TRAFOGUARD®

RELIABLE MONITORING
OF TRANSFORMER
OPERATING STATUSES.
TRAFOGUARD® – MONEY CAN'T BUY A BETTER WAY OF ENSURING ECONOMIC TRANSFORMER OPERATION.
TRAFOGUARD® – ALL-ROUND TRANSFORMER SAFETY.

Be on the safe side when operating on-load tap-changers and transformers. With our expert knowledge and TRAFOGUARD®.

As the world market leader in tap changers, we already have an innovative monitoring system for our products. The monitoring systems available from Maschinenfabrik Reinhausen have proven themselves in monitoring tap changers around the globe. TRAFOGUARD® is a practical professional solution for monitoring the most important transformer functions.

Collecting, processing, displaying and forwarding operating data from transformers – the TRAFOGUARD® combines all of these functions in one device. The modular system enables the basic module to be extended to suit the customer’s needs by means of function packages that can be combined in various ways. These can be selected upon ordering or added at a later date. For users who want to do more than simply monitor power transformers, the TRAFOGUARD® allows additional functions such as cooling system control or even voltage regulation to be integrated.

Power or distribution transformers? For both, TRAFOGUARD® increases transparency in terms of operating status, makes possible analysis of current and historical operating data (from up to 30 years ago) and helps you to detect critical operating statuses early on.

Quick and reliable
Very simple to configure and user-specific parameterization thanks to the new TRAFOSET® software

Flexibly combinable
Maximum flexibility through monitoring packages that can be selected for specific customers and individually combined

Graphic display
Data is displayed in a clear and operator-friendly way using TRAFOVISOR® visualization software and on the device

Diagnosis by experts
Individual visualization of operating data with the TRAFOVISOR® visualization software and data export
KNOW WHAT’S GOING ON. MONITORING SYSTEMS FROM MR.

More than 20 years of expertise in the monitoring field: This enables us to continuously develop and improve our monitoring systems.

TRAFOGUARD® – clear and operator-friendly display of data

Monitoring parameters, such as limit values or alarms, can be changed at any time using the TRAFOSSET® and TAPCON®trol parameterizing tools and therefore adapted to the current operating situation – even remotely.

- 9 of 10 LEDs for free event and/or signal allocation with option of labeling
- Clear graphics display (128 x 128 pixels) with logical, intuitive menu structure
- Clear display of all current events
- Life measured values (online monitoring)
- German/English can be selected as display language on device
You can adapt the basic TRAFOGUARD® device individually to your needs using various optional add-on modules. The functions can also be adapted or added to later on through individual signal allocation of the card inputs and outputs.

<table>
<thead>
<tr>
<th>Technical data</th>
<th>TRAFOGUARD®</th>
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</thead>
<tbody>
<tr>
<td>Device characteristics</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>19&quot;</td>
</tr>
<tr>
<td>Dimensions</td>
<td>483 x 133 x 178 mm (W x H x D; 84 part unit x 3 height unit)</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 20 in accordance with IEC 60529</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 5 kg (depending on equipment)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25°C to +70°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-35°C to +80°C</td>
</tr>
<tr>
<td>Display</td>
<td>128 x 128 pixels</td>
</tr>
<tr>
<td>Control system communication</td>
<td>IEC 61850; DNP 3.0</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>Multi-voltage mains unit 88-265V AC / DC 4.5 A</td>
</tr>
<tr>
<td></td>
<td>DC mains unit 36-72V DC 4.5 A or alternatively</td>
</tr>
<tr>
<td></td>
<td>DC mains unit 18-36V DC 4.5 A</td>
</tr>
</tbody>
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TRAFOGUARD®

Data storage of up to 45 measured values with adjustable recording interval.

- Current measured values: data stored for 24 hours, recording interval of 1 minute
- Historical measured values: data stored for 30 years, recording interval can be set to between 10 and 120 minutes
OPTIONS FOR INDIVIDUAL FUNCTION PACKAGES.

Freely selectable function packages and variable hardware configurations allow the TRAFOGUARD® to record and process extensive transformer status information using a range of different sensors and to make this available to the operating staff via the TRAFOVISOR® visualization software.

- **Extended monitoring**
  - Temperatures (oil temperature at bottom, ambient temperature two)
  - Winding temperature 1...3-ph
  - Dehydrating breather transformer/OLTC
  - Pressure relief device transformer/OLTC
  - Buchholz relay
  - Oil level of the conservator transformer, OLTC

- **DGA**
  - Gas status (up to 9 gases)
  - Moisture in oil (transformer, OLTC)
  - Total gas content

- **Cooling system control**
  - Control for up to six cooling stages
  - Alternating operation/predictive mode
  - Inflow temperature
  - Outflow temperature
  - Operating statistics

- **Automatic voltage regulation**
  - Parallel operation (circulating reactive current; master/follower, topology)
  - Line drop compensation (LDC, Z)

- **Basic monitoring**
  - 1-phase load voltage, load current (3-phase as an option)
  - Effective, reactive and apparent power
  - Temperatures (surroundings, Topoil, hotspot)
  - Transformer aging rate
  - Tap-change statistics (numbers for hours/tap, tap-changes/tap and passes through neutral position)
  - Maximum winding temperature
  - Local/Remote
  - Motor running OLTC
  - Tap position capture

- **On-load tap-changer monitoring**
  - Oil temperature OLTC
  - Oil carbonization
  - Contact wear
  - Difference contact wear
  - Maintenance recommendations

- **Free inputs**
  - Analog and digital inputs

- **Motor Current Index**
  - In accordance with IEEE PC57.143

*) Basic equipment
TRAFOGUARD® – INTERFACES.

For integration in station/mains management systems, the TRAFOGUARD® monitoring is equipped with extensive communication functions.

Various physical interfaces (e.g. RJ 45 or fiber optic) are available for the IEC61850 and DNP 3.0 control system protocols.

By using a managed industrial switch, redundant Ethernet connections are possible.
TRAFOGUARD® – A SYSTEM DESIGNED WITH MAXIMUM FLEXIBILITY IN MIND.

The TRAFOGUARD® system comprises three components, the TRAFOGUARD® device and the TRAFOSET® and TRAFOVISOR® software packages.

TRAFOSET® – simple commissioning and parameterization

- Simple configuration of functions without changes to the firmware
- Individual signal allocation of card inputs and outputs on the TRAFOGUARD®
- Simple parameterization of all analog and digital measurement signals, incl. limit values and events

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Flexible LED assignment on the TRAFOGUARD®
- Optimization of TRAFOGUARD® card population for customer-specific monitoring product requirements at the point when devices are ordered
- Rapid establishment of connection to TRAFOGUARD® device, data upload and download, firmware and configuration files
- Convenient transfer of configured parameter files to the TRAFOGUARD®
A new dimension in visualization thanks to TRAFOVISOR®

Emphasis was also given to maximum flexibility when developing the visualization and preparing the measured values. The TRAFOVISOR® visualization interface clearly displays all measured values, events and binary statuses of the transformer on a PC either locally or in the control room for example. The displays of MR’s TRAFOVISOR® visualization interface can be adapted to the respective user requirements conveniently and displayed in the form of tables or graphics. Configurable plottexts, colors and line widths provide maximum scope for customization.

TRAFOVISOR® – comprehensive visualization with graphic preparation of all the transformer’s operating data on one PC

- Local or remote access via Ethernet
- Visualization of all current and historical measured values of binary statuses
- Convenient depiction of all events in the event list
- Minute-by-minute visualization updates for all current measured values, events and binary statuses
- User-specific, configurable graphics
- Export of all current and historical operating data in tables