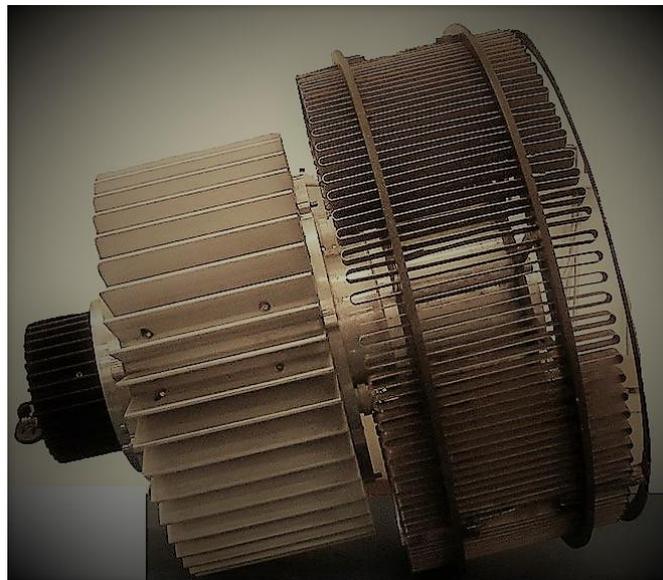




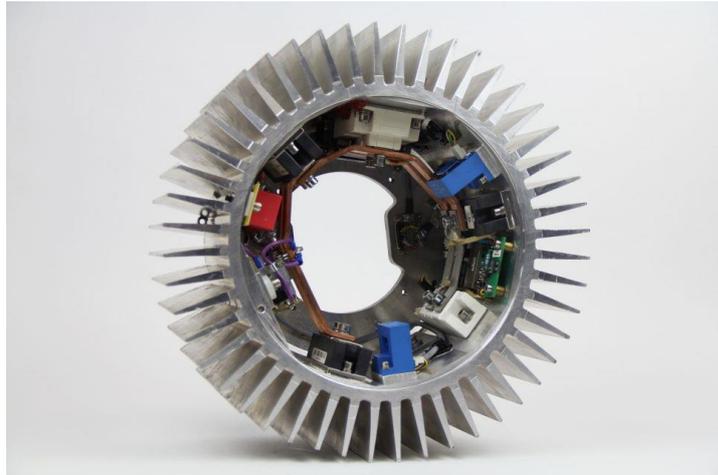
## VRCC Repair and Refurbishment Solution

705180	VRCC Power Module
CT273	VRCC Control Unit
705100	VRCC Resistor Unit



The Vestas Rotor Current Controller (mainly used on V47 Turbines) consists of a Resistor, Processor and Power Unit. These units can be serviced individually or as a set.

## VRCC Power Module



### ***VISUAL INSPECTION***

Before any work is carried out on the power electronic unit a visual inspection will be carried out on all electronic components looking for:

- a. Discoloring caused by over temperature, Smoke, Flash-over
- b. De-soldered or loose components, Solder splatter around components

### ***CLEANING***

Dismounting and thorough cleaning of all components will be carried out and sandblasting of the outer body of heat sink. **Note: After sandblasting serial number may need to be restamped.**

### ***COMPONENT REPLACEMENT***

Due to the high failure rate the Akuray Repair Solution replaces all components with newly manufactured modules and devices. The driver board is replaced with a board assembly specifically designed to improve reliability of the unit. The Over Voltage Protection (OVP) board is stress tested and replaced if one of the components is defective.

### ***DIAGNOSTIC TESTING***

Once the main components have been replaced a diagnostic test will be performed checking and replacing any component that fail the following tests:

- a. Snubber circuit
- b. Diodes
- c. Current Transformers
- d. IGBT
- e. IGBT Driver
- f. Thyristors
- g. Thyristor Driver
- h. PT100 sensor
- i. OVP circuit

### ***MECHANICAL CHECK AND DYNAMIC BALANCING***

Before final testing is done, all bolt connections will be checked and sealed for proper bolt torque. The unit will also to be balanced.

3 x flexible power cables are added to the unit for shipping.

## **VRCC CT 273 CONTROL UNIT:**



### ***VISUAL INSPECTION***

Before any work is carried out on the control unit a visual inspection will be carried out on all electronic components looking for evidence of overheating, melted plastic, arcing and damaged components, anything visible that may have caused the malfunction of unit.

### ***MECHANICAL INSPECTION***

The control unit will be checked for a noisy or dragging bearing, broken and damaged cable connections (supply and communication), any loose or broken electrical connection and alignment of optical connections.

### ***COMPONENT REPLACEMENT***

Due to the high failure rate of many of the main components, the following components will be replaced on all units:

- Bearings - 100%
- Capacitors - 100%
- LEDs, Optislip components, controller boards, etc. – as required

### ***DIAGNOSTIC TESTING***

The Control unit will be placed through a diagnostic test that tests the following:

- a. Feed Card
- b. Communication Card
- c. LED Diodes
- d. Analog Inputs
- e. Current sensors
- f. RAM
- g. Flash Memory
- h. IGBT Error

### ***FINAL TESTING***

Once all electrical and mechanical components have been replaced the unit is placed through a final test using the AKURAY custom made software ([see below](#)) and test equipment.

## **VRCC RESISTOR UNIT:**



### ***VISUAL INSPECTION***

Before any work is carried out on the resistor unit a visual inspection will be carried out looking for evidence of overheating, a break in the resistor or a broken weld.

### ***CLEANING***

The resistor will be thoroughly cleaning of any grease, dirt and contaminates using sandblasting and other means available.

### ***COMPONENT REPAIRS***

Repairs are carried out using the same alloy material used in the original component, welds are checked and rewelded if necessary in all connection points. Bolts and isolators are checked and replaced if necessary. A new O-ring will be supplied.

### ***FINAL TEST***

The measurement of the resistors R1-R2, R1-R3 and R2-R3 must be between 1.90 $\Omega$  to 2.14 $\Omega$  with a tolerance of no more than 0.02 $\Omega$  between each measurement and the measurement between resistor and base plate should be >1M $\Omega$ . During the final test the unit will also to be balanced.

### ***PACKAGING***

The repaired units will be shipped back to the client in adequate packing or new packing if required.

With the repair of these components at Akuray, a fast Turnaround Time for the repair of these units, a high quality repair and savings versus OEM prices. Akuray has been working with wind farm owners and wind turbine manufacturers to increase the MTBF of their wind turbine components. Our expertise is based on over 20 years in the Manufacture/Repair industry.