



IEC 63180

Edition 1.1 2025-05
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

**Methods of measurement and declaration of the detection range of detectors –
Passive infrared detectors for major and minor motion detection**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2025 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will also have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) Online.

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
INTRODUCTION to Amendment 1	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 General requirements on tests.....	9
5 Test environment.....	10
6 Test equipment.....	11
6.1 Test person for major motion detection	11
6.2 Test dummies for major motion detection when using automated test systems	11
6.3 Test arm for minor motion detection.....	16
7 Test procedure	18
7.1 General.....	18
7.2 Pre-conditioning of the detector	19
7.3 Major motion detection.....	20
7.3.1 Detection via walking test.....	20
7.3.2 Detection via an automated test system.....	22
7.4 Minor motion detection.....	23
7.5 Determining the detection boundary.....	25
7.5.1 Determining the detection boundary during the human walking test (tangential movement $\pm 5^\circ$ from the detector)	25
7.5.2 Determining the detection boundary for automated test (tangential movement $\pm 5^\circ$ from the detector).....	27
8 Presentation of test results	28
8.1 General.....	28
8.2 Major motion radial and tangential area	29
8.3 Minor motion area (MMA).....	30
8.5 Large major motion tangential areas and detection boundary.....	32
8.4 Creation of 3D data model for detection display of major motion	32
Bibliography.....	35
Figure 1 – Radial motion.....	8
Figure 2 – Tangential motion	8
Figure 3 – Example of a major motion detector detection area	9
Figure 4 – Test dummy perspective view	12
Figure 5 – Full size test dummy for testing motion detection	13
Figure 6 – Scaled 1:2 test dummy for testing motion detection.....	14
Figure 7 – Scaled 1:5 test dummy for testing motion detection.....	15
Figure 8 – Test arm for testing minor motion detection.....	17
Figure 9 – Example of a test grid for tangential walking and minor motion.....	20
Figure 10 – Test grid for radial walking test	21
Figure 11 – Test setup for tangential movements (top view).....	22
Figure 12 – Test setup for radial movements (side view).....	23

Figure 13 – Test setup for minor motion detection (view from above).....	24
Figure 14 – Walking test pattern for determining the detection boundary.....	27
Figure 15 – Symbol used when the major motion coverage pattern has been determined using a human subject.....	29
Figure 16 – Symbol used when the major motion coverage pattern has been determined by an automated test system	29
Figure 17 – Diagram for major motion and detection boundary with sample results for 90°	30
Figure 18 – Example of measurement result of a minor motion measurement	31
Figure 19 – Display of minor motion measurement.....	31
Figure 20 – Example of a 3D model	31
Table 1 – Relation between the declared mounting height, the mounting height of the device under test (DUT) and test dummy used.....	16
Table 2 – Tangential moving distance related -5° to $+5^{\circ}$ to the distance from the detector	28

Currently in preview, click buy full vers.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METHODS OF MEASUREMENT AND DECLARATION
OF THE DETECTION RANGE OF DETECTORS –****Passive infrared detectors for major and minor motion detection**

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, Publicly Available Specifications (PAS) 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, accept IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> [and/or] www.iso.org/patents. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60730-1 edition 1.1 contains the first edition (2020-06) [documents 23B/1319/FDIS and 23B/1320/RVD] and its amendment 1 (2025-05) [documents 23B/1491/CDV and 23B/1509A/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 63180 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
23B/1319/FDIS	23B/1320/RVD

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

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

The committee has decided that the contents of this document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

Currently in preview, click buy full version

INTRODUCTION

Passive infrared detectors are an important element in an energy efficient building. They allow for switching on and off and for controlling loads in order to achieve an optimum degree of comfort and energy efficiency.

The detectors covered in this document are motion detectors using passive infrared (PIR) technology in electronic control devices and appliance switches whether stand-alone (direct control of one or more applications) or as part of home and building electronic systems or building automation control systems (HBES/BACS) or similar. In the case of HBES/BACS, the resulting action depends on the programming of the relevant HBES/BACS.

The purpose of these detectors is to detect the movement of persons.

Detectors linked to a system may also be assigned other tasks: state reporting, power consumption, event reporting, scenarios, etc. These additional functions are not part of this document.

In order to achieve the energy efficiency targets and comfort, the detectors should operate accurately. In addition, the detection area will need to be provided with sufficient accuracy in order to allow integrators to choose the correct detectors for the needed action.

This document provides a methodology and test procedures for a manufacturer to declare and verify the detection performance of these devices with respect to the detection area.

INTRODUCTION to Amendment 1

This amendment includes the following significant technical changes with respect to the base edition:

- a) improvement of general tolerances for the test environment and test equipment;
- b) definition of the rotating point of the test arm;
- c) addition of the recommended mounting heights for performing the tests;
- d) addition of acceleration and deceleration speeds for scaled dummies;
- e) modification of the pre-conditioning test at minimum and maximum declared ambient temperature with new performance criteria;
- f) addition of an alternative test procedure for large tangential major motion detection areas.

METHODS OF MEASUREMENT AND DECLARATION OF THE DETECTION RANGE OF DETECTORS –

Passive infrared detectors for major and minor motion detection

1 Scope

This document provides a methodology and test procedures to be able to declare and verify the detection area for motion detectors using passive infrared technology in electronic control devices and appliance switches, whether stand-alone (direct control of one or more applications) or as part of home and building electronic systems or building automation control systems (HBES/BACS) or similar.

It also provides a uniform way to present the test results.

The purpose of these detectors is to detect the major and minor movements of persons.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

infrared IR

optical radiation for which the wavelengths in vacuum are longer than those for visible radiation, that is approximately between 780 nm and 1 mm

[SOURCE: IEC 60050-731:1991, 731-01-05]

3.2

passive infrared detector

electronic detector that measures infrared (IR) light radiating from humans in its field of view

3.3

motion detector

unit detecting motion that can be part of an electronic control device or an appliance switch

Note 1 to entry: "Electronic control device" is used as a general term to cover electronic switches, HBES/BACS switches and electronic extension units.

3.4

major motion

movement of a person walking into an area or walking within an area