

## SLOVENSKI STANDARD oSIST pren IEC 61810-7-7:2023

01-oktober-2023

Električni releji - Preskusi in meritve - 7-7. del: Funkcionalni preskusi

Electrical relays - Tests and Measurements - Part 7-7: Functional Tests

iTeh STANDARD PREVIEW

Relais électriques - Essais et mesurages - Partie 7-7: Essais fonctionnels

Ta slovenski standard je istoveten z: prEN IEC 61810-7-7:2023

https://standards.iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-

a21b5ec36t4b/osist-pren-iec-61810-7-7-2023

ICS:

29.120.70 Releji Relays

oSIST prEN IEC 61810-7-7:2023 en

oSIST prEN IEC 61810-7-7:2023

## iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN IEC 61810-7-7:2023 https://standards.iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-a21b5ec36f4b/osist-pren-iec-61810-7-7-2023 **oSIST prEN IEC 61810-7-7:2023** 

PROJECT NUMBER: IEC 61810-7-7 ED1

DATE OF CIRCULATION:

2023-08-18



## 94/924/CDV

### COMMITTEE DRAFT FOR VOTE (CDV)

CLOSING DATE FOR VOTING:

2023-11-10

	SUPERSEDES DOCU	MENTS:		
	94/818/CD, 94/911/CC			
IEC TC 94 : ELECTRICAL RELAYS				
SECRETARIAT:		SECRETARY:		
Austria		Mr Bernhard Spalt		
OF INTEREST TO THE FOLLOWING COMMITTEES:		PROPOSED HORIZONTAL STANDARD:  □		
		Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.		
FUNCTIONS CONCERNED:				
☐ EMC ☐ ENVIR	ONMENT	Quality assurance Safety		
SUBMITTED FOR CENELEC PARALLE	L VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING		
(8'	tandard			
Attention IEC-CENELEC parallel vot	ting			
The attention of IEC National Commi CENELEC, is drawn to the fact that thi for Vote (CDV) is submitted for parallel	s Committee Draft	61810-7-7:2023 ards/sist/71b32e5e-b760-4654-9269-		
The CENELEC members are invited to CENELEC online voting system.	o vote through the	n-iec-61810-7-7-2023		
This document is still under study and	subject to change.	It should not be used for reference purposes.		
Recipients of this document are invite which they are aware and to provide s		eir comments, notification of any relevant patent rights of station.		
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:				
Electrical relays – Tests and Measurements – Part 7-7: Functional Tests				
PROPOSED STABILITY DATE: 2025				
NOTE FROM TC/SC OFFICERS:				

Copyright © 2023 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

## - 2 - IEC CDV 61810-7-7:2023 © IEC:2023

## CONTENTS

2		
3	FOREWORD	2
4	1 Scope	6
5	2 Normative references	ε
6	3 Terms and definitions	
7	3.1 Energization values	
8	3.1.1 reverse revert voltage	
9	3.1.2 reverse non-revert voltage	
10	3.1.3 reverse polarity voltage	
11	4 Test procedure	
12	4.1 Purpose	
13	4.2 Procedure	
14	4.3 Conditions	13
15	5 Evaluation	14
16	Annex A (normative) Test procedures for particular relay types	15
17	A.1 Elementary relays with reed switches (reed contacts)	
18	A.1.1 General	
19	A.1.2 Influence of magnetic interferences	
20	A.1.3 Railway Applications	18
21	A.2 Time relays for industrial and residential use	19
22	A.2.1 General	
23	A.2.2 Operate OSIST prEN IEC 61810-7-7:2023	
24	A.2.3 https Release ds. iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-	
25	A.2.4 Time function Sec36f4b/osist-pren-iec-61810-7-7-2023	20
26	A.3 Solid-state relays	
27	A.3.1 General	
28	A.3.2 OFF-state leakage current measurement	
29	A.3.3 ON-state voltage drop measurement	
30	A.4 Relays with forcibly guided (mechanically linked) contacts	
31	A.4.1 General	21
32	A.4.2 Functional requirements	
33	A.4.3 Test procedure	
34	Annex B (normative) Standard test coils and test systems for reed switches	
35	B.1 Standard test coils for reed switches	
36	B.2 Test systems for reed switches	
37	B.2.1 Definition of test systems  B.2.2 Test procedures and Conditions of testing	
38 39	Annex T (informative) Test report	
	, , ,	
40	Bibliography	28
41		
12	Figure 1 – Monostable non-polarized DUT	
43	Figure 2 – Monostable DUT polarized by diode	
14	Figure 3 – Monostable polarized DUT with magnetic biasing	11
<b>4</b> 5	Figure 4 – Bistable non-polarized DUT (not applicable to remanence DUTs)	12

### oSIST prEN IEC 61810-7-7:2023

				_
IEC CDV	61810-7-	7:2023 ©	) IEC:2023	– 3 –

57

46	Figure 5 – Bistable polarized DUT (example)	13
47	Figure A.1 – Example of test arrangement for multi mounting	18
48	Figure B.1 – Configuration of test coils	23
49	Figure B.2 – Test system 1	25
50	Figure B.3 – Test system 2	25
51		
52	Table 1 – Energization quantity values and corresponding functions	8
53	Table A.1 – Special requirements for railway applications – rolling stock	19
54	Table A.2 – Changing of influencing quantities	20
55	Table B.1 – List of standard test coils (1 of 2)	23
56		

# iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN IEC 61810-7-7:2023 https://standards.iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-a21b5ec36f4b/osist-pren-iec-61810-7-7-2023 - 4 - IEC CDV 61810-7-7:2023 © IEC:2023

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

59 60 61

58

#### **ELECTRICAL RELAYS - TESTS AND MEASUREMENTS**

62 63

### Part 7-7: Functional Tests

64 65

### **FOREWORD**

66

67 68

69

70 71

72

73 74

75

76

77

78

79

80

81

82

83 84 85

86

87

88

90

91

92

93 94

95

96

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 89 6) All users should ensure that they have the latest edition of this publication.
  - 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
  - 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 97 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent
   98 rights. IEC shall not be held responsible for identifying any or all such patent rights.
- 99 IEC 61810-7 has been prepared by subcommittee WG3: Maintenance of basic relay standards, 100 of IEC technical committee 94: All-or-nothing electrical relays. It is an International Standard.
  - The text of this International Standard is based on the following documents:

CD	CC	
94/818/CD	94/911/CC	

102 103

104

- 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 International Standard 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

#### IEC CDV 61810-7-7:2023 © IEC:2023 - 5 -

- at www.iec.ch/members\_experts/refdocs. The main document types developed by IEC are described in greater detail at http://www.iec.ch/standardsdev/publications.
- A list of all parts of IEC 61810 series, published under the general title *Electromechanical* elementary relays, can be found on the IEC website.
- 112 This International Standard is to be used in conjunction with IEC 61810-1:2015.
- 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,
- 117 withdrawn,
- replaced by a revised edition, or
- 119 amended.

120

121

## iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN IEC 61810-7-7:2023 https://standards.iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-a21b5ec36f4b/osist-pren-iec-61810-7-7-2023 - 6 - IEC CDV 61810-7-7:2023 © IEC:2023

122	ELECTRICAL RELAYS – TESTS AND MEASUREMENTS
123 124	Part 7-7: Functional Tests
125	
126	
127	
128	1 Scope
129 130 131	This part of IEC 61810-7 is used for testing all kind of relays within the scope of technical committee 94 and shall evaluate their ability to perform under expected conditions of transportation, storage and all aspects of operational use.
132 133	The tests stated here within shall be done with test conditions and appropriate severities, as well as suitable measurements conditions.
134 135	The object of this test is to define a standard test method to ensure that the DUT performs satisfactorily at its specified energization values throughout the defined temperature range.
136	
137	2 Normative references TANDARD PREVIEW
138 139 140 141	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.  OSIST prEN IEC 61810-7-7:2023
142 143	61810-1:2015, Electromechanical elementary relays – Part 1: General and safety requirements
144 145	IEC 61810-1:2015/AMD1:2019, Amendment 1 - Electromechanical elementary relays - Part 1: General and safety requirements
146 147	IEC 61810-3:2015, Electromechanical elementary relays – Part 3: Relays with forcibly guided (mechanically linked) contacts
148 149	IEC 61810-4:2020, Electromechanical elementary relays – Part 4: General and safety requirements for reed relays
150 151	IEC 61810-7-0, All-or-nothing relays – Tests and measurements – Part 7-0: Testing – General and Guidance
152 153	IEC 61810-7-25, All-or-nothing relays – Tests and measurements – Part 7-25: Testing – Magnetic interference
154 155	IEC61812-1:2011, Time relays for industrial and residential use – Part1: Requirements and tests
156	IEC 62314:2022 (FDIS), Solid-state relays – Safety requirements
157	IEC 62246-1:2015, Reed switches – Part 1: Generic specification

IEC CDV 61810-7-7:2023 © IEC:2023 **-7-**

159	3	Terms	and	defin	itions
-----	---	-------	-----	-------	--------

- For the purposes of this document, the terms and definitions given in Clause 3 of IEC 61810-7-160
- 0 apply with the following additions. 161
- 162 ISO and IEC maintain terminological databases for use in standardization at the following
- 163 addresses:
- IEC Electropedia: available at http://www.electropedia.org/ 164
- ISO Online browsing platform: available at http://www.iso.org/obp 165

166

167

#### 3.1 **Energization values**

#### 168 3.1.1 reverse revert voltage

- for a specific type of polarized bistable relay, value of the coil voltage greater than and with the 169
- same polarity as the reset voltage, at which the relay reverts reversely 170
- [IEV 444-03-14, modified] 171

#### 172 3.1.2 reverse non-revert voltage

- for a specific type of polarized bistable relay, value of the coil voltage greater than and with the 173
- same polarity as the reset voltage, at which the relay does not revert reversely 174
- [IEV 444-03-15, modified] 175

#### reverse polarity voltage 3.1.3 176

- for a polarized monostable relay, value of the coil voltage of reverse polarity at which the relay 177
- does not operate standards.iteh.ai/catalog/standards/sist/71b32e5e-b760-4654-9269-178
- [IEV 444-03-16, modified] 21b5ec36f4b/osist-pren-iec-61810-7-7-2023 179
- NOTE: This voltage can be considered a special characteristic of non-operate for polarized monostable relays only, 180 181 182
  - in particular when the polarized property is established by means of a diode (breakdown voltage).

IEC CDV 61810-7-7:2023 © IEC:2023 – 8 –

#### **Test procedure**

#### 4.1 **Purpose**

183

184

188

189

190

191

192

193

196

199 200

201

To ensure that the DUT performs satisfactorily at its specified energization values throughout 185 the defined temperature range. This test is a part of the general DUT type test according to IEC 186 61810-1:2015, Table 3. 187

#### 4.2 **Procedure**

The basic operation functions for monostable and bistable relays are described in clause 9 of IEC 61810-1:2015. The following functional tests cover a wider range and shall be done in a sequence, that covers of all foreseeable DUT states and state changes. Table 1 sets out the applicable values and the significance of the functional tests, referring to Figure 1 to Figure 5, which give typical examples.

- Additional and/or alternative functional test procedures for the particular types of relays are 194 stated in Annex A. 195
  - Elementary relays with reed switches (Annex A.1)
- Time relays for industrial and residential use (Annex A.2) 197
- Solid-state relays (Annex 0) 198
  - Relays with forcibly guided (mechanically linked) contacts (Annex A.4)

Table 1 - Energization quantity values and corresponding functions

Diagram code (see Figure 1 to Figure 5)	Applied energization quantitye PTE	The DUT shall N IEC 61810-7-7:2023 (standards/sist/71b32e5e-b	Applicable to 760-4654-9269-
а	Non-operate voltage 36f4b/os	Not operate -61810-7-7-20	All types
b	Operate voltage	Operate	All types
С	Rated voltage	Remain operated	All types
d	Non-revert voltage	Remain operated	Polarized
е	Non-release voltage	Not release	Monostable
f	Release voltage	Release	Monostable
g	Non-reset voltage	Not reset	Bistable
h	Reset voltage	Reset	Bistable
i	Reverse rated voltage	Remain reset	Bistable polarized
j	Reverse non-revert voltage	Remain non-operated / reset	Bistable polarized
k	Reverse polarity voltage	Not operate	Monostable polarized
х	Preconditioning value	Be preconditioned	All if required
у	Setting voltage	Be set in required position	All if required
Z	Reverse setting voltage	Be set in required position	All if required

Testing is made by attributes and shall be made in the order given in the following figures, unless otherwise specified.

When required, the external magnetic preconditioning shall be applied, respecting the correct orientation of the DUT with regard to the applied external magnetic fields.

202

203

204

205

#### IEC CDV 61810-7-7:2023 © IEC:2023 - 9 -

When proceeding from one step to the next, the characteristics of the coil voltage shall be as specified. The corresponding function of the DUT shall be checked by the contact state as defined in IEC 61810-7-0.

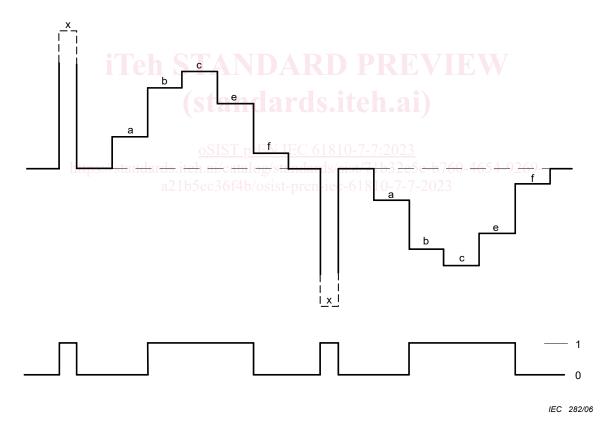
- NOTE 1 For statistical evaluation across a number of DUTs or several batches of DUTs, actual data for the values given in Table 1 may be recorded instead of attributive testing.
- NOTE 2 DUTs incorporating permanent magnets should be preconditioned with the rated voltage for a full cycle to achieve consistent electrical measurements. In case of expected external influences like shocks, which may change contact state without energization, the functional tests should be executed with and without preconditioning to verify performance.
- 216 <u>Explanatory notes concerning performance diagrams</u>, Figure 1 to Figure 5:
- The drawings are not to scale.

207

208

209

- The preconditioning pulses are examples only. Any other waveform direction, duration or amplitude may be used.
- The sequence of Figure 5, bistable polarized DUT, is an example only. Other sequences might apply to further types of such DUTs.



223 **Key** 

222

- a non-operate voltage
- b operate voltage
- c rated voltage

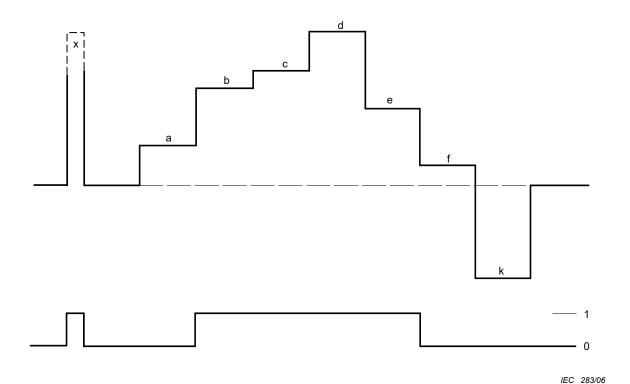
- e non-release voltage (monostable DUTs)
- f release voltage (monostable DUTs)
- x preconditioning voltage
- The upper traces each represent the energization values, the lower traces indicate the condition of the contact (0 = release condition, 1 = operate condition).

#### Figure 1 - Monostable non-polarized DUT

224

225





iTeh STANDARD PREVIEW

229 **Key** 

228

a non-operate voltage (monostable DUTs)

b operate voltage f release voltage (monostable DUTs)

c rated voltage k reverse polarity voltage

d non-revert voltage x preconditioning voltage

The upper traces each represent the energization values, the lower traces indicate the condition of the contact (0 = release condition, 1 = operate condition).

Figure 2 - Monostable DUT polarized by diode

233

230

231