
Sistemi za prenos prevodne moči in energije za električna vozila - 24. del: Digitalna komunikacija med opremo za enosmerno (DC) napajanje električnega vozila in električnim vozilom za krmiljenje enosmernega (DC) napajanja

Conductive power and energy transfer systems for electric vehicles - Part 24: Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging

Konduktive Ladesysteme für Elektrofahrzeuge - Teil 24: Digitale Kommunikation zwischen einer Gleichstromversorgungseinrichtung für Elektrofahrzeuge und dem Elektrofahrzeug zur Steuerung des Gleichstromladevorgangs

Système de charge conductive pour véhicules électriques - Partie 24: Communication numérique entre le système d'alimentation à courant continu et le véhicule électrique pour le contrôle de la charge à courant continu

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43.120 Električna cestna vozila Electric road vehicles

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69/1160/CDV

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IEC TC 69 : ELECTRICAL POWER/ENERGY TRANSFER SYSTEMS FOR ELECTRICALLY PROPELLED ROAD VEHICLES AND INDUSTRIAL TRUCKS	
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TITLE:

Conductive power and energy transfer systems for electric vehicles - Part 24: Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging

PROPOSED STABILITY DATE: 2028

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CONTENTS

1			
2			
3	FOREWORD		4
4	1 Scope		6
5	2 Normative references		6
6	3 Terms and definitions		7
7	4 System configuration		7
8	5 Digital communication architecture		7
9	6 Charging control process		7
10	7 Overview of charging control		7
11	8 Exchanged information for DC charging control		8
12	Annex A (normative) Digital communication for control of DC EV charging system A		10
13	A.1 General		10
14	A.2 Digital communication actions during charging control process		10
15	A.3 Digital communication of DC charging control		14
16	A.4 Parameter definition		15
17	A.5 Physical/data link layer		24
18	A.5.1 Communication circuit		24
19	A.5.2 Termination resistor		24
20	A.5.3 Noise filter		24
21	A.5.4 CAN transceiver		24
22	A.5.5 Twisted-pair line		24
23	A.5.6 Overvoltage protection for the CAN communication circuit		24
24	A.5.7 Communication protocol		24
25	A.5.8 CAN bus		25
26	A.5.9 Transmission process		25
27	A.5.10 CAN reception error		26
28	A.6 Bi-directional power flow		26
29	A.6.1 Digital communication actions during charging/discharging control		
30	process		26
31	A.6.2 Digital communication of DC charging/discharging control		29
32	A.6.3 Parameter definition		30
33	A.6.4 Charging/discharging control process		38
34	A.6.5 Exchanged information for DC charging/discharging control		38
35	Annex B (normative) Digital communication for control of DC charging of upgraded		
36	system B		40
37	B.1 General		40
38	B.2 Digital communication of DC charging control		40
39	B.3 Digital communication actions during charging control process		41
40	B.4 Parameter definition		44
41	B.5 Physical/data link layer		55
42	B.6 Backward compatibility		55
43	B.7 Version negotiation		56
44	B.7.1 General		56
45	B.7.2 Function definition		56
46	B.7.3 Negotiation process and result		56

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47	Annex C (normative) Digital communication for control of DC charging system C.....	57
48	C.1 General.....	57
49	C.2 Required exchange parameters	57
50	Annex D (normative) Digital communication for control of DC charging system D.....	59
51	D.1 General.....	59
52	D.2 CAN-based digital communication.....	59
53	D.2.1 Elements for digital communication.....	59
54	D.2.2 Layered architecture	60
55	D.2.3 Physical/data link layer	61
56	D.2.4 Transport layer	62
57	D.2.5 Application layer.....	64
58	D.3 Two-wire Ethernet digital communication	72
59	D.4 Digital Communication between EV /EVSE and adaptor	72
60	D.5 Identification approach for two-wire Ethernet and CAN	72
61	D.6 Charging/discharging control process	72
62	Bibliography	73
63		
64	Figure 1 – Digital communication between a EVSE and an electric vehicle for control of	
65	DC charging.....	10
66	Figure A.1 – Sequence diagram of DC charging control communication for system A.....	16
67	Figure A.2 – CAN communication circuit	26
68	Figure A.3 – CAN bus	27
69	Figure A.4 – Transmission cycle	28
70	Figure A.5 – Sequence diagram of DC charging/discharging control communication for	
71	system A.....	32
72	Figure B.1 – Sequence diagram of DC charging control communication for upgraded	
73	system B.....	43
74	Figure B.2 – Sequence diagram of version negotiation for upgraded system B.....	57
75	Figure D.1 – Layered structure for system D CAN-based communication protocol.....	63
76		
77	Table 1 – Exchanged information for DC charging control	11
78	Table A.1 – Communication actions and parameters during DC charging control	
79	process between system A station and vehicle (1 of 3)	14
80	Table A.2 – Exchanged parameter during DC charging control process from vehicle to	
81	system A station (1 of 4)	19
82	Table A.3 – Exchanged parameter during DC charging control process from system A	
83	station to vehicle (1 of 4)	23
84	Table A.4 – The physical link layer specification for system A.....	28
85	Table A.5 – Specification of data transmission	28
86	Table A.6 – Communication actions and parameters during DC charging/discharging	
87	control process between system A and vehicle	30
88	Table A.7 – Exchanged parameter during DC charging/discharging control process	
89	from vehicle to system A station (1 of 4)	34
90	Table A.8 – Exchanged parameter during DC charging/discharging control process	
91	from system A station to vehicle (1 of 3)	38
92	Table A.9 – Exchanged information for DC charging/discharging control.....	42
93	Table B.1 – Communication actions and exchanged information during DC charging	
94	control process between upgraded system B EVSE and EV	45

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95	Table B.2 – Parameters in version negotiation	48
96	Table B.3 – Public messages parameters in energy transfer process	49
97	Table B.4 – Parameters in function negotiation	50
98	Table B.5 – Parameters in parameter configuration	51
99	Table B.6 – Parameters in authentication	52
100	Table B.7 – Parameters in scheduled mode	53
101	Table B.8 – Parameters in cable check	54
102	Table B.9 – Parameters in power supply mode	54
103	Table B.10 – Parameters in pre-charge and energy transfer	55
104	Table B.11 – Message parameters in shutdown	57
105	Table B.12 – Physical/data link layer specifications for system B	58
106	Table C.1 – Required exchanged parameters for DC charging control for system C	61
107	Table D.1 – Function module	62
108	Table D.2 – Data link layer specifications for system D	64
109	Table D.3 – Charger Protocol Version message	65
110	Table D.4 – Vehicle Negotiation Result message	65
111	Table D.5 – Format of unreliable message	66
112	Table D.6 – Information Frame of Reliable Short Message	66
113	Table D.7 – Acknowledge Frame of Reliable Short Message	66
114	Table D.8 – Format of Information Frame of Long Message	66
115	Table D.9 – Format of Control Frame of Long Message	67
116	Table D.10 – Function Negotiation function module (FDC=1)	67
117	Table D.11 – Parameter definition	68
118	Table D.12 – Parameter configuration function module (FDC=1)	69
119	Table D.13 – Parameter definition	70
120	Table D.14 – Self-check function module (FDC=1)	71
121	Table D.15 – Parameter definition	72
122	Table D.16 – Energy Transfer in Charging Mode (FDC = 1)	73
123	Table D.17 – Parameter definition	74

124

125

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ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM –**Part 24: Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging****FOREWORD**

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International Standard IEC 61851-24 has been prepared by IEC technical committee 69: Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Annex A and Annex B have been updated in line with IEC 61851-23:202X and relevant standards;

The text of this document is based on the following documents:

CD	Report on voting
69/XX/CD	69/XX/CC

177
178 Full information on the voting for the approval of this document can be found in the report on
179 voting indicated in the above table.

180 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

183 The committee has decided that the contents of this publication will remain unchanged until the
184 stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to
185 the specific publication. At this date, the publication will be

- 186 • reconfirmed,
187 • withdrawn,
188 • replaced by a revised edition, or
189 • amended.

190

191 The National Committees are requested to note that for this publication the stability date
192 is 2026.

193 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
194 AT THE PUBLICATION STAGE.

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ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM –

Part 24: Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging

1 Scope

This part of IEC 61851, together with IEC 61851-23, applies to digital communication between a EVSE and an electric road vehicle (EV) for control of conductive DC power transfer, with a rated supply voltage up to 1 000 V AC or up to 1 500 V DC and a rated output voltage up to 1 500 V DC.

This document also applies to digital communication between the DC EV charging/discharging station and the EV for system A, as specified in Annex A.

The EV charging mode is mode 4, according to IEC 61851-23.

Annex A, Annex B, and Annex C give descriptions of digital communications for control of DC charging specific to DC EV charging systems A, B and C as defined in IEC 61851-23.

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 61851-23:202X, *Electric vehicle conductive charging system – Part 23: DC electric vehicle supply equipment*

ISO TR 8713, *Electric propelled road vehicles – Vocabulary*

ISO 11898-1:2015, *Road vehicles – Controller area network (CAN) – Part 1: Data link layer and physical signaling*

ISO 11898-2:2016, *Road vehicles – Controller area network (CAN) – Part 2: High-speed medium access unit*

ISO 15118-2:2014, *Road vehicles – Vehicle to grid communication interface – Part 2: Network and application protocol requirements*

ISO 15118-20:2022, *Road vehicles – Vehicle to grid communication interface – Part 20: 2nd generation network layer and application layer requirements*

ISO 15118-20:202X AMD1, *Road vehicles – Vehicle to grid communication interface – Part 20: 2nd generation network layer and application layer requirements AMENDMENT 1: AC DER service, MCS service, and improved security concept*

ISO 15118-202:2022, *Road vehicles – Vehicle to grid communication interface – Part 202: Extensible SECC Discovery Protocol and Event Notification Protocol*

DIN TS 70121:2024, *Electromobility – Digital communication between a DC EV charging station and an electric vehicle for control of DC charging in the combined charging system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO TR 8713 and the following 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>

This clause of IEC 61851-23:202X is applicable except as follows:

Addition:

3.1

parameter

single piece of information relevant to charging control, and that is exchanged between a EVSE and an EV using a form of digital communication

3.2

signal

data element that is communicated between a EVSE and an EV using any means other than digital communication

4 System configuration

The system configuration shall be in accordance with GG.2(TBD) of IEC 61851-23:202X.

5 Digital communication architecture

In this document, two digital communication architectures are used:

- based on CAN using a dedicated data communication circuit; CAN protocol is given in ISO 11898-1. Refer to Annex A and Annex B for specific implementation details.
- based on Homeplug® Green PHY™¹ (see IEEE 1901) over the control pilot line; refer to Annex C for specific implementation details.

6 Charging control process

H.3 of IEC 61851-23:202X provides general information on the charging process and the state of EVSE.

Specific requirements of charging process are given in A.4 and A.6.3 for system A, B.4 for system B, and C.3 for system C in IEC 61851-23:202X respectively.

7 Overview of charging control

The digital communication of DC charging control covered by this document is as shown in Figure 1, identifying the SECC (supply equipment communication controller) and EVCC (EV communication controller), as defined in IEC 61851-23. This document does not cover the

¹ Homeplug® and Green PHY™ are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of these products.

control protocol internal to the EVSE, nor the vehicle, such as power control protocol for AC/DC inverter of EVSE and battery management control in the vehicle.

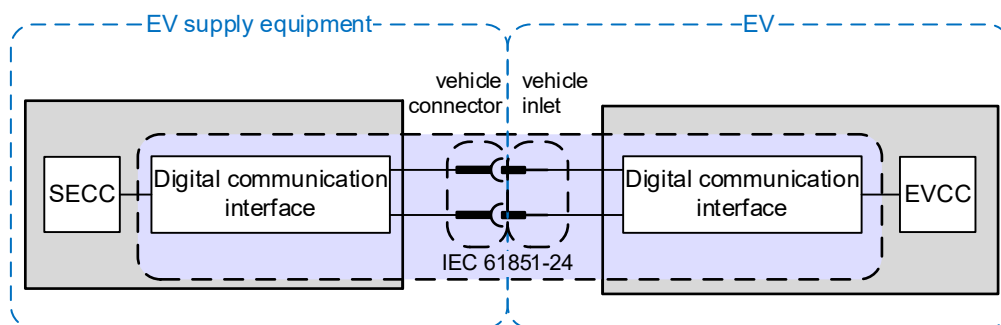


Figure 1 – Digital communication between a EVSE and an electric vehicle for control of DC charging

8 Exchanged information for DC charging control

This clause describes information which shall be exchanged between a EVSE and a vehicle during the charging process according to IEC 61851-23. The information in Table 1 is common to all systems described in Annex A, Annex B and Annex C. Each information listed in Table 1 is defined as a parameter in each annex. Each system can have additional parameters, and these parameters are defined in each annex.

Table 1 – Exchanged information for DC charging control

No.	Information	Description	Relevant requirement in IEC 61851-23: 202X
a-1	Current request for the controlled current charging (CCC) system	Exchange of current value requested by EV	6.3.1.7
a-2	Voltage request for the controlled voltage charging (CVC) system	Exchange of voltage value requested by EV	
a-3	Maximum rated voltage of EVSE	Exchange of maximum rated voltage value of EVSE	6.3.1.7 6.3.1.10
a-4	Maximum rated current of EVSE	Exchange of maximum rated current value of EVSE	6.3.1.7 6.3.1.10
b-1	Communication protocol	Exchange of software version of a charging system	6.3.1.10 6.3.1.12
b-2	Maximum voltage limit of EV	Exchange of maximum voltage limit value of vehicle.	
b-3	EV minimum current limit, only for the controlled voltage charging (CVC) system	Under consideration	
b-4	Implementation of optional control function	Exchange information about available optional function, such as high current control and dynamic control.	6.3.1.10 6.3.2.8
c	Insulation check result	Exchange of the result of insulation check before charging - If insulation check fails, a signal is sent that charging is not allowed.	6. 3.1.11
d	Short circuit test before charging	Exchange of information on short circuit test before charging	6.3.1.14

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No.	Information	Description	Relevant requirement in IEC 61851-23: 202X
e	Charging stopped by user	Exchange of information on charge stop command by the user of EVSE	6.3.1.15
f	EV supply equipment real time available load current (optional)	Exchange of EV supply equipment real time available load current for demand management. Required for system providing that function.	6.3.2.8
g	Loss of digital communication	Detection of loss of digital communication - If a receiver does not get information expected to receive within time out period, it is considered as loss of digital communication.	6.3.1.5
h-1	Zero current confirmed	Notification of zero current confirmed - Station informs EV that low current condition has been met (to allow the opening and welding check of EV contactors by EV)	6.3.1.18 G.3.4
h-2	Welding detection	Exchange of information on the whole process of welding detection	
i-1	Normal shutdown	Termination of the charging process not caused by a failure	6.3.1.18.2
i-2	Error shutdown	Termination of the charging process caused by a failure	6.3.1.18.3

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Annex A
(normative)

**Digital communication for control
of DC EV charging system A**

A.1 General

This annex shows the specification of digital communication for control of the EVSE of system A (in this annex, referred to as "System A station" or "station") as specified in Annex A of IEC 61851-23:20—. More detailed information on System A is defined in IEEE 2030.1.1.

This annex is also applicable to the DC EV charging/discharging station of system A.

NOTE Technical Specifications of CHAdeMO 2.0.1, Amendment 1 2020, provides additional information on system A. Available at <https://www.chademo.com>.

A.2 Digital communication actions during charging control process

The communication actions and parameters according to the charging control process as defined in Table A.15 of IEC 61851-23:20— are shown in Table A.1.

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Table A.1 – Communication actions and parameters during DC charging control process between system A station and vehicle (1 of 3)

Charging control stage		State	High level action at system level ^a	Digital communication action	Parameter	
					From EVSE	From vehicle
Initialization	Handshaking	DC-A	Vehicle unconnected	None	N/A	N/A
		DC-B1	Connector plugged in	None	N/A	N/A
		DC-B1	Wake up of DCCCF and VCCF	None	None	(default CAN)
			Communication data initialization	Preparation for digital communication	(default CAN)	(default CAN)
		DC-B1→DC-B2	Communication established, parameters exchanged, and compatibility checked	Exchange of charging control parameters	- Control protocol number - Available output voltage - Available output current - Battery incompatibility - Energizing state - Identifier of welding detection - Threshold voltage - Charging stop control	- Control protocol number - Total capacity of battery - Maximum battery voltage - Maximum charging time - Target battery voltage - Vehicle charging enabled - Minimum charge current - Estimated charging time - Vehicle status - Charged rate
	Charge preparation	DC-B2→DC-B3	Connector latched	Notification of state of charging progress	– Energizing state	None
		DC-B3	Insulation resistance check for DC power line	None	– Charging system error	None
		DC-B3	Pre-charge (depending on the system architecture)	N/A	N/A	N/A

303

Table A.1 (2 of 3)

Charging control stage	State	High level action at system level ^a	Digital communication action	Parameter	
				From EVSE	From vehicle
Energy transfer	DC-C or DC-D	Vehicle side contactors closed	Notification of vehicle main contactor closed status	None	– Vehicle status
	DC-C or DC-D	Charging by current demand (for CCC)	Notification of request value of charging current (or voltage)	– Station status – Output voltage – Output current – Remaining charging time – Station error – Charging system error – Charging stop control	– Charging current request – Charging system error – Parking status of the vehicle
	DC-C or DC-D	Charging by voltage demand (for CVC)	N/A	N/A	N/A
	DC-C,(D) →DC-B'1	Current suppression	Request of energy transfer shut-off	– Station status – Charging stop control – Output voltage – Output current	– Vehicle charging enabled
Shutdown (case 1)	DC-B'1	Zero current confirmed	Notification of energy transfer shut-off	– Station status – Charging system error	
	DC-B'1 → DC-B'2	Welding detection (by vehicle)		None	None
	DC-B'2	Vehicle side contactors open	None	None	– Vehicle status
	DC-B'2	DC power line voltage verification	Notification of present voltage	– Output voltage – Energizing state	None
	DC-B'3	Connector unlatched	Notification of connector unlatch status	None	None
	DC-B'4	End of charge at communication level	Terminate the digital communication	None	None
	DC-A	Connector unplugged		N/A	N/A

304