Applications

The single-phase constant current regulators, series UR2000 - UR2100 - UR2200, have been particularly designed to provide power to airport lighting series circuits; particularly UR2000 and UR2100 regulators assure sinusoidal current (see THD feature) either at the input either at the output, high power factor, elevated efficiency and low distortion (see THD feature), also in case of very low load. These constant current regulators are suitable for operation under the following environmental conditions:

- protected ambient;
- temperature comprising between - 40° C and + 55° C, including monitoring circuitry;
- height above sea from 0 up to 2000 m;
- humidity from 10% through 95% (not condensing).

Features

- L-828 and L-829 FAA Approved, ETL Certified.
- UR2100 regulators are equipped with two independent power modules for maximum reliability: one for normal operation, utilizes PWM controlled power transistors with forced ventilation (Patented Topology), the other, as stand-by, two anti-parallel thyristors with natural cooling. “Zero” commuting time between the two modules.
- UR2000 regulators are the same as UR2100 without SCR power unit.
- UR2200 regulators are the same as UR2100 without IGBT power unit.
- DSP (Digital Signal Processor) control for maximum performance improvement, very large operating data information and user-friendly diagnostic.
- Soft start with adjustable warm-up.
- Operation keyboard for local control.
- Auxiliary keyboard to scroll the display visualization and to access the menu for programming purpose.
- Max 8-step output current, each adjustable between 1.8A (for service purpose only) and 6.6A.
- Integrated input and output lightning arresters (opt. 74 and 75 respectively for IEC version).
- Alphanumeric LCD display, with four-line twenty characters each, to provide information about the regulator status-operation, to show input-output electrical data, time operation (total and at each step) and any warning-alarm condition, and to allow the calibration activity.
- Large STEP Display (one digit 7-segment multi-color led display) to provide an immediate information about the CCR status.
- Open circuit protection.
- Overcurrent protection.
- Input power loss, output power drop and output current mismatching detection always available.
- Integrated L-829 monitoring.
- Optional integrated circuit selector control (up to four ways).
- Integrated parallel wiring remote control interface.
- Optional integrated OCEM computerized interface, based on EIA-709.1 Lonworks Echelon standard protocol (opt. 93).
- Other available options:
  - RS232 serial port for diagnostic (opt. 25);
  - Earth leakage local continuous reading (MW, kW) and earth fault detection (opt. 31);
  - Lamp fault detection (opt. 36);
  - Series circuit cutout (opt. 76);
  - Nylon wheels (opt. 85);
  - Finish according to customer requirement (opt. 86);
  - AENA ANEXO compliance (opt. PPT2/04/04).

How to order

Compliances: FAA AC 150/5345-10F (L-828 & L-829)
IEC 61822 (2002-06) and IEC 61821 (2002-03)
ICAO Aerodrome Design Manual, Part 5
ANEXO 20, AENA PPT 002
Other features

- **Output power**: 2.5 kVA, 4 kVA, 5 kVA, 7.5 kVA, 10 kVA, 15 kVA, 20 kVA, 25 kVA and 30 kVA.
- **Single-phase power supply voltage**: 208VAC, 220VAC, 230VAC, 240VAC, 277VAC, 347VAC, 380VAC, 400VAC, 415VAC, 480VAC +10% -5% (FAA). The regulators are designed to work with the input voltage down up to -10% providing IEC performances.
- **Frequency**: 50 or 60 Hz ± 7.5%.
- **Maximum output current to the series circuit**: 6.6A, adjustable through step from 1.8A. The output current values are accurately regulated within the limits stated by the Specs, considering the following operating conditions which can be happened contemporary too:
  * any load from short circuit to full rated load
  * any input voltage within -5% (-10% for IEC) + 10 % of the rated input voltage, at the rated frequency;
  * any of the hereabove described environmental conditions
  * maximum 30% of the secondary windings of the isolating transformers open-circuited, considering a rated load not less than 50% of the rated one.
- **Efficiency** : not less than 0.90, with rated input voltage, at the maximum output setting (6.6A), with rated resistive load. Average efficiency exceeding IEC requirements.
- **Power factor** : not less than 0.98, with rated input voltage, at the maximum output setting (6.6A), with rated resistive load. Power factor exceeding IEC requirements.
- **Total Harmonic Distortion**: THD of input and output current: <5% with resistive load between 100% and 10% of the nominal, at rated input voltage and maximum output setting (with sinusoidal input voltage and PWM controlled power transistors module).
- **Remote control voltage**: 24 VDC, 48 VDC, 60 VDC or 120 VAC, internal or external.
- **Protection degree**: IP 21.

**EQUIPMENT DESCRIPTION**
The unit is assembled into a metal box consisting of a structural frame, a front panel, a rear panel, both of them screwed to the frame, and one front crane mounting all the CCR control/monitoring withdrawable PCBs. The front and rear panels can be removed, by unscrewing the relevant fixing screws, for complete inspection of the inside components.
The CCR is equipped with a main circuit breaker, rated according to the its power, to protect the power supply line and to surely cut out the power supply to the regulator.
The PCBs support keyboards, displays and signalling leds.
The finishing is made by phospating and baked electrostatic epoxy powder coating, colour RAL 7032.

**Dimensions** (CCRs up to 15 kVA): 500 mm wide, 770 mm deep, 1570 mm high. (CCRs 20 ÷ 30 kVA): 620 mm wide, 920 mm deep, 1670 mm high.

**THEORY OF OPERATION**

1. **Input circuit**: consists of an input filter for EMC compatibility, a two-pole circuit breaker and a single-pole load contactor.
2. **Power supply filter**: consists of a two-phase inductance and capacitor(s) and filters the harmonics generated by the power module.
3. **Normally operating PWM (Pulse Wave Modulation) power module**: consists of a suitable circuitry topology, including power diodes and IGBT with measuring sensors, provided with PWM control. The width of the pulse is modulated to follow the theoretical 50 Hz sinewave, as fixed by the control system (set point). The frequency of the carrier pulse is 7.5 kHz and the modulating sinewave has a line frequency. This block is not present on UR2200 regulators.
4. **Stand-by power module**: consists of two power thyristors, mounted in antiparellel, which are triggered according to the reference control signal (set point). This module is automatically inserted in case of main power module failure or in case of failure of the fans, provided for its forced ventilation. This block is not present on UR2000 regulators.
5. **Output filter**: consists of an inductance, which filters the 7.5 kHz frequency of the carrier and practically allows the passage of the fundamental harmonic only.
6. **Power transformer**: increases the output voltage and isolates the constant current regulator from the series circuit.
7. **Control and diagnostic circuit**: this circuit, based on DSP technology, constantly monitors the input voltage and current, the output current of the power module, the load voltage and current, to grant the correct operation of the unit. The internal loop assures the maximum bandwidth to provide a very fast response to any instantaneous changes at the CCR output (from full load to short circuit conditions).

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**UR2100 ELECTRICAL BLOCK DIAGRAM**