We take care of it.

a-eberle

REGSys™

Regulate Voltage Conveniently

with intelligent additional functions:

- Recorder
- Logbook
- Transducer
- Statistics
- Transformer Monitor
- ParaGramer
- PLC functionality

REGSys™

The voltage regulation system REGSys™ has been designed to regulate, control and monitor power transformers with on-load tap-changer (OLTC) in medium- and high-voltage grids.

A variety of freely programable inputs and outputs, LEDs and intelligent features – recorder and logbook, transducer, statistics, parallel operation with ParaGramer function, transformer monitoring and a powerful programming language – make the voltage regulation system very convenient.

Main emphasis was thereby given to flexibility in regard to customer-specific applications and ease of operation.

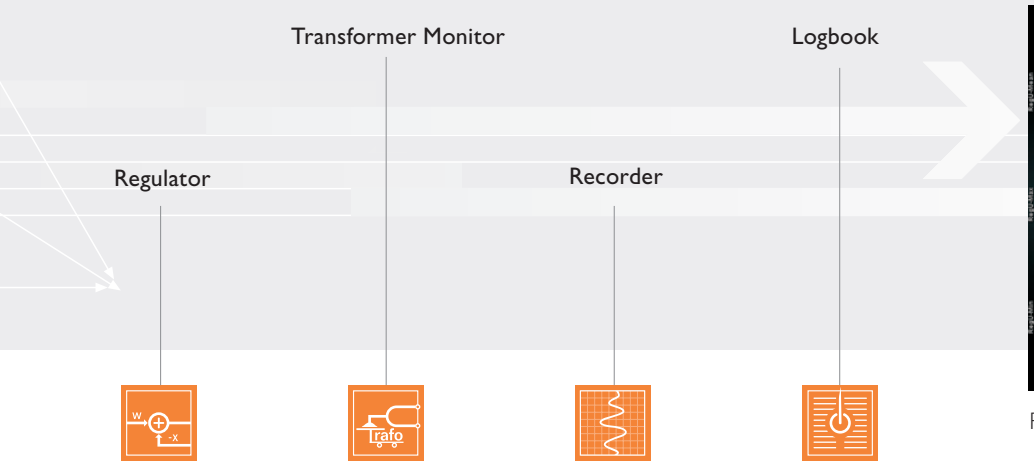
The devices of the REGSys™ family can be easily connected to a network of regulators (e.g. parallel operation, multimaster architecture). The user will find the right solution for any task.

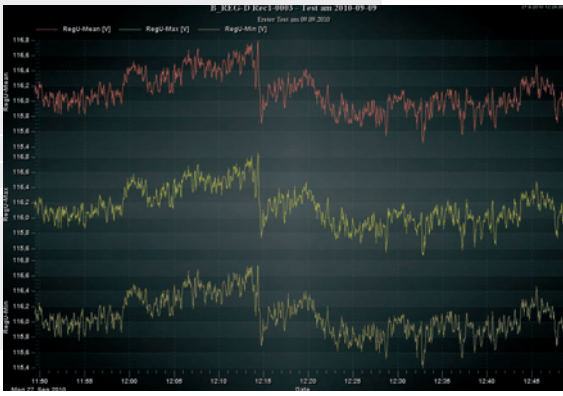
Voltage regulator

In addition to normal voltage regulation REG-D™ and REG-DA voltage regulators offer several additional functions. For example, four different programs are available to compensate the voltage drop along the line by using the current. Additional functions such as the creeping network breakdown, trend memory and various monitoring functions for the tap changer complete the array of useful features. All process

Regulating. Monitoring. Recording. Controlling.

REGSys™: Voltage Regulation System with integrated Transformer Monitor and more





REGView visualization software

data required to analysing the regulation are clearly displayed on the screen. Here are some particularly important functions:

Recorder

REG-D(A) and PAN-D

The default recording function allows the recording up to three measuring values (e.g. voltage, current, angle, oil temperature or winding temperature) and to display them in form of a Y-t diagram. With the recording control voltage, tap-position, setpoint, tolerance band and manual/auto state are included in the registration in a time-correlated manner.

In case of an event the analysis of all data can be done directly on the regulator or via the PC. The fault can then be analysed using the history data too. In addition, the REG-D™ can be equipped with feature S2. An extended recorder function with a total number of 256 channels is then available. A time resolution up to one second makes this version ideal for use in the transformer monitoring environment.

The data is archived and visualised with the REGView add-on software which can be integrated into the standard WinREG operating software.

Logbook

REG-D(A) and PAN-D

All events essential for the clarification of fault situations are registered here. The last 512 events are stored chronologically with time and date according to FIFO principle. **Example:** When was the regulator switched from manual to automatic mode or when did the voltage exceed or fall below a specific limit? The logbook function constitutes an optimal supplement to the recording function, and in the event of a fault it permits retroactive detail examinations; however, it is also used for general analysis purposes with the goal of optimising voltage regulation in general.

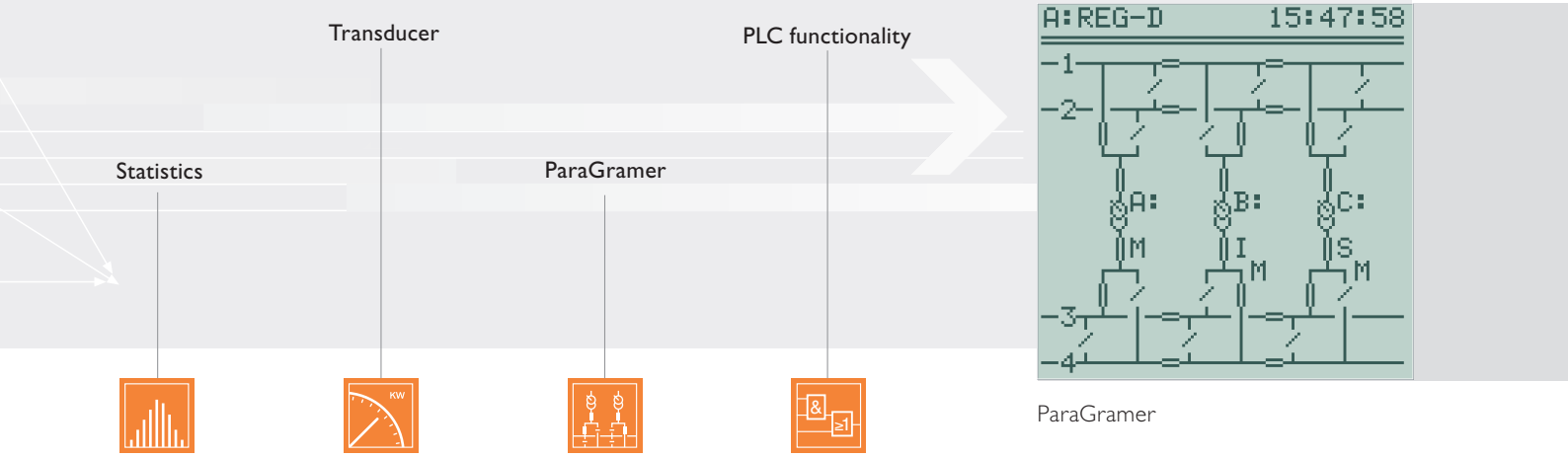
REGSys™

Statistics
REG-D(A)
When assessing regulation knowing the total number of all steps per time unit is not sufficient. Information as to which taps were switched how often under load is also required. The statistic feature provides this information and thus acts as key characteristic to improve the quality of the regulation. Furthermore, this useful additional function helps in determining the revision cycles.

Transformer Monitoring Module (TMM)
REG-D(A)
The life of a transformer depends essentially on the hot spot-temperature. It is calculated by measuring the oil-temperature and current in conjunction with key transformer characteristics according to IEC 60354 or IEC 60076. Using this data the Transformer Monitoring Module TMM, integrated in the voltage regulators, determines the residual life time of the transformer and is additionally able to even control up to six fan groups and two oil-pumps. The operating times of the fans and oil-pumps can be recorded at the same time. The *SMART Fan Control* function provides the control of the fan (groups) by using the expected winding-temperature, which increases the power reserves of the transformer.

The additional *Overload Prediction* function offers further tools for the optimal utilisation of the transformer.

REGSys™ – intelligent and free programmable



ParaGramer

Transducer
The transducer function of the REG-D(A) provides measured values from three phase networks with balanced or unbalanced load. All measuring variables required to analysing the measuring situation at the feeding point are clearly displayed on the LCD. The measuring variables can also be provided through mA outputs or via SCADA connection.

Parallel operation
ParaGramer
REG-D(A)
A certain management effort is always required when two or more transformers are operated in parallel according to the master-follower or minimizing the circulating current method. The *ParaGramer* function automates the detection of parallel operation. It uses a single line diagram of the substation to detect the parallel operation. In the master-follower program the selection of the master takes place automatically. Alternatively, the auxiliary MSI (master / slave / independent) can be used to explicitly select the function of a regulator via binary input or SCADA connection.

Background programs
REG-D(A) and PAN-D
The PLC functionality of the REGSys™ voltage regulation system with the proprietary REG-L programming language makes it especially flexible and powerful. Customer-specific solutions can be implemented quickly and efficiently by employing so-called background programs. Some examples are:

- Regulating a transformer bank
- Realising additional limit values
- Modifying certain parameters at runtime
- Generating additional operating menus and thus parameters

REGSys™

SCADA communication

REG-D(A) and PAN-D

The REGSys™ voltage regulation system supports all common SCADA protocols such as Modbus RTU, SPA-Bus, Profibus-DP, DNP 3, DNP via Ethernet, IEC 60870-5-101/-103/-104 and IEC 61850. Furthermore, solutions for remote maintenance (ComServer) and networking of remote regulators (ELAN over Ethernet) are available.

Parameterisation and visualization software WinREG/REGView

The WinREG program is available for convenient parameterisation, programming and archiving. The base program can be expanded for different tasks in modular fashion.

These are in detail:

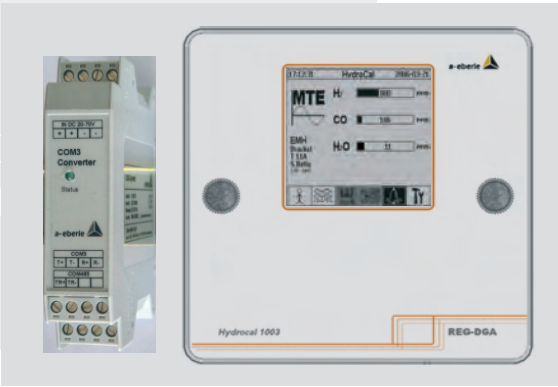
- REGView, consisting of data collector (Collector) and recorder, to archive and visualise REGSys™ recorder data
- WinTM to parameterise the Transformer Monitoring Module of the REG-D(A) and for visualization
- WinDM to parameterise the REG-DM(A) (pure transformer monitoring device)

Monitoring unit(s)

PAN-D, PAN-A1, PAN-A2

As supplement to the voltage regulators the REGSys™ voltage regulating system includes the monitoring units PAN-D, PAN-A1 and PAN-A2. Principally, these devices provide an additional voltage monitoring. If the

REGSys™ – with modular hardware options



COM3 Converter

voltage is too high or too low the regulating commands are physically interrupted into the respective direction from the voltage regulator to the tap changer. The units PAN-A1 and PAN-A2 and PAN-D can signal, in addition, limit violations via relay. PAN-D is based on the same platform as REG-D and offers even more functions while convenience is enhanced at the same time (WinREG, background programs, SCADA communication).

Hardware expansions and connectivity

ANA-D, BIN-D

The already very flexible and comprehensive hardware equipment of the REG-D(A) voltage regulators can be expanded even further by utilising ANA-D analogue interfaces (mA inputs or mA outputs) and BIN-D binary interfaces (binary inputs or outputs). These modules are connected via the standard available COM3 interface.

Depending on the application, the external COM3 converter can also be connected here. It enables the REG-D(A) or also the PAN-D to communicate directly with devices from other manufactures via Modbus RTU. This solution is optimal if the REG-D(A) shall record and scan data from sensors or other devices for transformer monitoring purposes and transfer them, for example, via IEC 61850 (e.g. DGA or hot spot temperature measurements).

REGSys™ product features

General Data

Supply voltage	AC/DC 88...264 V or DC 18...72V
Communication interfaces	3xRS232, 2xELAN
Measurement current input	1/5A
Number of setpoint values	four
Range of setpoint values	60...140V
Max. number of ELAN devices	255
SCADA protocols	IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104, IEC 61850 MODBUS RTU, SPABUS Profibus DP, DNP 3.0 ,DNP 3.0 via Ethernet

REGSys™ – The Allrounder

Design	19“ rack (84 HP) wall-mounting case (30 and 49 HP) panel-mounting case (30 and 49 HP)
Binary inputs	16 (max. 64 with BIN-D extension cards)*
Binary outputs	9 (max. 64 with BIN-D extension cards)*
LED's	8 *
Analog channels	6 as an option (max. 32 with ANA-D extension cards)*

* Number of in- and outputs for just one REG-D™. Depending on the design of the REGSys™ the number of in- and outputs can be different.

REG-DA™– The Compact one

Design	metall case for wall mounting, panel mounting and DIN rail mounting with IP 54
Binary inputs	16 (max. 28)*
Binary outputs	13 (max. 25)*
LED's	14
Analog channels	1 (max. 8)*

* Number of in- and outputs that can be mounted inside the REG-DA™ case while using a SCADA interface.

Your sales partner

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