INTERNATIONAL STANDARD

ISO 20860-1

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Road vehicles — 50 Ω impedance radio frequency connection system interface —

Part 1: Dimensions and electrical requirements

Véhicules routiers — Interface de système de connexion de fréquence radio de 50 Ω —

Partie 1: Dimensions et exigences électriques

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 20860-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

ISO 20860 consists of the following parts, under the general title *Road vehicles — 50 Ω impedance radio frequency connection system interface*:

— *Part 1: Dimensions and electrical requirements*

— *Part 2: Test procedures*

Road vehicles — 50 Ω impedance radio frequency connection system interface —

Part 1: Dimensions and electrical requirements

1 Scope

This part of ISO 20860 specifies male and female connectors of the 50 Ω impedance system interface for radio frequency applications in road vehicles, and ensures communication to and within road vehicles.

It specifies dimensional and electrical requirements and characteristics required for interchange ability.

This connection system can be applied in all relevant equipment and cable connections of road vehicles.

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.

ISO 20860-2, *Road vehicles — 50 Ω impedance radio frequency connection system interface — Part 2: Test procedures*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
male contact
pin contact
contact intended to make electrical engagement on its outer surface and which will enter a female contact (socket)

3.2
female contact
socket contact
contact intended to make electrical engagement on its inner surface and which will accept entry of a male contact (pin)

3.3
male connector
pin connector
connector containing a male centre contact

3.4
female contact
socket connector
connector containing a female centre contact

4 Dimensions and coding

4.1 General

Unspecified details shall be shown as required in accordance with the characteristics defined in Clause 6.

4.2 Male connector

The dimension of the cable connector (CC) and the connector on apparatus (CoA) of the 50 Ω connection system shall conform to Figures 1, 2 and 3.

4.3 Female connector

The dimensions of the female cable connectors (FCC) for use with the male connectors in accordance with 4.2, shall conform to Figures 4 and 5.

4.4 Coding ribs

The dimensions and denominations of the coding ribs shall be in accordance with Figure 6.

4.5 Mechanical and colour codings of the connection system

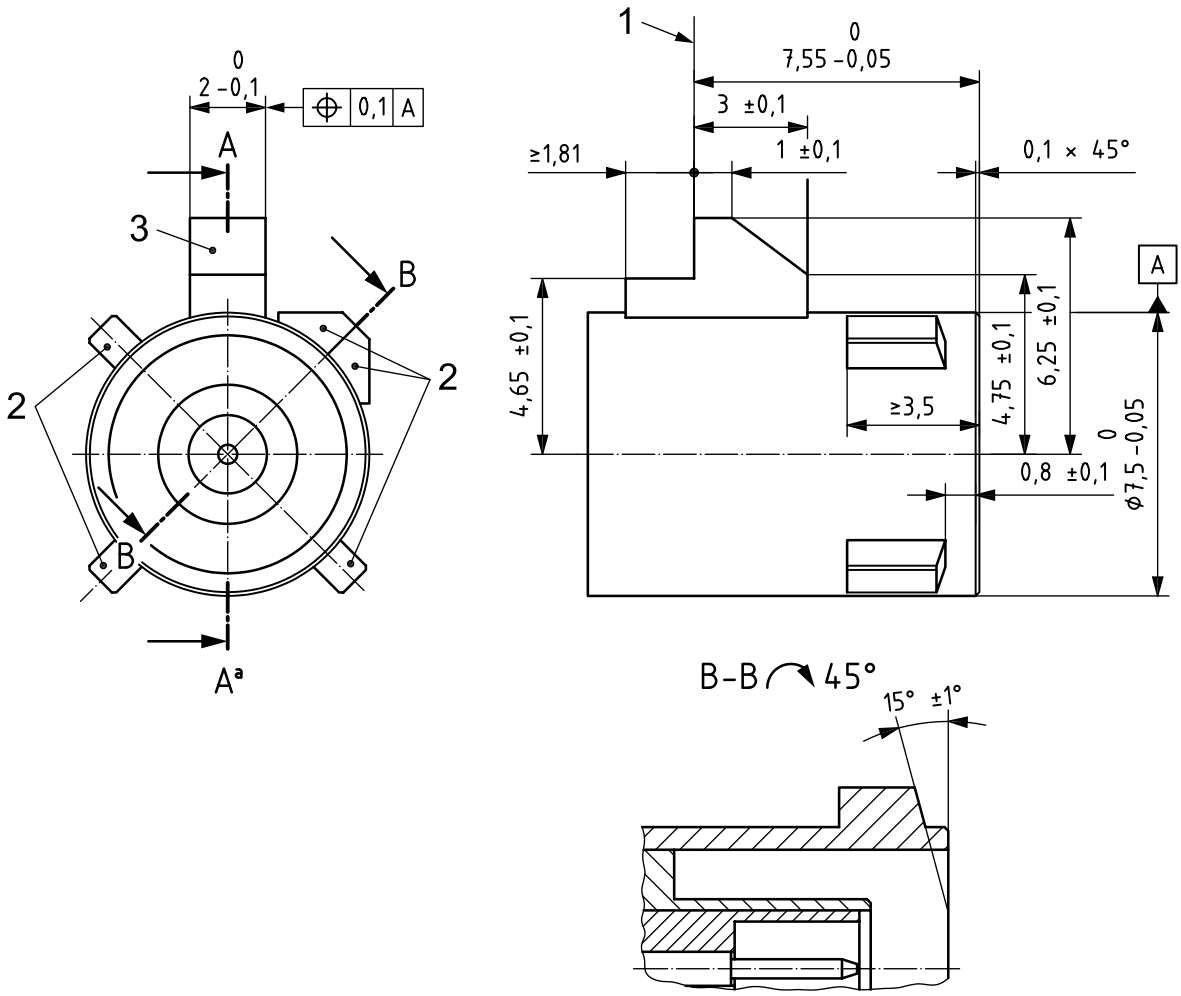
The male connector of the 50 Ω connection system allows the use of the mechanical coding options, by applying the coding ribs specified in Figure 6 and their arrangement according to Figure 7 and Table 1.

The mechanical design of the female connector shall consider the codings, the locking mechanism and the guide tube on the male connector.

4.6 Multiple interfaces

Applications for multiple connectors of the 50 Ω connection system are shown in Figures 8 and 9.

Dimensions in millimetres



Key

1 reference plane

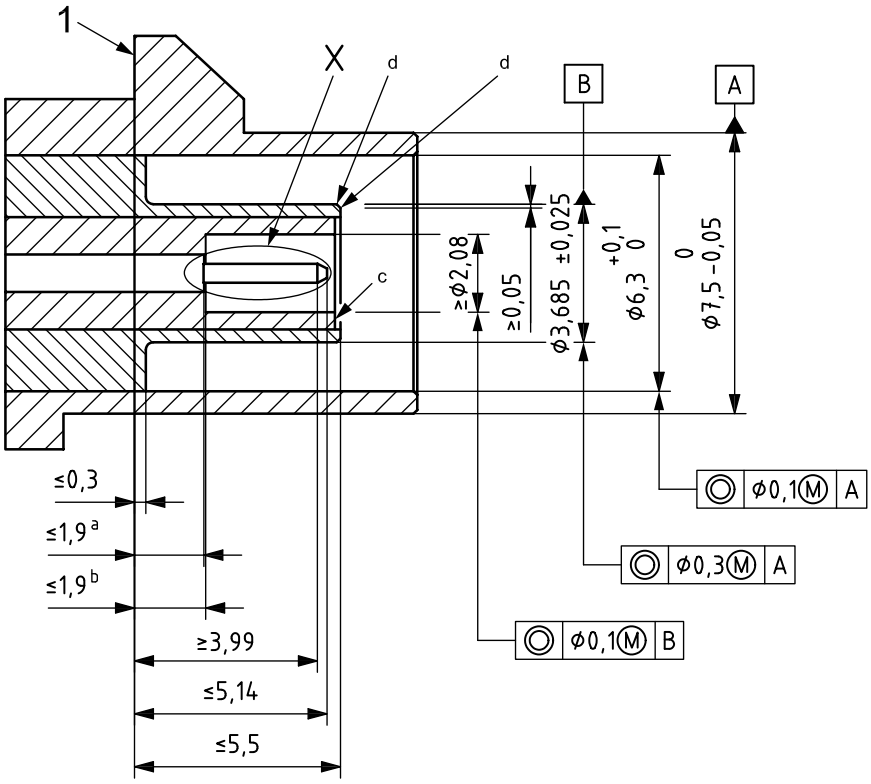
2 coding ribs (dimensions according to Figure 6)

3 locking nose

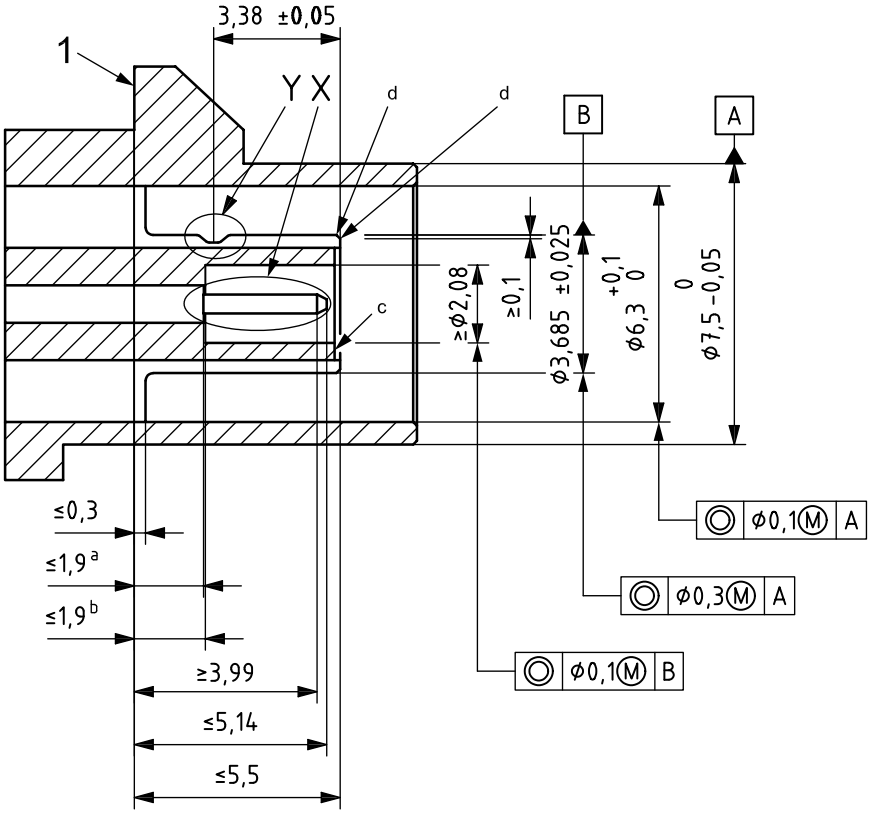
NOTE For Section A–A, see Figure 2.

Figure 1 — Male connector dimensions

Dimensions in millimetres



a) Cable connector (CC)



b) Optional connector on apparatus (CA opt)

Key

1 reference plane

a Centre contact: see detail X.

b Dielectric: see detail X.

c Dielectric insulation does not exceed the foremost plane of the outer conductor.

d No burrs, no sharp edges.

NOTE For details X and Y, see Figure 3.

Figure 2 — Section A–A of the male connector

Dimensions in millimetres

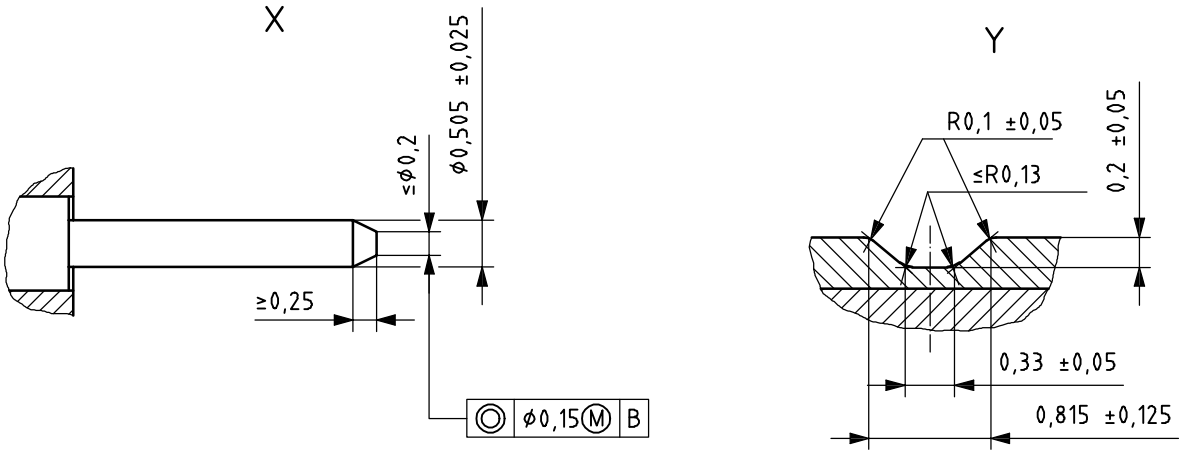
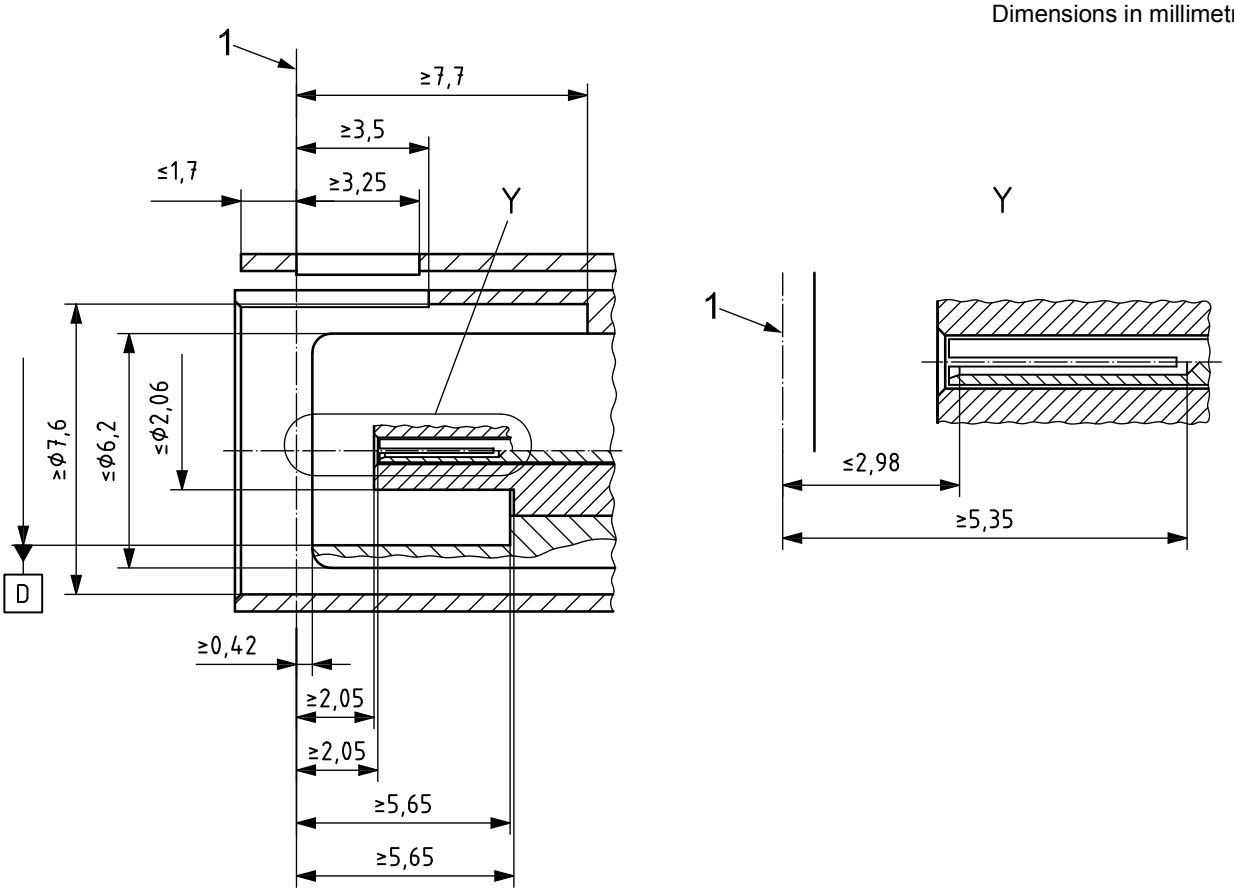


Figure 3 — Details X and Y of Figure 2

Dimensions in millimetres

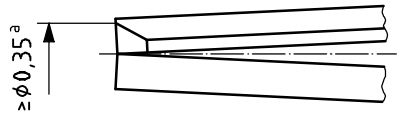


Key

1 reference plan

Figure 4 — Female cable connector (FCC)

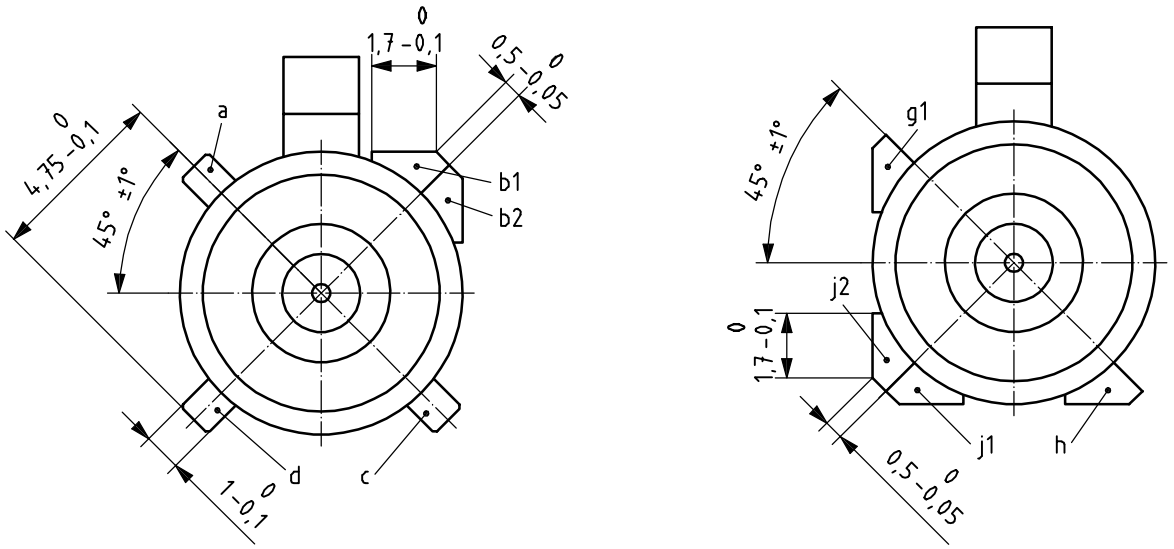
Dimensions in millimetres



a The catch circle is coaxially arranged to reference datum axis D (geometrically ideal). (See Figure 4.)

Figure 5 — Arrangement of the catch circle

Dimensions in millimetres



a) Coding ribs a, b1, b2, c and d

b) Coding ribs g1, h, j1 and j2

Figure 6 — Dimensions and denominations of coding ribs

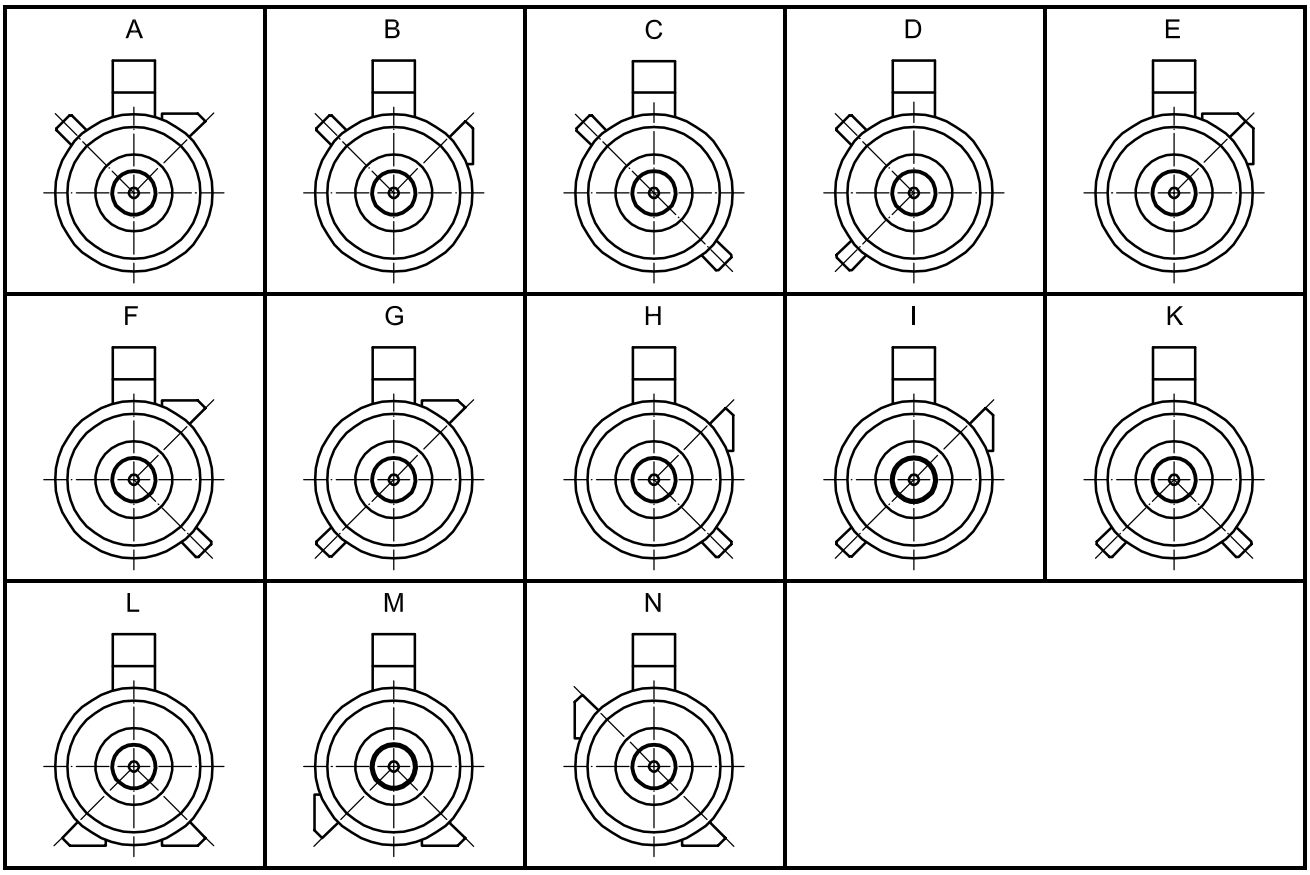


Figure 7 — Mechanical codings of single-pole 50 Ω connection system

Table 1 — Mechanical and colour codings

Coding	Combinations of coding ribs	Colour	Similar colour RAL number [a]
A	a – b1	Deep black	9005
B	a – b2	Cream white	9001
C	a – c	Signal blue	5005
D	a – d	Bordeaux violet	4004
E	b1 – b2	Leaf green	6002
F	b1 – c	Brown	8011
G	b1 – d	Blue grey	7031
H	b2 – c	Violet	4003
I	b2 – c	Beige	1001
K	c – d	Curry yellow	1027
L	h – j1	Carmine red	3002
M	h – j2	Pastel orange	2003
N	h – g1	Pastel green	6019

[a] See Bibliography [1].

Dimensions in millimetres

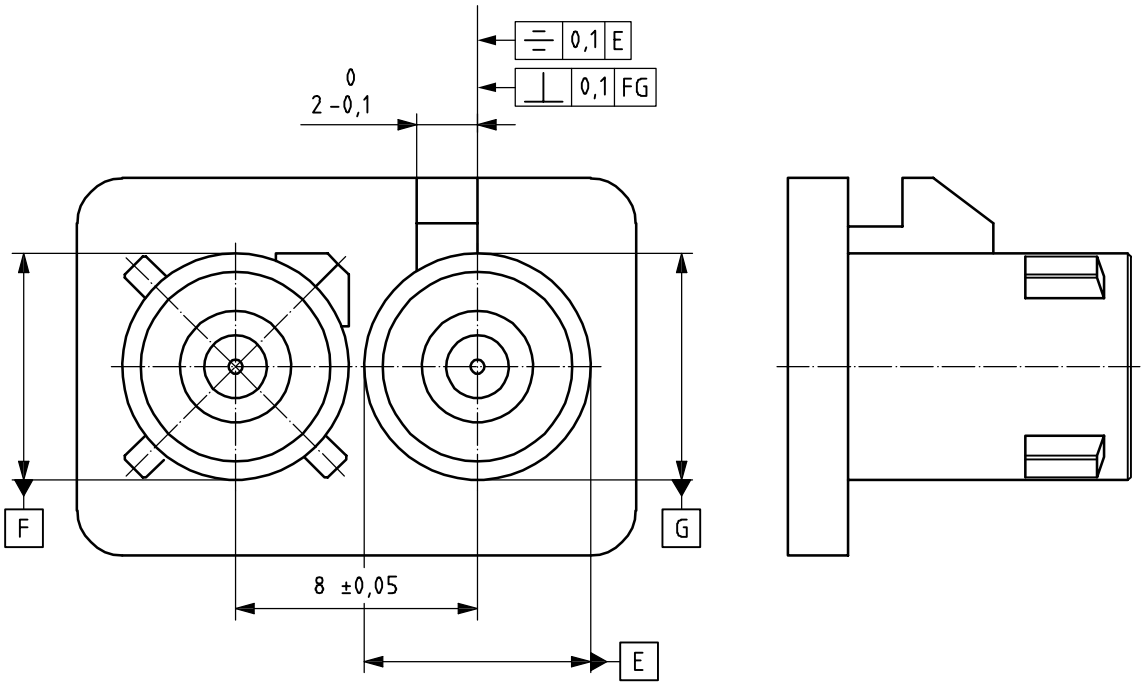


Figure 8 — Dual male connector (DC) Type X

Dimensions in millimetres

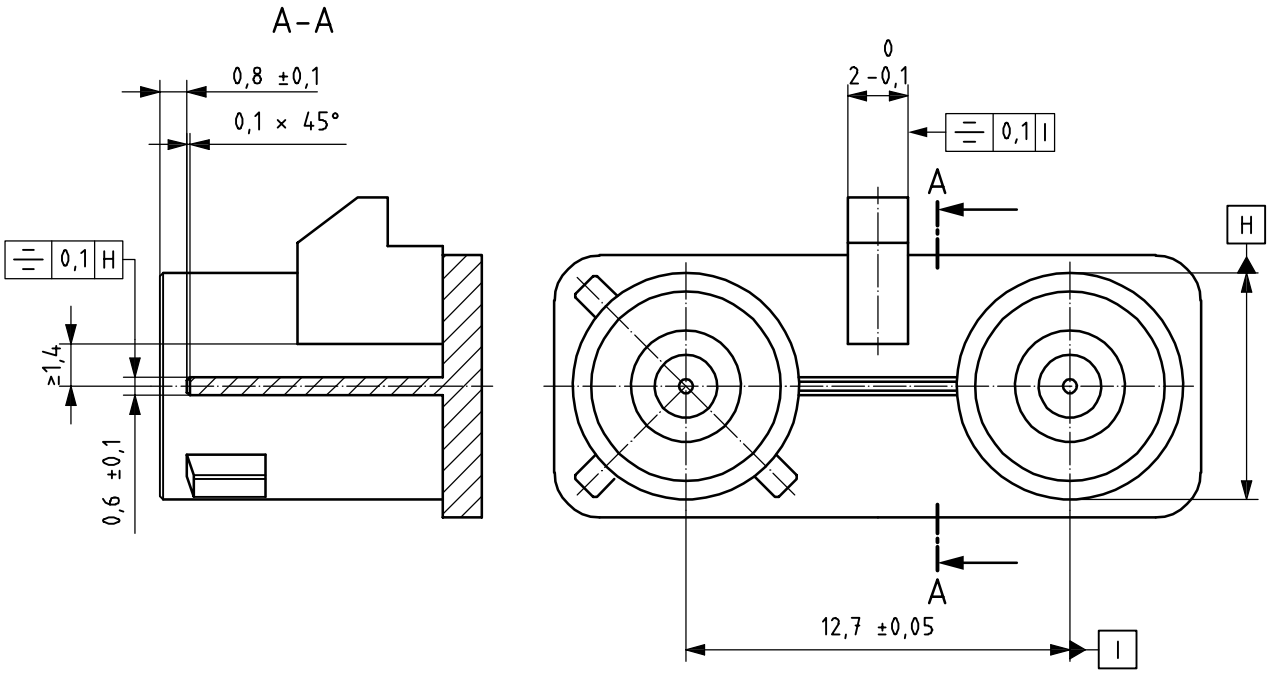


Figure 9 — Male connector Type Y

5 Designations

Designations for a single male cable connector (CC), coding H:

Cable connector ISO 20860 CC – H

Designation for an optional connector on apparatus (CA opt), coding A:

Connector on apparatus ISO 20860 CA opt – A

Designation for a female cable connector (FCC), coding C:

Female cable connector ISO 20860 FCC – C

Designation for a dual male connector Type X (DC):

Dual male connector ISO 20860 XDMC

Designation for a Type Y male connector:

Dual male connector ISO 20860 YDMC

6 Characteristic values

The 50 Ω connection system in accordance with this part of ISO 20860 shall meet the characteristic values specified in Tables 2, 3 and 4.

Table 2 — Electrical performance characteristics of the coaxial interface

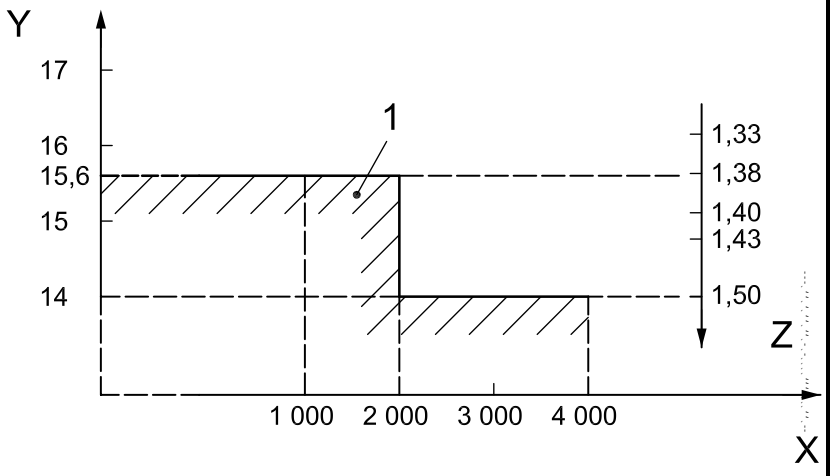
Nomination	Specification value
Frequency range	0 Ghz to 4 GHz
Nominal characteristic impedance	50 Ω
Return loss	 **Key** 1 restricted area for measurement X frequency, in Mhz Y return loss, in dB Z VSWR

Table 2 (*continued*)

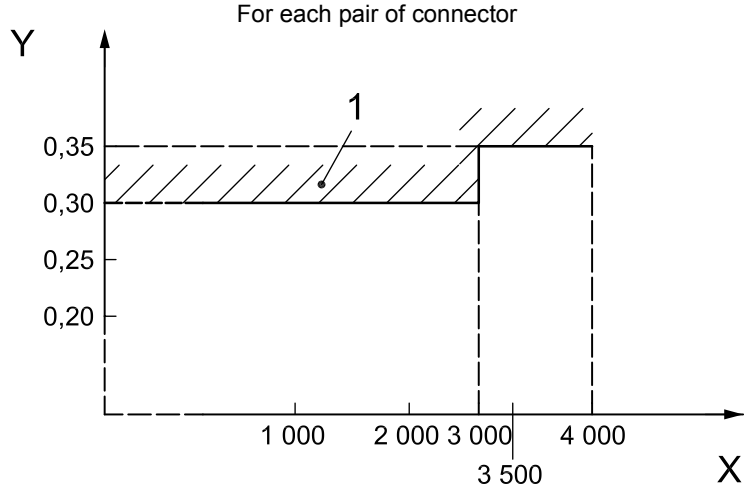
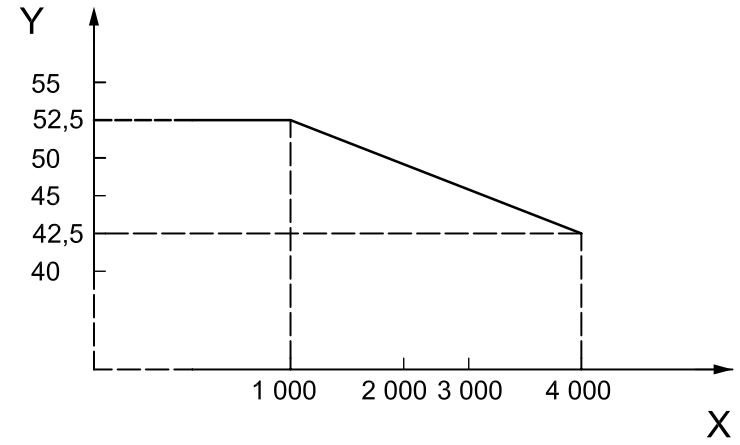
Nomination	Specification value
Insertion loss	For each pair of connector  **Key** 1 restricted area for measurement X frequency, in Mhz Y return loss, in dB
Shielding effectiveness	 **Key** X frequency, in Mhz Y return loss, in dB
Insulation resistance	$\geqslant$ 1 000 MΩ before, and $\geqslant$ 500 MΩ after strain
Centre contact resistance	$\leqslant$ 5 mΩ before, and $\leqslant$ 40 mΩ after 25 matings
Outer contact resistance	$\leqslant$ 5 mΩ before, and $\leqslant$ 40 mΩ after 25 matings
Dielectric withstanding voltage	500 V minimum
Working voltage	$\leqslant$ 60 V d.c.
Working current	$\leqslant$ 1 A d.c.

Table 3 — Mechanical performance characteristics

Nomination	Specification value [a]
Connection insertion force	⩽ 25 N
Connection extraction force	⩽ 25 N
Locking device strength	⩾ 80 N
Cable strain relief in axial direction	⩾ 100 N
Gauge retention force centre contact	⩾ 0,28 N
Gauge retention force outer contact	⩾ 2 N
Mating cycles	25 cycles minimum
Outer contact retention force in housing	⩾ 100 N
[a] Values are valid for single connectors.	

Table 4 — Material and coating characteristics

Nomination	Specification value
Material of coating ➢ contact zone of centre conductor	**Au**
Material of coating ➢ contact zone of outer conductor	**Ni** or **Sn**

7 Test procedures

Test procedures to verify conformance with the requirements given in Clause 6 shall be performed in accordance with ISO 20860-2.

Bibliography

[1] RAL, *The classic colour collection RAL 840-HR — standard for choosing colours*

[2] IEC 60169-1, *Radio frequency connectors — Part 1: General requirements and measuring methods*

[3] DIN 47299-1, *Radio frequency coaxial connector — Part 1: Terms of connectors and their coupling mechanisms*

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