IEC TS 63236-2

Edition 1.0 2021-06

TECHNICAL SPECIFICATION

Direct current (DC) appliance couplers for information and communication technology (ICT) equipment installed in data centres and telecom central offices –
Part 2: 5,2 kW system

IEC TS 63236-2:2021-06(en)

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Part 2: 5,2 kW system

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DIRECT CURRENT (DC) APPLIANCE COUPLERS FOR INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) EQUIPMENT INSTALLED IN DATA CENTRES AND TELECOM CENTRAL OFFICES –

Part 2: 5,2 kW system

FOREWORD

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IEC TS 63236-2 has been prepared by IEC technical committee 23: Electrical accessories. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

DTS	Report on voting
23/916/DTS	23/958A/RVDTS

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

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This Part 2 is to be used in conjunction with IEC TS 63236-1:2021.

The clauses of this document supplement or modify the corresponding clauses in IEC 63236-1. When a particular subclause or annex of Part 1 is not mentioned in this Part 2, the subclause or annex of IEC 63236-1 applies as far as is reasonable. Where this document states “addition”, “amendment” or “replacement”, the relevant requirement, test specification or explanatory matter in IEC 63236-1 is to be adapted accordingly.

Clauses or subclauses which are additional to those in Part 1 are numbered starting from 101.

A list of all parts in the IEC 63236 series, published under the general title *Direct current (DC) appliance couplers for information and communication technology (ICT) equipment installed in data centres and telecom central offices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

DIRECT CURRENT (DC) APPLIANCE COUPLERS FOR INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) EQUIPMENT INSTALLED IN DATA CENTRES AND TELECOM CENTRAL OFFICES –

Part 2: 5,2 kW system

1 Scope

This part of IEC 63236, which is a Technical Specification, applies to DC appliance couplers for class I equipment with two active contacts plus an earthing contact, a rated power of 5,2 kW and a rated voltage range from 294 V to 400 V DC. They are intended to power DC information and communication technology equipment only, as specified in IEC 62368-1.

The accessories according to this document are intended to be used by ordinary persons in data centres only where the value of the DC voltage distribution system is defined as follows:

- 380 V with a tolerance of ±20 V for installations with no backup battery or with a voltage regulation system;
- 380 V with a voltage range of 294 V to 400 V for installations with a backup battery where voltage regulation is not guaranteed;
- the voltage value between each live conductor and earth does not exceed 200 V DC during normal operation;
- there are two abnormal voltage ranges (duration below 10 min):
  - 260 V up to 294 V, and
  - above 400 V to 410 V.

The maximum current of the appliance couplers is

- 13 A when the voltage between live contacts is 400 V DC,
- 17,6 A when the voltage between live contacts is 294 V DC,

and can rise up to 20 A when the voltage between live contacts decreases to 260 V DC for 10 min maximum.

The voltage between live conductors can fall down to 260 V DC when the voltage discharge value of the battery reaches the disconnecting level. The consequence is that the current increases accordingly.

The accessories according to this document do not require maintenance.

The accessories according to this document are intended for use in circuits where

- basic protection,
- an overcurrent protection (of 17,6 A or less for each socket-outlet or multiple socket-outlet),
- the fault protection (indirect contact protection), and
- additional protection

are already assured.

Appliance couplers complying with this document are suitable for normal use at ambient air temperatures not normally exceeding +60 °C, with a lower limit of the ambient air temperature of -5 °C.

Appliance couplers are not suitable for use in place of plug and socket-outlet systems according to the IEC TS 62735 series

The 2,6 kW system complying with IEC TS 63236-1 is not compatible with the system complying with IEC TS 63236-2 as it is impossible to mate the 2,6 kW connector in the 5,2 kW appliance inlet and it is also impossible to mate the 5,2 kW connector into the 2,6 kW appliance inlet.

2 Normative references

This clause of IEC TS 63236-1:2021 applies.

3 Terms and definitions

This clause of IEC TS 63236-1:2021 applies except as follows:

Addition:

Add the following new definition:

3.101
0 (zero) current operated appliance coupler system
system, either electrical or electronic or mechanical or a combination of these, that prevents current flow while making and breaking

4 General requirements

This clause of IEC TS 63236-1:2021 applies.

5 General notes on tests

This clause of IEC TS 63236-1:2021 applies.

6 Standard ratings

This clause of IEC TS 63236-1:2021 is replaced as follows:

Replacement:

Accessories shall have a rated power of 5,2 kW at any voltage within the rated voltage range of 294 V to 400 V.

7 Classification of appliance coupler

This clause of IEC TS 63236-1:2021 applies.

8 Marking

This clause of IEC TS 63236-1:2021 applies.

9 Dimensions and compatibility

This clause of IEC TS 63236-1:2021 applies.

10 Protection against electric shock

This clause of IEC TS 63236-1:2021 applies.

11 Provision for earthing

This clause of IEC TS 63236-1:2021 applies.

12 Terminals and terminations

This clause of IEC TS 63236-1:2021 applies except as follows:

12.1 General

Replacement:

Replace Table 1 with the following:

Table 1 – Relationship between rated power and connectable nominal cross-sectional areas or American Wire Gauges (AWG) size of copper conductors

Power and type of accessory	Flexible copper conductors	
	Nominal cross-sectional area or AWG size[a]	Corresponding diameter of the largest conductor mm
5,2 kW 2P+ ⏚	From 1,5 mm^2 up to 2,5 mm^2 inclusive or from 16 AWG up to 14 AWG	2,21 or 1,85
[a] Nominal cross-sectional area of the conductors of appliance couplers.		

13 Construction

This clause of IEC TS 63236-1:2021 applies.

14 Insulation resistance and electric strength

This clause of IEC TS 63236-1:2021 applies except as follows:

Replacement:

Replace Table 2 with the following:

Table 2 – Maximum diameters of the cords

Type of cord	Number of conductors and nominal cross-sectional area mm^2	Maximum dimensions mm
60227 IEC 57	3 × 2,5	11,4
60245 IEC 53	3 × 2,5	12,4

15 Forces necessary to insert and to withdraw the connector

15.1 General

This clause of IEC TS 63236-1:2021 applies except as follows:

Replacement:

Replace Table 3 with the following:

Table 3 – Maximum and minimum withdrawal forces

Type of connector/ appliance inlet	Withdrawal forces N	
	15.2 Multi pin gauge maximum	15.3 Single pin gauge minimum
5,2kW	60	2,0

16 Operation of contact

This clause of IEC TS 63236-1:2021 applies.

17 Resistance to heating of appliance coupler

This clause of IEC TS 63236-1:2021 applies.

18 Breaking capacity

This clause of IEC TS 63236-1:2021 applies except as follows:

Replacement:

Replace the 3rd paragraph with the following:

The connector is mounted in an appropriate test apparatus, which incorporates the corresponding DC appliance inlet (standard sheet 1, see Figure D.1*).*

Replace the 7th paragraph with the following:

First the test is done with a test voltage of 260 V and a test current of 1,5 times 20 A with an inrush of 300 A with a profile equivalent to that shown in IEC TS 62735-1:2015, Figure 32, for 100 strokes including switching operation.

Replace the 11th paragraph with the following:

After this test, the test is repeated with a test voltage of 410 V and a test current of 1,5 times 12,7 A with an inrush of 475 A with a profile equivalent to that shown in IEC TS 62735-1:2015,Figure 32, for 100 strokes including switching operation.

19 Normal operation

This clause of IEC TS 63236-1:2021 applies except as follows:

Replacement:

Replace the 4th and 5th paragraphs with the following:

First the test is done with a test voltage of 400 V and a test current of 13 A with an inrush of 463 A with a profile equivalent to that shown in IEC TS 62735-1:2015, Figure 32, for 1 000 strokes.

Then the test is repeated with a test voltage of 294 V and a test current of 17,6 A with an inrush of 340 A with a profile equivalent to that shown in IEC TS 62735-1:2015, Figure 32, for 1 000 strokes.

20 Temperature rise

This clause of IEC TS 63236-1:2021 applies except as follows:

Replacement:

Replace Table 4 with the following:

Table 4 – Cords and conductors for the tests of Clause 21

Type of connector	Conductor [mm^2]	Test current [A]
Non-rewirable connectors	with cable as delivered	23,2
Rewirable connectors	2,5 (or 14AWG)	23,2

Replace the sixth paragraph with the following:

The connector is inserted into an appliance inlet having brass pins with the minimum dimensions specified in the standard sheet 1 (see Figure D.1), a tolerance of +0,02 mm being allowed, the distance between pin centres having the value specified in that standard sheet.

21 Cords and their connection

This clause of IEC TS 63236-1:2021 applies except as follows:

21.1 Cords for non-rewirable connectors

Replacement:

Replace Table 5 with the following:

Table 5 – Type and nominal cross-sectional area of cords

Type of connector	Type of cord	Length in m	Minimum nominal cross-sectional area
5,2 kW	60227 IEC 57	≤ 2 m	1,5 mm^2 or 16 AWG
		> 2 m	2,5 mm^2 or 14 AWG
If a rubber cable is to be used, the insulation shall be rated 90 °C or higher.			

21.2 Cable anchorage

21.2.3 Pull test for cable anchorage

Replacement:

Replace Table 6 with the following:

Table 6 – Types of cable for the rewirable connector test

Type of connector	Type of cord[a]	Cross-sectional area	
		Pull test according to 22.1.3	Flexing test according to 21.3
5,2 kW	60227 IEC 57 60227 IEC 57	1,5 mm^2 or 16 AWG 2,5 mm^2 or 14 AWG	2,5 mm^2 or 14 AWG
If a rubber cable is to be used, the insulation shall be rated 90 °C or higher. [a] Other cables or cables with equivalent properties may also be used.			

22 Mechanical strength

This clause of IEC TS 63236-1:2021 applies except as follows:

22.3 Lateral pull test for contacts

Replacement:

Replace Table 7 with the following:

Table 7 – Value for the lateral pulls applied

Rated power kW	Pull N
5,2	50

22.5.3 Lateral pull test

Replacement:

Replace Table 8 with the following:

Table 8 – Values for straight and lateral pull forces

Rated power kW	straight pull force N	lateral pull force N
5,2	100 ± 2	100 ± 2

23 Resistance to heat and ageing

This clause of IEC TS 63236-1:2021 applies.

24 Screws, current-carrying parts and connections

This clause of IEC TS 63236-1:2021 applies except as follows:

24.1 General

Replacement:

Replace the 9th paragraph with the following:

The nominal cross-sectional area of this conductor is 2,5 mm² or 14 AWG for 5,2 kW connectors.

25 Creepage distances, clearances and distances through sealing compound

This clause of IEC TS 63236-1:2021 applies.

26 Resistance of insulating material to heat, fire and tracking

This clause of IEC TS 63236-1:2021 applies.

27 Resistance to rusting

This clause of IEC TS 63236-1:2021 applies.

28 Electromagnetic compatibility (EMC) requirements

This clause of IEC TS 63236-1:2021 applies.

Addition:

101 0 (zero) current operated appliance inlet systems

The 5,2 kW appliance inlet shall be equipped with a 0 (zero) current operated system to prevent hazard along with arcing and to avoid undue damage to the pins/contacts.

Compliance is checked by inspection, by manual test and by performing the tests of Clause 18 and Clause 19.

Annex A
(normative)

Safety-related routine tests for factory-wired accessories (protection against electric shock and correct polarity)

This annex of IEC TS 63236-1:2021 applies.

Annex B
(normative)

Test schedule

This annex of IEC TS 63236-1:2021 applies.

Annex C
(informative)

Alternative gripping tests

This annex of IEC TS 63236-1:2021 applies.

Annex D
(normative)

Standard sheets and gauges

This annex of IEC TS 63236-1:2021 is replaced as follows:

Replace Annex D with the following:

D.1 Standard sheets

General tolerances according to ISO 2768-1; tolerance class medium.

Standard sheet 1 (Figure D.1)

Appliance inlet (compatible with the DC connector only)

The outline marked with c shall be at a distance of (18,5 ±0,5) mm from the engagement face at the bottom of the inlet.

The distance from the engagement face at the bottom of the inlet to plane A-A may, however, be less elsewhere within the area 1). Plane A-A need not necessarily be extended to the outline of area marked with a.

A rim which is slightly rounded on top is allowed around the recess if it has a thickness of at least 1,5 mm.

Retaining devices or parts thereof may be within the area marked with a.

No other parts of the inlet may protrude beyond plane A-A.

The height marked with b: For appliance inlets arranged countersunk in the outer surface of equipment and if this surface is curved or inclined with respect to the axis of the appliance inlet, this dimension shall be not more than 19 mm; the minimum shall be determined by visual inspection.

Dimensions to be checked by means of a gauge or 3D measurement.

For symbols of geometric tolerances see ISO 1101.

NOTE 1 The sketches are not intended to govern design, except as regards the dimensions shown. Dimensions without tolerances are only recommendations.

Dimensions in millimetres

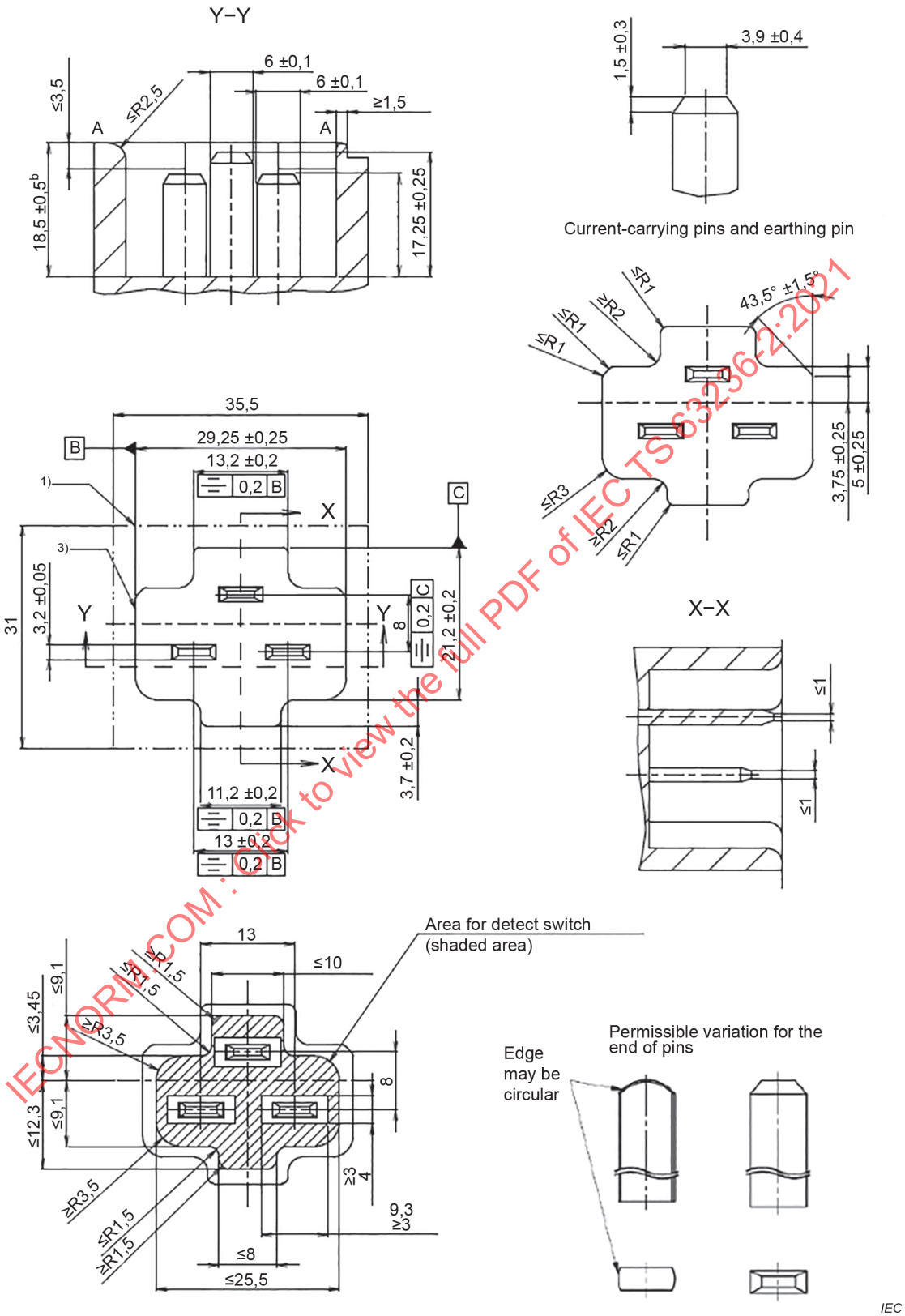


Figure D.1 – Appliance inlet

Standard sheet 2 (Figure D.2)

Connector

The area marked with a of the front part shall not be exceeded or decreased, at any point, within a distance of 20 mm from the engagement face.

The height marked with c of the rear part shall not be exceeded in any section perpendicular to the axis of the connector, except that, for connectors with lateral cable entry and for those combined with other accessories, this limitation does not apply in the direction of the axis of the cable or of the actuating member.

Retaining devices or parts thereof may exceed outline b.

The outline marked with c represents the first point of contact during pin engagement and the minimum axial clearance for pin intrusion, respectively. The latter shall not be obstructed by anything besides the contact spring brackets.

Dimensions to be checked by means of gauge or 3D measurement.

For symbols of geometric tolerances see ISO 1101.

NOTE 2 The sketches are not intended to govern design, except as regards the dimensions shown. Dimensions without tolerances are only recommendations.

Dimensions in millimetres

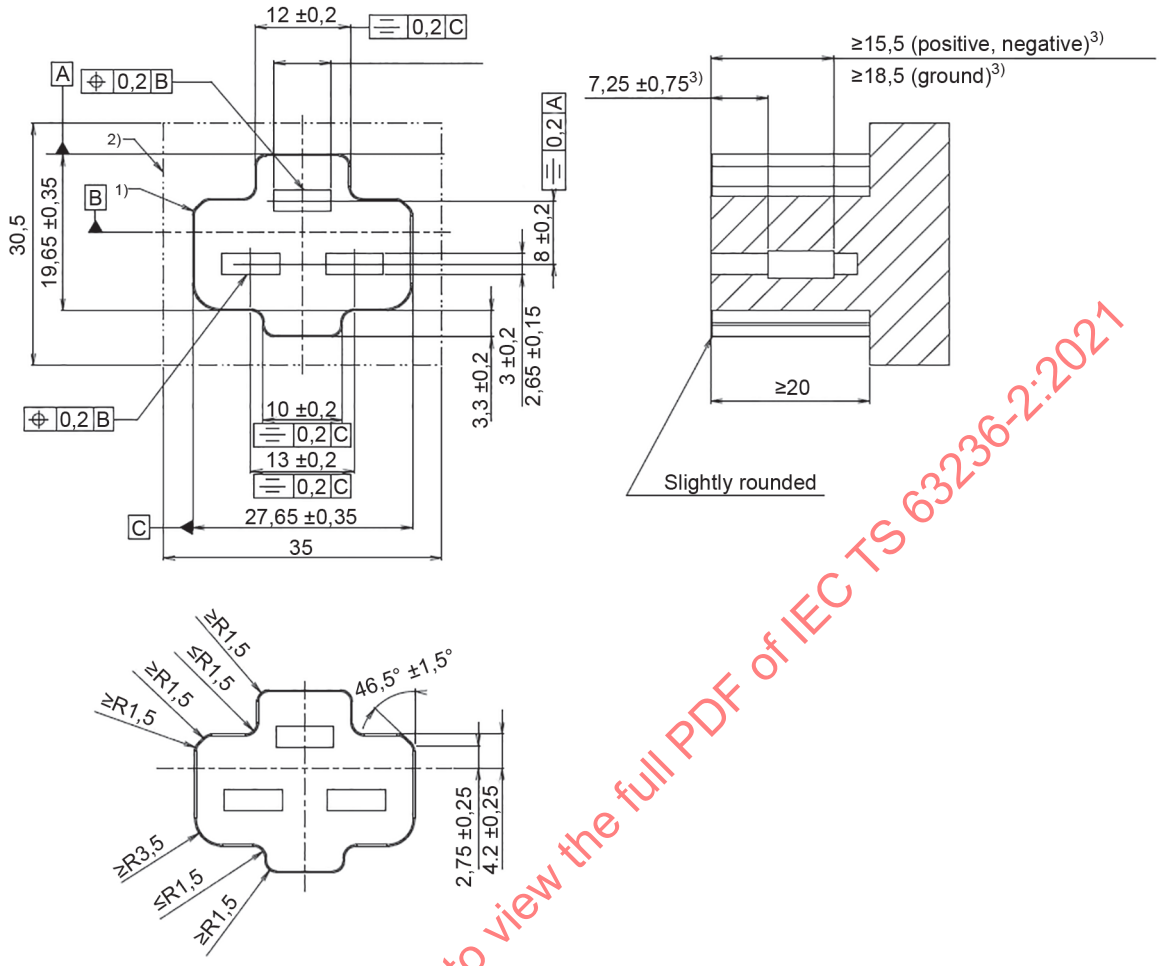


Figure D.2 – Connector

Standard sheet 3 (Figure D.3)

Positioning of the "+" and "−" pins/connector-contacts

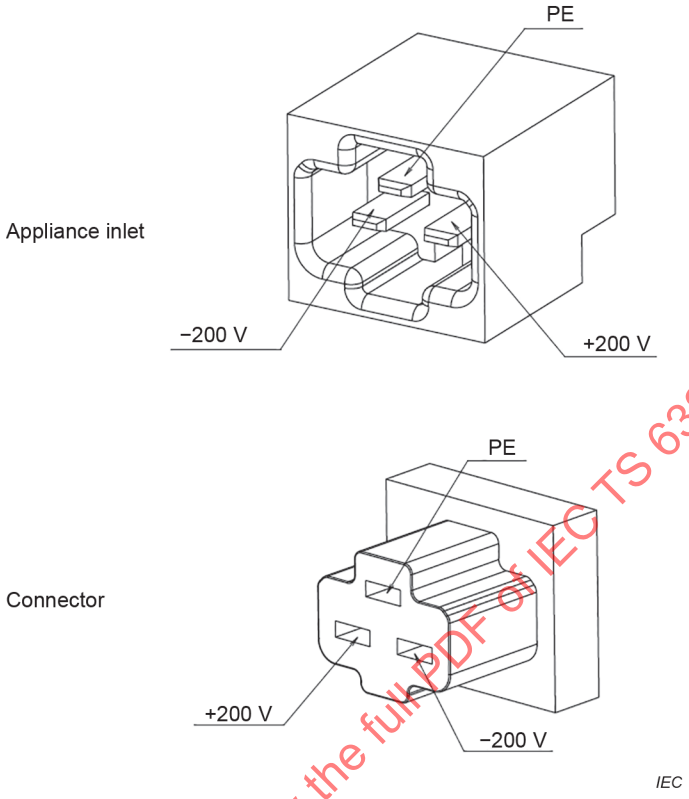


Figure D.3 – Positioning of the "+" and "−" pins/connector-contacts

D.2 Gauges

D.2.1 Distance to the point of first contact

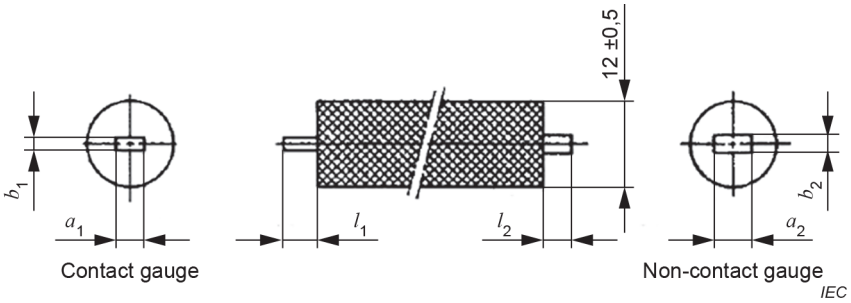
The distance from the engagement face of the connector to the point of the first contact of the connector contacts shall be checked by means of the relevant gauge shown in Figure D.4 and Table D.1.

The appropriate gauge shall be applied to the entry hole of each contact of the connector with a force not exceeding 5 N. When the gauge is fully inserted, the longer pin of the gauge ("contact gauge") shall make contact and the shorter pin ("no contact gauge") shall not make contact (see Figure D.4). See Table D.1 for dimensions of the contact gauge.

An electrical indicator with a voltage between 24 V and 50 V is used to show contact with the relevant socket contact.

The contact gauge and the no-contact gauge may be separate.

Dimensions in millimetres



[SOURCE: IEC 60320-3:2014, Figure 31.]

Figure D.4 – Gauges for checking point of first contact

Table D.1 – Dimensions of contact gauge

Dimensions	Tolerance	Dimensions in mm
		For ±/ PE holes
a_1	+0,05 0	5,9
b_1	+0,05 0	1,95
l_1	+0,05 0	6,5
a_2	0 -0,05	7
b_2	0 -0,05	2,5
l_2	0 -0,05	7,95

D.2.2 "GO" gauges for appliance inlets according to standard sheet 1 (Figure D.1)

The gauge in Figure D.5 shall be inserted fully into the appliance inlet with a force not exceeding 60 N.

The thickness of the gauge plate k, as well as the nominal values of the dimensions s and t of the handle and of the hole in the gauge plate, are left free, but the tolerances $h7$ and $F8$ shall be respected.

The plane A-A of the inlet shall lie between planes B-B and C-C of the gauge.

Then the gauge plate k shall be pushed over the handle to check the free area around the inlet opening.