

INTERNATIONAL STANDARD



**Connectors for electrical and electronic equipment –
Part 4: Detail specification for shielded or unshielded, free and fixed connectors
with up to 8 ways for balanced single-pair data transmission with current
carrying capacity – Mechanical mating information, pin assignment and
additional requirements for Type 4**

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.220.10

ISBN 978-2-8322-5608-4

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CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –**Part 4: Detail specification for shielded or unshielded, free and fixed connectors with up to 8 ways for balanced single-pair data transmission with current carrying capacity – Mechanical mating information, pin assignment and additional requirements for Type 4**

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IEC 63171-4 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment. It is an International Standard.

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

Draft	Report on voting
48B/2964/FDIS	48B/2984/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.

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.

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/publications.

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INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning contact mating surface dimensions given in 4.1.

The IEC takes no position concerning the evidence, validity, and scope of this patent right.

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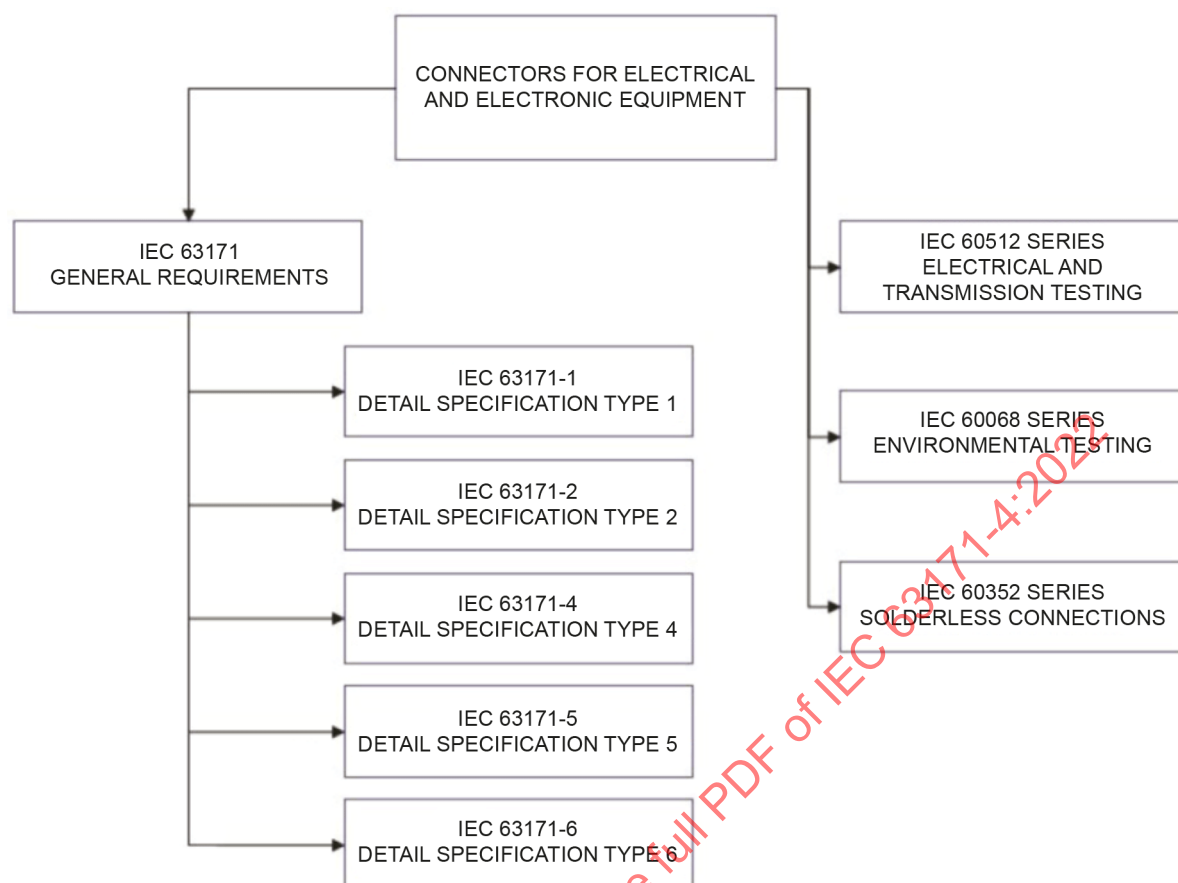
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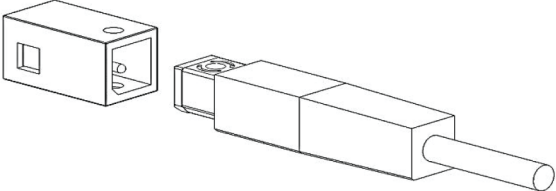
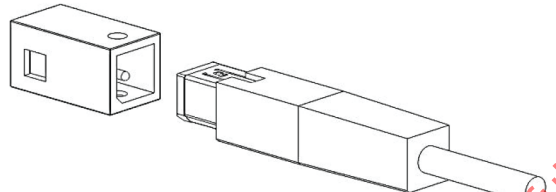
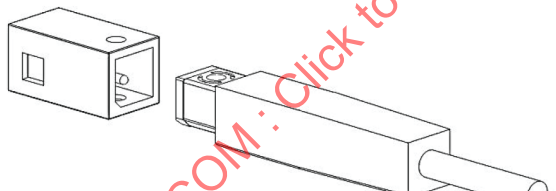
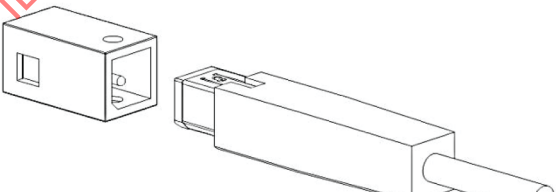
IEC 63171 is the base specification of the whole series. Subsequent specifications do not duplicate information given in the base document, but list only additional requirements. For complete specification regarding a component of a higher number document all lower numbered documents shall be considered as well. Figure 1 shows the interrelation of the documents.



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Figure 1 – Relationship between the IEC 63171 series documents and their related references

This document refers to International Standards for test and measurement, environmental testing as well as solderless connections.

IEC SC 48B – Electrical connectors Specification available from: IEC General secretariat or from the addresses shown on the inside cover.	IEC 63171-4 Ed. 1
DETAIL SPECIFICATION in accordance with IEC 63171	
 IEC	Shielded 1-pair connector with snap-in mechanism
 IEC	Shielded 1-pair connector with locking device
 IEC	Unshielded 1-pair connector with snap-in mechanism
 IEC	Unshielded 1-pair connector with locking device

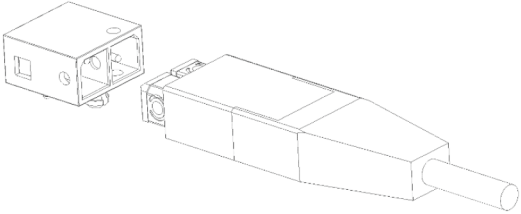
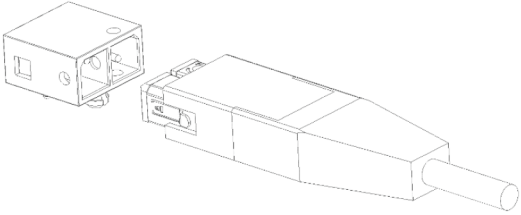
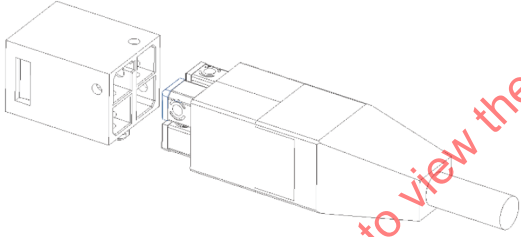
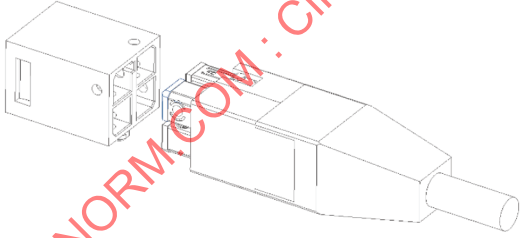
 IEC	Shielded 2-pair connector with snap-in mechanism
 IEC	Shielded 2-pair connector with locking device
 IEC	Shielded 4-pair connector with snap-in mechanism
 IEC	Shielded 4-pair connector with locking device

Figure 2 – Type 4 connector overview

CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –

Part 4: Detail specification for shielded or unshielded, free and fixed connectors with up to 8 ways for balanced single-pair data transmission with current carrying capacity – Mechanical mating information, pin assignment and additional requirements for Type 4

1 Scope

This part of IEC 63171 covers shielded and unshielded free and fixed multimedia connectors (MMC) for data transmission with frequencies up to and above 3 000 MHz for shielded and up to 600 MHz for unshielded connectors, both with current-carrying capacity with up to 8 ways. It specifies the common dimensions, mechanical, electrical and transmission characteristics and environmental requirements as well as test specifications, respectively.

The form factor of these connectors allows their use for cable sharing with TOs (Telecommunications Outlet) for structured cabling.

NOTE The overall performance of the transmission channel in such case is evaluated.

This document covers type 4 connectors. Each part of this series has the associated type number equal to the number of the part in the series. All connectors in the IEC 63171 series are deemed to provide the same functions as defined in IEC 63171, using different mechanical interfaces.

The shielded and unshielded connectors are interoperable for their internal transmission performance and can be exchanged. The shielded version has improved EMC and coupling properties.

The connectors are intended to be used for Single Pair Ethernet (SPE) according, but not restricted to the following IEEE standards: 10Base-T1 (IEEE 802.3cg), 100Base-T1 (IEEE 802.3bw), 1000Base-T1 (IEEE 802.3bp), Multi-Gig Base-T1 (IEEE 802.3ch) 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 60512-1, *Connectors for electrical and electronic equipment – Tests and measurements – Part 1: Generic specification*

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

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

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

IEC TR 63040, *Guidance on clearances and creepage distances in particular for distances equal to or less than 2 mm – Test results of research on influencing parameters*

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*

ISO/IEC 11801-1, *Information technology – Generic cabling for customer premises – Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63171, IEC 60050-581, IEC 60512-1, and the following 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>

3.1

MultiMedia Connector

MMC

connector which can be used to transmit data and/or power of independent applications on each pair without any significant disturbance from neighbour pairs within the same connector or adjacent similar connectors or different media types, e.g., single-pair, two-pair or four-pair applications.

Note 1 to entry: This is achieved by superior crosstalk performance, based on more than 85 dB coupling attenuation and better than Category 8.2 crosstalk levels, which make the residual disturbance insignificant.

4 Common features and typical connector pairs

4.1 Mating information

4.1.1 General

Dimensions are given in millimetres. Drawings are shown in third-angle projection. The shape of connectors may deviate from those given in Figure 2 to Figure 9, as long as the dimensions specified are not changed.

4.1.2 Overview of connector styles

Table 1 gives an overview of the different styles of connectors described in this document. The additional style descriptions give the number of pairs, e.g., 1P means 1-pair, 2P means 2-pair and 4P means 4-pair.

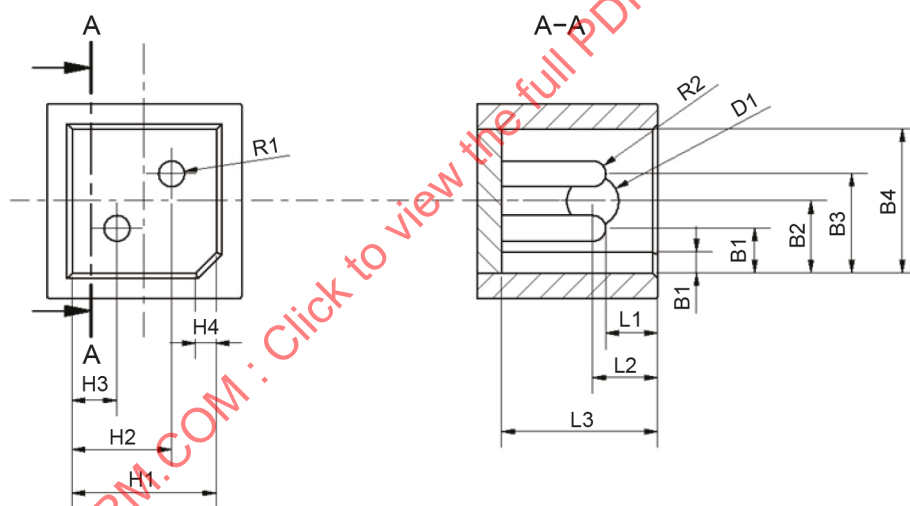
Table 1 – Styles of connectors

Style	Type	Description
MMC 1P	-	Single Pair fixed connector, male contacts
MMC 2P	-	Two Pair fixed connector, male contacts
MMC 4P	-	Four Pair fixed connector, male contacts
MMC 1PS	Snap In	Single Pair connector, female contacts, snap-in
MMC 1PL	Locking	Single Pair connector, female contacts, locking device
MMC 2PS	Snap In	Two Pair connector, female contacts, snap-in
MMC 2PL	Locking	Two Pair connector, female contacts, locking device
MMC 4PS	Snap In	Four Pair connector, female contacts, snap-in
MMC 4PL	Locking	Four Pair connector, female contacts, snap-in

4.1.3 Fixed connectors

4.1.3.1 Shielded and unshielded fixed connector – MMC 1P

In Figure 3 the details for the fixed MMC 1P are given. This is the basic drawing which is used in all other figures. The dimensions are given in Table 2.



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Figure 3 – Shielded and unshielded fixed connector details – MMC 1P

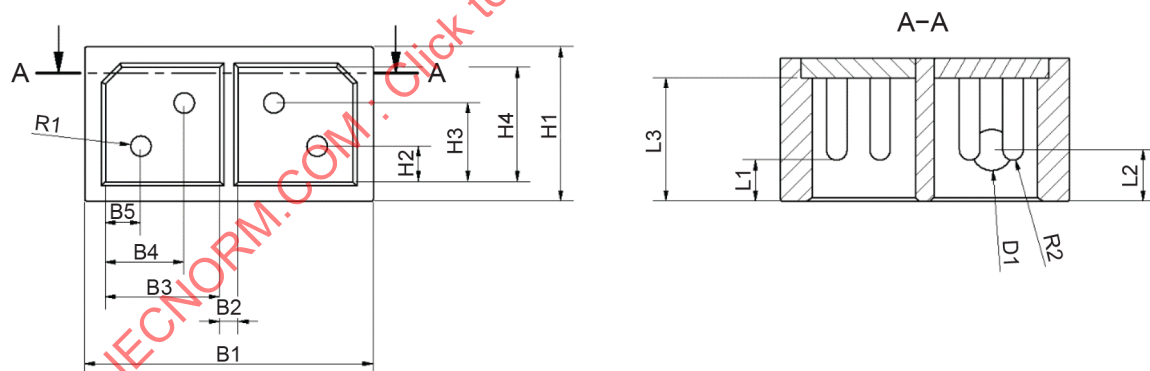
Table 2 – Dimensions for Figure 3 – MMC 1P

Dimensions in mm

Letter	Minimum	Nominal	Maximum
H1	-	5,55	5,60
H2	3,81	3,83	3,85
H3	1,71	1,73	1,75
H4	-	0,80	0,85
L1	-	2,00	-
L2	-	2,50	-
L3	-	6,00	-
B1	-	0,80	0,85
B2	1,71	1,73	1,75
B3	-	2,78	-
B4	3,81	3,83	3,85
B5	-	5,55	5,60
D1	-	2,00	-
R1	0,97	1,00	-
R2	-	0,50	-

4.1.3.2 Shielded and unshielded fixed connector – MMC 2P

In Figure 4 the details for the fixed MMC 2P are given. The respective dimensions are given in Table 3.



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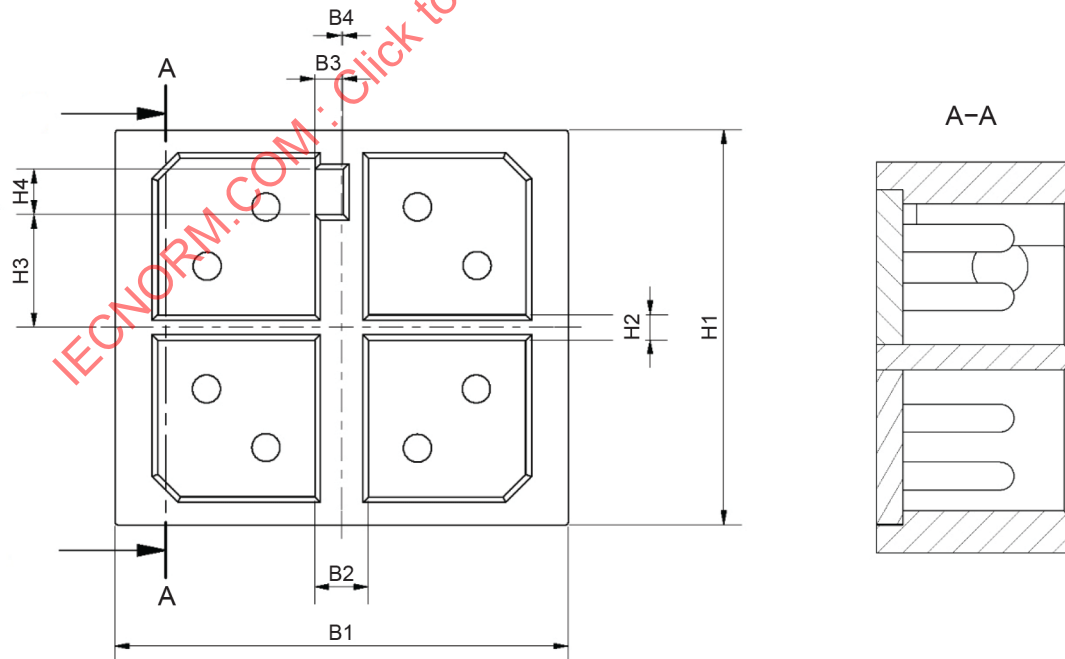
Figure 4 – Shielded and unshielded fixed connector details – MMC 2P

Table 3 – Dimensions for Figure 4 – MMC 2P

Dimensions in mm			
Letter	Minimum	Nominal	Maximum
H1		7,5	
H2	1,71	1,73	1,75
H3	3,81	3,83	3,85
H4	-	5,55	5,60
L1	-	2,00	-
L2	-	2,50	-
L3	-	6,00	-
B1	13,95	14,00	14,05
B2	0,85	0,90	0,95
B3	-	5,55	5,60
B4	3,81	3,83	3,85
B5	1,71	1,73	1,75
D1	-	2,00	-
R1	0,97	1,00	-
R2	-	0,50	-

4.1.3.3 Shielded and unshielded fixed connector – MMC 4P

In Figure 5 the details for the fixed MMC 4P are given. The respective dimensions are given in Table 4.



IEC

Figure 5 – Shielded and unshielded fixed connector details – MMC 4P

Table 4 – Dimensions for Figure 5 – MMC 4P

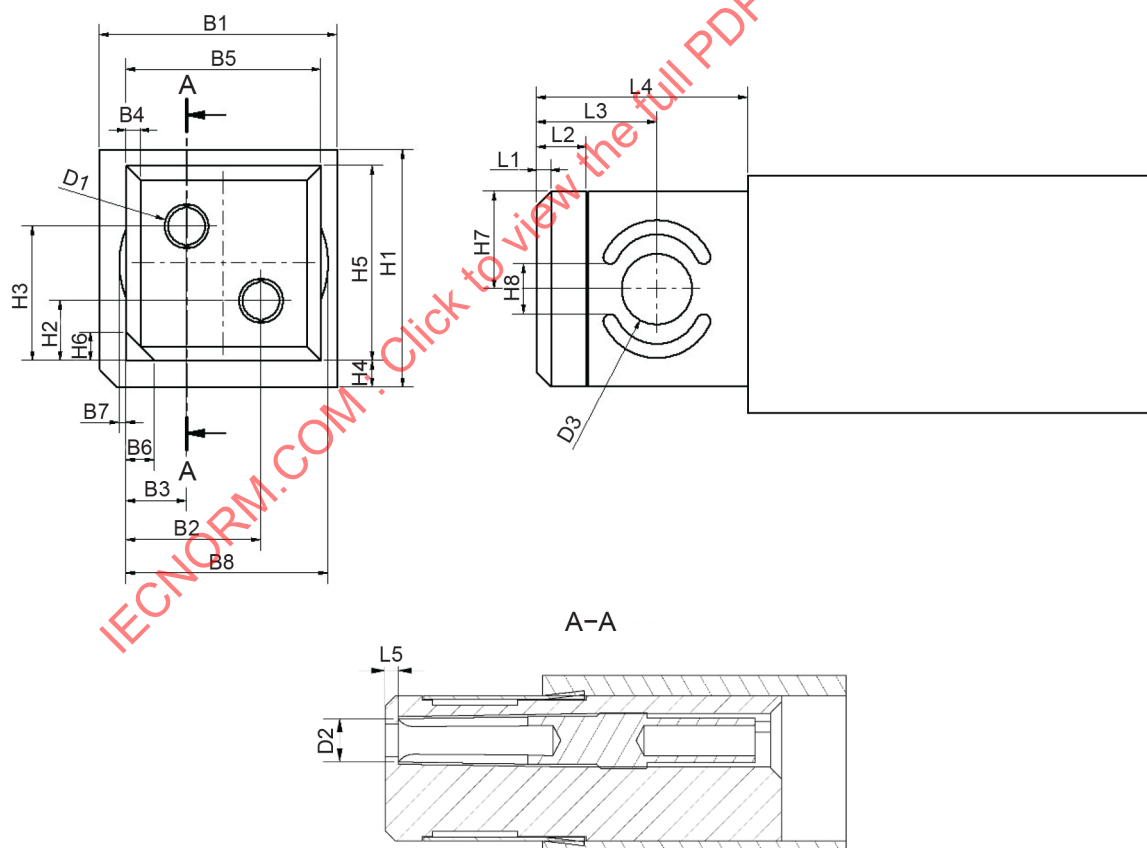
Dimensions in mm

Letter	Minimum	Nominal	Maximum
H1	13,95	14,00	14,05
H2	0,88	0,94	1,00
H3	3,94	3,97	4,00
H4	1,60	1,66	1,72
B1	15,95	16,00	16,05
B2	1,88	1,94	2,00
B3	0,94	1,00	1,06
B4	0,0025	0,025	0,06

4.1.4 Free connectors

4.1.4.1 Shielded and unshielded free connector with snap-in device – MMC 1PS

In Figure 6 the details for the free MMC 1PS are given. The respective dimensions are given in Table 5.



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Figure 6 – Shielded and unshielded free connector with snap-in device – MMC 1PS

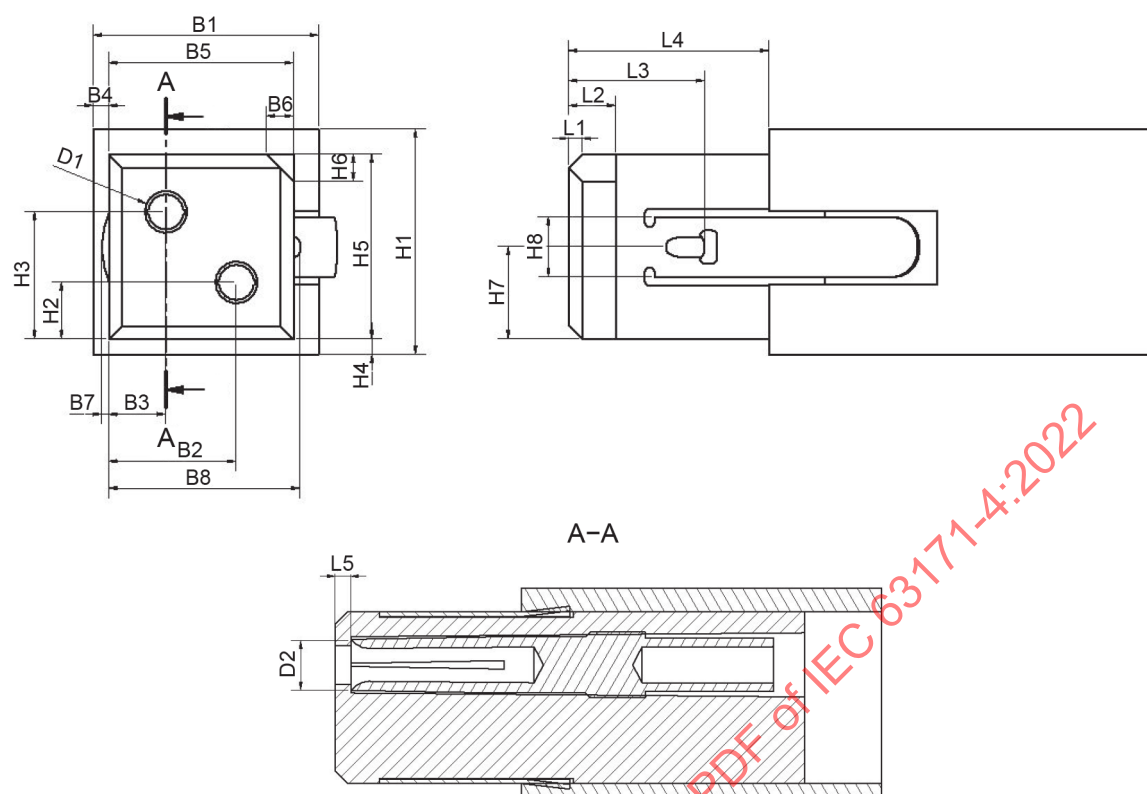
Table 5 – Dimensions for Figure 6 – MMC 1PS

Dimensions in mm

Letter	Minimum	Nominal	Maximum
B1	-	6,70	-
B2	3,78	3,80	3,82
B3	1,68	1,70	1,72
B4	-	0,40	-
B5	5,45	5,50	-
B6	0,75	0,80	-
B7	-	0,20	-
B8	-	5,70	-
H1	-	6,70	-
H2	1,68	1,70	1,72
H3	3,78	3,80	3,82
H4	-	0,75	-
H5	5,45	5,50	-
H6	0,75	0,80	-
H7	-	2,75	-
H8	-	1,41	-
L1	-	0,40	-
L2	-	1,40	-
L3	-	3,38	-
L4	-	5,95	-
L5	-	0,40	-
D1	-	1,25	-
D2	-	1,80	-
D3	-	2,00	-

4.1.4.2 Shielded and unshielded free connector with locking device – MMC 1PL

In Figure 7 the details for the free MMC 1PL are given. The respective dimensions are given in Table 6.



IEC

Figure 7 – Shielded and unshielded free connector with locking device – MMC 1PL

Table 6 – Dimensions for Figure 7 – MMC 1PL

Dimensions in mm			
Letter	Minimum	Nominal	Maximum
B1		6,70	
B2	3,78	3,80	3,82
B3	1,68	1,70	1,72
B4		0,45	
B5	5,45	5,50	-
B6	0,75	0,80	-
B7		0,20	
B8		5,70	
H1		6,70	
H2	1,68	1,70	1,72
H3	3,78	3,80	3,82
H4		0,45	
H5	5,45	5,50	-
H6	0,75	0,80	-
H7		2,75	
H8		1,80	
L1		0,40	
L2		1,40	
L3		4,04	
L4		5,95	
L5		0,40	
D1		1,25	
D2		1,80	

4.1.4.3 Shielded and unshielded free connector with snap-in device – MMC 2PS

In Figure 8 the details for the free MMC 2PS are given. The respective dimensions are given in Table 7.

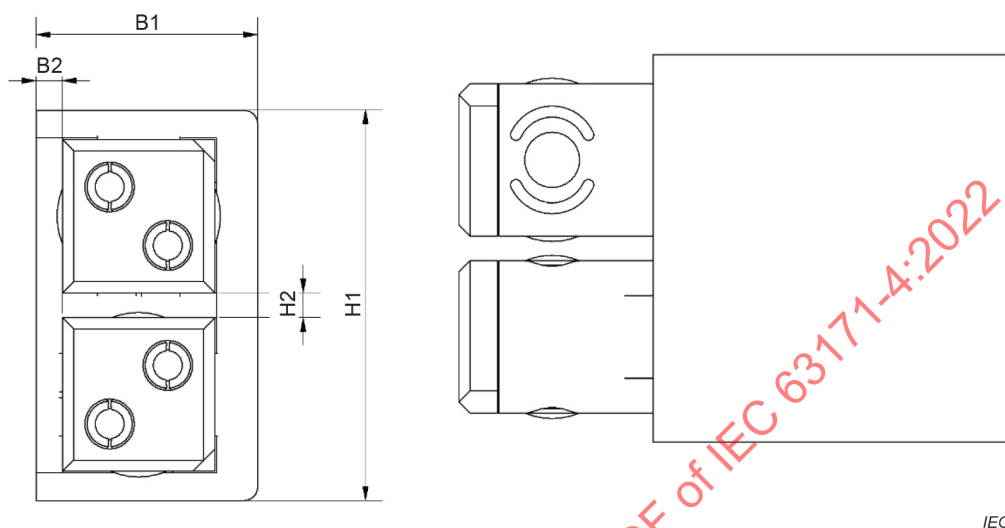


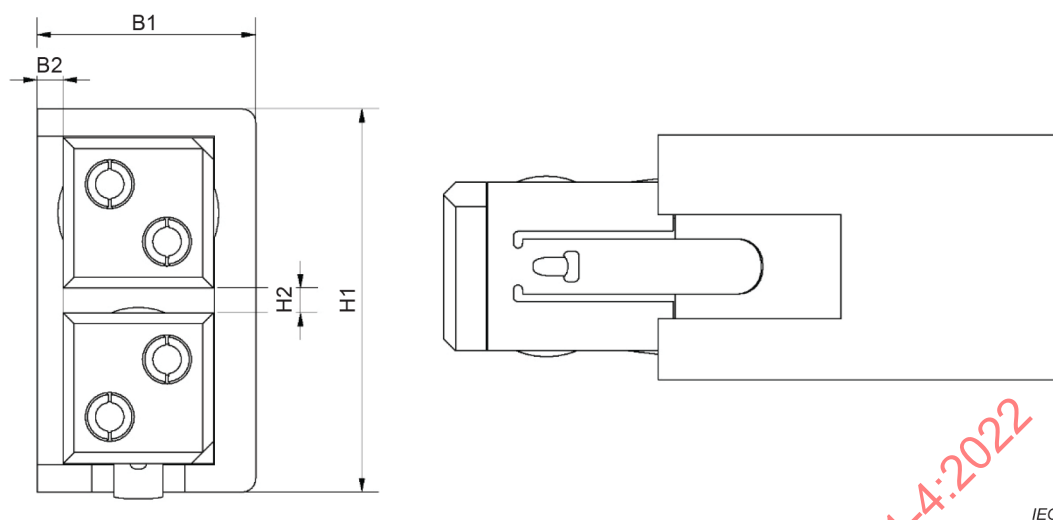
Figure 8 – Shielded and unshielded free connector with snap-in device – MMC 2PS

Table 7 – Dimensions for Figure 8 – MMC 2PS

Dimensions in mm			
Letter	Minimum	Nominal	Maximum
B1	7,97	8,00	8,00
B2	0,89	0,95	0,95
H1	13,97	14,00	14,03
H2	0,87	0,90	0,93

4.1.4.4 Shielded and unshielded free connector with locking device – MMC 2PL

In Figure 9 the details for the free MMC 2PL are given. The respective dimensions are given in Table 8.



IEC

Figure 9 – Shielded and unshielded free connector with locking device- MMC 2PL

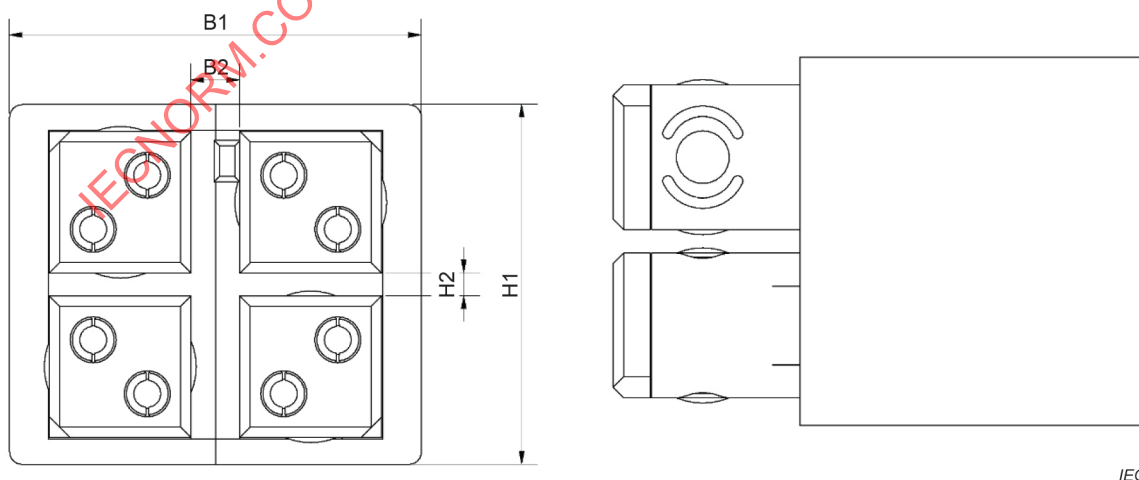
Table 8 – Dimensions for Figure 9 – MMC 2PL

Dimensions in mm

Letter	Minimum	Nominal	Maximum
B1	7,97	8,00	8,00
B2	0,89	0,95	0,95
H1	13,97	14,00	14,03
H2	0,87	0,90	0,93

4.1.4.5 Shielded and unshielded free connector with snap-in device – MMC 4PS

In Figure 10 the details for the free MMC 4PS are given. The respective dimensions are given in Table 9.



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Figure 10 – Shielded and unshielded free connector with snap-in device – MMC 4PS

Table 9 – Dimensions for Figure 10 – MMC 4PS

Dimensions in mm			
Letter	Minimum	Nominal	Maximum
B1	15,97	16,00	16,00
B2	1,87	1,90	1,90
H1	13,97	14,00	14,03
H2	0,87	0,90	0,93

4.1.4.6 Shielded and unshielded free connector with locking device – MMC 4PL

In Figure 11 the details for the free MMC 4PL are given. The respective dimensions are given in Table 10.

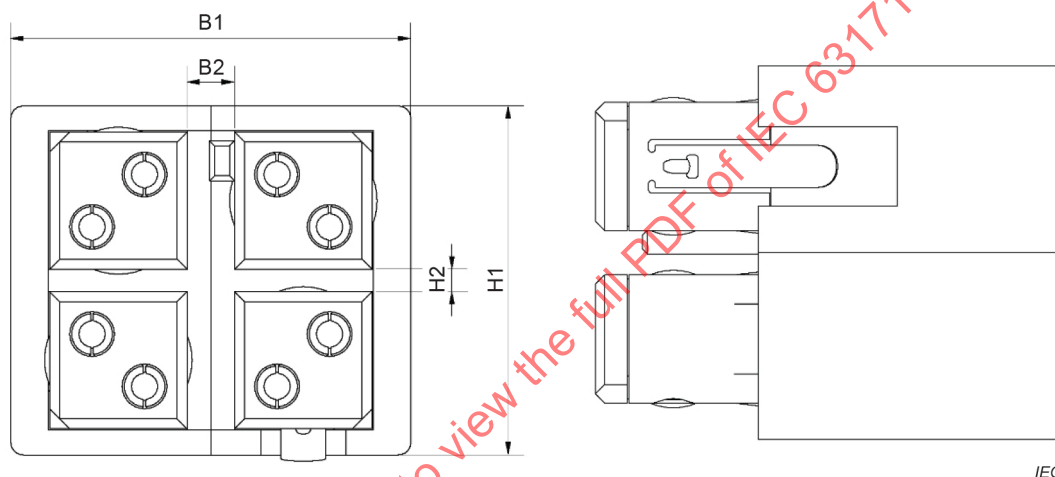


Figure 11 – Shielded and unshielded free connector with locking device- MMC 4PL

Table 10 – Dimensions for Figure 11 – MMC 4PL

Dimensions in mm			
Letter	Minimum	Nominal	Maximum
B1	15,97	16,00	16,00
B2	1,87	1,90	1,90
H1	13,97	14,00	14,03
H2	0,87	0,90	0,93

4.1.4.7 Dimensions for free connectors contact

In Figure 12 the details for the contacts of the free connector are given. The respective dimensions are given in Table 11.

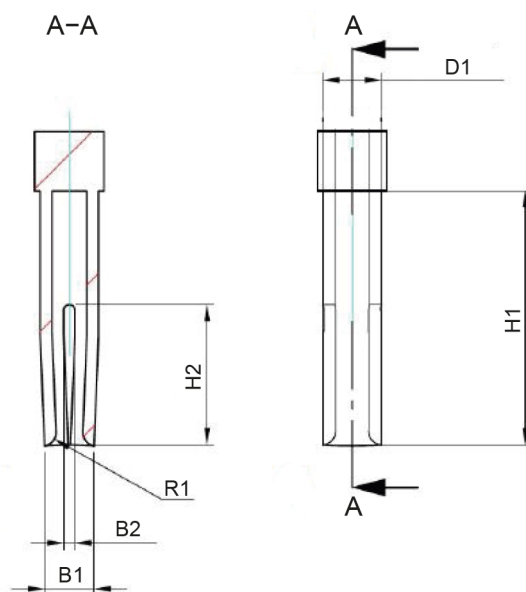


Figure 12 – Free connector female contact

Table 11 – Dimensions for Figure 12

Dimensions in mm

Letter	Minimum	Nominal	Maximum
B1	1,51	1,52	1,55
B2	-	0,34	-
H1	7,67	7,70	7,73
H2	4,20	4,25	4,30
R1	-	0,40	-
D1	1,72	1,75	1,77

5 Characteristics

5.1 General

Compliance to the test schedules is intended to ensure the reliability of all performance parameters, including transmission parameters, over the range of operating climatic conditions.

5.2 Pin assignment

For those specifications where pin assignment is relevant the pin assignment shall be as shown in Figure 13, unless otherwise specified.

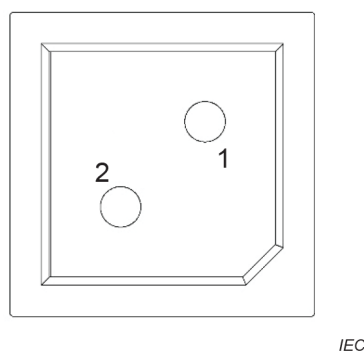


Figure 13 – Fixed connector pin assignment (front view of connector)

Board connector pin assignment for single pair Ethernet, see Table 12.

Table 12 – 2-way connector signal pin assignment

Pin No.	Signal	PoDL
1	BI_DA+	PoDL +
2	BI_DA–	PoDL -

5.3 Classification into climatic category

The temperature range and climatic category shall be compatible with ISO/IEC 11801-1 classification of a M11C1E1 environment for unshielded, M11C1E3 environment for shielded connectors.

5.4 Electrical characteristics

5.4.1 Creepage and clearance distances

The permissible operating voltages depend on the application and on the specified safety requirements.

Although insulation coordination is not required for safety aspects for these connectors, it is still required for their electrical functional requirements.

In general, for minimum values of clearances and creepage distances IEC 60664-1 shall apply, based on the assigned voltage rating 50 V AC and 60 V DC.

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

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

The creepage and clearance distances given in Table 13 apply as operating characteristics for mated connectors according to this document.

In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used and should duly be considered.

Table 13 – Creepage and clearance distances

Dimensions in mm

Minimum distance between contacts and chassis		Minimum distance between adjacent contacts	
Creepage	Clearance	Creepage	Clearance
1,50	0,83	2,0	2,0

5.4.2 Voltage proof

According to 5.4.2 of IEC 63171:2021.

5.4.3 Current-temperature derating

According to Class II with level 2 of 5.4.3 of IEC 63171:2021.

5.4.4 Initial contact resistance – interface only (separable fixed and free contact)

According to 5.4.4 of IEC 63171:2021.

5.4.5 Input to output DC resistance

According to 5.4.5 of IEC 63171:2021.

5.4.6 Input to output DC resistance unbalanced

According to 5.4.6 of IEC 63171:2021.

5.4.7 Initial insulation resistance

According to 5.4.7 of IEC 63171:2021.

5.5 Transmission characteristics**5.5.1 General**

Compliance to this document, in respect to transmission characteristics, shall be determined according to specified test methods described in test group FP of IEC 63171.

All transmission performance requirements shall apply between the reference planes specified in IEC 60512-28-100.

All transmission results shall be reported as worst case overall result after testing all samples.

5.5.2 Insertion loss

According to Category B for unscreened and Category C for screened connectors in 5.5.2 of IEC 63171:2021.

5.5.3 Return loss

According to Category B for unscreened and Category C for screened connectors in 5.5.3 of IEC 63171:2021.

5.5.4 Propagation delay

According to 5.5.4 of IEC 63171:2021.