INTERNATIONAL STANDARD

IEC 61822

First edition
2002-06

Electrical installations for lighting and beaconing of aerodromes – Constant current regulators

Installations électriques pour l'éclairage et le balisage des aérodromes – Régulateurs du courant constant

Reference number
IEC 61822:2002(E)

Publication numbering

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International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE S

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS FOR LIGHTING AND BEACONING OF AERODROMES – CONSTANT CURRENT REGULATORS

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liasing with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61822 has been prepared by IEC Technical Committee 97: Electrical installations for lighting and beaconing of aerodromes.

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

FDIS	Report on voting
97/86/FDIS	97/90/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 3.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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

ELECTRICAL INSTALLATIONS FOR LIGHTING AND BEACONING OF AERODROMES – CONSTANT CURRENT REGULATORS

1 Scope

This International Standard specifies the requirements for a Constant Current Regulator (CCR) having a nominal output of 6,6 A for use in an aeronautical ground lighting constant current series circuit. However CCRs may be manufactured which have a different power rating (kVA) and current steps than those specified in this standard in order to be used on existing circuits. This standard shall be applied where appropriate for these CCRs.

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 60038, *IEC standard voltages*

IEC 60439-1:1991, *Low-voltage switchgear and controlgear assemblies – Part 1: Type-tested and partially type-tested assemblies*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 4: Emission standard for industrial environments*

IEC/TS 61000-6-5, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards – Immunity for power station and substation environments*

IEC 61140, *Protection against electric shock – Common aspects for installation of equipment*

CISPR 11, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*

CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purposes of this International Standard, the following definitions developed to be included in international standards relating to airport/aerodrome visual aids apply

3.1
aeronautical ground lighting (AGL) constant current series circuit
apparatus configured as an electrical circuit designed to produce and operate with a constant current, independent of variations in the load, in order to provide a specified light for aeronautical purposes

3.2
constant current regulator (CCR)
apparatus which produces a current output at a constant r.m.s. value independent of variations in the constant current series circuit load, input voltage and service conditions as specified

3.3
contractor
organisation or person(s) given a written order to provide a service or undertake specified work

3.4
earthed
connected to the ground in such a manner as to ensure at all times an immediate discharge of electrical energy to reduce the danger of equipment damage or personnel injury

3.5
electrical equipment
anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electrical energy

3.6
injury
death or personnel injury from electric shock, electric burn, electrical explosion or arcing, or from fire or explosion initiated by electrical energy, where any such death or injury is associated with the generation, provision, transmission, transformation, rectification, conversion, conduction, distribution, control, storage, measurement or use of electrical energy

3.7
isolate
to disconnect and separate electrical equipment from the normal source(s) of electrical energy in such a way that the disconnection and separation is secure

3.8
live
electrically connected to a source of electricity or having acquired a charge by other means

3.9
work/working (on electrical equipment)
installing, dismantling, assembling, maintaining or repairing of electrical equipment

4 Classification

4.1 Output current

The CCR shall produce a maximum rated r.m.s. current output of 6,6 A and a minimum rated r.m.s. current output of 1,8 A.

4.2 Current steps

CCRs shall be classified according to the number of output current steps available, as follows:

style 1 3 current steps;

style 2 5 current steps.

Each step shall have a single adjustment over the full range specified in 4.1.

NOTE An additional low current step(s) for non-illumination purposes may be offered as an option (see5.7.6). Each style CCR can be configured to operate with a reduced number of current steps.

4.3 Ratings

CCRs shall be manufactured in the following output power ratings:

1; 2,5; 5; 7,5; 10; 15; 20; 25; and 30 kVA.

NOTE 1 There may be situations where greater power rating is required than that specified in this International Standard to meet existing circuit requirements. In this case, the CCR should meet the applicable performance, qualification and safety requirements contained in this International Standard.

The standard input voltage to the CCR (see 5.3.5) shall be a single-phase or three-phase value in accordance with IEC 60038.

NOTE 2 Input voltage configured between two phases of a three-phase system is defined as single-phase.

The operating frequency shall be 50 Hz ± 7,5 % or 60 Hz ± 7,5 %.

NOTE 3 The CCR may be designed to operate from a d.c. power source.

5 Requirements

5.1 General

The following requirements are grouped into six categories: environmental, performance, EMC, design, protection against electric shock and optional accessories.

5.2 Environmental requirements

The equipment shall be designed for continuous indoor operation without derating, under the following conditions:

– temperature range from 0 °C to +50 °C;
– relative humidity from 10 % to 95 % without dewing;
– altitude from sea-level to 1 000 m;
– electromagnetic compatibility – as per IEC 61000-6-2.

5.3 Performance requirements

5.3.1 Regulation – resistive loading

The CCR shall maintain the output current within the limits of table 1 while powering any resistive load between no load (short circuit) and full load. CCRs shall provide regulation over the full range of environmental conditions specified in 5.2 and the input voltage range of 90 % to 110 %.

When current steps different than those shown below are used, the tolerances (± 0,1 A) used in table 1 shall be maintained.

Table 1 – Nominal CCR output current range

Style	Current step	Nominal output (A r.m.s.)	Allowable range (A r.m.s.)
1	3	6,60	6,50 – 6,70
	2	5,50	5,40 – 5,60
	1	4,80	4,70 – 4,90
2	5	6,60	6,50 – 6,70
	4	5,20	5,10 – 5,30
	3	4,10	4,00 – 4,20
	2	3,40	3,30 – 3,50
	1	2,80	2,70 – 2,90

5.3.2 Regulation – reactive loading

The CCR shall maintain the current within the limits of table 1 for all current steps when the load has an inductive power factor of 0,60.

5.3.3 Efficiency

At all current steps, the average efficiency of the CCR, operating at rated input voltage into a full nominal resistive load shall not be less than 80 %.

5.3.4 Power factor

The power factor of the CCR, operating at rated input voltage into a full nominal resistive load shall not be less than 0,90.

5.3.5 Input voltage

Input voltage shall be as stated in 4.3. The CCR shall operate as required in 5.3.1 when the input voltage is anywhere between 90 % and 110 % of the nominal input.

The CCR shall be designed to withstand momentary increases of voltage up to 120 % and momentary decreases of voltage down to 80 % of the nominal input voltage without being de-energized or damaged by such voltages. The CCR shall withstand such voltage excursions for up to 50 ms within a period of 1 min. The CCR shall automatically resume normal operation (table 1) when the input voltage returns to 90 % to 110 % of the nominal value.

5.3.6 Load matching

CCRs shall match connected loads from 50 % to 100 % of the rated load.

For resistive loads in the range of 50 % to 100 % of the rated load, at the rated input voltage, and with an output current at 100 %, the efficiency and power factor shall not be less than the values specified in 5.3.3 and 5.3.4. If required, additional output load taps may be provided to allow a more precise adjustment.

5.3.7 Operation

The CCR shall stabilize the output current at any selected current step within 500 ms, and shall hold the output current stable within the limits of table 1. There shall not be any interruption of output current to the series circuit when switching from one current step to another.

5.3.8 Control/Monitoring System

5.3.8.1 Functions

The CCR shall be capable of being controlled locally and from a remote location. Information on the selected current step and remote/local status shall be provided at the CCR regardless of whether the CCR is in local or remote control.

The local control system shall be integral to the CCR and shall not be supplied from a source located outside the CCR package. The CCR shall be capable of being controlled remotely for any current level by parallel wiring or serial interface. The design of the remote control interface shall provide, at least, the inputs and outputs described in table 2:

Table 2 – CCR remote control/monitoring functions

Remote control			Remote monitoring			
	Standard	**Option**		**Standard**		**Option**
a	On/Off selection		a	CCR on		
			b	Local/Remote		
b	Current step selection		c	Step 1 selected	c1	Step 1 obtained
			d	Step 2 selected	d1	Step 2 obtained
			e	Step 3 selected	e1	Step 3 obtained
			f	Step 4 selected	f1	Step 4 obtained
			g	Step 5 selected	g1	Step 5 obtained
					h	CCR out of range
			I	Open circuit trip		
			J	Over current trip		
c		CCR Non-illumination step			k	CCR non-illumination step
d		Circuit Selector Switch			l	Circuit selector fault
					m	Lamp fault warning
					n	Lamp fault alarm
					o	Earth fault warning
					p	Earth fault alarm
NOTE For the monitoring section, if (c1) to (g1) is implemented, (c) to (g) can be omitted						

5.3.8.2 Control interface

The standard source voltage for controlling and monitoring the CCR shall be +48 V d.c., +24 V d.c. or +60 V d.c. nominal, with the negative pole being common. Remote control power shall be provided from a source either external or internal to the CCR. If internal, a dedicated power supply shall be for remote control only.

Relays or other isolating devices shall be provided for switching on and setting the current steps of the CCR.

Monitoring of the CCR data output shall be provided by relay contacts or another isolating device rated at minimum 60 V d.c. and 50 mA. Where a common pole is used, it shall be negative.