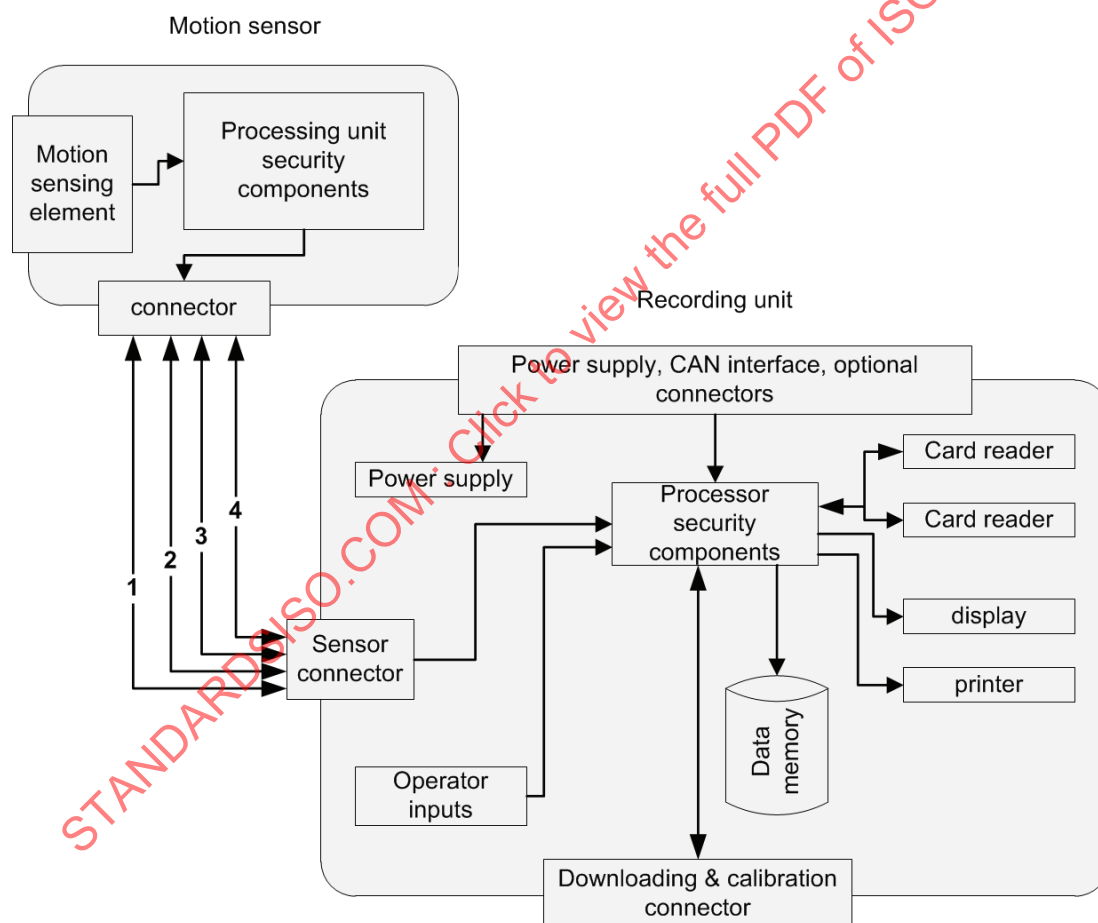


**Figure 1 — Typical tachograph system**

This part of ISO 16844 has been established in order to enable the implementation of unified diagnostic services on CAN and on K-Line.

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498-1[1] and ISO/IEC 10731,[2] which structures communication systems into seven layers. When mapped on this model, the services specified by ISO 16844 are divided as given in [Table 1](#).

**Table 1 — Diagnostics implementation reference applicable to the OSI layers**

| Applicability                                         | OSI seven layer        | Diagnostics according to this part of ISO 16844 |                             |
|-------------------------------------------------------|------------------------|-------------------------------------------------|-----------------------------|
|                                                       |                        | On CAN                                          | On K-Line                   |
| Seven layer according to ISO 7498-1 and ISO/IEC 10731 | Application (layer 7)  | ISO 14229-1/ISO 16844-6/ISO 16844-5             |                             |
|                                                       |                        | ISO 14229-3                                     | ISO 14229-6                 |
|                                                       | Presentation (layer 6) | Vehicle manufacturer specific                   |                             |
|                                                       | Session (layer 5)      | ISO 14229-2                                     |                             |
|                                                       | Transport (layer 4)    | ISO 15765-2                                     | —                           |
|                                                       | Network (layer 3)      |                                                 |                             |
|                                                       | Data link (layer 2)    | ISO 16844-4                                     | ISO 14230-2/<br>ISO 14230-1 |
|                                                       | Physical (layer 1)     |                                                 |                             |

STANDARDSISO.COM : Click to view the full PDF of ISO 16844-6:2015

# Road vehicles — Tachograph systems —

## Part 6: Diagnostics

### 1 Scope

This part of ISO 16844 defines diagnostic communication and services for tachograph systems of road vehicles. The communication is specified both for CAN communication mode and K-line communication mode.

The diagnostic services based on ISO 14229-1 and most services are common for the two communication interfaces. Interface specific implementations are specified in the respective sections.

### 2 Normative reference

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

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Specification and requirements*

ISO 14229-2, *Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services*

ISO 14229-3, *Road vehicles — Unified diagnostic services (UDS) — Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)*

ISO 14229-6, *Road vehicles — Unified diagnostic services (UDS) — Part 6: Unified diagnostic services on K-Line implementation (UDSonK-Line)*

ISO 14230-1, *Road vehicles — Diagnostic communication over K-Line (DoK-Line) — Part 1: Physical layer*

ISO 14230-2, *Road vehicles — Diagnostic communication over K-Line (DoK-Line) — Part 2: Data link layer*

ISO 15765-2, *Road vehicles — Diagnostic communication over K-Line (DoK-Line) — Part 2: Transport protocol and network layer services*

ISO 16844-4, *Road vehicles — Tachograph systems — Part 4: CAN interface*

ISO 16844-5, *Road vehicles — Tachograph systems — Part 5: Secured CAN interface*

ISO 16844-7, *Road vehicles — Tachograph systems — Part 7: Parameters*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### recording unit

##### RU

part of the tachograph system which acquires and stores data concerning the vehicle and its driver(s) and their activities

Note 1 to entry: A recording unit is also referenced as a vehicle unit in other standards, both are synonyms.

## 4 Abbreviated terms

For the purpose of this document, the following abbreviated terms apply.

|      |                 |
|------|-----------------|
| Cvt. | convention      |
| M    | mandatory       |
| U    | user option     |
| C    | conditional     |
| DID  | data identifier |

## 5 Overview and conventions

### 5.1 Service description conventions

The service description conventions according to ISO 14229-1 shall be used.

### 5.2 Addresses

#### 5.2.1 General

All ECUs shall be able to respond to both functional and physical diagnostic addresses.

#### 5.2.2 Functional addresses

The recording equipment shall respond to the functional address 238<sub>10</sub> as the system address and the functional address 255<sub>10</sub> addressing all ECUs in the vehicle.

#### 5.2.3 Physical addresses

Each ECU that is part of the recording unit shall have a physical address. The specific ECU containing the data memory for recorded data shall have the address 238<sub>10</sub>. All other addresses shall be vehicle-manufacturer specific.

### 5.3 Parameters

If a parameter value or a record value consists of more than one byte, the most significant byte shall always be transmitted first, followed by bytes of decreasing significance.

## 6 Diagnostic services implementation

### 6.1 General and overview

The diagnostic services shall be implemented in accordance with ISO 14229-1 and the restrictions given in this clause. [Table 2](#) gives a summary and an overview of all diagnostic services that may be available in the tachograph, specifying which sessions and services are mandatory in the tachograph and in which diagnostic sessions the diagnostic services are to be used.

**Table 2 — Diagnostic service usage and identifier value summary and overview**

| Diagnostic service name<br>(according to ISO 14229-1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SID<br>value <sup>a</sup> | Diagnostic session |                   |                    |                  |                  |                 | Document<br>reference |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------|-------------------|--------------------|------------------|------------------|-----------------|-----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           | DS <sup>b</sup>    | PRGS <sup>c</sup> | EXTDS <sup>d</sup> | VMS <sup>e</sup> | SSS <sup>f</sup> | RS <sup>g</sup> |                       |
| Diagnostic and communication management functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |                    |                   |                    |                  |                  |                 |                       |
| DiagnosticSessionControl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10 <sub>16</sub>          | M                  | M                 | M                  | M                | M                | M               | <a href="#">6.2.1</a> |
| ECUReset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 11 <sub>16</sub>          | U                  | U                 | U                  | U                | U                | U               | <a href="#">6.2.2</a> |
| SecurityAccess                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 27 <sub>16</sub>          | N                  | M                 | U                  | M                | M                | N               | <a href="#">6.2.3</a> |
| CommunicationControl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 28 <sub>16</sub>          | N                  | M                 | U                  | U                | U                | N               | <a href="#">6.2.4</a> |
| TesterPresent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3E <sub>16</sub>          | M                  | M                 | M                  | M                | M                | M               | —                     |
| AccessTimingParameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 83 <sub>16</sub>          | N                  | U                 | U                  | U                | U                | N               | —                     |
| SecuredDataTransmission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 84 <sub>16</sub>          | N                  | U                 | U                  | U                | U                | N               | <a href="#">6.2.5</a> |
| ControlDTCSetting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 85 <sub>16</sub>          | N                  | U                 | U                  | U                | U                | N               | —                     |
| ResponseOnEvent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 86 <sub>16</sub>          | U                  | U                 | U                  | U                | U                | U               | <a href="#">6.2.6</a> |
| LinkControl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 87 <sub>16</sub>          | N                  | U                 | U                  | U                | U                | N               | <a href="#">6.2.7</a> |
| Data transmission functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                           |                    |                   |                    |                  |                  |                 |                       |
| ReadDataByIdentifer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 22 <sub>16</sub>          | M                  | M                 | M                  | U                | U                | M               | <a href="#">6.3.1</a> |
| ReadMemoryByAddress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 23 <sub>16</sub>          | N                  | N                 | N                  | U                | U                | N               | —                     |
| ReadScalingDataByIdentifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 24 <sub>16</sub>          | M                  | M                 | M                  | U                | U                | M               | —                     |
| ReadDataByPeriodicIdentifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2A <sub>16</sub>          | N                  | U                 | U                  | U                | U                | N               | <a href="#">6.3.2</a> |
| DynamicallyDefineDataIdentifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2C <sub>16</sub>          | U                  | U                 | U                  | U                | U                | U               | <a href="#">6.3.3</a> |
| WriteData ByIdentifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2E <sub>16</sub>          | N                  | M                 | U                  | U                | U                | N               | <a href="#">6.3.4</a> |
| WriteMemoryByAddress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3D <sub>16</sub>          | N                  | N                 | N                  | U                | U                | N               | —                     |
| Stored data transmission functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                    |                   |                    |                  |                  |                 |                       |
| ReadDTCInformation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 19 <sub>16</sub>          | M                  | M                 | M                  | U                | U                | M               | <a href="#">6.4.2</a> |
| ClearDiagnosticInformation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 14 <sub>16</sub>          | M                  | M                 | U                  | U                | U                | M               | <a href="#">6.4.1</a> |
| Input/Output control functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           |                    |                   |                    |                  |                  |                 |                       |
| InputOutputControlByIdentifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2F <sub>16</sub>          | N                  | N                 | M                  | U                | U                | N               | <a href="#">6.5.1</a> |
| Remote activation of routine functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                    |                   |                    |                  |                  |                 |                       |
| RoutineControl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 31 <sub>16</sub>          | N                  | U                 | M                  | U                | U                | M               | <a href="#">6.6.1</a> |
| <p>M the service is mandatory in this diagnostic session</p> <p>U the service may be available in this diagnostic session</p> <p>N the service is not allowed in this diagnostic session</p> <p><sup>a</sup> Assigns the service identifier values for the request message.</p> <p><sup>b</sup> These services of the defaultSession (DS) may be implemented in each server (ECU), if the electronic system supports the functionality of these services. This session is mandatory.</p> <p><sup>c</sup> These services of the ProgrammingSession (PRGS) may be implemented to allow for programming of memory (e.g. flash), variant coding, parameters, etc. in the server (ECU). This session is mandatory.</p> <p><sup>d</sup> These services of the ExtendedDiagnosticSession (EXTDS) may be implemented to allow for adjustment of input/output signals of the server (ECU). This session is mandatory.</p> <p><sup>e</sup> These services of the vehicleManufacturerSpecificSession (VMS) shall be specified by the vehicle manufacturer. This session is optional and may be as selected by the vehicle manufacturer.</p> <p><sup>f</sup> These services of the systemSupplierSpecificSession (SSS) shall be specified by the system supplier. This session is optional and may be as selected by the vehicle manufacturer.</p> <p><sup>g</sup> These services of the remoteSession (RS) shall be implemented to allow for remote company card authentication and data download.</p> |                           |                    |                   |                    |                  |                  |                 |                       |

**Table 2** (continued)

| Upload/Download functional unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |   |   |   |   |   |   |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---|---|---|---|---|---|------|
| RequestDownload                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 34 <sub>16</sub> | N | U | N | U | U | N | —    |
| RequestUpload                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 35 <sub>16</sub> | N | U | U | U | U | M | —    |
| TransferData                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 36 <sub>16</sub> | N | U | U | U | U | M | —    |
| RequestTransferExit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 37 <sub>16</sub> | N | U | U | U | U | M | —    |
| Data link layer services according to ISO 14230-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |   |   |   |   |   |   |      |
| startCommunication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 81 <sub>16</sub> | M | M | M | M | M | M | 11.2 |
| stopCommunication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 82 <sub>16</sub> | M | N | N | N | N | M | 11.2 |
| accessTimingParameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 83 <sub>16</sub> | U | U | U | U | U | U | 11.2 |
| <p>M the service is mandatory in this diagnostic session</p> <p>U the service may be available in this diagnostic session</p> <p>N the service is not allowed in this diagnostic session</p> <p>a Assigns the service identifier values for the request message.</p> <p>b These services of the defaultSession (DS) may be implemented in each server (ECU), if the electronic system supports the functionality of these services. This session is mandatory.</p> <p>c These services of the ProgrammingSession (PRGS) may be implemented to allow for programming of memory (e.g. flash), variant coding, parameters, etc. in the server (ECU). This session is mandatory.</p> <p>d These services of the ExtendedDiagnosticSession (EXTDS) may be implemented to allow for adjustment of input/output signals of the server (ECU). This session is mandatory.</p> <p>e These services of the vehicleManufacturerSpecificSession (VMS) shall be specified by the vehicle manufacturer. This session is optional and may be as selected by the vehicle manufacturer.</p> <p>f These services of the systemSupplierSpecificSession (SSS) shall be specified by the system supplier. This session is optional and may be as selected by the vehicle manufacturer.</p> <p>g These services of the remoteSession (RS) shall be implemented to allow for remote company card authentication and data download.</p> |                  |   |   |   |   |   |   |      |

## 6.2 Diagnostic and communication management functional unit

### 6.2.1 DiagnosticSessionControl service

The convention of the DiagnosticSessionControl subfunction parameter, DiagnosticSessionType, shall be in accordance with [Table 3](#).

**Table 3 — DiagnosticSessionControl subfunction parameter DiagnosticSessionType**

| bit 6-0                                                                                                           | Description                                                                                                                                          | Cvt. | Mnemonic |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 01 <sub>16</sub>                                                                                                  | defaultSession                                                                                                                                       | M    | DS       |
| 02 <sub>16</sub>                                                                                                  | programmingSession                                                                                                                                   | M    | PRGS     |
| 03 <sub>16</sub>                                                                                                  | extendedDiagnosticSession                                                                                                                            | U    | EXTDS    |
| YY <sup>a</sup>                                                                                                   | remoteSession<br>This diagnostic session enables all diagnostic services required to allow for remote company card authentication and data download. | M    | RS       |
| <sup>a</sup> The value used for remoteSession shall be determined using DID F900 <sub>16</sub> (see ISO 16844-7). |                                                                                                                                                      |      |          |

### 6.2.2 ECUReset service

The convention of the ECUReset subfunction parameter, ResetType, shall be in accordance with [Table 4](#).

**Table 4 — ECUReset subfunction parameter ResetType**

| Value            | Description   | Cvt. |
|------------------|---------------|------|
| 01 <sub>16</sub> | hardReset     | U    |
| 02 <sub>16</sub> | keyOffOnReset | M    |
| 03 <sub>16</sub> | softReset     | U    |

### 6.2.3 SecurityAccess service

The convention of the SecurityAccess subfunction parameter, AccessType, shall be in accordance with [Table 5](#). The maximum delay time for the positive response according to ISO 14229-1 shall be 10 s.

**Table 5 — SecurityAccess subfunction parameter AccessType**

| Value                                                                      | Description                    | Cvt. |
|----------------------------------------------------------------------------|--------------------------------|------|
| 01 <sub>16</sub>                                                           | requestSeed                    | M    |
| 02 <sub>16</sub>                                                           | sendKey                        | M    |
| 03 <sub>16</sub> , 05 <sub>16</sub> , 07 <sub>16</sub> to 41 <sub>16</sub> | requestSeed                    | U    |
| 04 <sub>16</sub> , 06 <sub>16</sub> , 08 <sub>16</sub> to 42 <sub>16</sub> | sendKey                        | U    |
| 61 <sub>16</sub> to 7E <sub>16</sub>                                       | system supplier specific range | U    |

### 6.2.4 CommunicationControl service

The convention of the CommunicationControl subfunction parameter, ControlType, shall be in accordance with [Table 6](#). The convention of the CommunicationControl CommunicationType, parameter shall be in accordance with [Table 7](#).

**Table 6 — CommunicationControl subfunction parameter ControlType**

| Value            | Description          | Cvt. |
|------------------|----------------------|------|
| 00 <sub>16</sub> | enableRxAndTx        | M    |
| 01 <sub>16</sub> | enableRxAndDisableTx | M    |
| 02 <sub>16</sub> | disableRxAndEnableTx | U    |
| 03 <sub>16</sub> | disableRxAndTx       | U    |

**Table 7 — CommunicationControl CommunicationType parameter**

| Value            | Description                            | Cvt. |
|------------------|----------------------------------------|------|
| 001 <sub>2</sub> | normalCommunicationMessages            | M    |
| 010 <sub>2</sub> | networkManagementCommunicationMessages | U    |
| 100 <sub>2</sub> | diagnosticCommunicationMessages        | U    |

### 6.2.5 SecuredDataTransmission service

The convention of the SecuredDataTransmission service shall be implemented in accordance with ISO 16844-5.

### 6.2.6 ResponseOnEvent service

The convention of the ResponseOnEvent subfunction parameter, EventType, shall be in accordance with [Table 8](#). The convention of the ResponseOnEvent EventWindowTime parameter shall be in accordance

with [Table 9](#). The convention of the ResponseOnEvent serviceToRespondToRecord parameter shall be in accordance with [Table 10](#).

**Table 8 — ResponseOnEvent subfunction parameter EventType**

| Value            | Description              | Cvt. |
|------------------|--------------------------|------|
| 00 <sub>16</sub> | stopResponseOnEvent      | M    |
| 01 <sub>16</sub> | onDTCStatusChange        | M    |
| 02 <sub>16</sub> | onTimerInterrupt         | M    |
| 03 <sub>16</sub> | onChangeOfDataIdentifier | M    |
| 04 <sub>16</sub> | reportActivatedEvents    | U    |
| 05 <sub>16</sub> | startResponseOnEvent     | M    |
| 06 <sub>16</sub> | clearResponseOnEvent     | M    |
| 07 <sub>16</sub> | OnComparisonOfValues     | M    |

**Table 9 — ResponseOnEvent EventWindowTime parameter**

| Value            | Description            | Cvt. |
|------------------|------------------------|------|
| 02 <sub>16</sub> | infiniteTimeToResponse | M    |

**Table 10 — ResponseOnEvent ServiceToRespondToRecord parameter**

| Value            | Description                    | Cvt. |
|------------------|--------------------------------|------|
| 22 <sub>16</sub> | readDataByIdentifier           | U    |
| 19 <sub>16</sub> | readDTCInformation             | M    |
| 31 <sub>16</sub> | routineControl                 | U    |
| 2F <sub>16</sub> | inputOutputControlByIdentifier | U    |

### 6.2.7 LinkControl service

The convention of the LinkControl subfunction parameter, LinkControlType, shall be in accordance with [Table 11](#). The convention of the LinkControl BaudrateIdentifier parameter shall be in accordance with [Table 12](#).

**Table 11 — LinkControl subfunction parameter LinkControlType**

| Value            | Description                                  | Cvt. |
|------------------|----------------------------------------------|------|
| 01 <sub>16</sub> | verifyBaudrateTransitionWithFixedBaudrate    | U    |
| 02 <sub>16</sub> | verifyBaudrateTransitionWithSpecificBaudrate | U    |
| 03 <sub>16</sub> | transitionBaudrate                           | U    |

**Table 12 — LinkControl BaudrateIdentifier parameter**

| Value            | Description  | Cvt. |
|------------------|--------------|------|
| 01 <sub>16</sub> | PC9600Baud   | U    |
| 02 <sub>16</sub> | PC19200Baud  | U    |
| 03 <sub>16</sub> | PC38400Baud  | U    |
| 04 <sub>16</sub> | PC57600Baud  | U    |
| 05 <sub>16</sub> | PC115200Baud | U    |

### 6.3 Data transmission functional unit

#### 6.3.1 ReadDataByIdentifier service

The convention of ReadDataByIdentifier parameter shall be according to ISO 14229-1, with the DIDs specified in ISO 16844-7. The implementation on this service shall support at least eight DIDs with one request/response.

#### 6.3.2 ReadDataByPeriodicIdentifier service

The convention of the ReadDataByPeriodicIdentifier TransmissionMode parameter shall be according to [Table 13](#).

**Table 13 — ReadDataByPeriodicIdentifier TransmissionMode parameter**

| Value                                                                                                                    | Description      | Cvt. |
|--------------------------------------------------------------------------------------------------------------------------|------------------|------|
| 01 <sub>16</sub>                                                                                                         | sendAtSlowRate   | U    |
| 02 <sub>16</sub>                                                                                                         | sendAtMediumRate | U    |
| 03 <sub>16</sub>                                                                                                         | sendAtFastRate   | U    |
| 04 <sub>16</sub>                                                                                                         | stopSending      | Ca   |
| <sup>a</sup> This parameter shall be supported if sendAtSlowRate, sendAtMediumRate, and/or sendAtFastRate are supported. |                  |      |

#### 6.3.3 DynamicallyDefineDataIdentifier service

The convention of the DynamicallyDefineDataIdentifier subfunctions shall be in accordance with [Table 14](#).

**Table 14 — DynamicallyDefineDataIdentifier subfunctions**

| Value                                                                                                                      | Description                           | Cvt. |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|
| 01 <sub>16</sub>                                                                                                           | defineByIdentifier                    | U    |
| 02 <sub>16</sub>                                                                                                           | defineByMemoryAddress                 | Ca   |
| 03 <sub>16</sub>                                                                                                           | clearDynamicallyDefinedDataIdentifier | U    |
| <sup>a</sup> DefineByMemoryAddress shall not be used in defaultSession, programmingSession, and extendedDiagnosticSession. |                                       |      |

#### 6.3.4 WriteDataByIdentifier service

The convention of the WriteDataByIdentifier service shall be in accordance with ISO 14229-1, with the DIDs specified in ISO 16844-7.

## 6.4 Stored data transmission functional unit

### 6.4.1 ClearDiagnosticInformation service

The convention of the ClearDiagnosticInformation GroupOfDTC parameter shall be in accordance with [Table 15](#).

**Table 15 — ClearDiagnosticInformation GroupOfDTC parameter**

| Value                                          | Description    | Cvt. |
|------------------------------------------------|----------------|------|
| 000000 <sub>16</sub> to FFFFFFFE <sub>16</sub> | Individual DTC | M    |
| FFFFFF <sub>16</sub>                           | allDTCs        | M    |

### 6.4.2 ReadDTCInformation service

The convention of the ReadDTCInformation subfunctions shall be in accordance with [Table 16](#). The convention of the ReadDTCInformation DTC status bits shall be in accordance with [Table 17](#).

**Table 16 — ReadDTCInformation subfunctions**

| Value            | Description                                   | Cvt. |
|------------------|-----------------------------------------------|------|
| 01 <sub>16</sub> | reportNumberOfDTCByStatusMask                 | M    |
| 02 <sub>16</sub> | reportDTCByStatusMask                         | M    |
| 03 <sub>16</sub> | reportDTCsSnapshotIdentification              | U    |
| 04 <sub>16</sub> | reportDTCsSnapshotRecordByDTCNumber           | U    |
| 05 <sub>16</sub> | reportDTCsSnapshotRecordByRecordNumber        | U    |
| 06 <sub>16</sub> | reportDTCExtendedDataRecordByDTCNumber        | M    |
| 07 <sub>16</sub> | reportNumberOfDTCBySeverityMaskRecord         | M    |
| 08 <sub>16</sub> | reportDTCBySeverityMaskRecord                 | M    |
| 09 <sub>16</sub> | reportSeverityInformationOfDTC                | U    |
| 0A <sub>16</sub> | reportSupportedDTC                            | U    |
| 0B <sub>16</sub> | reportFirstTestFailedDTC                      | U    |
| 0C <sub>16</sub> | reportFirstConfirmedDTC                       | U    |
| 0D <sub>16</sub> | reportMostRecentTestFailedDTC                 | U    |
| 0E <sub>16</sub> | reportMostRecentConfirmedDTC                  | U    |
| 0F <sub>16</sub> | reportMirrorMemoryDTCByStatusMask             | U    |
| 10 <sub>16</sub> | reportMirrorMemoryDTCExtDataRecordByDTCNumber | U    |
| 11 <sub>16</sub> | reportNumberOfMirrorMemoryDTCByStatusMask     | U    |

**Table 17 — ReadDTCInformation DTC status bits**

| Bit                                                                                                                                                                      | Description                  | Cvt.           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------|
| 0                                                                                                                                                                        | testFailed                   | M              |
| 1                                                                                                                                                                        | testFailedThisOperationCycle | C <sup>a</sup> |
| 2                                                                                                                                                                        | pendingDTC                   | U              |
| <sup>a</sup> Bit 1 (testFailedThisMonitoringCycle) is<br>— mandatory, if bit 2 (pendingDTC) is supported, or<br>— user optional, if bit 2 (pendingDTC) is not supported. |                              |                |

**Table 17** (continued)

| Bit                                                                                                                                                                      | Description                        | Cvt. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------|
| 3                                                                                                                                                                        | confirmedDTC                       | M    |
| 4                                                                                                                                                                        | testNotCompletedSinceLastClear     | M    |
| 5                                                                                                                                                                        | testFailedSinceLastClear           | M    |
| 6                                                                                                                                                                        | testNotCompletedThisOperationCycle | M    |
| 7                                                                                                                                                                        | warningIndicatorRequested          | M    |
| <sup>a</sup> Bit 1 (testFailedThisMonitoringCycle) is<br>— mandatory, if bit 2 (pendingDTC) is supported, or<br>— user optional, if bit 2 (pendingDTC) is not supported. |                                    |      |

## 6.5 Input/Output control functional unit

### 6.5.1 InputOutputControlByIdentifier service

The convention of the InputOutputControlByIdentifier InputOutputControlParameter shall be in accordance with [Table 18](#).

The ControlState parameter shall be present only when the InputOutputControlParameter is set to ShortTermAdjustment in the InputOutputControl service.

The setting may be read by the service ReadDataByIdentifier. The DataRecord in the response shall be equal to the parameter ControlState.

**Table 18 — InputOutputControlByIdentifier InputOutputControlParameter**

| Value                                                                | Description                      | Cvt. |
|----------------------------------------------------------------------|----------------------------------|------|
| 00 <sub>16</sub>                                                     | returnControlToECU               | M    |
| 01 <sub>16</sub>                                                     | resetToDefault                   | U    |
| 02 <sub>16</sub>                                                     | freezeCurrentState               | U    |
| 03 <sub>16</sub>                                                     | shortTermAdjustment <sup>a</sup> | M    |
| <sup>a</sup> ShortTermAdjustment shall not be used in defaultSession |                                  |      |

## 6.6 Remote activation of routine functional unit

### 6.6.1 RoutineControl service

The convention of the RoutineControl subfunctions shall be in accordance with [Table 19](#). The convention of the RoutineControl parameter RoutineStatusRecord shall be in accordance with [Table 20](#) when used for exiting status.

**Table 19 — RoutineControl subfunctions**

| Value            | Description           | Cvt. |
|------------------|-----------------------|------|
| 01 <sub>16</sub> | startRoutine          | M    |
| 02 <sub>16</sub> | stopRoutine           | U    |
| 03 <sub>16</sub> | requestRoutineResults | U    |