

INTERNATIONAL STANDARD

IEC 61810-1

Second edition
2003-08

Electromechanical elementary relays –

Part 1: General and safety requirements

Relais électromécaniques élémentaires –

*Partie 1:
Exigences générales et de sécurité*

© IEC 2003 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

XB

For price, see current catalogue

CONTENTS

| | |
|---|----|
| FOREWORD | 4 |
| 1 Scope | 6 |
| 2 Normative references..... | 6 |
| 3 Terms and definitions | 8 |
| 3.1 Definitions related to general terms | 8 |
| 3.2 Definitions of relay types | 8 |
| 3.3 Definitions related to conditions and operations..... | 9 |
| 3.4 Definitions of operating values..... | 12 |
| 3.5 Definitions related to contacts..... | 13 |
| 3.6 Definitions related to accessories | 15 |
| 3.7 Definitions related to insulation..... | 16 |
| 4 Influence quantities..... | 18 |
| 5 Rated values..... | 18 |
| 5.1 Rated coil voltage/rated coil voltage range | 19 |
| 5.2 Operative range..... | 19 |
| 5.3 Release | 19 |
| 5.4 Reset (bistable relays)..... | 19 |
| 5.5 Recommended number of cycles for electrical endurance..... | 20 |
| 5.6 Recommended frequencies of operation..... | 20 |
| 5.7 Contact loads | 20 |
| 5.8 Ambient temperature | 20 |
| 5.9 Categories of environmental protection..... | 20 |
| 5.10 Duty factor..... | 21 |
| 6 General provisions for testing | 21 |
| 7 Documentation and marking | 22 |
| 7.1 Data | 22 |
| 7.2 Additional data..... | 23 |
| 7.3 Marking | 23 |
| 7.4 Symbols | 24 |
| 8 Terminations..... | 24 |
| 8.1 Screw terminals and screwless terminals..... | 24 |
| 8.2 Flat quick-connect terminations | 24 |
| 8.3 Solder terminals | 25 |
| 8.3.1 Resistance to soldering heat..... | 25 |
| 8.3.2 Solder pins | 25 |
| 8.3.3 Terminals for surface mounting (SMD)..... | 25 |
| 8.3.4 Other solder terminations (for example soldering lugs)..... | 25 |
| 8.4 Sockets | 25 |
| 8.5 Alternative termination types..... | 26 |
| 9 Sealing | 26 |
| 10 Insulation resistance and dielectric strength..... | 26 |
| 10.1 Preconditioning..... | 26 |
| 10.2 Insulation resistance..... | 26 |
| 10.3 Dielectric strength..... | 27 |

| | |
|--|----|
| 11 Heating..... | 29 |
| 11.1 Requirements | 29 |
| 11.2 Test procedure | 29 |
| 11.3 Terminals | 30 |
| 11.3.1 General test conditions | 30 |
| 11.3.2 Solder terminals..... | 30 |
| 11.3.3 Flat quick-connect terminations..... | 31 |
| 11.3.4 Screw and screwless type terminals..... | 31 |
| 11.3.5 Alternative termination types..... | 31 |
| 12 Basic operating function | 32 |
| 12.1 General test conditions | 32 |
| 12.2 Operate (monostable relays)..... | 32 |
| 12.3 Release (monostable relays) | 32 |
| 12.4 Operate/reset (bistable relays)..... | 32 |
| 13 Heat and fire resistance | 33 |
| 14 Electrical endurance | 33 |
| 15 Mechanical endurance | 35 |
| 16 Clearances, creepage distances and solid insulation | 35 |
| 16.1 Clearances and creepage distances | 35 |
| 16.2 Solid insulation | 39 |
| 16.3 Accessible surfaces | 40 |
| Annex A (normative) Explanations regarding relays..... | 41 |
| Annex B (normative) Heating test arrangement | 44 |
| Annex C (informative) Schematic diagram of families of terminations | 45 |
| Annex D (normative) Glow-wire test | 46 |
| Annex E (normative) Proof tracking test | 49 |
| Annex F (normative) Ball pressure test..... | 51 |
| Annex G (informative) Needle flame test | 52 |
| Annex H (normative) Measurement of clearances and creepage distances..... | 54 |
| Annex I (normative) Relation between rated impulse withstand voltage, rated voltage and overvoltage category | 59 |
| Annex J (normative) Pollution degrees | 60 |
| Annex K (normative) Inductive contact loads | 61 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 1: General and safety requirements

FOREWORD

- 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, 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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61810-1 has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

This second edition cancels and replaces the first edition published in 1998 and IEC 61810-5, published in 1998. This edition constitutes a technical revision.

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

| FDIS | Report on voting |
|-------------|------------------|
| 94/182/FDIS | 94/186/RVD |

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

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

A bilingual version of this document may be issued at a later date.

This new edition has been completely revised in order to

- establish a stand-alone standard for the type testing of electromechanical elementary relays,
- incorporate and update the requirements and tests with regard to insulation coordination as contained in former IEC 61810-5:1998,
- improve the structure of the standard to achieve better readability,
- update various requirements and tests.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

The contents of the corrigendum of October 2004 have been included in this copy.

Withdrawn

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 1: General and safety requirements

1 Scope

This part of IEC 61810 applies to electromechanical elementary relays (non-specified time all-or-nothing relays) for incorporation. It defines the basic safety-related and functional requirements for applications in all areas of electrical engineering or electronics, such as:

- general industrial equipment,
- electrical facilities,
- electrical machines,
- electrical appliances for household and similar use,
- information technology and business equipment,
- building automation equipment,
- automation equipment,
- electrical installation equipment,
- medical equipment,
- control equipment,
- telecommunications,
- vehicles,
- transportation,
- etc.

Compliance with the requirements of this standard is verified by the type tests indicated.

In case the application of a relay determines additional requirements exceeding those specified in this standard, the relay should be assessed in line with this application in accordance with the relevant IEC standard(s) (for example IEC 60730-1, IEC 60335-1, IEC 60950-1).

2 Normative references

The following referenced documents are indispensable for the application 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 60038:1983, *IEC standard voltages*
Amendment 1 (1994)
Amendment 2 (1997)

IEC 60050: *International Electrotechnical Vocabulary*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2: Tests – Test Q: Sealing*

IEC 60068-2-20:1979, *Basic environmental testing procedures – Part 2: Tests – Test T: Soldering*
Amendment 2 (1987)

IEC 60085:1984, *Thermal evaluation and classification of electrical insulation*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60364-4-44:2001, *Electrical installations of buildings – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60417-DB:2002, *Graphical symbols for use on equipment*¹

IEC 60664-1:1992, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*
Amendment 1 (2000)
Amendment 2 (2002)

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle flame test*
Amendment 1 (1994)

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-10-2:1995, *Fire hazard testing – Part 10-2: Guidance and test methods for the minimization of the effects of abnormal heat on electrotechnical products involved in fires – Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test*
Amendment 1 (2001)

IEC 60721-3-3:1994, *Classification of environmental conditions – Part 3-3: Classification of groups of environmental parameters and their severities – Stationary use at weatherprotected locations*
Amendment 1 (1995)
Amendment 2 (1996)

IEC 60730-1:1999, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 60947-5-1:1997, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*
Amendment 1 (1999)
Amendment 2 (1999)

IEC 60950-1:2001, *Information technology equipment – Safety – Part 1: General requirements*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

IEC 61210:1993, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

¹ "DB" refers to the IEC on-line database.

IEC 61760-1:1998, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

IEC 61984:2001, *Connectors – Safety requirements and tests*

Withdrawn