IEC 63171-6

Edition 2.0 2021-10

INTERNATIONAL STANDARD

Connectors for electrical and electronic equipment – Part 6: Detail specification for 2-way and 4-way (data/power), shielded, free and fixed connectors for power and data transmission with frequencies up to 600 MHz

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FOREWORD

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This International Standard IEC 63171-6 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

This second edition cancels and replaces the first edition published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Mating conditions changed, see Figure 2, Figure 4, Figure 13, Figure 15, Figure 19 and Figure 21.
b) Voltage proof requirement added, 2 250 V DC, see 5.7.2.
c) Mechanical shock requirement added, see 5.7.6 (the requirement itself already was specified indirectly by Ed1 due to the specification of the test EP3 of Table 14 which is still identical to Ed1).

d) Styles added, 6P-M8CI and 6J-M8CI, see Table 1.

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

FDIS	Report on voting
48B/2907/FDIS	48B/2917/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

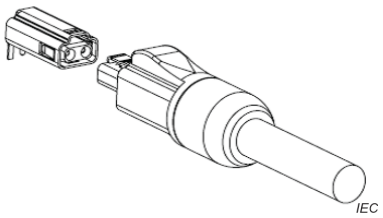
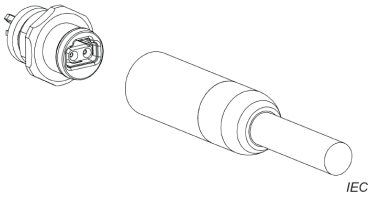
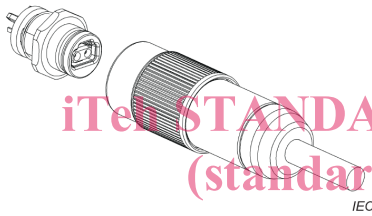
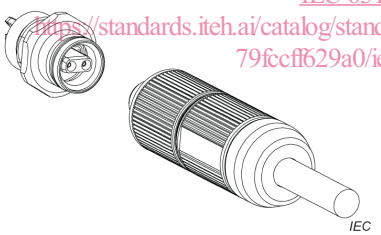
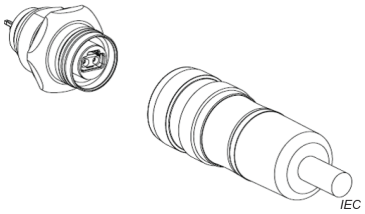
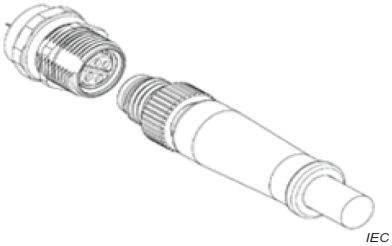
The language used for the development of this International Standard is English.

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/standardsdev/publications.

A list of all parts in the IEC 63171 series, published under the general title *Connectors for electrical and electronic equipment*, 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,
- replaced by a revised edition, or
- amended.

IEC SC 48B – Electrical connectors **Specification available from: IEC General secretariat or from the addresses shown on the inside cover.**	**IEC 63171-6 Ed. 2**
DETAIL SPECIFICATION in accordance with IEC 61076-1	
	2-way data IP20, latch locking
	2-way data IP65/IP67, snap-in locking
 -+	2-way data IP65/IP67, push-pull locking
	2-way data IP65/IP67, M8 screw locking
	2-way data IP65/IP67, M12 screw locking or push-pull locking (or both)
	4-way (2 power + 2 data) IP65/IP67, M8 screw locking

CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –

Part 6: Detail specification for 2-way and 4-way (data/power), shielded, free and fixed connectors for power and data transmission with frequencies up to 600 MHz

1 Scope

This document covers 2-way and 4-way (data/power), shielded, free and fixed connectors for data transmission with frequencies up to 600 MHz and specifies the common dimensions, mechanical, electrical and transmission characteristics and environmental requirements as well as test specifications.

NOTE 1 This 63171-6 document is not fully harmonized with the content and structure of IEC 63171. There are several specifications in both documents which are overlapping. In any case the provisions within this document prevail.

NOTE 2 The connectors are intended to be used for single-pair Ethernet (SPE) according to the following IEEE Standards: 10BaseT1 (IEEE 802.3cg), 100Base-T1 (IEEE 802.3bw), 1000Base-T1 (IEEE 802.3bp), and optionally with Power over Data line (PoDL) power supply according to IEEE 802.3bu.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components for electronic equipment*

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

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-38, *Environmental testing – Part 2-38: Tests – Test Z/AD: Composite temperature/humidity cyclic test*

IEC 60352 (all parts), *Solderless connections*

IEC 60512-1, *Connectors for electrical and electronic equipment – Tests and measurements – Part 1: Generic specification*

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 60512-2-5, *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*

IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof*

IEC 60512-5-2, *Connectors for electronic equipment – Tests and measurements – Part 5-2: Current-carrying capacity tests – Test 5b: Current-temperature derating*

IEC 60512-6-3, *Connectors for electronic equipment – Tests and measurements – Part 6-3: Dynamic stress tests – Test 6c: Shock*

IEC 60512-6-4, *Connectors for electronic equipment – Tests and measurements – Part 6-4: Dynamic stress tests – Test 6d: Vibration (sinusoidal)*

IEC 60512-9-1, *Connectors for electronic equipment – Tests and measurements – Part 9-1: Endurance tests – Test 9a: Mechanical operation*

IEC 60512-9-2, *Connectors for electronic equipment – Tests and measurements – Part 9-2: Endurance tests – Test 9b: Electrical load and temperature*

IEC 60512-11-3, *Connectors for electronic equipment – Tests and measurements – Part 11-3: Climatic tests – Test 11c: Damp heat, steady state*

IEC 60512-11-4, *Connectors for electronic equipment – Tests and measurements – Part 11-4: Climatic tests – Test 11d: Rapid change of temperature*

IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7: Climatic tests – Test 11g: Flowing mixed gas corrosion test*

IEC 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat*

IEC 60512-11-10, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11j: Cold*

IEC 60512-11-12, *Connectors for electronic equipment – Tests and measurements – Part 11-12: Climatic tests – Test 11m: Damp heat, cyclic*

IEC 60512-13-2, *Connectors for electronic equipment – Tests and measurements – Part 13-2: Mechanical operation tests – Test 13b: Insertion and withdrawal forces*

IEC 60512-13-5, *Connectors for electronic equipment – Tests and measurements – Part 13-5: Mechanical operation tests – Test 13e: Polarizing and keying method*

IEC 60512-15-6, *Connectors for electronic equipment – Tests and measurements – Part 15-6: Connector tests (mechanical) – Test 15f: Effectiveness of connector coupling devices*

IEC 60512-25-7, *Connectors for electronic equipment – Tests and measurements – Part 25-7: Test 25g – Impedance, reflection coefficient, and voltage standing wave ratio (VSWR)*

IEC 60512-25-9, *Connectors for electrical equipment – Tests and measurements – Part 25-9: Signal integrity tests – Test 25i: Alien crosstalk*

IEC 60512-26-100, *Connectors for electronic equipment – Tests and measurements – Part 26-100: Measurement setup, test and reference arrangements and measurements for connectors according to IEC 60603-7 – Tests 26a to 26g*

IEC 60512-28-100, *Connectors for electrical and electronic equipment – Tests and measurements – Part 28-100: Signal integrity tests up to 2 000 MHz – Tests 28a to 28g*

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

IEC 60603-7:2020, *Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors*

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

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

IEC 61076-2-010, *Connectors for electrical and electronic equipment – Product requirements – Part 2-010: Circular connectors – Detail specification for connectors with outer or inner push-pull locking mechanism, based on mating interfaces according to IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113*

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

IEC 61076-3, *Connectors for electronic equipment – Product requirements – Part 3: Rectangular connectors – Sectional specification*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 61984, *Connectors – Safety requirements and tests*

IEC 62153-4-15, *Metallic communication cable test methods – Part 4-15: Electromagnetic compatibility (EMC) – Test method for measuring transfer impedance and screening attenuation – or coupling attenuation with triaxial cell*

IEC 63171:2021, *Connectors for electrical and electronic equipment – Shielded or unshielded free and fixed connectors for balanced single-pair data transmission with current-carrying capacity – General requirements and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581, IEC 61076-1, IEC 61076-3 and IEC 60512-1 apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Common features and typical connector pair

4.1 Systems of levels – Compatibility levels

4.1.1 Performance level

Connectors according to this document are classified by mating performance level (MPL). See 5.7.1 for details.

4.1.2 Compatibility levels

Compatibility levels are according to IEC 61076-1

a) Intermateability

Intermateability as defined in Clause B.3 of IEC 61076-1:2006 standardizes only dimensions of electrical and mechanical interfaces. Intermateability shall be ensured by application of the “Go” and “No-Go” gauge requirements in the standards that may be referenced, and adherence to the dimensional requirements within.

b) Interoperability

Interoperability as defined in Clause B.5 of IEC 61076-1:2006 shall be assured by compliance with the specified interface dimensions and by compliance with the requirements in 5.2 through 5.7 proven by the respective testing sequences in Clause 6.

4.2 Classification into climatic categories

See 5.2.

4.3 Clearance and creepage distances

See 5.3.1.

4.4 Current carrying capacity

See 5.3.4

4.5 Marking

The marking of the connector and the packaging shall be in accordance with 2.7 of IEC 61076-12006.

4.6 Dimensional information

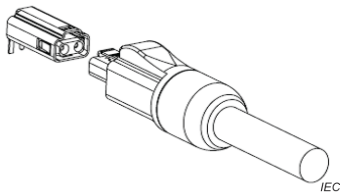
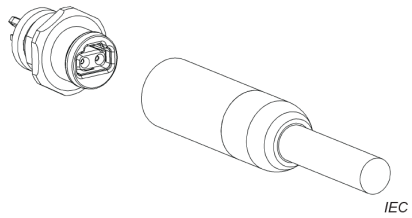
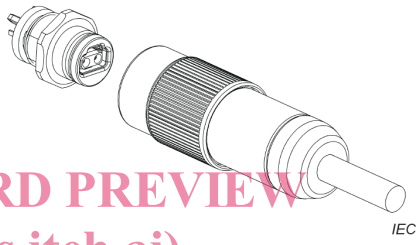
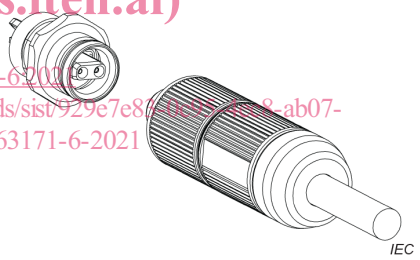
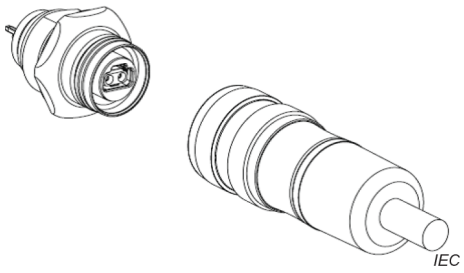
4.6.1 General

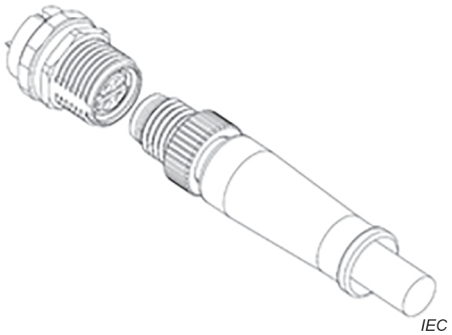
Drawings are shown in the first angle projection. The shape of connectors may deviate from those shapes given in the following figures as long as the specified dimensions are not influenced. Coordination dimensions are dimensions without tolerances which indicate the boundary or centre-line references in order to allow for (modular) arrangement.

4.6.2 Isometric view and common features – Connector styles

Table 1 shows an overview of connector styles specified in this document.

Table 1 – Connector styles

Style	Description	Figures	Picture[3]
2P-L	PLUG[1] – Free 2-way IP20 connector with male contacts, latch locking	Figure 3 Figure 4	
2J-L	JACK[1] – Fixed 2-way IP20 connector with female contacts, latch locking, intended for PCB mounting	Figure 1 Figure 2	
6P-S8		Figure 7	
6J-S8	JACK[1] – Fixed 2-way IP65/IP67 connector with female contacts, size[2] 8, snap-in locking, intended for single hole mounting.	Figure 5 Figure 6	
6P-P8	PLUG[1] – Free 2-way IP65/IP67 connector with male contacts, size 8, push pull locking	Figure 11 Figure 8	
6J-P8		Figure 8 Figure 9	
6P-M8	PLUG[1] – Free 2-way IP65/IP67 connector with male contacts, size 8, M8-screw locking	Figure 12 Figure 13	
6J-M8	JACK[1] – Fixed 2-way IP65/IP67 connector with female contacts, size 8, M8 thread locking, intended for single hole mounting.	Figure 8 Figure 10	
6P-P12	PLUG[1] – Free 2-way IP65/IP67 connector with male contacts, size[2] 12, push pull locking	Figure 14 Figure 17	
6P-M12	PLUG[1] – Free 2-way IP65/IP67 connector with male contacts, size 12, M12 thread locking	Figure 16	
6J-P12	JACK[1] – Fixed 2-way IP65/IP67 connector with female contacts, size 12, push pull locking, intended for single hole mounting	Figure 14 Figure 15	
6J-M12	JACK[1] – Identical to 6J-P12 but with M12 thread locking instead of push pull, intended for single hole mounting	Figure 14 Figure 15	
6J-C12	JACK[1] – Combination of 6J-P12 and 6J-M12: With both, M12 thread and push pull locking, intended for single hole mounting	Figure 14 Figure 15	

Style	Description	Figures	Picture[3]
6P-M8C	PLUG[1] – Free 4-way IP65/IP67 connector with male contacts, size 8, M8 thread locking	Figure 21 Figure 22 Figure 18	
6J-M8C	JACK[1] – Fixed 4-way IP65/IP67connector with female contacts, size 8, M8 thread locking, intended for single hole mounting	Figure 18 Figure 19	
6P-M8CI	PLUG[1] – Free 4-way IP65/IP67 connector with female contacts, “inverse style”, size 8, M8 thread locking	Figure 19 Figure 23	
6J-M8CI	JACK[1] – Fixed 4-way IP65/IP67connector with male contacts, “inverse style”, size 8, M8 thread locking, intended for single hole mounting	Figure 20 Figure 21	

[1] The terms PLUG and JACK are used only for easier reading since they are widely used.

[2] The designation “size 8” and “size 12” indicates roughly the diameter of the jack in millimetres.

[3] The pictures are only intended to give an idea of the components, the visible details are not binding.

4.6.3 Overall and mating dimensions by style

4.6.3.1 2-way connectors

4.6.3.1.1 Styles 2J-L and 2P-L

4.6.3.1.1.1 Style 2J-L, jack

Figure 1 shows the overall dimensions of fixed 2-way IP20 connector with female contacts, latch locking, intended for PCB mounting. Figure 2 shows its mating dimensions.

Dimensions in millimetres

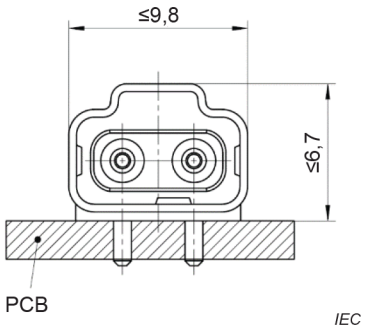


Figure 1 – Style 2J-L, overall dimensions

NOTE The PCB is shown only for illustration purposes.