REG-D/DA – a sentinel for conditioned based maintenance

There are literally hundreds of REG-D/DA's in service, quietly regulating voltage on electricity networks all around the world. Many of these are connected back to the networks SCADA for basic supervision and control. However, there is a wide range of other reporting features these IED's are capable of that give benefit to technical support and maintenance staff.

Recorder:

To monitor the effectiveness of the selected regulator settings, REG-D/DA voltage regulators with Recorder Function option allow up to three values of V, I, Power ,Reactive Power ,Apparent Power(P,Q, & S), PF & tap position to be recorded. Actually, whatever can be assigned to an analog (output) channel can be recorded, including up to the first 6 analogue input channels.

The recorded information is available locally on the REG-D/DA display, or via download for offline viewing using REGView software. This information is provided in a graph together with setpoint voltage and voltage tolerance band, providing a quick review of the historical performance of the regulators settings.

Every second the recorder stores the average of the last 10 x 100 ms measurement values. This is stored in a circular buffer which typically allows information from the last 18 to 40 days to be accessed.

REGView software provides graphical display of recorded data, with a variety of zoom and cursor controls. A statistics function within this software provides details on the maximum, minimum and average voltage for a user selected period, together with the number of operations for each tap during that period. This information can be useful for determining if settings are providing the desired regulation, and at what cost to the life of the tap changer.

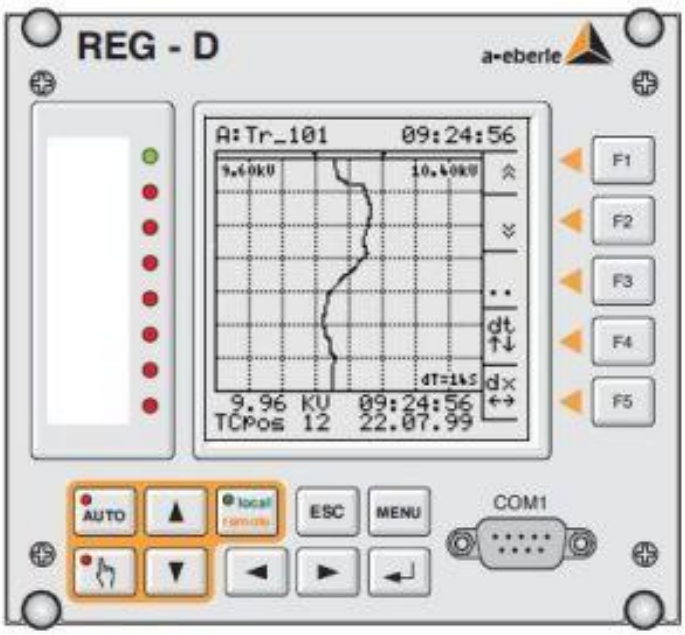

Figure 1 Example of REG-D Recorder Display.

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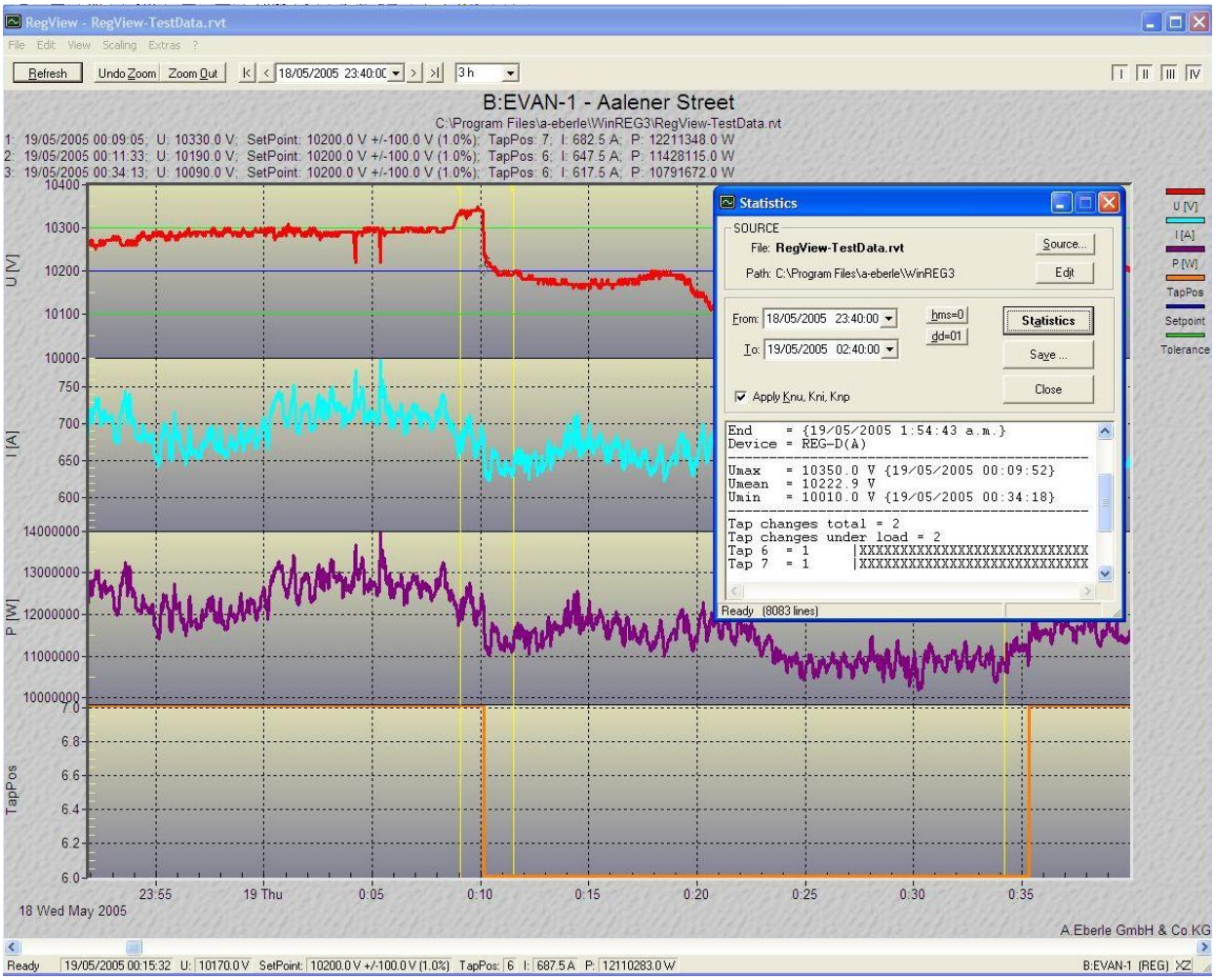

Figure 2. Example of REGView software – download stored operating data.

Tap Change Statistics

To aid tap changer maintenance, and to optimise regulator settings, the voltage regulator records the total number of tap changes, the total number of on load tap changes, and for each tap, the number of operations on load. This can provide valuable information to predict maintenance requirements.

1. Total I^2t or I^2 information is also accessible to allow estimation of the level of wear on the tap changer contacts.

Statistics are accessible via the regulator front panel, or using later versions of WinREG “Service” module or “TM” module.

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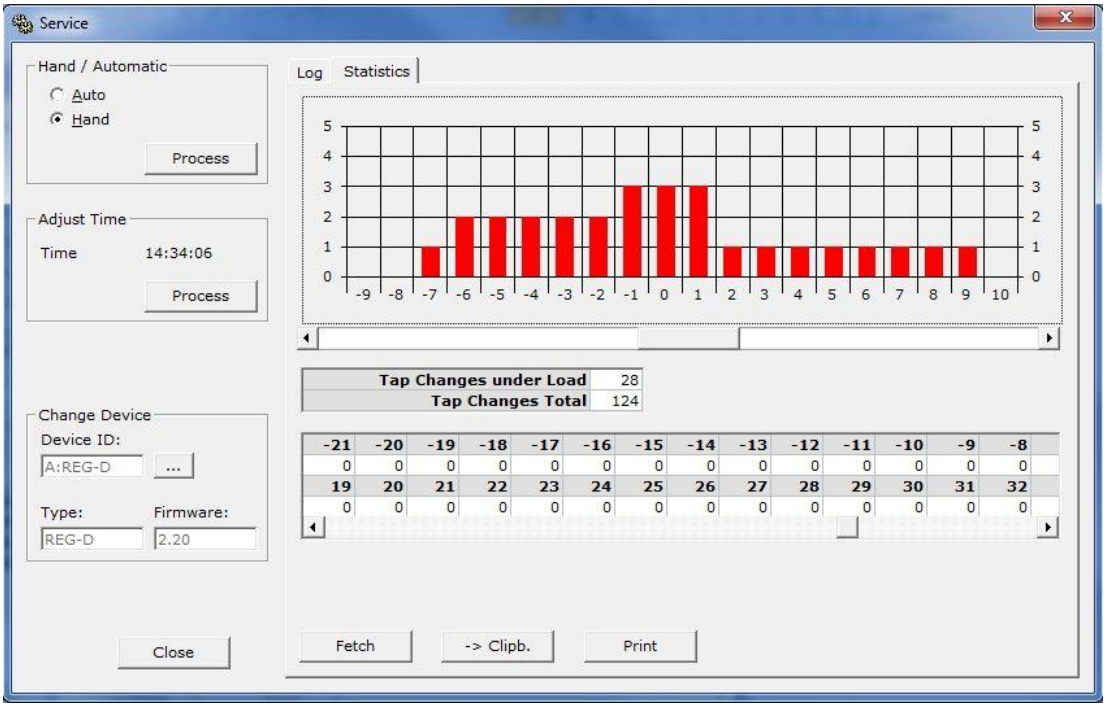

Figure 3. Example of WinREG Services software display of REG-D tap change statistics.

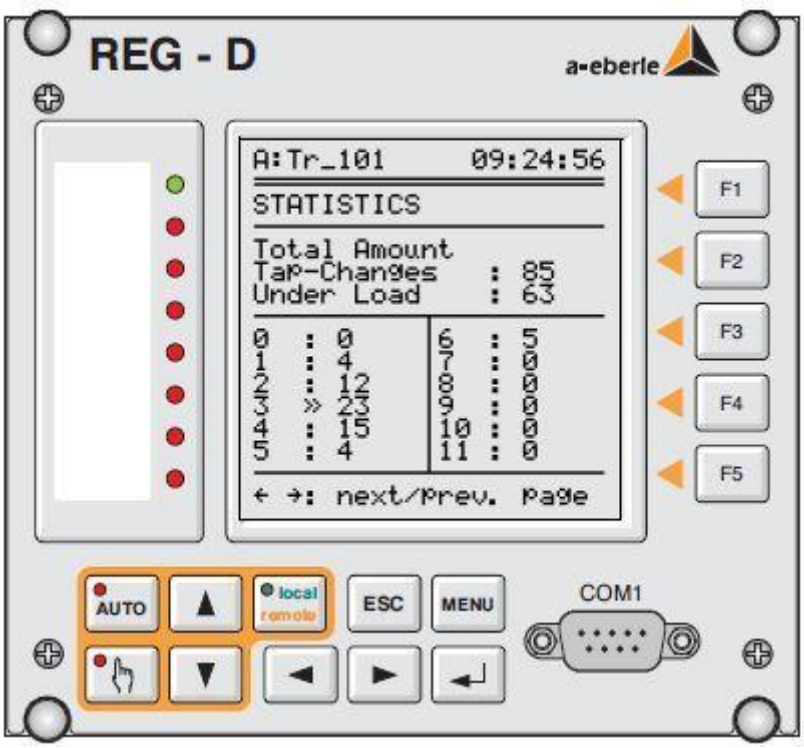

Figure 4. Example of REG-D tap change statistics display.

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Lifetime information

For regulators with Transformer Monitoring (TM) enabled, the run time of cooling fans, pumps and tap change motor is logged and available for display. Alarms can be generated when preset thresholds are exceeded.

Transformer winding life is also calculated, based on IEC 354. Essentially for every 6 deg C rise above 80 deg C, a typical transformer's life consumption doubles. The voltage regulator measures the transformer temperature, and determines the "consumption" of the transformers estimated life.

Where transformers can be run at higher temperatures, such as in an emergency overload situation, this information is very useful.

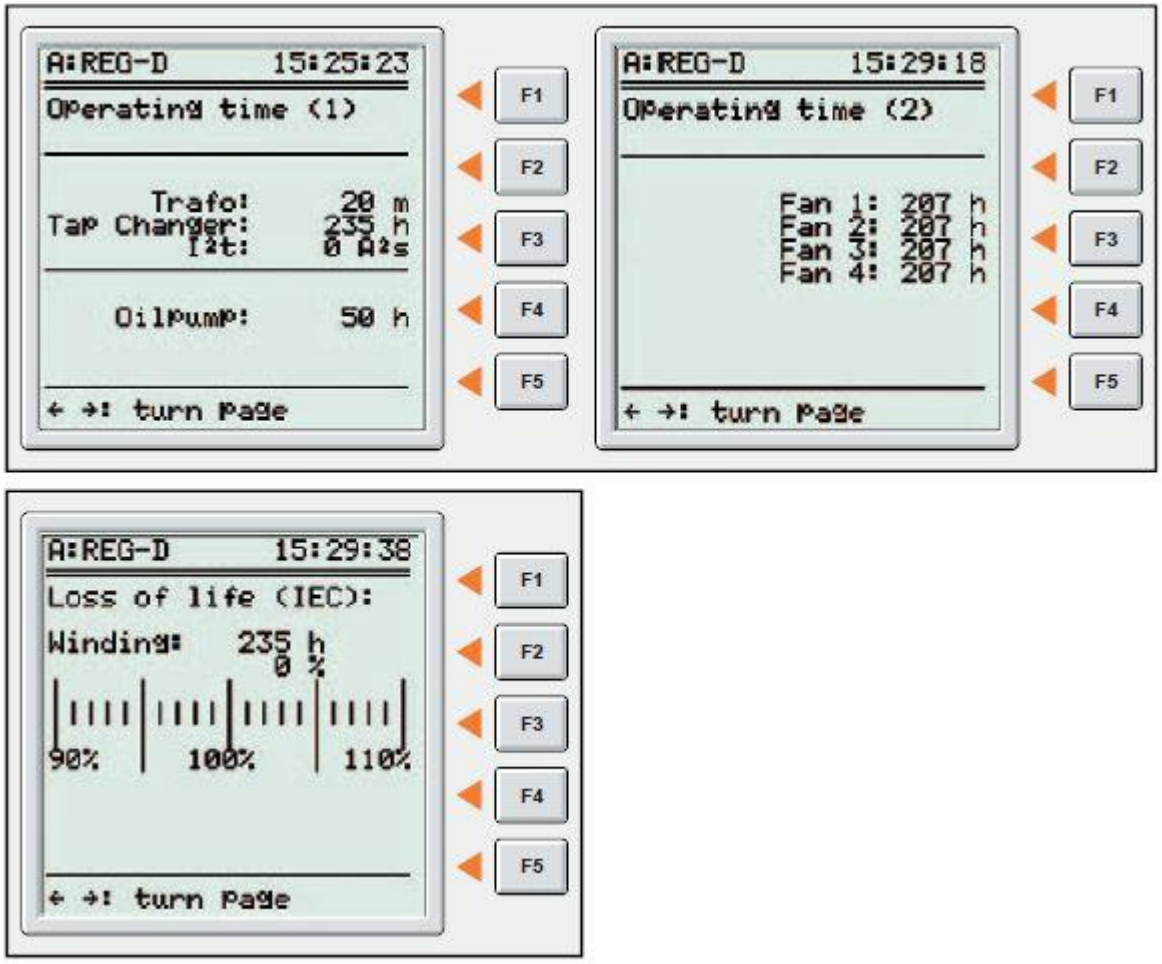

Figure 5. Examples of REG-D/A life run/consumption information.

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Regulator Log

This handy tool for investigative work keeps a record of the last 127 events together with data and time of occurrence. Those items to be captured by the log are selected by the Logmask.
All activity on any digital input, relay outputs, LED operations and over 25 internal system events can be selected for recording.

The log may be viewed via front panel or downloaded using WinREG Service Module.

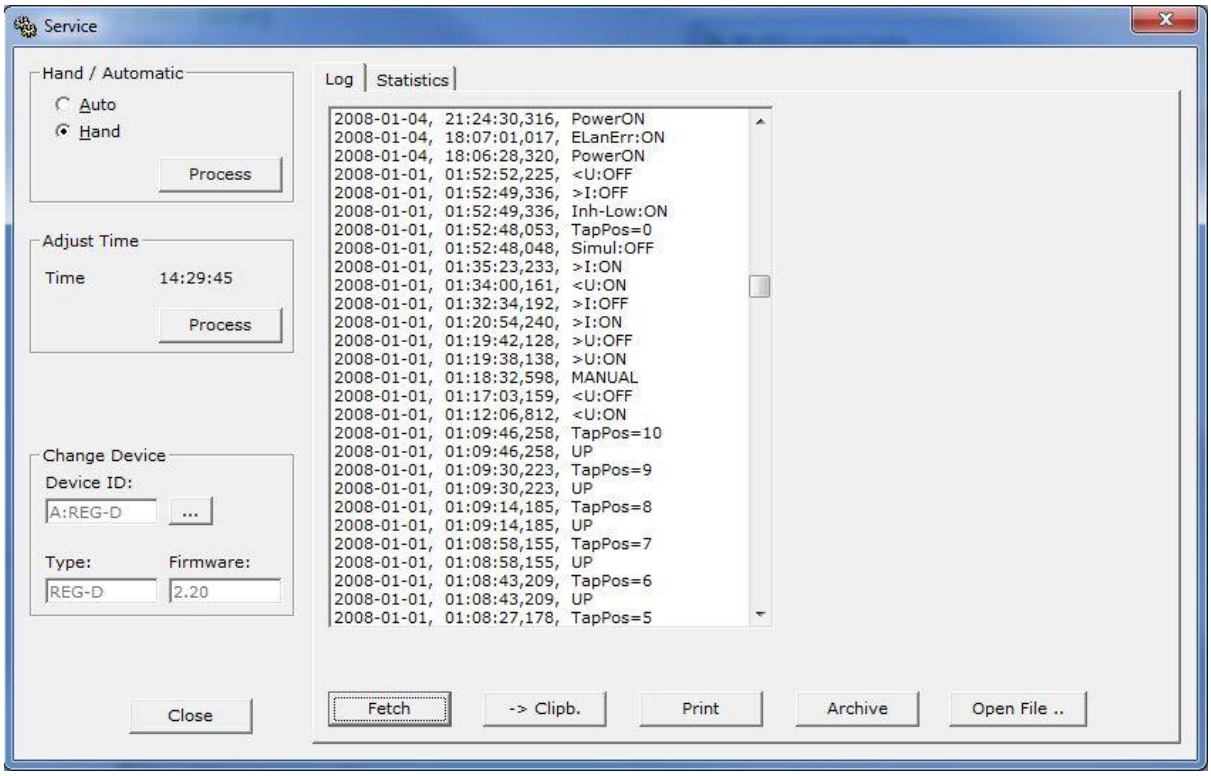

Figure 6. Example REG-D log extracted using WinREG Services software.

Other Condition Monitoring

The REG-D/DA provide capability to interface to, and monitor other condition monitoring equipment, via mA or binary inputs, or IEC 61850 protocols. The REG-D/DA can be used as the data concentrator for all transformer related information, simplifying transformer physical connections and SCADA mapping/interfacing.

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