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## **DRMCC - Dynamic Ratings Monitoring Control and Communications System.**

The growing need to maximise transformer utilisation without compromising reliability, the cost savings achieved through Condition Based Maintenance, and the requirement for intelligent, adaptive, control and communication functions as part of a "Smart Grid" approach to power system operation, all combine to encourage asset managers to rethink the way in which transformers are monitored and controlled.

As an alternative to the conventional thermo-mechanical OTI and WTI temperature measuring devices and discrete relays for AVC and thermal protection we recommend the well proven DRMCC-T3 electronic monitoring and control system described in our technical specification and brochure.

The DRMCC offers the following features and benefits:

- **Dynamic Rating** – The Dynamic Rating feature provides load despatch operators with the real time loading (and overloading) capability of the transformer based on the current operating conditions. Predictive "Smart Cooling" functions are of great benefit in reducing the aging of the transformer while providing increased dynamic loading capacity. Information can be presented in two ways; how long can a transformer carry the present load or what is the maximum load that can be carried for a specified time without exceeding the pre-set loss-of-life limits.
- **Cooling System Monitoring & Control** – Basic thermal monitoring is via top oil and ambient probes using rugged solid-state RTDs. Control is provided for one or two pumps and up to two banks of fans. Cycling and forced running can be programmed to maximise reliability. Status of selector switches, contactors, etc. and motor current can be monitored to detect problems.
- **On-Load Tapchanger Monitoring & Control** – OLTCs are one of the most common sources of transformer failure. Monitoring parameters such as drive motor current, number of operations and contact wear levels at each tap can assist in determining appropriate maintenance strategies. Automatic Voltage Control (AVC) and Line Drop Compensation (LDC) the DRMCC provides a range of paralleling capability including independent, master/follower, circulating current, VAR control and reverse reactance.
- **HV Bushing Health Monitor** – HV bushings are another major source of failure in high voltage transformers. With the addition of bushing sensors at each capacitor tap the optional module detects changes in Power Factor and/or Capacitance to provide alarm and tripping functions for bushings to give warning and protection well in advance of potential failure. On-line Partial Discharge monitoring can also be integrated with the DRMCC.
- **Direct Winding Temperature Measurement** – Dynamic Ratings can supply an optional module for processing the signals from Lumasense Fibre-Optic sensors embedded in the transformer windings. This provides a more accurate measurement of hot-spot temperature for comparison with the calculated values. Other makes of F/O WTI can also be integrated with the DRMCC.
- **Data Concentration** – Data can be marshalled from a range of inputs including third-party systems for on-line DGA such as Serveron, Calisto or Hydran; Vaisala moisture-in-oil, etc. The data is presented as salient information including various stages of alarm. Data is time and date stamped and stored for 52 weeks as well as being relayed to the SCADA system via a single connection.

- **Multi-mode Communications** – Interface with other transformer and substation monitoring devices, local consoles and SCADA systems can be made via RS232 or fibre-optic cables for point-to-point connections and/or RS485 for multi-drop communications links. A range of protocols is supported. An Ethernet port is available for connection to LAN/WAN from which remote monitoring and control may be obtained using an Internet browser.
- **Fail-safe System** – In the event of a sensor failure required for the thermal model, the DRMCC deems the model to be unreliable and all the available cooling is turned on and an alarm is generated. If the entire DRMCC fails as detected by the system watchdog, the cooling is turned on and a hardwired alarm is activated.
- **Control Cubicle** – The DRMCC Control Unit (CU) and associated cooler controls are usually located in a weatherproof control cubicle attached to the transformer. The Interface Unit (IU) with display and user input buttons can either be located in this cubicle or remotely at the substation control room.
- **Engineering Support** – The DRMCC is offered as an engineered system and we have allowed for the work required to support the end user in defining the communication points for the SCADA interface. We have also allowed for the checking, confirmation and further tuning of the thermal models of the transformer after sufficient operating data has been gathered, should this be necessary
- **Training** - We can offer an optional training program for end users, project and operational staff to ensure a smooth entry and use of the DRMCC system.

The DRMCC was designed by transformer engineers and grew out of requests by customers to improve on the monitoring and control devices available in the mid 1990s. It has evolved through three generations since then, in response to customer requirements for more sophisticated monitoring, control and communications, but continuing to represent good value-for-money.

Many power system operators are obtaining significant benefits and reliable service from the DRMCC. We have more than 1500 model T3's (the third generation model) installed in countries around the world such as the USA, UK, Ireland, Sweden, Middle East, South Africa and China as well as Australia and New Zealand. An extensive reference list is available on request

DRMCCs are installed in many different transformer applications (generator, transmission, distribution, wind farms, industrial and furnace) with excellent results and performance. The resulting benefits of transformer condition monitoring, life extension, dynamic loading and cost savings have been immediately evident.

Related documents:

DRMCC-T3 brochure  
 Bushing Health Monitor brochure  
 Direct Winding Fibre-optic Temperature Measurement brochure  
 Reference List  
 T3-001 Generic Technical Specification