
Nosljive elektronske naprave in tehnologije - 402-3. del: Merjenje zmogljivosti nosljivih izdelkov za fitnes - Preskusne metode za ugotavljanje točnosti srčnega utripa (IEC 63203-402-3:2024)

Wearable electronic devices and technologies - Part 402-3: Performance measurement of fitness wearables - Test methods for the determination of the accuracy of heart rate (IEC 63203-402-3:2024)

Tragbare elektronische Geräte und Technologien - Teil 402-3: Leistungsmessverfahren für Fitness-Wearables - Testmethoden für die Bestimmung der Genauigkeit der Herzfrequenz (IEC 63203-402-3:2024)

Technologies et dispositifs électroniques prêts-à-porter - Partie 402-3: Mesurage de l'aptitude à la fonction des dispositifs prêts-à-porter pour les activités de mise en forme - Méthodes d'essai pour déterminer l'exactitude des mesures de la fréquence cardiaque (IEC 63203-402-3:2024)

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Performance measurement of fitness wearables - Test methods
for the determination of the accuracy of heart rate
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Technologies et dispositifs électroniques prêts-à-porter -
Partie 402-3: Mesurage de l'aptitude à la fonction des
dispositifs prêts-à-porter pour les activités de mise en forme
- Méthodes d'essai pour déterminer l'exactitude des
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Tragbare elektronische Geräte und Technologien - Teil 402-
3: Leistungsmessverfahren für Fitness-Wearables -
Testmethoden für die Bestimmung der Genauigkeit der
Herzfrequenz
(IEC 63203-402-3:2024)

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European foreword

The text of document 124/247/FDIS, future edition 1 of IEC 63203-402-3, prepared by IEC/TC 124 "Wearable electronic devices and technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63203-402-3:2024.

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**Wearable electronic devices and technologies –
Part 402-3: Performance measurement of fitness wearables – Test methods for
the determination of the accuracy of heart rate**

**Technologies et dispositifs électroniques prêts-à-porter –
Partie 402-3: Mesurage de l'aptitude à la fonction des dispositifs prêts-à-porter
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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and abbreviated terms	6
3.1 Terms and definitions.....	6
3.2 Abbreviated terms.....	7
4 Test methods and procedures.....	7
4.1 General.....	7
4.2 Other considerations.....	7
4.3 Setup and configuration	8
4.3.1 PPG simulator test.....	8
4.3.2 Comparative test with a reference ECG device	8
4.4 Participant considerations.....	9
4.4.1 General considerations	9
4.4.2 Skin tones	9
4.4.3 BMI range.....	10
4.4.4 Gender balance	10
4.4.5 Skin influences	10
4.4.6 Age.....	10
4.4.7 Clothing and shoes.....	10
4.5 Comparative test protocols	10
4.5.1 Test environment.....	10
4.5.2 Test preparation	10
4.5.3 Test protocols.....	11
5 Accuracy	13
5.1 HRMD accuracy for PPG simulator test.....	13
5.2 Heart rate accuracy for comparative test with a reference ECG device	13
6 Test report.....	14
6.1 General.....	14
6.2 PPG simulator test results.....	14
6.3 HRMD properties	14
6.4 Reference device (chest type ECG)	14
6.5 Descriptions of participant characteristics	14
6.6 Test conditions	15
6.7 Detailed description of each test protocol.....	15
6.8 Test results	15
Annex A (informative) Example of PAR-Q	16
Bibliography.....	17
Figure 1 – PPG simulator circuit and setup	8
Figure 2 – Example of PPG to be tested and reference ECG devices.....	9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES –**Part 402-3: Performance measurement of fitness wearables –
Test methods for the determination of the accuracy of heart rate**

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IEC 63203-402-3 has been prepared by IEC technical committee 124: Wearable electronic devices and technologies. It is an International Standard.

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

Draft	Report on voting
124/247/FDIS	124/259/RVD

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 International Standard 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.

A list of all parts in the IEC 63203 series, published under the general title *Wearable electronic devices and technologies*, can be found on the IEC website.

The committee has decided that the contents of this document 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.

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INTRODUCTION

The intent of this document is to evaluate the accuracy of wearables that measure heart rate with a photoplethysmogram (PPG) sensor.

Heart rate is a widely used physiological variable that non-invasively assesses the cardiac autonomic nervous system by measuring changes in the cardiac rhythm through time. Heart rate can be measured from an electrocardiographic signal (ECG). However, the use of physiological signals other than ECG to extract heart rate information is common. The term “pulse rate” has been used in literature to reference heart rate obtained through PPG.

Researchers have been using PPG to extract as much information as possible given its widespread use in clinical and everyday activities. PPG is a simple, non-invasive, optical measurement technique used for the detection of blood volume changes in peripheral tissue. Pulse rate has been treated as a synonym to heart rate and these two terms are often used interchangeably by manufacturers in describing device features to consumers. However, it is possible that the relationship or differences between heart rate and pulse rate will not be clear based on intent. Because some countries and manufacturers can use the term pulse rate rather than heart rate, the reader is encouraged to clarify preferential term, if the term is being used as a synonym, and testing expectations.

Heart rate measures the rate of contractions or heartbeats whereas pulse rate measures changes in blood pressure. For an unhealthy person, these two factors could be different. The reader is reminded that according to 4.4.1 of this document, test participants are asked to fill out the Physical Activity Readiness Questionnaire (PAR-Q) to determine their eligibility for the comparative test. Anyone deemed unhealthy per the PAR-Q will be disqualified from testing.

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WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES –

Part 402-3: Performance measurement of fitness wearables – Test methods for the determination of the accuracy of heart rate

1 Scope

This part of IEC 63203 specifies terms, a measurement protocol, and a test to evaluate the accuracy of wearables that measure heart rate with a photoplethysmogram (PPG) sensor. While this document can be used to measure a variety of different devices claiming to report heart rate, care will be taken when testing in countries that differentiate between heart rate and pulse rate. This measurement protocol is not intended to evaluate medical devices associated with the IEC 60601 series or ISO 80601 series.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

3.1.1

heart rate

HR

speed of the heartbeat measured by the number of contractions of the heart per unit time (typically per minute), or frequency of contractions of the ventricles

3.1.2

body mass index

BMI

person's weight divided by their height in meters squared

Note 1 to entry: It is expressed in kilograms per square meter.

3.1.3

heart rate monitoring device

HRMD

device that captures pulsation signals and calculates the pulse rate at regular intervals

Note 1 to entry: HRMD is used in this document for PPG wearable devices under test only.

3.1.4

plethysmograph

device which produces a plethysmogram