

PUBLICLY
AVAILABLE
SPECIFICATION

IEC
PAS 61076-3-117

Pre-Standard

First edition
2006-09

**Connectors for electronic equipment –
Product requirements –**

Part 3-117:

**Rectangular connectors – Protective housings
for use with 8-way shielded and unshielded
connectors for frequencies up to 600 MHz
for industrial environments incorporating
IEC 60603-7 – Variant 14 related to
IEC 61076-3-106 – Push-pull coupling**



Reference number
IEC/PAS 61076-3-117:2006(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)
- **Catalogue of IEC publications**
The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.
- **IEC Just Published**
This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.
- **Customer Service Centre**
If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

PUBLICLY
AVAILABLE
SPECIFICATION

IEC
PAS 61076-3-117

Pre-Standard

First edition
2006-09

**Connectors for electronic equipment –
Product requirements –**

Part 3-117:

**Rectangular connectors – Protective housings
for use with 8-way shielded and unshielded
connectors for frequencies up to 600 MHz
for industrial environments incorporating
IEC 60603-7 – Variant 14 related to
IEC 61076-3-106 – Push-pull coupling**

© IEC 2006 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

T

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 General data	6
1.1 Scope.....	6
1.2 Normative references	6
1.3 IEC type designation.....	8
2 Terms and definitions	9
3 Dimensional information	9
3.1 Common features	9
3.2 General.....	9
3.3 Contact arrangement of all connector types.....	9
3.4 IP65 and IP67 sealing.....	9
3.5 Industrial IEC 60603-7 variant 14 – Rectangular push-pull coupling.....	10
3.5.1 Industrial IEC 60603-7 variant 14, fixed connector.....	10
3.5.2 Industrial IEC 60603-7 variant 14, free connector.....	12
3.6 Termination and mounting information.....	14
3.6.1 General	14
3.6.2 Mounting information for variant 14, fixed connector	14
4 Gauges	14
4.1 Connectors, IEC 60603-7 interface	14
5 Characteristics	14
5.1 Climatic category.....	14
5.2 Electrical	15
5.2.1 Clearance and creepage distances.....	15
5.2.2 Voltage proof.....	15
5.2.3 Current-carrying capacity	15
5.2.4 Mating cycles with power applied	16
5.2.5 Initial contact resistance.....	16
5.2.6 Input-to-output resistance.....	16
5.2.7 Resistance unbalance	16
5.2.8 Initial insulation resistance	16
5.3 Transmission characteristics	17
5.3.1 General	17
5.3.2 Mechanical	17
5.3.3 Mechanical operation	17
5.3.4 Effectiveness of connector coupling devices transversal	17
5.3.5 Effectiveness of connector coupling devices	17
5.3.6 Separation and engagement forces	17
6 Test schedule.....	18
6.1 General.....	18
6.2 Test procedures and measuring methods	18
6.3 Preconditioning.....	18
6.4 Wiring and mounting of specimens.....	18
6.4.1 Wiring.....	18
6.4.2 Mounting.....	18

6.5	Arrangement for contact resistance test:	18
6.6	Arrangement for dynamic stress tests (test phase AP2)	19
6.7	Basic (minimum) test schedule	19
6.8	Full test schedule	19
6.8.1	Test preliminary group P	19
6.8.2	Test group P	20
6.8.3	Test Group AP	21
6.8.4	Test Group BP	22
6.8.5	Test group CP	23
6.8.6	Test Group DP	24
6.8.7	Test Group EP	24

IECNORM.COM: Click to view the full PDF of IEC PAS 61076-3-117:2006

Withdrawn

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONNECTORS FOR ELECTRONIC EQUIPMENT – Product requirements –

Part 3-117: Rectangular connectors – Protective housings for use with 8-way shielded and unshielded connectors for frequencies up to 600 MHz for industrial environments incorporating IEC 60603-7 – Variant 14 related to IEC 61076-3-106 – Push-pull coupling

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

A PAS is a technical specification not fulfilling the requirements for a standard but made available to the public.

IEC-PAS 61076-3-117 has been processed by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
48B/1655/NP	48B/1697A/RVN

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of three years starting from 2006-09. The validity may be extended for a single three-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

IECNORM.COM: Click to view the full PDF of IEC PAS 61076-3-117:2006

Withdrawn

CONNECTORS FOR ELECTRONIC EQUIPMENT – Product requirements –

Part 3-117: Rectangular connectors – Protective housings for use with 8-way shielded and unshielded connectors for frequencies up to 600 MHz for industrial environments incorporating IEC 60603-7 – Variant 14 related to IEC 61076-3-106 – Push-pull coupling

1 General data

1.1 Scope

This Publicly Available Specification (PAS) covers protective housings for upgrading existing 8-way shielded and unshielded connectors utilizing the interface described in IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, IEC 60603-7-5, IEC 60603-7-7 to IP65 and IP67 ratings according to IEC 60529, for use in industrial environments.

The housings cover a variety of different locking mechanisms according to this PAS and a variety of different mounting configurations and termination types which are detailed in IEC 60603-7.

Common mating configurations for all variants are defined in IEC 60603-7. The mating dimensions for the housings under Clause 3 allow the mating conditions under IEC 60603-7 to be fulfilled.

The fully assembled variants (connectors) described in this document incorporate fixed and free connectors which are fully compliant with IEC 60603-7.

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 60050-581:1978, *International Electrotechnical Vocabulary – Chapter 581: Electro-mechanical components for electronic equipment*

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

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

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

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

IEC 60529:1989, *Degree of protection provided by enclosures (IP Code)*

IEC 60603-7: *Connectors for frequencies below 3 MHz for use with printed boards – Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality*

IEC 60603-7-2: *Connectors for electronic equipment – Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for data transmission with frequencies up to 100 MHz¹*

¹ To be published.

IEC 60603-7-3: *Connectors for electronic equipment – Part 7-3: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz*

IEC 60603-7-4: *Connectors for electronic equipment – Part 7-4: Detail specification for 8-way, unshielded, free and fixed connectors for data transmission with frequencies up to 250 MHz*

IEC 60603-7-5: *Connectors for electronic equipment – Part 7-5: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz²*

IEC 60603-7-7: *Connectors for electronic equipment – Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 600 MHz*

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

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

IEC 61156-2: *Multicore and symmetrical pair/quad cables for digital communications – Part 2: Horizontal floor wiring – Sectional specification*

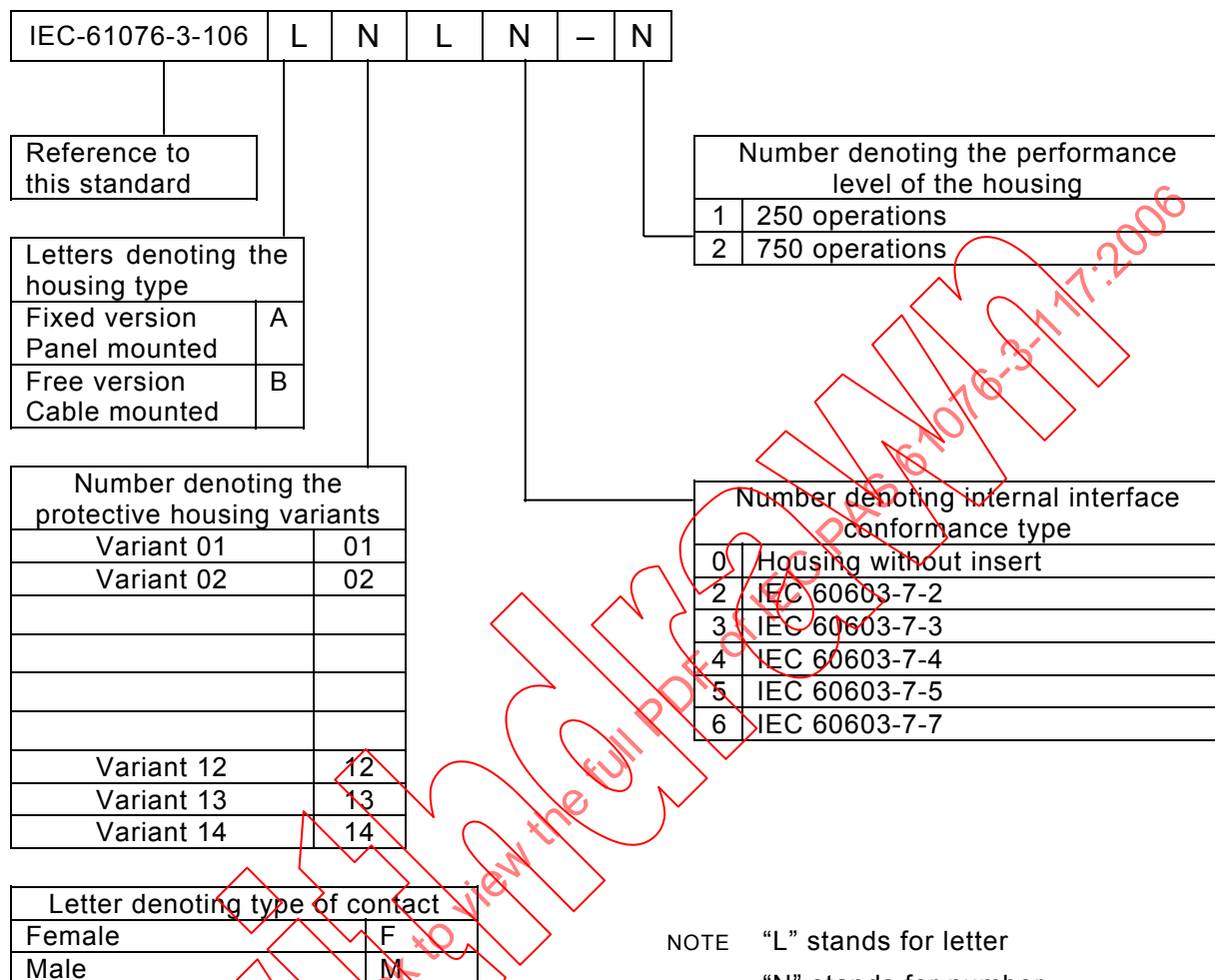
IEC 61156-3: *Multicore and symmetrical pair/quad cables for digital communications – Part 3: Work area wiring – Sectional specification*

IEC 61156-4: *Multicore and symmetrical pair/quad cables for digital communications – Part 4: Riser cables – Sectional specification*

² To be published.

1.3 IEC type designation

Protective housings and connectors in protective housings according to this standard shall be designated by the following system.



Example:

IEC-PAS 61076-3-106 A14F5 – 2: Fixed protective housing panel mounted, housing variant 14, female version, insert according to IEC 60603-7-5 (250 MHz – shielded), housing for 750 operations.

2 Terms and definitions

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

3 Dimensional information

3.1 Common features

The industrial connectors referenced in this specification are composed of IEC 60603-7 style fixed and free connectors housed in unique, industrial rated interfaces. The mating information and contact requirements of the IEC 60603-7 interface portion of these industrial connectors shall be compliant with the relevant part of IEC 60603-7.

The following requirements apply to the complete connector comprised of both the free and fixed connectors in one of the described variant shells/outer housing.

3.2 General

Dimensions are given in millimeters; drawings are shown in first-angle projection. The shape of connectors may deviate from the shapes given in the following figures as long as the specified dimensions are not influenced.

3.3 Contact arrangement of all connector types

Contact arrangements shall be in accordance with the relevant IEC 60603-7 specifications.

3.4 IP65 and IP67 sealing

Connectors meant to comply with IP ratings according to IEC 60529 require sealing of the components in order to meet the requirements detailed in the test schedules in 6.8.2 through 6.8.7.

3.5 Industrial IEC 60603-7 variant 14 – Rectangular push-pull coupling

3.5.1 Industrial IEC 60603-7 variant 14, fixed connector

First-angle projection

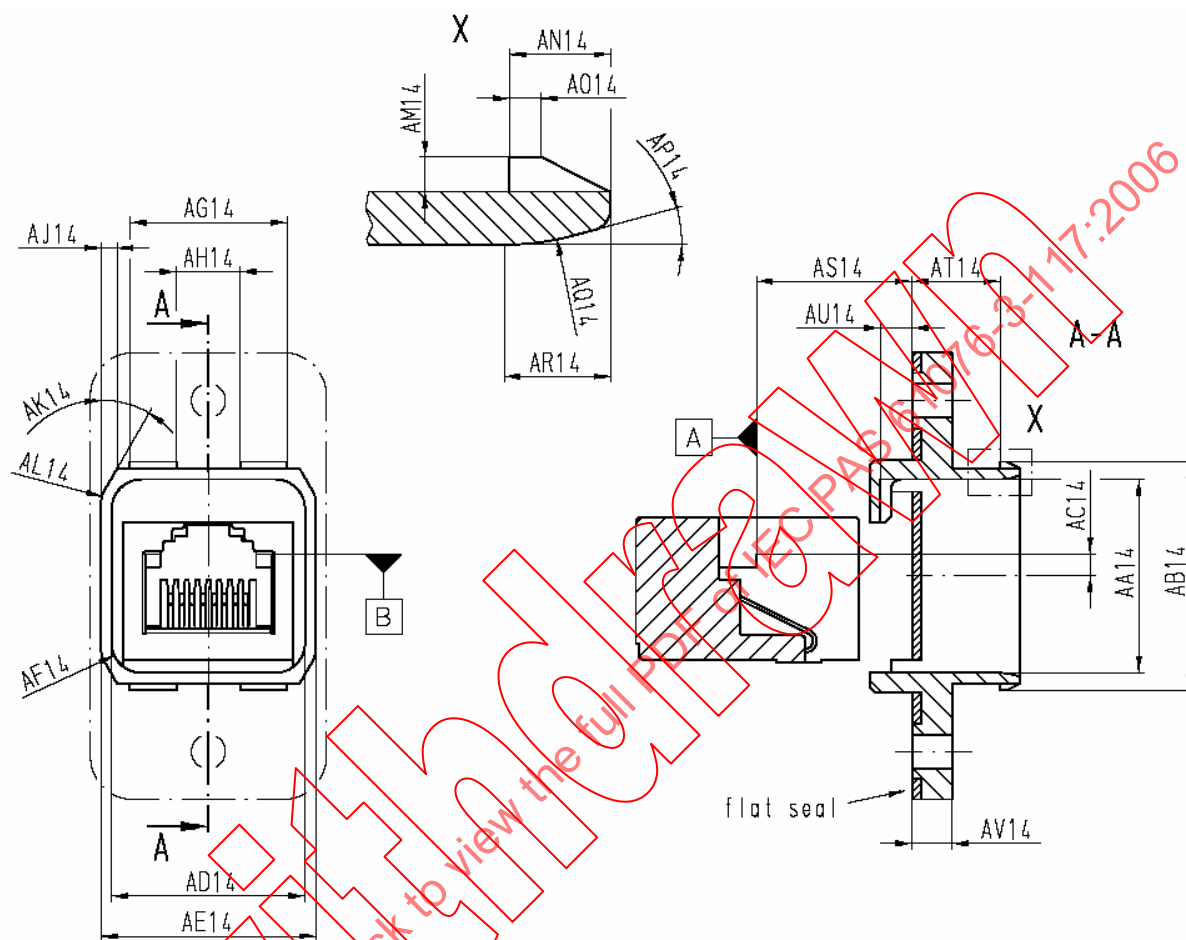


Figure 1 – Variant 14, fixed connector

Table 1 – Dimensions fixed connector variant 14

Letter	Maximum mm	Minimum mm	Nominal mm
AA ₁₄	18,23	18,17	18,2
AB ₁₄	21,55	21,45	21,5
AC ₁₄	2,11	1,99	2,05
AD ₁₄	18,23	18,17	18,2
AE ₁₄	20,3	20,1	20,2
AF ₁₄	2,83	2,77	2,8
AG ₁₄	14,85	14,75	14,8
AH ₁₄	6,05	5,95	6
AJ ₁₄	1,7	1,3	1,5
AK ₁₄	31	29	30
AL ₁₄	2,1	1,9	2
AM ₁₄	0,7	0,6	0,65
AN ₁₄	1,95	1,85	1,9
AO ₁₄	0,65	0,55	0,6
AP ₁₄	16	14	15
AQ ₁₄	5,1	4,9	5
AR ₁₄	2,1	1,9	2
AS ₁₄	14,85	14,45	14,65
AT ₁₄	8,35	8,25	8,3
AU ₁₄	3,1	2,9	3
AV ₁₄	3,9	3,7	3,8

3.5.2 Industrial IEC 60603-7 variant 14, free connector

First-angle projection

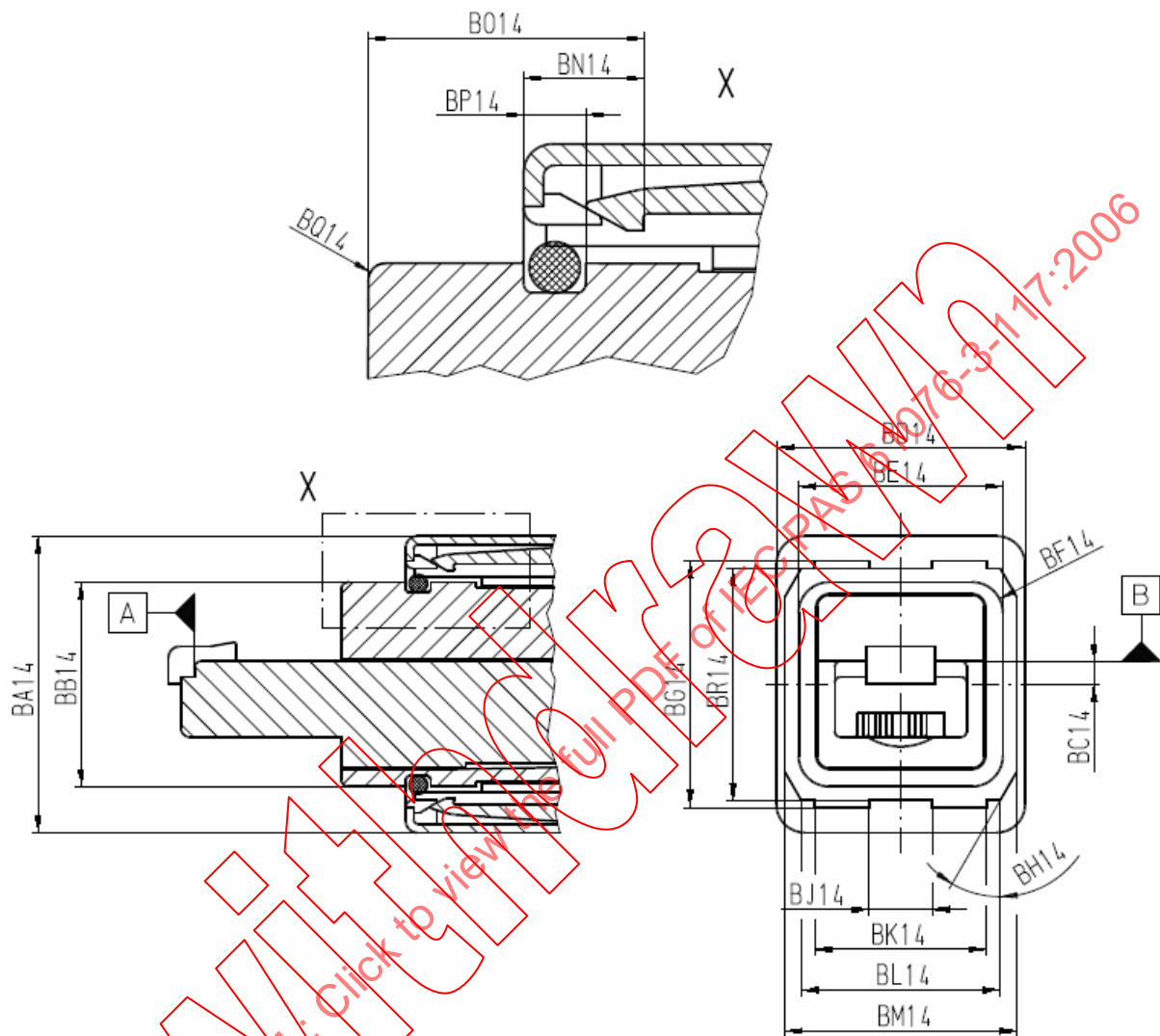


Figure 2 – Variant 14, free connector

Table 2 – Dimensions free connector variant 14

Letter	Maximum mm	Minimum mm	Nominal mm
BA ₁₄	29	-	-
BB ₁₄	18,09	18,03	18,06
BC ₁₄	2,11	1,99	2,05
BD ₁₄	22,8	-	-
BE ₁₄	18,09	18,03	18,06
BF ₁₄	2,73	2,67	2,7
BG ₁₄	21,9	21,7	21,8
BH ₁₄	31	29	30
BJ ₁₄	5,75	5,45	5,6
BK ₁₄	15,35	15,05	15,2
BL ₁₄	17,8	17,4	17,6
BM ₁₄	20,6	20,4	20,5
BN ₁₄	4,3	-	-
BO ₁₄	11	-	-
BP ₁₄	2,25	2,15	2,2
BQ ₁₄	0,65	0,55	0,6
BR ₁₄	20,55	20,45	20,5

3.6 Termination and mounting information

3.6.1 General

Terminations according to IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, IEC 60603-7-5, IEC 60603-7-7.

3.6.2 Mounting information for variant 14, fixed connector

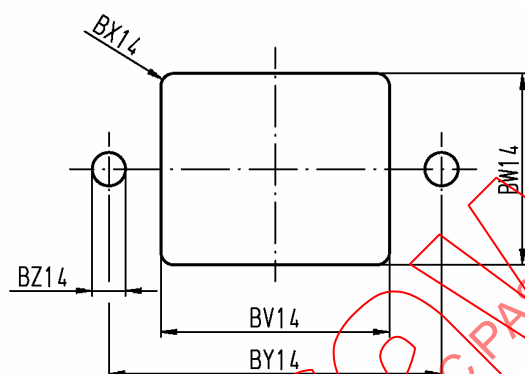


Figure 3 – Variant 14 mounting drawing

Table 3 – Variant 14 mounting information

Letter	Maximum mm.	Minimum mm	Nominal mm
BV ₁₄	22,05	21,95	22
BW ₁₄	18,45	18,35	18,4
BX ₁₄	R 1,25	-	-
BY ₁₄	33,1	32,9	33
BZ ₁₄	-	-	M 3

4 Gauges

4.1 Connectors, IEC 60603-7 interface

Refer to the relevant IEC 60603-7 specifications.

5 Characteristics

5.1 Climatic category

The lowest and highest temperatures and the duration of the damp-heat steady-state test should be selected from the preferred values stated in 2.2 of IEC 61076-1 and shall not exceed the values defined in the relevant IEC 60603-7 specification.

The following preferred temperature range and severity of the damp-heat steady-state test have been selected to comply with IEC 61156.

Table 4 – Climatic categories – Selected values for environmental performance level A

Climatic category	Lower temperature °C	Upper temperature °C	Damp-heat steady-state (days)
40/70/21	-40	70	21

5.2 Electrical

5.2.1 Clearance and creepage distances

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

Insulation coordination is not required for this connector; therefore, the creepage and clearance distances in IEC 60664-1 are reduced and covered by overall performance requirements.

Therefore, the creepage and clearance distances are given as operating characteristics of mated connectors.

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

Table 5 – Clearance and creepage distances

Type	Distance between contacts and shield		Minimum distance between adjacent contacts	
	Creepage	Clearance	Creepage	Clearance
	mm	mm	mm	mm
A, B	1,40	0,51	0,36	0,36

The electrical characteristics are specified in the relevant part of IEC 60603-7.

5.2.2 Voltage proof

Conditions:

IEC 60512-2, Test 4a, Method A.

Standard atmospheric conditions.

Mated connectors.

All variants: 1 000 V d.c. or a.c. peak, contact-to-contact
1 500 V d.c. or a.c. peak, contact-to-shield

5.2.3 Current-carrying capacity

Conditions: IEC 60512-3, Test 5b.
All contacts, connected in series.

The current-carrying capacity of connectors in accordance with the requirements of 2.4 of IEC 61076-1 shall comply with the derating curve given in Figure 4.

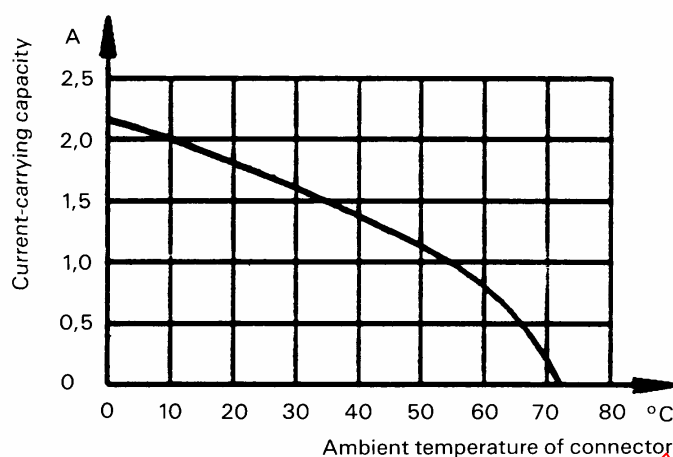


Figure 4 – Connector derating curve

5.2.4 Mating cycles with power applied

On agreement between manufacturer and user.

5.2.5 Initial contact resistance

Conditions: IEC 60512, Test 2a

Mated connectors

Measurement points: as specified in the relevant clause of IEC 60603-7

Signal contacts: 20 mΩ max.

Shield contact: 20 mΩ max.

5.2.6 Input to output resistance

Conditions: IEC 60512, Test 2a

Mated connectors

Signal contacts: 200 mΩ maximum

Shield: 100 mΩ maximum

5.2.7 Resistance unbalance

Conditions: IEC 60512, Test 2a

Mated connectors

Among all conductors, difference between maximum and minimum

100 mΩ max.

5.2.8 Initial insulation resistance

Conditions: IEC 60512, Test 3a

Method A

Mated connectors

Test voltage: 100 V d.c.

Each contact and shield to all others: 500 MΩ min.

5.3 Transmission characteristics

5.3.1 General

Transmission performance is defined by the relevant part of IEC 60603-7.

5.3.2 Mechanical

5.3.3 Mechanical operation

Conditions: IEC 60512, Test 9a

Speed: 10 mm/s max.
Rest: 5 s min. (unmated)
PL1: 750 operations
PL2: 250 operations

5.3.4 Effectiveness of connector coupling devices transversal

Conditions: IEC 60512, Test 8a.

Force 60 N to be applied at the end of the free housing to load the coupling device with the maximum torque

5.3.5 Effectiveness of connector coupling devices

Conditions: IEC 60512, Test 15f

All types: 50 N for 60 s $\pm$ 5 s

5.3.6 Separation and engagement forces

Conditions: IEC 60512, Test 13a

Speed: 50 mm/s max.

All types, insertion and withdrawal: 30 N max.

Initial torque test insertion 1,0 Nm max. and withdrawal 0,7 Nm max.
After conditioning torque test insertion 2,0 Nm max. and withdrawal 1,2 Nm max.

6 Test schedule

6.1 General

This test schedule shows all tests and the order in which they shall be carried out, as well as the requirements to be met.

Reference is made to the test groups of the relevant part of IEC 60603-7 for electrical and environmental test groups.

Tests according to this PAS shall demonstrate the performance of the protective housings under harsh industrial environment with the relevant IEC 60603-7 connector inserted.

Unless otherwise specified, mated sets of connectors shall be tested. Care shall be taken to keep a particular combination of connectors together during the complete test sequence; that is, when unmating is necessary for a certain test, the same connectors shall be mated for the subsequent tests.

Hereinafter, a mated set of connectors is called a "specimen".

6.2 Test procedures and measuring methods

The test methods specified and given in the relevant standards are the preferred methods but not necessarily the only ones that can be used. In case of dispute, however, the specified method shall be used as the reference method.

Unless otherwise specified, all tests shall be carried out under standard atmospheric conditions for testing as specified in IEC 60068-1.

Where approval procedures are involved and alternative methods are employed, it is the responsibility of the manufacturer to satisfy the authority granting approval that any alternative methods which he may use give results equivalent to those obtained by the methods specified.

6.3 Preconditioning

Before the tests are made, the connectors shall be preconditioned under standard atmospheric conditions for testing as specified in IEC 60068-1 for a period of 24 h unless otherwise specified by the manufacturer.

6.4 Wiring and mounting of specimens

6.4.1 Wiring

Wiring of these connectors shall take into account the wire diameter of the cables defined in IEC 61156-2, IEC 61156-3 and IEC 61156-4 as applicable. Where wiring and/or shielding of test specimens is required, the detail specification of the relevant part of IEC 60603-7 shall be reviewed for information suitable to comply with the selected methods of test.

6.4.2 Mounting

When mounting is required in a test, unless otherwise specified, the connectors shall be rigidly mounted on a metal plate or to specified accessories, whichever is applicable, using the specified connection methods, fixing devices and panel cut-outs as laid down in 3.6.

6.5 Arrangement for contact resistance test

As specified in the relevant part of IEC 60603-7.

6.6 Arrangement for dynamic stress tests (test phase AP2)

Contact resistance measurement as specified in the relevant part of IEC 60603-7.

6.7 Basic (minimum) test schedule

Not applicable.

6.8 Full test schedule

The detail specification shall call for the following tests and shall specify the characteristics to be examined and the requirements to be fulfilled.

For a complete test sequence, 18 specimens are needed (3 groups of 6). Within each group, only 2 of the 6 samples shall be subjected to the IPX5 and IPX7 tests. The same samples are used for both tests, spray and immersion. Two additional samples are used for the dust test, IP6X.

6.8.1 Test preliminary group P

The specimens shall be comprised on the variant shell and an IEC 60603-7-X interface. All specimens shall be subjected to the following tests. All the test group specimens shall be subjected to the preliminary group P tests in the following sequence.

The specimens shall then be divided into the appropriate number of groups. All connectors in each group shall undergo the following tests as described in the detail specification and in the sequence given, unless the detail specification of the relevant part of IEC 60603-7 requires alteration of the sequence of tests or adds new tests to verify additional connector characteristics.

The test parameters required shall not be less than those listed. The following tests specify the characteristics to be checked and the requirements to be fulfilled.

6.8.2 Test group P

Table 6 – Test group P

Test phase	Test			Measurement to be performed		
	Title	IEC 60512 Test No.	Severity or condition of test	Title	IEC 60512 Test No.	Requirement All connector styles
P1	General examination		Unmated connectors	Visual examination	1a	There shall be no defect that would impair normal operation
				Dimensional examination	1b	The dimensions shall comply with those specified in the relevant figure of Clause 3
P2	Polarizing method	13e	Not applicable			
P3			Test voltage 100 V $\pm$ 15 V d.c. Method A 8 contacts/specimen	Insulation resistance	3a	500 M Ω min.
P4			Contact/contact: Method A mated connectors	Voltage proof	4a	1 000 V d.c. or a.c. peak
			All contacts to test panel: Method A mated connectors		X	1 500 V d.c. or a.c. peak