

Australian/New Zealand Standard™

**Low-voltage switchgear and controlgear**

**Part 4.3: Contactors and motor-starters—  
A.C. semiconductor controllers and  
contactors for non-motor loads**



**S t a n d a r d s** Australia



**STANDARDS**  
NEW ZEALAND  
Te Ara Raukawa

## **AS/NZS 3947.4.3:2000**

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This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL/6, Industrial Switchgear and Controlgear. It was approved on behalf of the Council of Standards Australia on 28 March 2000 and on behalf of the Council of Standards New Zealand on 20 March 2000. It was published on 30 May 2000.

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# Australian/New Zealand Standard™

## Low-voltage switchgear and controlgear

### Part 4.3: Contactors and motor-starters— A.C. semiconductor controllers and contactors for non-motor loads

Originated as AS C63—1965.  
Previous edition AS 1029.2—1982.  
Jointly revised and redesignated AS/NZS 3947.4.3:2000.

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Jointly published by Standards Australia International Ltd, PO Box 1055, Strathfield, NSW 2135 and Standards New Zealand, Private Bag 2439, Wellington 6020

ISBN 0 7337 3376 X

## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL/6, Industrial Switchgear and Controlgear to supersede AS 1029.2—1982 *Low voltage contactors Part 2: Semiconductor (solid state) (up to and including 1000 V a.c. and 1500 V d.c.)*.

The objective of this Standard is to provide characteristics, constructional and performance requirements and tests to verify performance for a.c. semiconductor non-motor load controllers and contactors for rated voltage up to 1000 V a.c.

This Standard is Part 4.3 of a series which, when complete, will consist of the following:

AS/(NZS) 3947	Low-voltage switchgear and controlgear
AS/NZS 3947.1	Part 1: General rules
AS 3947.2	Part 2: Circuit-breakers
AS/NZS 3947.3	Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
AS/NZS 3947.3 Suppl	Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units Supplement 1: Fuse-switch-disconnectors and switch-disconnectors for use with low voltage aerial bundled cables
AS 3947.4.1	Part 4.1: Contactors and motor-starters—Electromechanical contactors and motor-starters
AS 3947.4.2	Part 4.2: Contactors and motor-starters—A.C. semiconductor motor controllers and starters
AS/NZS 3947.4.3	Part 4.3: Contactors and motor-starters—A.C. semiconductor controllers and contactors for non-motor loads
AS/NZS 3947.5.1	Part 5.1 Control circuit devices and switching elements—Electromechanical control circuit devices
AS/NZS 3947.5.2	Part 5.2: Control circuit devices and switching elements—Proximity switches
AS/NZS 3947.5.3	Part 5.3 Control circuit devices and switching elements—Requirements for proximity devices with defined behaviour under fault conditions
AS/NZS 3947.5.4	Part 5.4: Control circuit devices and switching elements—Methods of assessing the performance of low-energy contacts—Special tests
AS/NZS 3947.5.5	Part 5.5 Control circuit devices and switching elements—Electrical emergency stop devices with mechanical latching function
AS/NZS 3947.5.6	Part 5.6 Control circuit devices and switching elements—D.C. interface for proximity sensors and switching amplifiers (NAMUR)
AS 3947.6.1	Part 6.1: Multiple function equipment—Automatic transfer switching equipment
AS 3947.6.2	Part 6.2: Multiple function equipment—Control and protective switching devices (or equipment) (CPS)
AS 3947.7.1	Part 7.1: Ancillary equipment—Terminal blocks for copper conductors
AS 3947.7.2	Part 7.2: Ancillary equipment—Protective conductor terminal blocks for copper conductors
AS/NZS 3947.7.3	Part 7.3: Ancillary equipment—Safety requirements for terminal blocks for the reception of cartridge fuse-links

This Standard is identical with and has been reproduced from IEC 60947-4-3:1999, *Low-voltage switchgear and controlgear—Part 4-3: Contactors and motor-starters—AC semiconductor controllers and starters for non motor loads*.

A reference to an International Standard identified in the Normative References Clause by strikethrough (~~example~~) is replaced by a reference to the Australian or Australian/New Zealand Standard(s) listed immediately thereafter and identified by shading (~~example~~). Where the struck-through referenced document and the referenced Australian or Australian/New Zealand Standard are identical, this is indicated in parenthesis after the title of the latter.

In January 1997, the IEC commenced numbering its Standards from 60000 by adding 60000 to the number of each existing Standard. This coordinates IEC numbering with ISO numbering. During the transition period an IEC Standard might be identified by its new number or its old number (for example, IEC 60050 or IEC 50).

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text 'this standard' should read 'this Australian/New Zealand Standard'.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A normative annex is an integral part of a Standard, whereas an informative annex is only for information and guidance.

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## INTRODUCTION

This part of IEC 60947 covers low-voltage a.c. semiconductor controllers and contactors (solid-state contactors) intended for the use with non-motor loads. As controllers, they have many capabilities beyond the simple switching on and off of non-motor loads. As contactors, they perform the same functions as mechanical contactors, but utilize one or more semiconductor switching devices in their main poles.

The devices may be single-pole or multi-pole (see 2.3.1 of IEC 60947-1). This standard refers to complete devices rated as a unit incorporating all necessary heat-sinking material and terminals. It includes devices with all necessary terminals, which are supplied with or without heat-sink in knocked-down form for combination by the users, when the manufacturer gives with the device detailed information about choosing the heat-sink and mounting the device on the heat-sink.

The generic term, "controller", is used in this standard wherever the unique features of the power semiconductor switching elements are the most significant points of interest. The generic term "contactor" is used in this standard wherever the feature of simple switching on and off is the most significant point of interest. Specific designations (for example, form 4, form HxB, etc.) are used wherever the unique features of various configurations comprise significant points of interest.

The provisions of the general rules (IEC 60947-1) are applicable to this standard, where specifically called for. Clauses and subclauses thus applicable, as well as tables, figures, and annexes, are identified by reference to IEC 60947-1, for example 1.2.3, table 4 of IEC 60947-1 or annex A of IEC 60947-1.

## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

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**Australian/New Zealand Standard****Low-voltage switchgear and controlgear**  
**Part 4.3: Contactors and motor-starters—A.C. semiconductor controllers**  
**and contactors for non-motor loads**

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Any IEC table, figure or passage of text that is struckthrough is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

**1 Scope and object**

This part of IEC 60947 applies to a.c. semiconductor non-motor load controllers and contactors intended for performing electrical operations by changing the state of a.c. electric circuits between the ON-state and the OFF-state. Typical applications are given in table 2.

As controllers, they may be used to reduce the amplitude of the r.m.s. a.c. voltage on the load terminals from that of the applied voltage – either continuously or for a specified period of time. The half-wave period of the a.c. wave form remains unchanged from that of the applied voltage.

They may include a series mechanical switching device and are intended to be connected to circuits, the rated voltage of which does not exceed 1 000 V a.c.

The semiconductor controllers and contactors dealt with in this standard are not normally intended to interrupt short-circuit currents. Therefore, suitable short-circuit protection (see 8.2.5) should form part of the installation but not necessarily of the controller itself.

In this context, this standard gives requirements for semiconductor controllers and contactors associated with separate short-circuit protective devices.

This standard does not apply to

- continuous operation of a.c. motors;
- low-voltage a.c. semiconductor motor controllers and starters covered by IEC 60947-4-2;
- electronic a.c. power controllers covered by IEC 60146;
- all-or-nothing solid-state relays.

Contactors and control-circuit devices used in semiconductor controllers and contactors should comply with the requirements of their relevant product standard. Where mechanical switching devices are used, they should meet the requirements of their own IEC product standard and the additional requirements of this standard.

The object of this standard is to state

- a) the characteristics of semiconductor controllers and contactors and associated equipment;