Compliance with Standards

FAA:  AC 150/5345-10 (current edition), L-828, L-829 except for input voltage


IEC:  61822

CENELEC:  EN61822
Various national standards
CE certified

Uses

The pure sine wave CCRs are specially designed for the supply of airport lighting series circuits at various intensity levels. The high reaction speed of the CCR contributes substantially to coping with present days circuits characterized by non-linear loads like taxiway guidance signs, LED electronics and ILCMS modules.

Benefits & Features

- True sinusoidal wave output, low harmonic output.
- High regulation precision and response dynamic thanks to high frequency PWM - IGBT technology.
- State-of-the-art power management technology:
  - DSP (Digital Signal Processor) and microprocessor embedded processing control.
  - Fully digitalized high precision control and regulation, via parameters processed in a numerical way to overcome affection by temperature, voltage or other physical parameters.
  - Adaptable to circuit configurations consisting of non-linear loads like new technology LED lights, Individual Lamp Control and Monitoring Systems and taxiway signs with light sources other than halogen lamps.
- Remote network control, monitoring and diagnostic functionality.
- An integrated menu-driven human machine interface (HMI) allowing full configuration on-site without any additional equipment.
- Available for 1-phase or for a better balance of the load – 3-phases mains supply.
- Standard built-in lamp, earth fault detection and high energy lightning protection.
POWER EQUIPMENT

Types VIS and CRE

Concept

- The innovative design principle adopted for the CRE CCR family is based on transferring most of the power control tasks from the hardware circuits into the software processing of control algorithms.
- An IGBT H-bridge transfers the input signal into a PWM (Pulse Width Modulation) output sine wave. The switching timing is controlled directly by a very fast DSP (Digital Signal Processor) loaded with proper software.
- An A/D converter at the secondary side of the output transformer measures the output signal. These data are processed via software algorithms in the Digital Signal Processor (DSP) and form the input for the regulation process. The high-speed DSP allows for real-time control and improves the regulation dynamics by at least a factor 10 compared to traditional thyristor-type CCRs. The same microprocessor also detects the lamp and earth faults and manages any other useful status information for local or remote control and monitoring.
- The remote control and monitoring can either be realized via multiwire, or serial bus via single or dual J-Bus or via J-Bus over Ethernet, or even via a wireless ZigBee connection.
- A line filter protects the main line for harmonic pollution on the mains.

![Fig. 2 Concept](image-url)
Construction

The CRE type CCRs are FAA-style stand-alone units each housing a complete regulator in one enclosure (Fig. 3), divided into three compartments:

1. A low-voltage front compartment, containing the power, the control and monitoring PCBs, and a fused input switch.
   a. CPU board
   b. Input circuit breaker
   c. Main contactor
   d. IGBT control board with IGBT bridge
   e. IGBT driver board
   f. Power supply board
   g. Remote control board (not shown)
   h. Measurement board (not shown)

2. A high-voltage rear compartment, containing the output transformer, current and voltage measurement transformers, and lightning arrestors.

3. A control module housing a customer-friendly menu driven control and monitoring unit with functional keyboard (Fig. 4) and alphanumeric display (Fig. 5).

Depending on the rating of the CCR the units are supplied in mainly 2 different sizes. The 2.5 kVA can be supplied as racked version.

Finish

Baked epoxy powder coating.
Color: Light grey RAL 7035.

Standard Options

Lamp (LFD) and Earth Fault Detection (EFD)

Both modules come standard with each delivered CCR.

The LFD provides accurate and real-time detection of the number of burnt-out lamps, up to 15 lamps, in a series circuit whereas the EFD measures the insulation resistance of the series circuit to the ground, with the regulator both ON and OFF. Measurement range from 500MΩ down to 5kΩ.

The number of failed lamps in and the isolation resistance of the circuit are reported to the alphanumeric display (Fig. 5) on the CCR front. The 2 alarm levels for each function can be adjusted via customer settable parameters.

The CCRs can be supplemented by an integrated circuit selector allowing to control simultaneously or individually different sub-circuits from one CCR. This circuit selector is available with 2, 4, 6 or 8 circuits and can be controlled remotely via multi-wire, J-Bus or ethernet.
The H.V. cut out is a safety device that isolates the series circuit from the CCR output. It also provides earthing and insulation resistance measurement functions. The H.V. cut out is not available with the circuit selector option.

Rolling castors/support feet
The CCR can be equipped with two fix and two pivoting rolling castors to ease displacement during service activities. Not for stacked units. Rolling castors are not available with the Circuit Selector Option, the circuit selector option is delivered with support feet.

Technical Data
Performance figures are always equal to or better than specified hereunder.

Current regulation:
- Within 1% tolerance
  - For nominal input voltage ± 10% nominal frequency ± 7%
  - Under IEC 61822 environmental conditions
  - From full load to short circuit
- Two preset regulation modes (normal lamps - distorted loads)

Ratings

<table>
<thead>
<tr>
<th>Rated power (kVA)</th>
<th>Output VRMS @ max output current 6.6A (continuous service)</th>
<th>Insulation test on output(1)</th>
<th>Output over-voltage protections 25kApk</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>0.38kVRMS</td>
<td>3kV</td>
<td>750VRMS, 1.4kJ</td>
</tr>
<tr>
<td>4</td>
<td>0.60kVRMS</td>
<td>5kV</td>
<td>1k5VRMS, 2.8kJ</td>
</tr>
<tr>
<td>5</td>
<td>0.75kVRMS</td>
<td>5kV</td>
<td>1k5VRMS, 2.8kJ</td>
</tr>
<tr>
<td>7.5</td>
<td>1.13kVRMS</td>
<td>6kV</td>
<td>2k2VRMS, 4.2kJ</td>
</tr>
<tr>
<td>10</td>
<td>1.5kVRMS</td>
<td>10kV</td>
<td>2k2VRMS, 4.2kJ</td>
</tr>
<tr>
<td>15</td>
<td>2.30kVRMS</td>
<td>12kV</td>
<td>3kVRMS, 5.6kJ</td>
</tr>
<tr>
<td>20</td>
<td>3.00kVRMS</td>
<td>15kV</td>
<td>4k5VRMS, 8.4kJ</td>
</tr>
<tr>
<td>25</td>
<td>3.80kVRMS</td>
<td>19kV</td>
<td>5k2VRMS, 9.8kJ</td>
</tr>
<tr>
<td>30</td>
<td>4.54kVRMS</td>
<td>23kV</td>
<td>6kVRMS, 11.2kJ</td>
</tr>
</tbody>
</table>

Input voltage ratings:
400 V AC +/- 10% 50/60 Hz 1-phase or 3-phase
Other versions upon request.

Remote control:
Multi-wire: 24 or 48 to 60 V DC
Single or Dual J-Bus protocol over RS485
Single or Dual J-Bus over Ethernet IEEE 802.3

Brightness control:
Up to 8 brightness steps, user adjustable in 65k levels (1mA resolution)
Output current regulation. Within ± 1% for all the brightness steps, under either IEC or FAA standard conditions.

Regulation response time:
The regulation time is less than 0.3 seconds for any operational condition, and exceeds the requirements of IEC 61822.

Open circuit output voltage:
Less than 1.2 times the nominal output voltage (RMS)
Efficiency
92 to 94% depending on the CCR size, under nominal resistive load, nominal output current and nominal input voltage

Power factor at the output
CRE Power factor exceeds IEC and FAA requirements. The power factor at rated load is close to 1 and is kept at high level for any possible operational conditions.
The VIS power factor is better than 0.85.

Degree of protection: IP 21
Mechanical arrangement rack version (2.5kVA)

Note: On request, the rack version can be installed into an apposite steel frame.

Outline Dimensions and Weight
(Tables for both 1-phase and 3-phase CCRs)

<table>
<thead>
<tr>
<th>Power kVA</th>
<th>Dimensions (W×D×H)mm ¹ Keyboard including</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-phase</td>
<td>3-phase</td>
</tr>
<tr>
<td>2.5 (stackable)</td>
<td>550×800×460</td>
<td>550×800×460</td>
</tr>
<tr>
<td>2.5</td>
<td>420×550×1300</td>
<td>420×840×1300</td>
</tr>
<tr>
<td>4</td>
<td>420×840×1300</td>
<td>420×840×1300</td>
</tr>
<tr>
<td>5</td>
<td>420×840×1300</td>
<td>420×840×1300</td>
</tr>
<tr>
<td>7.5</td>
<td>420×840×1300</td>
<td>420×840×1300</td>
</tr>
<tr>
<td>10</td>
<td>420×840×1300</td>
<td>600×840×1350</td>
</tr>
<tr>
<td>15</td>
<td>420×840×1300</td>
<td>600×840×1350</td>
</tr>
<tr>
<td>20</td>
<td>520×840×1660</td>
<td>600×840×1780</td>
</tr>
<tr>
<td>25</td>
<td>520×840×1660</td>
<td>600×840×1780</td>
</tr>
<tr>
<td>30</td>
<td>520×840×1660</td>
<td>600×840×1780</td>
</tr>
</tbody>
</table>

Notes
1 Depth dimension will be different with optional cut-out.
See leaflet A.06.455.

Packing Data

<table>
<thead>
<tr>
<th>Rating kVA</th>
<th>Seaworthy packing</th>
<th>Case dimensions (mm)</th>
<th>Gross Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1-phase</td>
<td>3-phase</td>
</tr>
<tr>
<td>2.5/stackable</td>
<td>Pallets:</td>
<td>600 x 1000 x H = 650</td>
<td>115</td>
</tr>
<tr>
<td>2.5</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1500</td>
<td>153</td>
</tr>
<tr>
<td>4</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1500</td>
<td>183</td>
</tr>
<tr>
<td>5</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1500</td>
<td>188</td>
</tr>
<tr>
<td>7.5</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>213</td>
</tr>
<tr>
<td>10</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>253</td>
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<tr>
<td>15</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>283</td>
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<tr>
<td>20</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>370</td>
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<tr>
<td>25</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>420</td>
</tr>
<tr>
<td>30</td>
<td>Pallets:</td>
<td>1200 x 800 x H = 1850</td>
<td>450</td>
</tr>
</tbody>
</table>
## Types VIS and CRE

### Ordering Code

<table>
<thead>
<tr>
<th>Type of CCR</th>
<th>CRE X X X X X X X X X X</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRE = Single phase</td>
<td></td>
</tr>
<tr>
<td>VIS = Three phase</td>
<td></td>
</tr>
</tbody>
</table>

#### Output Power/Current

<table>
<thead>
<tr>
<th>Letter</th>
<th>Power/Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.5 kVA/6.6A</td>
</tr>
<tr>
<td>B</td>
<td>2.5 kVA/6.6A</td>
</tr>
<tr>
<td>C</td>
<td>4 kVA/6.6A</td>
</tr>
<tr>
<td>D</td>
<td>5 kVA/6.6A</td>
</tr>
<tr>
<td>E</td>
<td>7.5 kVA/6.6A</td>
</tr>
<tr>
<td>F</td>
<td>10 kVA/6.6A</td>
</tr>
<tr>
<td>G</td>
<td>15 kVA/6.6A</td>
</tr>
<tr>
<td>H</td>
<td>20 kVA/6.6A</td>
</tr>
<tr>
<td>I</td>
<td>25 kVA/6.6A</td>
</tr>
<tr>
<td>J</td>
<td>30 kVA/6.6A</td>
</tr>
<tr>
<td>K</td>
<td>40 kVA/6.6A</td>
</tr>
</tbody>
</table>

#### Input Voltage (50/60Hz)

- 2 = 220/230
- 4 = 380/400

#### Remote Control Multi-wire

- 0 = No Multi-wire
- B = Multi-wire 48 VDC
- C = Multi-wire 24 VDC

#### Remote Control Via Serial Bus

- 0 = No J-Bus
- B = Single J-Bus on Ethernet (MCR II Protocol)
- C = Dual J-Bus on RS485 (MCR II Protocol)
- D = Dual J-Bus on Ethernet (MCR II Protocol)

#### Output Field Connection

- 0 = None
- 1 = SCO
- 3 = SCB

#### Rolling Castors

- 0 = None
- 1 = 2 fix / 2 pivot
- 4 = With pedestal (CRE)

#### Circuit Selector / Number of Circuits

- 0 = No circuit selector, 1 circuit
- A = With circuit selector, 2 circuits
- C = With circuit selector, 4 circuits
- E = With circuit selector, 6 circuits
- G = With circuit selector, 8 circuits

#### Output Current

- 0 = 6.6A

#### CCR Revision

- 1 = v01 (VIS)
- 2 = v02 (CRE)

### Notes

1. Stackable.
2. Signals out limited in case of dual J-Bus.
3. 220/230V only up to 7.5 kVA. If digit 5 is 2, then digit 4 must be A, B, C, D or E.
4. If digit 4 is A, then digit 9 must be 0.
5. If digit 8 is 0, then digit 9 must be 4.
6. If digit 6 is B, then digit 10 must be 0. M48Vdc is not compatible with the circuit selector.
7. Only for CRE stackable.
8. If digit 10 is A, C, E or G, then digit 9 must be 4. Circuit selector is housed in a pedestal.

Note: For any special request, please contact your ADB SAFEGATE sales representative.