

## Helicopter Starting Rectifier

## 3RC15KE



The Transformer Rectifier Unit 3RC15KE is intended for shipboard Helicopter Start applications. There are three basic modes of operation

- i) Powering the starter motor of a helicopter
- ii) Providing a 28VDC supply to aircraft on-board equipment
- iii) Providing an 18.2V DC supply for turning the helicopter turbo shaft engine at reduced speed for compressor washing.

The 3RC15KD provides a high quality 28V regulated output with a two stage current limit protection circuit that allows for a short time rating of 3000A and a continuous rating of 540A.

The Transformer Rectifier Unit is built into a custom built steel enclosure, which is designed for deck mounting. Protection level is to IP23.

The enclosure also contains the contactor to control the output to the flight deck

Access for maintenance and repair is from the front via a hinged door that opens to the left, it will open to 180° with a minimum maintenance-opening requirement of 90°. The door contains indicating lamps for supply available, anti condensation heater on, and output on, together with the ON/OFF switch.

Louvers on the front and sides of the assembly and also a shielded vent on the top of the unit provide for fan assisted cooling during normal operation. The Transformer Rectifier

Unit is cooled by natural convection when the Anti Condensation Heaters are operating.

A soft start system is employed such that the input inrush current is less than the full load current.

The TRU has an input isolation transformer and a 12 pulse thyristor rectifier configured as two fully controlled bridges combined in parallel by an interphase transformer. This produces a very smooth DC output and eliminates all harmonics below the 11th from the input current waveform. The input current to the equipment is close to sinusoidal with a "traditional" lagging power factor dependent on loading and mains voltage.

Electrical connections to and from the Transformer Rectifier Unit for supply, heater, remote and sense connections are made on rail-mounted terminals. Provision for the output is by means of M12 bolt connections. The terminals are situated inside the cubicle and access is via a cable gland plate that is situated on the bottom of the enclosure. An M10 (x 1.5) external earth stud is provided adjacent to the gland plate, on the bottom of the enclosure.

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## ELECTRICAL CHARACTERISTICS

### Input

440 volts 3 phase 3 wire 60Hz in accordance with STANAG 1008 Edition 8

Input kVA	21.4kVA (@540A o/p)
Input Power	18.2kW (@540A o/p)
Input Rated Voltage	440V
Input Rated Current	28A (@540A o/p)
Input current for typical engine start (1s) 74A (@ 1200A o/p)	
Power Factor	>0.85
Inrush Current	<Inom

Anti-condensation Heater: 230V

### Output

Output in accordance with BS2G219 and MILSTD-704F

28V DC nominal	26-32V adjustment available (internal) (18.2V with wash terminals linked)
Voltage Regulation	<1%
Voltage Ripple	<200mVpk-pk
Voltage transients	<10% (10 to 90% load step)
Voltage recovery time	<100ms (10 to 90% load step)
Isolation	> 10Mohm

Contactors for flight deck output.

### Load

Output Power	15kW
Nominal output current 540A continuous,	
Maximum continuous	600A

### Overload

3000A pk, 2700A (15s), 2100A (30s), 900A (120s)

### Engine Starting Duty

Suitable for diesel engines 550A (2s), 450A (4s), 350A (30s)  
Suitable for gas turbines 1200A (1s), 800A (2s), 300A (25s)  
4 consecutive starting attempts, 30s between starting attempts  
Cooling period 30m before further starts.

**Wild heat** 3.1kW (@540A o/p)

**Efficiency** >83%

### Protection

Inputs fused, output current limited, over-voltage trip, over-temperature trip.

### Local Controls and Indications.

Supply ON/OFF rotary switch, Supply available LED, ACH On LED, Output Available LED, Alarm LED, Fault LED, Earth Fault LED, Output Voltmeter, Output Ammeter, Hangar DC Contactor, Open/closed switch & LED, Flight Deck DC Contactor Open/closed switch & LED, Contactor local/remote selector switch

### Remote Indications.

Fault, Output ON, and Alarm remote indication by means of volt free contacts.

### Remote Sense

To compensate for output cable voltage drop.

## MECHANICAL FEATURES

### Enclosure

Fabricated mild steel folded and welded for strength. Deck mounted, top steadies. Lifting eyes.

### Dimensions

(O/A)(h x w x d) mm 1385 x 640 x 715

A clearance of at least 100 mm should be allowed around the unit to allow proper ventilation.

Fixings 4 holes 13.0mm dia. Centres 588(w) x 435(d) mm  
2 holes 13.0mm dia. Centres 545(w) x 1385(h) mm

**Weight** 564kg

### Cable Entry

Bottom via gland plate. Aperture 360mm x 90mm

### Ingress Protection Rating

IP23

### Cooling

Naturally cooled via louvers. Fan assisted by two speed fans.

### Maintenance

Front maintenance - Hinged door for access.

### Internal wiring

Low fire hazard cross linked polyolefin RADOX 125.

### Earthing

M10 external earth stud.

## ENVIRONMENTAL CHARACTERISTICS

### Shock

Maximum vertical acceleration (half sine-wave pulse) of amplitude 117.7m/s<sup>2</sup> (12g) and of duration 9ms (rise time to peak velocity) and 24ms (fall time to zero velocity). For installed shock levels in excess of this shock mounts should be fitted.

### Vibration.

Designed to meet shipboard vibration requirements Typically 5 to 33Hz +/- 0.125mm

### Noise

< 60dbA (@540A o/p)

### Electromagnetic Compatibility.

Designed to meet the requirements of Def Stan 59-41, emissions and susceptibility (Below deck limits)

### Ambient Temperature.

0°C to + 55°C.

### Relative Humidity

10% to 95% non-condensing.

All PCBs are conformally coated to protect against condensation.

### Ships Motion

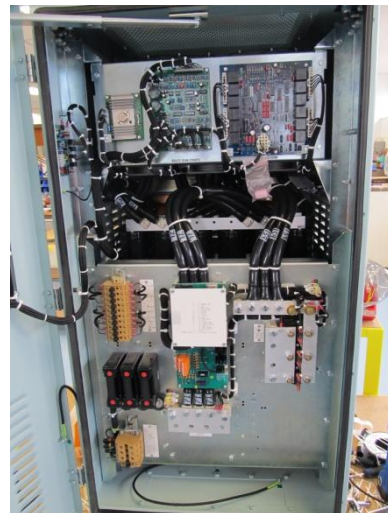
The equipment is designed to withstand, without damage or degradation of performance or spillage of fluids, ship motion due to the action of the sea and weather as well as accelerations and velocities deriving from deliberate ship manoeuvres. Typically:

Roll angles ± 30°

Pitch angles ± 10°

Steady list angles ± 15°

Steady trim angles ± 5°



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