



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 61439-8:2024**  
**01-julij-2024**

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**Sestavi nizkonapetostnih stikalnih in krmilnih naprav - 8. del: Sestavi za uporabo v fotonapetostnih inštalacijah**

Low-voltage switchgear and controlgear assemblies - Part 8: Assemblies for use in photovoltaic installations

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Ta slovenski standard je istoveten z: **prEN IEC 61439-8:2024**

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**ICS:**

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| 29.130.20 | Nizkonapetostne stikalne in krmilne naprave | Low voltage switchgear and controlgear |
|-----------|---|--|

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**en**





# 121B/199/CDV

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| IEC SC 121B : LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES   |   |
| SECRETARIAT:<br>Germany   | SECRETARY:<br>Mr Jörg Hußmann   |
| OF INTEREST TO THE FOLLOWING COMMITTEES:<br>TC 23,SC 23E,TC 64,TC 82,SC 121A  | PROPOSED HORIZONTAL STANDARD:<br><input type="checkbox"/><br>Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary. |
| FUNCTIONS CONCERNED:<br><input checked="" type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY  |   |
| <input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING<br><br><b>Attention IEC-CENELEC parallel voting</b><br><br>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.<br><br>The CENELEC members are invited to vote through the CENELEC online voting system. | <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING  |

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Recipients of this document are invited to submit, with their comments, notification of any relevant "In Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

**Low-voltage switchgear and controlgear assemblies - Part 8: Assemblies for use in photovoltaic installations**

PROPOSED STABILITY DATE: 2028

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## 117 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –**

121

122

**Part 8: Assemblies for use in photovoltaic installations**

123

124

**FOREWORD**

125 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising  
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154 indispensable for the correct application of this publication.

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156 rights. IEC shall not be held responsible for identifying any or all such patent rights.

157 International Standard IEC 61439-8 has been prepared by subcommittee 121B: Low-voltage  
158 switchgear and controlgear assemblies, of IEC technical committee 121: Switchgear and  
159 controlgear and their assemblies for low voltage.

160 This first edition removes annex DD, EE and FF from IEC 61439-2 edition 3 published in 2020  
161 to create IEC 61439-8 as a standalone document. It contains technical revisions.

162 This edition includes the following significant technical changes with respect to the previous  
163 Annex DD in IEC 61439-2: 2020:

164 a) the scope has been modified to further define the characteristics of PV assemblies;

165 b) addition of several definitions of different type of boxes and other technical terms;

166 c) consideration of IP code according to the different applications of PV assemblies;

167 d) additional consideration for the limits of all external surfaces and manual operating means  
168 during the temperature rise test with solar radiation.

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

| FDIS          | Report on voting |
|---------------|------------------|
| 121B/XXX/FDIS | 121B/XXX/RVD     |

170  
171 Full information on the voting for the approval of this International Standard can be found in the  
172 report on voting indicated in the above table.

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

174 In this document, general terms and definitions are defined in Clause 3.

175 The reader's attention is drawn to the fact that Annex EE lists all the "in-some-country" clauses  
176 on differing practices of a less permanent nature relating to the subject of this document.

177 This document is to be read in conjunction with IEC 61439-1:2020. The provisions of the general  
178 rules dealt with in IEC 61439-1 are only applicable to this document insofar as they are  
179 specifically cited. When this document states "addition", "modification" or "replacement", the  
180 relevant text in IEC 61439-1 is to be adapted accordingly.

181 Subclauses that are numbered with a 101 (102, 103, etc.) suffix are additional to the same  
182 subclause in IEC 61439-1.

183 Tables and figures in this document that are new are numbered starting with 101.

184 Annexes in this document are lettered AA, BB, etc.

185 In this document, the term Photovoltaic Assembly (PVA) is defined in 3.1.101.

186 NOTE Throughout the IEC 61439 series of standards, the term assembly (see 3.1.1 of IEC 61439-1:2020) is used  
187 for a low-voltage switchgear and controlgear assembly.

188 A list of all parts of the IEC 61439 series, under the general title *Low-voltage switchgear and*  
189 *controlgear assemblies* can be found on the IEC website. <https://standards.iteh.ai/catalog/standards/sist/cb2f2202-f30e-45e7-9f80-02f260c117fd/osist-pren-iec-61439-8-2024>

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

- 193 • reconfirmed,
- 194 • withdrawn,
- 195 • replaced by a revised edition, or
- 196 • amended.

197



198

## INTRODUCTION

199 The photovoltaic technology enables electricity to be produced directly from sunlight, which is  
 200 a source of renewable energy. Photovoltaic (PV) energy is one of the most promising  
 201 technologies meeting the pressing need for green renewable energy and is a part of the answer  
 202 to the challenge of sustainable development. Pushed by sustainable energy policies, extensive  
 203 country engagement, technology development, and cost reduction the number of photovoltaic  
 204 (PV) installations according to IEC60364-7-712 is increasing rapidly.

205 PV installations are usually split into two main categories:

- 206 - large scale-utility PV installations, where electricity production can be stored or  
 207 exported to the grid.
- 208 - small PV installations, for example rooftop installation, where the produced energy can  
 209 be consumed locally or exported to the grid.

210 PV applications have characteristics that require assemblies with specific performance. A  
 211 typical arrangement of a PV installation is shown in figure 101. Further examples are provided  
 212 in Annex FF.

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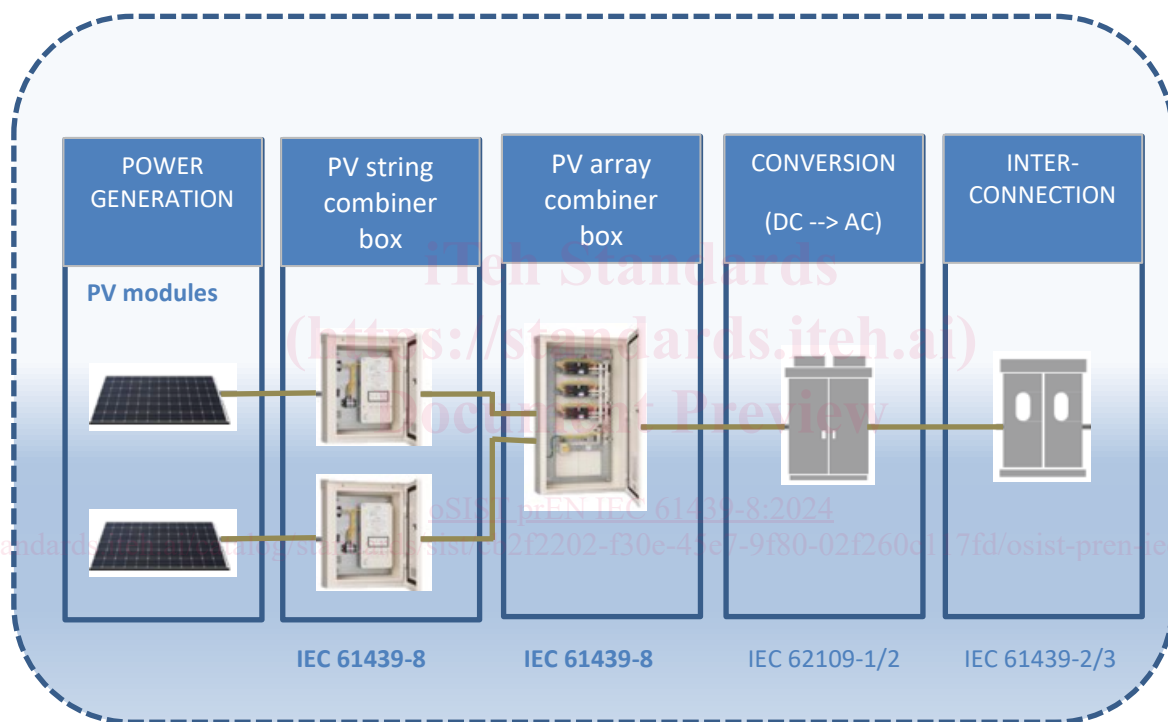


Figure 101 – Example of a PV installation

229

## 230 LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

231

232

### 232 Part 8: Assemblies for use in photovoltaic installations

233

#### 234 1 Scope

235 This part of the IEC 61439 series specifies requirements for the design and verification of  
236 assemblies for use in photovoltaic installations. Such photovoltaic assemblies are designated  
237 PVAs.

238 PVAs have the following characteristics:

- 239 – assemblies used for the combination or recombination of electrical energy in DC systems  
240 for which the voltage does not exceed 1 500 V DC and supply to an AC network where the  
241 voltage does not exceed 1 000 V AC;
- 242 – stationary assemblies with an enclosure;
- 243 – assemblies intended for operation by authorised persons (see 3.7.17 of IEC 61439-1:2020),  
244 but can be located in an area accessible to ordinary persons;
- 245 – suitable for indoor or outdoor installation.

246 NOTE: PV installations having PV modules with micro-inverters that are connected directly to inter-connection  
247 assemblies according to IEC 61439-2 or IEC 61439-3 are not covered by this document.

248 This document identifies definitions, specifies the service conditions, details the construction  
249 requirements, defines the technical characteristics, and provides verifications for PVAs.

250 PVAs can also include control and or signaling devices associated with the distribution of  
251 electrical energy.

252 This document applies to all PVAs whether they are designed and manufactured on a one-off  
253 basis or fully standardized and manufactured in quantity.

254 The manufacture and/or assembly can be carried out by an entity other than the original  
255 manufacturer (see 3.10.1 of IEC 61439-1:2020). This document does not apply to individual  
256 devices, for example, circuit-breakers, fuse switches and self-contained components such as,  
257 motor starters, power electronic converter systems and equipment (PECS), switch mode power  
258 supplies (SMPS), uninterruptable power supplies (UPS), basic drive modules (BDM), complete  
259 drive modules (CDM), adjustable speed power drives systems (PDS), stand-alone energy  
260 storage systems (battery and capacitor systems), other electronic equipment which comply with  
261 their relevant product standards, and junction boxes for photovoltaic modules. This document  
262 describes their integration into a PVA or an empty enclosure used as a part of a PVA.

263 For some applications, such as explosive atmospheres and/or functional safety, there may be  
264 a need to comply with the requirements of other standards or legislation in addition to those  
265 specified in the IEC 61439 series.

266 This document does not apply to the specific types of assemblies covered by other parts of  
267 IEC 61439.

268

#### 269 2 Normative references

270 The following documents are referred to in the text in such a way that some or all of their content  
271 constitutes requirements of this document. For dated references, only the edition cited applies.

272 For undated references, the latest edition of the referenced document (including any  
273 amendments) applies.

274 Clause 2 of IEC 61439-1:2020 is applicable in addition to the following:

275 *Addition:*

276 IEC 60068-2-14:2023, *Environmental testing – Part 2-14: Tests – Test N: Change of*  
277 *temperature*

278 IEC 60269-6:2010, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for*  
279 *the protection of solar photovoltaic energy systems*

280 IEC 60364-7-712:2017, *Low voltage electrical installations – Part 7-712: Requirements for*  
281 *special installations or locations – Solar photovoltaic (PV) power supply systems*

282 IEC TR 60890:2020, *A method of temperature-rise verification of low-voltage switchgear and*  
283 *controlgear assemblies by calculation*

284 IEC 60898-2:2016, *Electrical accessories – Circuit-breakers for overcurrent protection for*  
285 *household and similar installations – Part 2: Circuit-breakers for AC and DC operation*

286 IEC 60898-3:2019/AMD1:2022, *Electrical accessories – Circuit-breakers for overcurrent*  
287 *protection for household and similar installations – Part 3: Circuit-breakers for DC operation*

288 IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*  
289 *IEC 60947-2:2016/AMD1:2019*

291 IEC 60947-3:2020, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors,*  
292 *switch-disconnectors and fuse-combination units*

294 IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

295 IEC 62109-1, *Safety of power converters for use in photovoltaic power systems – Part 1:*  
296 *General requirements*

297 IEC 62109-2, *Safety of power converters for use in photovoltaic power systems – Part 2:*  
298 *Particular requirements for inverters*

299 IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against*  
300 *external mechanical impacts (IK code)*

301 IEC 62262:2002/AMD1:2021

302

### 304 **3 Terms and definitions**

305 For the purposes of this document, the terms and definitions given in IEC 61439-1:2020 and  
306 the following apply.

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

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

311 Clause 3 of IEC 61439-1:2020 is applicable, except as follows.

312 **3.1 General terms**

313 *Additional terms and definitions:* **photovoltaic assembly**

314 **PVA**

315 assembly used in the DC part of a photovoltaic installation to receive electrical energy from one  
316 or more PV modules and distributes the energy through one or more outgoing circuits

317 **3.1.102 PV string**

318 circuit of one or more series-connected PV modules

319 **3.1.103 photovoltaic string combiner box**

320 PVA where photovoltaic strings are electrically connected, which may also contain  
321 overcurrent protection and/or disconnection devices

322 NOTE The terms junction, connection and termination box have the same meaning

323 **3.1.104 photovoltaic array combiner box**

324 PVA where photovoltaic sub-arrays or arrays are electrically connected, which may also contain  
325 overcurrent protection and/or disconnection devices

326 **3.1.105 test situation**

327 condition of a PVA or part of it in which the relevant main circuits are open on its supply side  
328 but not necessarily isolated whilst the associated auxiliary circuits are connected, allowing  
329 operational tests of the incorporated device(s)

330 **3.1.106 form of internal separation**

331 classification of physical separation within a PVA

332 **3.1.107 Solar irradiance**

333 *G*

334 irradiance produced by solar radiation expressed in watt per square metre (W/m<sup>2</sup>).

335 **3.2 Constructional units of assemblies** <https://standards.iteh.ai/catalog/standards/sist/cb2f2202-f30e-45e7-9f80-02f260c117fd/osist-pren-iec-61439-8-2024>

336 *Replacement of the title:*

337 **3.2 Constructional units of PVAs**

338 *Additional terms and definitions:*

339 **3.2.101 withdrawable part**

340 removable part intended to be moved from the connected position to the isolated position and  
341 to a test position, if any, whilst remaining mechanically attached to the PVA

342 **3.2.102 test position**

343 position of a withdrawable part in which the relevant main circuits are open on its supply side  
344 but not necessarily isolated and in which the auxiliary circuits are connected allowing operation  
345 tests of the incorporated device(s), the withdrawable part remaining mechanically attached to  
346 the PVA

347 Note 1 to entry: The opening can also be achieved without any mechanical movement of the withdrawable part by  
348 operation of a suitable device.

349 **3.2.103 isolated position**

350 position of a withdrawable part in which an isolating distance is established in main and auxiliary  
351 circuits on its supply side, the withdrawable part remaining mechanically attached to the PVA