

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Connectors for electronic equipment – Product requirements –  
Part 2–107: Detail specification for circular hybrid connectors M12 with  
electrical and fibre-optic contacts with screw locking**

**Connecteurs pour équipements électroniques – Exigences de produit –  
Partie 2–107: Spécification particulière relative aux connecteurs circulaires  
hybrides M12 à contacts électriques et à fibres optiques, à verrouillage par vis**



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IEC 61076-2-107:2010

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hybrides M12 à contacts électriques et à fibres optiques, à verrouillage par vis**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRONIC EQUIPMENT –  
PRODUCT REQUIREMENTS –****Part 2–107: Detail specification for circular hybrid connectors M12  
with electrical and fibre-optic contacts with screw locking**

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IEC 61076-2-107 cancels and replaces IEC/PAS 61076-2-107 issued in 2007.

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

FDIS	Report on voting
48B/2141/FDIS	48B/2181/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.

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

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

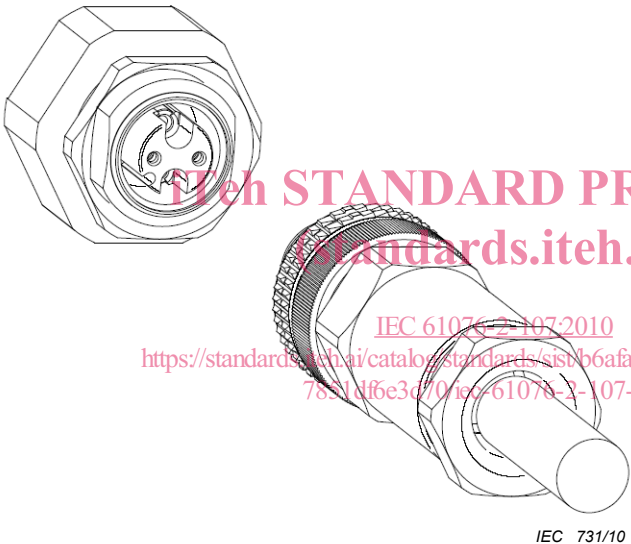
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<p>IEC SC 48B – Connectors</p> <p>Specification available from: IEC General secretariat or from the addresses shown on the inside cover.</p>	<p>IEC 61076-2-107, Ed. 1.0</p>
<p>ELECTRONIC COMPONENTS</p> <p>DETAIL SPECIFICATION in accordance with IEC 61076-1</p>	
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## CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

### Part 2–107: Detail specification for circular hybrid connectors M12 with electrical and fibre-optic contacts with screw locking

#### 1 General information

##### 1.1 Scope

This standard describes circular M12 connectors typically used for industrial process measurement and control. These connectors consist of fixed and free connectors with screw-locking as well as adaptors.

The connectors are suitable to connect two optic fibres and two electrical wires intended for power transmission to the optionally integrated transmitter and receiver, not specified in this standard.

Male connectors have round electrical contacts  $\varnothing$  1,0 mm and round optical contacts with the ferrule  $\varnothing$  1,25 mm according to IEC 61754-20, grade 1 for

All-silica optical fibre cables

single mode fibre 9/125  $\mu\text{m}$

multimode fibre 50/125  $\mu\text{m}$  or 62,5/125  $\mu\text{m}$

NOTE M12 is the dimension of the thread of the screw locking mechanism of these circular connectors.

Throughout this standard dimensions are in mm.

##### 1.2 Normative references

The following referenced documents are indispensable for the application of this document. 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 60068-1:1988, *Environmental testing – Part 1: General and guidance*  
Amendment 1 (1992)

IEC 60352 (all parts), *Solderless connections*

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

IEC 60529:2001, *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 60793-2-40, *Optical fibres – Part 2-40: Product specifications – Sectional specification for category A4 multimode fibres*

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60998-2-1:2002, *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 60999-1:1999, *Connecting devices – Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm<sup>2</sup> up to 35 mm<sup>2</sup> (included)*

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

IEC 61300-2-1:2009, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

IEC 61300-2-2:2009, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-2: Tests – Mating durability*

IEC 61300-2-4:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre/cable retention*

IEC 61300-2-5:2009, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-5: Tests – Torsion*

IEC 61300-2-26:2006, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-26: Tests – Salt mist*

IEC 61300-2-27:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-27: Tests – Dust – Laminar flow*

IEC 61300-3-4:2001, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

IEC 61300-3-6:2008 *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-10:2006, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-10: Examinations and measurements – Gauge retention force*

IEC 61300-3-34:2009, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-34: Examinations and measurements – Attenuation of random mated connectors*

IEC 61753-022-2, *Fibre optic interconnecting devices and passive components performance standard – Part 022-2: Fibre optic connectors terminated on multimode fibre for category C – Controlled environment*

IEC 61754-20:2002, *Fibre optic connector interfaces – Part 20: Type LC connector family*

IEC 61755-2-1, *Fibre optic connector optical interfaces – Part 2-1: Optical interface standard single mode non-angled physically contacting fibres*

IEC 61755-3-1, *Fibre optic connector optical interfaces – Part 3-1: Optical interface, 2,5 mm and 1,25 mm diameter cylindrical full zirconia PC ferrule, single mode fibre*

IEC 61984: 2008, *Connectors – Safety requirements and tests*

EN 50377-7-4, *Connector sets and interconnect components to be used in optical fibre communication systems – Product specifications – Part 7-4: Type LC-PC simplex terminated on IEC 60793-2 category B1.1 singlemode fibre*

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

### 1.3 Terms and definitions

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

### 1.4 Recommended method of termination

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

The optical contact terminations shall be defined between manufacturer and user.

### 1.5 Ratings and characteristics

#### 1.5.1 Electrical contacts

Rated voltage : 250 V d.c. or a.c.

Rated current : 4 A  
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Insulation resistance : min.  $10^8 \Omega$

Climatic category : see 4.1 Table 11

Contact spacing : see Clause 3

#### 1.5.2 Optical contacts

Dimensions for ferrule and end face:

- for singlemode fibre according to ferrule grade 1 of IEC 61754-20;
- for multimode fibre according to ferrule grade 2 of IEC 61754-20.

Insertion loss: see 4.3.2

Return Loss: see 4.3.4

Contact force: ferrule compression force shall be 5-6 N

Climatic category: see 4.1, Table 11

Contact spacing: not applicable

### 1.6 Marking

The marking of the connector and the package shall be in accordance with 2.6 of IEC 61076-1.

### 1.7 Safety aspects

For safety aspects IEC 61984 shall be considered unless otherwise specified.

## 2 Technical information

All dimensions in mm.

### 2.1 Mounting orientation

Circular mounting position of the connector in relation to the polarization of the mating interface.

### 2.2 Survey of styles and variants

For all connector styles with cables the length L of the cable shall be agreed between manufacturer and user.

For interface dimensions see 3.2.

The interface dimensions of the female styles shall be chosen according to the common characteristics of the male styles.

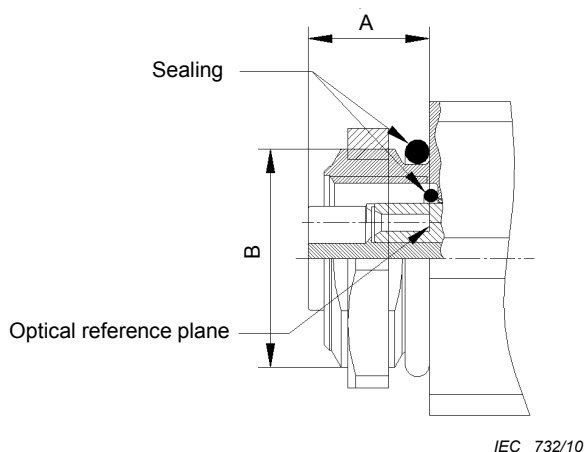
#### 2.2.1 Fixed connectors

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**Table 1 – Styles of fixed connectors**

Style	Description
AF	Fixed connector, electrical female contacts, single hole mounting thread M16 × 1,5, mounting orientation
BF	Fixed connector, electrical female contacts, for feed through, single hole mounting thread M16 × 1,5

#### 2.2.1.1 Style AF

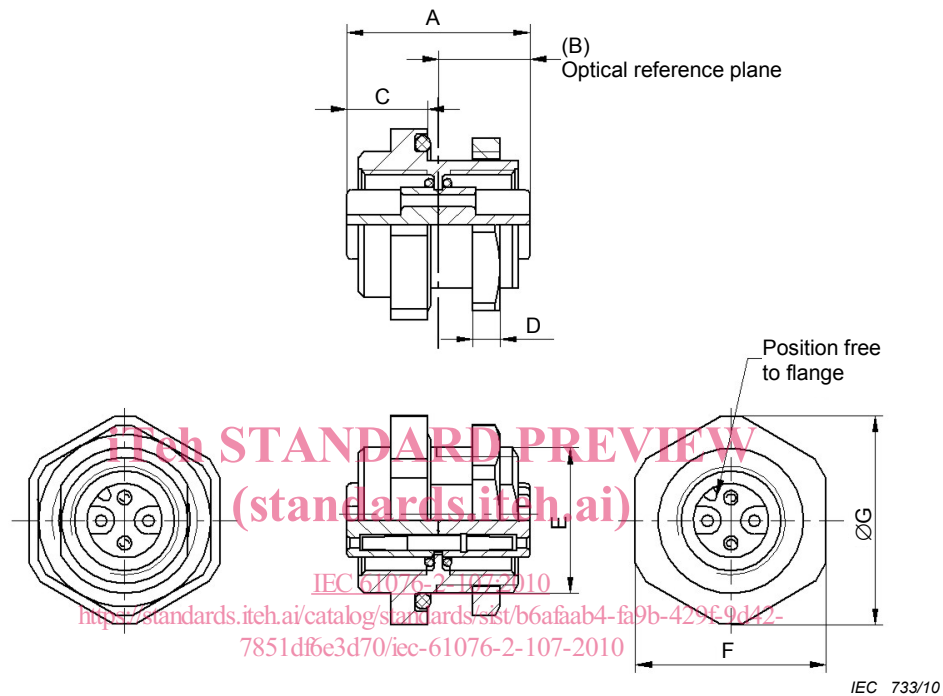


**Figure 1 – Fixed connector, electrical female contacts, single hole mounting thread M16 × 1,5, mounting orientation**

**Table 2 – Dimensions for connector style AF**

All dimensions in mm

Symbol	Value
A	8,9
B	mounting thread M16 × 1,5

**2.2.1.2 Style BF****Figure 2 – Fixed connector, electrical female contacts, for feed through, single hole mounting thread M16 × 1,5****Table 3 – Dimensions for connector style BF**

All dimensions in mm

Symbol	Value		
	Min.	Nominal	Max.
A			20,5
B		10,25	
C	8,55	8,85	9,15
D	2,75	2,85	2,95
E		M16 × 1,5 -6g	--
F		SW 21 <sup>a</sup>	
G			Ø 23,2

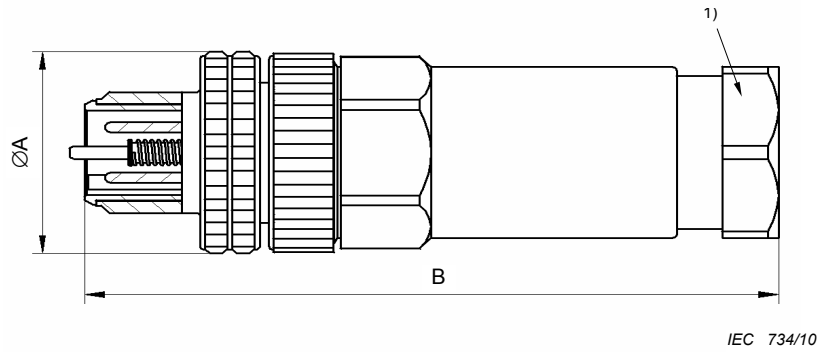
<sup>a</sup> SW has the meaning of a wrench size across flats.

2.2.2 Free connectors

Table 4 – Styles of free connectors

Style	Description
CM	Free connector, straight version, with locking nut, male contacts

2.2.2.1 Style CM



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Key

<sup>1)</sup> Cable outlet diameter upon agreement.

Figure 3 – Free connector, straight version, with locking nut, male contacts

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Table 5 – Dimensions for connector style CM

All dimensions in mm

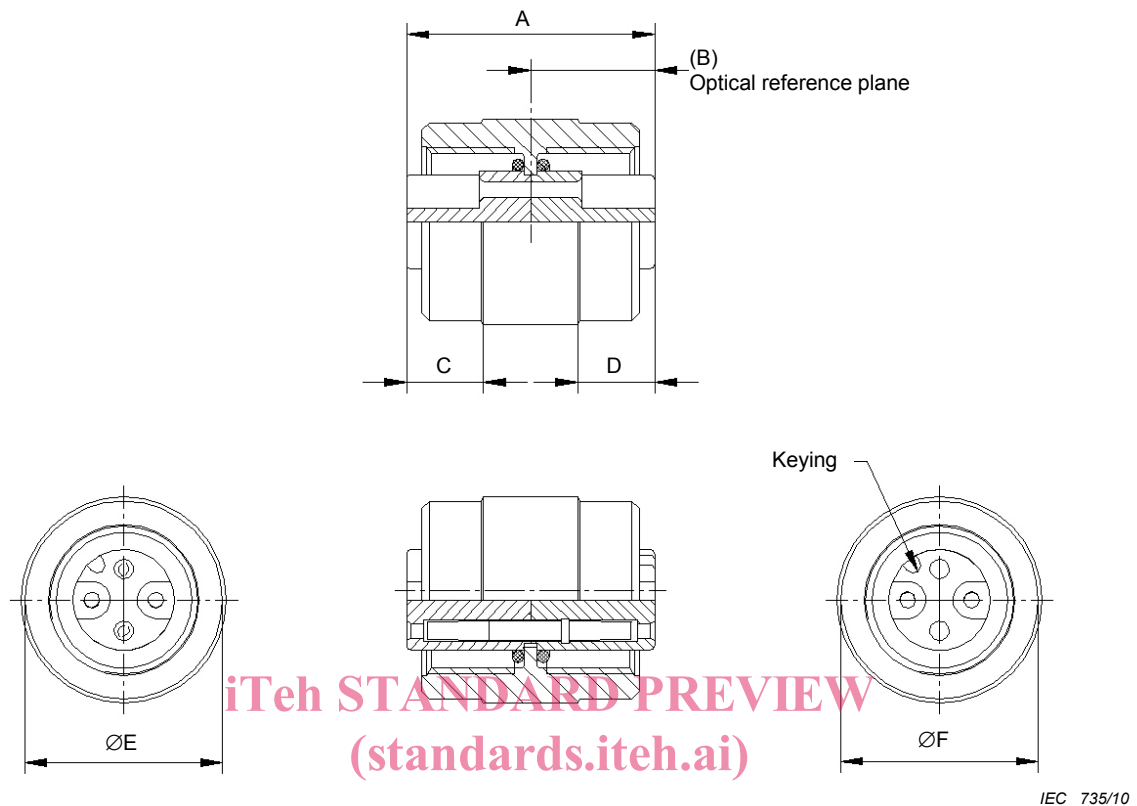
Symbol	Value		
	Min.	Nominal	Max.
A			Ø 21
B			82

2.2.3 Adaptor

Table 6 – Styles of adaptors

Style	Description
DF	Adaptor, straight version, without locking nut

### 2.2.3.1 Style DF



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Figure 4 – Adaptor, straight version, without locking nut

Table 7 – Dimensions for adaptor style DF

All dimensions in mm

Symbol	Value		
	Min.	Nominal	Max.
A			20,5
B		10,25	
C	5,775	6,05	6,425
D	5,775	6,05	6,425
E			Ø 16,2
F			Ø 16,2

## 3 Dimensions

### 3.1 General

All dimensions in millimetres are original. Drawings are shown in the first angle projection. The shape of the connectors may deviate from those given in the following drawings as long as the specified dimensions are not influenced.

For connector dimensions and interface dimensions see 2.2.