

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Connectors for electronic equipment – Product requirements –
Part 2-104: Circular connectors – Detail specification for circular connectors
with M8 screw-locking or snap-locking**

**Connecteurs pour équipements électroniques – Exigences de produit –
Partie 2-104: Connecteurs circulaires – Spécification particulière pour les
connecteurs circulaires M8 à vis ou à encliquetage**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2014 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

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: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Connectors for electronic equipment – Product requirements –
Part 2-104: Circular connectors – Detail specification for circular connectors
with M8 screw-locking or snap-locking**

**Connecteurs pour équipements électroniques – Exigences de produit –
Partie 2-104: Connecteurs circulaires – Spécification particulière pour les
connecteurs circulaires M8 à vis ou à encliquetage**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

W

ICS 31.220.10

ISBN 978-2-8322-9670-3

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
1 Scope.....	8
2 Normative references	8
3 Technical information	9
3.1 Terms and definitions.....	9
3.2 Recommended method of termination	9
3.3 Number of contacts, ratings and characteristics	9
3.4 Creepage and clearance distances	9
3.5 Marking.....	10
3.6 Safety aspects.....	10
4 Dimensional information	10
4.1 General.....	10
4.2 Survey of styles and variants	10
4.2.1 General	10
4.2.2 Fixed connectors	10
4.2.3 Free connectors.....	12
4.3 Interface dimensions.....	17
4.3.1 Pin front and side view A-coding.....	17
4.3.2 Pin front view B-coding.....	19
4.4 Engagement (mating) information	20
4.5 Gauges	21
4.5.1 Sizing gauges and retention force gauges	21
5 Characteristics	22
5.1 Climatic category	22
5.2 Electrical characteristics	22
5.2.1 Rated voltage – Rated impulse voltage – Pollution degree.....	22
5.2.2 Voltage proof.....	23
5.2.3 Current-carrying capacity.....	23
5.2.4 Contact resistance	23
5.2.5 Insulation resistance	23
5.3 Mechanical characteristics	24
5.3.1 Mechanical operation.....	24
5.3.2 Insertion and withdrawal forces	24
5.3.3 Contact retention in insert.....	24
5.3.4 Polarizing method	24
5.3.5 Vibration (sinusoidal).....	24
5.4 Other characteristics	25
5.4.1 IP degree of protection	25
6 Test schedule	25
6.1 General.....	25
6.1.1 Introductory remarks.....	25
6.1.2 Arrangement for contact resistance measurements.....	25
6.1.3 Arrangement for dynamic stress tests (vibration)	26
6.2 Test schedule	28
6.2.1 Test group P – Preliminary	28
6.2.2 Test group AP – Dynamic/ Climatic.....	29

6.2.3	Test group BP – Mechanical endurance.....	31
6.2.4	Test group CP – Electrical load	33
6.2.5	Test group DP – Chemical resistivity	34
6.2.6	Test group EP – Connection method tests	34
Annex A (informative)	Diameter of the female connector body	35
Figure 1	– Tube insert, male contacts dip solder mounting, long version	11
Figure 2	– Tube insert, male contacts dip solder mounting, short version.....	11
Figure 3	– Fixed connector with wire ends, male contacts, single hole mounting.....	11
Figure 4	– Fixed connector with wire ends, female contacts, single hole mounting.....	12
Figure 5	– Rewireable connector, male contacts, straight version, with locking nut	13
Figure 6	– Rewireable connector, male contacts, right angled version, with locking nut	13
Figure 7	– Non-rewireable connector, male contacts, straight version, snap-locking	14
Figure 8	– Non-rewireable connector, male contacts, straight version, with locking nut	14
Figure 9	– Non-rewireable connector, male contacts, right angled version, with locking nut ..	14
Figure 10	– Rewireable connector, female contacts, straight version, with locking nut	15
Figure 11	– Rewireable connector, female contacts, right angled version, with locking nut...	15
Figure 12	– Non-rewireable connector, female contacts, straight version, snap-locking.....	15
Figure 13	– Non-rewireable connector, female contacts, right angled version, snap-locking	16
Figure 14	– Non-rewireable connector, female contacts, straight version, with locking nut	16
Figure 15	– Non-rewireable connector, female contacts, right angled version, with locking nut	16
Figure 16	– Pin front view A-coding	17
Figure 17	– Pin side view A-coding	18
Figure 18	– Contact position A-coding – Front view	19
Figure 19	– Pin front view B-coding	19
Figure 20	– Contact position – B-coding – Front view.....	20
Figure 21	– Engagement (mating) information.....	20
Figure 22	– Gauge dimensions	22
Figure 23	– Contact resistance arrangement.....	26
Figure 24	– Dynamic stress test arrangement	27
Figure A.1	– Diameter of the female connector body, coding variant A.....	35
Figure A.2	– Shape of the female connector body, coding variant B.....	35
Table 1	– Connector ratings related to coding and number of contacts.....	9
Table 2	– Creepage and clearance distances.....	9
Table 3	– Styles of fixed connectors	10
Table 4	– Styles of free connectors	12
Table 5	– Connector dimensions in mated and locked position.....	21
Table 6	– Gauges	22
Table 7	– Climatic category.....	22
Table 8	– Rated voltage – Rated impulse voltage – Voltage proof.....	23
Table 9	– Voltage proof.....	23

Table 10 – Number of mechanical operations	24
Table 11 – Insertion and withdrawal forces	24
Table 12 – Number of test specimens	25
Table 13 – Test group P	28
Table 14 – Test group AP	29
Table 15 – Test group BP	31
Table 16 – Test group CP	33
Table 17 – Test group DP	34
Table 18 – Test group EP	34

This document is a preview generated by EVS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRONIC EQUIPMENT –
PRODUCT REQUIREMENTS –****Part 2-104: Circular connectors –
Detail specification for circular connectors
with M8 screw-locking or snap-locking**

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, access to 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61076-2-104 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- three new type ways have been added to the A-coding, including new gauges and contact diameters;
- the type designation has been removed.

A list of all parts of the IEC 61076 series, under the general title *Connectors for electronic equipment – Product requirements*, can be found on the IEC website.

The text of this standard is based on the following documents:

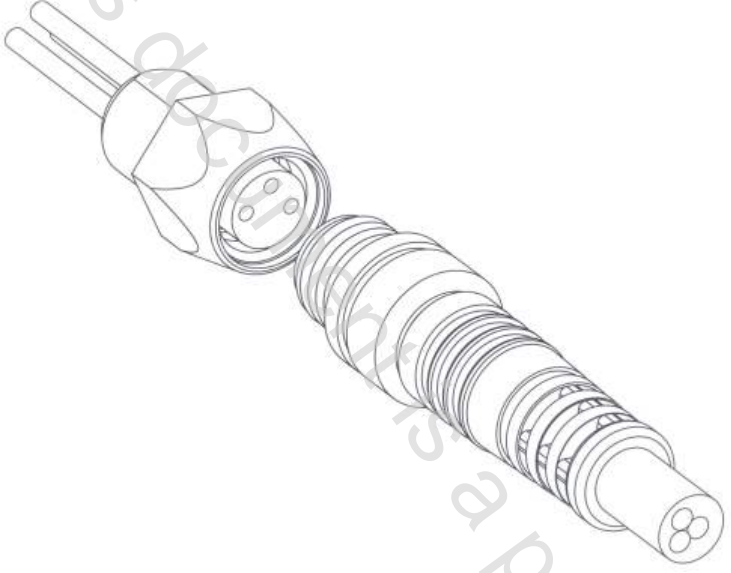
FDIS	Report on voting
48B/2384/FDIS	48B/2399/RVD

Full information on the voting for the approval of this standard 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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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.

<p>International Electrotechnical Commission IEC SC 48B – Connectors Specification available from: IEC General secretariat or from the addresses shown on the inside cover.</p>	IEC 61076-2-104
ELECTRONIC COMPONENTS detail specification in accordance with IEC 61076-1	
	<p>Circular connectors M8/ diameter 8 mm 3 to 8 way Male and female contacts Male and female connectors Rewireable – Non-rewireable</p> <p>Free cable connectors Straight and right angle connectors Fixed connectors Flange mounting Single hole mounting</p>

CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

Part 2-104: Circular connectors – Detail specification for circular connectors with M8 screw-locking or snap-locking

1 Scope

This part of IEC 61076 describes circular connectors M8 screw-locking or with nominal diameter 8 mm snap-locking, typically used for industrial process measurement and control. These connectors consist of fixed and free connectors either rewirable or non-rewirable. Male connectors have round contacts of diameter 0,6 mm, diameter 0,7 mm and diameter 1,0 mm.

Throughout this detail specification, dimensions are in mm.

NOTE M8 is the dimension of the thread of the screw-locking mechanism of these circular connectors.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts): *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

IEC 60068-1:2013, *Environmental testing - Part 1: General and guidance*

IEC 60068-2-60, *Environmental testing – Part 2: Tests – Test Ke: Flowing mixed gas corrosion test*

IEC 60352 (all parts), *Solderless connections*

IEC 60512 (all parts), *Connectors for electronic equipment – Tests and measurements*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
Amendment 2:2013
Amendment 1:1999

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 60999 (all parts), *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units*

IEC 61076-1:2006, *Connectors for electronic equipment – Product requirements – Part 1: Generic specification*

IEC 61984, *Connectors – Safety requirements and tests*

ISO 1302, *Geometrical Product Specification (GPS) – Indication of surface texture in technical product documentation*

3 Technical information

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581 apply.

3.2 Recommended method of termination

The contact terminations shall be of the following types: screw, crimp, insulation piercing, insulation displacement, press-in or solder.

3.3 Number of contacts, ratings and characteristics

Table 1 – Connector ratings related to coding and number of contacts

Coding	Contacts	Rated voltage	Rated current
A	3	50 V a.c./ 60 V d.c.	3 A
A	4	50 V a.c./ 60 V d.c.	3 A
A	6	30 V a.c./ 30 V d.c.	1,5 A
A	8	30 V a.c./ 30 V d.c.	1,5 A
B	5	30 V a.c./ 30 V d.c.	3 A

Insulation resistance: $10^8 \Omega \text{ min.}$

Climatic category: see 5.1, Table 7

Contact spacing: see Clause 4, dimensions

3.4 Creepage and clearance distances

The permissible operating voltages, depends on the application and also on the safety requirements.

The creepage and clearance distances in Table 2 are given as operating characteristics of mated connectors and shall be measured according to IEC 60512-1-2. The minimum values for clearance and creepage can be found in Table 2.

Table 2 – Creepage and clearance distances

Dimensions are in millimeter

Connector style and number of contacts	Minimum distance between contacts and earth contact		Minimum distance between adjacent contacts	
	Creepage	Clearance	Creepage	Clearance
A-coding 3+4 contacts	0,6	0,6	0,6	0,6
A-coding 6+8 contact and B-coding	0,6	0,6	0,6	0,6