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Interested committees:

Title: BS EN IEC 61076-2-104 Connectors for electronic equipment - Product requirements

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

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



48B/3070/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER: IEC 61076-2-104 ED3	
DATE OF CIRCULATION: 2023-09-29	CLOSING DATE FOR COMMENTS: 2023-12-22
SUPERSEDES DOCUMENTS: 48B/3063/RR	

IEC SC 48B : ELECTRICAL CONNECTORS	
SECRETARIAT: United States of America	SECRETARY: Mr Jeffrey Toran
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

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TITLE: Connectors for electronic equipment - Product requirements - Part 2-104: Circular connectors - Detail specification for circular connectors with M8 screw-locking or snap-locking
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NOTE FROM TC/SC OFFICERS:

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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**

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- International Standard IEC 61076-2-104 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electrical and electronic equipment.
- This third edition cancels and replaces the second edition of IEC 61076-2-104 (2014). This edition constitutes a technical revision.
- This edition includes the following significant technical changes with respect to the previous edition:
- a) The structure of this international standard has been adapted to the new ICE template for standards. New subchapters have been added. Clauses 5 *Dimensional information* and 6 *Characteristics* technical specifications have been updated.
 - b) The mating face for a M8-12pole connector has been added

238 c) Annex B *Orientation of cable outlet in relation to coding* has been added.

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

FDIS	Report on voting
48B/xx/FDIS	48B/xx/RVD

240
241 Full information on the voting for the approval of this standard can be found in the report on
242 voting indicated in the above table.

243 The language used for the development of this international Standard is English.

244 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2, and
245 developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC
246 Supplement, available at www.iec.ch/members_experts/refdocs. The main document types
247 developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

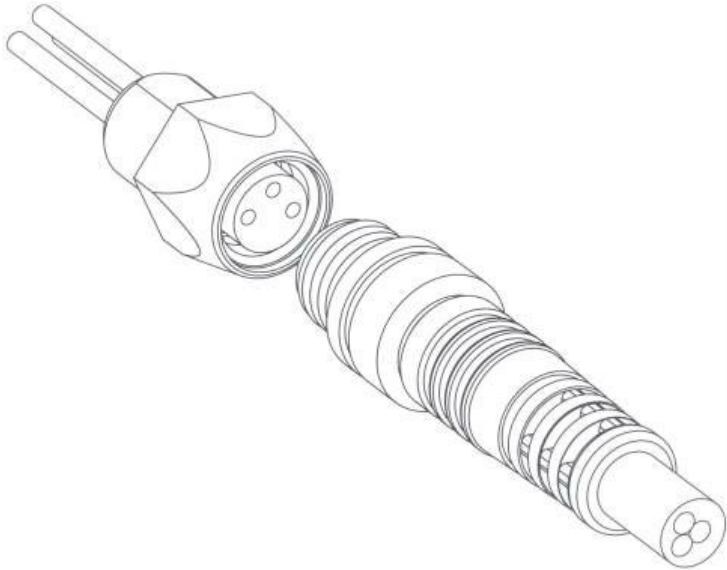
248 A list of all parts of the IEC 61076 series, published under the general title *Connectors for*
249 *electronic equipment – Product requirements*, can be found on the IEC website.

250 The committee has decided that the contents of this publication will remain unchanged until
251 the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data
252 related to the specific publication. At this date, the publication will be

- 253 • reconfirmed,
254 • withdrawn,
255 • replaced by a revised edition, or
256 • amended.

257
258

259

IEC SC 48B – Electrical connectors Specification available from: IEC General secretariat or from the addresses shown on the inside cover.	IEC 61076-2-104 Ed 3
Electronic components of assessed quality in accordance with: IEC 61076-1	
	Circular connectors M8 - diameter 8mm 3 to 12 way Male and female contacts Male and female connectors Rewirable – Non-rewirable
	Free cable connectors Straight and right angled connectors Fixed connectors Flange mounting Single hole mounting Connector insert Snap- and screw-locking

260

261

1 Scope

This part of IEC 61076 describes circular connectors M8 screw-locking or with nominal 8mm snap-locking, for connection of automation devices with signal and power up to 50V AC / 60V DC rated voltage and up to 4 A rated current.

These connectors consist of fixed and free connectors either rewirable or non-rewirable. Male connectors have round contacts $\varnothing$ 0,48 mm, $\varnothing$ 0,6 mm, $\varnothing$ 0,7 mm and $\varnothing$ 1,0 mm according to the number of ways and coding, all contacts with the same size.

The different codings prevent the mating of differently coded male and female connectors.

NOTE 1 M8 is the dimension of the thread of the screw locking mechanism of these circular connectors.

NOTE 2 The connectors are typically used for connecting industrial automation devices for process measurement and control.

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, *Advance edition of the International Electrotechnical Vocabulary – Chapter 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 60512-1, *Connectors for electronic equipment – Tests and measurements – Part 1: General*

IEC 60512-1-1, *Connectors for electronic equipment – Tests and measurements – Part 1-1: General examination – Test 1a: Visual examination*

IEC 60512-1-2, *Connectors for electronic equipment – Tests and measurements – Part 1-2: General examination – Test 1b: Examination of dimension and mass*

IEC 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-2-2 *Connectors for electronic equipment – Tests and measurements – Part 2-2: Electrical continuity and contact resistance tests – Test 2b: Contact resistance – Specified test current method*

IEC 60512-2-5 *Connectors for electronic equipment – Tests and measurements – Part 2-5: Electrical continuity and contact resistance tests – Test 2e: Contact disturbance*

IEC 60512-3-1, *Connectors for electronic equipment – Tests and measurements – Part 3-1: Insulation tests – Test 3a: Insulation resistance*

- 299 IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1:*
300 *Voltage stress tests – Test 4a: Voltage proof*
- 301 IEC 60512-5-2, *Connectors for electronic equipment – Tests and measurements – Part 5-2:*
302 *Current-carrying capacity tests – Test 5b: Current-temperature derating*
- 303 IEC 60512-6-3, *Connectors for electronic equipment – Tests and measurements – Part 6-3:*
304 *Dynamic stress tests – Test 6c: Shock*
- 305 IEC 60512-6-4, *Connectors for electronic equipment – Tests and measurements – Part 6-4:*
306 *Dynamic stress tests – Test 6d: Vibration (sinusoidal)*
- 307 IEC 60512-9-1, *Connectors for electronic equipment – Tests and measurements – Part 9-1:*
308 *Endurance tests – Test 9a: Mechanical operation*
- 309 IEC 60512-9-2, *Connectors for electronic equipment – Tests and measurements – Part 9-2:*
310 *Endurance tests – Test 9b: Electrical load and temperature*
- 311 IEC 60512-11-1, *Electromechanical components for electronic equipment – Basic testing* 339
312 *procedures and measuring methods – Part 11: Climatic tests – Section 1: Test 11a – Climatic*
313 *sequence*
- 314 IEC 60512-11-4, *Connectors for electronic equipment – Tests and measurements – Part 11-4:*
315 *Climatic tests – Test 11d: Rapid change of temperature*
- 316 IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7:*
317 *Climatic tests – Test 11g: Flowing mixed gas corrosion test*
- 318 IEC 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9:*
319 *Climatic tests – Test 11i: Dry heat*
- 320 IEC 60512-11-10, *Connectors for electronic equipment – Tests and measurements – Part 11-*
321 *10: Climatic tests – Test 11j: Cold*
- 322 IEC 60512-11-12, *Connectors for electronic equipment – Tests and measurements – Part 11-*
323 *12: Climatic tests – Test 11m: Damp heat, cyclic*
- 324 IEC 60512-13-2, *Connectors for electronic equipment – Tests and measurements – Part 13-2:*
325 *Mechanical operation tests – Test 13b: Insertion and withdrawal forces*
- 326 IEC 60512-13-5, *Connectors for electronic equipment – Tests and measurements – Part 13-5:*
327 *Mechanical operation tests – Test 13e: Polarizing and keying method*
- 328 IEC 60512-14-7 *Electromechanical components for electronic equipment – Basic testing*
329 *procedures and measuring methods – Part 14: Sealing tests – Section 7: Test 14g: Impacting*
330 *water*
- 331 IEC 60512-15-1 *Connectors for electronic equipment – Tests and measurements – Part 15-1:*
332 *Connector tests (mechanical) – Test 15a: Contact retention in insert*
- 333 IEC 60512-16-5, *Connectors for electronic equipment – Tests and measurements – Part 16-5:*
334 *Mechanical tests on contacts and terminations – Test 16e: Gauge retention force (resilient*
335 *contacts)*

336 IEC 60512-19-3, *Electromechanical components for electronic equipment – Basic testing*
337 *procedures and measuring methods – Part 19: Chemical resistance tests – Section 3: Test*
338 *19c – Fluid resistance*

339 IEC 60512-23-3 *Connectors for electrical and electronic equipment – Tests and*
340 *measurements – Part 23-3: Screening and filtering tests – Test 23c: Shielding effectiveness of*
341 *connectors and accessories – Line injection method*

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

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

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

348 IEC 60999-1, *Connecting devices – Electrical copper conductors – Safety requirements for*
349 *screw-type and screwless-type clamping units – Part 1: General Requirements and particular*
350 *requirements for clamping units for conductors from 0,2mm² up to 35mm² (included)*

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

353 IEC 61076-2, *Connectors for electronic equipment – Product requirements – Part 2: Sectional*
354 *specification for circular connectors*

355 IEC 61984, *Connectors – Safety requirements and tests*

356 ISO 11469:2016, *Plastics – Generic identification and marking of plastic products*

357 ISO 21920-1 (2021), *Geometrical Product Specifications (GPS) – Surface texture: Profile –*
358 *Part 1: Indication of surface texture*

359 **3 Terms and definitions**

360 For the purposes of this document, terms and definitions from IEC 60050-581, IEC 61076-1,
361 IEC 60512-1 as well as the following apply.

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

364 • ISO Online browsing platform: available at <https://www.iso.org/obp>

365 • IEC Electropedia: available at <http://www.electropedia.org/>

366 **3.1**

367 **mounting orientation**

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

4 Technical information

4.1 Recommended method of termination for rewirable connectors

The contact termination for rewirable connectors shall be of the following types: screw, crimp, spring clamp, insulation piercing, insulation displacement, press-in connections according to the respective part of IEC 60352 series and IEC 60999-1, as applicable or solder.

4.2 Connector coding, number of contacts, ratings and characteristics

Table 1 provides the codings of these connectors as a function of their style, number of contacts, rated voltage and rated current.

Table 1 – Ratings of connectors

Coding	Style	Number of contacts	Rated voltage AC or DC	Rated current A
A-coding	3-way	3	50 V AC / 60 V DC	4
	4-way	4	50 V AC / 60 V DC	4
	6-way	6	32 V	1,5
	8-way	8	32 V	1,5
B-coding	5-way	5	32 V	3
C-coding	12-way	12	32 V	1
NOTE The rated current refers to the interface. It does not refer to the contact termination nor the <u>terminated</u> conductor cross-section.				

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

Contact spacing: see interface dimensions subclause 5.4

4.3 Systems of levels

4.3.1 Performance level

Connectors according to this standard are classified by mating performance level (MPL). See 6.5.1 for details.

4.3.2 Compatibility levels, according to IEC 61076-1

Connectors according to this standard are intermateable and interoperable according to IEC 61076-1 (level 3).

Interoperability is granted, provided that the same performance level as defined in 4.3.1 and the same surface of contacts as defined in 6.2 is considered.

4.4 Classification into climatic categories

See 6.3 in this standard.

4.5 Creepage and clearance distances

The creepage and clearance distances shall be dimensioned according to rated insulation voltage values specified in Table 32 (see 6.4.1), in accordance with IEC 60664-1 and shall be measured only in mated position (see 4.8, COC unless otherwise specified by the manufacturer) according to IEC 60512-1-2.

398 NOTE Creepage distances can be dimensioned for pollution degree 2 for connectors IP54 or higher, see IEC
399 61984 (2008), subclause 6.19.3.

400 The creepage and clearance distances that cover performance requirements in IEC 60664-1
401 may be reduced, based on IEC TR 63040.

402 NOTE As indicated in IEC 60664-1, IEC TR 63040 provides an alternative and more precise dimensioning
403 procedure for clearances equal to or less than 2mm.

404 In practice, reductions in creepage or clearance distances may occur due to the conductive
405 pattern of the printed board, or the wiring used and should in such case duly be taken into
406 account.

407 NOTE The permissible rated voltage depends on the application and the relevant specified safety requirements.

408 **4.6 Current-carrying capacity**

409 See 6.4.3 in this standard.

410 **4.7 Marking**

411 The marking of the connector and the package shall be in accordance with 2.7 of
412 IEC 61076-1.

413 **4.8 Safety aspects**

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

415 Connectors according to this standard are COC (connectors without breaking capacity) per
416 IEC 61984, unless otherwise specified by the manufacturer.

417

5 Dimensional information

5.1 General

Throughout this standard, dimensions are in mm. 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.

Missing dimensions shall be chosen according to common characteristics and intended use.

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

Alternative installation situations are possible and shall be specified upon between manufacturer and user. Requirements defined in this document must be adhered to.

For interface dimensions see 5.4.

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

For reliable intermateability, the dimensions of the female connector body as detailed in Annex A should be met.

For free connectors with right angled cable outlets, the direction of the coding in relation to the cable outlet shall be specified to assure that the cable leaves the housing in the specified direction. This is indicated by an arrow and described in Annex B.

5.2 Fixed connectors

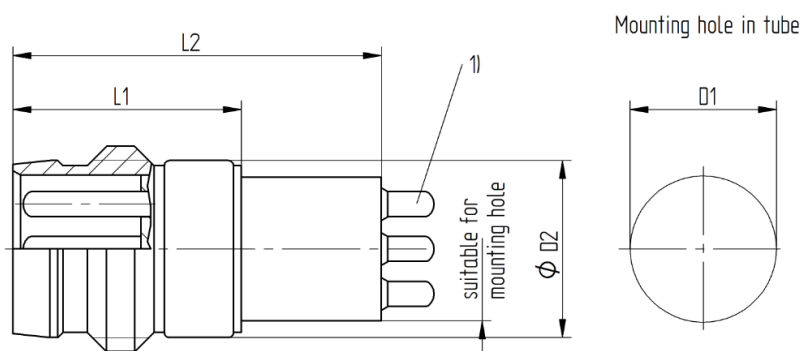
Table 2 shows the different styles of fixed connectors.

Table 2 – Styles of fixed connectors

Style	Description
BM	Connector insert, male contacts, dip solder mounting, long version with screw- and snap-locking
CM	Connector insert, male contacts, dip solder mounting, short version with screw- and snap-locking
EM	Fixed connector with wires, male contacts, single hole mounting
EF	Fixed connector with wires, female contacts, single hole mounting

5.2.1 Style BM

Figure 1 shows a connector insert with male contacts dip solder long version with screw- and snap-locking.



NOTE 1 Diameter and length of contacts shall be agreed upon between the manufacturer and user

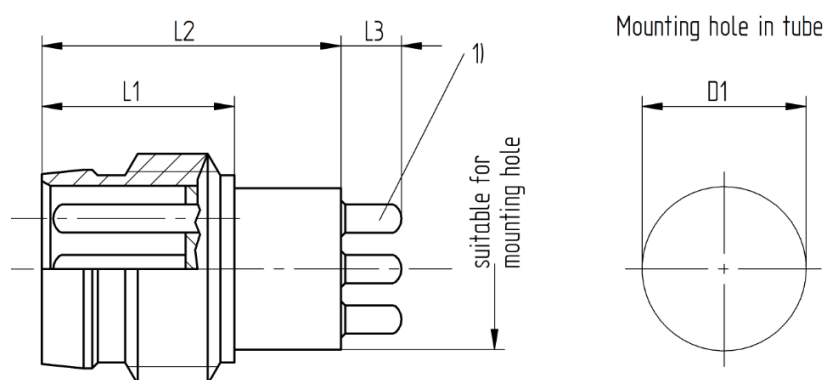
Figure 1 – Connector insert with male contacts, dip solder long version with screw- and snap-locking

Table 3 – Dimensions of style BM, Figure 1

<i>Dimensions in millimetres</i>			
Letter	Minimum	Nominal	Maximum
L1	-	-	9,5
L2	-	-	15
D1	Ø5,7	Ø5,7	Ø5,715
D2	-	-	Ø8

5.2.2 Style CM

Figure 2 shows a connector insert with male contacts dip solder short version with screw- and snap-locking.



NOTE 1 Diameter of contacts shall be agreed upon between the manufacturer and user

Figure 2 – Connector insert with male contacts, dip solder short version with screw- and snap-locking

Table 4 – Dimensions of style CM, Figure 2

<i>Dimensions in millimetres</i>			
Letter	Minimum	Nominal	Maximum
L1	-	-	7

L2	-	-	11
L3	-	-	2,5
D1	Ø5,7	Ø5,7	Ø5,715

5.2.3 Style EM

Figure 3 shows a fixed connector with wires, male contacts, single hole mounting.

5.1dns

NOTE 1 Dimension for width across flats

NOTE 2 Length of wires shall be agreed upon between the manufacturer and user

Figure 3 – Fixed connector with wires, male contacts, single hole mounting

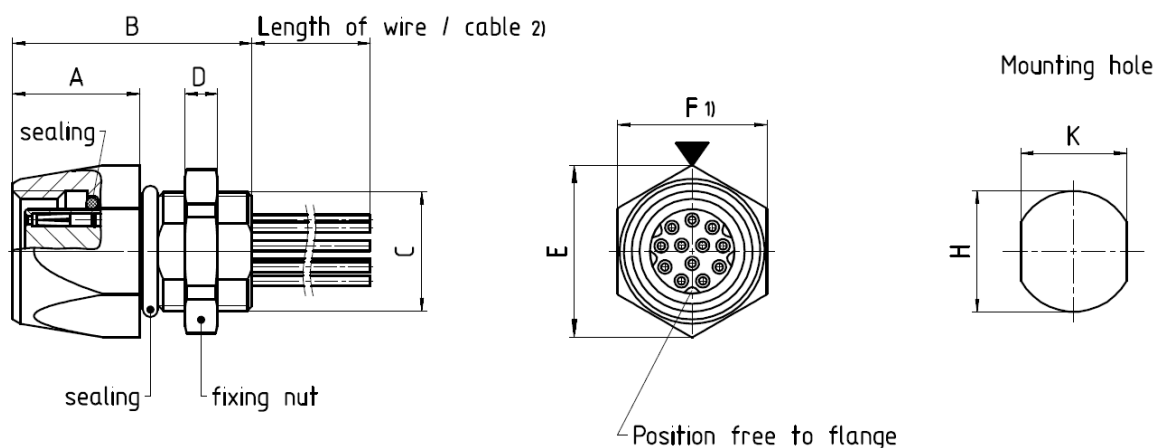
Table 5 – Dimensions of style EM, Figure 3

Dimensions in millimetres

Letter	Minimum	Nominal	Maximum
A	8,0	8,5	9,0
B	-	-	18
C	-	M8x0,5	-
D	-	-	3,2
E	-	-	11,5
F	-	10	-
G	6	-	-
H	Ø8,2	Ø8,2	Ø8,3
K	7,1	7,1	7,2

5.2.4 Style EF

Figure 4 shows a fixed connector with wires, female contacts, single hole mounting.



NOTE 1 Dimension for width across flats

NOTE 2 Length of wires shall be agreed upon between the manufacturer and user

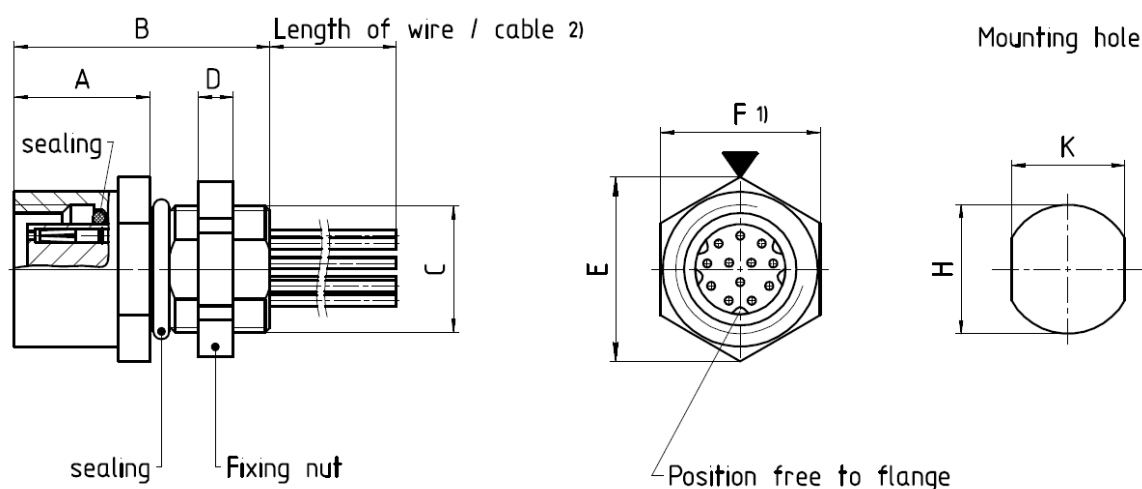
Figure 4 – Fixed connector with wires, female contacts, single hole mounting

Table 6 – Dimensions of style EF, Figure 4

Dimensions in millimetres

Letter	Minimum	Nominal	Maximum
A	8,0	8,5	9,0
B	-	-	16,5
C	-	M8x0,5	-
D	-	-	3,2
E	-	-	11,5
F	-	10	-
H	Ø8,2	Ø8,2	Ø8,3
K	7,1	7,1	7,2

Figure 5 shows a fixed connector with wires, female contacts, single hole mounting.



NOTE 1 Dimension for width across flats

NOTE 2 Length of wires/cable shall be agreed upon between the manufacturer and user

Figure 5 – Fixed connector with wires, female contacts, single hole mounting

Table 7 – Dimensions of style EF, Figure 5

Dimensions in millimetres

Letter	Minimum	Nominal	Maximum
A	8,0	8,5	9,0
B	-	-	16,5

C	-	M8x0,5	-
D	-	-	3,2
E	-	-	11,5
F	-	10	-
H	Ø8,2	Ø8,2	Ø8,3
K	7,1	7,1	7,2

487

488 NOTE Both variants are according to this specification