

TECHNICAL REPORT

ISO/IEC TR 14762

First edition
2001-01

Information Technology – Home Control Systems – Guidelines for functional safety

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Reference number
ISO/IEC TR 14762:2001(E)

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TECHNICAL REPORT – TYPE 3

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<https://standards.itih.ai/Catalogue/standards/iec/fb5b0a3a-3932-4026-adf8-4bf1561fec84/iso-iec-tr-14762-2001>

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PRICE CODE **F**

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INFORMATION TECHNOLOGY – HOME CONTROL SYSTEMS – GUIDELINES FOR FUNCTIONAL SAFETY

FOREWORD

- 1) ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
- 2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.
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- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where, for any other reason, there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when the technical committee has collected data of a different kind from that which is normally published as an International Standard, for example 'state of the art'.

Technical reports of types 1 and 2 are subject to review within three years of publication to decide whether they can be transformed into International Standards. Technical reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC 14762, which is a technical report of type 3, was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This document which is purely informative is not to be regarded as an International Standard. Comments on the content of this document should be sent to IEC Central Office.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

INTRODUCTION

This technical report gives guidance to the product committees, so that they can specify products using home control systems. It gives guidance on the default actions a device should take when it loses network access, and on the definition of the “safe” state of the product.

Verb forms such as “should” are used because a technical report is informative and should not contain requirements. However, if safety is to be achieved, compliance with the statement is compulsory.

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INFORMATION TECHNOLOGY – HOME CONTROL SYSTEMS – GUIDELINES FOR FUNCTIONAL SAFETY

1 Scope

This technical report gives guidelines for functional safety of electrically-controlled devices intended to be integrated in a home control system (HCS), as defined in IEC Guide 110. These guidelines also apply to similar equipment having home and/or building control functions. Any reference to HCS includes similar equipment, such as sensors and activators for security and energy management.

1.1 User environment

This technical report is concerned with the safety of persons, surroundings, livestock and domestic animals. It includes personal protection against electric shock, effects of excessive temperature, radiation, explosion, implosion, mechanical stability and moving parts, as well as protection against fire. It covers safety both in homes and non-industrial buildings. (See IEC Guide 104.)

This technical report specifies requirements intended to ensure safety for the user and layperson who may come into contact with the equipment and, where specifically stated, for service personnel (see clause 1 of IEC 60950).

An HCS should comply with the requirements for functional safety indicated in this report. In addition, the individual equipment integrated into an HCS should comply with relevant product safety standards.

1.2 Hazards

Application of this technical report is intended to prevent injury or damage due to any of the following hazards that could result from malfunction or failure of an HCS:

- electric shocks;
- energy hazards;
- fire;
- mechanical and heat hazards;
- radiation hazards;
- chemical hazards.

Included is safety in homes and non-industrial buildings for persons, surroundings, livestock and domestic animals.

1.3 Conditions

This technical report covers all conditions of normal use and fault conditions.

Foreseeable misuse should be taken into consideration; however, sabotage, *force majeure* and intentional damage are excluded.

After abnormal operation or in a fault condition, a device should not interfere with the safety of the HCS and should remain safe for the user as defined in the relevant product safety standard. It is not required that the device should still be in full working order.

1.4 Possible protection measures

The following measures are suggested:

- measures to prevent an HCS from interfering with the safety of a device connected to the HCS;
- measures to ensure that a malfunction or a failure of an HCS does not impair the safety level of devices integrated into the system;
- measures to prevent a device integrated into an HCS from interfering with the safety of the HCS, or other devices connected to the HCS.

Some examples of such measures are

- appropriate installation of a device,
- adequate electrical safety of interface modules,
- control of HCS access,
- verification of safety critical information,
- safe mode of a device in the event of a malfunction or a failure of the HCS.

Relevant information should be given within installation or operation manuals (or instruction sheets).

2 Reference documents

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

IEC Guide 110, *Home control systems – Guidelines relating to safety*

IEC Guide 112:2000, *Guide on the safety of multimedia equipment*

IEC 60065:1998, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60364 (all parts), *Electrical installation of buildings*

IEC 60950, *Safety of information technology equipment*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this technical report the definitions of IEC Guide 110 apply as well as the following definition.

3.1.1

functional safety (for a home control system)

ability of a home control system to carry out the actions necessary to achieve and maintain an appropriate level of safety both under normal conditions and when a fault or hazard occurs [see IEC 61508-4]

3.2 Abbreviations

HCS: home control system

4 General guidelines for the product committees

For HCS products, the following applies.

- The existing measures and protection concepts incorporated in regulations and product standards need to be taken into account.
- No part of a home control system should rely upon unconfirmed safety-critical information. This applies equally to new and modified systems (extensions, changes of configuration). (IEC Guide 110, 4.2.1.)
- The network or any other part of a home control system should not impair the safety of a device; all safety aspects of regulations and the product standard of the device should be complied with. Similarly, connection of an application device should not interfere with the safety of the home control system. (IEC Guide 110, 4.2.2.)
- If a device relies upon an HCS for safe operation but cannot verify correct function of the relevant parts of the HCS, the device should maintain an appropriate level of safety independent of the HCS. (IEC Guide 110, 4.2.3.)
- An order or series of orders (even if incorrect or unexpected) received via the HCS should not result in a hazard or damage the HCS product or the equipment controlled by the HCS. These orders may cause the product not to operate at all or not to operate properly, for example, by entering a "default" mode, provided it is in a safe mode.
- The manufacturer and/or installer should apply the relevant safety standards to the installation of HCS, in particular IEC 60364 (containing the rules for the erection and design of electrical installations), so as to ensure safety and proper functioning for the use intended.

It is to be noted that the above recommendations can easily be taken into account by a manufacturer of a product by integrating an HCS access that has a well-defined function (for example dish-washer, toaster, etc.).

The above recommendations should not present difficulties for product manufacturers skilled in the design and production of conventional forms of domestic appliances and similar equipment that do not include HCS access.

Integration of an HCS access adds electrical safety requirements that have to be complied with, but does not add new classes of potential safety hazards. In this case, the manufacturer is expected to know about the existing safety measures for a non-HCS-connected device in order to ensure the safety of this device.

As an example, an oven integrating an HCS access may be unexpectedly switched on, either over the HCS or locally by a child; this must be taken into account by the manufacturer in the same way. The integration of the HCS access does not create a new hazard; however, it affords another way of exposing an existing hazard, that of unintended operation.

5 Guidelines referring to installation

The above recommendations may not be sufficient in cases where the geographical distribution or the combination of the device with other devices may lead to potential functional safety hazards.

For example, a light in a staircase may lead to a safety hazard if unexpectedly switched off. Similarly, a device used to switch on or off an electrical line or plug, operating independently of the kind of load connected, may generate additional safety hazards, depending on the equipment that is using the line or plug.

In these cases, the manufacturer should draw the attention of the installer and/or the user to the installation and usage conditions and requirements.

- Installation of products should be done according to the manufacturer's user and installation manuals; these manuals should provide guidance for the installation, configuration, extension and maintenance of such systems so that potential safety problems are avoided.
- Installation of an HCS does not alter or diminish the need to comply with existing regulations and guidelines. After the installation of a home control system or any HCS-connected device, the electrical installation should still comply with the latest regulations and state of the art. This should be stated in the product instructions.
- Relevant safety requirements apply to the connection of a home control system to a public services network if the home control system includes an access point to such a network.

If the system is to be installed in a building where some national or regional safety requirements apply, the behaviour of the system should comply with these requirements. In case of a fault, the system should default to a safe mode compatible with those requirements.

6 Case by case requirements

6.1 Message types

A primary consideration of safety relates to the messages sent on an HCS. The messages on an HCS are intended to do one of a number of things as listed below.

- a) Convey either information or instructions to a device; for example, "it is 22 °C in the bedroom" or "turn off the kitchen heater." The messages are generally about the real world, that is, the world outside the HCS, and are intended to have an immediate effect on the actions of other devices. These are the most common forms of messages on an HCS.
- b) Change the state of a device by rendering either the whole or parts of the device inoperable, for example, taking it off-line.¹⁾
- c) Modify the performance of a device; for example, "don't report temperature changes smaller than 1 °C" or "send an alarm if the temperature of the swimming pool is below 16 °C". These messages modify the future performance of the system. These may be regarded as configuration messages since they modify the way in which the target device is configured.

¹⁾ These messages should not prejudice the safety of a system since it should not be necessary to rely on the functioning of all network devices for safe operation.