

Connectors for electronic equipment - Product requirements - Part 2-101: Circular connectors - Detail specification for M12 connectors with screw-locking

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 61076-2-101:2012 sisaldab Euroopa standardi EN 61076-2-101:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 61076-2-101:2012 consists of the English text of the European standard EN 61076-2-101:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 03.08.2012.	Date of Availability of the European standard is 03.08.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 31.220.10

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

English version

**Connectors for electronic equipment -
Product requirements -
Part 2-101: Circular connectors -
Detail specification for M12 connectors with screw-locking
(IEC 61076-2-101:2012)**

Connecteurs pour équipements
électroniques - Exigences de produit -
Partie 2-101: Connecteurs circulaires -
Spécification particulière pour les
connecteurs M12 à vis
(CEI 61076-2-101:2012)

Steckverbinder für elektronische
Einrichtungen - Produktanforderungen -
Teil 2-101: Rundsteckverbinder -
Bauartspezifikation für Steckverbinder
M12 mit Schraubverriegelung
(IEC 61076-2-101:2012)

This European Standard was approved by CENELEC on 2012-05-25. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 48B/2279/FDIS, future edition 3 of IEC 61076-2-101, prepared by SC 48B "Connectors" of IEC/TC 48 "Electromechanical components and mechanical structures for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61076-2-101:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-02-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-05-25

This document supersedes EN 61076-2-101:2008.

EN 61076-2-101:2012 includes the following significant technical changes with respect to EN 61076-2-101:2008:

- the drawings of some styles have been corrected;
- a new style with maximum 17 poles, with A-coding, has been added, as new applications for the industrial process measurement and control require a high number of poles in M12 circular connectors. The existing styles and dimensions which were specified in EN 61076-2-101:2008 are further applicable for the added interface dimension of the 17 poles versions;
- removal of the type designation and ordering information, former Tables 6 and 7 have been updated accordingly;
- inclusion of the technical content of IEC/PAS 61076-2-108, which will be withdrawn after the publication of this European Standard. The drawings have been updated and correction to the title of Figure 9 was made.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61076-2-101:2012 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-581	2008	International Electrotechnical Vocabulary (IEV) - Part 581: Electromechanical components for electronic equipment	-	-
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60068-2-60	-	Environmental testing - Part 2: Tests - Test Ke: Flowing mixed gas corrosion test	EN 60068-2-60	-
IEC 60352	Series	Solderless connections	EN 60352	Series
IEC 60423	2007	Conduit systems for cable management - Outside diameters of conduits for electrical installations and threads for conduits and fittings	EN 60423	2007
IEC 60512	Series	Connectors for electronic equipment - Tests and measurements	EN 60512	Series
IEC 60512-1-100	-	Connectors for electronic equipment - Tests and measurements - Part 1-100: General - Applicable publications	EN 60512-1-100	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	-
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	EN 60998-2-1	-
IEC 60999	Series	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units	EN 60999	Series
IEC 61076-1	2006	Connectors for electronic equipment - Product requirements - Part 1: Generic specification	EN 61076-1	2006
IEC 61984	-	Connectors - Safety requirements and tests	EN 61984	-
ISO 1302	-	Geometrical Product Specifications (GPS) - Indication of surface texture in technical product documentation	EN ISO 1302	-

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
3.2.1 General	9
3.2.2 Number of contacts or contact cavities	10
3.3 Ratings and characteristics	10
3.4 Marking	10
3.5 Safety aspects.....	10
4 Dimensional information	11
4.1 General.....	11
4.2 Survey of styles and variants.....	11
4.2.1 Fixed connectors	11
4.2.2 Free connectors	22
4.3 Interface dimensions	27
4.3.1 Pin front view A-coding.....	27
4.3.2 Pin front view B-coding.....	32
4.3.3 Pin front view C-coding.....	33
4.3.4 Pin front view D-coding.....	36
4.3.5 Pin front view P-coding.....	37
4.4 Engagement (mating) information.....	38
4.5 Gauges	40
5 Characteristics	41
5.1 Climatic category.....	41
5.2 Electrical characteristics.....	41
5.2.1 Rated voltage – Rated impulse voltage – Pollution degree.....	41
5.2.2 Voltage proof.....	42
5.2.3 Current-carrying capacity.....	43
5.2.4 Contact resistance.....	43
5.2.5 Insulation resistance.....	44
5.3 Mechanical characteristics	44
5.3.1 IP degree of protection	44
5.3.2 Mechanical operation	44
5.3.3 Insertion and withdrawal forces	44
5.3.4 Contact retention in insert.....	44
5.3.5 Polarizing method.....	45
5.3.6 Vibration (sinusoidal).....	45
5.3.7 Pressure differential	45
6 Test schedule.....	45
6.1 General.....	45
6.2 Arrangement for contact resistance measurements	46
6.3 Arrangement for dynamic stress tests (vibration)	46
6.4 Test schedule.....	48

6.4.1	Test group P – Preliminary	48
6.4.2	Test group AP – Dynamic/ Climatic.....	49
6.4.3	Test group BP – Mechanical endurance.....	52
6.4.4	Test group CP – Electrical load	54
6.4.5	Test group DP – Chemical resistivity	55
6.4.6	Test group EP – Connection method tests	55
6.4.7	Test group FP – Electrical transmission requirements	56
Annex A (informative)	Diameter of the female connector body	57
Annex B (informative)	Steel conduit thread, sizes	58
Figure 1	– Tube insert, male contacts, mounting without thread (thread on tube)	12
Figure 2	– Tube insert, male contacts, mounting with thread M12 × 1	12
Figure 3	– Fixed connector, male contacts, mounting with thread M12 × 1, square flange front mounting	13
Figure 4	– Fixed connector, male contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M16 × 1,5	14
Figure 5	– Fixed connector, male contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M20 × 1,5	14
Figure 6	– Fixed connector, male contacts, mounting with thread M12 × 1 with wire ends, single hole mounting thread M16 × 1,5, mounting orientation.....	15
Figure 7	– Fixed connector, male contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M20 × 1,5, mounting orientation.....	15
Figure 8	– Fixed connector, glass to metal seal, square flange front mounting, male contacts.....	16
Figure 9	– Fixed connector, glass to metal seal, single hole front mounting, male contacts.....	17
Figure 10	– Fixed connector, glass to metal seal, jam nut rear mounting, male contacts.....	18
Figure 11	– Fixed connector, glass to metal seal, through flange mounting, male contacts.....	19
Figure 12	– Fixed connector, female contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M16 × 1,5	19
Figure 13	– Fixed connector, female contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M20 × 1,5	20
Figure 14	– Fixed connector, female contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M16 × 1,5, mounting orientation.....	21
Figure 15	– Fixed connector, female contacts, mounting with thread M12 × 1, with wire ends, single hole mounting thread M20 × 1,5, mounting orientation.....	21
Figure 16	– Rewireable connector, male contacts, straight version, with locking nut	22
Figure 17	– Rewireable connector, male contacts, right angled version, with locking nut.....	23
Figure 18	– Non-rewireable connector, male contacts, straight version, with locking nut	23
Figure 19	– Non-rewireable connector, male contacts, right angled version, with locking nut	24
Figure 20	– Non-rewireable connector, male contacts, right angled higher version, with locking nut	24
Figure 21	– Rewireable connector, female contacts, straight version, with locking nut	25
Figure 22	– Rewireable connector, female contacts, right angled version, with locking nut....	25
Figure 23	– Non-rewireable connector, female contacts, straight version, with locking nut	26

Figure 24 – Non-rewireable connector, female contacts, right angled version, with locking nut	26
Figure 25 – Pin front view A-coding, up to 12 ways	27
Figure 26 – Pin front view A-coding, 13 up to 17 ways	28
Figure 27 – Contact position A-coding front view	30
Figure 28 – Pin front view B-coding	32
Figure 29 – Contact position B-coding front view	32
Figure 30 – Pin front view 3 way with C-coding	33
Figure 31 – Pin front view 4 way with C-coding	33
Figure 32 – Pin front view 5 way with C-coding	34
Figure 33 – Pin front view 6 way with C-coding	34
Figure 34 – Contact position C-coding front view	35
Figure 35 – Pin front view D-coding	36
Figure 36 – Contact position D-coding front view	36
Figure 37 – Pin front view P-coding	37
Figure 38 – Contact position P-coding front view	37
Figure 39 – Engagement (mating) information.....	38
Figure 40 – Gauge dimensions	41
Figure 41 – Contact resistance arrangement.....	46
Figure 42 – Dynamic stress test arrangement.....	47
Figure A.1 – Diameter of the female connector body.....	57
Figure B.1 – Dimensions Pg thread.....	58
Table 1 – Ratings of connectors.....	10
Table 2 – Styles of fixed connectors	11
Table 3 – Styles of free connectors.....	22
Table 4 – Connectors dimensions in mated and locked position.....	39
Table 5 – Gauges	41
Table 6 – Climatic category	41
Table 7 – Rated voltage – Rated impulse voltage – Pollution degree	42
Table 8 – Voltage proof.....	43
Table 9 – Number of mechanical operations	44
Table 10 – Insertion and withdrawal forces	44
Table 11 – Number of test specimens	46
Table 12 – Test group P	48
Table 13 – Test group AP	49
Table 14 – Test group BP	52
Table 15 – Test group CP	54
Table 16 – Test group DP	55
Table 17 – Test group EP	55
Table 18 – Test group FP	56
Table A.1 – Diameter of the female connector body, dimension x	57
Table B.1 – Dimensions	59

CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

Part 2-101: Circular connectors – Detail specification for M12 connectors with screw-locking

1 Scope

This part of IEC 61076 describes M12 circular connectors typically used for industrial process measurement and control. These connectors consist of fixed and free connectors either rewirable or non-rewirable, with screw-locking. The connectors with glass to metal seal are fixed connectors only which consist of fixed glass to metal sealed styles with rewirable male contacts and are intermateable with corresponding free connectors according to this International Standard. Male connectors have round contacts \varnothing 0,6 mm, \varnothing 0,76 mm, \varnothing 0,8 mm and \varnothing 1,0 mm.

The different codings prevent the mating of these coded male or female connectors to any other interfaces and cross-mating between the different codings.

NOTE M12 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 60050-581: 2008, *International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components for electronic equipment*

IEC 60068-1, *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 60423:2007, *Conduit systems for cable management – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

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

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*

IEC 60664-1, *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: *Technical drawings – Methods of indicating surface texture*

3 Technical information

3.1 Terms and definitions

For the purposes of this document, terms and definitions from IEC 60050-581 as well as the following apply.

3.1.1

mounting orientation

circular mounting position of the connector in relation to the polarization of the mating interface

NOTE Where the free connector has an angled cable entry (as opposed to an in-line cable entry), the angle between the cable entry direction and the polarization keyway should be specified.

3.1.2

glass to metal seal

a form of construction whereby the connector contacts are housed in a glass insert which is inside a metal connector shell so as to form a connector with a hermetic seal which may be used to isolate differing environments

3.1.3

matched glass to metal seal

a form of construction whereby the thermal expansion characteristics of the glass, the metallic contacts, and the connector shell are similar and the seal between the glass and the metal is formed by a chemical bond

3.1.4

compression glass to metal seal

a form of construction whereby due to its higher coefficient of expansion the shell contracts around the glass during the solidification phase of manufacture applying a compression force to the glass insert so as to form a seal

3.2 Recommended method of termination

3.2.1 General

The contact terminations shall be of the following types: screw, crimp, insulation piercing, insulation displacement, press-in or solder. For the male connectors having a glass to metal seal the recommended contact terminations are crimp, eyelet, solder, PCB and rounded.

NOTE 1 eyelet – the termination end is flattened and pierced with a hole to provide both mechanical retention of the wire as well as solder attachment.

NOTE 2 rounded – terminal post with rounded (domed) end.