POWER EQUIPMENT

Types VIS and CRE

Pure Sine Wave IGBT controlled CCRs

Compliance with Standards

FAA:	AC 150/5345-10 (Current Edition), L-828, L-829 except for input voltage
ICAO:	Aerodrome Design Manual Part 5, para 3.2. (Current Edition)
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.

Fig. 1

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.

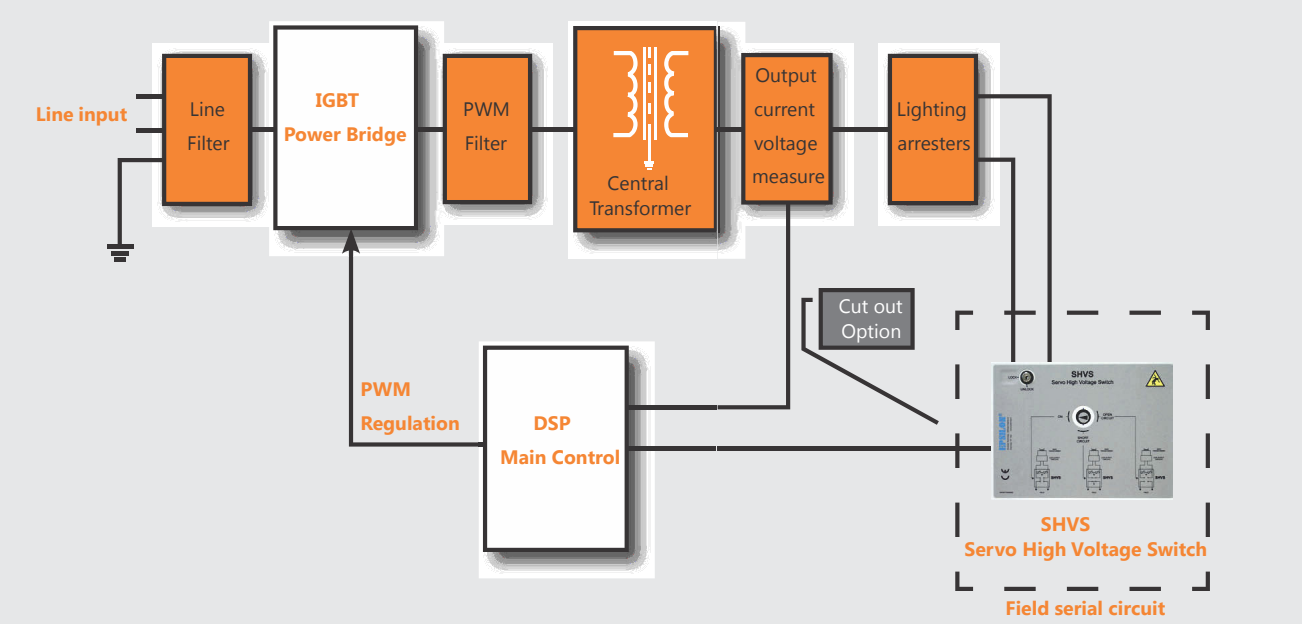

Fig. 2 Concept

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.

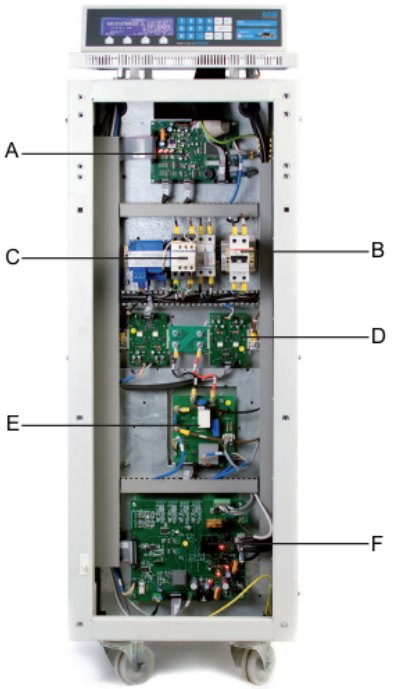

Fig. 3 The housing

Finish

Baked epoxy powder coating.

Color: Light grey RAL 7035.

Fig. 4 Control and monitoring unit with keyboard

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 alphanumerical display (Fig. 5) on the CCR front. The 2 alarm levels for each function can be adjusted via customer settable parameters.

Fig. 5 Alphanumerical display

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.

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Fig. 6 Circuit selector

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.

Fig. 7 H.V. cut out

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)

Table 1: Ratings

Rated power (kVA)	Output vRMS @ max output current 6.6A (continuous service)	Insulation test on output(1)	Output over-voltage protections 25kApk
2.5	0.38kV$_{RMS}$	3kV	750V$_{RMS}$, 1.4kJ
4	0.60kV$_{RMS}$	5kV	1k5V$_{RMS}$, 2.8kJ
5	0.75kV$_{RMS}$	5kV	1k5V$_{RMS}$, 2.8kJ
7.5	1.13kV$_{RMS}$	6kV	2k2V$_{RMS}$, 4.2kJ
10	1.5kV$_{RMS}$	10kV	2k2V$_{RMS}$, 4.2kJ
15	2.30kV$_{RMS}$	12kV	3kV$_{RMS}$, 5.6kJ
20	3.00kV$_{RMS}$	15kV	4k5V$_{RMS}$, 8.4kJ
25	3.80kV$_{RMS}$	19kV	5k2V$_{RMS}$, 9.8kJ
30	4.54kV$_{RMS}$	23kV	6kV$_{RMs}$, 11.2kJ

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 0.5 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

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Power factor at the output

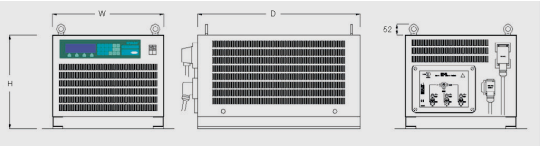
CRE Power factor exceeds IEC and FAA requirements. The power factor at rated load is close to 1 and is kept at high level for any possible operational conditions.

The VIS power factor is better than 0,85.

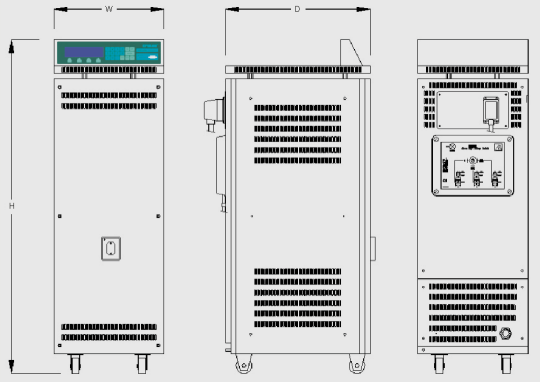
Degree of protection: IP 21

Mechanical arrangement rack version (2.5kVA)

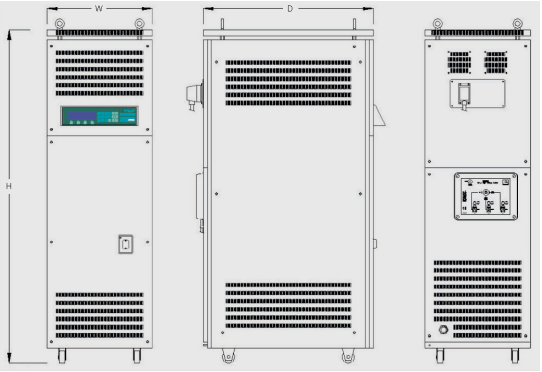
Note: On request, the rack version can be installed into an apposite steel frame.



Mechanical arrangement from 2.5kVA to 15kVA



Mechanical arrangement from 20kVA to 30kVA



Outline Dimensions and Weight

(Tables for both 1-phase and 3-phase CCRs)

Power kVA	Dimensions (W×D×H)mm [1] Keyboard including		Weight (Kg)	
	1 -phase	3-phase	1-phase	3-phase
2.5 (stackable)	550×800×460	550×800×460	95	105
2.5	420×550×1300	420×840×1300	130	140
4	420×840×1300	420×840×1300	160	180
5	420×840×1300	420×840×1300	165	190
7.5	420×840×1300	420×840×1300	190	215
10	420×840×1300	600×840×1350	230	255
15	420×840×1300	600×840×1350	260	285
20	520×840×1660	600×840×1780	330	360
25	520×840×1660	600×840×1780	380	410
30	520×840×1660	600×840×1780	410	450

Notes

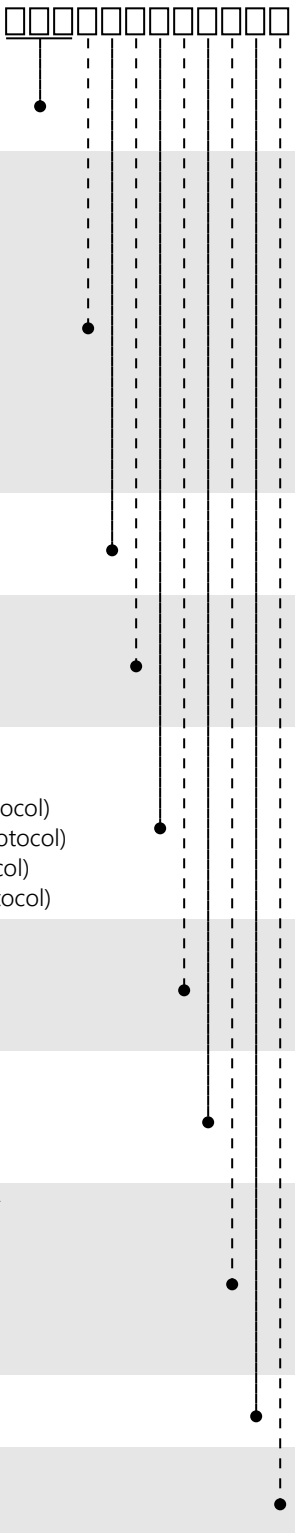
[1] Depth dimension will be different with optional cut-out. See leaflet A.06.455.

Packing Data

Rating kVA	Seaworthy packing		
	Case dimensions (mm)	Gross Weight (kg)	
		1-phase	3-phase
2.5/stackable	Pallets: 600 × 1000 x H = 650	115	135
2.5	Pallets: 1200 × 800 x H=1500	153	163
4		183	203
5		188	213
7.5		213	238
10		253	278
15		283	308
20	Pallets: 1200 × 800 x H = 1850	370	400
25		420	450
30		450	490

Types VIS and CRE

Ordering Code



Type of CCR
CRE= Single phase
VIS = Three phase

Output Power/Current
A = 2.5 kVA/6.6A[1,5,9]
B = 2.5 kVA/6.6A
C = 4 kVA/6.6A
D= 5 kVA/6.6A
E = 7.5 kVA/6.6A
F = 10 kVA/6.6A
H= 15 kVA/6.6A
I = 20 kVA/6.6A
J = 25 kVA/6.6A
K = 30 kVA/6.6A

Input Voltage (50/60Hz)
2 = 220/230[7]
4 = 380/400

Remote Control Multi-wire[9]
0 = No Multi-wire[2]
B = Multi-wire 48 VDC[6]
C = Multi-wire 24 VDC

Remote Control Via Serial Bus[6,9]
0 = No J-Bus
A = Single J-BUS on RS485 (MCR II Protocol)
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[3]
1 = SCO
3 = SCB

Rolling Castors
0 = None[8]
1 = 2 fix / 2 pivot
4 = With pedestal (CRE)

Circuit Selector / Number of Circuits[4]
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. If digit 4 is A , then digit 9 must be 0.
2. If digit 6 is B, then digit 9 must be 0 or 1 and digit 10 must be 0. MW48Vdc is not compatible with the pedestal/circuit selector.
3. If this digit 8 is 0, then digit 9 must be 4. Pedestal is not compatible with SCO or SCB . I f digit 8 is 1 or 3, then digit 9 must be 0 or 1. Cabinets without pedestal need to be equipped with either SCO or SCB.
4. If digit 10 is A, C , E or G, then digit 9 must be 4. Circuit selector is housed in a pedestal.
5. Stackable.
6. Signals out limited in case of dual J-Bus.
7. 220/230V only up to 7,5 kVA. If digit 5 is 2 , then digit 4 must be A, B, C, D or E.
8. Only for CRE stackable.
9. For 2.5 kVA, stackable (digit 4 is A and digit 9 is 0): If digit 6 is B or C, digit 7 must be 0 or C.

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