

DIN 14700



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Einsprüche bis 2024-06-05
Ersatzvermerk
siehe unten**Entwurf****Feuerwehrwesen –
CAN-Schnittstelle für Geräte in Einsatzfahrzeugen;
Text Englisch**Firefighting and fire protection –
CAN interface for devices in emergency vehicles;
Text in EnglishLutte contre l'incendie –
CAN interface pour composants dans véhicules d'urgence;
Texte en anglais**Anwendungswarnvermerk**

Dieser Entwurf mit Erscheinungsdatum 2024-04-05 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

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Ersatzvermerk

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Foreword

This document has been prepared by Working Committee NA 031-06-04 AA “In-vehicle communication interfaces” of *DIN-Normenausschuss Feuerwehrwesen (FNFW)* (DIN Standards Committee Firefighting and Fire Protection).

For current information on this standard, please go to DIN’s website (www.din.de) and search for the document number in question.

Amendments

This standard differs from DIN 14700-1:2016-08, DIN 14700-2:2019-06, DIN 14700-3:2016-08, DIN 14700-4:2016-08, DIN 14700-5:2016-08, DIN 14700-6:2016-08, DIN 14700-7:2016-08, DIN 14700-8:2016-08, DIN 14700-9:2016-08, DIN 14700-10:2017-04 and DIN 14700-11:2016-08 as follows:

- a) DIN 14700 series has been translated into the English language and all legacy parts have been integrated into a single document in order to avoid inconsistencies caused by different maintenance dates;
- b) the new document has been re-structured;
- c) technical and editorial improvements have been implemented, including new feature requests for the specified host controller and some fire-fighting equipment units.

Introduction

Objective of this document is to specify interoperable communication interfaces based on the CANopen application layer and communication profile (CiA 301 respectively DIN EN 50325-4) for fire-fighting equipment. The host controller (HC) specified in this document controls this equipment. The specified fire-fighting equipment units (FFU) includes battery charger unit (BCU), frequency inverter unit (FIU), light mast unit (LMU), portable water-pump unit, powder extinguishing unit (PEU), power generator unit (PGU), potable water-pump unit (PWU), traffic warning unit (TWU), warning signal unit (WSU), water cannon unit (WCU), and winch unit (WU).

A single device can implement multiple functions. It is possible that an FFU is available multiple times in the network.

It is intended that devices compliant with this document provided by different suppliers can exchange data and interpret it consistently. In case, the devices implement the same functionality they are even interchangeable. The devices implementing the same functionality can be exchanged without reprogramming the HC.

The specified FFUs are not directly connected to the in-vehicle networks.

The HC and the FFUs such as BCU, FIU, LMU, PEU, PGU, PWU, TWU, WSU and WU are linked to a CANopen network. The network topology is usually a bus-line with short stubs and is terminated at both ends with nominal 120-Ohm resistors.

Figure 1 shows an example with a HC connected to a DIN 4630 compliant network comprising additional body application units (BAU) and an in-vehicle gateway unit (IGU) providing communication to the electronic control units (ECU) of the in-vehicle networks (IVN).

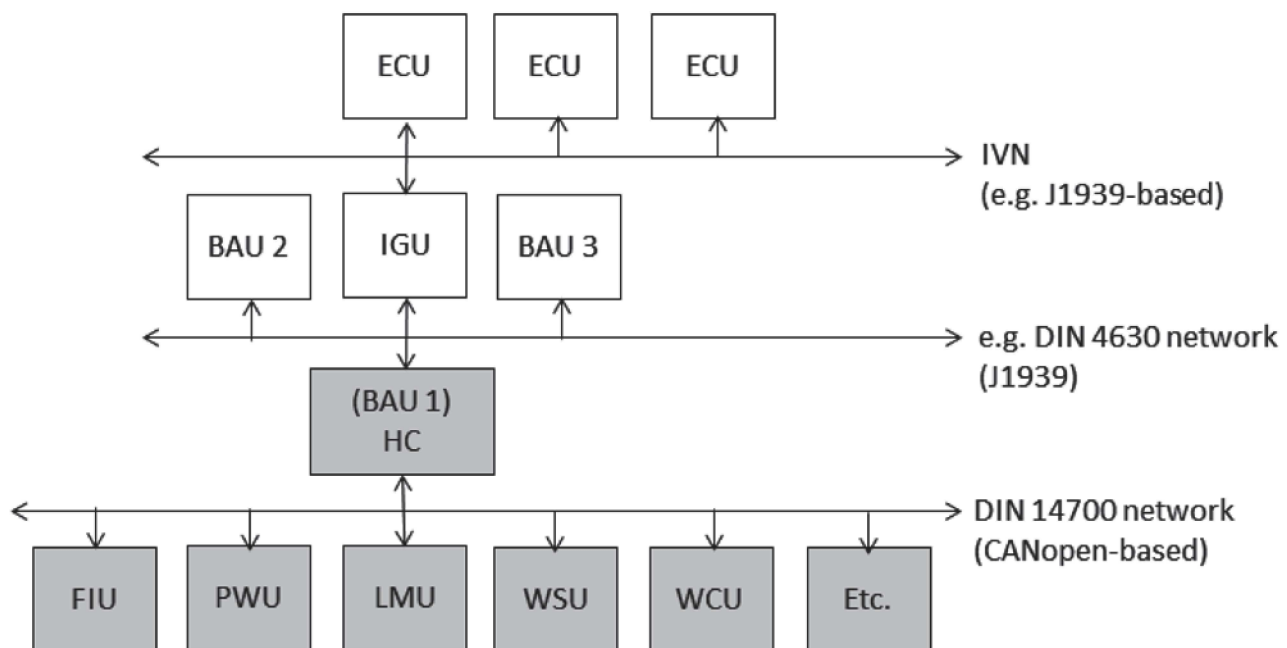


Figure 1 — Network architecture example, the IGU interface is standardized in DIN 14704

The HC manages and controls the connected FFUs. The FFUs do not have direct access to the in-vehicle network gateway (IGU). This means, the HC acts as a gateway to the DIN 4630 network, which provides an IGU compliant with DIN 14704, for example.

The HC gateway functionality ensures that the FFUs have access to relevant vehicle related information like engine speed and that data from the attached FFUs can be forwarded to other ECUs or human machine interface devices connected to the IVNs.

The recommendations given in CiA 301 regarding the overall network length and the maximum length of a single stub (0,75 m) are suitable for DIN 14700 networks. A wiring harness featuring 120-Ohm impedance is feasible. Trunk and stub cables providing four wires for fixed-mounted devices and six wires for portable devices are recommended. The cables can be shielded. In case of using shielded cables, ground loops needs to be avoided. The red wire connects to V_{cc} and the black wire connects to GND. The white wire connects to the CAN_H wire and the blue wire connects to the CAN_L wire. The pin-assignments of the socket connectors attached to the wiring harness corresponds to those given in this document for the plug connectors. Wires for fixed-mounted devices having a cross-section of $0,34 \text{ mm}^2$ respectively for portable devices having a cross-section of $1,5 \text{ mm}^2$ are suitable.

1 Scope

The communication interfaces specified in this document are based on ISO 11898-1 and ISO 11898-2 (Controller Area Network) as well as the CANopen¹ application layer as specified in DIN EN 50325-4 respectively CiA 301. This document specifies the CANopen-based interfaces for the fire-fighting equipment host controller and dedicated fire-fighting equipment units.

Additionally, this document specifies process data mapped into PDM (process data object) messages as well as an optional mapping into the CANopen Object Dictionary.

The host controller gateway functionality to the in-vehicle network is not in the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DIN 14610, *Sound warning devices for authorized emergency vehicles*

DIN 14685-1, *Firefighting and fire protection — Portable generator — Part 1: Generating set ≥ 5 kVA*

DIN 14685-2, *Firefighting and fire protection — Portable generator — Part 2: Generating set ≥ 5 kVA*

DIN 72552 (all parts), *Terminal markings for motor vehicles*

DIN EN 50325-4, *Industrial communications subsystem based on ISO 11898 (CAN) — Part 4: CANopen*

DIN EN 60529 (VDE 0470-1), *Degrees of protection provided by enclosures (IP-Code)*

DIN EN 61076-2-101 (VDE 0687-76-2), *Connectors for electronic equipment — Product requirements — Part 2-101: Circular connectors — Detail specification for M12 connectors with screw-locking*

ISO 4148, *Road vehicles — Special warning lamps — Dimensions*

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

ISO 11898-2, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

ISO 15170-1, *Road vehicles — Four-pole electrical connectors with pins and twist lock — Part 1: Dimensions and classes of applications*

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

CiA 301, version 4.2, *CANopen application layer and communication profile*

3 Terms and definitions

For the purposes of this document, the following terms and definitions as well as those given in ISO 11898-1, ISO 11898-2, and CiA 301 apply.

DIN and DKE maintain terminological databases for use in standardization at the following addresses:

¹ CANopen is a European Union trademark by CAN in Automation (CiA) e. V.; the CiA 301 document can be downloaded free of charge at <https://www.can-cia.org/groups/specifications/>

— DIN-TERMinologieportal: available at <https://www.din.de/go/din-term>

— DKE-IEV: available at <https://www.dke.de/DKE-IEV>

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

— IEC Electropedia: available at <https://www.electropedia.org/>

— ISO Online Browsing Platform: available at <https://www.iso.org/obp>

CiA maintains a terminological database for use in CiA specifications at the following address:

— CiA Glossary: available at <https://www.can-cia.org/groups/cia-glossary-of-terms/>

3.1

alley light

surrounding light of the PWU

3.2

attack position

position, when the entity is active

3.3

audio switching module

ASM

WSU module connected wirelessly to load-speakers of a tone sequencer

3.4

backlight

light illumination of the roof-bar background

3.5

battery charger unit

BCU

FFU entity that is connected to supply mains and to a battery set for the purpose of charging the batteries

3.6

beacon

optical 360-degree warning device

3.7

beacon locking

mode, in which the beacon is deactivated

3.8

c sharp

sequence of sounds used in Switzerland

3.9

cavitation

operational state of a pump causing repeated implosions

3.10

city

sequence of sounds according to DIN 14610 used for urban areas

3.11

command

process data causing a change of state

3.12

compressor

sequence of sounds generated by means of pneumatics

3.13

cross signal

sequence of sounds used at crossings

3.14

cruising light

not flashing and at reduced power operating light

3.15

day/night mode

modes, in which actuators operate at maximum power level respectively at reduced power level

3.16

direct break

intermediate termination of the sound sequence

3.17

drop position

transport position of an FFU entity

3.18

fire-fighting equipment unit

FFU

functional entity compliant with this document controlled by the host controller

3.19

frequency inverter unit

FIU

FFU entity that changes output voltage frequency and magnitude to vary the speed, power, and torque of a connected induction motor to meet load conditions

3.20

fuel-reserved indication warning

warning that the fuel level is low

3.21

full-jet

extinguished agent discharged as full beam

3.22

g sharp

sequence of sounds used in Switzerland

3.23

half roof bar

lightbar according to ISO 4148 with one or more optical entities emitting light intermittently from 135° left to 135° right relative to its horizontal reference axis, which is intended to be mounted on the vehicle either to the front or the rear of the vehicle

[SOURCE: ECE R65]

3.24

high-distance flasher

forward facing high-power beacon

3.25

HiLo

sequence of sounds used by fire departments

3.26

host controller

HC

functional entity with NMT manager functionality

3.27

infrared flashing

mode enabling infrared beacons to increase night visibility

3.28

insulation monitor

functional entity monitoring the not grounded system between an active phase conductor and a protective

[SOURCE: DIN EN 61557-8 (VDE 0413-8), modified]

3.29

leadership lamp

lamp to identify the command line, supporting emergency vehicles to approach and find the operational control center or the operational area on sight

3.30

light mast unit

LMU

tall mast with several big searchlights on top of it

3.31

mandatory

keyword indicating an item that is required to be implemented as specified in this document

[SOURCE: ISO/IEC 14776-261:2012, 3.3.2, modified]

3.32

normal

sequence of sounds used in countrysides

3.33

optical accident data recorder

independent electronic entity that records optically before, during, and after a traffic accident relevant data

3.34

optional

keyword indicating an item that is not required to be implemented by this document; however, if any optional feature specified in this document is implemented, then it is implemented as specified in this document

[SOURCE: ISO/IEC 14776-261:2012, 3.3.6, modified]

3.35

parking position

position, when an entity is inactive

3.36

phase

polyphase-line conductor

[SOURCE: IEC 60050-141:2004]

3.37

piercer

sequence of sounds used in United Kingdom

3.38

portable water-pump unit

PWU

portable FFU entity for raising or circulating water

3.39

powder extinguishing unit

PEU

FFU entity that discharges powder by the pressure of a gas stored in the same container as the powder

3.40

power cycle

process of turning-off an electronic entity and turning it on again

3.41

power generator unit

PGU

FFU entity that produces electric energy complying with DIN 14685-1 or DIN 14685-2, which can be truck-mounted or can be portable

3.42

pressure controller

functional entity that maintains a set pump outlet pressure

3.43

process data

parameter related to inputs and outputs mappable into PDOs

3.44

pump start warning

information that the pump starts soon

3.45

radio announcement

broad-casting radio communication via an FFU entity

3.46

recommended

keyword indicating an item that is not required to be implemented by this document; however, for new designs it ought to be implemented as specified in this document, in order to improve compatibility or interoperability

3.47

request

process data demanding a change of state

3.48

roof bar

lightbar according to ISO 4148 with two or more optical entities emitting light intermittently from 180° left to 180° right relative to its horizontal reference axis

[SOURCE: ECE R65]

3.49

rope-end limit switch

sensing component detecting the end of the unwinding

3.50

special warning lamp

lamp according to ISO 4148, ECE R65, or SAE J845 depending on national or regional regulations

3.51

spray-jet

extinguished agent discharged as a spray

3.52

start

activate default operation

3.53

state

sequence of sounds according to DIN 14610 used for countrysides

3.54

stop

deactivate default operation

3.55

surrounding beacon

beacon, which is visible from all sides

3.56

surrounding lighting

lighting of the vehicle's scene

3.57

swivel motor

motor that tilts the light mast head

3.58

terminal

contact compliant with DIN 72552 (all parts)

3.59

traffic warning unit

TWU

FFU entity that displays to other road users warning information at the front or at the rear of the fire-fighting vehicle

3.60

traffic warning unit

TWU

FFU entity that displays to other road users warning information at the front or at the rear of the fire-fighting vehicle

3.61

turning motor

motor that turns the light mast

3.62

wail

sequence of sounds according to SAE J1849

3.63

warning signal unit

WSU

FFU entity that emits blue and amber light or acoustic signals

3.64

wig-wag

flashing light that operates only one of the two headlights at a time with two flashing preset rates

3.65

winch unit

WU

hauling or lifting FFU entity consisting of a rope or chain winding round a horizontal rotating drum, turned typically by a crank or by motor

3.66

wobbled

sequence of sounds used in urban areas

3.67

yelb

sequence of sounds according to SAE J1849

4 Symbols and abbreviations

For the purposes of this document, the following abbreviations and acronyms apply.

BAU	body application unit
CAN	controller area network
CBFF	Classical base frame format
CEFF	Classical extended frame format
CiA	CAN in Automation
COB	communication object
ECU	electronic control unit
ERR	error
FBFF	FD base frame format

FEFF	FD extended frame format
HMI	human machine interface
ICAO	International Civil Aviation Organization
IGBT	insulated-gate bipolar transistor
IGU	in-vehicle gateway unit
IVN	in-vehicle network
L1	line 1 phase
L2	line 2 phase
L3	line 3 phase
LF	low frequency
M	mandatory
n.a.	not applicable
NMT	network management
O	optional
PDO	process data object
PTO	power take-off
R	recommended
RPDO	receive PDO
ro	read only
rw	read/write
SDO	service data object
SRDO	safety-related data object
TPDO	transmit PDO
VAR	variable

5 Driving direction definitions

Figure 2 defines the main driving direction with right and left side of the vehicle as well as front and rear of the vehicle.

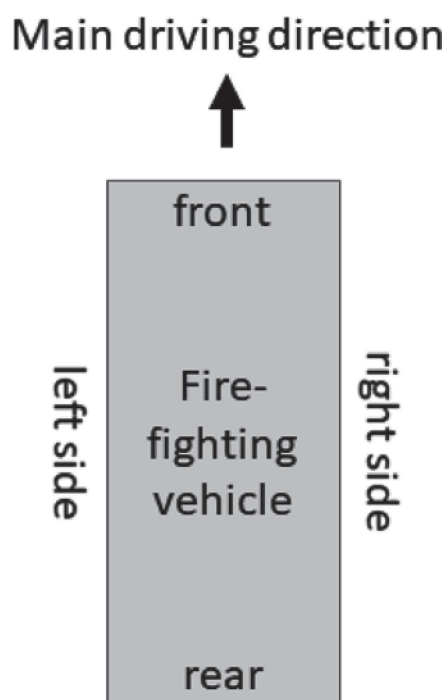


Figure 2 — Main driving direction

6 CAN interface requirements

6.1 General

The CANopen interface of devices compliant to this document are based on ISO 11898-1 and ISO 11898-2 as well as DIN EN 50325-4 and CiA 301, and the parameter and PDO specifications given in Clause 7.

6.2 Physical layer

The CANopen interface shall comply with the mandatory requirements of the CAN high-speed physical layer given in ISO 11898-2. Low-power and selective wake-up functionality should not be used.

The transmission rate shall be 250 kbit/s. The bit-timing recommendations given in CiA 301 shall be applied, especially the sample-point range.

The CAN interface compliant shall not apply galvanic isolation between CAN controller and CAN transceiver. The devices shall not integrate termination resistors.

The CANopen interface of fixed mounted FFU devices shall use 5-pin M12 plug circular connectors compliant with DIN EN 61076-2-101 (VDE 0687-76-2). The connector shall be A-coded and shall be in minimum IP67-rated as specified in DIN EN 60529 (VDE 0470-1). Table 1 specifies the pin-assignment of the 5-pin M12 connector.

Table 1 — Pin-assignment of the 5-pin M12 connector

Pin no.	Function	Definition	Remark
1	Shield	Optional	None
2	V _{CC}	External power supply from the vehicle to the device ^a	Red wire
3	GND	Power supply ground	Black wire

Table 1 (continued)

Pin no.	Function	Definition	Remark
4	CAN_H	CAN-High bus-line as specified in ISO 11898-2	White wire
5	CAN_L	CAN-Low bus-line as specified in ISO 11898-2	Blue wire
^a Current shall not exceed 500 mA.			

The CANopen interface of fixed portable FFU devices, especially portable BCUs, shall use 7-pin bayonet round connectors based on ISO 15170-1. The connector shall be A-coded and shall be in minimum IP67-rated as specified in DIN EN 60529 (VDE 0470-1). Table 2 specifies the pin-assignment of the 7-pin byonet connector.

Table 2 — Pin-assignment of the 7-pin bayonet connector

Pin no.	Function	Definition	Remark
1	+12 V _{DC}	Battery voltage of the device compliant with terminal 30 as specified in DIN 72552 (all parts) ^a	Red wire
2	GND	Ground of the device compliant with terminal 31 as specified in DIN 72552 (all parts)	Black wire
3	ENABLE	+12 V _{DC} prevents starting the device	None
4	CAN_H	CAN-High bus-line as specified in ISO 11898-2	White wire
5	Shield	Optional	None
6	CAN_L	CAN-Low bus-line as specified in ISO 11898-2	Blue wire
7	TEMP	Temperature sensor signal of the battery to be charged ^b	None
^a The current shall not exceed 15 A.			
^b The signal is manufacturer-specific.			

6.3 Data link layer

The CANopen interface shall comply with the mandatory requirements given in ISO 11898-1. It shall transmit only CAN Data Frames in CBFF; it shall not transmit CAN Data Frames in CEFF, FBFF, and FEFF and shall not transmit CAN Remote Frames.

6.4 Application layer

6.4.1 General requirements

The application layer is based on CANopen as specified in CiA 301 and DIN EN 50325-4. The data types and encoding rules defined in CiA 301 shall apply, too.

6.4.2 Node-ID

Each logical CANopen-based interface shall be assigned uniquely with a node-ID as specified in CiA 301 depending on the implemented functionality. After power-on, the CANopen-based interface shall use the default or configured node-ID. The method of node-ID configuring is not in the scope of this document. However, the node-IDs can be assigned by means of electromechanical components (e.g. dual in-line package (DIP) switch or rotary switch) or by means of the services specified in CiA 305. The node-IDs shall not be assigned by means of SDO services.

When during the operation the node-ID is configured, it shall be applied after an NMT reset command or a power-cycle.

Table 3 specifies the node-ID assignment. A single device may implement several logical CANopen-based interfaces using different node-IDs.

— EXAMPLE A host controller with one BCU implements two CANopen protocol stack entities with node-ID 01₁₆ respectively node-ID 10₁₆.

Table 3 — Node-ID assignment

Unit	Number of entities in a single network	Default node-ID	Allowed node-IDs
HC	1	01 ₁₆	01 ₁₆
WSU 1 (2, 3, 4, 5, 6) ^a	6	02 ₁₆	02 ₁₆ , 03 ₁₆ , 04 ₁₆ , 20 ₁₆ , 21 ₁₆ , 22 ₁₆ ^b
WU	1	05 ₁₆	05 ₁₆
PWU 1 (2, 3)	3	07 ₁₆	07 ₁₆ , 08 ₁₆ , 1C ₁₆
Vehicle-mounted PGU ^c	2	09 ₁₆	09 ₁₆ , 0B ₁₆
Portable PGU ^c	2	0B ₁₆	0B ₁₆ , 09 ₁₆
LMU 1 (2)	2	19 ₁₆	19 ₁₆ , 20 ₁₆
BCU 1 (2, 3, 4, 5)	5	10 ₁₆	10 ₁₆ , 11 ₁₆ , 12 ₁₆ , 13 ₁₆ , 14 ₁₆
FIU 1 (2, 3, 4)	4	15 ₁₆	15 ₁₆ , 16 ₁₆ , 17 ₁₆ , 18 ₁₆
WCU 1 (2, 3)	3	19 ₁₆	19 ₁₆ ^d , 1A ₁₆ ^d , 1B ₁₆
PEU	1	0F ₁₆	0F ₁₆
TWU	1	23 ₁₆	23 ₁₆
Reserved by document	n.a.	n.a.	24 ₁₆ to 77 ₁₆
Manufacturer-specific units	8	n.a.	28 ₁₆ to 7F ₁₆
^a The front roof bar shall use the node-ID 02 ₁₆ , the rear roof bar shall use the node-ID 03 ₁₆ , and the pure acoustic unit shall use node-ID 04 ₁₆ . Are there two half-roof bars installed, the left one shall use the node-ID 20 ₁₆ and the right one shall use node-ID 21 ₁₆ . Are there four WSUs installed the following node-ID assignment shall be used: front-left (node-ID 20 ₁₆), front-right (node-ID 02 ₁₆), rear-left (node-ID 03 ₁₆), and rear-right (node-ID 21 ₁₆). ^b The ASM shall use the node-ID 22 ₁₆ . ^c There shall not be more than two PGUs in a single network. ^d Are there two WCUs installed, the left one shall use the node-ID 19 ₁₆ and the right one shall use the node-ID 1A ₁₆ .			

6.4.3 Network management

The CANopen device implementing the HC function shall provide the NMT manager service. The CANopen device hosting the HC shall request the NMT node control services as specified in CiA 301 for all other CANopen device connected to the network. Any CANopen device shall indicate these NMT node control services evaluating, if the NMT node control request is addressed to it.

CANopen devices compliant to this document shall support the Boot-up service as specified in CiA 301. The Boot-up protocol shall be transmitted at least 2 s after power-on or NMT reset.

CANopen devices compliant to this document shall support the Heartbeat service as specified in CiA 301. The Heartbeat producer time shall be 1 s.

Each CANopen device shall support the Boot-up event service and the Heartbeat event service for CANopen devices, which sends PDOs to it. The Heartbeat consumer time shall be 2 s.

6.4.4 SDO services

The CANopen device hosting the HC shall provide for all specified FFUs Default SDO client services supporting the SDO normal service as well as the SDO expedited service as specified in CiA 301. The CANopen devices providing FFUs shall implement the corresponding Default SDO server services.

6.4.5 PDO services

The CANopen devices compliant with this document shall support TPDO and RPDO services as specified in CiA 301. The detailed specification of the PDO mapping parameter sets is given in Clause 7. All TPDOs are transmitted when transiting from the NMT pre-operational state to the NMT operational state. The TPDOs shall be transmitted with a period of 3 000 ms. The inhibit time shall be 100 ms.

— NOTE The pre-defined PDO connection set given in CiA 301 does not apply to this document.

6.4.6 ERR message services

FFUs compliant with this document shall support the ERR message service. This service is a specific PDO service. Table 4 specifies the transmit ERR communication parameter data object and Table 5 specifies the transmit ERR communication data elements. The ERR message transmit service shall be initiated, if transiting into the NMT operational state. It shall be transmitted periodically with the in Table 5 specified event timer value (given in ms).

— NOTE This service is not specified in CiA 301.

Table 4 — Transmit ERR communication parameter data object

Index	Object name		
	Category	Object code	Data type
19FF ₁₆	Transmit ERR communication parameter		
	Optional	RECORD	PDO COMMUNICATION PARAMETER

Table 5 — Transmit ERR communication parameter data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			05 ₁₆	05 ₁₆
	Mandatory	constant	None		
	ro	No	No		
01 ₁₆	COB-ID			8000 0740 ₁₆ + node-ID	8000 0740 ₁₆ + node-ID
	Mandatory	constant	See CiA 301		
	ro	No	No		
02 ₁₆	Transmission type			FF ₁₆	FF ₁₆
	Mandatory	constant	See CiA 301		
	ro	No	No		

Table 5 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
05 ₁₆	Event timer			0BB8 ₁₆	0BB8 ₁₆
	Mandatory	constant	See CiA 301		
	ro	No	No		
NOTE	Sub-index 03 ₁₆ and sub-index 04 ₁₆ are reserved for compatibility reasons.				

Table 6 specifies the transmit ERR mapping parameter data object and Table 7 specifies the transmit ERR mapping parameter data elements.

Table 6 — Transmit ERR mapping parameter data object

Index	Object name		
	Category	Object code	Data type
1BFF ₁₆	Transmit ERR mapping parameter		
	Optional	RECORD	PDO MAPPING PARAMETER

Table 7 — Transmit ERR mapping parameter data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆	01 ₁₆
	Mandatory	constant	None		
	ro	No	No		
01 ₁₆	Application object 1			6000 01 20 ₁₆	6000 01 20 ₁₆
	Mandatory	constant	None		
	ro	No	No		

The HC shall consume the ERR messages transmitted by the connected FFUs. Table 8 specifies the receive ERR communication parameter data objects and Table 9 specifies the receive ERR communication data elements.

Table 8 — Receive ERR communication parameter data object

Index	Object name		
	Category	Object code	Data type
1580 ₁₆ to 15FF ₁₆	Receive ERR communication parameter for node-ID 1 to node-ID 127		
	Optional	RECORD	PDO COMMUNICATION PARAMETER

Table 9 — Receive ERR communication parameter data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			02 ₁₆	02 ₁₆
	Mandatory	constant	None		
	ro	No	No		
01 ₁₆	COB-ID			8000 0740 ₁₆ + node-ID	8000 0740 ₁₆ + node-ID
	Mandatory	constant	See CiA 301		
	ro	No	No		
02 ₁₆	Transmission type			FF ₁₆	FF ₁₆
	Mandatory	constant	See CiA 301		
	ro	No	No		

Table 10 specifies the receive ERR mapping parameter data object and Table 11 specifies the receive ERR mapping parameter data elements. The mapped data elements should be stored in HC's local memory, too.

Table 10 — Receive ERR mapping parameter data object

Index	Object name		
	Category	Object code	Data type
1780 ₁₆ to 17FF ₁₆	Receive ERR mapping parameter for node-ID 1 to node-ID 127		
	Optional	RECORD	PDO MAPPING PARAMETER

Table 11 — Receive ERR mapping parameter data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆	01 ₁₆
	Mandatory	constant	None		
	ro	No	No		
01 ₁₆	Application object 1			6001 01 20 ₁₆ to 6001 7E 20 ₁₆	0000 0000 ₁₆
	Mandatory	constant	None		
	ro	No	No		

7 Parameters and PDOs

7.1 General

The CANopen communication parameters, the process data, and the diagnostic data specified in this document are partly accessible by means of the CANopen object dictionary as specified in CiA 301 respectively DIN EN 50325-4. But not all mandatory CANopen object dictionary entries are required to be compliant with

this document. Because the PDO mapping is not configurable, the process data and the PDO communication and mapping parameter sets as specified in CiA 301 do not need to be accessible by means of SDO services. Nevertheless, the implementation of these parameters and the mapped process data is advantageous for an improved diagnostics by the HC. Therefore, the process data and the diagnostic data should be accessible by means of SDO services. Additionally, there are data objects not mapped into PDOs; they are only accessible by the HC using SDO read services.

— NOTE The providing of Electronic Datasheets compliant with CiA 306 allows system designers to evaluate virtually the device functionality.

7.2 CANopen communication parameters

The CANopen devices compliant with this document shall implement a CANopen object dictionary using the 16-bit index and 8-bit sub-index addressing schema as specified in CiA 301. Table 12 specifies the mandatory (M) and optional (O) CANopen communication parameters.

Table 12 — Mandatory and optional CANopen communication parameters

Index	Parameter name	Category	Reference
1000 ₁₆	Device type	M ^a	See 7.2
1001 ₁₆	Error register	M ^a	CiA 301
1002 ₁₆	Manufacturer status register	O	CiA 301
1008 ₁₆	Manufacturer device name	M	CiA 301
1009 ₁₆	Manufacturer hardware version	M	CiA 301
100A ₁₆	Manufacturer software version	M	CiA 301
1016 ₁₆	Consumer heartbeat time	O ^b	CiA 301
1017 ₁₆	Heartbeat producer time	O	CiA 301
1018 ₁₆	Identity	M/O ^c	CiA 301
1029 ₁₆	Error behaviour	O	CiA 301
^a These parameters are mandatory for new designs; in legacy implementations, they were not required.			
^b For each CANopen device sending PDOs to this CANopen device an appropriate sub-index should be implemented, in order to be able to configure the consumer heartbeat time.			
^c Sub-index 00 ₁₆ and sub-index 01 ₁₆ are mandatory, all other sub-indexes are optional			

The device type parameter shall be compliant with the specification given in CiA 301. The 16-bit device profile number field in the device type parameter (see CiA 301) shall be 1F3₁₆.

The 16-bit additional information field shall be structured as specified in Figure 3.

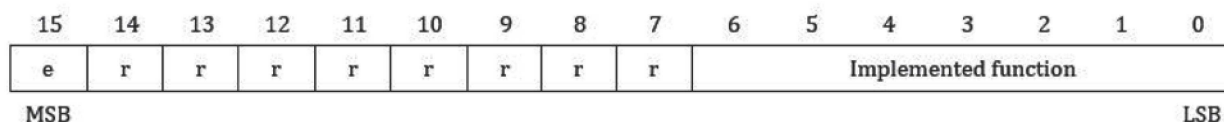


Figure 3 — Sub-fields of the additional information field of the device type parameter

The reserved (r) sub-fields shall be set to 0_b. The escape (e) sub-field shall be set to 0_b. Table 13 defines the values for the implemented function sub-field.

Table 13 — Implemented function value definitions

Value	Implemented function
01 ₁₆	HC
02 ₁₆	BCU
03 ₁₆	FIU
04 ₁₆	LMU
05 ₁₆	PGU
06 ₁₆	PEU
07 ₁₆	PWU
08 ₁₆	TWU
09 ₁₆	WCU
0A ₁₆	WSU
0B ₁₆	WU

7.3 Process data

7.3.1 General

The process data specified in this document follow the definitions and specifications given in CiA 301. This includes also the used data types and their coding. Each process data is assigned with a unique address, the 16-bit index and the 8-bit sub-index as specified below.

NOTE 1 Because the CAN data link layer uses a byte-oriented transmission technique for the data field, the PDO mapping specified in this document is byte-aligned.

Binary process data is provided by means of the data type UNSIGNED2. Table 14 defines the values.

Table 14 — Definition of UNSIGNED2 values

Value	Definition
00 ₂	For requests: switch off/deactivate/disable For status: off/not active/disabled
01 ₂	For requests: switch on/activate/enable For status: on/active/enabled
10 ₂	Error
11 ₂	For requests: take no action For status: not available

If two UNSIGNED2 parameters are received with contradicting commands (e.g. start and stop or open and close), the receiving device shall ignore both commands and take no action. If two UNSIGNED2 parameters are received with contradicting status information, both should be ignored and should be considered as not available.

Analogue process data is provided by means of the data types UNSIGNED8 or UNSIGNED16. Table 15 and Table 16 respectively define the values. Table 17 defines the resolution and the offset for physical quantities.

NOTE 2 The definitions given in Table 15 and Table 16 are not compliant with the value definitions given in SAE J1939/71.

Table 15 — Definition of UNSIGNED8 values

Value	Definition
00 ₁₆ to FA ₁₆	Valid value
FB ₁₆ to FE ₁₆	Error indication
FF ₁₆	Request: Take no action Status: Not available

Table 16 — Definition of UNSIGNED16 values

Value	Definition
0000 ₁₆ to FDE8 ₁₆	Valid value
FE01 ₁₆ to FFFF ₁₆	Error indication
FF00 ₁₆ to FFFF ₁₆	Request: Take no action Status: Not available

Table 17 — Physical quantity definitions

Physical quantity	Resolution	Offset
Length	1 mm	0 mm
Direction of drive/inclination ^a	0,1 °	0,0 °
Per cent	0,1 %	0,0 %
Voltage	0,01 V	0,00 V
Temperature	1 °C	-40 °C
Current	0,01 A	0,0 A
Electric charge	0,1 Ah	0,0 Ah
Charging time	1 min	0 min
Power	1 W	0 W
Frequency	0,01 Hz	0,0 Hz
Pressure	0,01 bar ^b	-50 bar ^b
Speed	0,01 km/h	0,00 km/h
Rotation speed	0,1 min ⁻¹	0,0 min ⁻¹
Electric resistance	1 kΩ	0 kΩ
Mass	0,1 kg	0,0 kg
^a Direction of drive: 180° means forwards, 0° means backwards, 270° means right, and 90° means left; inclination: 0° and 180° means vertical and 90° means horizontal. ^b 1 bar = 105 Pa.		

7.3.2 UNSIGNED2 data type (0060₁₆)

Table 18 specifies the data object and Table 19 specifies the data element of the UNSIGNED2 data type. The data object and data element attributes are defined in CiA 301 respectively DIN EN 50325-4.

Table 18 — UNSIGNED2 data object

Index	Object name		
	Category	Object code	Data type
0060 ₁₆	UNSIGNED2		
	Mandatory	DEFTYPE	UNSIGNED32

Table 19 — UNSIGNED2 data element

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	UNSIGNED2			0000 0002 ₁₆	0000 0002 ₁₆
	Mandatory	constant	None		
	ro	Yes	No		

7.3.3 Current error list (6000₁₆)

This data object provides the current error list of the FFU. The highest available sub-index (00₁₆) data element indicates the number of active errors. If no error is active, the value shall be 00₁₆; in this case, the SDO read request shall be responded with an SDO abort message with abort codes 0800 0024₁₆ or 0800 0000₁₆. Every new error shall be listed at sub-index 01₁₆; all previously listed errors shall be moved to the next higher sub-index. The error in sub-index 10₁₆ is in this case lost. If an error disappears, the related sub-index shall be deleted. The earlier errors shall move up by one sub-index. If all errors disappear, sub-index 01₁₆ shall be set to 0000 0000₁₆, and shall be deleted after transmission of the ERR message.

Writing 00₁₆ to sub-index 00₁₆ shall delete the sub-index 01₁₆ to sub-index 0A₁₆. Other values than 00₁₆ are not allowed and shall cause the transmission of an SDO about message with the error code 0609 0030₁₆.

Figure 4 specifies the data element structure.

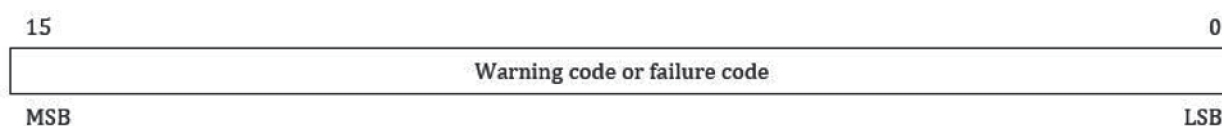


Figure 4 — Structure of the data element

Table 20 specifies the HC warning and failure codes.

Table 20 — HCU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	Hardware malfunction
	65 ₁₆	1F5 ₁₆	Software malfunction

Table 21 to Table 30 specify the FFU warning and failure codes.

Table 21 — BCU warning and failure codes

Classification	Warning code	Failure code	Description
Battery	64 ₁₆	1F4 ₁₆	Short-circuit
	65 ₁₆	1F5 ₁₆	Undervoltage
	66 ₁₆	1F6 ₁₆	Overvoltage
	67 ₁₆	1F7 ₁₆	Fuse malfunction
Charging	78 ₁₆	208 ₁₆	Charging time exceeded
	79 ₁₆	209 ₁₆	Battery undertemperature
	7A ₁₆	20A ₁₆	Battery overtemperature
Mains voltage	8C ₁₆	21C ₁₆	Overtemperature
	8D ₁₆	21D ₁₆	Undervoltage
	8E ₁₆	21E ₁₆	Overvoltage
Unit	A0 ₁₆	230 ₁₆	Output fuse malfunction
	A1 ₁₆	231 ₁₆	Temperature range exceeded
	A2 ₁₆	232 ₁₆	Current control malfunction
	A3 ₁₆	233 ₁₆	External temperature sensor malfunction

Table 22 — FIU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	General malfunction
Electrical equipment	12C ₁₆	2BC ₁₆	Phase 1 overload
	12D ₁₆	2BD ₁₆	Phase 2 overload
	12E ₁₆	2BE ₁₆	Phase 3 overload
	12F ₁₆	2BF ₁₆	Phase 1 maximum current exceeded
	130 ₁₆	2C0 ₁₆	Phase 2 maximum current exceeded
	131 ₁₆	2C1 ₁₆	Phase 3 maximum current exceeded
	132 ₁₆	2C2 ₁₆	IGBT overtemperature
	133 ₁₆	2C3 ₁₆	Frequency inverter overtemperature
	134 ₁₆	2C4 ₁₆	General FIU malfunction
	135 ₁₆	2C5 ₁₆	Cooling malfunction (e.g. fan failure)
	136 ₁₆	2C6 ₁₆	Low intermediate circuit voltage
	137 ₁₆	2C7 ₁₆	High intermediate circuit voltage

Table 23 — LMU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	No air pressure
	65 ₁₆	1F5 ₁₆	Air leakage
	66 ₁₆	1F6 ₁₆	Automatic-parking malfunction
	67 ₁₆	1F7 ₁₆	Vertical obstacle detected
	68 ₁₆	1F8 ₁₆	Turning position and extension height unknown
	69 ₁₆	1F9 ₁₆	Head turning and swivel position not in park position
Electrical equipment	C8 ₁₆	258 ₁₆	Folding light mast motor current exceeded
	C9 ₁₆	259 ₁₆	Turning motor malfunction
	CA ₁₆	25A ₁₆	Swivel motor 1 malfunction
	CB ₁₆	25B ₁₆	Swivel motor 2 malfunction
	CC ₁₆	25C ₁₆	Turning motor current exceeded
	CD ₁₆	25D ₁₆	Swivel motor 1 current exceeded
	CE ₁₆	25E ₁₆	Swivel motor2 current exceeded

Table 24 — PEU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	Reserved by document
	65 ₁₆	1F5 ₁₆	Pressure loss in container
Electrical equipment	C8 ₁₆	258 ₁₆	Valve outlet malfunction
	C9 ₁₆	259 ₁₆	Valve control malfunction

Table 25 — PGU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	Emergency stop active
	65 ₁₆	1F5 ₁₆	Maintenance needed

Table 25 (continued)

Classification	Warning code	Failure code	Description
Drive equipment	C8 ₁₆	258 ₁₆	Low oil pressure
	C9 ₁₆	259 ₁₆	High oil temperature
	CA ₁₆	25A ₁₆	Low oil level
	CB ₁₆	25B ₁₆	Low fuel level
	CC ₁₆	25C ₁₆	High fuel level
	CD ₁₆	25D ₁₆	Charging control malfunction
	CE ₁₆	25E ₁₆	High battery temperature
	CF ₁₆	25F ₁₆	High ambient temperature
	D0 ₁₆	260 ₁₆	High cooling temperature
	D1 ₁₆	261 ₁₆	High cylinder-head temperature
	D2 ₁₆	262 ₁₆	High exhaust-manifold temperature
	D3 ₁₆	263 ₁₆	Low battery voltage
	D4 ₁₆	264 ₁₆	High battery voltage
	D5 ₁₆	265 ₁₆	Electronic control malfunction

Table 25 (*continued*)

Classification	Warning code	Failure code	Description
Electric equipment	12C ₁₆	2BC ₁₆	Isolation monitor switch-off enabled
	12D ₁₆	2BD ₁₆	High current generator temperature
	12E ₁₆	2BE ₁₆	Phase 1 overload
	12F ₁₆	2BF ₁₆	Phase 2 overload
	130 ₁₆	2C0 ₁₆	Phase 3 overload
	131 ₁₆	2C1 ₁₆	Low phase 1 voltage
	132 ₁₆	2C2 ₁₆	Low phase 2 voltage
	133 ₁₆	2C3 ₁₆	Low phase 3 voltage
	134 ₁₆	2C4 ₁₆	High phase 1 voltage
	135 ₁₆	2C5 ₁₆	High phase 2 voltage
	136 ₁₆	2C6 ₁₆	High phase 3 voltage
	137 ₁₆	2C7 ₁₆	High phase 1 current
	138 ₁₆	2C8 ₁₆	High phase 2 current
	139 ₁₆	2C9 ₁₆	High phase 3 current
	13A ₁₆	2CA ₁₆	Starter restart lock enabled
	13B ₁₆	2CB ₁₆	High frequency
	13C ₁₆	2CC ₁₆	Low frequency
	13D ₁₆	2CD ₁₆	Generic electronic malfunction
	13E ₁₆	2CE ₁₆	High frequency-inverter temperature
	13F ₁₆	2CF ₁₆	Generic frequency-inverter malfunction
	140 ₁₆	2D0 ₁₆	Cooling malfunction (e.g. fan error)
	141 ₁₆	2D1 ₁₆	Low intermediate-circuit voltage
	142 ₁₆	2D2 ₁₆	High intermediate-circuit voltage
	143 ₁₆	2D3 ₁₆	Circuit-breaker enabled
	144 ₁₆	2D4 ₁₆	High generator temperature
	145 ₁₆	2D5 ₁₆	High voltage-inverter temperature

Table 26 — PWU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	Emergency stop active
	65 ₁₆	1F5 ₁₆	Maintenance needed
	66 ₁₆	1F6 ₁₆	Alley lighting malfunction
	67 ₁₆	1F7 ₁₆	Pump start warning

Table 26 (continued)

Classification	Warning code	Failure code	Description
Pump equipment	C8 ₁₆	258 ₁₆	Low oil pressure
	C9 ₁₆	259 ₁₆	High oil temperature
	CA ₁₆	25A ₁₆	Low oil level
	CB ₁₆	25B ₁₆	Low fuel level
	CC ₁₆	25C ₁₆	High fuel temperature
	CD ₁₆	25D ₁₆	Alternator malfunction
	CE ₁₆	25E ₁₆	High battery temperature
	CF ₁₆	25F ₁₆	High ambient temperature
	D0 ₁₆	260 ₁₆	High cooling temperature
	D1 ₁₆	261 ₁₆	High cylinder-head temperature
	D2 ₁₆	262 ₁₆	High exhaust manifold temperature
	D3 ₁₆	263 ₁₆	Battery undervoltage
	D4 ₁₆	264 ₁₆	Battery overvoltage
	D5 ₁₆	265 ₁₆	Drive malfunction
Water-bearing equipment	12C ₁₆	2BC ₁₆	High pump temperature
	12D ₁₆	2BD ₁₆	Cooling bypass malfunction
	12E ₁₆	2BE ₁₆	Inlet pressure sensor malfunction
	12F ₁₆	2BF ₁₆	Output pressure sensor malfunction
	130 ₁₆	2C0 ₁₆	Pressure controller malfunction
	131 ₁₆	2C1 ₁₆	Cavitation
	132 ₁₆	2C2 ₁₆	Outlet 1 malfunction
	133 ₁₆	2C3 ₁₆	Outlet 2 malfunction

Table 27 — TWU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	General malfunction

Table 28 — WCU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	CAN malfunction
	65 ₁₆	1F5 ₁₆	Low power-supply voltage

Table 28 (*continued*)

Classification	Warning code	Failure code	Description
Electrical equipment	C8 ₁₆	258 ₁₆	Horizontal positioning malfunction
	C9 ₁₆	259 ₁₆	Horizontal-motor malfunction
	CA ₁₆	25A ₁₆	Vertical position malfunction
	CB ₁₆	25B ₁₆	Vertical-motor malfunction
	CC ₁₆	25C ₁₆	Jet-adjustment malfunction
	CD ₁₆	25D ₁₆	Jet-adjustment motor malfunction
	CE ₁₆	25E ₁₆	Jet-volume malfunction
	CF ₁₆	25F ₁₆	Jet-volume motor malfunction
	D0 ₁₆	260 ₁₆	Surrounding beacon 1 malfunction
	D1 ₁₆	261 ₁₆	Lightning 1 malfunction
	D2 ₁₆	262 ₁₆	Surrounding beacon 2 malfunction
	D3 ₁₆	263 ₁₆	Lightning 2 malfunction

Table 29 — WSU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	General malfunction
Optical equipment	C8 ₁₆	258 ₁₆	Left rotating beacon malfunction
	C9 ₁₆	259 ₁₆	Right rotating beacon malfunction
	CA ₁₆	25A ₁₆	Left surrounding lightning malfunction
	CB ₁₆	25B ₁₆	Alley lightning malfunction
	CC ₁₆	25C ₁₆	Additional rotating beacon malfunction
	CD ₁₆	25D ₁₆	Left searchlight malfunction
	CE ₁₆	25E ₁₆	Right searchlight malfunction
	CF ₁₆	25F ₁₆	High-distance flasher malfunction
	D0 ₁₆	260 ₁₆	Backlight malfunction
	D1 ₁₆	261 ₁₆	Power supply malfunction
Acoustical equipment	12D ₁₆	2BD ₁₆	Signal tone 1 malfunction
	12E ₁₆	2BE ₁₆	Signal tone 2 malfunction
	12F ₁₆	2BF ₁₆	Signal tone 3 malfunction
	130 ₁₆	2C0 ₁₆	Signal tone 4 malfunction
	131 ₁₆	2C1 ₁₆	Microphone malfunction
	132 ₁₆	2C2 ₁₆	Microphone amplifier malfunction
	133 ₁₆	2C3 ₁₆	Audio source amplifier malfunction
	134 ₁₆	2C4 ₁₆	Power supply malfunction

Table 30 — WU warning and failure codes

Classification	Warning code	Failure code	Description
General	64 ₁₆	1F4 ₁₆	Emergency stop enabled
	65 ₁₆	1F5 ₁₆	Maintenance needed
Electrical equipment	C8 ₁₆	258 ₁₆	HMI communication malfunction
	C9 ₁₆	259 ₁₆	Traction sensor malfunction
	CA ₁₆	25A ₁₆	Rope-end limit switch malfunction
	CB ₁₆	25B ₁₆	General electronic malfunction
	CC ₁₆	25C ₁₆	HMI malfunction
Hydraulic equipment	12C ₁₆	2BC ₁₆	High oil temperature
	12D ₁₆	2BD ₁₆	Low oil level
	12E ₁₆	2BE ₁₆	Oil filter dirty
	12F ₁₆	2BF ₁₆	Oil-cooling fan malfunction
	130 ₁₆	2C0 ₁₆	Traction limit exceeded

Table 31 specifies the data object and Table 32 specifies the data elements.

Table 31 — Current error list data object

Index	Object name		
	Category	Object code	Data type
6000 ₁₆	Current error list		
	Optional	ARRAY	UNSIGNED32

Table 32 — Current error list data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			00 ₁₆ to 10 ₁₆	n.a.
	Mandatory	variable	None		
	ro	No	No		
01 ₁₆	Error information <i>n</i>			See Figure 4 and Table 20 to Table 30	n.a.
	Optional	variable	None		
	ro	Yes	No		
02 ₁₆	Error information <i>n</i> – 1			See Figure 4 and Table 20 to Table 30	n.a.
	Optional	variable	None		
	ro	Yes	No		
to					

Table 32 (*continued*)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
0A ₁₆	Error information $n - 9$			See Figure 4 and Table 20 to Table 30	n.a.
	Optional	variable	None		
	ro	Yes	No		

7.3.4 FFU error information (6001₁₆)

This data object implemented by the HC indicates the received latest error information form the connected FFUs.

Figure 4 specifies the data element structure. Table 33 specifies the data object and Table 34 specifies the data elements.

Table 33 — FFU error information data object

Index	Object name		
	Category	Object code	Data type
6001 ₁₆	FFU error history		
	Optional	ARRAY	UNSIGNED8

Table 34 — FFU error history data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆ to 7E ₁₆	Implementation-specific
	Mandatory	variable	None		
	ro	No	No		
01 ₁₆	Node-ID 2			See Figure 4 and Table 20 to Table 30	00 ₁₆
	Optional	variable	None		
	ro	Yes	No		
02 ₁₆	Node-ID 3			See Figure 4 and Table 20 to Table 30	00 ₁₆
	Optional	variable	None		
	ro	Yes	No		
to					
7E ₁₆	Node-ID 127			See Figure 4 and Table 20 to Table 30	00 ₁₆
	Optional	variable	None		
	ro	Yes	No		

7.3.5 TWU display command (6010₁₆)

This data object indicates the TWU display command provided by the HC. Figure 5 specifies the data element structure and Table 35 specifies the field values.

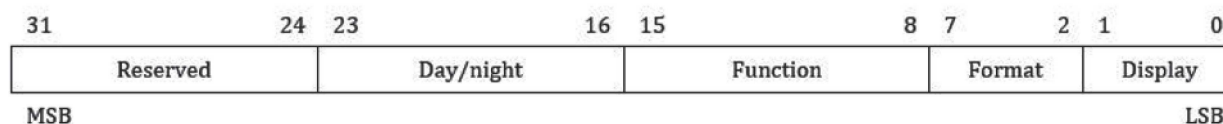


Figure 5 — Structure of the TWU display command data element

Table 35 — Field values of the TWU display command

Field	Value	Definition
Display	00 ₂	Disabled
	01 ₂	Enabled
	10 ₂	Failure
	11 ₂	Not available
Format	000000 ₂	No format
	000001 ₂	Normal writing (static)
	000011 ₂	Reserved by document
	000101 ₂	Mirror writing (static)
	001001 ₂	Marquee (from right to left)
	010001 ₂	Normal writing (blinking)
	010101 ₂	Mirror writing (blinking)
	100001 ₂	Normal writing (static bold)
	100101 ₂	Mirror writing (static bold)
	110001 ₂	Normal writing (blinking bold)
	110101 ₂	Mirror writing (blinking bold)
	01000001 ₂	Marquee (from left to right)
Function	0000 0000 ₂	TWU off
	0000 0001 ₂	Flashing pattern
	0000 0010 ₂	Running arrows (inside to outside)
	0000 0011 ₂	Running arrows (right to left)
	0000 0100 ₂	Running arrows (left to right)
	0000 0101 ² ₂	Running arrows (outside to inside)
	0000 0111 ₂	Text
	1111 1111 ₂	Take no action
Day/night	0000 0000 ₂	Day mode
	0000 0001 ₂	Night mode
	1111 1111 ₂	Take no action

Table 35 (*continued*)

Field	Value	Definition
reserved	1111 1111 ₂	Take no action
^a Not defined values are reserved by document.		

Table 36 specifies the data object and Table 37 specifies the data element.

Table 36 — TWU display command data object

Index	Object name		
	Category	Object code	Data type
6010 ₁₆	TWU display command		
	Optional	ARRAY	UNSIGNED32

Table 37 — TWU display command data element

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆ or 02 ₁₆	Implementation-specific
	Mandatory	variable	None		
	rw	No	No		
01 ₁₆	Rear display			See Table 35	TWU: FFFF FFFF ₂
	Optional	variable	None		
	rw	No	No		
02 ₁₆	Front display			See Table 35	TWU: FFFF FFFF ₂
	Optional	variable	None		
	rw	No	No		

7.3.6 TWU text (6011₁₆)

This data object indicates the TWU text (up to 255 characters) provided by the HC. The data elements shall use the coding as defined in ISO/IEC 8859-1. Table 38 defines additional coding definitions.

Table 38 — Additional coding definitions

Character	Code	Definition
~	7E ₁₆	Letter “E” (4 pixel width)
~~	7E ₁₆ 7E ₁₆	Letter “E” (3 pixel width)
space	20 ₁₆	1-pixel space
\r	0D ₁₆	Short pause between two blinking words (e.g. 0,2 s)
\n	0A ₁₆	Long pause between two blinking words (e.g. 0,8 s)

Table 39 specifies the data object and Table 40 specifies the data element.

Table 39 — TWU text data object

Index	Object name		
	Category	Object code	Data type
6011 ₁₆	TWU text		
	Optional	ARRAY	UNSIGNED8

Table 40 — TWU display command data element

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆ to FE ₁₆	Implementation-specific
	Mandatory	variable	None		
	rw	No	No		
01 ₁₆	Character 1			ISO/IEC 8859-1 and Table 38	TWU: 20 ₁₆
	Mandatory	variable	None		
	rw	No	No		
02 ₁₆	Character 2			ISO/IEC 8859-1 and Table 38	TWU: 20 ₁₆
	Optional	variable	None		
	rw	No	No		
to					
FE ₁₆	Character 255			ISO/IEC 8859-1 and Table 38	TWU: 20 ₁₆
	Optional	variable	None		
	rw	No	No		

7.3.7 Vehicle statuses (6101₁₆)

This data object contains status information of the fire-fighting vehicle provided by the HC.

Table 41 specifies the data object and Table 42 specifies the data element.

Table 41 — Vehicle statuses data object

Index	Object name		
	Category	Object code	Data type
6101 ₁₆	Vehicle statuses and FFU requests		
	Mandatory	ARRAY	UNSIGNED2

Table 42 — Vehicle statuses data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆ to 09 ₁₆	Implementation-specific
	Mandatory	constant	None		
	ro	No	No		
01 ₁₆	Ignition status (on/off)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
02 ₁₆	Gear status (neutral/not neutral)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
03 ₁₆	Engine status (running/not running)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
04 ₁₆	Parking brake status (on/off)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
05 ₁₆	Intermediate speed status (reached/not reached)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	Variable	None		
	ro	Yes	No		
06 ₁₆	Clearance light status (on/off)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
07 ₁₆	Horn status (on/off)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
08 ₁₆	Four-wheel brake status (active/not active)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
09 ₁₆	WU PTO status (engaged/not engaged)			See Table 14	HC: n.a. Other units: 11 ₂
	Optional	variable	None		
	ro	Yes	No		

7.3.8 Vehicle engine speed actual value (6102₁₆)

This data object provides the actual value of the vehicle engine speed. Table 43 specifies the data object and Table 44 specifies the data element.

Table 43 — Vehicle engine speed actual value data object

Index	Object name		
	Category	Object code	Data type
6102 ₁₆	Vehicle engine speed status		
	Optional	ARRAY	UNSIGNED16

Table 44 — Vehicle engine speed actual value special data element(s)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆	01 ₁₆
	Mandatory	variable	None		
	ro	Yes	No		
01 ₁₆	Vehicle engine speed actual value			See Table 16	HC: n.a. Other units: FFFF ₁₆
	Mandatory	variable	See Table 17		
	ro	Yes	No		

7.3.9 WSU control 1 (6111₁₆)

This data object contains WSU commands and statuses. Table 45 specifies the data object and Table 46 specifies the data elements.

NOTE 1 The WSU special warning lamp 1 parameters corresponds to the main beacon 1 data object in CiA 447.

NOTE 2 The WSU special warning lamp 2 is in Netherland a yellow lamp, for example.

Table 45 — WSU control 1 data object

Index	Object name		
	Category	Object code	Data type
6111 ₁₆	WSU control 1		
	Optional	ARRAY	UNSIGNED2

Table 46 — WSU control 1 data elements

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
00 ₁₆	Highest sub-index supported			01 ₁₆ to F0 ₁₆	Implementation-specific
	Mandatory	variable	None		
	ro	No	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
01 ₁₆	WSU 1 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 1: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
02 ₁₆	WSU 1 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
03 ₁₆	WSU 1 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
04 ₁₆	WSU 1 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
05 ₁₆	WSU 2 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 2: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
06 ₁₆	WSU 2 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
07 ₁₆	WSU 2 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
08 ₁₆	WSU 2 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
09 ₁₆	WSU 3 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 3: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
0A ₁₆	WSU 3 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
0B ₁₆	WSU 3 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
0C ₁₆	WSU 3 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
0D ₁₆	WSU 4 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 4: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
0E ₁₆	WSU 4 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
0F ₁₆	WSU 4 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
10 ₁₆	WSU 4 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
11 ₁₆	WSU 5 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 5: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
12 ₁₆	WSU 5 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
13 ₁₆	WSU 5 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
14 ₁₆	WSU 5 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
15 ₁₆	WSU 6 special warning lamp 1 command (on/off)			See Table 14	HC: n.a. WSU 6: 11 ₁₆
	Optional	variable	None		
	ro	Yes	No		
16 ₁₆	WSU 6 left special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
17 ₁₆	WSU 6 right special warning lamp 1 status (on/off)			See Table 14	HC: 11 ₁₆ WSU 6 n.a.
	Optional	variable	None		
	ro	Yes	No		
18 ₁₆	WSU 6 special warning lamp 1 function status (active/not active)			See Table 14	HC: 11 ₁₆ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
19 ₁₆	WSU 1 signal tone 1 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
1A ₁₆	WSU 1 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
1B ₁₆	WSU 2 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
1C ₁₆	WSU 3 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
1D ₁₆	WSU 4 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
1E ₁₆	WSU 5 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
1F ₁₆	WSU 6 signal tone 1 status (on/off)			See Table 14	HC: 11 ₂ LMU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
20 ₁₆	WSU 1 signal tone 2 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
21 ₁₆	WSU 1 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
22 ₁₆	WSU 2 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
23 ₁₆	WSU 3 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
24 ₁₆	WSU 4 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
25 ₁₆	WSU 5 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
26 ₁₆	WSU 6 signal tone 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
27 ₁₆	WSU 1 signal tone 3 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
28 ₁₆	WSU 1 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
29 ₁₆	WSU 2 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
2A ₁₆	WSU 3 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
2B ₁₆	WSU 4 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
2C ₁₆	WSU 5 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
2D ₁₆	WSU 6 signal tone 3 status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
2E ₁₆	WSU 1 signal tone 4 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
2F ₁₆	WSU 1 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Otional	variable	None		
	ro	Yes	No		
30 ₁₆	WSU 2 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
31 ₁₆	WSU 3 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
32 ₁₆	WSU 4 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
33 ₁₆	WSU 5 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
34 ₁₆	WSU 6 signal tone 4 status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
35 ₁₆	WSU 1 left alley light command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
36 ₁₆	WSU 1 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
37 ₁₆	WSU 2 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
38 ₁₆	WSU 3 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
39 ₁₆	WSU 4 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
3A ₁₆	WSU 5 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
3B ₁₆	WSU 6 left alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
3C ₁₆	WSU 1 right alley light command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
3D ₁₆	WSU 1 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
3E ₁₆	WSU 2 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
3F ₁₆	WSU 3 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
40 ₁₆	WSU 4 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
41 ₁₆	WSU 5 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
42 ₁₆	WSU 6 right alley light status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
43 ₁₆	WSU 1 left front working light command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
44 ₁₆	WSU 1 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
45 ₁₆	WSU 2 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
46 ₁₆	WSU 3 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
47 ₁₆	WSU 4 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
48 ₁₆	WSU 5 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
49 ₁₆	WSU 6 left front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
4A ₁₆	WSU right front working light command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
4B ₁₆	WSU 1 right front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
4C ₁₆	WSU 2 right front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
4D ₁₆	WSU 3 right front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
4E ₁₆	WSU 4 rightworking light status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
4F ₁₆	WSU 5 right front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
50 ₁₆	WSU 6 right front working light status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
51 ₁₆	WSU 1 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
52 ₁₆	WSU 2 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
53 ₁₆	WSU 3 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
54 ₁₆	WSU 4 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
55 ₁₆	WSU 5 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
56 ₁₆	WSU 6 backlight status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
57 ₁₆	WSU special warning lamp 2 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
58 ₁₆	WSU 1 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
59 ₁₆	WSU 2 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
5A ₁₆	WSU 3 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
5B ₁₆	WSU 4 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
5C ₁₆	WSU 5 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
5D ₁₆	WSU 6 special warning lamp 2 status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
5E ₁₆	WSU high-distance flasher 1 command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
5F ₁₆	WSU 1 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
60 ₁₆	WSU 2 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
61 ₁₆	WSU 3 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
62 ₁₆	WSU 4 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
63 ₁₆	WSU 5 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
64 ₁₆	WSU 6 high-distance flasher 1 status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
65 ₁₆	WSU rear-warning flasher command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
66 ₁₆	WSU microphone LF amplifier command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
67 ₁₆	WSU 1 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
68 ₁₆	WSU 2 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
69 ₁₆	WSU 3 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		

Table 46 (continued)

Sub-index	Entry name			Value range	Default value
	Category	Modification	Unit		
	SDO access	PDO access	SRDO access		
6A ₁₆	WSU 4 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
6B ₆	WSU 5 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
6C ₁₆	WSU 6 microphone LF amplifier status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
6D ₁₆	WSU radio announcement command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
6E ₁₆	WSU 1 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		
6F ₁₆	WSU 2 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 2: n.a.
	Optional	variable	None		
	ro	Yes	No		
70 ₁₆	WSU 3 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 3: n.a.
	Optional	variable	None		
	ro	Yes	No		
71 ₁₆	WSU 4 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 4: n.a.
	Optional	variable	None		
	ro	Yes	No		
72 ₁₆	WSU 5 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 5: n.a.
	Optional	variable	None		
	ro	Yes	No		
73 ₁₆	WSU 6 radio announcement status (on/off)			See Table 14	HC: 11 ₂ WSU 6: n.a.
	Optional	variable	None		
	ro	Yes	No		
74 ₁₆	WSU audio source command (on/off)			See Table 14	HC: n.a. WSU: 11 ₂
	Optional	variable	None		
	ro	Yes	No		
75 ₁₆	WSU 1 audio source status (on/off)			See Table 14	HC: 11 ₂ WSU 1: n.a.
	Optional	variable	None		
	ro	Yes	No		