

200KV MOBILE TEST UNIT

PRODUCT BROCHURE

The 200kV mobile test unit improves our capability in both VT accuracy testing of High Voltage transformers and increases capability in mobile testing of high voltage electrical apparatus.

A key improvement is the increased range of the calibrated voltage transformer and VA capacity of the HV power source. Which allows the truck to be used for a wider range of site condition assessment testing and calibration, applicable to electrical apparatus.

The custom designed and built heavy rigid twin steer truck can be maneuvered into tight spaces such as switch-yards, substations and other electrical infrastructure.

The design and size, along with mobility, greatly improves the ability of the testing system to be brought in close to the test object and then manoeuvred compared to a testing systems that has to be assembled from separate components, connected, tested and then reassembled, the 200 kV unit his can significantly improve testing logistics at a site.

The 200kV mobile unit is a multi-use system and can be configured for a variety of purposes:

- As a Standard Voltage Transformer calibration and testing
- Applied Voltage Withstand tests up to 200 kV 0.5A and 100kV 1A. This capacity is increased from the original unit.
- Routine and investigative HV testing on electrical infrastructure equipment including power transformers, circuit breakers, surge arrestors, air-break switches and isolators, and GIS busbars.



VOLTAGE TRANSFORMER ACCURACY

When High Voltage transformers are used for revenue metering, their accuracy is important. Periodically voltage transformers are required to be re-tested to ensure that revenue metering accuracy is maintained. The NEM requires that High Voltage users have their voltage transformers tested every 10 years.

If accuracy is not in tolerance it could have serious consequence in relation to settlements, for billing of bulk energy for high energy users.

The calibration is achieved with an ultra-precision calibrated voltage transformer, that is used to intercompare to the customer's VTs under various test conditions

The ultra-precision reference was itself calibrated at the National Measurements Institute (NMI) North Ryde, NSW. This ultra-precision VT can be used to cover VT's with system voltages from 330kV to 11kV.

APPLIED WITHSTAND AND SERVICE VOLTAGE TESTING

Service voltage and over-voltage (stress testing), is a standard functional test for utilities. When energising high voltage apparatus for the first time, or especially after overhauls and upgrades, this test provides confidence that the equipment has the capability to withstand service voltages and has been installed according to specifications.

Testing equipment by directly connecting it to the power network at system voltage (soak testing), is a high-risk testing methodology. Not only does it under test the equipment, but should a fault occur it can lead to significantly more damage to the equipment than when using separate source testing, resulting in greater safety risk and delays. Apart from the fact that there is often ample warning of impending failure in separate source test arrangements enabling the ultimate failure to be averted, should failure occur then the fault energy is very limited, and thus the consequences are much less than with soak testing. Also, soak testing provides very little indication of the ultimate electrical strength of the installation, as the equipment has only system voltage applied to the insulation and there is no indication how it will perform when it degrades over time.

TESTING FUNCTIONS AVAILABLE AT SITE

In association with performing testing using the HV source, additional diagnostic and asset integrity tests can be carried out as indicated below.

Switchyards and Switchgear:

- 0-200kV Applied Withstand and Service Voltage testing
- Partial Discharge both 50Hz and UHF
- Insulation Resistance (IR) open and closed positions
- DDF and capacitances of bushings C1 and C2;
- CT Polarity checks
- New switchgear NATA laboratory testing
- New CT, CVT and VT NATA laboratory testing

Transformers:

- 0-200kV - Applied Withstand and Service Voltage testing
- Partial Discharge
- Voltage ratio on all taps including vector group and polarity checks
- Low Voltage excitation
- Winding resistance of all windings on all taps
- On load and off load tap switch testing, including dynamic resistance.
- Insulation Resistance (IR) and Polarisation Index (PI) of windings
- Dielectric Dissipation Factor (DDF) and capacitances of windings
- DDF and capacitance of bushings C1 and C2
- Induced overvoltage withstand test at 1.1pu at 50Hz (depends on txf design, may be up to 1.15pu), can achieve up to 1.2 when operating from 60Hz supply.
- Frequency Response Analysis (FRA)
- Winding paper moisture
- Bushing C1 capacitance and DDF spectroscopy (using DIRANA)
- Oil samples e.g. DGA, Oil Quality, Furan, PCB and Corrosive Sulphur test
- Life management and service support

Surge arrestors, Insulators and Earth switches:

- 0-200kV Applied Withstand and service voltage testing
- Partial Discharge
- Micro-ohm resistance

HIGH VOLTAGE CABLE

- HV cables by their nature will require an amount of reactive power to energise to test voltage which is dependent on the total cable capacitance.
- The current available from the test truck and its duration can be limiting factors when considering cable testing.
- Obtaining information such as cable type, length, capacitance, test voltage and any specific testing requirements from the client, to determine applicability.

TYPICAL CABLE TESTING ROUTINE:

- Apply 10kV D.C. for one minute to each cable phase
- Applied High Voltage test
- Measurement of Conductor Resistance
- Tan Delta at 50Hz up to the rated voltage of the cable (carried out at 0.5U0, 1.0U0)
- Cable resonance characteristics
- DC conductor resistance (including phasing and continuity)
- Insulation resistance (IR) measurements (before and after HV Test)
- Positive and negative sequence impedance (including sheath current)
- Capacitance measurements
- Partial Discharge
- New bushing NATA laboratory testing

HIGH VOLTAGE - PFC AND HARMONIC FILTER YARDS, STATIC VAR COMPENSATORS:

- 0-200kV Applied Withstand and Service Voltage testing
- Partial discharge tests
- Measure component values
- Measure filter characteristics

HIGH VOLTAGE TRANSMISSION LINES:

- 0-200kV Applied Withstand and Service Voltage testing
- Overvoltage testing
- Measurement of transmission line characteristics

SPECIFICATION

Electrical: HV test supply

Manufacturer	General electric
Type	K (form EW 50 cycles)
HV rated volts and amps	200KV 0.5A, 100KV 1.0A
LV rated volts	460/ 960V
Output	100KVA 1 hour (55°C TEMP RISE)

Standard voltage transformer

Manufacturer	Epro GallSpach GmbH
Type	NVOS 408SMO
Serial No	2/19/0656
Primary Voltage	330/ $\sqrt{3}$ KV / 220/ $\sqrt{3}$ KV / 132/ $\sqrt{3}$ KV
Secondary Voltage	110V
Rated Output	5 VA COS.B 1.0
Accuracy	$\pm 0,010$ % ; $\pm 0,5$ MIN
Range	(40% - 120%) X rated voltage
PD Level	< 5PC @ 1,2 X UN
Frequency	50 HZ
Overvoltage Test	286 KV ; 50 HZ ; 1 minute
Applied Voltage Test	3KV ; 50 HZ ; 1 minute

TRUCK:

- IVECO Max 2 persons can travel in cabin
- No sleeper cabin fitted
- GPS locator fitted

TRAVEL:

- Maximum distance per day – ~800 km
- Maximum driving per day – 12 hours – As per fatigue management policy

TYPICAL TRAVEL DURATION

Location	Travel Time	Overnight Accomodation
Sydney	3.0 hours	0
Brisbane	12.5 hours	1
Mackay	24 hours	1
Melbourne	15 hours	1
Darwin	59 hours	5
Perth	55 hours	4
Adelaide	23 hours	1
Hobart	34 hours	4- ferry crossing
Port Hedland	76 hours	6

WEIGHT AND MEASUREMENTS

	Total
Axel Weight Static	24075
Stabilisers	4
Measurements	200kV
Overall Length	11.6m
Width	2.46m
Height	4.24m
Rear Overhang	3.24m
GVM	31,000kg
Tare Weight	21,900kg
Trailer	No

FUEL SYSTEM

- 1 x 500 litre rectangular aluminium tank (RHS) – Approx 8L/100km
- 1 x 55 litre AdBlue tank – (Diesel additive to reduce particulate emissions) <http://goblue.com.au/what-is-adblue/>