

TECHNICAL SPECIFICATION



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

IEC TS 61851-3-7:2023

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CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms and definitions	11
4 Symbols and abbreviated terms.....	12
5 Operating principles	12
5.1 General.....	12
5.2 Battery system specific FSA.....	12
5.3 State definitions	13
5.4 Transitions in the FSA for battery systems	13
6 Object dictionary.....	14
6.1 General.....	14
6.2 Additional definitions to general application objects	15
6.2.1 General	15
6.2.2 Object 6001 _h : Control word	15
6.2.3 Object 6002 _h : Status word.....	15
6.3 Detailed complex data type specifications.....	15
6.3.1 General	15
6.3.2 Object 0081 _h to 0082 _h : Reserved.....	16
6.3.3 Object 0083 _h : Ni-MH charging rules parameter record.....	16
6.4 Produced application objects	16
6.4.1 General	16
6.4.2 Object 6100 _h : Type of battery cells.....	16
6.4.3 Object 6102 _h : Battery system rated Wh capacity (optional)	20
6.4.4 Object 6105 _h : Battery system temperature	22
6.4.5 Object 6126 _h : Battery system maximum cell voltage (optional, mandatory for rental/swap battery systems).....	25
6.4.6 Object 6127 _h : Battery system minimum cell voltage (optional, mandatory for rental/swap battery systems).....	27
6.4.7 Object 6160 _h : Actual battery system Wh capacity	28
6.4.8 Object 6162 _h : Full EMS output battery system Wh capacity (optional, mandatory for rental/swap battery systems).....	30
6.4.9 Object 6164 _h : Relative battery system Wh capacity (SOC) (optional)	32
6.4.10 Object 6192 _h : Reserved	34
6.4.11 Object 6193 _h : Threshold time of the battery system maximum charging time	34
6.5 Produced application objects (optional).....	35
6.5.1 General	35
6.5.2 Object 6101 _h : Battery system connecting status (optional)	35
6.5.3 Object 6103 _h : Battery system rated Ah capacity (optional)	38
6.5.4 Object 6104 _h : Battery system number of cells (optional).....	39
6.5.5 Object 6106 _h : Battery system lifetime (optional)	41

6.5.6	Object 6107 _h : Battery system lifetime in cycles (optional).....	42
6.5.7	Object 6108 _h : Battery system lifetime EMS input capacity (optional)	44
6.5.8	Object 6109 _h : Battery system manufacturer (optional).....	45
6.5.9	Object 610A _h : Battery system cell manufacturer (optional)	47
6.5.10	Object 610B _h : Battery system cell notation (optional)	48
6.5.11	Object 6120 _h : Battery system maximum charge start temperature (optional).....	49
6.5.12	Object 6121 _h : Battery system minimum charge start temperature (optional).....	51
6.5.13	Object 6122 _h : Battery system maximum discharge temperature (optional).....	53
6.5.14	Object 6123 _h : Battery system minimum discharge temperature (optional).....	54
6.5.15	Object 6124 _h : Battery system maximum temperature for storage (optional).....	56
6.5.16	Object 6125 _h : Battery system minimum temperature for storage (optional).....	58
6.5.17	Object 6161 _h : Actual battery system Ah capacity (optional)	59
6.5.18	Object 6163 _h : Full EMS output battery system Ah capacity (optional)	61
6.5.19	Object 6165 _h : Battery system VDN 1 actual cell voltage (optional)	62
6.5.20	Object 6166 _h to 6174 _h : Battery system VDN 2 to 16 actual cell voltage (optional).....	64
6.5.21	Object 6175 _h : Battery system balance (optional)	64
6.5.22	Object 6176 _h : Battery system SOH (optional)	65
6.5.23	Object 6177 _h : Battery system EMS output time (optional).....	67
6.5.24	Object 6178 _h : Battery system EMS input time (optional).....	69
6.5.25	Object 6179 _h : Battery system EMS output Ah counter (optional)	70
6.5.26	Object 617A _h : Battery system EMS input Ah counter (optional)	72
6.5.27	Object 617B _h : Battery system EMS output Wh counter (optional)	74
6.5.28	Object 617C _h : Battery system EMS input Wh counter (optional)	75
6.5.29	Object 617D _h : Battery system EMS output counter (optional)	77
6.5.30	Object 617E _h : Battery system EMS input counter (optional)	79
6.5.31	Object 617F _h : Battery system deep discharging counter (optional)	80
6.5.32	Object 6180 _h : Battery system short-circuit counter (optional)	82
6.5.33	Object 6181 _h : Battery system over-temperature counter (optional)	83
6.5.34	Object 6182 _h : Temperature dependent average EMS output current (optional).....	85
6.5.35	Object 6183 _h : Temperature dependent peak EMS output current (optional).....	86
6.5.36	Object 6184 _h : Temperature dependent average EMS input current (optional).....	87
6.5.37	Object 6185 _h : Temperature dependent peak EMS input current (optional).....	88
6.5.38	Object 6186 _h : Temperature dependent capacity correction (optional)	89

6.5.39	Object 6187 _h : Battery system capacity dependent current correction (optional)	90
6.5.40	Object 6188 _h : Battery system temperature dependent self-discharge rate (optional)	92
6.5.41	Object 6189 _h : Temperature dependent cell charge maximum voltage (optional)	93
6.5.42	Object 618A _h : Battery system 100 % to 90 % capacity dependent voltage correction (optional)	94
6.5.43	Object 618B _h : Battery system 0 % to 10 % capacity dependent voltage correction (optional)	95
6.5.44	Object 618C _h : Battery system point of cell balancing (optional)	96
6.6	Consumed application objects	98
6.6.1	General	98
6.6.2	Object 618F _h : EMS output rules for Ni-MH battery system (optional)	98
6.6.3	Object 618D _h : Battery system go to deep sleep mode timing (optional)	101
6.6.4	Object 618E _h : Battery system minimal SOC for go to deep sleep mode (optional)	103
6.6.5	Object 6190 _h : Battery system specific controls (optional)	104
<p style="text-align: center;">STANDARD PREVIEW (standards.iteh.ai)</p> <p style="text-align: center;">IEC TS 61851-3-7:2023</p> <p style="text-align: center;">https://standards.iteh.ai/catalog/standards/sist/273bfad9-ed41-4190-bc13-73358e9adcif/iec-ts-61851-3-7-2023</p>		
	Figure 1 – FSA for battery system	13
	Figure 2 – Value structure	16
	Figure 3 – Object structure	36
	Figure 4 – Object structure	39
	Table 1 – States behaviour	13
	Table 2 – Transitions, events and actions	14
	Table 3 – Value definition	15
	Table 4 – Value definition for VD specific FSA control	15
	Table 5 – Value definition for virtual device FSA state	15
	Table 6 – Ni-MH charging rules parameter record	16
	Table 7 – Value definition	17
	Table 8 – Object description	18
	Table 9 – Entry description	19
	Table 10 – Object description	20
	Table 11 – Entry description	21
	Table 12 – Grouping of sub-indices	22
	Table 13 – Object description	23
	Table 14 – Entry description	23
	Table 15 – Object description	25
	Table 16 – Entry description	26
	Table 17 – Object description	27
	Table 18 – Entry description	27
	Table 19 – Object description	29
	Table 20 – Entry description	29
	Table 21 – Object description	30

Table 22 – Entry description	31
Table 23 – Value definition	32
Table 24 – Object description	32
Table 25 – Entry description	33
Table 26 – Entry description	34
Table 27 – Entry description	35
Table 28 – Value definition	36
Table 29 – Object description	36
Table 30 – Entry description	37
Table 31 – Object description	38
Table 32 – Entry description	38
Table 33 – Value definition for the parallel and series cell number fields.....	40
Table 34 – Object description	40
Table 35 – Entry description	40
Table 36 – Object description	41
Table 37 – Entry description	42
Table 38 – Object description	43
Table 39 – Entry description	43
Table 40 – Object description	44
Table 41 – Entry description	44
Table 42 – Object description	46
Table 43 – Entry description	46
Table 44 – Object description	47
Table 45 – Entry description	47
Table 46 – Object description	48
Table 47 – Entry description	49
Table 48 – Object description	50
Table 49 – Entry description	50
Table 50 – Object description	51
Table 51 – Entry description	52
Table 52 – Object description	53
Table 53 – Entry description	53
Table 54 – Object description	55
Table 55 – Entry description	55
Table 56 – Object description	56
Table 57 – Entry description	56
Table 58 – Object description	58
Table 59 – Entry description	58
Table 60 – Object description	59
Table 61 – Entry description	60
Table 62 – Object description	61
Table 63 – Entry description	61
Table 64 – Object description	63

Table 65 – Entry description	63
Table 66 – Index assignments for battery system 2 to 16	64
Table 67 – Value definition	64
Table 68 – Object description	64
Table 69 – Entry description	65
Table 70 – Value definition	66
Table 71 – Object description	66
Table 72 – Entry description	66
Table 73 – Object description	67
Table 74 – Entry description	68
Table 75 – Object description	69
Table 76 – Entry description	69
Table 77 – Object description	71
Table 78 – Entry description	71
Table 79 – Object description	72
Table 80 – Entry description	73
Table 81 – Object description	74
Table 82 – Entry description	74
Table 83 – Object description	76
Table 84 – Entry description	76
Table 85 – Object description	77
Table 86 – Entry description	77
Table 87 – Object description	79
Table 88 – Entry description	79
Table 89 – Object description	80
Table 90 – Entry description	81
Table 91 – Object description	82
Table 92 – Entry description	82
Table 93 – Object description	84
Table 94 – Entry description	84
Table 95 – Object description	85
Table 96 – Entry description	86
Table 97 – Object description	86
Table 98 – Entry description	87
Table 99 – Object description	87
Table 100 – Entry description	88
Table 101 – Object description.....	88
Table 102 – Entry description	89
Table 103 – Object description.....	89
Table 104 – Entry description	90
Table 105 – Sub-index relation to capacity range.....	90
Table 106 – Value definition.....	91
Table 107 – Object description.....	91

Table 108 – Entry description 91

Table 109 – Object description..... 92

Table 110 – Entry description 92

Table 111 – Object description..... 93

Table 112 – Entry description 93

Table 113 – Value definition..... 94

Table 114 – Object description..... 94

Table 115 – Entry description 94

Table 116 – Value definition..... 95

Table 117 – Object description..... 95

Table 118 – Entry description 96

Table 119 – Object description..... 96

Table 120 – Entry description 97

Table 121 – Object description..... 99

Table 122 – Entry description 99

Table 123 – Object description..... 102

Table 124 – Entry description 102

Table 125 – Value definition..... 103

Table 126 – Object description..... 103

Table 127 – Entry description 103

Table 128 – Value definition..... 105

Table 129 – Object description..... 105

Table 130 – Entry description 106

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC VEHICLES CONDUCTIVE CHARGING SYSTEM –**Part 3-7: DC EV supply equipment where protection
relies on double or reinforced insulation –
Battery system communication**

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IEC TS 61851-3-7 has been prepared by 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
69/653/DTS	69/674/RVDTS
	69/674A/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.

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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,
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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 – 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*

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ELECTRIC VEHICLES CONDUCTIVE CHARGING SYSTEM –

Part 3-7: DC EV supply equipment where protection relies on double or reinforced insulation – Battery system communication

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 specifies application objects provided by the battery system.

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

IEC TS 61851-3-5:2023 *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*

EN 50325-4:2002, *Industrial communications subsystem based on ISO 11898 (CAN) for controller- device interfaces – Part 4: CANopen*

EN 50604-1:2016, *Secondary lithium batteries for light EV (electric vehicle) applications – Part 1: General safety requirements and test methods*

3 Terms and definitions

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

Ag	silver
AGM	absorbent glass mat
Al	aluminium
Cd	cadmium
Fe	iron
Li	lithium
MeO	metal oxide
Ni	nickel
Ni-MH	nickel metal hydride
SOC	state of charge
SOH	state of health
TiO	titanium oxide
Zn	zinc

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5 Operating principles

5.1 General

IEC TS 61851-3-7:2023

In addition to the finite state automaton (FSA) defined by 9.1 of IEC TS 61851-3-4:2023, this document defines an additional battery system specific FSA to operate batteries in a common way. Any battery system supports the mandatory FSA states. State transitions within the FSA are based on device internal events (e.g. occurrence of device errors) or on the reception of the FSA control word.

5.2 Battery system specific FSA

The battery system specific FSA as defined in Figure 1 shall start with the initial entry in the EMS FSA state **Disconnected** and shall exist as long as the EMS FSA is not left.

The FSA defines the application behaviour of the battery system (see also Table 1). The battery system shall ensure safety by providing independent local control according to EN 50604-1:2016 (even when the CAN network is not working properly). The NMT slave FSA as defined in EN 50325-4:2002, the EMS FSA and the battery system FSA are coupled in the following way: a state change in any of the involved FSAs may trigger state changes in the other FSAs.

For state transitions (numbers in Figure 1), see Table 2.

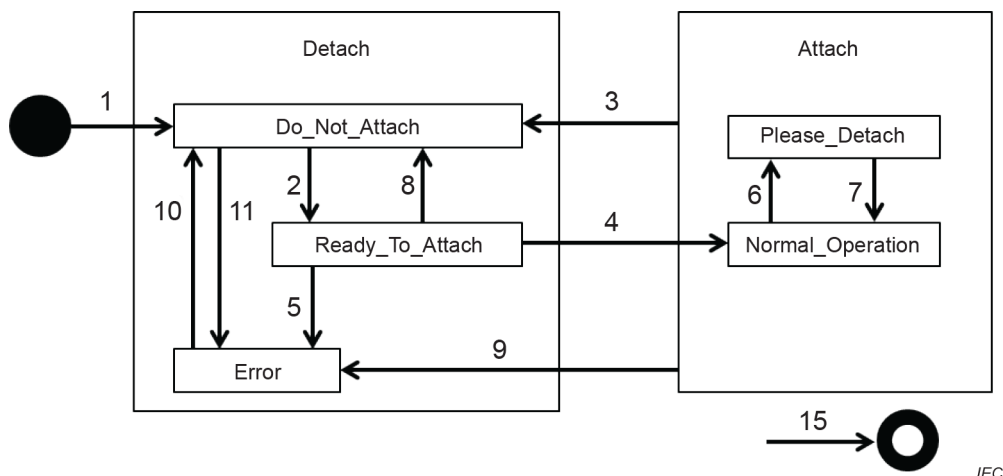


Figure 1 – FSA for battery system

5.3 State definitions

The FSA for battery systems as shown in Figure 1 shall provide the following states with the described state behaviour in Table 1 and state transitions in Table 2.

NOTE 1 States refer to removable and non-removable battery systems.

NOTE 2 "Detached" does not mean "removable".

Table 1 – States behaviour

Name	Behaviour
Initial	Pseudo state indicating the activation of the FSA
Detached	Battery system is not connected to the power circuit
Do_Not_Attach	Battery system may be configured and is not prepared to be connected to the power circuit
Ready_To_Attach	Battery system is prepared and ready to be attached to the power circuit.
Attached	Battery system is connected to the power circuit
Normal_Operations	Battery system is operating on the power circuit
Please_Detach	Battery system indicates itself that it requires to be disconnected from the power circuit (e.g. because the battery system operates no longer within the operating limits).
Error	The battery system is in an error condition. There is no power transferred. See also Clause 7 of IEC TS 61851-3-4:2023.
Final	Pseudo state, indicating the deactivation of the FSA

5.4 Transitions in the FSA for battery systems

The FSA for battery systems shall support the transitions as given in Table 2.