IEC 61169-14

Edition 1.0 2010-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Radio-frequency connectors –
Part 14: R.F. coaxial connectors with inner diameter of outer conductor 12 mm with screw coupling – Characteristic impedance 75 ohms (Type 3,5/12)

Connecteurs pour fréquences radioélectriques –
Partie 14: Connecteurs coaxiaux pour fréquences de diamètre intérieur du conducteur extérieur de 12 mm à verrouillage à vis – Impédance caractéristique 75 ohms (Type 3,5/12)

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International Standard IEC 61169-14 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This first edition cancels and replaces IEC 60169-14 published in 1977. This edition constitutes a technical revision.

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

FDIS	Report on voting
46F/148/CDV	46F/169/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61169 series, under the general title: *Radio-frequency connectors*, can be found on the IEC website.

A bilingual version may be issued at a later date.

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RADIO-FREQUENCY CONNECTORS –

Part 14: R.F. coaxial connectors with inner diameter of outer conductor 12 mm with screw coupling – Characteristic impedance 75 ohms (Type 3,5/12)

1 Scope

This standard concerns RF coaxial connectors for use with RF cables both flexible and semi-rigid, where air dielectric interface and high mechanical stability is required for severe environmental exposure. The connectors provide low reflection in the microwave region up to 12 GHz and all patterns may provide sealing up to a pressure differential of 3 bar.

For this type of connector, cables IEC 75-7-and 75-8 of IEC 61196-6: *Coaxial communication cables – Part 6: Sectional specification for CATV drop cables*, are recommended.

This type is known commercially as the 3,5/12 connector.

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 61169-1:1992, *Radio-frequency connectors – Part 1: Generic specification – General requirements and measuring methods*[1]
Amendment 1 (1996)
Amendment 2 (1997)

3 IEC type designation

Connectors conforming to this standard shall be designated by:

a) the reference to this standard: 61169-14 IEC;

b) number of the grade:

Grade 0 = standard test connector = G0

Grade 1 = high performance connector = G1

Grade 2 = general purpose connector

– if Grade 2 is required, no grade designation is necessary;

c) a serial number (see Clause 7);

d) a group of figures specifying the climatic category (see Clause 4).

Example

61169-14 IEC-GI-1 (40/85/21) denotes a free pin Grade 1 high performance connector (straight) for cable 96-2 IEC 75-7-1/2/8 with mating face as indicated in Clause 5 of this standard with a reflection coefficient not greater than 0,06 at frequencies up to 6 GHz belonging to climatic category 40/85/21.

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[1] There exists a consolidated edition 1.2 (1998) that comprises IEC 61169-1:1992, its Amendment 1:1996 and its Amendment 2:1997.

4 Mating face for general purpose connector

4.1 Connector with pin centre contact (see Figure 1)

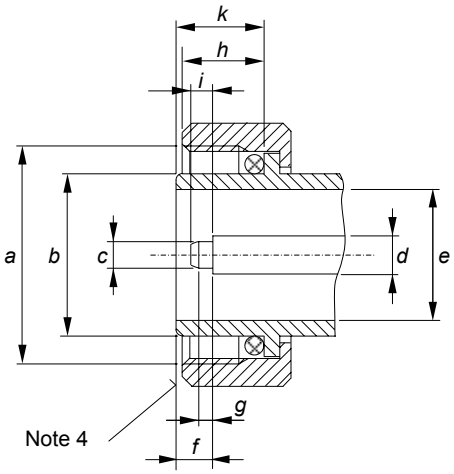


Figure 1 – Connector with pin centre contact (for dimensions, see Table 1)

Table 1 – Dimensions for connector with pin centre contact

Ref.	mm		Note
	Min.	Max.	
a	M 20 × 1		2
b	14,84	14,95	
c	2,855	2,945	
d	3,5 ref		1/3
e	12,0 ref		1/3
f	2,51	2,7	6
g	1,8	–	
h	7	9	
i	2,2	2,7	
k	8	–	5

NOTE 1 The tolerance on this dimension is determined by the tolerance of characteristic impedance. (For Grade 1 connector, the characteristic impedance should be 75 Ω ± 0,38 Ω).

NOTE 2 M 20 × 1 indicates metric ISO screw-thread with nominal diameter 20 mm and pitch 1 mm.

NOTE 3 Reference dimensions.

NOTE 4 Mechanical and electrical reference plane.

NOTE 5 This dimension together with O-ring gasket to meet environmental requirements.

NOTE 6 For Grade 1 connectors: dimension *f:* 2,51 mm min.
2,6 mm max.

NOTE 7 All undimensioned pictorial configurations are for reference purposes only.

4.2 Connector with socket centre contact (see Figure 2)

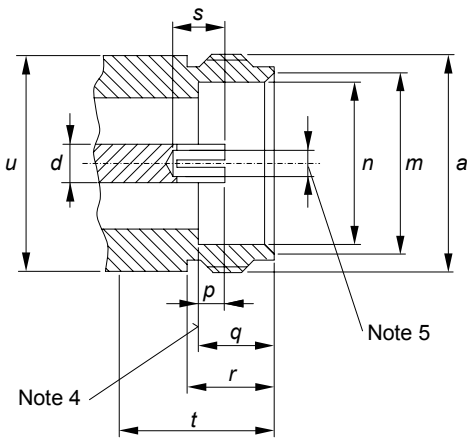


Figure 2 – Connector with socket centre contact (for dimensions, see Table 2)

Table 2 – Dimensions for connector with socket centre contact

Ref.	mm		Note
	Min.	Max.	
a	M 20 × 1		2
d	3,5 ref.		1/3
m	15,5	16,0	
n	15,0	15,1	
p	2,3	2,49	6
q	6,9	7,1	
r	9,0	11	
s	4,5	–	
t	15,5	–	
u	19,7	20,2	

NOTE 1 The tolerance on this dimension is determined by the tolerance of characteristic impedance. (For Grade 1 connector the characteristic impedance should be 75 Ω ± 0,38 Ω).

NOTE 2 M 20 × 1 indicates metric ISO screw-thread with nominal diameter 20 mm and pitch 1 mm.

NOTE 3 Reference dimension.

NOTE 4 Mechanical and electrical reference plane.

NOTE 5 Bore diameter and slots to meet gauge requirements.

NOTE 6 For Grade 1 connectors:

dimension *p:* 2,4 mm min.
2,49 mm max.

NOTE 7 All undimensioned pictorial configurations are for reference purposes only.

5 Gauges and standard test connectors

5.1 Mechanical gauges

5.1.1 Socket connector

5.1.1.1 Centre contact

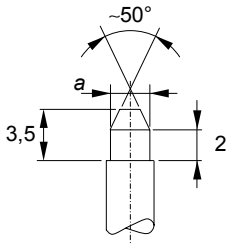


Figure 3 – Gauge pins for centre contact of socket connector

5.1.1.2 Test sequence

a) A steel test pin (Figure 3) with a diameter *a* of 3,1 mm ± 0,005 mm shall be inserted once into the centre contact a minimum distance of 2 mm.

b) A second steel test pin (Figure 3) with a diameter *a* of 2,855 mm ± 0,005 mm and a 0,4 µm finish shall then be inserted. The contact shall then exert a retention force of 4 N minimum/9 N maximum after insertion into the centre contact.

It is recommended that the mass of this gauge should be 400 g.

5.2 Standard test connectors (Grade 0)

5.2.1 General

In order to carry out the reflection coefficient measurement according to Subclause 14.1 of IEC 61169-1, the measuring equipment should be provided with standard test connectors (Grade 0). The standard test connectors with tolerances specified in 5.2.2 and 5.2.3 guarantee an accuracy of characteristic impedance of 75 Ω ± 0,1 Ω.

5.2.2 Standard test connectors with pin centre contact

The dimensions of the standard test connectors with pin centre contact shall be as specified in Subclause 5.1 but with the following tolerances (see Table 3).

Table 3 – Dimensions for connector with pin centre contact Grade 0

Dimension	mm	
	Min.	Max.
c	2,898	2,902
d	3,482	3,485
e	12,165	12,185
f	2,51	2,53

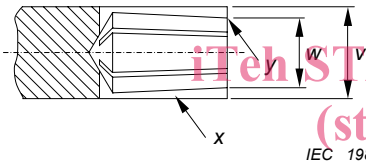
5.2.3 Standard test connectors with socket centre contact

The dimensions of the standard test connectors with socket centre contact shall be as specified in 5.2 and with the following tolerances (see Table 4).

Table 4 – Dimensions for connector with socket centre contact Grade 0

Dimension	mm	
	Min.	Max.
d	3,482	3,485
e	12,165	12,185
p	2,47	2,49

Additionally, dimensions of the slotted centre contact (see Figure 4) shall be as follows:



Key

y = ∅ 3,483 mm min.
∅ 3,485 mm max.

with pin gauge ∅ 2,898 mm min.
∅ 2,902 mm max.
inserted 2 mm deep

w = to fulfil the requirements of dimension *y* and gauge retention

x = six slots spaced 60° apart
0,3 mm wide
4,5 mm min. length
4,7 mm) max. length

y = radius of chamfer *r* = 0,1 mm

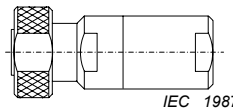
Figure 4 – Slotted centre contact

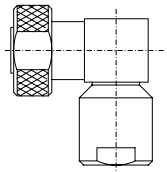
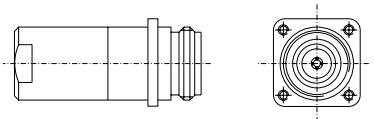
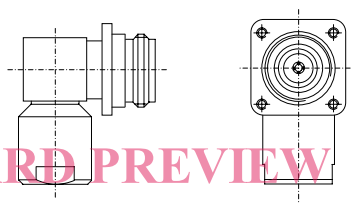
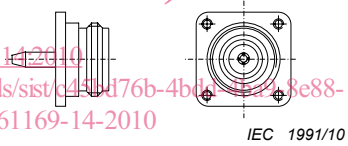
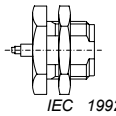
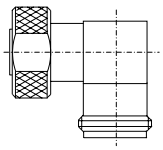
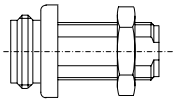
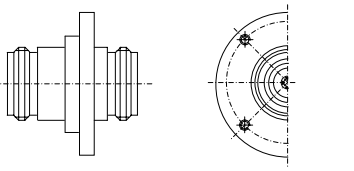
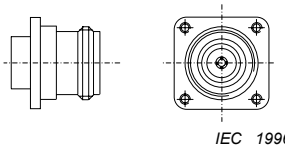
A pair of standard test connectors shall not introduce a reflection coefficient greater than 0,01 at 6 GHz.

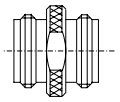
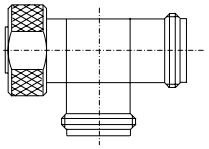
6 Survey of patterns

Table 5 is a survey of existing patterns.

Table 5 – Survey of patterns

Test class	Description	Contact	Pattern	Type designation[1]
1	Free connector (straight)	Pin	 IEC 1987/10	61169-14 IEC-1 See Note

Test class	Description	Contact	Pattern	Type designation[1]
1	Free connector (right angle)	Pin	 IEC 1987/10	61169-14 IEC-2 See Note
1	Free connector (straight)	Socket	 IEC 1988/10	61169-14 IEC-3 See Note
1	Fixed connector (straight 4-hole panel mounting with entry for r.f. cable)	Socket	 IEC 1989/10	61169-14 IEC-4 See Note
1	Fixed connector (right angle), 4-hole panel mounting with entry for r.f. cable)	Socket	 IEC 1990/10	61169-14 IEC-5 See Note
3	Fixed connector (4-hole panel mounting with solder bucket)	Socket	 IEC 1991/10	61169-14 IEC-6
3	Fixed connector (panel and barrier sealed, single hole panel mounting with solder bucket)	Socket	 IEC 1992/10	61169-14 IEC-7
2	Free adaptor (right angle)	Pin-socket	 IEC 1993/10	61169-14 IEC-8
2	Fixed adaptor (panel and barrier sealed, single hole panel mounting)	Socket-socket	 IEC 1994/10	61169-14 IEC-9
2	Fixed adaptor (4-hole panel mounting)	Socket-socket	 IEC 1995/10	61169-14 IEC-10
2	Fixed connector (4-hole panel mounting for rigid lines)	Socket	 IEC 1996/10	61169-14 IEC-11

Test class	Description	Contact	Pattern	Type designation[1]
2	Free adaptor	Socket-socket	 IEC 1997/10	61169-14 IEC-12
3	T-adaptor	Pin-socket-socket	 IEC 1998/10	61169-14 IEC-13
1 If no details are given, Grade 2 is referred to. Grade 1 has to be indicated.				
NOTE To be used with r.f: cables 61196-6 IEC 75-7 or 8.				

In Table 5, the test classes applicable to the various connector patterns are indicated.

A test class comprises all connectors to which the same tests are applicable although in some cases the test requirements may differ in part.

Test Class 1: Connectors attached to cables.

Test Class 2: Adaptors with mating faces at both ends.

Test Class 3: Connectors to which the reflection coefficient measurements do not apply.

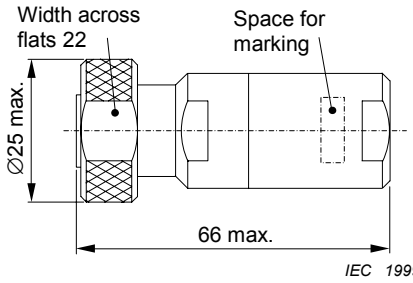
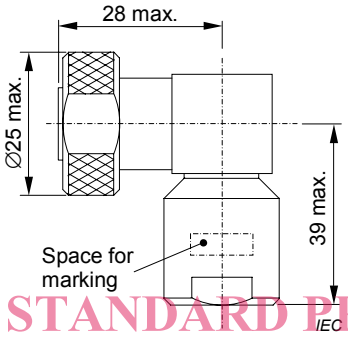
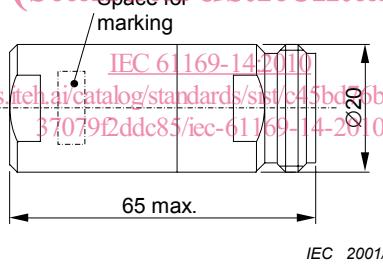
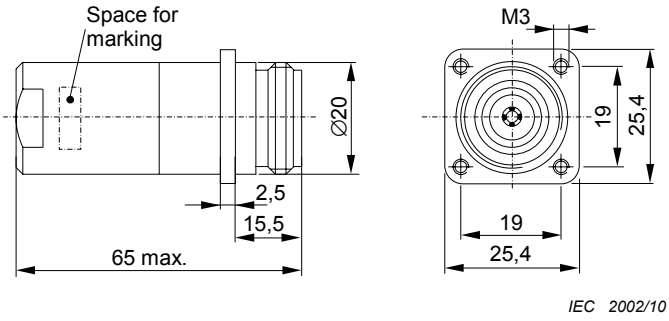
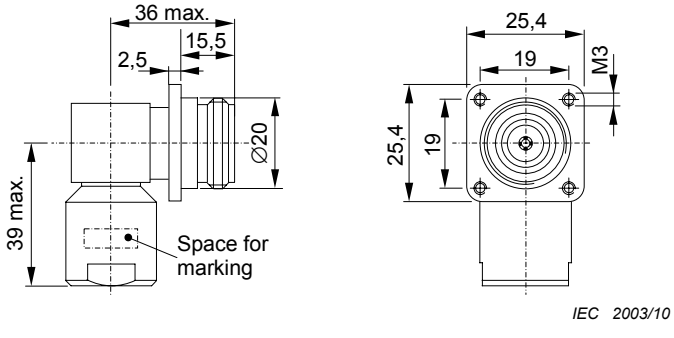
7 Outline dimensions

The appearance of the connectors shown in the following Table 6 drawings is typical. Only the main dimensions given are mandatory *(dimensions in millimetres)*.

Other constructions or the use of other cables are permissible if the dimensions according to Clause 5 are met, together with the gauging requirements of Clause 6 and applicable test conditions of Clause 9.

The type designation refers to Grade 2 (for Grade 1 and 0, see Clause 2).

Table 6 – Outline dimensions

Style		Test Class	Type designation
Free connector (straight) with pin contact		1	61169-14 IEC1-
Free connector (right angle) with pin contact		1	61169-14 IEC-2
Free connector (straight) with socket con		1	61169-14 IEC-3
Fixed connector (straight, 4-hole panel mounting with entry for r.f. cable) with socket contact		1	61169-14 IEC-4
Fixed connector (right angle, 4-hole panel mounting with entry for r.f. cable) with socket contact		1	61169-14 IEC-5