



BSI Standards Publication

Electric vehicles conductive charging system

Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation — Pre-defined communication parameters and general application objects

National foreword

This Published Document is the UK implementation of CLC IEC/TS 61851-3-5:2023. It is identical to IEC TS 61851-3-5:2023. It supersedes PD IEC TS 61851-3-5:2023, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/69, Electric vehicles.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

**Electric vehicles conductive charging system - Part 3-5: DC EV
supply equipment where protection relies on double or reinforced
insulation - Pre-defined communication parameters and general
application objects
(IEC/TS 61851-3-5:2023)**

Système de charge conductive pour véhicules électriques -
Partie 3-5 : Exigences relatives aux véhicules électriques
légers - Paramètres de communication prédéfinis et objets
à application générale
(IEC/TS 61851-3-5:2023)

Konduktive Ladesysteme für Elektrofahrzeuge - Teil 3-5:
Gleichstrom-Versorgungseinrichtungen für
Elektrofahrzeuge mit Schutzwirkung durch doppelte oder
verstärkte Isolierung - Vordefinierte
Kommunikationsparameter und allgemeine
Anwendungsgegenstände
(IEC/TS 61851-3-5:2023)

This Technical Specification was approved by CENELEC on 2023-12-04.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (CLC IEC/TS 61851-3-5:2023) consists of the text of IEC/TS 61851-3-5:2023, prepared by IEC/TC 69 "Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks".

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This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Endorsement notice

The text of the International Technical Specification IEC/TS 61851-3-5:2023 was approved by CENELEC as a European Technical Specification without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TS 61851-3-1	2023	Electric vehicles conductive charging system - Part 3-1: DC EV supply equipment where protection relies on double or reinforced insulation - General rules and requirements for stationary equipment	-	-
IEC/TS 61851-3-4	2023	Electric vehicles conductive charging system - Part 3-4: DC EV supply equipment where protection relies on double or reinforced insulation - General definitions and requirements for CANopen communication	-	-
		Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces - Part 4: CANopen	EN 50325-4	2002
CiA 302-2	2009	CANopen additional application layer functions - Part 2: Network management	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC VEHICLES CONDUCTIVE CHARGING SYSTEM –**Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation – Pre-defined communication parameters and general application objects**

FOREWORD

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IEC TS 61851-3-5 has been prepared by s IEC technical committee 69: Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
69/651/DTS	69/672/RVDTS 69/672A/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The following print types are used:

- requirements: in roman type;
- notes: in small roman type;
- **text formatted in bold and using mixed capital and underline are used as state names and are not to be translated.**

A list of all parts in the IEC 61851 series, published under the general title *Electric vehicles conductive charging system*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This document is published in separate parts according to the following structure:

IEC TS 61851-3-1, *Electric vehicles conductive charging system – Part 3-1: DC EV supply equipment where protection relies on double or reinforced insulation – General rules and requirements for stationary equipment*

IEC TS 61851-3-2, *Electric vehicles conductive charging system – Part 3-2: DC EV supply equipment where protection relies on double or reinforced insulation – Particular requirements for portable and mobile equipment*

IEC TS 61851-3-4, *Electric vehicles conductive charging system – Part 3-4: DC EV supply equipment where protection relies on double or reinforced insulation – General definitions and requirements for CANopen communication*

IEC TS 61851-3-5, *Electric vehicles conductive charging system – Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation – Pre-defined communication parameters and general application objects*

IEC TS 61851-3-6, *Electric vehicles conductive charging system – Part 3-6: DC EV supply equipment where protection relies on double or reinforced insulation – Voltage converter unit communication*

IEC TS 61851-3-7, *Electric vehicles conductive charging system – Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication*

ELECTRIC VEHICLES CONDUCTIVE CHARGING SYSTEM –

Part 3-5: DC EV supply equipment where protection relies on double or reinforced insulation – Pre-defined communication parameters and general application objects

1 Scope

This part of IEC 61851, which is a Technical Specification, applies to CANopen communication for the conductive transfer of electric power between the supply network and an electric road vehicle or a removable RESS or traction-battery of an electric road vehicle.

This document provides specifications with regard to the pre-defined communication parameters and general application objects.

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.

IEC TS 61851-3-1:2023, *Electric vehicles conductive charging system – Part 3-1: DC EV supply equipment where protection relies on double or reinforced insulation – General rules and requirements for stationary equipment*

IEC TS 61851-3-4:2023, *Electric vehicles conductive charging system – Part 3-4: DC EV supply equipment where protection relies on double or reinforced insulation – General definitions and requirements for CANopen communication*

EN 50325-4:2002: *Industrial communications subsystem based on ISO 11898 (CAN) For controller-device interface - Part 4: Canopen*

CiA 302-2:2009, *CANopen additional application layer functions – Part 2: Network management* (available at www.can-cia.org)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61851-3-4:20231 apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in IEC TS 61851-3-4:2023 apply.

5 Pre-defined communication objects

5.1 General

5.1.1 Overview

Clause 5 provides additional definitions with regard to the predefined communication objects in EN 50325-4.

The object dictionary structure is defined in Table 1 of EN 50325-4:2002.

Communication parameters and application parameters (e.g. process, configuration, and diagnostic data) are described by object description and entry description. Object description and entry description attributes are specified in EN 50325-4:2002. The category and entry category attributes indicate whether the object shall be implemented (mandatory) or may be implemented (optional). The access attribute describes if a process data is produced (ro) or consumed (rw) by means of SDO or PDO services, see also Annex B. The default value attribute defines the value with access attribute of the value "const", "rw" or "wo" after the first power-on or after reset if the configuration has not been saved.

5.1.2 Object 1000_h: Device type

This object shall indicate the type of device and its functionality. Figure 1 illustrates the object structure as specified in EN 50325-4:2002. In addition to the value definition given in EN 50325-4:2002, Table 1 specifies the value definition for the bit field "Additional information". The "device profile number" shall be 454_d. Table 2 specifies the object description, and Table 3 specifies the entry description.

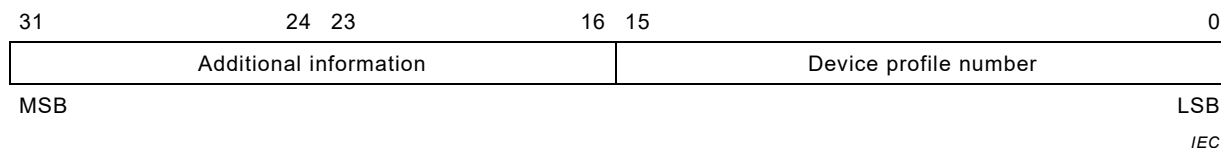


Figure 1 – Object structure

Table 1 – Value definition for the bit field additional information

Bit	Value	Description
16	0	EMSC not supported
	1	EMSC supported
24	0	Active device
	1	Passive device
25	0	Device not changeable by end user
	1	Device, changeable by the end-user
26	0	Manufacturer-specific functionality not supported
	1	Manufacturer-specific functionality supported
27	0	Masterless mode not supported
	1	Masterless mode supported
30	0	CANopen device not in Bootloader mode; application software running
	1	Bootloader active; no application software is running
All other bits shall be reserved (always 0).		

Table 2 – Object description

Attribute	Value
Index	1000 _h
Name	Device type
Object code	VAR
Data type	UNSIGNED32
Category	Mandatory

Table 3 – Entry description

Attribute	Value
Sub-index	00 _h
Access	const
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific

5.1.3 Object 1001_h: Error register

The device profile specific bit in the error register object is reserved. For details, see Annex B of EN 50325-4:2002.

5.1.4 Object 1003_h: Pre-defined error field

The pre-defined error field shall be implemented. The supported depth is manufacturer-specific. For details, see Annex B of EN 50325-4:2002.

5.1.5 Object 1005_h: COB-ID SYNC

The EMSC, the virtual device hosting the NMT master functionality, shall support SYNC producer capabilities. The device with NMT slave functionality shall support SYNC consumer capabilities. The SYNC counter value shall be supported. Table 4 provides the default values for EMSC and devices, not hosting the EMSC.

Table 4 – Default value definition object 1005_h

Device type	Value
EMSC	4000 0080 _h
Non-EMSC device	0000 0080 _h

5.1.6 Object 1006_h: Communication cycle period

The device with NMT master functionality shall support SYNC communication cycle period. The SYNC signal shall be transmitted with a SYNC cycle period of 100 ms. The device with NMT slave functionality may support this object.

5.1.7 Object 1007_h: Communication window length

It is recommended that all devices support this object, which supports TPDOs with a synchronous transmission type.

5.1.8 Object 1016_h: Heartbeat consumer time

It is recommended to set the heartbeat consumer time to 300 ms. Object description and entry description are defined in Annex B of EN 50325-4:2002. Each active device shall implement the heartbeat consumer time and shall consume the heartbeat that is produced by the EMSC. Other heartbeat messages may be consumed. The EMSC shall implement the heartbeat consumer in a way, so that the EMSC is capable to receive the heartbeat of all network participants.

5.1.9 Object 1017_h: Heartbeat producer time

All devices shall support the heartbeat producer. It is recommended to set the heartbeat producer time to 100 ms. Object description and entry description are defined in Annex B of EN 50325-4:2002.

5.1.10 Object 1018_h: Identity

Each CANopen device compliant to this application profile shall support all sub-indices of the identity object. For details, see Annex B of EN 50325-4:2002.

NOTE This object is a base for LSS usage.

5.1.11 Object 1029_h: Error behaviour

This object specifies to which NMT state the device shall be set in case a communication error or a device-internal error is detected in NMT operational state. The device-internal error shall be valid when the device's application state machine is in error state. For informative reasons, Table 5 illustrates the value definition. Table 6 specifies the object description. Table 7 specifies the entry description.

Table 5 – Value definition

Value [hex]	Function
00	Transit to NMT pre-operation state (only if current state is NMT operational)
01	No state transition
02	Transit to NMT stopped state
03 to FF	Reserved

Table 6 – Object description (optional)

Attribute	Value
Index	1029 _h
Name	Error behaviour
Object code	ARRAY
Data type	UNSIGNED8
Category	Mandatory

Table 7 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Number of error classes
Entry category	Mandatory
Access	Const
PDO mapping	No
Value range	02 _h
Default value	02 _h
Sub-index	01 _h
Description	Communication error
Entry category	Mandatory
Access	Rw
PDO mapping	No
Value range	00 _h to 02 _h
Default value	01 _h
Sub-index	02 _h
Description	Internal device error
Entry category	Mandatory
Access	Rw
PDO mapping	No
Value range	00 _h to 02 _h
Default value	01 _h

5.2 PDO communication

Subclause 5.2 provides additional specifications for the PDO communication parameters. The PDOs are specified in Annex B.

6 General application objects for CANopen devices

6.1 General

Clause 6 provides application objects, common to all CANopen devices compliant with this document. These objects may be implemented in all CANopen devices, supporting any part of this profile series. Clause 6 distinguishes between application objects that are either produced or consumed by the CANopen devices with NMT slave functionality. Produced application objects are transmitted via the CANopen interface of the CANopen device. Consumed application objects are received, respectively. All parameters in this profile are grouped in the object dictionary and defined by attributes as defined in 4.3.2 of EN 50325-4:2002. Each object within the CANopen object dictionary is addressed uniquely by using a 16-bit index and an 8-bit sub-index. The objects may be read respectively written via the CANopen network. The standardized device profile area in the index range of 6000_h to 9FFF_h contains all application objects, for example configuration parameter, process data, diagnostic information, etc., common to this document.

Within this range of parameters, it is possible to implement up to eight logical devices (see EN 50325-4:2002). The following index ranges are used:

- 6000_h to 67FF_h: 1st logical device;
- 6800_h to 6FFF_h: 2nd logical device;
- 7000_h to 77FF_h: 3rd logical device;
- 7800_h to 7FFF_h: 4th logical device;
- 8000_h to 87FF_h: 5th logical device;
- 8800_h to 8FFF_h: 6th logical device;
- 9000_h to 97FF_h: 7th logical device;
- 9800_h to 9FFF_h: 8th logical device.

The general application objects for the application profile for EMS groups the general application objects to a virtual device called GAO (General application objects). The virtual device GAO shall be implemented in any IEC 61851-3 (all parts) compatible device in case parameters of this document are supported and no other virtual devices are implemented.

6.2 Application objects produced by CANopen devices with NMT slave functionality

6.2.1 General

Subclause 6.2 defines the consumed application objects. The CANopen devices that support the NMT slave functionality only receive these application objects. The CANopen device hosting the virtual device EMSC shall produce these objects.

In order to get the actual process image, for example for speeding up the local reaction time in case of emergencies, extensions of these objects may be supported to store the received data.

6.2.2 Object 6000_h: Supported virtual devices

This object shall provide information on the supported virtual devices. In order to allow supporting several instances of a virtual device locally in one CANopen device or globally in the entire EMS application, it is necessary to distinguish between the different instances of that virtual device. CANopen device internally, the instances of the same virtual device are distinguished by means of the "Instance number". To distinguish between the same virtual devices, residing in different CANopen devices, the EMSC may configure an additional instance offset. The bit field "device class" shall provide the nominal operating voltage. Devices Class 00 or 01 devices operate on extra-low voltage. On higher classes, a galvanic isolation between communication and application is mandatory.

In case a wrong value is written by means of SDO to the instance offset sub-field, the SDO abort code 0609 0030_h shall be used to reject this attempt. In case a wrong value is written to one of the other sub-fields of this object by means of SDO, the SDO abort code 0604 0043_h shall be used.

Figure 2 illustrates the object structure. Table 8 provides the value definition. Table 9 specifies the object description, and Table 10 specifies the entry description.

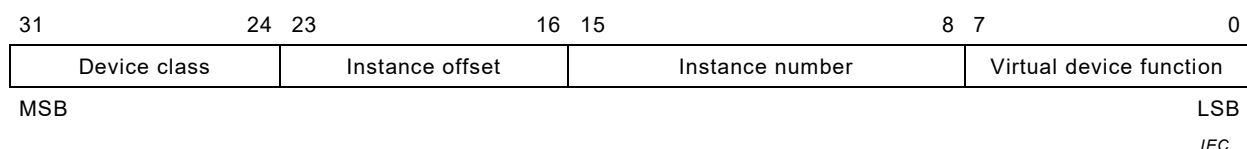


Figure 2 – Object structure supported virtual devices

Table 8 – Value definition for bit fields

Name	Value [hex]	Description
Virtual device function	00 to 01	Reserved
	02	GAO
	03	Reserved
	04	EMSC
	05	Voltage converter unit
	06	Battery system
	07	Motor control unit ^a
	08	Load monitoring unit ^a
	09	HMI control unit ^a
	0A	Security unit
	0B	Sensor unit ^a
	0C	Gateway unit ^a
	0D	Generator unit ^a
	0E	Load unit ^a
	0F to 7F	Reserved
	80	Manufacturer-specific VD
	81 to FF	Reserved
Instance number	00	Reserved
	01 to 7F	Local instance number
	80 to FF	Reserved
Instance offset	00	Default
	01 to 7F	Instance offset
	80 to FF	Reserved
Device voltage class	00	Device does not consume energy from the EMS and is only powered by an AUX voltage (passive device)
	01	Device operating at 12 V _{DC} to 48 V _{DC} nominal voltage
	02	Device operating at more than 48 V _{DC} to 96 V _{DC} nominal voltage
	03	Device operating at more than 96 V _{DC} to 200 V _{DC} nominal voltage
	04	Device operating at more than 200 V _{DC} to 400 V _{DC} nominal voltage
	05	Device operating at more than 400 V _{DC} nominal voltage
	06 to 7F	Reserved
	80	Device operating at 85 to 127 V _{AC} , single phase
	81	Device operating at 200 to 265 V _{AC} , single phase
	82 to BF	Reserved
	C0	Device operating at 85 to 127 V _{AC} , three phase, (Y-connection)
	C1	Device operating at 200 to 265 V _{AC} , three phase, (Y-connection)
	C2	Device operating at 85 to 127 V _{AC} , three phase, (Δ-connection)
	C3	Device operating at 200 to 265 V _{AC} , three phase, (Δ-connection)
	C4 to FD	Reserved
	FE	Device class provided in 60A5h
	FF	Reserved

^a This virtual device is not specified in this document. For details, refer to IEC TS 61851-3-4.

NOTE Requirements for voltages are covered by other documents of the IEC 61851-3 series.

Table 9 – Object description

Attribute	Value
INDEX	6000 _h
Name	Supported virtual device
Object code	ARRAY
Data type	UNSIGNED32
Category	Mandatory

Table 10 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	01 _h to 7F _h
Default value	No
Sub-index	01 _h
Description	VDN 1
Entry category	Mandatory
Access	ro; rw if changing "Instance offset" is supported, CANopen device is in NMT state pre-operational and virtual device FSA is in FSA state compatibility check
PDO mapping	Optional
Value range	See value definition
Default value	Manufacturer-specific
Sub-index	02 _h
Description	VDN 2
Entry category	Optional
Access	ro; rw if changing "Instance offset" is supported, CANopen device is in NMT state pre-operational and virtual device FSA is in FSA state compatibility check.
PDO mapping	Optional
Value range	See value definition
Default value	Manufacturer-specific
To	
Sub-index	7F _h
Description	VDN 127
Entry category	Optional
Access	ro; rw if changing "Instance offset" is supported, CANopen device is in NMT state pre-operational and virtual device FSA is in FSA state compatibility check.
PDO mapping	Optional
Value range	See value definition
Default value	Manufacturer-specific

6.2.3 Object 6002_h: Status word

This object shall provide the status of each virtual device, which is implemented. As specified in Figure 3, the status is represented by means of the general EMS FSA state, the virtual device specific FSA state, as well as the device status.

Figure 3 illustrates the value structure. Table 11 provides the value definition. Table 12 specifies the object description and Table 13 specifies the entry description.

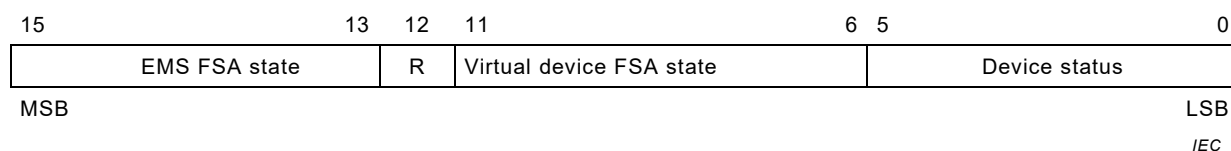


Figure 3 – Object structure device status

Table 11 – Value definition device status

Bit	Value	Description
0	0	Current input not active
	1	Current input active
1	0	Current output not active
	1	Current output active
2	0	Fixed voltage input not active
	1	Fixed voltage input active
3	0	Fixed voltage output not active
	1	Fixed voltage output active
4	0	Current regulation or limitation not active
	1	Current regulation or limitation active
5	0	Voltage regulation or limitation not active
	1	Voltage regulation or limitation active
6 to 11	00	No virtual device specific FSA states supported or virtual device specific FSA has not been accessed yet
	01 to 3F	Indication of virtual device specific FSA states
12	Reserved for future use; always 0	
13 to 15	0	FSA state Disconnected
	1	FSA state Connected
	2	FSA state Compatibility Check
	3	FSA state Limiting
	4	FSA state Operating
	5	FSA state Masterless operating
	6	FSA state sleep mode
	7	Reserved

Table 12 – Object description

Attribute	Value
Index	6002 _h
Name	Status word
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 13 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	01 _h to 7F _h
Default value	Manufacturer-specific
Sub-index	01 _h
Description	VDN 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	VDN 2
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
To	
Sub-index	7F _h
Description	VDN 127
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No

6.2.4 Object 6003_h: Device capability

This object shall provide the device capability. Figure 4 illustrates the value structure. Table 14 provides the value definition. Table 15 specifies the object description and Table 16 specifies the entry description.

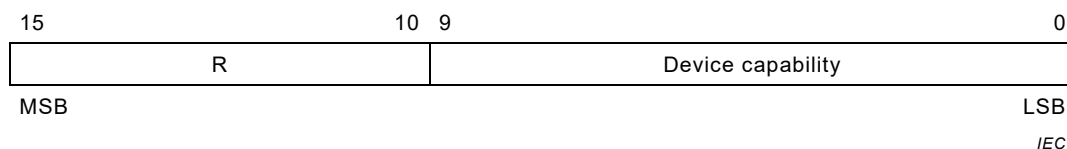


Figure 4 – Value structure

Table 14 – Value definition

Name	Bit	Value	Description
device capability	0	0 _b	Device is not able to switch off or on
		1 _b	Device is able to switch off or on
	1	0 _b	Device is possibly passive
		1 _b	Device is possibly active
	2	0 _b	Device is not master capable
		1 _b	Device is a master capable
	3	0 _b	Device is not able to switch to sleep mode
		1 _b	Device is able to switch to sleep mode
	4	0 _b	Device is not able to limit the input current
		1 _b	Device is able to limit the input current
	5	0 _b	Device is not able to limit the output current
		1 _b	Device is able to limit the output current
	6	0 _b	Device is not able to limit the input voltage
		1 _b	Device is able to limit the input voltage
	7	0 _b	Device is not able to limit the output voltage
		1 _b	Device is able to limit the output voltage
	8	0 _b	Device is not able to transmit dynamic limitation
		1 _b	Device is able to transmit dynamic limitation
	9	0 _b	Device is not able to receive dynamic limitation
		1 _b	Device is able to receive dynamic limitation
R	10 to 15	0 _b	Reserved (always 0)
		1 _b	

Table 15 – Object description

Attribute	Value
Index	6003 _h
Name	Device capability
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 16 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	01 _h to 7F _h
Default value	Manufacturer-specific
Sub-index	01 _h
Description	VDN 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	VDN 2
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
To	
Sub-index	7F _h
Description	VDN 127
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No

6.2.5 Object 6004_h: System date and time (optional)

This object shall provide system date and time. Table 17 specifies the object description, and Table 18 specifies the entry description. Sub-index 01_h shall provide the system date's number of days, given since January 1st, 1984. Sub-index 02_h shall provide the system date's time, given in multiples of 1 ms since midnight.

Table 17 – Object description

Attribute	Value
INDEX	6004 _h
Name	System date and time
Object code	ARRAY
Data type	UNSIGNED32
Category	Optional

Table 18 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h
Default value	02 _h
Sub-index	01 _h
Description	Days
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No
Sub-index	02 _h
Description	Time
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.6 Object 6005_h: Device unique part number (optional)

This object shall provide the unique part number of the device. Table 19 specifies the object description and Table 20 specifies the entry description.

Table 19 – Object description

Attribute	Value
Index	6005 _h
Name	Device unique part number
Object code	VAR
Data type	UNSIGNED32
Category	Optional

Table 20 – Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.7 Object 6006_h: Device electronic production date (optional)

This object shall provide the date of device electronic production. Table 21 specifies the object description and Table 22 specifies the entry description. Sub-index 01_h shall provide the production date's number of days, given since January 1st, 1984. Sub-index 02_h shall provide the production date's time, given in multiples of 1 ms since midnight.

Table 21 – Object description

Attribute	Value
Index	6006 _h
Name	Device electronic production date
Object code	ARRAY
Data type	UNSIGNED32
Category	Optional

Table 22 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h
Default value	02 _h
Sub-index	01 _h
Description	Days
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No
Sub-index	02 _h
Description	Time
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.8 Object 6007_h: Device installation date (optional)

This object shall provide the date of device installation. Table 23 specifies the object description and Table 24 specifies the entry description. Sub-index 01_h shall provide the installation date's number of days, given since January 1st, 1984. Sub-index 02_h shall provide the installation date's time, given in multiples of 1 ms since midnight.

Table 23 – Object description

Attribute	Value
Index	6007 _h
Name	Device installation date
Object code	ARRAY
Data type	UNSIGNED32
Category	Optional

Table 24 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h
Default value	02 _h
Sub-index	01 _h
Description	Days
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No
Sub-index	02 _h
Description	Time
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.9 Object 6008_h: Device nominal voltage (optional, mandatory for active devices)

This object shall provide the nominal voltage as labelled on the device. This voltage shall not exceed the minimal and the maximal voltage of the device. The values shall be given in multiples of 1 mV. Table 25 specifies the object description and Table 26 specifies the entry description. The sub-indices 01_h to 7F_h shall provide the local rated voltages of the device. The sub-indices 80_h to FE_h may be used to administer the rated voltages of other active devices in the system.

NOTE Passive devices return 0.

Table 25 – Object description

Attribute	Value
Index	6008 _h
Name	Device nominal voltage
Object code	ARRAY
Data type	INTEGER32
Category	Optional, mandatory for active devices

Table 26 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	01 _h to FE _h
Default value	No
Sub-index	01 _h
Description	Voltage VDN 1
Entry category	Mandatory
Access	const
PDO mapping	Optional
Value range	INTEGER32
Default value	No
Sub-index	02 _h
Description	Voltage VDN 2
Entry category	Optional
Access	const
PDO mapping	Optional
Value range	INTEGER32
Default value	No
to	
Sub-index	7F _h
Description	Voltage VDN 127
Entry category	Optional
Access	const
PDO mapping	Optional
Value range	INTEGER32
Default value	No
Sub-index	80 _h
Description	External voltage 1
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	INTEGER32
Default value	Manufacturer-specific
to	
Sub-index	FE _h
Description	External voltage 127
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	INTEGER32
Default value	Manufacturer-specific

6.2.10 Object 6009_h: Device alarm status

This object shall provide the device alarm status. Figure 5 illustrates the value structure. Table 27 provides the value definition. Table 28 specifies the object description and Table 29 specifies the entry description.

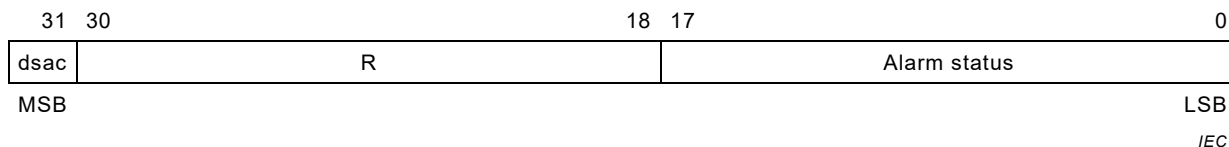


Figure 5 – Value structure

Table 27 – Value definition

Name	Bit	Value	Description
alarm status	0	0 _b	No over voltage
		1 _b	Over voltage occurred
	1	0 _b	No under voltage
		1 _b	Under voltage occurred
	2	0 _b	No output over current
		1 _b	Output over current
	3	0 _b	No input over current
		1 _b	Input over current
	4	0 _b	No electronic over temperature
		1 _b	Electronic over temperature
	5	0 _b	No battery cells over temperature
		1 _b	Battery cells over temperature occurred
	6	0 _b	No communication error
		1 _b	Communication error occurred
	7	0 _b	No battery system compatibility error occurred
		1 _b	Battery system compatibility error occurred
	8	0 _b	No electronic power stage defect detected
		1 _b	Electronic power stage defect
	9	0 _b	All fuses ok
		1 _b	Fuse blown detected
	10	0 _b	All cells ok
		1 _b	Cell damaged
	11	0 _b	Charge temperature ok
		1 _b	Charge over temperature
	12	0 _b	Discharge temperature ok
		1 _b	Discharge over temperature
	13	0 _b	All sensors ok
		1 _b	Sensor damaged
	14	0 _b	No broken wire detected
		1 _b	Wire broken
	15	0 _b	No isolation damage detected

Name	Bit	Value	Description
	16	1 _b	Isolation damaged
		0 _b	Fuel capacity ok
		1 _b	Low fuel capacity
	17	0 _b	No maintenance required
		1 _b	Maintenance required
R	18 to 30	Reserved (always 0)	
dsac: device specific alarm status	31	0 _b	No error
		1 _b	Device specific alarm status

Table 28 – Object description

Attribute	Value
Index	6009 _h
Name	Device alarm status
Object code	VAR
Data type	UNSIGNED32
Category	Optional

Table 29 – Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No

6.2.11 Object 600A_h: Device alarm capability

This object shall provide the supported device alarm capability. Figure 6 illustrates the value structure. Table 30 provides the value definition. Table 31 specifies the object description and Table 32 specifies the entry description.

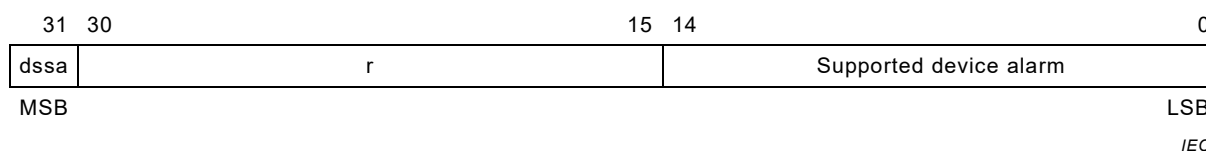
**Figure 6 – Value structure**

Table 30 – Value definition

Name	Bit	Value	Description
supported device alarm	0	0 _b	Over voltage alarm not supported
		1 _b	Over voltage alarm supported
	1	0 _b	Under voltage alarm not supported
		1 _b	Under voltage alarm supported
	2	0 _b	Output over current alarm not supported
		1 _b	Output over current alarm supported
	3	0 _b	Input over current alarm not supported
		1 _b	Input over current alarm supported
	4	0 _b	Electronic over temperature alarm not supported
		1 _b	Electronic over temperature alarm supported
	5	0 _b	Battery cells over temperature alarm not supported
		1 _b	Battery cells over temperature alarm supported
	6	0 _b	Communication error alarm not supported
		1 _b	Communication error alarm supported
	7	0 _b	Battery system compatibility error alarm not supported
		1 _b	Battery system compatibility error alarm supported
	8	0 _b	Electronic power stage defect alarm not supported
		1 _b	Electronic power stage defect alarm supported
	9	0 _b	Fuse blown alarm not supported
		1 _b	Fuse blown alarm supported
	10	0 _b	Cell damaged alarm not supported
		1 _b	Cell damaged alarm supported
	11	0 _b	Charge over temperature alarm not supported
		1 _b	Charge over temperature alarm supported
	12	0 _b	Discharge over temperature alarm not supported
		1 _b	Discharge over temperature alarm supported
	13	0 _b	Sensor damaged alarm not supported
		1 _b	Sensor damaged alarm supported
	14	0 _b	Wire broken alarm not supported
		1 _b	Wire broken alarm supported
	15	0 _b	Isolation damaged alarm not supported
		1 _b	Isolation damaged alarm supported
R	16 to 30	0 _b	Reserved (always 0)
		1 _b	
dssa: device specific supported alarm	31	0 _b	Alarm not supported
		1 _b	Alarm supported

Table 31 – Object description

Attribute	Value
Index	600A _h
Name	Supported device alarm
Object code	VAR
Data type	UNSIGNED32
Category	Optional

Table 32 – Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.12 Object 600B_h: Device warning status (optional)

This object shall provide the device warning status. Figure 7 illustrates the value structure. Table 33 provides the value definition. Table 34 specifies the object description and Table 35 specifies the entry description.

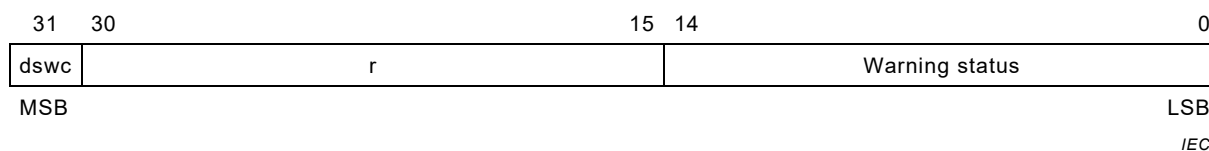
**Figure 7 – Value structure**

Table 33 – Value definition

Name	Bit	Value	Description
warning status	0	0 _b	No over voltage warning
		1 _b	Over voltage warning
	1	0 _b	No under voltage warning
		1 _b	Under voltage warning
	2	0 _b	No output over current warning
		1 _b	Output over current warning
	3	0 _b	No input over current warning
		1 _b	Input over current warning
	4	0 _b	No electronic over temperature warning
		1 _b	Electronic over temperature warning
	5	0 _b	No battery cells over temperature warning
		1 _b	Battery cells over temperature warning
	6	0 _b	No communication error warning
		1 _b	Communication error warning
	7	0 _b	No battery system compatibility error warning
		1 _b	Battery system compatibility error warning
	8	0 _b	No electronic power stage defect warning
		1 _b	Electronic power stage defect warning
	9	0 _b	No fuse blown warning
		1 _b	Fuse blown warning
	10	0 _b	No cell damaged warning
		1 _b	Cell damaged warning
	11	0 _b	No charge over temperature warning
		1 _b	Charge over temperature warning
	12	0 _b	No discharge over temperature warning
		1 _b	Discharge over temperature warning
	13	0 _b	No sensor damaged warning
		1 _b	Sensor damaged warning
	14	0 _b	No wire broken warning
		1 _b	Wire broken warning
	15	0 _b	No isolation damaged warning
		1 _b	Isolation damaged warning
R	16 to 30	0 _b	Reserved (always 0)
		1 _b	
dswc: device specific warning status	31	0 _b	No manufacturer-specific warning
		1 _b	Manufacturer-specific warning

Table 34 – Object description

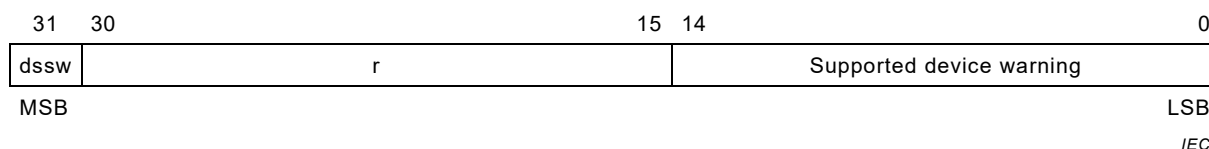
Attribute	Value
Index	600B _h
Name	Device warning status
Object code	VAR
Data type	UNSIGNED32
Category	Optional

Table 35 – Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.13 Object 600C_h: Device warning capability (optional)

This object shall provide the device warnings capabilities. Figure 8 illustrates the value structure. Table 36 provides the value definition. Table 37 specifies the object description and Table 38 specifies the entry description.

**Figure 8 – Value structure****Table 36 – Value definition**

Name	Bit	Value	Description
supported device warning	0	0 _b	Over voltage warning not supported
		1 _b	Over voltage warning supported
	1	0 _b	Under voltage warning not supported
		1 _b	Under voltage warning supported
	2	0 _b	Output over current warning not supported
		1 _b	Output over current warning supported
	3	0 _b	Input over current warning not supported
		1 _b	Input over current warning supported
	4	0 _b	Electronic over temperature warning not supported
		1 _b	Electronic over temperature warning supported
	5	0 _b	Battery cells over temperature warning not supported



Name	Bit	Value	Description
	6	1 _b	Battery cells over temperature warning supported
		0 _b	Communication error warning not supported
	7	1 _b	Communication error warning supported
		0 _b	Battery system compatibility error warning not supported
	8	1 _b	Battery system compatibility error warning supported
		0 _b	Electronic power stage defect warning not supported
	9	1 _b	Electronic power stage defect warning supported
		0 _b	Fuse blown warning not supported
	10	1 _b	Fuse blown warning supported
		0 _b	Cell damaged warning not supported
	11	1 _b	Cell damaged warning supported
		0 _b	Input over temperature warning not supported
	12	1 _b	Input over temperature warning supported
		0 _b	Output over temperature warning not supported
	13	1 _b	Output over temperature warning supported
		0 _b	Sensor damaged warning not supported
	14	1 _b	Sensor damaged warning supported
		0 _b	Wire broken warning not supported
	15	1 _b	Wire broken warning supported
		0 _b	Isolation damaged warning not supported
R	16 to 30	0 _b	Reserved (always 0)
		1 _b	
dssw: device specific supported warning	31	0 _b	Device-specific warning not supported
		1 _b	Device-specific warning supported

Table 37 – Object description

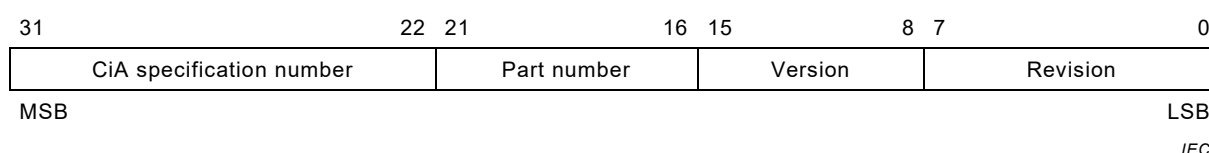
Attribute	Value
Index	600C _h
Name	Supported device warning
Object code	VAR
Data type	UNSIGNED32
Category	Optional

Table 38 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.2.14 Object 600E_h: Implemented specification versions

This object shall provide version numbers of the implemented CiA specifications. Figure 9 provides object structure. Table 39 provides the value definition. Table 40 specifies the object description and Table 41 specifies the entry description.

**Figure 9 – Value structure****Table 39 – Value definition**

Bit field	Value	Description
CiA specification number	0	Reserved
	1	IEC 61851-3 series implemented
	2 to 99	Reserved
	100 to 899	Number of implemented CiA specification
	900 to 1023	Reserved
Part number	0	Specification indicated in CiA specification number is a monolithic document. There do not exist several parts
	1 to 63	Implemented part of that CiA specification, whose CiA specification number is indicated
Version	0	Reserved
	1 to 255	Version of the part of the implemented CiA specification
Revision	0	Reserved
	1 to 255	Revision of the part of the implemented CiA specification

Table 40 – Object description

Attribute	Value
Index	600E _h
Name	Implemented profile versions
Object code	ARRAY
Data type	UNSIGNED32
Category	Mandatory

Table 41 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	01 _h to 7F _h
Default value	No
Sub-index	01 _h
Description	Implemented profile version 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	Implemented profile version 2
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
To	
Sub-index	7F _h
Description	Implemented profile version 127
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No

6.2.15 Object 6020_h: Device request dynamic voltage limitation

This object shall provide the request for dynamic voltage limitation to a certain percentage of the maximum voltage of the device. In case an overload occurs in the device, the device reduces the local input voltage to the dynamic voltage limitation. The values shall be given in multiples of 0,01 %. The value definition is specified in Table 42. Table 43 specifies the object description and Table 44 specifies the entry description.

Table 42 – Value definition

Value	Definition
0000 _h	0 % (maximum limitation)
0001 _h to 270F _h	Limitation to 0,01 % to 99,99 % of maximum voltage of device
2710 _h	100 % (no limitation)
2711 _h to FFFE _h	100,01 % to 655,34 % of maximum voltage ^a of device (value shall not exceed maximum voltage specified in Table 2 of IEC TS 61851-3-1:–)
FFFF _h	Reserved
^a In case of, for example, huge voltage drops on the line, the demanded voltage is not reached. Therefore, an option is provided to request "more" than the maximum voltage. Warning: in case several active devices are connected, make sure that all active devices operate within their operating limits.	

Table 43 – Object description

Attribute	Value
Index	6020 _h
Name	Device request dynamic voltage limitation
Object code	ARRAY
Data type	UNSIGNED16
Category	Conditional; mandatory for active devices

Table 44 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	01 _h to FE _h
Default value	No
Sub-index	01 _h
Description	Voltage limitation on input VDN 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional

Attribute	Value
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	Voltage limitation on input VDN 2
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
to	
Sub-index	7F _h
Description	Voltage limitation on input VDN 127
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	80 _h
Description	External voltage limitation on input 1
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific
to	
Sub-index	FE _h
Description	External voltage limitation on input 127
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific

6.2.16 Object 6022_h: Device request dynamic current input limitation

This object shall provide the request for dynamic current input limitation to a certain percentage of the maximum current of the device. In case an overload occurs in the device, the device reduces the local input current with the dynamic current limitation. The values shall be given in multiples of 0,01 %. The value definition is specified in Table 45. Table 46 specifies the object description and Table 47 specifies the entry description.

Table 45 – Value definition

Value	Definition
0000 _h	0 % (maximum limitation)
0001 _h to 270F _h	Limitation to 0,01 % to 99,99 % of current input
2710 _h	100 % (no limitation)
2711 _h to FFFE _h	100,01 % to 655,34 % of current input ^a
FFFF _h	Reserved
^a In case of, for example, huge current drops on the line, the demanded current is not reached. Therefore, an option is provided to request "more" than the current input. Warning: in case several active devices are connected, make sure that all active devices operate within their operating limits.	

Table 46 – Object description

Attribute	Value
Index	6022 _h
Name	Device request dynamic current input limitation
Object code	ARRAY
Data type	UNSIGNED16
Category	Conditional; mandatory for active devices

Table 47 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	01 _h to FE _h
Default value	No
Sub-index	01 _h
Description	Current limitation on input VDN 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	Current limitation on input VDN 2
Entry category	Optional
Access	Ro
PDO mapping	Optional



Attribute	Value
Value range	See value definition
Default value	No
to	
Sub-index	7F _h
Description	Current limitation on input VDN 127
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
to	
Sub-index	80 _h
Description	External current limitation on input 1
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific
to	
Sub-index	FE _h
Description	External current limitation on input 127
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific

6.2.17 Object 6023_h: Device request dynamic current output limitation

This object shall provide the request for dynamic current output limitation to a certain percentage of the maximum current of the device. In case an overload occurs in the device, the device reduces the local output current with the dynamic current limitation. The values shall be given in multiples of 0,01 %. The value definition is specified in Table 48. Table 49 specifies the object description and Table 50 specifies the entry description.

Table 48 – Value definition

Value	Definition
0000 _h	0 % (maximum limitation)
0001 _h to 270F _h	Limitation to 0,01 % to 99,99 % of current output
2710 _h	100 % (no limitation)
2711 _h to FFFE _h	100,01 % to 655,34 % of current output ^a
FFFF _h	Reserved
^a In case of, for example, huge voltage drops on the line, the demanded voltage is not reached. Therefore, an option is provided to request "more" than the current output. Warning; in case several active devices are connected, make sure that all active devices operate within their operating limits.	

Table 49 – Object description

Attribute	Value
Index	6023 _h
Name	Device request dynamic current output limitation
Object code	ARRAY
Data type	UNSIGNED16
Category	Conditional; mandatory for active devices

Table 50 – Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	01 _h to FE _h
Default value	No
Sub-index	01 _h
Description	Current limitation on output VDN 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
Sub-index	02 _h
Description	Current limitation on output VDN 2
Entry category	Optional
Access	ro
PDO mapping	Optional



Attribute	Value
Value range	See value definition
Default value	No
to	
Sub-index	7F _h
Description	Current limitation on output VDN127
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	See value definition
Default value	No
to	
Sub-index	80 _h
Description	External current limitation on output 1
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific
to	
Sub-index	FE _h
Description	External current limitation on output 127
Category	Optional
Access	rw
PDO mapping	No
Value range	See value definition
Default value	Manufacturer-specific

6.2.18 Object 6024_h: Device maximum continuous input current

This object shall provide maximum continuous input current that is safely delivered to the device from the EMS. The values shall be given in multiples of 1 mA. Table 51 specifies the object description and Table 52 specifies the entry description. Sub-index 01_h to sub-index 7F_h shall be used to provide the device maximum continuous input currents. The sub-indices 80_h to FE_h may be used to administer maximum continuous input currents from other devices in the system.

Table 51 – Object description

Attribute	Value
Index	6024 _h
Name	Device maximum continuous input current
Object code	ARRAY
Data type	INTEGER32
Category	Conditional; mandatory for active devices