

Relay for OLTC Control & Transformer Monitoring

Model REG-DA

- ▶ Wall mounting housing
- ▶ Panel mounting housing
- ▶ Din-rail mounting



1. Application

The REG-DA relay for OLTC control & Transformer Monitoring is used to perform both complex and simple measurement, control and regulation tasks on tap-changing transformers. To achieve these tasks, the REG-DA voltage regulator can be used with an array of add-on components, such as the BIN-D and ANA-D remote I/O modules, and an assortment of communication cards.

Each REG-DA has transducer and statistical modes, as well as optional multi-channel recorder, transformer monitoring module (TMM) and ParaGramer.

Transducer Mode displays all of the relevant measured variables of the voltage network, while Statistical Mode provides a clear overview of the various switching operations of the tap changer.

Voltage regulators operating in parallel are connected via a fibre optic or copper ELAN bus, which enables the automatic sharing of relevant data. ParaGramer then detects which transformers have been switched into a parallel control scheme and displays this information via a single-line diagram.

The powerful TMM functions enable the continuous monitoring of various conditions within the transformer and tap changer. Information such as hot-spot temperature (IEC 60354 or IEC 60076) and transformer loss-of-life are calculated, and if necessary up to six cooling levels can be activated.

As an alternative to direct measurement, the U, I, tap position and $\cos(\varphi)$ value can also be transmitted to the REG-DA via SCADA client function (IEC 61850, IEC 60870-5-104), IEC61850-9-2 Sampled Values, IEC61850 GOOSE or by mA inputs, thereby eliminating the need for CT and VT cabling to the regulator.

The REG-DA regulator can communicate with a SCADA system (see list of characteristics) through all of the common protocols.

Freely programmable inputs and outputs enable the implementation of application specific tasks.

A number of different communication cards are available for the REG-DA, with connections that range from copper RS232 to fibre optic Ethernet.

A variety of protocols are available to communicate with a SCADA system or RTU:

- IEC 61850 including GOOSE and Sampled Values
- IEC 60870 - 5 - 101 / 103 / 104
- DNP 3.0 via Ethernet
- DNP 3.0
- MODBUS TCP
- MODBUS RTU
- Profibus DP
- SPABUS
- LON (on request)

The integrated SCADA communication cards are capable of most of these protocols and may be switched between them and configured using the free WinConfig software. WinConfig is specifically designed to provide a similar configuration interface for all of the protocols, thereby reducing engineering time.

The communication interfaces of the REG-DA are equipped with cyber security features including role based access control (RBAC) with remote user authentication via e.g. the Radius protocol.

We take care of it.

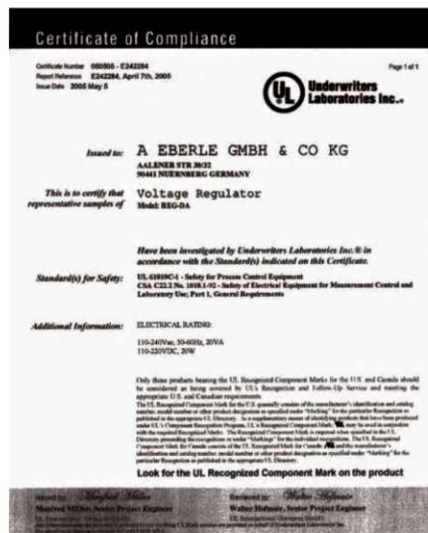
4. Technical specifications

Regulations and standards

- IEC 61010-1 / EN 61010-1
- CAN/CSA C22.2 No. 1010.1-92
- CISPR 22 Ed.6 (2009-09)
- IEC 60255-11 / EN 60255-11
- IEC 60255-21 / EN 60255-21
- IEC 60255-22-1 / EN 60255-22-1
- IEC 60255-25 / EN 60255-25
- IEC 60255-26 / EN 60255-26
- IEC 60255-27 / EN 60255-27
- IEC 61326-1 / EN 61326-1
- IEC 60529 / EN 60529
- IEC 60068-1 / EN 60068-1
- IEC 60688 / EN 60688
- IEC 61000-6-2 / EN 61000-6-2
- IEC 61000-6-4 / EN 61000-6-4



UL Certificate Number 050505 - E242284



| AC voltage inputs (U _E) | |
|-------------------------------------|--|
| Measuring voltage U _E | 0 ... 160 V |
| Shape of the curve | sinusoidal |
| Frequency range | 16... <u>50</u> ... <u>60</u> ...65 Hz |
| Internal consumption | ≤ U ² / 100 kΩ |
| Overload capacity | 230 V AC continuous |

| AC input (I _E) | |
|----------------------------------|---|
| Measuring current I _n | 1 A / 5 A software selectable |
| Shape of the curve | sinusoidal |
| Frequency range | 16... <u>50</u> ... <u>60</u> ...65 Hz |
| Control range | 0 ... I _n ... 2.1 I _n |
| Internal consumption | ≤ 0.5 VA |

| AC input (I _E) | |
|----------------------------|---|
| Overload capacity | 10 A continuous 30 A for 10 s 100 A for 1 s 500 A for 5 ms |

| Analogue inputs (AI) | |
|-----------------------|---|
| Quantity | See order specifications |
| Input range | -20 mA...0...20 mA points Y1 and Y2 are programmable |
| Control limit | ± 1.2 Y2 |
| Voltage drop | ≤ 1.5 V |
| Potential isolation | Optocoupler |
| Common-mode rejection | > 80 dB |
| Series-mode rejection | > 60 dB / Decade from 10 Hz |
| Overload capacity | ≤ 50 mA continuous |
| Error limit | 0.5% |

The REG-DA is supplied with 1 x mA Analogue Input (e.g. for the tap position indicator) as standard.

The inputs can be continuously short-circuited or open circuited. All inputs are galvanically isolated from all of the other circuits.

| Temperature input PT100 | |
|-------------------------|--|
| Quantity | one PT100 input at Level III possible two PT100 inputs at Level II possible |
| Type of connection | Three-wire circuit |
| Current through sensor | < 8 mA |
| Potential isolation | Optocoupler |
| Line compensation | No compensation required |
| Transmission behaviour | linear |

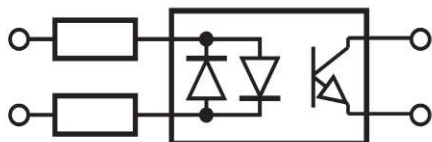
| Resistance input (tap change potentiometer) | |
|---|--|
| Quantity | See order specifications |
| Connection | Three-wire, convertible to four-wire |
| Total resistance in the resistor chain | R1: 180 Ω ... 2 kΩ R3: 2 kΩ ... 20 kΩ |
| Tap resistance | adjustable R1: 5...100 Ω/tap R3: 50...2000 Ω/tap |
| Number of taps | ≤ 38 |
| Potential isolation | Optocoupler |
| Current through resistor chain | max. 25 mA |

The measuring device has an open circuit monitoring.

| Analogue outputs (AO) | |
|-------------------------|--|
| quantity | See order specifications |
| Output range Y1...Y2 | -20 mA...0...20 mA Y1 and Y2 programmable |
| Control limit | $\pm 1.2 Y2$ |
| Potential isolation | Optocoupler |
| Load range | $0 \leq R \leq 8 V / Y2$ |
| Alternating component | <0.5% of Y2 |

The outputs can be continuously short-circuited or open circuited. All outputs are galvanically isolated from all of the other circuits.

| Binary inputs (BI) | |
|--------------------------------------|--|
| Inputs E1 ... E16 (... E22, ... E28) | |
| Control signals U_{st} | in the AC/DC range 48 V ... 250 V, 10 V ... 50 V, 80 V ... 250 V, 190 V ... 250 V in accordance with characteristic Dx |
| Shape of the curve, permissible | Rectangular, sinusoidal |
| 48 V...250 V | <ul style="list-style-type: none"> — H - Level $\geq 48 V$ — L - Level $< 10 V$ |
| 10 V...50 V | <ul style="list-style-type: none"> — H - Level $\geq 10 V$ — L - Level $< 5 V$ — Input resistance 6.8 kΩ |
| 80 V ... 250 V | <ul style="list-style-type: none"> — H - Level $\geq 80 V$ — L - Level $< 40 V$ |
| 190 V ... 250 V | <ul style="list-style-type: none"> — H - Level $\geq 176 V$ — L - Level $< 88 V$ |
| Signal frequency | DC, 40 ... 70 Hz |
| Input resistance | 108 k Ω , except 10...50 V |
| Potential isolation | Optocoupler; groups of four, each galvanically isolated from each other. |
| Anti-bounce filter | Software filter, with 50Hz AC input filter |



Simplified diagram of a binary input

| Binary outputs (BO) | |
|--|--|
| R 1 ... R13 (... R19, ... R25) max. switching frequency | $\leq 1 \text{ Hz}$ |
| Potential isolation | Isolated from all internal device potentials |
| Contact load | AC: 250 V, 5 A ($\cos\phi = 1.0$) AC: 250 V, 3 A ($\cos\phi = 0.4$) Switching capacity max. 1250 V A DC: 30 V, 5 A resistive DC: 30 V, 3.5 A L/R=7 ms DC: 110 V, 0.5 A resistive DC: 220 V, 0.3 A resistive Switching capacity max. 150 W |
| Inrush current | 250 V AC, 30 V DC 10 A for max. 4 s |
| Switching operations | $\geq 5 \cdot 10^5$ electrical |

| Display | |
|---------------|--|
| LC - Display | 128 x 128 graphic display |
| Back-lighting | LED, automatic switch off after 15 minutes |

| Indicator elements | | |
|--|---------------------|--------|
| The regulator has 14 light-emitting diodes (LED) | | |
| LED Service | Normal operation | Green |
| LED Blocked | Faulty operation | Red |
| LED 1 ... LED 8 | Freely programmable | Yellow |
| LED 9 ... LED 12 | Freely programmable | Red |

Each LED can be labelled on site.

If the labelling wishes are known at the time of order placement, labelling can be done at the factory.

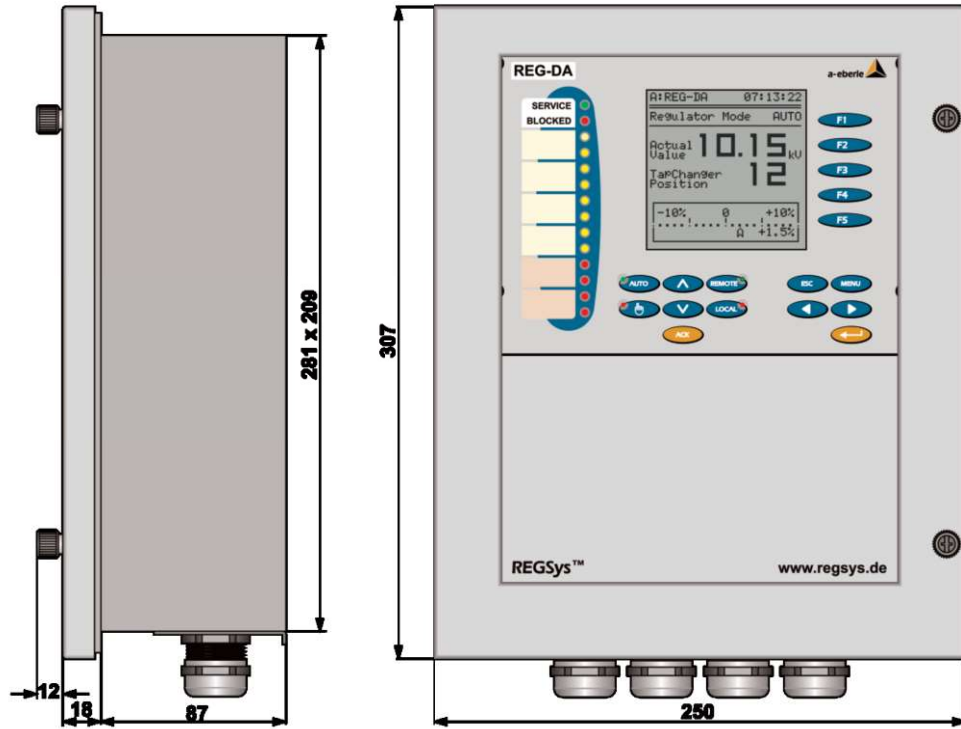
| Analog/Digital Conversion | |
|---------------------------|--|
| Type | 12 bit successive-approximation converter |
| A/D bit resolution | +/- 11 bit |
| Sampling rate | 24 samples per period, e.g. 1.2 kHz at a 50Hz signal * |

*The measurement inputs are equipped with an Anti-Aliasing filter.

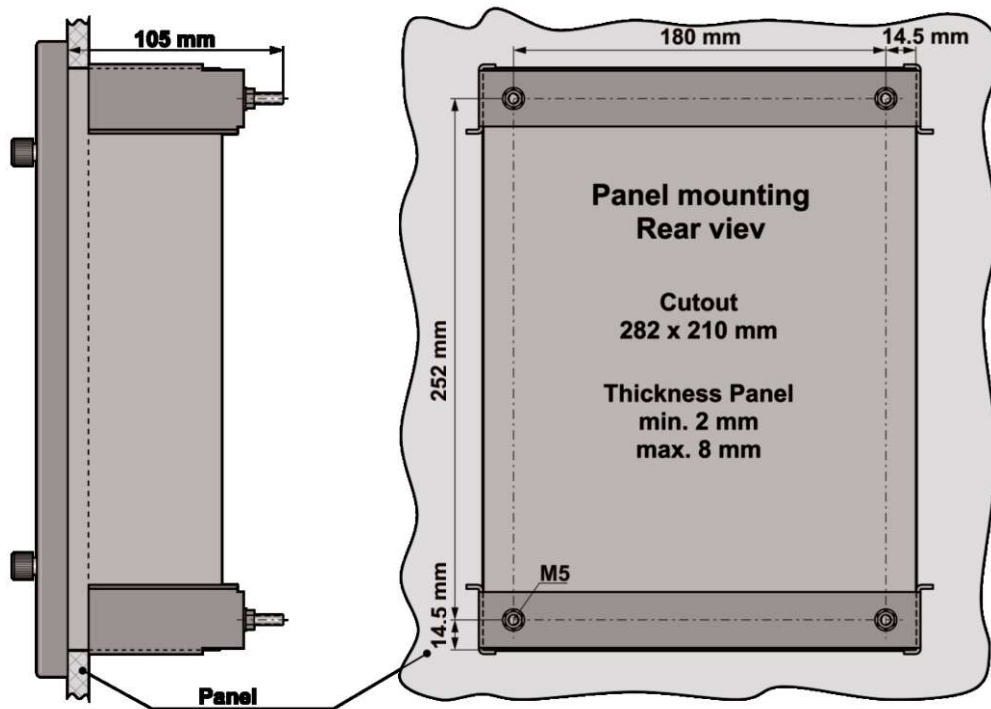
| Device real time clock | |
|------------------------|--|
| Accuracy | +/- 20 ppm (0...10 ppm on devices with feature S2) |

| Limit-value monitoring | |
|------------------------|---|
| Limit values | programmable |
| Response times | programmable |
| Alarm indicators | LEDs are programmable or are programmable on an LCD |

We take care of it.



Mechanical dimensions, in mm



Mechanical dimensions, panel mounting