Test van for maintenance and diagnostics of power transformers

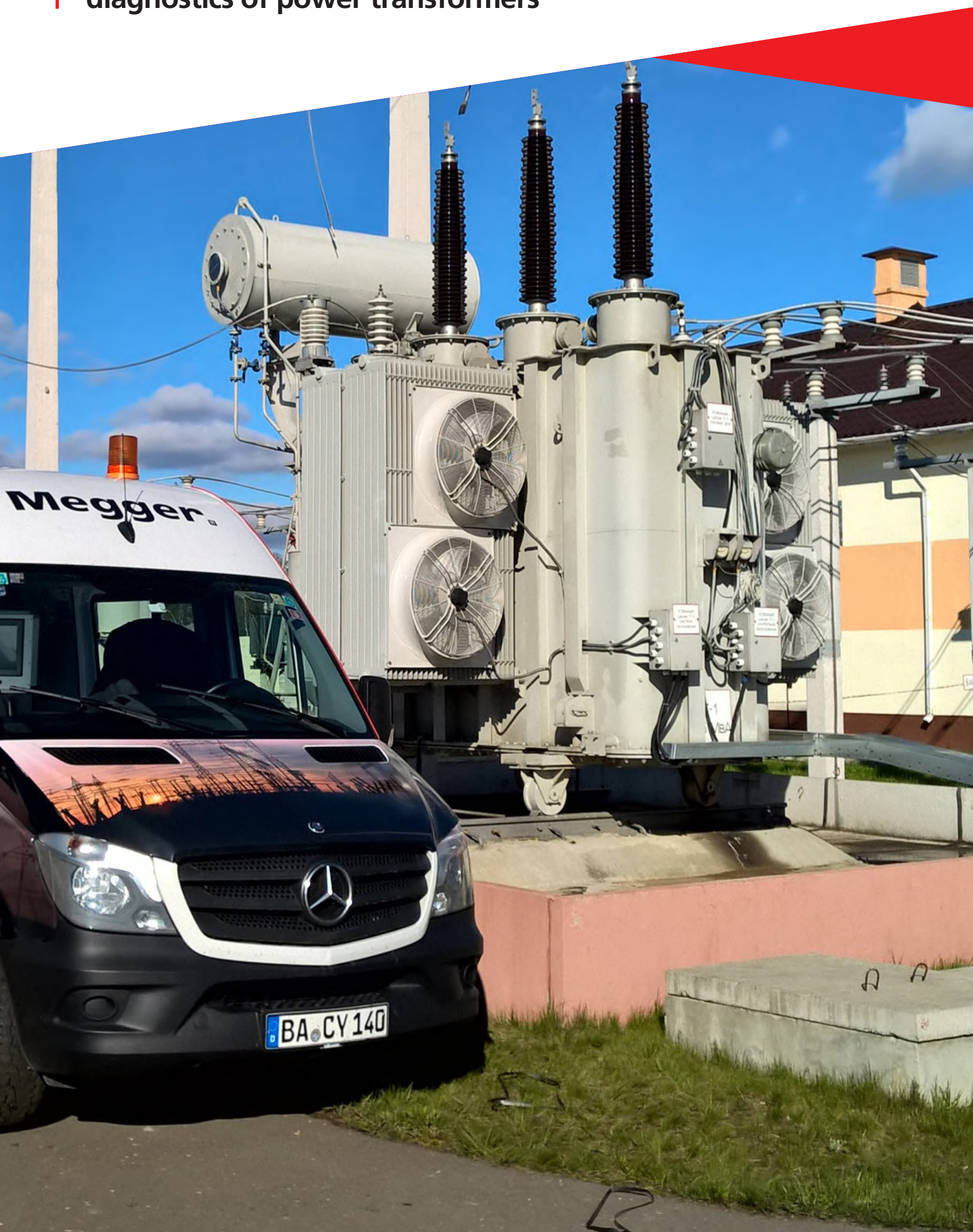


Figure 1

Description

Transformer Test Van

Increased transformer test efficiency

To stream-line your on-site assessment of a power transformer's condition the Megger transformer test van is equipped with a selection of instruments. It arrives on site ready for action: from starting the test, to rapidly yielding and storing results, as well as simplifying the cleanup process for you.

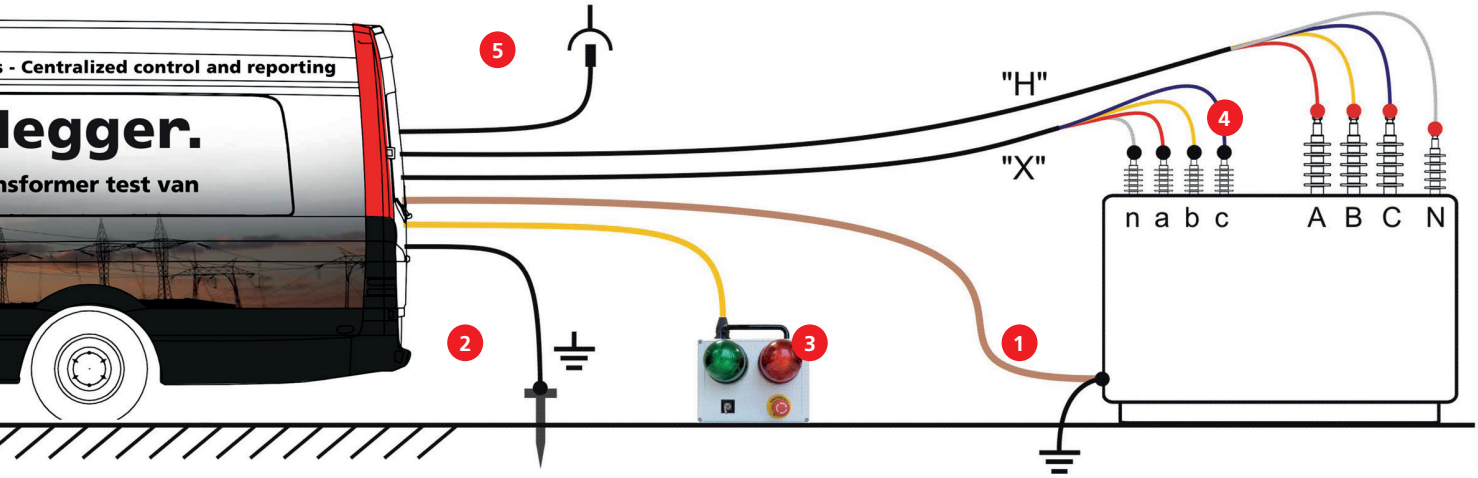
The dedicated transformer test van helps you perform a range of routine electrical tests, commissioning testing. and advanced diagnostic techniques to international standards.

The key benefit

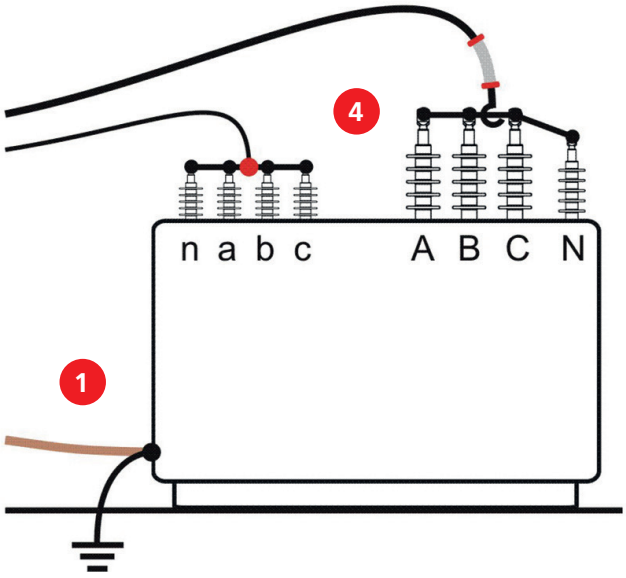
Before the transformer test van, each individual tester would have its own dedicated test leads, and you would have to man-handle both tester and leads on to the site. You would need to climb the transformer several times to swap the leads to do a particular test.

Connection diagram

LV test connection for MTO / TTR



HV test connection for Delta / S1



Now things are different!

The test leads are stored on drums and connected to the selection of instruments on-board using automatic switching, reducing the time you waste, and safety. You waste less time and can work more safely because you do not have to continuously climb the transformer to reconnect the test leads.

Integration means safer working practices

All the test techniques on-board the van are to and well-accepted and meet the international standards. By integrating the multiple tests in to a single system, the van has the benefit, of organising testing in to an automated workflow. At heart of the system is a switch box which commutates the test leads between several measuring devices and test schemes, minimising transformer climbing, and giving you a safe and comfortable working environment.

(connection diagram in figure 1).

Connection sequence

1. Protective earth
2. Step voltage reference (earth spike)
3. External safety box
4. Test leads connection
5. Power supply

Features

Basic configuration

- **A** Central computer with touch screen
- **B** Control unit
- **C** DC winding resistance / onload tap changer continuity test
- **D** Turns ratio and vector group verification
- **E** Insulation resistance
- **F** Capacitance and power factor/ dissipation factor (and exciting current) for transformer and bushings

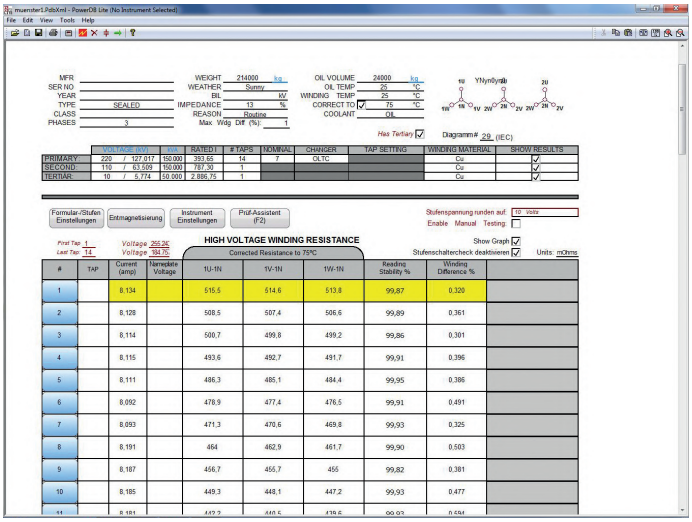
Optional features

- **Short circuit impedance**
- **Power losses for no-load and short circuit conditions**
- **Frequency response analysis**
- **Moisture-in-cellulose assessment with DFR technique**
- **Withstand tests at elevated voltage up to 100 kV AC 50 Hz and 70 kV DC**
- **Oil dielectric strength measurements**
- **and more...**

1. HV test leads (red, blue, interlock) for insulation assessment, 30 m
2. LV test leads for winding resistance and turns ratio (3 ph + neutral, HV & LV side), 30 m
3. External safety box
4. HV cable, 30 m
5. Protective earthing cable, 50 m
6. Mains drum and fuse box, 50 m
7. Switch box

Operation

The user is working with two sets of test leads (for HV and LV testing). When a certain set of test leads is connected to the test object, an instrument can be selected (powered on) with an auxiliary software. Later this device is controlled by a dedicated database platform (PowerDB). Upon completion of each measurement, results are automatically transferred into a test report. PowerDB allows remote accessing, reporting and comparing the data with previous tests and eventually establishing a trend of the transformer condition over time.



Multiple field tests have proven that the measurement accuracy stays in line with single instrument's specifications. The automated selection of instruments and switching through all necessary test arrangements lead to a substantial time saving, and also help prevent accidents.

The safety concept

An essential part of the transformer test van is the safety system, which monitors all safety-relevant parameters.

The following systems are monitored:

- **Step voltage: Earth to vehicle chassis**
- **Fast ramp voltages**
- **Rear door switch**
- **Safety-key switch**
- **Internal / external emergency stop**
- **Interlock button**

Safety equipment in accordance with BGI 891 and VDE 0104

Technical data

PARAMETER	VALUE
Power supply	100-240 V, 50-60 Hz, or three phase (optional)
Built-in power generator (optional)	TravelPower 5 kVA and higher
Test leads	30 m (optionally motorized)
Insulation testing (IR, DAR, PI, DD, SV)	
Test voltage, DC	up to 5, 10 or 15 kV
Range of measurement	100 kOhm…15 TOhm
Charging current	2 mA, 6 mA (short circuit)
Noise immunity	8 mA
Capacitance and dissipation factor (tan δ)	
Test voltage, AC	0-12 kV
Test current (at 12 kV)	300 mA (4 minutes), 100 mA (continuous)
Test frequency range	45-70 Hz (12 kV), 15-400 Hz (4 kV), 1-500 Hz (250 V)
Measurement range of dielectric losses tan δ and capacitance	0-100 (0-10,000%), (max. resolution 0.001%) 0 -100 µF, (max. resolution 0.01 pF)
Individual temperature correction of tan δ results	from 5°C to 50°C insulation test temperature to 20 °C reference
Noise immunity	Electrostatic 15 mA, Electromagnetic 500 µT, at 50 Hz
Winding resistance and OLTC	
Core de-magnetisation	automatic
Test current	up to 10 A (optional up to 50 A)
Measurement range	1 µOhm – 2 kOhm
Accuracy	+/- 0,25%
Turns ratio and vector group	
Excitation voltage	up to 80 V
Ratio measurement range	0,8 – 45000
Phase deviation	+/-90°
Accuracy	+/-0,1%... +/- 0,3%
No-load and short-circuit loss power (optional)	
3 phase power multimeter	0-650 V, 0-100 A, 10-1000 Hz, 0-100 kW
3 phase current regulating auto transformer	up to 16 A
Voltage withstand testing (optional)	
AC 50 Hz test voltage	0…100 kV
DC test voltage	0…70 kV
Load capacitance	0,01-1,9 nF
Leakage current measurement	up to 100 mA
Max. power consumption	20 kVA
Frequency Response Analysis (optional)	
Moisture in cellulose assessment (optional)	
Oil dielectric strength test set (optional)	up to 100 kV
Control & data acquisition & reporting	PowerDB, LabTransControl
Basic operating system	WIN 7
Interface	RS 232, USB, Ethernet
Uninterruptable power supply for industrial PC	7 min

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