BS EN 60130-9:2011

BSI Standards Publication

Connectors for frequencies below 3 MHz

Part 9: Circular connectors for radio and associated sound equipment

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National foreword

This British Standard is the UK implementation of EN 60130-9:2011. It is identical to IEC 60130-9:2011. It supersedes BS EN 60130-9:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/48, Electromechanical components and mechanical structures for electronic equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2011.

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60130-9

April 2011

ICS 31.220.10

Supersedes EN 60130-9:2000

English version

Connectors for frequencies below 3 MHz - Part 9: Circular connectors for radio and associated sound equipment

(IEC 60130-9:2011)

Connecteurs utilisés aux fréquences jusqu'à 3 MHz -
Partie 9: Connecteurs circulaires pour appareils de radiodiffusion et équipements électroacoustiques associés
(CEI 60130-9:2011)

Steckverbinder für Frequenzen unter 3 MHz -
Teil 9: Rundsteckverbinder für Rundfunk- und verwandte elektroakustische Geräte
(IEC 60130-9:2011)

This European Standard was approved by CENELEC on 2011-03-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60130-9:2011 E

Foreword

The text of document 48B/2180/CDV, future edition 4 of IEC 60130-9, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60130-9 on 2011-03-30.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

This European Standard supersedes EN 60130-9:2000.

EN 60130-9:2011 includes the following significant technical changes with respect to EN 60130-9:2000:

— the scope has been amended to clarify its separation through its field of application, from EN 61076-2-106;

— 8-pole connector styles 60130-9 IEC-22 through 60130-9 IEC-25 with screw locking have been deleted as obsolete and overlapping with some styles of EN 61076-2-106;

— application and connections in Table 1 have been deleted because of referencing obsolete sound equipment. Titles of the dimension sheets and the clause headlines of Annex A have been amended accordingly;

— the reference to safety requirements according to EN 60065 has been deleted.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-12-30
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-03-30

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60130-9:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60065 NOTE Harmonized as EN 60065.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60068-1 + A1	1988 1992	Environmental testing - Part 1: General and guidance	EN 60068-1	1994
IEC 60512	Series	Connectors for electronic equipment - Tests and measurements	EN 60512	Series
IEC 60512-1-1	-	Connectors for electronic equipment - Tests and measurements - Part 1-1: General examination - Test 1a: Visual examination	EN 60512-1-1	-
IEC 60512-1-2	-	Connectors for electronic equipment - Tests and measurements - Part 1-2: General examination - Test 1b: Examination of dimension and mass	EN 60512-1-2	-
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	EN 60512-2-1	-
IEC 60512-3-1	-	Connectors for electronic equipment - Tests and measurements - Part 3-1: Insulation tests - Test 3a: Insulation resistance	EN 60512-3-1	-
IEC 60512-4-1	-	Connectors for electronic equipment - Tests and measurements - Part 4-1: Voltage stress tests - Test 4a: Voltage proof	EN 60512-4-1	-
IEC 60512-7-1	-	Connectors for electronic equipment - Tests and measurements - Part 7-1: Impact tests (free connectors) - Test 7a: Free fall (repeated)	EN 60512-7-1	-
IEC 60512-7-2	-[1)]	Connectors for electronic equipment - Tests and measurements - Part 7-2: Impact tests (free connectors) - Test 7b: Mechanical strength impact	EN 60512-7-2	-[1)]
IEC 60512-9-1	-	Connectors for electronic equipment - Tests and measurements - Part 9-1: Endurance tests - Test 9a: Mechanical operation	EN 60512-9-1	-

[1)] To be published.

Publication	Year	Title	EN/HD	Year
IEC 60512-11-1	-	Electromechanical components for electronic equipment - Basic testing procedures and measuring methods - Part 11: Climatic tests - Section 1: Test 11a - Climatic sequence	EN 60512-11-1	-
IEC 60512-11-3	-	Connectors for electronic equipment - Tests and measurements - Part 11-3: Climatic tests - Test 11c: Damp heat, steady state	EN 60512-11-3	-
IEC 60512-11-9	-	Connectors for electronic equipment - Tests and measurements - Part 11-9: Climatic tests - Test 11i: Dry heat	EN 60512-11-9	-
IEC 60512-11-10	-	Connectors for electronic equipment - Tests and measurements - Part 11-10: Climatic tests - Test 11j: Cold	EN 60512-11-10	-
IEC 60512-11-12	-	Connectors for electronic equipment - Tests and measurements - Part 11-12: Climatic tests - Test 11m: Damp heat, cyclic	EN 60512-11-12	-
IEC 60512-13-2	-	Connectors for electronic equipment - Tests and measurements - Part 13-2: Mechanical operating tests - Test 13b: Insertion and withdrawal forces	EN 60512-13-2	-
IEC 60512-16-5	-	Connectors for electronic equipment - Tests and measurements - Part 16-5: Mechanical tests on contacts and terminations - Test 16e: Gauge retention force (resilient contacts)	EN 60512-16-5	-
IEC 60512-17-1	-	Connectors for electronic equipment - Tests and measurements - Part 17-1: Cable clamping tests - Test 17a: Cable clamp robustness	EN 60512-17-1	-
IEC 60512-17-2	-[1)]	Connectors for electronic equipment - Tests and measurements - Part 17-2: Cable clamping tests - Test 17b: Cable clamp resistance to cable rotation	EN 60512-17-2	-[1)]
IEC 60512-17-3	-	Connectors for electronic equipment - Tests and measurements - Part 17-3: Cable clamping tests - Test 17c: Cable clamp resistance to cable pull (tensile)	EN 60512-17-3	-
IEC 60512-17-4	-	Connectors for electronic equipment - Tests and measurements - Part 17-4: Cable clamping tests - Test 17d: Cable clamp resistance to cable torsion	EN 60512-17-4	-
IEC 61076-2-106	-[1)]	Connectors for electronic equipment - Product requirements - Part 2-106: Circular connectors - Detail specification for connectors m 16 x 0,75 with screw-locking and degree of protection ip40 or ip65/67	EN 61076-2-106	-[1)]
ISO 1302	-	Geometrical Product Specifications (GPS) - Indication of surface texture in technical product documentation	EN ISO 1302	-

CONTENTS

CONNECTORS FOR FREQUENCIES BELOW 3 MHz –

Part 9: Circular connectors for radio and associated sound equipment

1 Scope

This part of IEC 60130 relates to circular connectors for radio and associated sound equipment.

NOTE IEC 61076-2-106 specifies connectors with a similar mating interface for connectors M16x0,75 with screw-locking and degree of protection IP40 or IP65/IP67 and with M16x0,75 screw-locking accessory. As the IEC 60130-9 connector styles mating with the corresponding ones of IEC 61076-2-106 do not have a locking mechanism specified they are therefore not appropriate for industrial process measurement and control equipment. Users of this IEC 60130-9 standard should be aware that some of the IEC 61076-2-106 styles could be mated but not locked to some connector styles of this IEC 60130-9 standard.

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 60068-1: 1988, *Environmental testing – Part 1: General and guidance*
Amendment 1 (1992)

IEC 60512 (all parts*), Connectors for electronic equipment – Basic testing procedures and measuring methods*

IEC 60512-1-1, *Connectors for electornic 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:Electronic continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

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 60512-7-1, *Connectors for electronic equipment – Tests and measurements – Part 7-1: Impact tests (free connectors) – Test 7a: Free fall (repeated)*

IEC 60512-7-2, *Connectors for electronic equipment – Tests and measurements – Part 7-2: Impact tests (free components) – Test 7b: Mechanical strength impacts and measurements*[1]

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1 To be published.

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

IEC 60512-11-1, *Electromechanical components for electronic equipment – Basic testing procedures and measuring methods – Part 11 – Section 1: Test 11a – Climatic sequence*

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

IEC 60512-11-9, *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 11-10: 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 60512-16-5, *Connectors for electronic equipment – Tests and measurements – Part 16-5: Mechanical tests on contacts and terminations – Test 16e: Gauge retention force (resilient contacts)*

IEC 60512-17-1, *Connectors for electronic equipment – Tests and measurements – Part 17-1: Cable clamping tests – Test 17a: Cable clamp robustness*

IEC 60512-17-2, *Connectors for electronic equipment – Tests and measurements – Part 17-2: Cable clamping tests – Test 17b: Cable clamp resistance to cable rotation*[2]

IEC 60512-17-3, *Connectors for electronic equipment – Tests and measurements – Part 17-3: Cable clamping tests – Test 17c: Cable clamp resistance to cable pull (tensile)*

IEC 60512-17-4, *Connectors for electronic equipment – Tests and measurements – Part 17-4: Cable clamping tests – Test 17d: Cable clamp resistance to cable Torsion*

IEC 61076-2-106, *Connectors for electronic equipment – Product requirements – Part 2-106: Circular connectors – Detail specification for connectors M 16 x 0,75 with screw-locking and degree of protection IP40 or IP65/67*[3]

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

3 Technical information

3.1 IEC type designation

Connectors according to this part of IEC 60130 shall be designated by:

a) the reference to this standard: 60130-9 IEC;

b) a serial number according Table 1.

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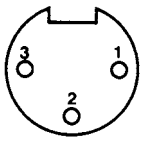
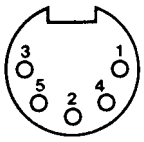
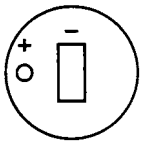
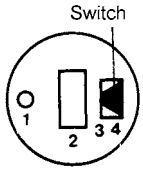
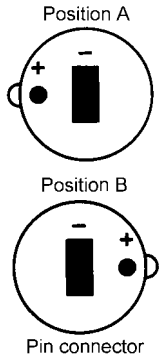
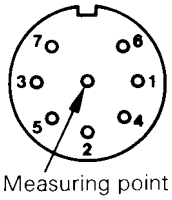
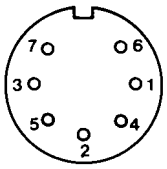
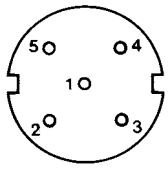
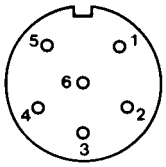
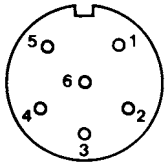
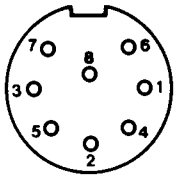
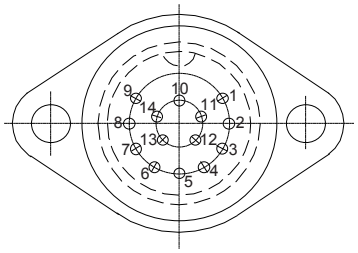
2 Under consideration.

3 To be published.

Table 1 – Type designation

Contact arrangement	Type designation	
See note 1 of 3.2	**Male connector**	**Female connector**
	**60130-9 IEC-01**	**60130-9 IEC-02**
	**60130-9 IEC-03**	**60130-9 IEC-04**
	**60130-9 IEC-06**	**60130-9 IEC-07** **60130-9 IEC-09**
		**60130-9 IEC-08** See note 2 of 3.2
	**60130-9 IEC-05** See note 2	
	**60130-9 IEC-10**	**60130-9 IEC-11**
	**60130-9 IEC-12**	**60130-9 IEC-13**
	**60130-9 IEC-14**	**60130-9 IEC-15** **60130-9 IEC-15a**

Contact arrangement	Type designation	
See note 1 of 3.2	**Male connector**	**Female connector**
	**60130-9 IEC-16**	**60130-9 IEC-17**
	**60130-9 IEC-19**	**60130-9 IEC-18**
	**60130-9 IEC-20**	**60130-9 IEC-21**
	**60130-9 IEC-26** **Fixed connector**	**60130-9 IEC-27** **Free connector**
	60130-9 IEC-28 **Free connector**	**60130-9 IEC-29** **Fixed connector**

3.2 Contact arrangements and connections

The contact arrangements of each type of connector are shown in Table 1.

NOTE 1 The numbering of the contacts is shown as seen on the mating face of the female connector, unless otherwise indicated.

NOTE 2 The male connector Type 05 can be inserted in a female connector Type 08 in either of the two positions A or B (see Annex C).

The switch is actuated by the short round pin 1, when the male connector is inserted in position B.

The construction of the switch shall be such that it opens properly when the round pin is inserted and spring 4 is in contact with the pin. In this position, there shall be no connection between contact 3 and the round pin.

The use of the socket connector with switch and its circuitry depends upon the switching function which is to take place when the male connector is inserted.

The circuitry shown in Annex C is suggested to illustrate the use of the switch.

4 Dimensional information

The dimensions in millimetres are original.

Dimensions and tolerances are given in Tables 2 up to and including Table 29.

The size and suspension system of the sockets shall be such that the insertion and withdrawal forces are in accordance with the requirements given in Clause 8.

It shall not be possible to insert a wire having a diameter of 1 mm (0,04 in) either in the entry of female contacts or in the interior of the connector.

All female connectors shall have solder tags accommodating two wires having a diameter up to 0,64 mm (0,025 in).

FREE CONNECTOR, THREE MALE CONTACTS	60130-9 IEC-01

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

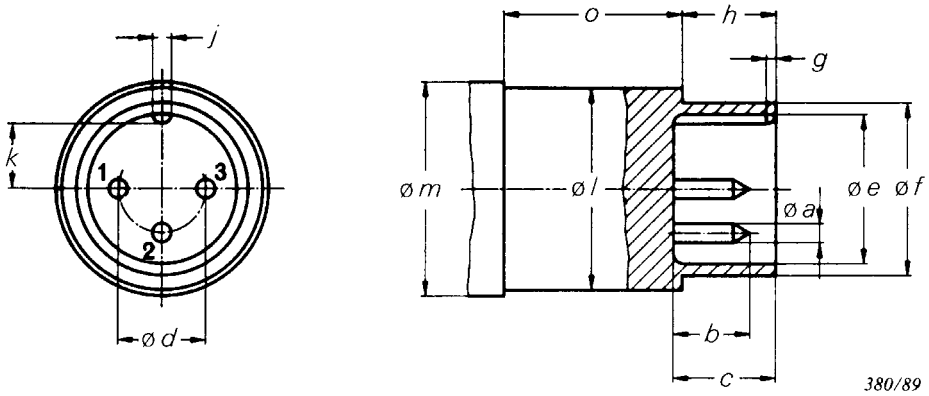


Figure 1 – Free connector 60130-9 IEC-01

Table 2 – Free connector 60130-9 IEC-01

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1989

FIXED CONNECTOR, THREE FEMALE CONTACTS	60130-9 IEC-02

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

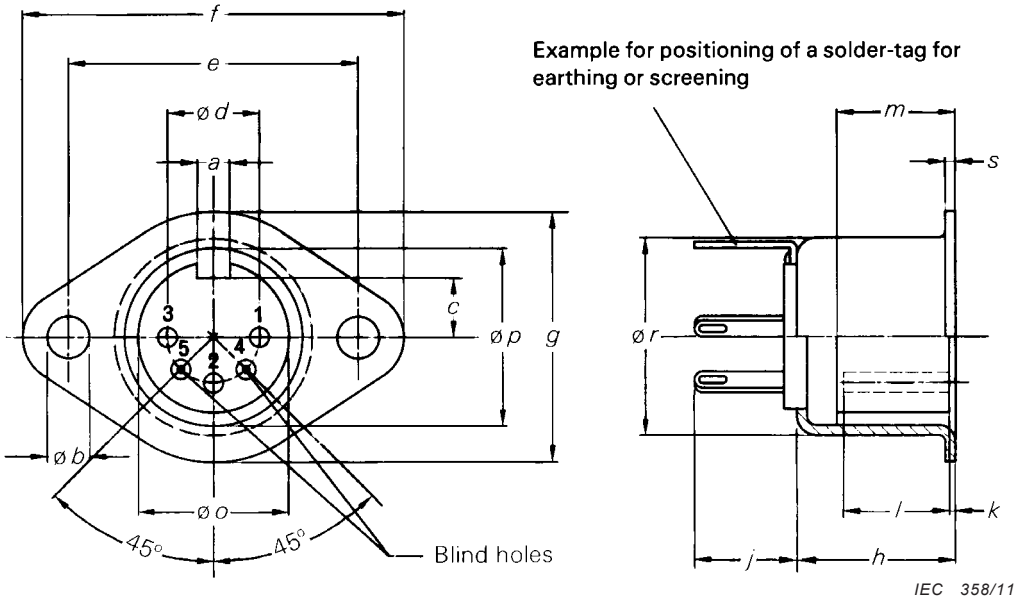


Figure 2 – Fixed connector 60130-9 IEC-02

Table 3 – Fixed connector 60130-9 IEC-02

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1989

FREE CONNECTOR, FIVE MALE CONTACTS	60130-9 IEC-03

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

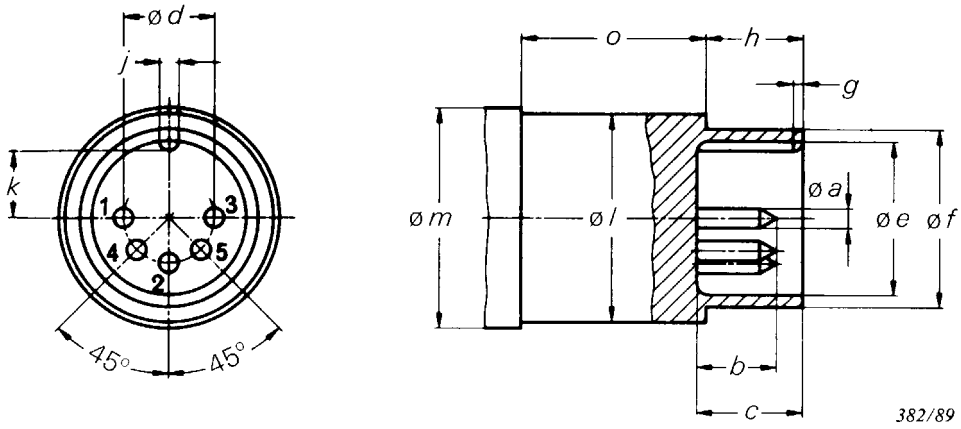


Figure 3 – Free connector 60130-9 IEC-03

Table 4 – Free connector 60130-9 IEC-03

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1989

FIXED CONNECTOR, FIVE FEMALE CONTACTS	60130-9 IEC-04

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

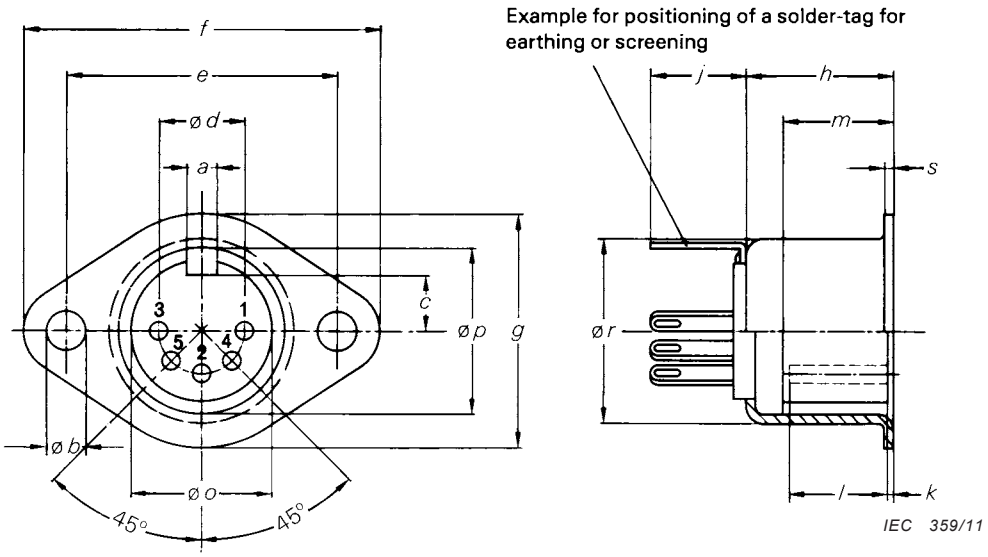


Figure 4 – Fixed connector 60130-9 IEC-04

Table 5 – Fixed connector 60130-9 IEC-04

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1989

FREE CONNECTOR, TWO MALE CONTACTS	60130-9 IEC-05

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

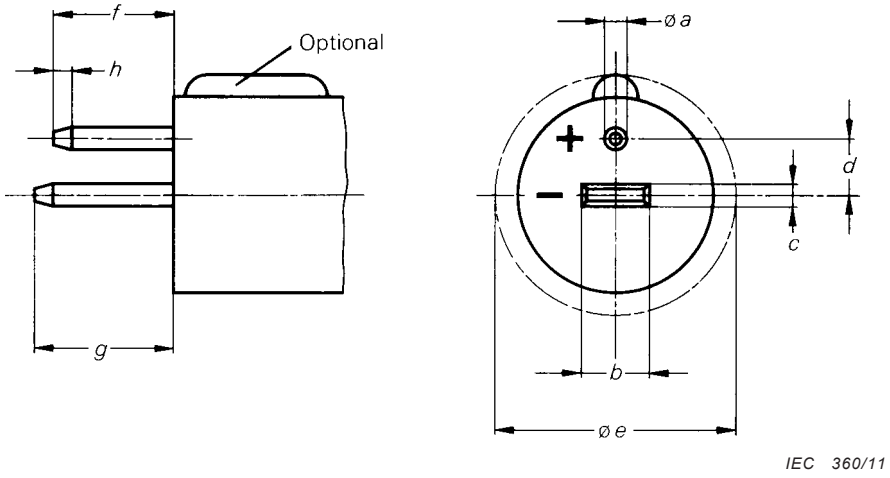


Figure 5 – Free connector 60130-9 IEC-05

Table 6 – Free connector 60130-9 IEC-05

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	4,5	4,3	0,177	0,169
c	1,535	1,465	0,0604	0,0576
d	3,55	3,45	0,140	0,136
∅ *e*	16	–	0,630	–
f	8,5	8,0	0,335	0,315
g	9,5	9,0	0,374	0,354
h	1,3	0,8	0,051	0,031

First angle projection	Date: 1989

FIXED CONNECTOR, TWO MALE CONTACTS	60130-9 IEC-06

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

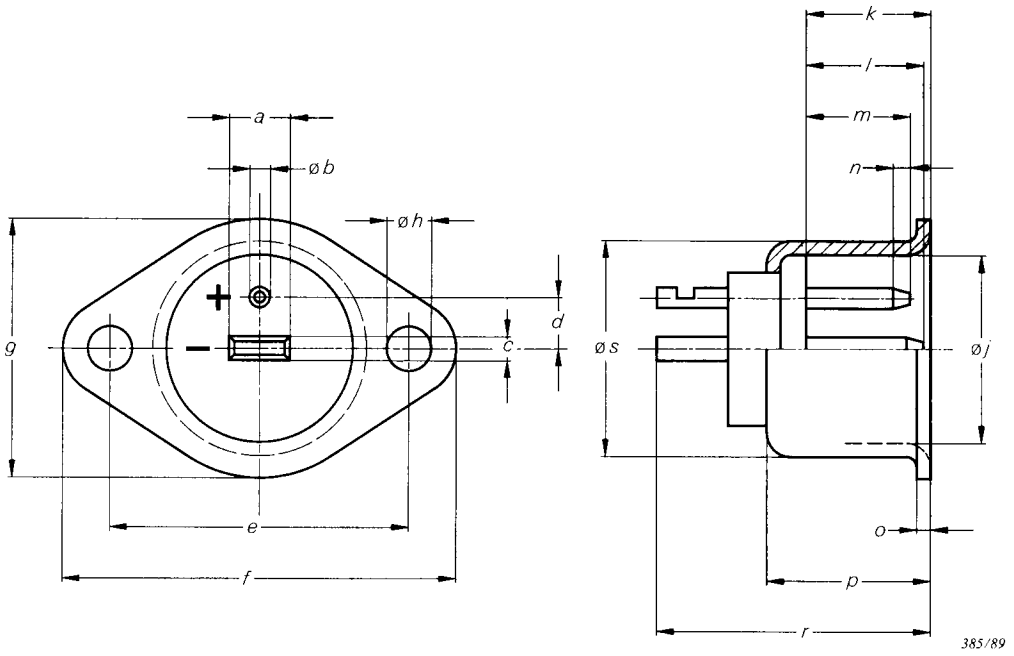


Figure 6 – Fixed connector 60130-9 IEC-06

Table 7 – Fixed connector 60130-9 IEC-06

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	4,5	4,3	0,177	0,169
∅ *b*	1,5	1,46	0,059	0,0574
c	1,535	1,465	0,0604	0,0576
d	3,55	3,45	0,140	0,136
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
∅ *h*	3,3	3,2	0,130	0,126
∅ *j*	14,0	13,8	0,554	0,543
k	10,0	9,5	0,394	0,374
l	9,5	9,0	0,374	0,354
m	8,5	8,0	0,335	0,315
n	1,3	–	0,051	–
o	1,3	1,0	0,051	0,039
p	12,6	11,9	0,496	0,469
r	20	–	0,787	–
∅ *s*	16,2	–	0,638	–

First angle projection	Date: 1989

FIXED CONNECTOR, TWO FEMALE CONTACTS	60130-9 IEC-07

Numbering of contacts seen at the soldering face

The millimetre dimensions are original dimensions

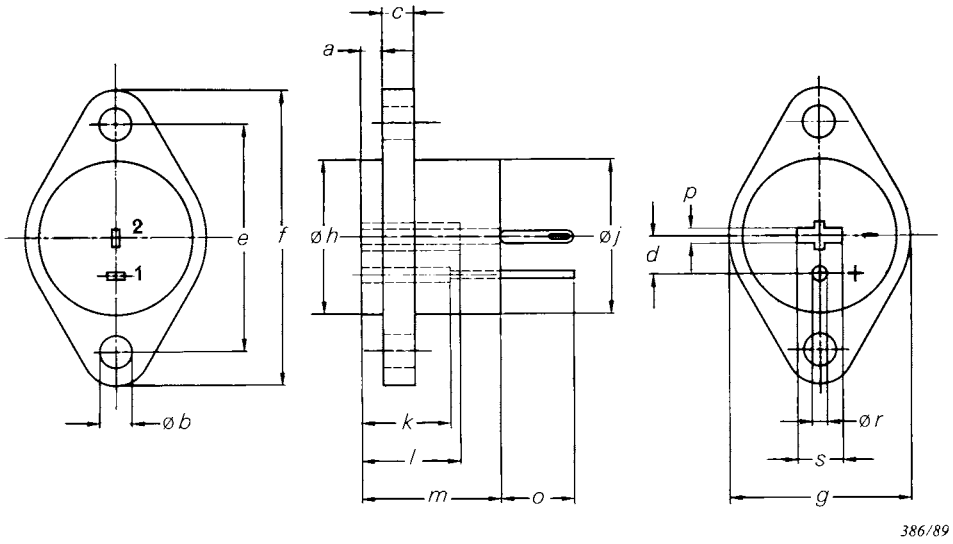


Figure 7 – Fixed connector 60130-9 IEC-07

Table 8 – Fixed connector 60130-9 IEC-07

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2	1	0,079	0,039
∅ *b*	3,3	3,2	0,130	0,126
c	3,4	3,0	0,134	0,118
d	3,55	3,45	0,140	0,136
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
∅ *h*	16	–	0,630	–
∅ *j*	16	–	0,630	–
k	–	8,7	–	0,343
l	–	9,7	–	0,382
m	15	–	0,591	–
o	8	–	0,315	–
p	1,7	1,6	0,067	0,063
∅ *r*	1,8	1,7	0,071	0,067
s	4,7	4,6	0,185	0,181

First angle projection	Date: 1989

FIXED CONNECTOR, TWO FEMALE CONTACTS, WITH SWITCH	60130-9 IEC-08

Numbering of contacts seen at the soldering face

The millimetre dimensions are original dimensions

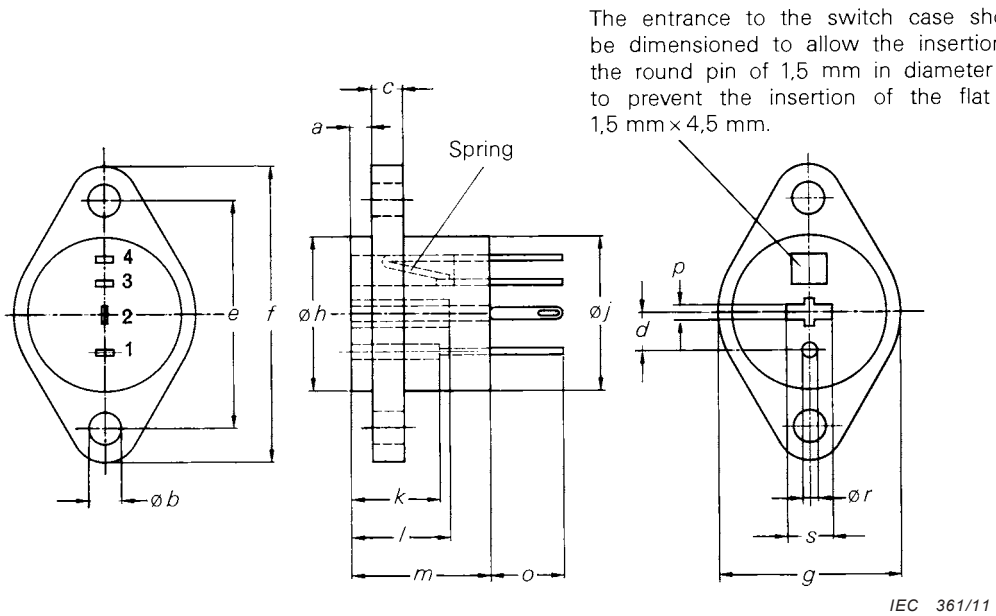


Figure 8 – Fixed connector 60130-9 IEC-08

Table 9 – Fixed connector 60130-9 IEC-08

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2	1	0,079	0,039
∅ *b*	3,3	3,2	0,130	0,126
c	3,4	3,0	0,134	0,118
d	3,55	3,45	0,140	0,136
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
∅ *h*	16	–	0,630	–
∅ *j*	16	–	0,630	–
k	–	8,7	–	0,343
l	–	9,7	–	0,382
m	15	–	0,591	–
o	8	–	0,315	–
p	1,7	1,6	0,067	0,063
∅ *r*	1,8	1,7	0,071	0,067
s	4,7	4,6	0,185	0,181

First angle projection	Date: 1989

FREE CONNECTOR, TWO FEMALE CONTACTS	60130-9 IEC-09

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

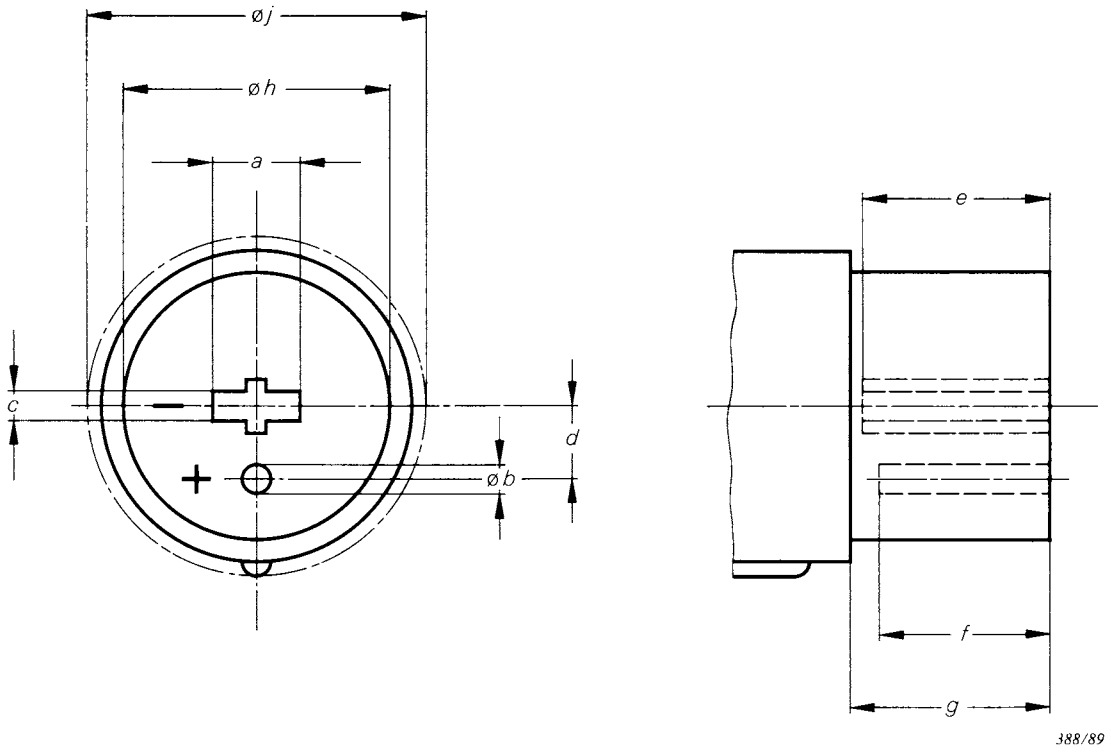


Figure 9 – Free connector 60130-9 IEC-09

Table 10 – Free connector 60130-9 IEC-09

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	4,7	4,6	0,185	0,181
∅ *b*	1,8	1,7	0,071	0,067
c	1,7	1,6	0,067	0,063
d	3,55	3,45	0,140	0,136
e	–	9,7	–	0,382
f	–	8,7	–	0,343
g	10	7,5	0,394	0,295
∅ *h*	13,6	–	0,535	–
∅ *j*	18	–	0,709	–

First angle projection	Date: 1989

FREE CONNECTOR, SEVEN MALE CONTACTS	60130-9 IEC-10

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

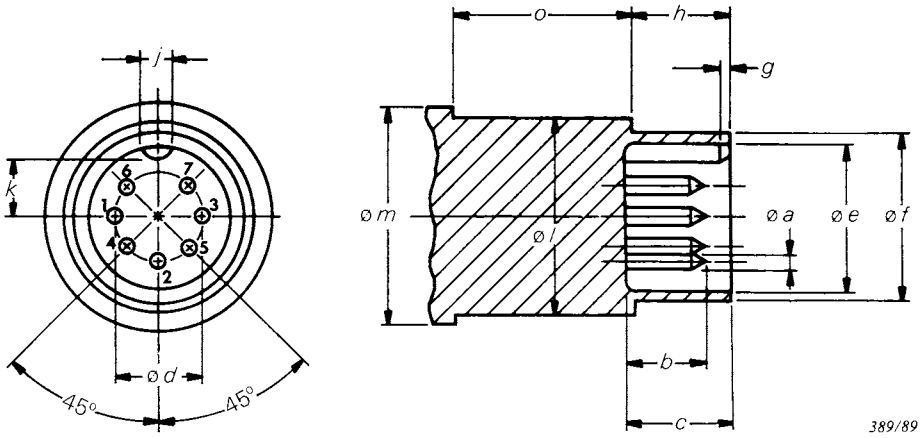


Figure 10 – Free connector 60130-9 IEC-10

Table 11– Free connector 60130-9 IEC-10

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1,0	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1989

FIXED CONNECTOR, SEVEN FEMALE CONTACTS	60130-9 IEC-11

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

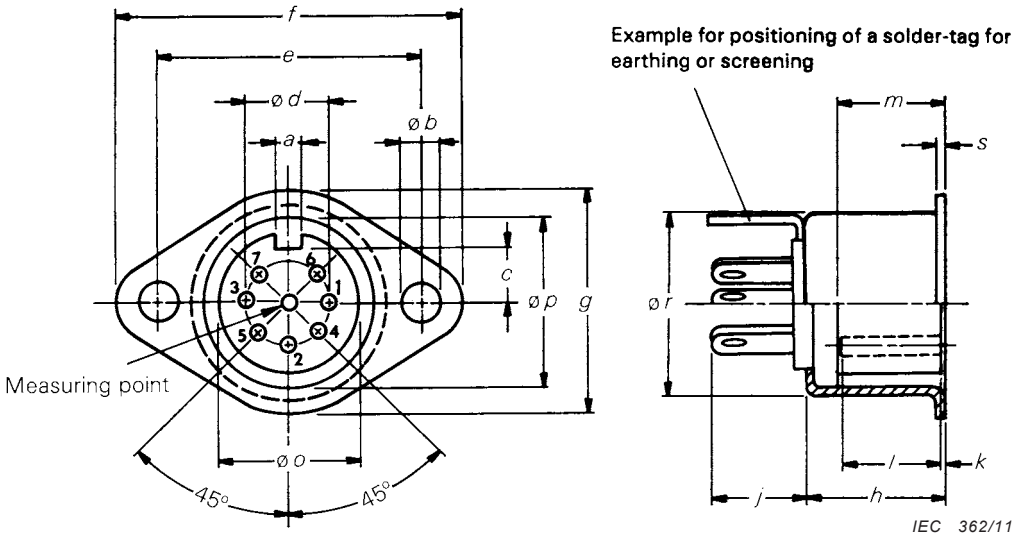


Figure 11 – Fixed connector 60130-9 IEC-11

Table 12 – Fixed connector 60130-9 IEC-11

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1989

FREE CONNECTOR, SEVEN MALE CONTACTS	60130-9 IEC-12

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

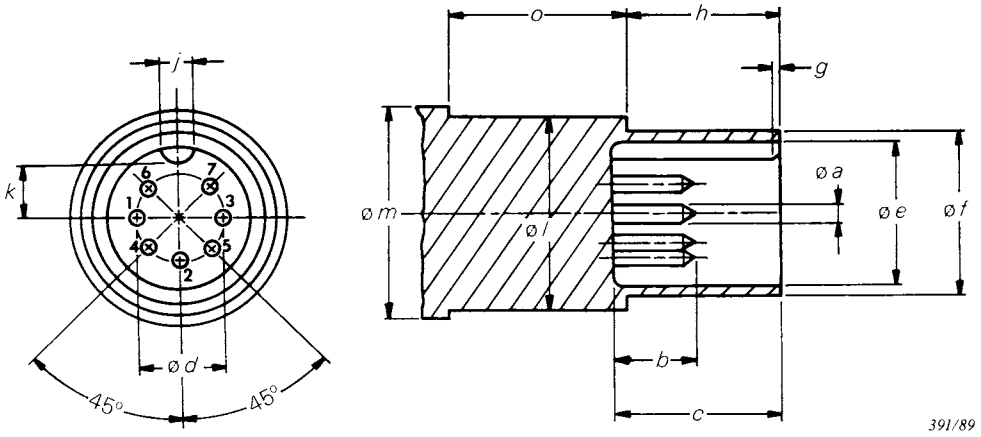


Figure 12 – Free connector 60130-9 IEC-12

Table 13 – Free connector 60130-9 IEC-12

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	14,3	13,8	0,563	0,543
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1,0	–	0,039	–
h	–	13,0	–	0,512
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1989

FIXED CONNECTOR, SEVEN FEMALE CONTACTS	60130-9 IEC-13

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

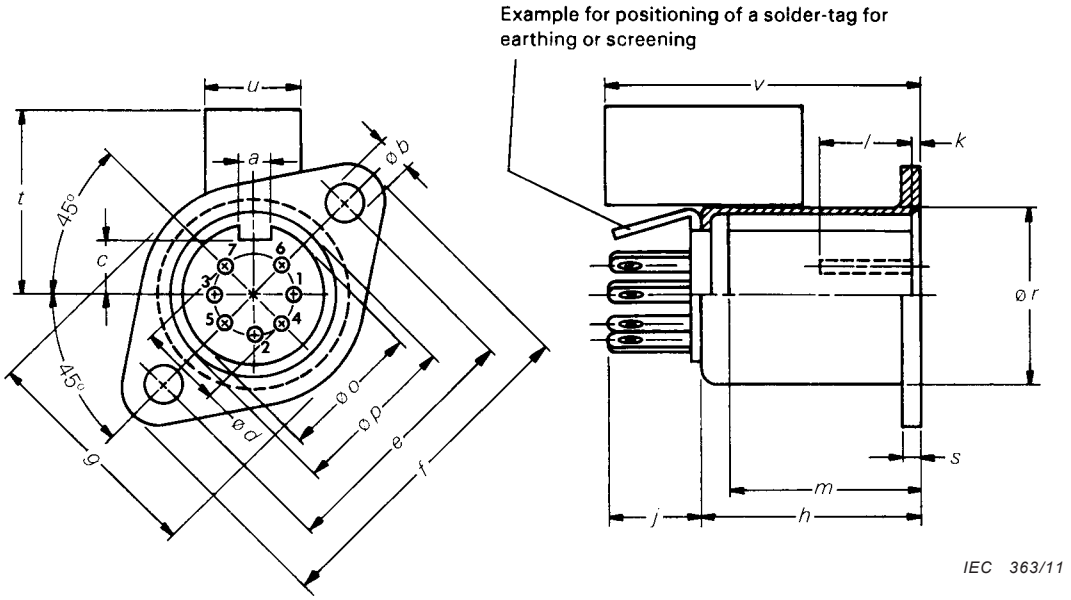


Figure 13 – Fixed connector 60130-9 IEC-13

Table 14 – Fixed connector 60130-9 IEC-13

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	17,6	16,9	0,693	0,665
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	14	–	0,551
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118
t	18	–	0,709	–
u	10	–	0,394	–
v	30	–	1,181	–

First angle projection	Date: 1989

FREE CONNECTOR, FIVE MALE CONTACTS	60130-9 IEC-14

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

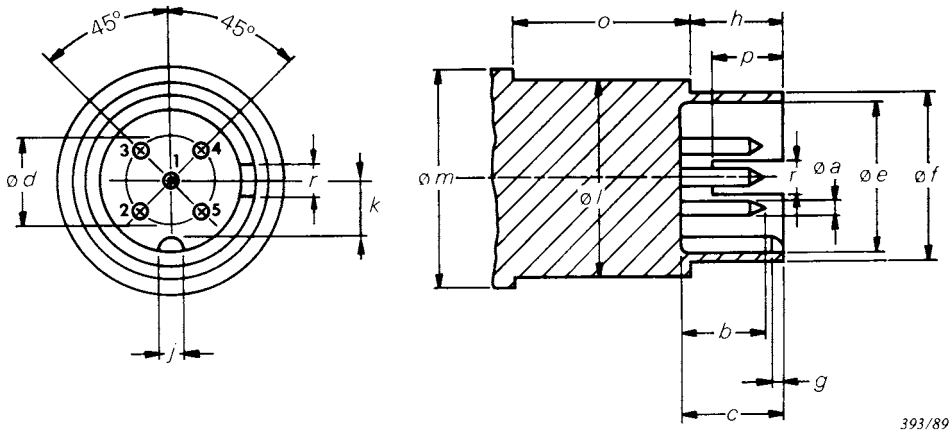


Figure 14 – Free connector 60130-9 IEC-14

Table 15 – Free connector 60130-9 IEC-14

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1,0	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591
p	6,5	6,0	0,256	0,236
r	3,5	3,0	0,138	0,118

First angle projection	Date: 1989

FIXED CONNECTOR, FIVE FEMALE CONTACTS	60130-9 IEC-15

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

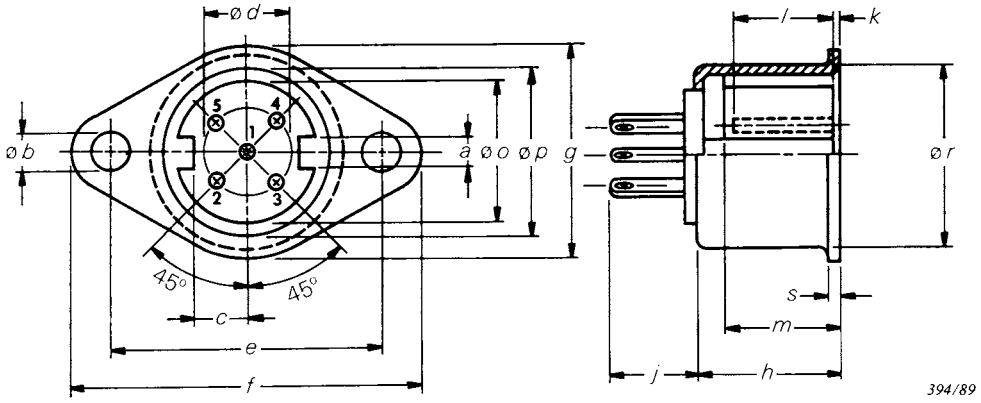


Figure 15 – Fixed connector 60130-9 IEC-15

Table 16 – Fixed connector 60130-9 IEC-15

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1989

FIXED CONNECTOR, FIVE FEMALE CONTACTS	60130-9 IEC-15a

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

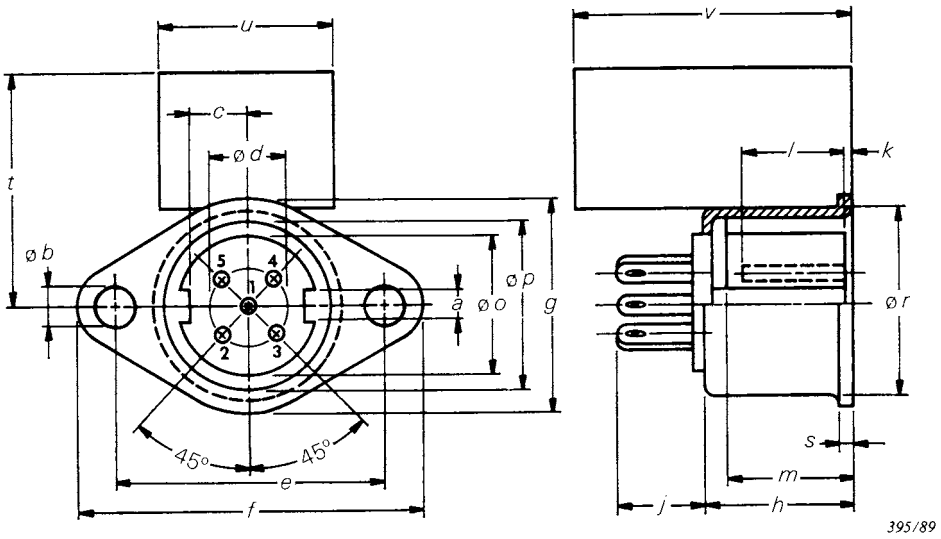


Figure 16 – Fixed connector 60130-9 IEC-15a

Table 17 – Fixed connector 60130-9 IEC-15a

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118
t	20	–	0,787	–
u	15	–	0,591	–
v	25	–	0,984	–

First angle projection	Date: 1989

FREE CONNECTOR, SIX MALE CONTACTS	60130-9 IEC-16

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

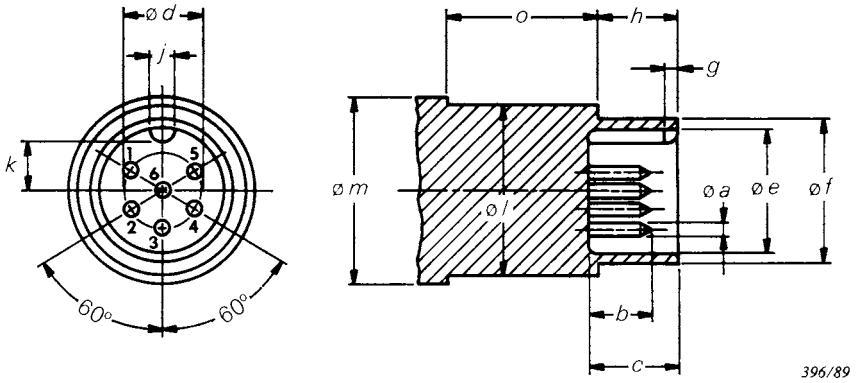


Figure 17– Free connector 60130-9 IEC-16

Table 18– Free connector 60130-9 IEC-16

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1,0	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1989

FIXED CONNECTOR, SIX FEMALE CONTACTS	60130-9 IEC-17

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

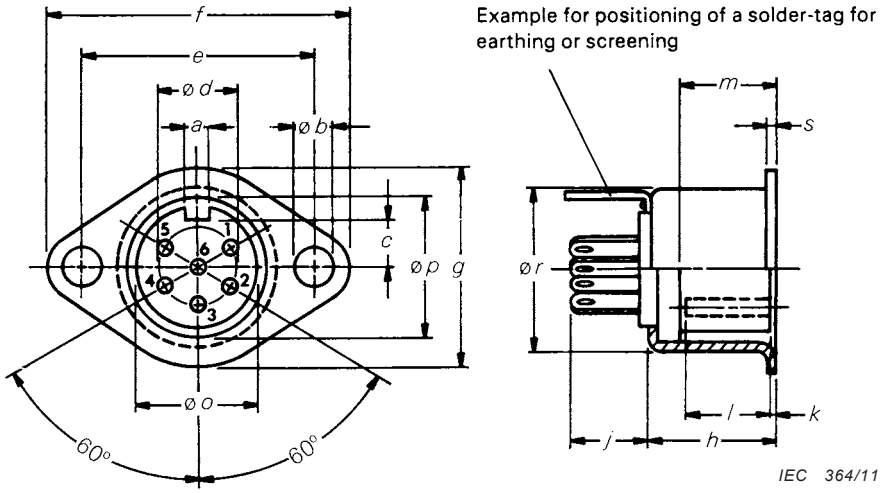


Figure 18 – Fixed connector 60130-9 IEC-17

Table 19 – Fixed connector 60130-9 IEC-17

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1989

FREE CONNECTOR, SIX FEMALE CONTACTS	60130-9 IEC-18

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

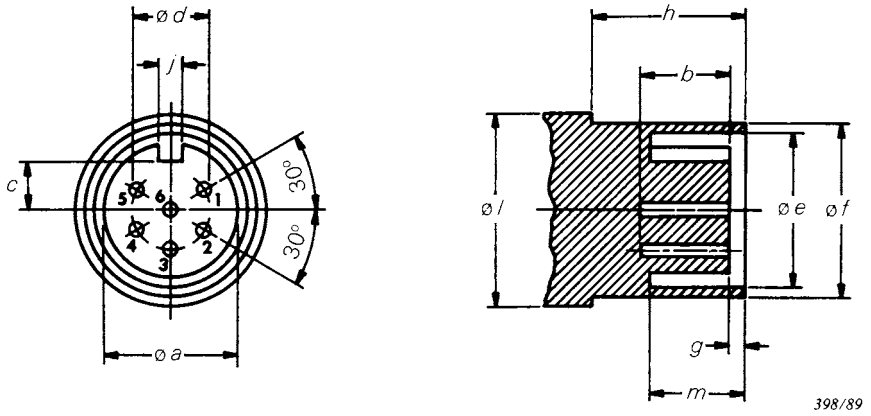


Figure 19 – Free connector 60130-9 IEC-18

Table 20 – Free connector 60130-9 IEC-18

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	11,8	11,6	0,465	0,457
b	–	8,7	–	0,343
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	14,0	13,8	0,551	0,543
∅ *f*	16,5	–	0,650	–
g	1,0	–	0,039	–
h	–	15,0	–	0,591
j	2,7	2,5	0,106	0,098
∅ *l*	18,0	–	0,709	–
m	–	9,0	–	0,354

First angle projection	Date: 1989

FIXED CONNECTOR, SIX MALE CONTACTS	60130-9 IEC-19

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

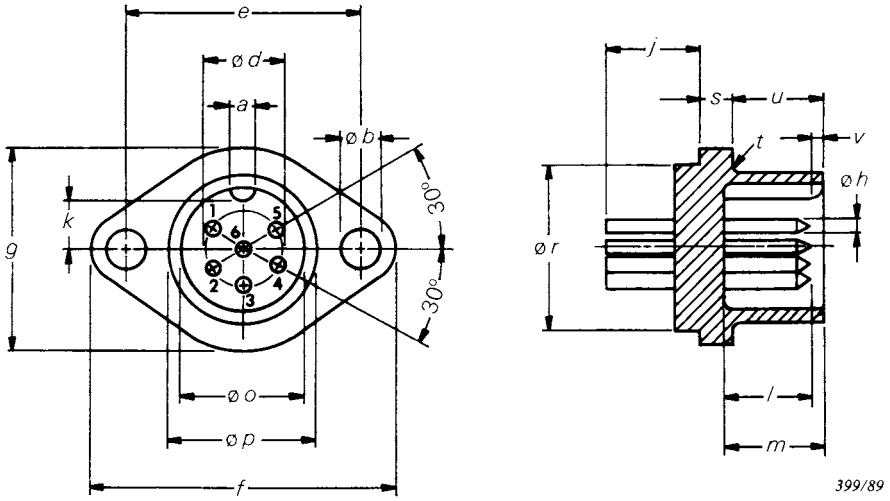


Figure 20 – Fixed connector 60130-9 IEC-19

Table 21 – Fixed connector 60130-9 IEC-19

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,4	2,2	0,095	0,087
∅ *b*	3,3	3,2	0,130	0,126
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
∅ *h*	1,5	1,46	0,059	0,057
j	9	–	0,354	–
k	4,9	4,55	0,193	0,179
l	8,5	7,5	0,335	0,295
m	9,3	8,8	0,366	0,346
∅ *o*	12,4	12,1	0,488	0,476
∅ *p*	13,6	13,1	0,535	0,516
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118
t	0,5	–	0,020	–
u	9,0	8,5	0,354	0,335
v	1,0	–	0,04	–

First angle projection	Date: 1989

FREE CONNECTOR, EIGHT MALE CONTACTS	60130-9 IEC-20

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

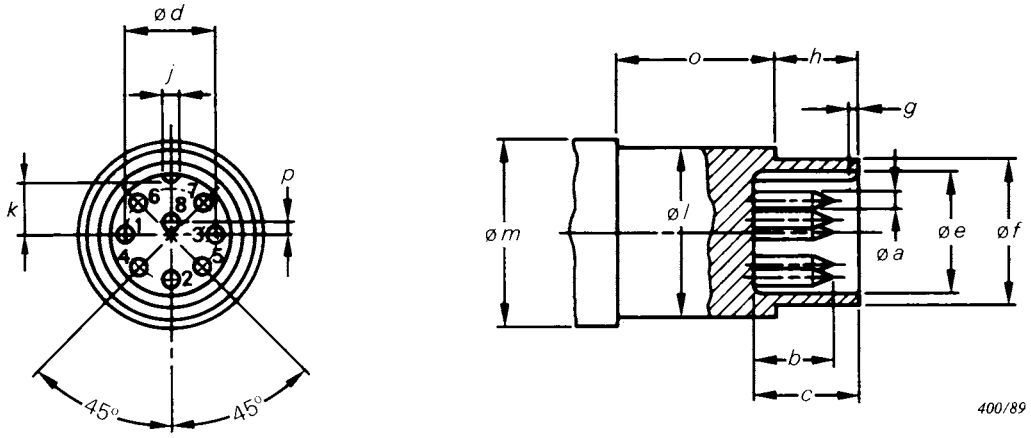


Figure 21 – Free connector 60130-9 IEC-20

Table 22 – Free connector 60130-9 IEC-20

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,095	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591
p	0,75	0,65	0,030	0,026

First angle projection	Date: 1989

FIXED CONNECTOR, EIGHT FEMALE CONTACTS	60130-9 IEC-21

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

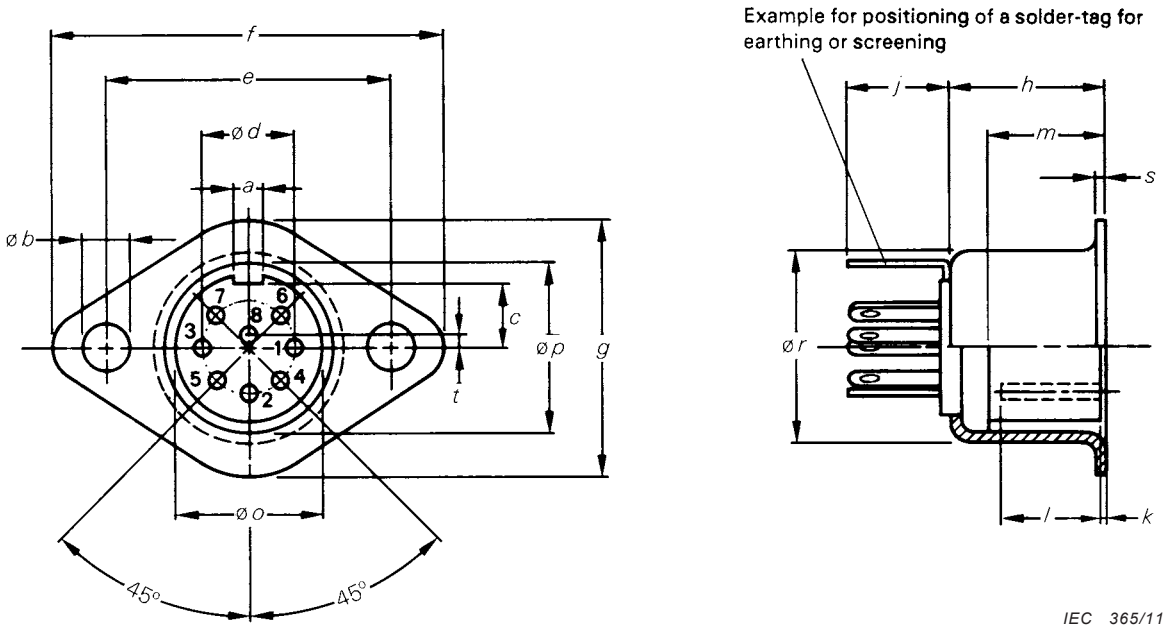


Figure 22 – Fixed connector 60130-9 IEC-21

Table 23 – Fixed connector 60130-9 IEC-21

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118
t	0,75	0,65	0,030	0,026

First angle projection	Date: 1989

FIXED CONNECTOR WITH 14 MALE CONTACTS	60130-9 IEC-26

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

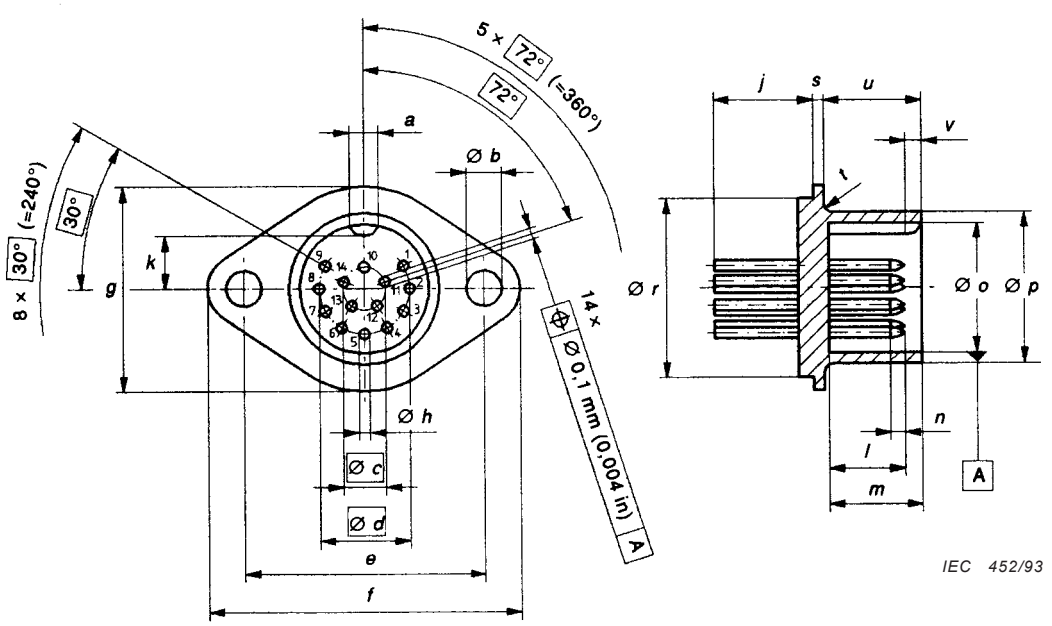


Figure 23 – Fixed connector 60130-9 IEC-26

Table 24 – Fixed connector 60130-9 IEC-26

Reference	mm			in		
	Max.	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**
a	2,4	2,2		0,094	0,087	
∅ *b*	3,3	3,2		0,130	0,126	
∅ *c*			4,0			0,157
∅ *d*			8,4			0,331
e	22,3	22,1		0,878	0,870	
f	29,0	–		1,142	–	
g	19,0	–		0,748	–	
∅ *h*	1,05	1,0		0,041	0,039	
j	9,0	–		0,354	–	
k	4,9	4,55		0,193	0,179	
l	7,0	6,5		0,276	0,256	
m	9,3	8,8		0,366	0,346	
n	0,9	0,5		0,035	0,020	
∅ *o*	12,4	12,1		0,488	0,476	
∅ *p*	13,6	13,1		0,535	0,516	
∅ *r*	16,2	–		0,638	–	
s (metal)	1,3	1,0		0,051	0,039	
s (plastic)	3,4	3,0		0,134	0,118	
t	0,5	–		0,020	–	
u	9,0	8,5		0,354	0,335	
v	1,0	–		0,039	–	

First angle projection	Date: 1993

FREE CONNECTOR WITH 14 FEMALE CONTACTS	60130-9 IEC-27

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

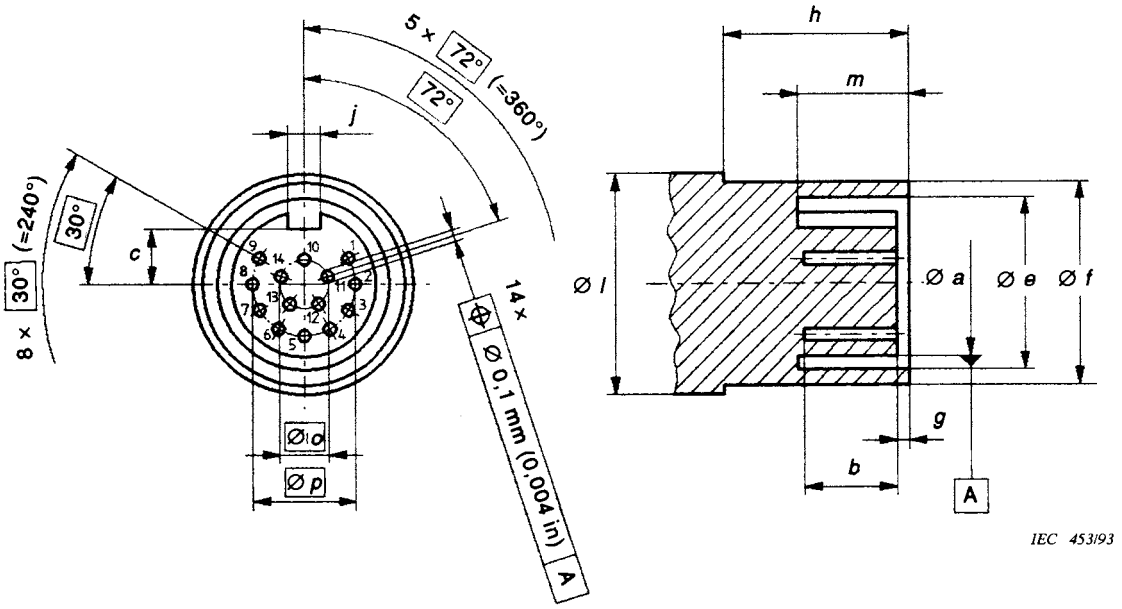


Figure 24 – Free connector 60130-9 IEC-27

Table 25 – Free connector 60130-9 IEC-27

Reference	mm			in		
	Max.	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**
∅ *a*	11,8	11,6		0,465	0,457	
b	–	7,5		–	0,295	
c	4,5	–		0,177	–	
∅ *e*	14,0	13,8		0,551	0,543	
∅ *f*	16,5	–		0,650	–	
g	1,0	–		0,039	–	
h	–	15,0		–	0,591	
j	2,7	2,5		0,106	0,098	
∅ *l*	18,0	–		0,709	–	
m	–	9,0		–	0,354	
∅ *o*			4,0			0,157
∅ *p*			8,4			0,331

First angle projection	Date: 1993

FREE CONNECTOR WITH 14 MALE CONTACTS	60130-9 IEC-28

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

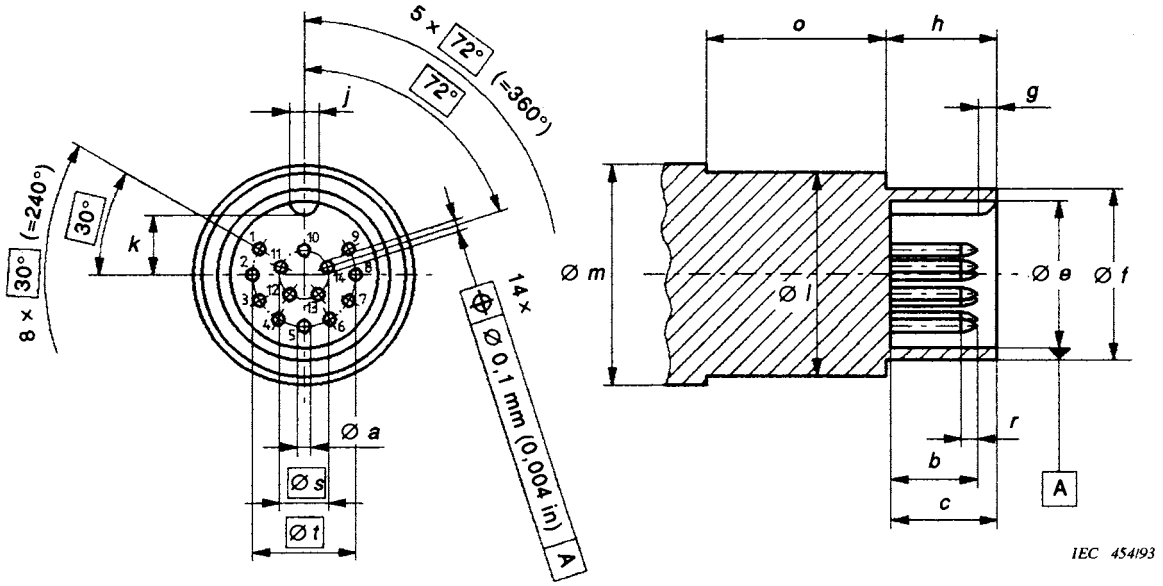


Figure 25 – Free connector 60130-9 IEC-28

Table 26 – Free connector 60130-9 IEC-28

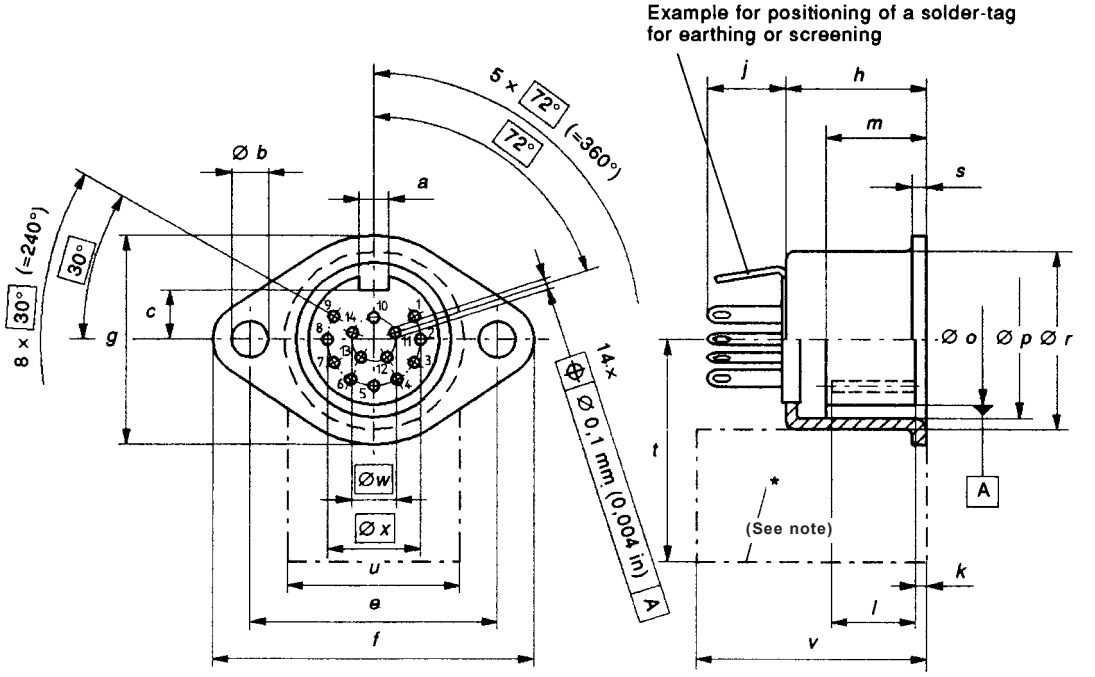
Reference	mm			in		
	Max.	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**
∅ *a*	1,05	1,0		0,041	0,039	
b	7,0	6,5		0,276	0,256	
c	9,3	8,8		0,366	0,346	
∅ *e*	12,4	12,1		0,488	0,476	
∅ *f*	13,6	13,1		0,535	0,516	
g	1,0	–		0,039	–	
h	9,0	8,5		0,354	0,335	
j	2,4	2,2		0,094	0,087	
k	4,9	4,55		0,193	0,179	
∅ *l*	16,5	–		0,650	–	
∅ *m*	18,0	–		0,709	–	
o	–	15,0		–	0,591	
r	0,9	0,5		0,035	0,020	
∅ *s*			4,0			0,157
∅ *t*			8,4			0,331

First angle projection	Date: 1993

FIXED CONNECTOR WITH 14 FEMALE CONTACTS	60130-9 IEC-29

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions



NOTE Maximum available space for accessory switch.

Figure 26 – Fixed connector 60130-9 IEC-29

Table 27 – Fixed connector 60130-9 IEC-29

Reference	mm			in		
	Max.	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**
a	2,7	2,5		0,106	0,098	
∅ *b*	3,3	3,2		0,130	0,126	
c	4,5	–		0,177	–	
e	22,3	22,1		0,878	0,870	
f	29,0	–		1,142	–	
g	19,0	–		0,748	–	
h	12,6	11,9		0,496	0,469	
j	8,0	–		0,315	–	
k	1,0	–		0,039	–	
l	–	7,5		–	0,295	
m	–	9,0		–	0,354	
∅ *o*	11,8	11,6		0,465	0,457	
∅ *p*	14,0	13,8		0,551	0,543	
∅ *r*	16,2	–		0,638	–	
s (metal)	1,3	1,0		0,051	0,039	
s (plastic)	3,4	3,0		0,134	0,118	
t	20,0	–		0,787	–	
u	15,0	–		0,591	–	
v	25,0	–		0,984	–	
∅ *w*			4,0			0,157
∅ *x*			8,4			0,331

First angle projection	Date: 1993

FIXED CONNECTOR, FOUR FEMALE CONTACTS	60130-9 IEC-30

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

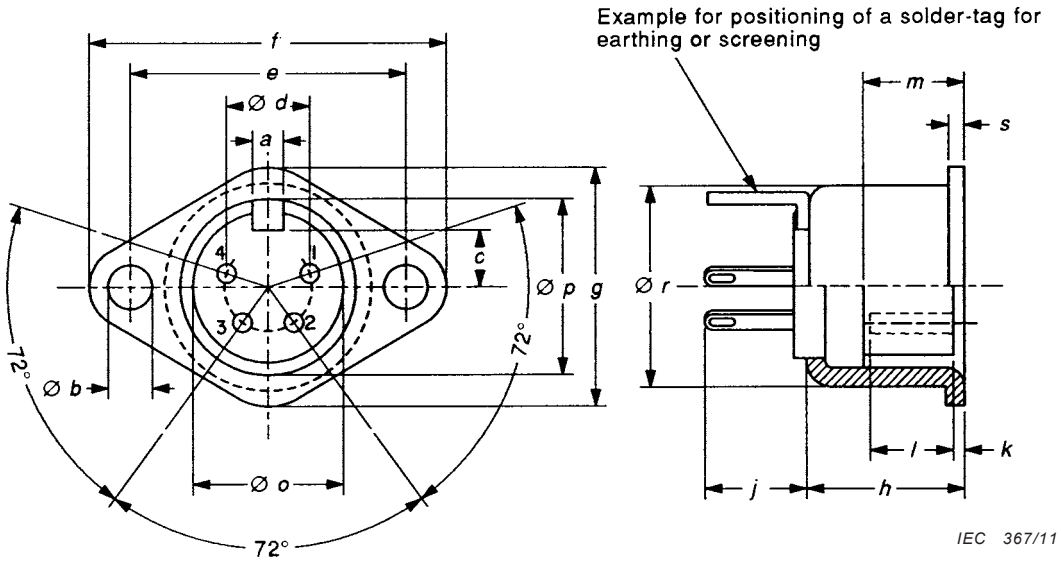


Figure 27 – Fixed connector 60130-9 IEC-30

Table 28 – Fixed connector 60130-9 IEC-30

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
a	2,7	2,5	0,106	0,098
∅ *b*	3,3	3,2	0,130	0,126
c	4,5	–	0,177	–
∅ *d*	7,05	6,95	0,278	0,274
e	22,3	22,1	0,878	0,870
f	29	–	1,142	–
g	19	–	0,748	–
h	12,6	11,9	0,496	0,469
j	8	–	0,315	–
k	1	–	0,039	–
l	–	8,7	–	0,343
m	–	9	–	0,354
∅ *o*	11,8	11,6	0,465	0,457
∅ *p*	14,0	13,8	0,551	0,543
∅ *r*	16,2	–	0,638	–
s (metal)	1,3	1,0	0,051	0,039
s (plastic)	3,4	3,0	0,134	0,118

First angle projection	Date: 1995

FREE CONNECTOR, FOUR MALE CONTACTS	60130-9 IEC-31

Numbering of contacts seen at the mating face

The millimetre dimensions are original dimensions

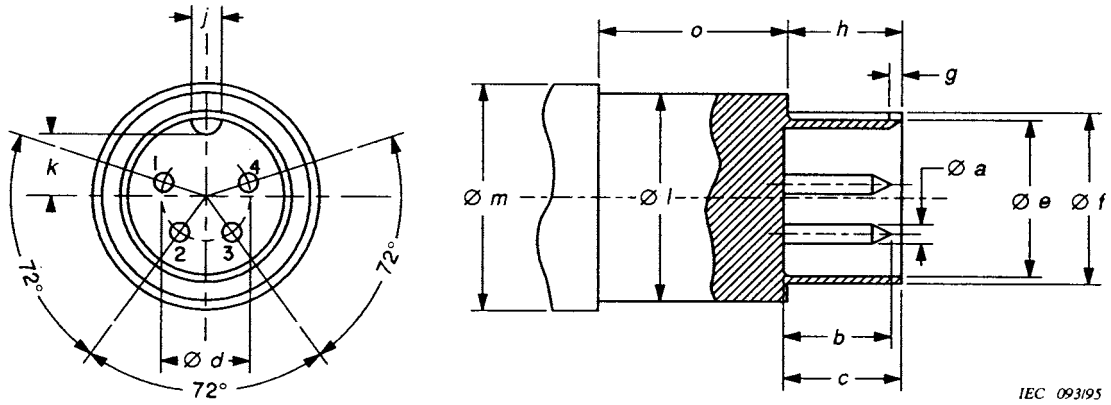


Figure 28 – Free connector 60130-9 IEC-31

Table 29 – Free connector 60130-9 IEC-31

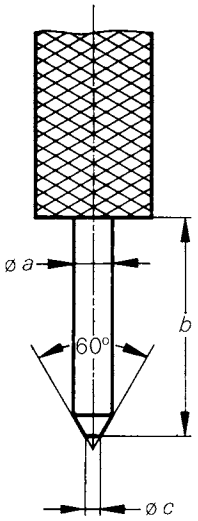
Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,5	1,46	0,059	0,057
b	8,5	7,5	0,335	0,295
c	9,3	8,8	0,366	0,346
∅ *d*	7,05	6,95	0,278	0,274
∅ *e*	12,4	12,1	0,488	0,476
∅ *f*	13,6	13,1	0,535	0,516
g	1	–	0,039	–
h	9	8,5	0,354	0,335
j	2,4	2,2	0,094	0,087
k	4,9	4,55	0,193	0,179
∅ *l*	16,5	–	0,650	–
∅ *m*	18	–	0,709	–
o	–	15	–	0,591

First angle projection	Date: 1995

5 Gauges

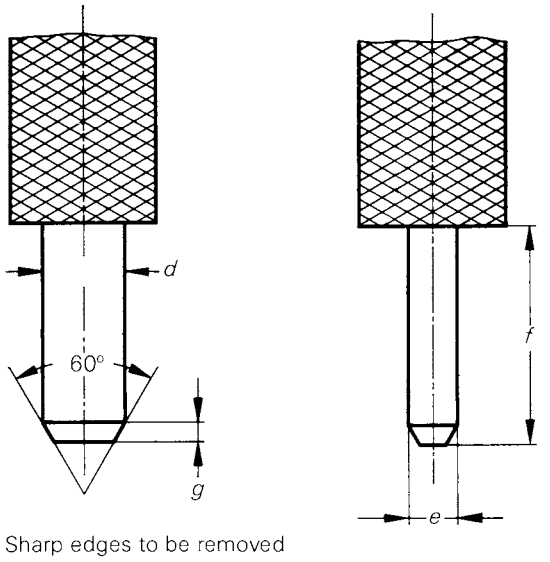
5.1 Gauges for checking dimensions

Material: hardened tool steel.



IEC 368/11

Figure 29 – Gauge for connector types 60130-9 IEC-02, 04, 07, 08, 09, 11, 13, 15, 17, 18, 21



IEC 369/11

Figure 30 – Gauge for connector types 60130-9 IEC-07, 08 and 09

Table 30 – Dimensions of gauges for checking dimensions

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,500	1,495	0,0591	0,0589
b	8,60	8,40	0,339	0,331
∅ *c*	0,6 nom.		0,024 nom.	
d	4,50	4,49	0,1772	0,1768
e	1,535	1,530	0,0604	0,0602
f	9,6	9,4	0,378	0,370
g	0,7 nom.		0,028 nom.	

5.2 Gauges for measuring contact resistance

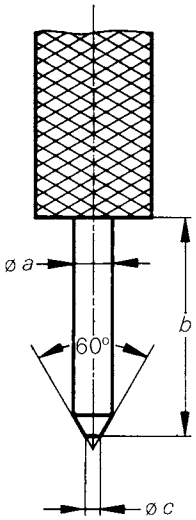
Material: beryllium copper, rhodium plated.

5.3 Gauges for measuring retention force

Material: hardened tool steel, weight: 120 g.

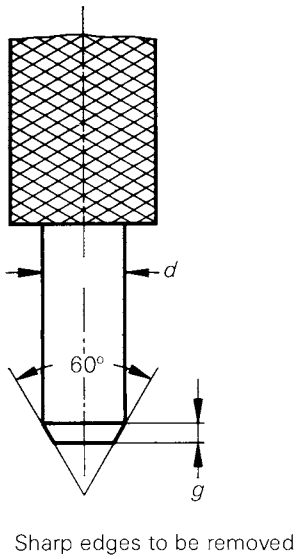
Surface roughness according to ISO 1302:

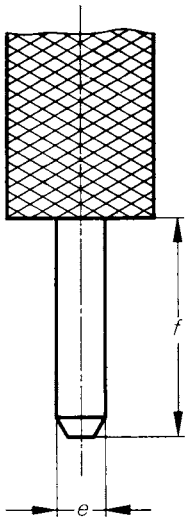
R_a = 0,16 μm to 0,25 μm
= 6 μin to 10 μin



IEC 370/11

Figure 31 – Gauge for connector types 60130-9 IEC-02, 04, 07, 08, 09, 11, 13, 15, 17, 18, 21





IEC 371/11

Figure 32 – Gauge for connector types 60130-9 IEC-07, 08 and 09

Table 31 – Dimensions of gauges for measuring retention force

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,46	1,45	0,0575	0,0571
b	7,8	7,5	0,307	0,295
∅ *c*	0,6 nom.		0,024 nom.	
d	4,51	4,50	0,1776	0,1772
e	1,475	1,465	0,0581	0,0577
f	9,3	9,0	0,366	0,354
g	0,7 nom.		0,028 nom.	

5.4 Gauge for voltage proof and insulation resistance tests of connectors 60130-9 IEC-08

Materials:

Circular pin: beryllium copper, rhodium plated.

Flat pin: hardened tool steel;

surface roughness according to ISO 1302:

R_a = 0,16 μm to 0,25 μm

= 6 μin to 10 μin

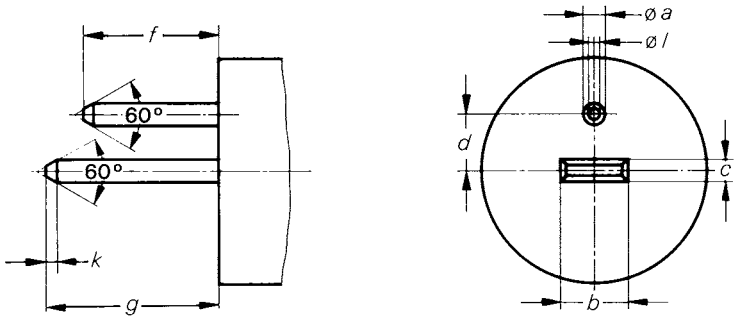


Figure 33 – Gauge for voltage proof and insulation resistance tests of connectors 60130-9 IEC-08

Table 32 – Dimensions of gauge for voltage proof and insulation resistance tests of connectors 60130-9 IEC-08

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,500	1,495	0,0591	0,0589
b	4,5	4,4	0,177	0,173
c	1,535	1,525	0,0604	0,0600
d	3,56	3,54	0,1402	0,1394
f	8,51	8,49	0,3350	0,3343
g	9,3	9,0	0,366	0,354
k	0,7 nom.		0,028 nom.	
∅ *l*	0,75	0,65	0,030	0,026

5.5 Gauge for voltage proof and contact resistance tests of connectors 60130-9 IEC-08

Materials:

Circular pin: beryllium copper, rhodium plated.

Flat pin: hardened tool steel;

surface roughness according to ISO 1302:

R_a = 0,16 μm to 0,25 μm

= 6 μin to 10 μin

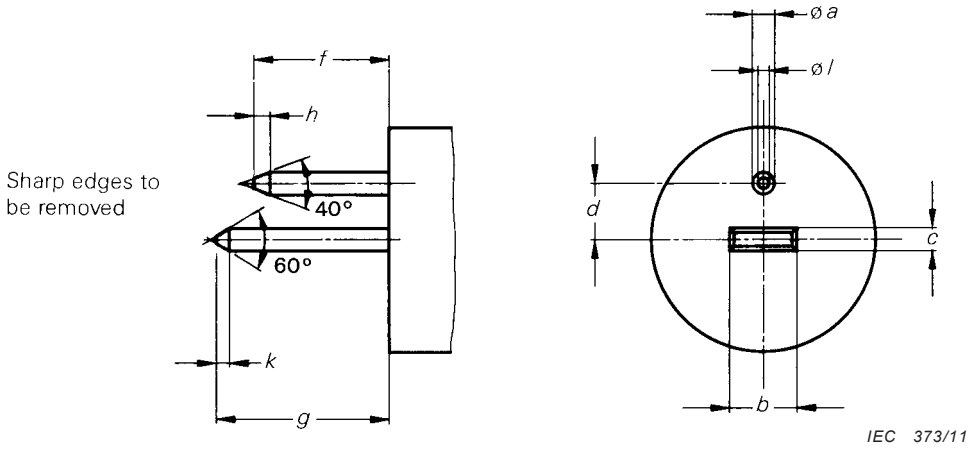


Figure 34 – Gauge for voltage proof and contact resistance tests of connectors 60130-9 IEC-08

Table 33 – Dimensions of gauge for voltage proof and contact resistance tests of connectors 60130-9 IEC-08

Reference	mm		in	
	Max.	**Min.**	**Max.**	**Min.**
∅ *a*	1,46	1,45	0,0575	0,0571
b	4,4	4,3	0,173	0,169
c	1,475	1,465	0,0581	0,0577
d	3,47	3,45	0,1366	0,1358
f	8,01	7,99	0,3154	0,3146
g	9,3	9,0	0,366	0,354
h	1,30	1,29	0,0512	0,0508
k	0,7 nom.		0,028 nom.	
∅ *l*	0,6 nom.		0,024 nom.	

6 Characteristics

6.1 Rated values

Rated voltage: 34 V a.c. or d.c.

Rated current: 2 A

6.2 Climatic category

Conditions: IEC 60068-1

Table 34 – Climatic category

Climatic category	Category temperature		Damp heat steady state		Days
	Lower °C	Upper °C	Temperature °C	Rel. humidity %	
25/70/21	-25	+70	40	93	**21**

7 Schedule for type tests

This schedule shows all the tests and the order in which they shall be carried out as well as the requirements to be met for each type of connector.

All specimens of each type shall be subjected to the following tests:

Table 35 – Test group for all specimens

Test	IEC 60512 Part	Conditions of test	Requirements
Visual inspection: Test 1a	1-1		
Dimensions: Test 1b	1-2	Gauge according to 5.1	
Contact resistance: Test 2a	2-1	Two contacts per connector to be measured[a]	
Measurement on individual resilient contacts	Annex B of this standard	Gauge according to 5.2	10 mΩ max.
Insulation resistance: Test 3a	3-1	100 V ± 15 V	10^3 MΩ min.
Voltage proof: Test 4a	4-1	E = 500 V r.m.s.	
Switch of socket connector 60130-9 IEC-08	6.3 of this standard		

[a] Any subsequent measurement of contact resistance shall be made on these same two contacts.

The group of connectors shall then be divided into four lots.

All connectors of each lot shall be subject to the following tests:

Table 36 – Test group for the first lot

Test	IEC 60512 Part	Conditions of test	Requirements
First lot			
On half of this lot:			
Gauge retention force: Test 16e	16-5	Gauge according to 5.3	
On the other half of this lot:			
Insertion force: Test 13b	13-2	2-contact types 3-contact types 5-contact types 6-contact types 7-contact types 8-contact types	16 N max. 24 N max. 40 N max. 48 N max. 56 N max. 64 N max.
Withdrawal force: Test 13b	13-2	2-contact types	2 N min. 12 N max.
		3-contact types	3 N min. 18 N max.
		5-contact types	5,5 N min. 30 N max.
		6-contact types	6,6 N min. 36 N max.
		7-contact types	7,7 N min. 42 N max.
		8-contact types	8,8 N min. 48 N max.
On all specimens of the lot:			
Climatic sequence: Test 11a	11-1		
Dry heat: Test 11j	11-9	70 °C	
Insulation resistance at high temperature: Test 3a	3-1	100 V ± 15 V	10 MΩ min.
Damp heat, accelerated: Test 11m	11-12	One cycle	
Cold: Test 11j	11-10	–25 °C	
Final measurements:			
Insulation resistance: Test 3a	3-1	100 V ± 15 V	10 MΩ min.
Contact resistance: Test 2a	2-1		
Measurement on individual resilient contacts	Annex B of this standard	Gauge according to 5.2	20 mΩ max.
Voltage proof: Test 4a	4-1	*E* = 500 V r.m.s.	
Switch of female connector 60130-9 IEC-08	6.3 of this standard		
Visual inspection: Test 1a	1-1		

Table 37 – Test group for the second and third lot

Test	IEC 60512 Part	Conditions of test	Requirements
Second lot			
Mechanical endurance: Test 9a	9-1	Frequency of operation: 10 per minute approximately; minimum interval between successive operations: 3 s Total number of operation: 1 000	
Final measurements:			
Contact resistance: Test 2a	2-1		
Measurement on individual resilient contacts	Annex B of this standard	Gauge according to 5.2	20 mΩ max.
Insulation resistance: Test 3a	3-1	100 V ± 15 V	10^3 MΩ min.
Switch of female connector 60130-9 IEC-08	6.3 of this standard		
Insertion and withdrawal force: Test 13b	13-2		To be agreed between customer and manufacturer
Visual inspection: Test 1a	1-1		
Third lot			
Damp heat, steady state: Test 11c	11-3	21 days	
Final measurements:			
Insulation resistance:Test 3a	3-1	100 V ± 15 V	10 MΩ min.
Contact resistance: Test 2a	2-1		
Measurement on individual resilient contacts	Annex B of this standard	Gauge according to 5.2	20 mΩ max.
Voltage proof: Test 4a	4-1	*E* = 500 V r.m.s.	
Switch of female connector 60130-9 IEC-08	6.3 of this standard		
Visual inspection: Test 1a	1-1		

Table 38 – Test group for the fourth lot

Test	IEC 60512 Part	Conditions of test	Requirements
Fourth lot			
Electrical endurance test:			
Insulation resistance at high temperature: Test 3a	3-1	100 V ± 15 V	10 MΩ min.
Final measurements:			
Voltage proof: Test 4a	4-1	*E* = 500 V r.m.s.	
Insulation resistance: Test 3a	3-1	100 V ± 15 V	10^3 MΩ min.
Contact resistance: Test 2a	2-1		
Measurement on individual resilient contacts	Annex B of this standard	Gauge according to 5.2	10 mΩ max.
Switch of female connector 60130-9 IEC-08	6.3 of this standard		
Visual inspection: Test 1a	1-1		
Mechanical strength (for free connector only): Test 7b	7-2	Number of falls: 500	
Mechanical tests on cable fixing and cable entry		See note	
Effectiveness of clamping device against cable pulling: Test 17c	17-1	Force: 30 N Time: 100 s	
Effect of cable rotation: Test 17b	17-2	Number of revolutions: 2 000	
Effectiveness of clamping device against cable bending: Test 17a	17-1	Number of bends: 2 000 Force to be applied: 2 N at 10 cm from cable entry	
Effectiveness of clamping device against cable torsion: Test 17d	17-4	Torque: 0,1 Nm	
NOTE The cable used for the mechanical tests on cable fixing and cable entry shall be specified by agreement between purchaser and manufacturer.			

Where stated in the test schedule of Clause 8, the switch shall be tested as specified below:

Table 39 – Test group for switches in 60130-9 IEC-08

Test	IEC 60512 Part	Conditions of test	Requirements
Insulation resistance: Test 3a	3-1	100 V ± 15 V Gauge according to 5.4	10 MΩ min.
Voltage proof:Test 4a	4-1	Gauge according to 5.4 *E* = 500 V r.m.s.	
Contact resistance: Test 2a	2-1	Gauge according to 5.5	10 mΩ max. After climatic test and mech-anical endurance test 20 mΩ max.
Voltage proof: Test 4a	4-1	Gauge according to 5.5 *E* = 500 V r.m.s.	

Annex A
(normative)

Description of the connectors

A.1 Free connector, three male contacts, 60130-9 IEC-01

This connector mates with the female connector 60130-9 IEC-02.

The screening collar surrounding the pins is made of metal and its continuation inside the plug ensures electrical screening.

The rib inside the screening collar together with the corresponding groove of the female connector prevents incorrect insertion of the plug. A spring inside the female connector provides for contact between the collar and the screening of the female connector.

A.2 Fixed connector, three female contacts, 60130-9 IEC-02

This connector mates with the male connector 60130-9 IEC-01.

Supporting flange and shell may be of metal or plastic as required.

The screening collar of the male connector extends into the female connectors so that in most cases adequate screening is ensured, even when the shell is made of plastic.

The shell has a spring contact with termination for a screen or earth lead, ensuring proper contact with the screening collar of the male connector.

The metal version has an electrical connection between the spring contact and the shell.

The groove in the insulator of the female connector together with the rib in the screening collar of the male connector prevents incorrect insertion of the plug.

The blind holes in the insulator allow insertion of a five-pole male connector (60130-9 IEC-03) into the female connector.

If the blind holes are undesirable in view of the possibility of incorrect insertion, agreement between customer and manufacturer should be reached to omit these.

A.3 Free connector, five male contacts, 60130-9 IEC-03

This connector mates with the five-female connector 60130-9 IEC-04.

Except for the number of contacts, this version corresponds to the three-pole female connector, described in Clause A.1.

A.4 Fixed connector, five female contacts, 60130-9 IEC-04

This connector mates with the male-connector 60130-9 IEC-03.

Except for the number of contacts, the version corresponds to the three-pole female connector described in Clause A.2.

A.5 Free connector, two male contacts, 60130-9 IEC-05

This connector mates with the female connectors 60130-9 IEC-07, 08 and 09.

The blade contact is longer than the round one, thus facilitating exact positioning before complete insertion.

A.6 Fixed connector, two male contacts, 60130-9 IEC-06

This connector mates with the female connector 60130-9 IEC-09.

A.7 Fixed connector, two female contacts, 60130-9 IEC-07

This connector mates with the male connector 60130-9 IEC-05.

A.8 Fixed connector, two female contacts, with switch 60130-9 IEC-08

As far as function and outside dimensions are concerned, this female connector corresponds to the one described in Clause A.7.

Moreover, it has a switch which is actuated when the male connector 60130-9 IEC-05 is inserted in position B of Table 1.

The spring functions as a change-over switch.

When the male connector is inserted, the spring (contact 4) contacts the round, short male and is at the same time actuated, cutting the connection with contact 3.

The switch shown in the drawing is meant only as an example.

The manufacturer should decide on the means required to realize the switching function described above.

Its construction should be such that during insertion of the round male, the switch opens properly and reliably and spring 4 is in proper contact with the round male.

Contact 3 should be arranged in such a way that it never contacts the inserted male.

The properties of the switch may be tested according to Clause A.9.

An example of the circuit of this connector is given in Annex C. In practice, a female connector with two switches may also be required. The second switch then takes the place of contact 1.

The termination of the make contact should then be marked "5" and that of the break contact be marked "6".

Special designs should be subject to an agreement between customer and manufacturer.

A.9 Free connector, two female contacts, 60130-9 IEC-09

This connector mates with the male connectors 60130-9 IEC-05 and 06.

A.10 Free connector, seven male contacts, 60130-9 IEC-10

This connector mates with the female connector 60130-9 IEC-11.

A.11 Fixed connector, seven female contacts, 60130-9 IEC-11

This connector mates with the free male connector 60130-9 IEC-10.

A.12 Free connector, seven male contacts, 60130-9 IEC-12

This connector mates with the fixed female connector 60130-9 IEC-13.

A.13 Fixed connector, seven female contacts, 60130-9 IEC-13

This connector mates with the free male connector 60130-9 IEC-12.

A.14 Free connector, five male contacts, 60130-9 IEC-14

This connector mates with the female connector 60130-9 IEC-15 or 60130-9 IEC-15a.

A.15 Fixed connector, five female contacts, 60130-9 IEC-15, and fixed connector, five female contacts, with switch 60130-9 IEC-15a

This connector mates with the free male connector 60130-9 IEC-14.

A.16 Free connector, six male contacts, 60130-9 IEC-16

This connector mates with the fixed female connector 60130-9 IEC-17.

A.17 Fixed connector, six female contacts, 60130-9 IEC-17

This connector mates with the free male connector 60130-9 IEC-16.

A.18 Free connector, six female contacts, 60130-9 IEC-18

This connector mates with the fixed male connector 60130-9 IEC-19.

A.19 Fixed connector, six male contacts, 60130-9 IEC-19

This connector mates with the free female connector 60130-9 IEC-18.

A.20 Free connector, eight male contacts, 60130-9 IEC-20

This connector mates with the fixed female connector 60130-9 IEC-21.

A.21 Fixed connector, eight female contacts, 60130-9 IEC-21

This connector mates with the free male connector 60130-9 IEC-20.

Annex B
(normative)

Measurement of individual contacts (resilient contacts only)

Prior to the measurement of contact resistance, the following sizing procedure shall be carried out:

a) socket contacts shall have a maximum size pin gauge inserted and withdrawn five times;
b) pin contacts shall be inserted in a minimum size socket gauge and withdrawn five times.

The measurement of the individual contacts shall be carried out as follows:

c) socket contacts with a minimum size pin gauge inserted;
d) pin contacts inserted in a maximum size socket gauge.

All necessary details of the gauge and the number of contacts to be measured shall be specified by the relevant sheet.

There shall be five measuring cycles. The average of the values per contact thus obtained is the resistance of the contact under test (R_2). The value of any individual measurements shall not exceed twice this value.

Annex C
(informative)

Examples of circuitry of connector with switch

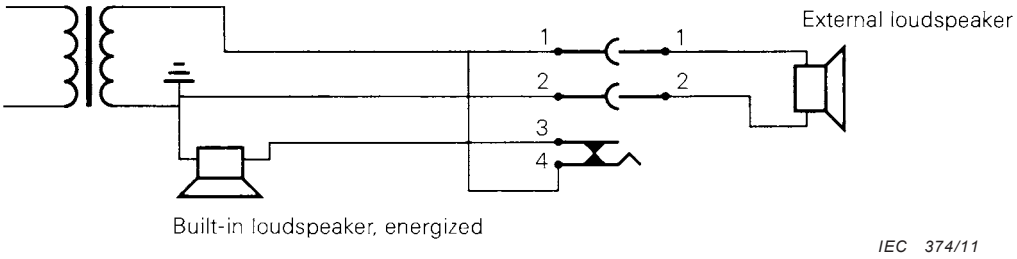


Figure C.1 – Free connector 60130-9 IEC-05 inserted in position A

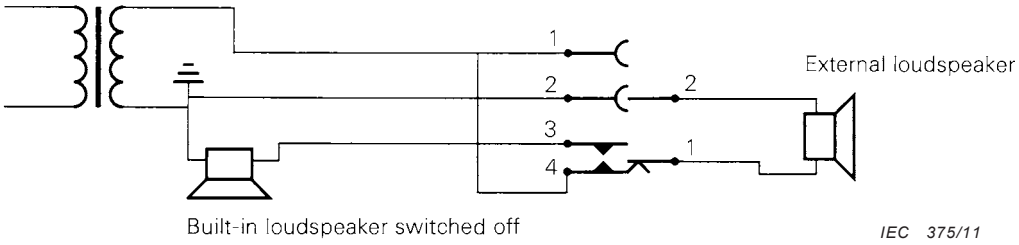


Figure C.2 – Free connector 60130-9 IEC-05 inserted in position B

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