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Application guidance based on the IEC 60364 series -
Part 201: Asynchronous motor starting and protection

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Application guidance based on the IEC 60364 series - Part 201: Asynchronous motor starting and protection

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IEC TS 61200-201 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
64/2860/DTS	64/2871/RVDTS

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 Technical Specification 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 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

Asynchronous motors are used in a wide variety of applications. The following are examples of driven machines:

– centrifugal pumps;
– fans and blowers;
– compressors;
– crushers;
– conveyors;
– lifts and cranes.

The consequences of a motor failure due to incorrect protection or the inability of control circuits to operate can include the following.

– For persons:
  - lack of fresh air due to the blockage of motor ventilation;
  - electrocution or electric shock due to insulation failure in the motor;
  - accident due to non-stopping of the motor.
– For the driven machine and the process:
  - shaft couplings, axles, driving belts, etc. damaged due to a stalled rotor;
  - loss of production;
  - delayed manufacturing.
– For the motor itself:
  - motor winding burnt out due to stalled rotor;
  - economical aspects of repair;
  - economical aspects of replacement.

Therefore, safety of persons and properties, as well as reliability and availability levels, are highly dependent on the selection of protective devices.

In economic terms, it is important to consider the overall cost of failure. This is linked with the size of the motor and with the difficulties of access and replacement. Loss of production is a further and evidently important factor.

Specific features of motor performance influence the power supply circuits that are needed for satisfactory operation.

A motor power-supply circuit presents certain constraints not normally encountered in other (common) final circuits. These are due to the particular characteristics of motors directly connected to the line, such as the following:

– high start-up current, which is mostly reactive, and can therefore be the cause of significant voltage drop;
– high number and frequency of start-up operations;
– because of the high start-up current, motor overload protective devices must have operating characteristics which avoid tripping during the starting period;
– some safety application requiring exemption of protection against overload;
– specificities due to application, e.g. lifts, cranes, motor with strong inertia.

All guidance in this document is based on the IEC 60364 series [1].

1 Scope

This part of IEC 61200 provides guidance, based on the general requirements provided in the IEC 60364 series, on the implementation of protective measures for low-voltage asynchronous motors. This document covers the control and the protection of low-voltage asynchronous motors.

2 Normative references

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.

IEC 60364-1, *Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, and definitions*

IEC 60364-4-41, *Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock*

IEC 60364-4-43, *Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent*

IEC 60364-5-53:2019, *Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Devices for protection for safety, isolation, switching, control and monitoring*

IEC 60947-4-1, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60364-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/
– ISO Online browsing platform: available at https://www.iso.org/obp

3.1
asynchronous motor
alternating current motor in which the speed of the motor is not in a fixed ratio with the frequency of the current supplied

Note 1 to entry: For more details and information on various categories of asynchronous motor, refer to Annex A.

[SOURCE: IEC 60050-811:2017 [2], 811-12-25, modified – Note 1to entry has been added.]

3.2
starter
combination of all the switching means necessary to start and stop a motor in combination with suitable overload protection

Note 1 to entry: Starters may be designated according to the method by which the force for closing the main contacts is provided.

Note 2 to entry: For more details and information on various motor starters, refer to Annex B.