

INTERNATIONAL STANDARD

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**Test method on electromagnetic emissions –
Part 1: Electronic control gear for single- and double-capped fluorescent lamps**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TEST METHOD ON ELECTROMAGNETIC EMISSIONS –

Part 1: Electronic control gear for single- and double-capped fluorescent lamps

FOREWORD

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

CISPR 30-1, which is a technical report, has been prepared by CISPR subcommittee F: Interference relating to household appliances tools, lighting equipment and similar apparatus.

This first edition of CISPR/TR 30-1 cancels and replaces the first edition of CISPR/TR 30 published in 2001. It is a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- minor correction of wiring distances of reference luminaire in Figure A.1;

- addition of reference luminaires for electronic control gear with output terminals on both ends;
- addition of reference luminaires for electronic control gear for circular-shaped fluorescent lamps;
- introduction of control gear marking indicating suitability for application in protection class I and/or class II luminaires.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
CISPR/F/538/DTR	CISPR/F/577/RVC

Full information on the voting for the approval of this technical report 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 CISPR 30 series can be found, under the general title *Test method on electromagnetic emissions*, on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

Requirements to limit radio-frequency disturbances from lighting equipment are standardized in CISPR 15. They are restricted to those kinds of lighting equipment which are considered as finished products and intended to be placed on the market for the end user, viz. luminaires, self-ballasted lamps and independent lamp control gear. No emission requirements apply to components intended to be built into luminaires.

Most electronic control gear for lamps (tubular fluorescent, low voltages halogen incandescent lamps or HID-lamps) are built into a number of different types of luminaires: not only in luminaires of different manufacturers but also in different types of luminaires of one manufacturer.

All those luminaires are tested, although disturbance data of a certain luminaire can be predicted from other luminaire measurements equipped with the same electronic control gear and lamps.

This has led to the question whether a worst-case test luminaire could be designed in which the electronic control gear could be tested. In the event that this test luminaire complies with the relevant requirements, all luminaires where that particular electronic control gear is built in comply, and a great deal of superfluous testing can be avoided. This idea looks correct, simple and interesting, but leads to two comments:

- a worst-case luminaire is too strict. From pre-measurements it appeared that commercial electronic control gear did not pass some tests in a worst-case dummy luminaire, whereas they do in real luminaires;
- even if the electronic control gear passes the tests in a worst-case luminaire, the question remains who is responsible in case the real luminaire, where it is built in, does not comply.

The conclusion is that it is not advisable to change the basic principle of CISPR 15 that no emission requirements apply to components built into a luminaire.

There is, however, a need for an independent test method to check the behaviour of an electronic control gear in the radiofrequency spectrum.

This edition of CISPR/TR 30-1, which replaces CISPR/TR 30, is published in conjunction with CISPR/TR 30-2. Each part of CISPR 30 series is independent and describes the test set-up for electronic control gear use together with a special lamp family. The formatting into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognised.

CISPR 30-1 is a technical report for such a method, and it concerns electronic control gear for single- and double-capped fluorescent lamps.

CISPR 30-2 describes reference luminaires for EMC testing of electronic control gear for discharge lamps other than fluorescent lamps.

TEST METHOD ON ELECTROMAGNETIC EMISSIONS –

Part 1: Electronic control gear for single- and double-capped fluorescent lamps

1 Scope

This part of CISPR 30, which is a technical report, details, with the aid of reference luminaires, an independent method by which the radio disturbance characteristics of electronic control gear for fluorescent lamp luminaires with protection classes I and/or II may be compared against the requirements of CISPR 15.

This technical report covers electronic control gear for double-capped fluorescent lamps fitted with G5 or G13 lamp caps and to single-capped fluorescent lamps fitted with lamp caps: 2GX7, 2G8, 2G10, 2G11, 2GX13, G23, GX23, G24q, GX24q, GR8, and GR10q.

NOTE The above listing shows a typical selection of caps which are commonly used and does not lay claim to be exhaustive.

It is specifically applicable for equipment to be connected to 230 V – 50 Hz mains power networks. For other power systems, modifications may be necessary.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 15:2005, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*
Amendment 1 (2006)
Amendment 2 (2008)

3 Presumption of compliance

The electronic lamp control gear in conjunction with the appropriate reference luminaire is deemed to comply with the radiofrequency disturbance limits of CISPR 15 if it complies with the terminal voltage limits of Table 2a of CISPR 15:2005 and with the radiated disturbance limits of Table 3a and Table 3b or Table B.1 of CISPR 15:2005. Where the electronic lamp control gear is controlled by an external device the disturbance voltage at the control terminals shall comply with the limits of Table 2c of CISPR 15:2005. Limits of disturbance voltage at the load terminals do not apply.

It should, however, be noted that the reference luminaire is not a worst-case luminaire, and the use of a reference luminaire cannot accurately predict the performance of a real luminaire. A real luminaire where the tested electronic control gear is built in would not automatically comply with the requirements of CISPR 15.

For EMC compliance the luminaire manufacturer should consider Clauses 6 and 7 of this technical report and the mounting instruction of the lamp control gear manufacturer.

4 Test method

The electronic lamp control gear is mounted on a reference luminaire as specified in Clause 5.

When the electronic control gear is designed for operating more than one lamp, all lamps shall be operated simultaneously.

The reference luminaire is tested according to the methods of measurement as described in 8.1, 9.1 and 9.2 (or Annex B) of CISPR 15:2005.

Tests shall be carried out with lamps for which the electronic control gear is designed.

The operating conditions of Clause 6 of CISPR 15:2005 apply.

5 Reference luminaire

5.1 Construction

The reference luminaire is built up of a metal plate $1\text{ mm} \pm 0,5\text{ mm}$ thick having external dimensions as given in Figures A.1 to A.10. This metal plate is mounted on a piece of insulating material $20\text{ mm} \pm 2\text{ mm}$ thick having dimensions slightly larger than the metal plate. The electronic lamp control gear and lamp holders are mounted on this metal plate. The height of the lamp holders shall be such that the distance between the lamp and the metal plate is $9\text{ mm} \pm 1\text{ mm}$ for lamps having a nominal tube diameter lower or equal to 25 mm and $20\text{ mm} \pm 1\text{ mm}$ for lamps having a nominal tube diameter greater than 25 mm. Single-capped fluorescent lamps shall be mounted with the plane through the centre lines of both tubes parallel to the metal plate and supported at the end by a small piece of insulating material.

The length of the metal plate shall be as indicated on the drawing. For double-capped fluorescent lamps, it is recommended that a reference luminaire for each lamp length be designed. However, as some types of fluorescent lamps have only a small difference in length, a reference luminaire may be used for more than one lamp length.

5.2 Mounting and wiring schemes

Figures A.1 to A.10 describe the mounting and wiring schemes.

- Figure A.1 gives the mounting and wiring scheme of a reference luminaire for two double-capped fluorescent lamps.
- Figure A.2 gives the mounting and wiring scheme of a reference luminaire for two single-capped fluorescent lamps where the output terminals of the electronic control gear are at the opposite side to the input terminals.
- Figure A.3 gives the mounting and wiring scheme of a reference luminaire for two single-capped fluorescent lamps where the output terminals of the electronic control gear are at the same side as the input terminals.
- Figure A.4 gives the mounting scheme of reference luminaires for one, two, three or four double-capped fluorescent lamps.
- Figure A.5 gives the mounting scheme of a reference luminaire for one, two, three or four single-capped fluorescent lamps where the output terminals of the electronic control gear are at the opposite side to the input terminals.
- Figure A.6 gives the mounting scheme of a reference luminaire for one, two, three or four single-capped fluorescent lamps where the output terminals of the electronic control gear are at the same side as the input terminals.

- Figure A.7 gives the mounting schema of a reference luminaire for four double-capped fluorescent lamps where the output terminals of the electronic control gear are positioned on both ends of the electronic control gear.
- Figure A.8 gives the mounting schema of reference luminaires for one, two, three or four double-capped fluorescent lamps where the output terminals of the electronic control gear are positioned on both ends of the electronic control gear.
- Figure A.9 gives the mounting schema of a reference luminaire for one circular-shaped fluorescent lamp, single-sided electronic control gear terminals.
- Figure A.10 gives the mounting schema of a reference luminaire for two circular-shaped fluorescent lamps, single-sided electronic control gear terminals.

5.3 Grounding

Information of protective (PE) or functional (FE) earth connection of the metal plate (if existing) of the reference luminaires and the PE or FE connection of the electronic control gear is given in Table 1.

If a metal plate is used (application of electronic lamp control gear in luminaire with metal housing or in luminaires designed with parts of metal) then the metal plate shall be connected to the reference earth of the V-network.

If the electronic control gear has an earth terminal and the electronic control gear is designed for metal housing luminaire, this terminal shall be connected to the metal plate with the shortest possible wire. Electronic control gear having a metal housing shall be fixed to the metal plate to ensure proper galvanic contact.

For electronic control gear applications in luminaire with plastic housing the metal plate of the reference luminaires shall be removed.

5.4 Wiring

Not twisted and flat multi-wire cables are recommended for the cables used on the reference luminaire. Where on the figures the connecting cables are drawn close together, they shall be mounted as close as possible to each other and to the metal plate. Wiring dimension and insulation shall be adequate for the applied voltage and current. The wiring connecting the reference luminaire to the artificial mains network and the wiring to the CISPR measuring receiver shall be in conformity with CISPR 15:2005 (Figures 5 and 6).

Table 1 – Grounding connection overview for protection class I and class II applications

Control gear design (terminals)	Selected luminaire design	
	A) Protection Class – I	B) Protection Class – II
PE, L, N or FE, L, N	reference luminaire <u>with</u> metal plate: - PE terminal of the reference luminaire is connected to the metal plate - PE or FE terminal of the control gear is connected to the metal plate - control gear housing is connected to the metal plate using the means for fixing the control gear	reference luminaire <u>without</u> metal plate: FE terminal of the reference luminaire is connected to the FE terminal of the control gear, only if needed for fulfilling the EMC requirements. A PE terminal of the control gear may not be connected.
L, N	reference luminaire <u>with</u> metal plate: - PE terminal of the reference luminaire is connected to the metal plate - if applicable the control gear housing is connected to the metal plate by using the means for fixing the control gear	reference luminaire <u>without</u> metal plate

6 Marking

The selected luminaire design for the measurement setup shall be specified in the technical documentation. As an option this information may be provided on the label of the control gear:

- “CIS 30-1: M” indicates the selected protection class I luminaire design;
- “CIS 30-1: P” indicates the selected protection class II luminaire design;
- “CIS 30-1: M + P” indicates the selected protection class I and class II luminaire design.

7 Guidance for luminaire design

When an electronic lamp control gear is incorporated in a luminaire, the method of installation of the electronic lamp control gear and the design of the luminaire itself can influence the overall radio disturbance characteristics of the luminaire.

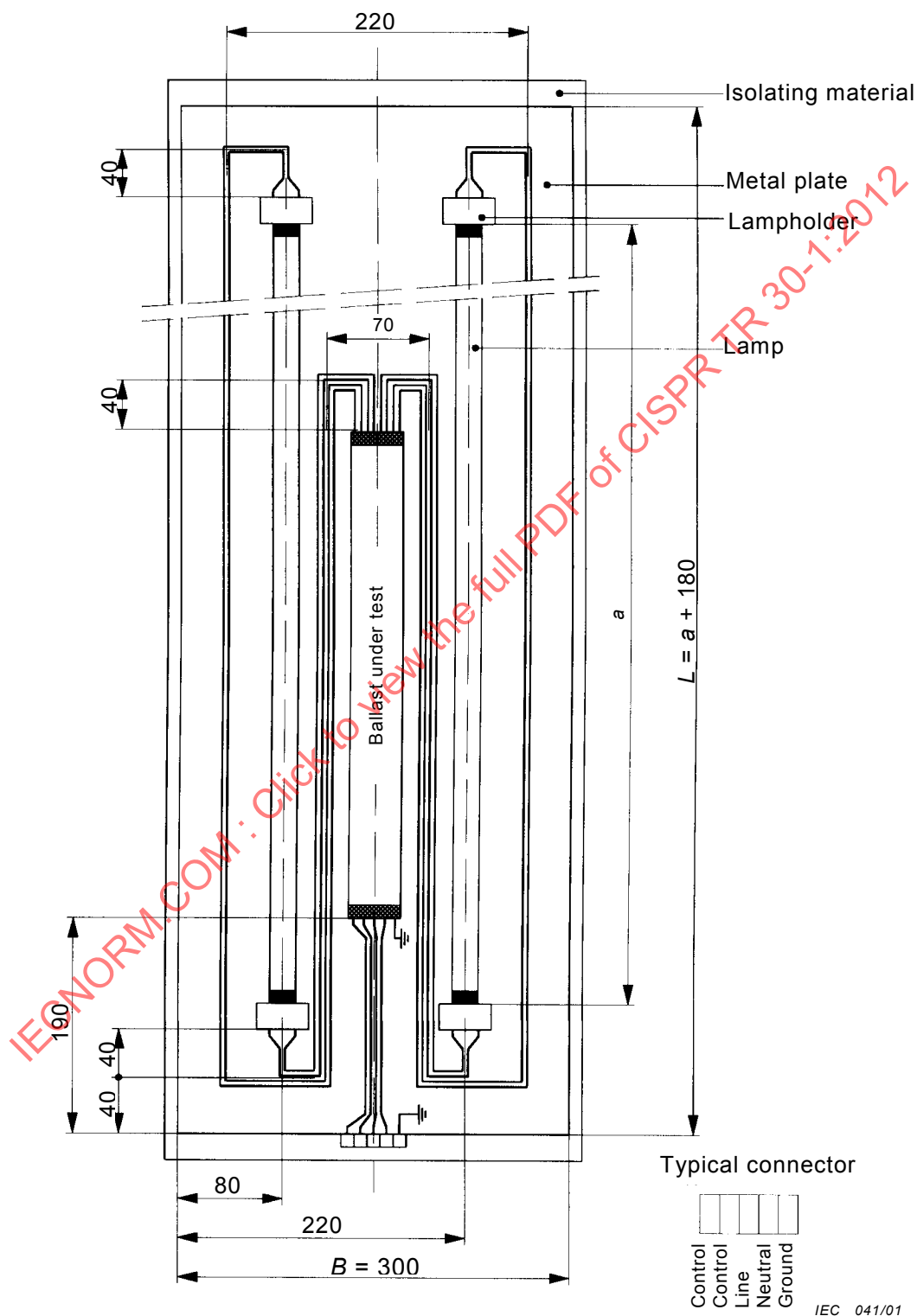
It is recommended that the electronic lamp control gear manufacturer give guidance to the luminaire designers on those aspects of the luminaire which affect its radio disturbance performance.

In this respect basic design rules are as follows:

- minimize wiring within the luminaire;
- separate mains wiring and control wiring from lamp wiring and lamp;
- if separation is not possible, screen the mains wiring and control wiring by a jacket;
- ensure a firm electrical contact and/or connection between all metal parts in the luminaire and the electronic control gear housing;
- ensure good connection to functional earth if metal shielding is used around the lamp(s).

Annex A (informative)

Mounting and wiring schemes



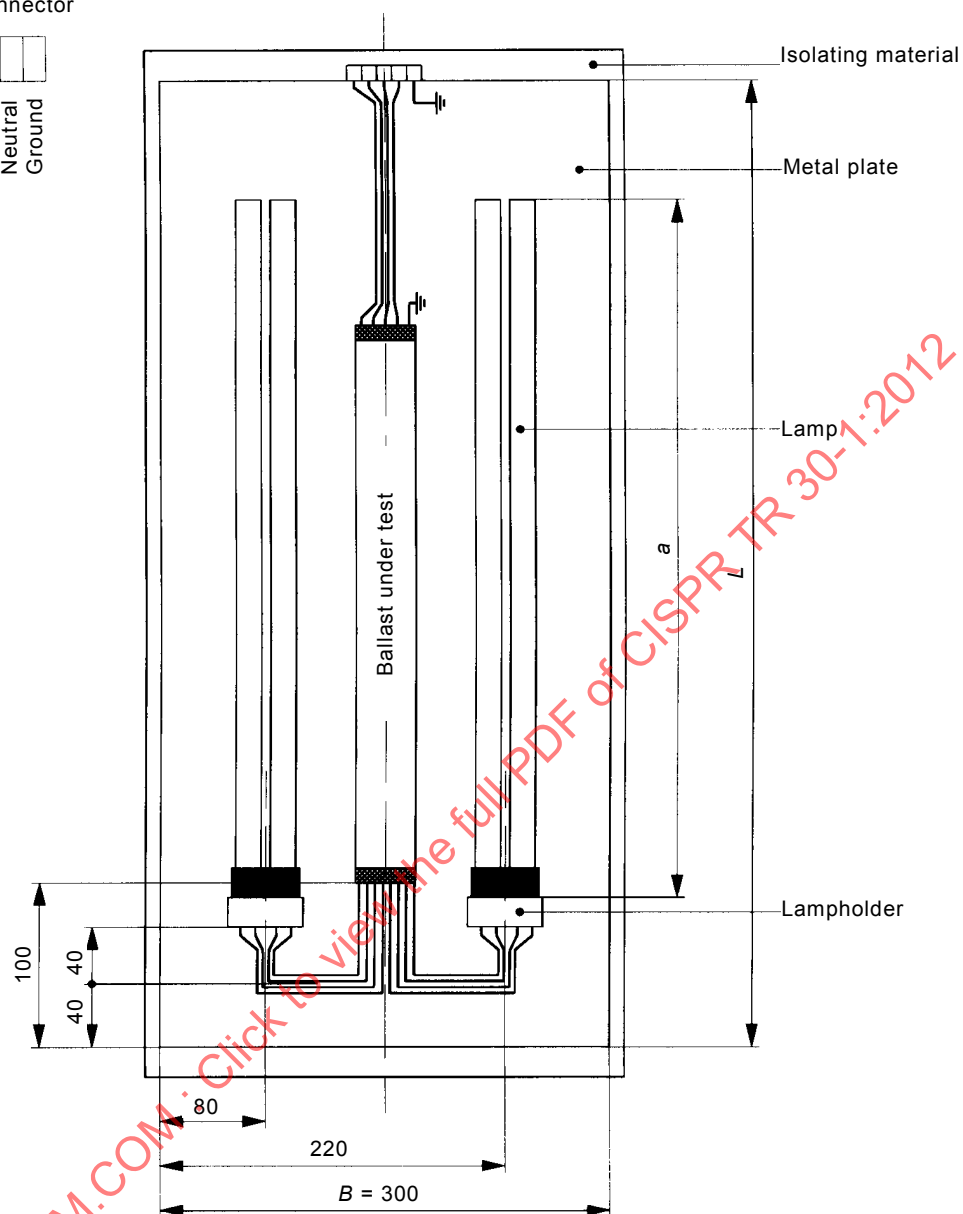
Dimensions in millimetres

**Figure A.1 – Mounting and wiring scheme of a reference luminaire
for two double-capped fluorescent lamps**

Typical connector



Control
Control
Line
Neutral
Ground

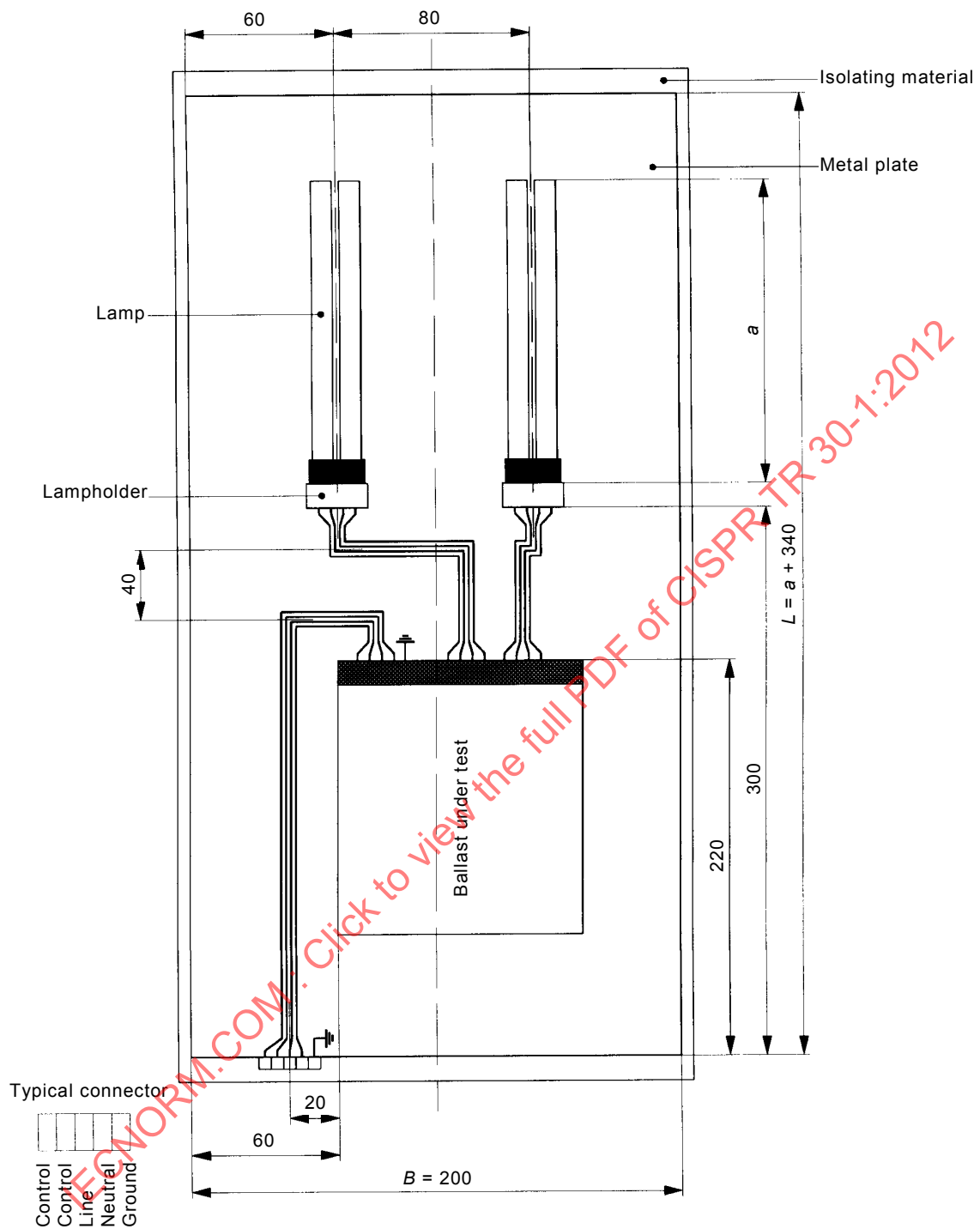


IEC 042/01

Dimensions in millimetres

 $L = 700$ for lamps with $a > 250$
 $L = 400$ for lamps with $a \leq 250$

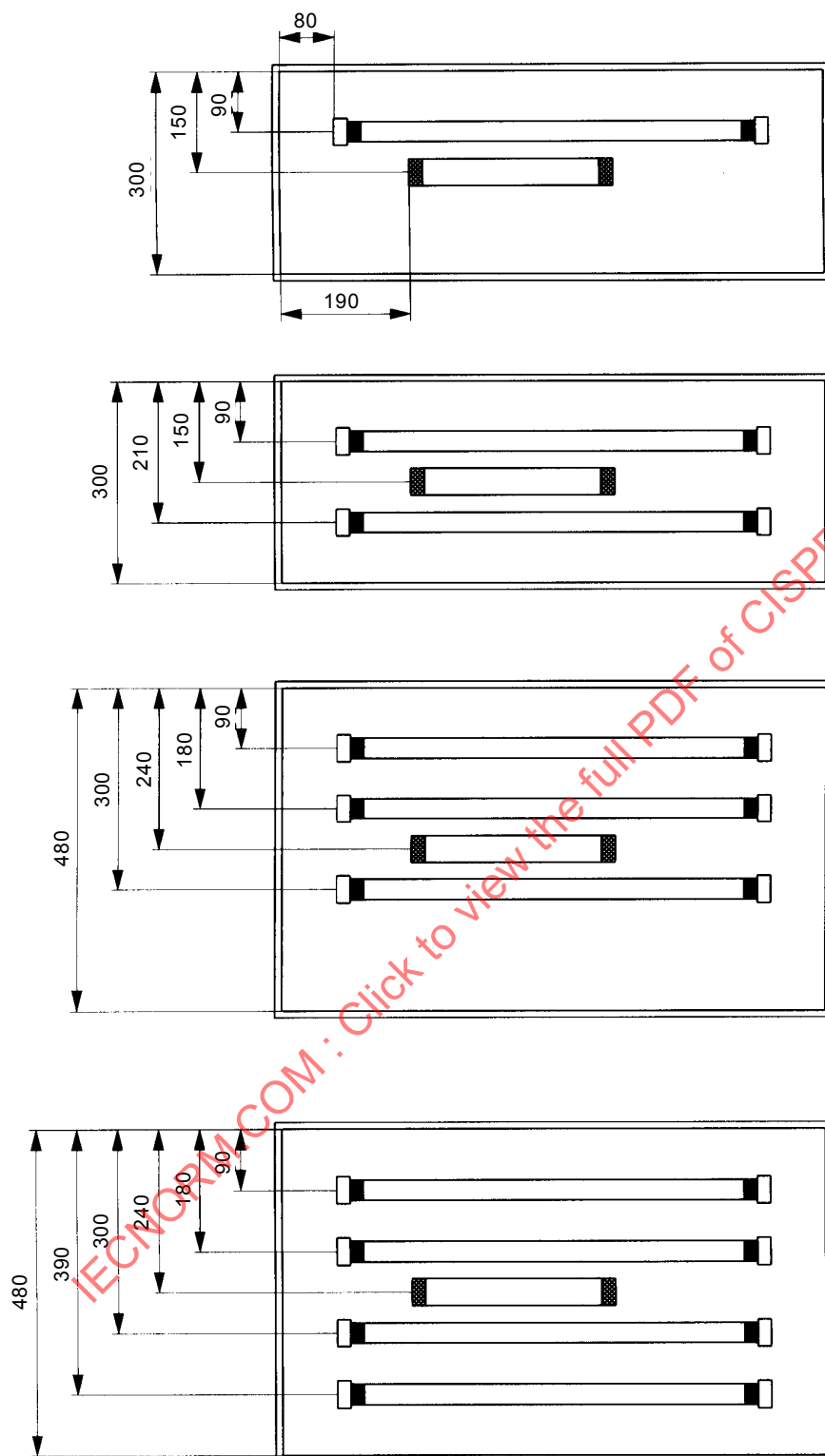
Figure A.2 – Mounting and wiring scheme of a reference luminaire for two single-capped fluorescent lamps, two-sided electronic control gear terminals



IEC 043/01

Dimensions in millimetres

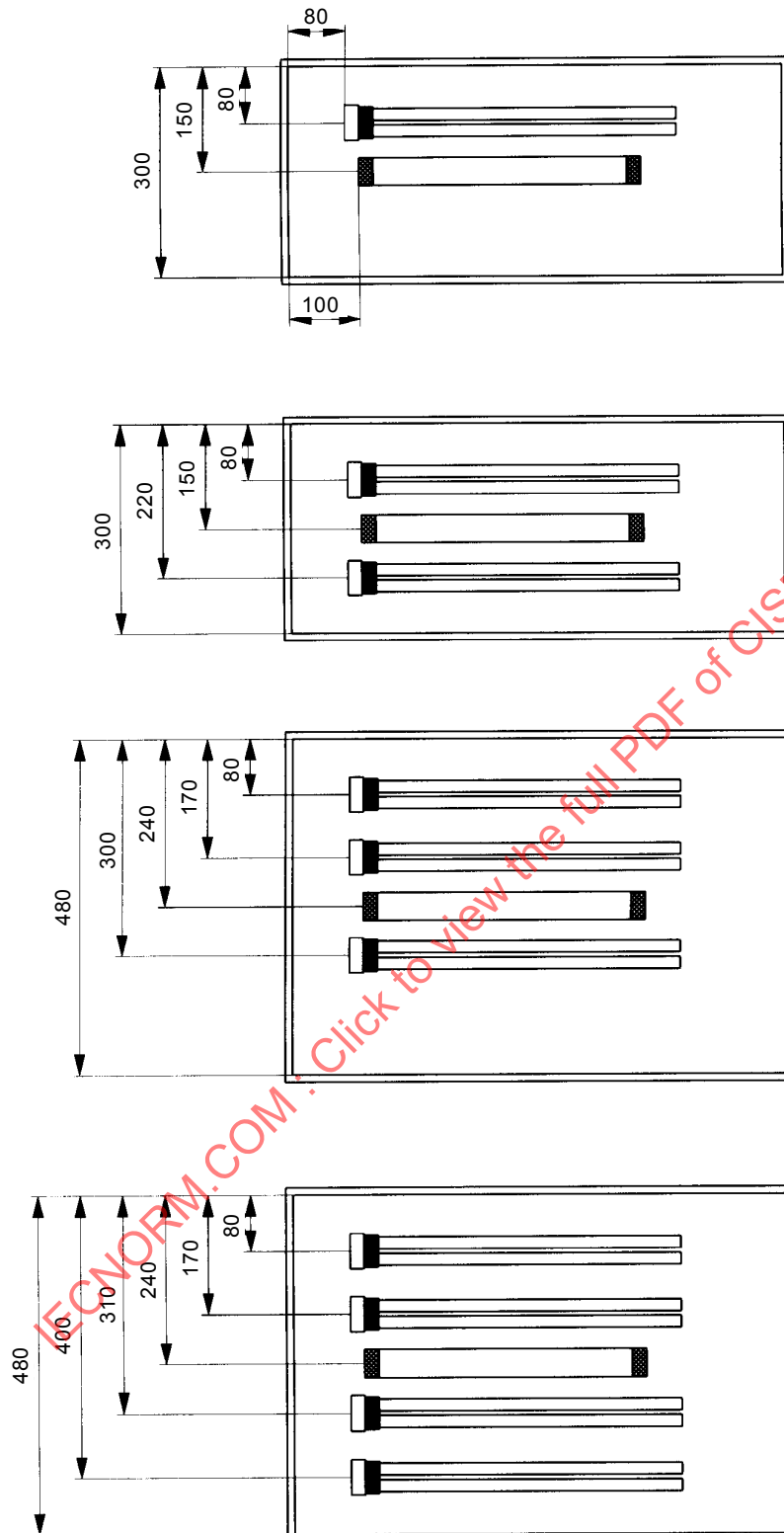
Figure A.3 – Mounting and wiring scheme of a reference luminaire for two single-capped fluorescent lamps, single-sided electronic control gear terminals



IEC 044/01

Dimensions in millimetres

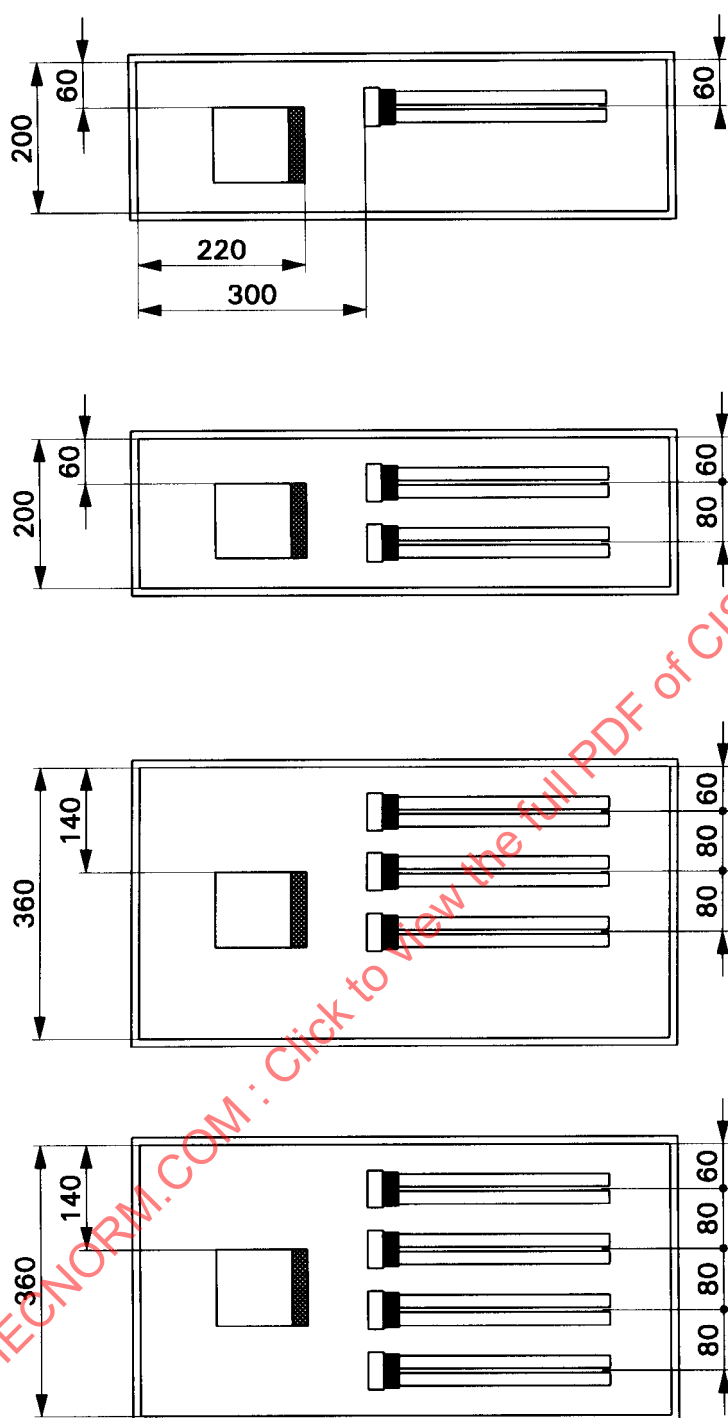
Figure A.4 – Mounting scheme of a reference luminaire for one, two, three or four double-capped fluorescent lamps



IEC 045/01

Dimensions in millimetres

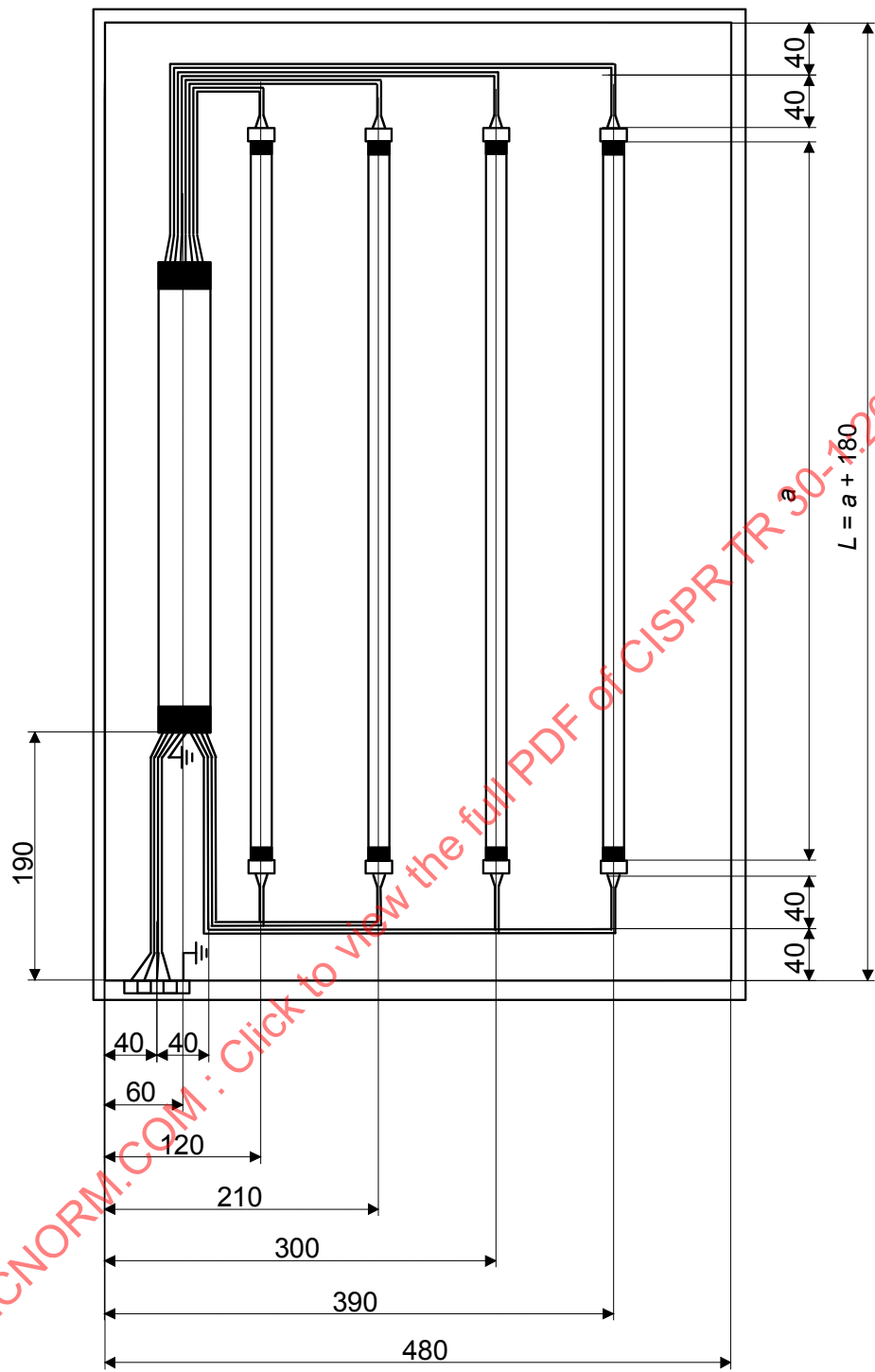
Figure A.5 – Mounting scheme of a reference luminaire for one, two, three or four single-capped fluorescent lamps, two-sided electronic control gear terminals



IEC 046/01

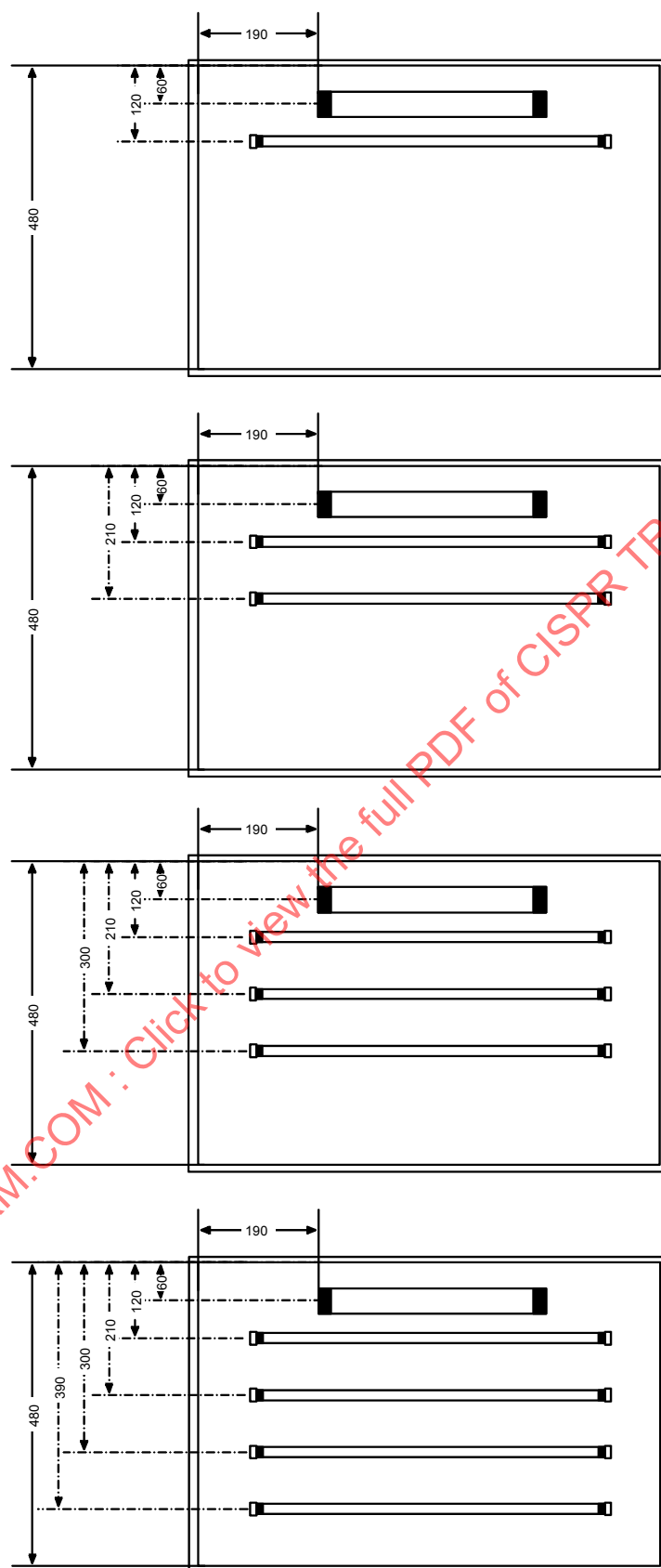
Dimensions in millimetres

Figure A.6 – Mounting scheme of a reference luminaire for one, two, three or four single-capped fluorescent lamps, single-sided electronic control gear terminals



Dimensions in millimetres

Figure A.7 – Mounting and wiring schema of a reference luminaire for four double-capped fluorescent lamps where the output terminals of the electronic control gear are positioned on both ends



Dimensions in millimetres

Figure A.8 – Mounting and wiring schema of reference luminaires for one, two, three or four double-capped fluorescent lamps where the output terminals of the electronic control gear are positioned on both ends