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Short-circuit currents — Calculation of effects

Part 2: Examples of calculation

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/73, Short circuit currents.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Short-circuit currents – Calculation of effects – Part 2: Examples of calculation

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SHORT-CIRCUIT CURRENTS – CALCULATION OF EFFECTS

Part 2: Examples of calculation

FOREWORD

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 60865-2, which is a technical report, has been prepared by IEC technical committee 73: Short-circuit currents.

This second edition cancels and replaces the first edition published in 1994. This edition constitutes a technical revision.

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

a) The determinations for auto reclosure together with rigid conductors have been revised.

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b) The configurations in cases of flexible conductor arrangements have been changed.

c) The influence of mid-span droppers to the span has been included.

d) For vertical cable-connection the displacement and the tensile force onto the lower fixing point may be calculated now.

e) Additional recommendations for foundation loads due to tensile forces have been added.

f) The subclause for determination of the thermal equivalent short-circuits current has been deleted (is part of IEC 60909-0:2001 now).

g) The standard IEC 60865-1:2011 has been reorganized and some of the symbols have been changed to follow the conceptual characteristic of international standards.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
73/168/DTR	73/173/RVC

Full information on the voting for the approval of this technical report 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 list of all parts in the IEC 60865 series, published under the general title *Short-circuit currents – Calculations of effects*, can be found on the IEC website.

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

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

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

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SHORT-CIRCUIT CURRENTS – CALCULATION OF EFFECTS

Part 2: Examples of calculation

1 Scope

The object of this part of IEC 60865, which is a Technical Report, is to show the application of procedures for the calculation of mechanical and thermal effects due to short circuits as presented in IEC 60865-1. Thus, this technical report is an addition to IEC 60865-1. It does not, however, change the basis for standardized procedures given in that publication.

The following points should particularly be noted:

a) The examples in this Technical Report illustrate how to make the calculations according to IEC 60865-1 in a simplified and easy-to-follow manner. They are not intended as a check for computer programs.

b) The numbers in parentheses at the end of the equations refer to the equations in IEC 60865-1:2011.

c) The system voltages are referred to as nominal voltages.

d) The results are rounded to three significant digits.

e) Short-circuit effects appear as exceptional load in addition to the mechanical loads of the normal operation of a switchgear. In the following examples with rigid conductors, a possible static preloading is therefore calculated too. Depending on whether it concerns the load of the normal operation or the load during the short-circuit different safety factors come to use. The height of these factors has been chosen typically and is recommended for the use. However, other safety factors may be necessary depending on the safety concept.

2 Normative references

IEC 60865-1:2011, *Short-Circuit Currents – Calculation of Effects – Part 1: Definitions and calculation methods*

IEC 60909-0:2001, *Short-circuit currents in three-phase AC systems – Part 0: Calculation of currents*

3 Symbols and units

For symbols and units, reference is made to IEC 60865-1:2011.

In addition, the following symbols are used:

$F_{str,k}$	Dead load (characteristic value)	N
$F_{str,d}$	Dead load (design value)	N
$F_{st,r,d}$	Force on support of rigid conductors (design value) due to dead load	N
h_S, h_I	Height of the substructure, insulator	m
H_s	Horizontal component of the force at the lower fixing point of one sub-conductor of a dropper	N

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