

UR3000

Constant Current Regulators New Generation

Compliances: **FAA AC 150/5345-10G (L-828 & L-829)**
IEC 61822 Ed. 2 and IEC 61821 Ed. 2.0
ICAO Aerodrome Design Manual, Part 5



Applications

The three-phase constant current regulators, series UR3000, have been designed to provide power to airport lighting series circuits; particularly UR3000 regulators assure balanced load distribution, high power factor, elevated efficiency and output sinusoidal current independently by the load.

These constant current regulators are suitable for indoor operation under the following environmental conditions:

- protected ambient;
- temperature comprising between - 20° C and + 50° C, including monitoring circuitry;
- height above sea from 0 up to 2000 m;
- humidity from 10% through 95% (not condensing).

Features

- Three-phase power supply assuring a perfect load balance to the three phases:
 - * to optimize the power distribution;
 - * to reduce the current values with consequent reduction of power supply cable and disconnecting device size;
 - * to permit accurate and lower sizing of the emergency generators.
- Very low harmonic content of the output series current (THD<3% from short circuit to full load condition): particularly suitable to power supply critical loads as signs, LED lights, and so on.
- Very low response time to any load and input voltage variation (less than 250 μs): high stability of the output series current.
- 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.

How to order

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Specs : _____

IEC = IEC 61822
828 = FAA L-828
829 = FAA L-829

Model : _____

30 = three-phase

Frequency : _____

50 = 50 Hz

Rating : _____

02 = 2.5 kVA 05 = 5 kVA
07 = 7.5 kVA 10 = 10 kVA
15 = 15 kVA 20 = 20 kVA

Input Voltage : _____

2 = 400 V

Output Current : _____

66 = 6.6 A

Output Brightness Step : _____

01 = fixed 03 = 3 steps
05 = 5 steps

Remote Control Voltage : _____

C = 48 Vcc Internal

Options : _____

See here below; the following options can be selected simultaneously too.

- Max 8-step output current, each adjustable between 1.8A (for service purpose only) and 6.6A.
- Integrated input and output lightning arresters (option 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-colour 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.

- 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.
- Other available options:
 - ❖ RS232 serial port for diagnostic;
 - ❖ Earth leakage local continuous reading (MΩ, kΩ) and earth fault detection;
 - ❖ Lamp fault detection;
 - ❖ Series circuit cutout;
 - ❖ Nylon wheels;
 - ❖ Finish as per customer request;
 - ❖ J-BUS port.

Other features

- **Output power:** 2.5 kVA, 5kVA, 7.5kVA, 10kVA, 15kVA, 20kVA.
- **Three-phase power supply voltage:** 400VAC +10% -5% (FAA). The regulators are designed to work with the input voltage down up to -10% providing IEC performances.
- **Frequency:** 50 Hz \pm 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 0.97, with rated input voltage, at the maximum output setting (6.6A), with rated resistive load. Power factor exceeding IEC requirements.
- **Input current harmonic conten:** less than 30%.
- **Outpur current harmonic content:** less than al 3% at any load condition.
- **Remote control voltage:** 48 VDC, internal.
- **Protection degree:** IP 20.

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 crate 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.

The assembly is equipped with four lifting eyebolts. The lower side of the unit is suitably shaped, to allow the handling by means of a fork truck too.

The cable entrance is provided through the bottom of the unit.

One grounding bolt, complete with washers and nuts, is outside provided in the right rear side of the unit (close to the bottom). Inside the unit (always in the rear side, close to the bottom) a grounding bar allows the grounding of all the unit metallic parts through screws, washers and nuts.

The identification label, including electrical and manufacturing data and standard conformity, are mounted on the front side of the regulator.

Warning labels are placed outside and inside the unit.

Dimensions, the same of the single-phase regulators:

(CCRs up to 15 kVA): 475 mm wide, 750 mm deep, 1530 mm high. (CCRs 20 ÷ 30 kVA): 600 mm wide, 900 mm deep, 1630 mm high.

THEORY OF OPERATION

(1) Input circuit: consists of an input filter for EMC compatibility and a four-pole main circuit breaker.

(2) Precharging circuit: it allows to charge the input power capacitors of the DC filter (see block n. 4) by a controlled current, limited by resistors. Once the capacitors are fully charged, the resistors are short-circuited by the contacts of the main contactor.

(3) AC/DC rectifier bridge: it rectifies the input voltage to provide a direct current voltage of approx 500 VDC by using uncontrolled diodes.

(4) DC filter: it includes an inductance and an electrolytic capacitor bank with discharge resistances, to filter the rectified voltage; at the output of this block we have a filtered DC voltage of approx 500 V.

(5) PWM (Pulse Wave Modulation) DC/AC inverter: it consists of an IGBT bridge with measuring sensors. 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 12 kHz and the modulating sinewave has a frequency of 50 Hz..

(6) Output filter: it consists of an inductance, which filters the 12 kHz frequency of the carrier and practically allows the passage of the 50 Hz basic harmonic only.

(7) Power transformer: increases the output voltage and isolates the constant current regulator from the series circuit.

(8) 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).

