Helicopter Starting Rectifier 3RC10KF

The Transformer Rectifier Unit 3RC10kF 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 3RC10kF provides a high quality 28V regulated output with a two stage current limit protection circuit that allows for a short time rating of 2000A and a continuous rating of 360A.

The Transformer Rectifier Unit is built into a custom built steel enclosure, which is designed for deck mounting. The enclosure may be direct mounted for shock levels up to 30g, above this suitable shock mounts may be used. Protection level is to IP23.

Access for maintenance and repair is from the front via a hinged door that opens to the left, it will open to 180^0 with a minimum maintenance-opening requirement of 90^0. The door contains indicating lamps for supply available, anti condensation heater on, and output on, together with the ON/OFF switch.

Louvres pressed inwards 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	14.3kVA
Input Power	12.2kW
Input Rated Voltage	440V
Input Rated Current	19A (@360A o/p)
Input current for typical engine start (1s)	74A (@ 1200A o/p)
Power Factor	>0.85
Inrush Current	<Inom

Option: Anti-condensation Heater: 115V or 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

Option: Earth isolation monitor

Load

Output Power	10kW
Nominal output current	360A continuous
Maximum continuous	400A

Overload
2000A pk,1800A (15s),1400A (30s), 600A (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 2.1kW (@360A o/p)

Efficiency >83%

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

Local Controls and Indications.
Supply ON/OFF selector switch
Output Voltmeter
Output Ammeter
Supply Available LED
ACH On LED
Output On LED
Alarm LED
Fault LED

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)(hxwxd) mm 1200 x 640 x 560

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

Fixings (mm) 4 holes 13.0mm dia. Centres 536(w) x 350(d) mm
2 holes 13.0mm dia. Centres 536(w) x 1327(h) mm

Weight 365kg

Cable Entry
Bottom via gland plate. Aperture 390 mm x 150mm

Ingress Protection Rating
IP23

Cooling
Naturally cooled via louvres. 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
Designed to meet the “minimum ruggedness” requirement of DGS 349, 30g in each of the three orthogonal directions when solidly mounted. For installed shock levels in excess of this shock mounts should be fitted.

Vibration.
Designed to meet the vibration requirements of DGS 350. (5 to 33Hz +/- 0.125mm)

Noise < 65dbA.

Electromagnetic Compatibility.
Designed to meet the requirements of Def Stan 59-41 (below decks 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.

Roll angles	± 30°	Pitch angles	± 10°
Steady list angles	± 15°	Steady trim angles	± 5°

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