TALDRIVE LTD

2021

CABLE TEST VAN HVT-200L

(FOR 132 KV POWER CABLE)

Larnaca, Cyprus

TALDRIVE LTD
Number ΦΠΑ (VAT) 10132211L

Holding company "EMZ"
Head office and Factory:
Aradippou Industrial and Commercial Estat
Larnaca, Cyprus
RN HE 132211; IN 9.84

CABLE TEST VAN FOR 132 KV POWER CABLE

HVT-200L

The cable test van performs the following functions:

1. *DC Hipot Withstand Testing up to 110kV*
2. *Very Low Frequency (VLF) AC voltage 0.1-0.02 Hz high voltage withstand test 132 kV of power cables*
3. *Burning down defective insulation of power cables*
4. *Pre-locating high voltage cable faults by Impulse Reflection Method, Arc Reflection Method (Secondary Impulse Method)/Multiple Impulse Method (MIM), Impulse Current Method and Decay Method*
5. *Locating cable faults by the acoustic method and inductive method*
6. *Audio frequency cable route tracing and cable depth evaluation*
7. *Cable identification from a cable bundle*

A. High Voltage Testing

1.MAIN EQUIPMENT.

Laboratory equipment is conventionally divided into primary (mounted) and additional (non-mounted) equipment. Fully functional usage of the laboratory is possible only with a complete set of basic and additional equipment.

1.1 Network Remote

Designed for switching nodes and blocks of the laboratory along power circuits, as well as for controlling lighting of the laboratory cabin.

1.2 Voltage regulator

Designed for smooth control of the level of supply voltage supplied to the BVI-200M and BNI-M unit. If the regulator is not in the zero position, testing is not possible.

1.3. VI control unit

Management of high voltage tests with measurement of test voltage on the primary side using a high voltage measurement system with error. measurements 3%

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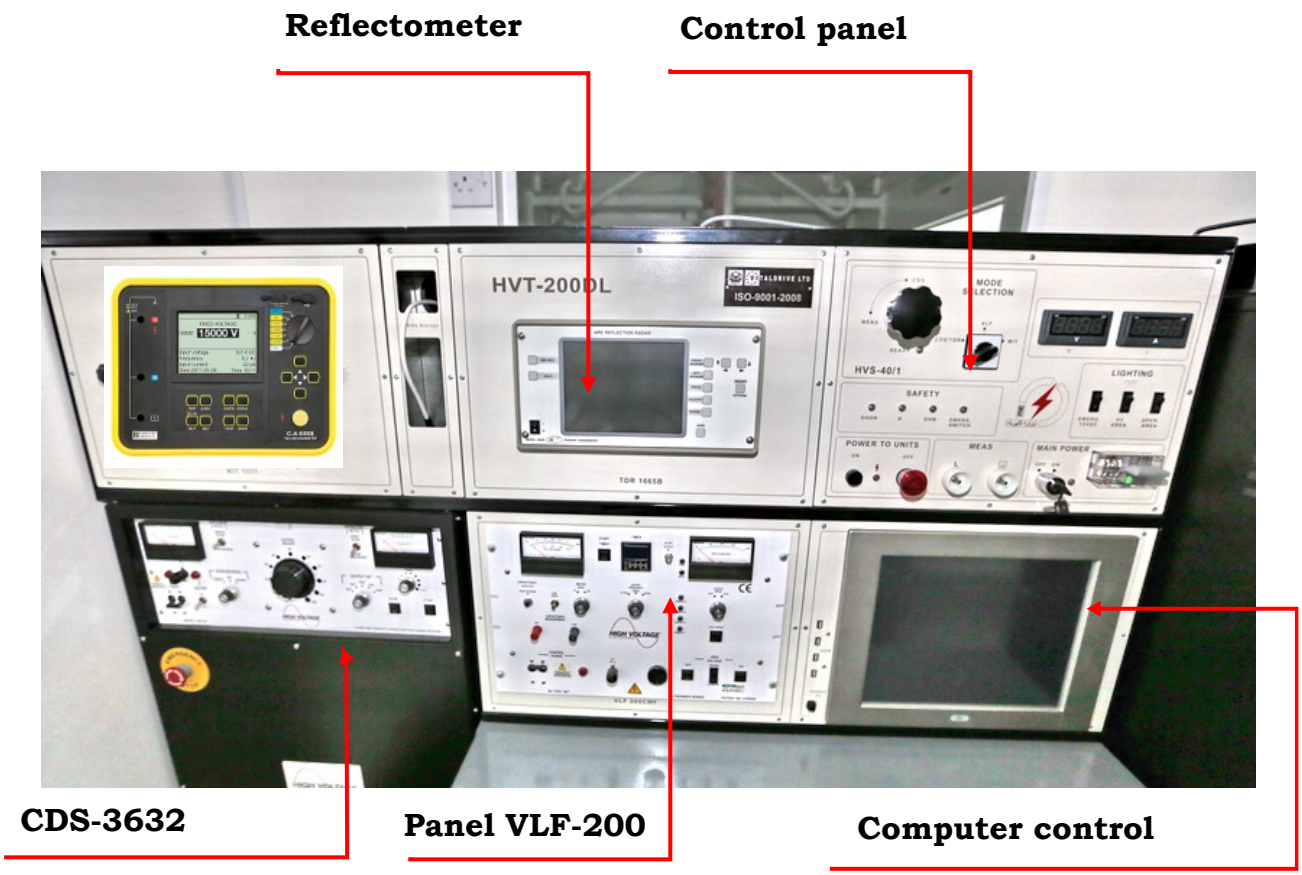

View of the control panel LVI HVT-200L

B. AC (VLF) HIGH VOLTAGE WITHSTAND TEST AND DC HIPOT TEST.

2. AC HIPOT/BURNER VLF-200CMF

The VLF-200 CMF hipot is an AC output tester but with an output frequency of 0.1 Hz or lower rather than 50/60Hz. Although the frequency is low, it is still an alternating current with polarity reversals every half cycle. At 0.1 Hz output, rather than 50Hz, it takes 500 times less current and power to apply an AC voltage to a capacitive load, like a long cable. The VLF-200 CMF provides a 200 kVac peak output voltage, suitable for performing VLF hipot tests on 138 kV cable and as a voltage source for tan delta and partial discharge testing on 160 kV cable. In addition to the standard controls, this model also contains a Cable Burn mode. A VLF burner is one of the most effective methods of reducing a cable fault's impedance, or arc-over voltage, in order to permit the use of lower voltage and energy rated fault locators – thumpers. The VLF hipot applies its voltage to the faulted cable. The voltage output raises to the arc-over level and the cable arcs. The current of the VLF and the stored energy in the cable discharges into the fault. This process continues, but now in the opposite polarity, as the sine wave output of the VLF continues. This arcing of the cable fault repeatedly in opposite polarities rapidly reduces the fault voltage.

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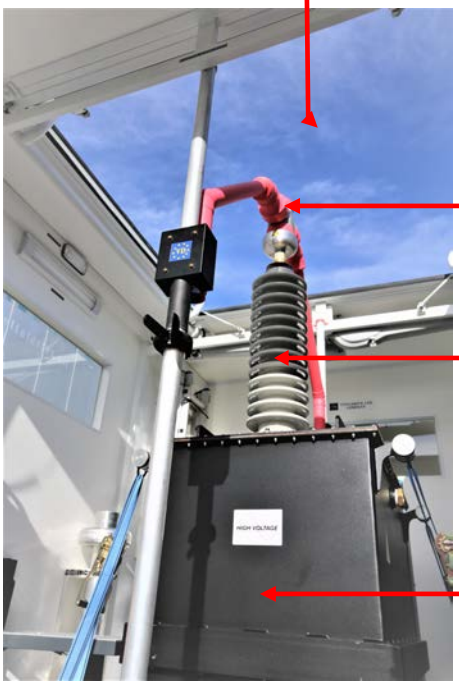
TECHNICAL SPECIFICATIONS

Input:	230 V, 80A peak, 50/60 Hz (single phase)
Output:	Voltage: 0-200 kVac peak Current: 100 mA
Duty cycle:	Continuous
Load Capacitance:	0.75 µF @ 0.1 Hz, 1.5 µF @ 0.05 Hz, 3.75 µF @ 0.02 Hz
Metering:	Voltage: 0-200 kVac peak 3.5" analog disp.
	Current: 0-200 mAac 3.5" analog disp.
Controls:	HV On/Off, Motorized Voltage Control, Zero Start Interlock, External Interlock, Digital Dwell Timer, Capacitance Measuring Circuit, Burn/Hipot Operation Mode Switch, Fixed 120% Overload
Size/Weight:	Controls: 61cm W x 65cm D x 180cm H, 295 kg HV Tank: 155cm W x 93cm D x 220cm H, 1678 kg

High voltage window



High voltage insulation support

High voltage insulator 200 kV

Transformer tank 200 kV

The ADL data logger is designed to monitor, record, and wirelessly download all test data from an HVI Very Low Frequency tester to a computer. In HVT-200DL there is a possibility to record the test data and using the central computer one can monitor the test, record or save all the results. This function is provided by the built-in the VLF 200 CMF Automatic Data Logger.

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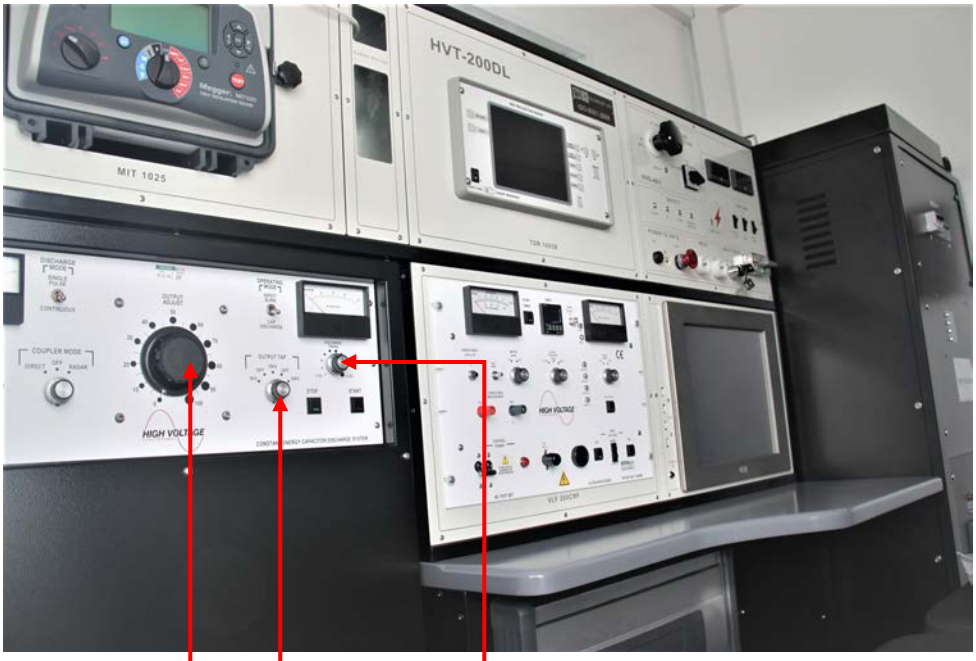
C. POWER CABLE FAULT LOCATION

3. CONTROLLED ENERGY SURGE WAVE GENERATOR AND FAULT BURNER CDS-3632 UF

The CDS-3632 UF Controlled Energy fault locator is self-contained test set for testing and fault locating in primary cable systems. It is designed to provide constant energy at each of three different selectable output voltages. The controlled energy feature provides full energy at each output voltage tap, allowing the user to thump at a lower voltage with a higher energy while minimizing further cable damage.



CDS 3632U Series front panel control

The powerful 3200 joule pulse makes fault locating easier using acoustical and electro-magnetic detection devices. With 280 mA of burn current, faults can be rapidly reduced to low voltage levels, permitting thumping at lower and less damaging voltage levels. The CDS-3632 UF can thump at 9kV, 18 kV, or 36 kV yet deliver 3200 joules.

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TECHNICAL SPECIFICATIONS

Input:	230 V, 50/60 Hz, 10A
Output Burn:	0-9/18/36 kV DC
Current:	280/140/70 mA DC
Capacitor Discharge Energy:	3200 J at full output available on all output taps. 80 microfarads/9kV, 20 microfarads/18kV, 5 microfarads/36kV
Polarity:	Negative Output
Duty:	Continuous
Repetition Rate:	3 to 10 Seconds, Variable
Voltmeter:	3.5", Scaled 0-40 kVdc ±2% F.S.
Current Meter:	3.5", Scaled 0-400 mAdc ±2% F.S.
Dimensions and Weight:	635mm w x 737mm d x 1130mm h, 204kg

4. Automatic Time Domain Reflectometer TDR-906

The automatic time domain reflectometer is intended for power cable fault prelocation by the Impulse Reflection Method (TDR), the Arc Reflection (Secondary)/Multiple Impulse Method (MIM), the Current Impulse method and the Voltage Decay Method. The device transmits a low voltage pulse of energy that travels or propagates along the cable. A portion of this energy will reflect back to the unit whenever it passes a relative change in the impedance of the cable. Since the time the reflections take to return is proportional to the distance and the approximate speed of the impulse is known, the automatic time domain reflectometer can easily measured the distance to the fault position. Therefore, the TDR-906 shows the continuity of characteristic impedance along the power cable under test applying electrical pulses, which is ideal for checking faults (such as complete open & short, partial open & short, loose connection, broken lines etc.) on any cables which consist of at least two metallic conductors. When the TDR-906 is used in conjunction with High Voltage equipment (e.g. CDS-3632), the unit supports high voltage methods of power cable fault prelocation such as the Secondary Impulse (Arc Reflection) and the Current Impulse method.

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TECHNICAL SPECIFICATIONS

Measuring Range	64000 m
Pulse Width	40 ns – 3.56 mirco seconds
Pulse Amplitude	30V
Sampling Rate	100 MHz
Accuracy/Resolution	≤1m
Display	8.4" in touch, 640 x 480 dots, touch screen, colour LCD
Storage	100 records
Connection	USB
Velocity	90 – 300 m/μs
Output Impedance	5 – 80 Ohm
Menu Styles	Guided Menu
Fault Location Method	TDR, SIM, MIM, ICM, AIC, Decay
Weight	3 kg
Dimensions	0.33 x 0.31 x 0.15 m

D. ADDITIONAL TEST EQUIPMENT

5. INSULATION RESISTANCE TESTER C.A 6555

With its test voltage of up to 15 kV, the C.A 6555 megohm-meter is an expert tool for testing insulation safely and accurately. It complies with the most recent recommended practice while taking into account future developments, it is ideal for use on rotating equipment and machinery operating at 12 kV or even higher. The multiple test modes mean that you can both assess the insulation in qualitative terms by non-destructive testing ("I-limit" and "early-break" modes) and use samples to investigate insulation ageing problems for preventive maintenance purposes ("burning" mode).

The C.A 6555 offers quick, effective checking of test execution by displaying the evolution of the test in progress in graphic form. Thanks to its large storage capacity, complete analysis of the test sessions performed on-site can be carried out with the DataView software after transferring the data onto a PC

6. SUPER DIRECTIONAL ACOUSTIC DETECTOR S.D.A.D

Ease and speed of fault finding with a thumper have been greatly enhanced with the addition of the S.D.A.D. The Super DAD conveys more information about the fault location, and faster, with the addition of new microprocessor controlled electronics that provide bright, easier-to-see-and-read signals - day or night.

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FEATURES

- Dual channel system designed to work with any brand thumper
- Ultra-high speed clock indicates direction to the fault
- Soft coil microphones (earth probes) with tri-pod bases for hard surface location
- Ballistic impulse detector visually confirms the presence of the "thump"
- Three different modes of operation: Direction-to-fault, time-based distance to fault and fault depth indication

7. AUDIO FREQUENCY CABLE TRACER SET (Inductive method)

The IFL-1210 cable locator set is used for the successful location of the exact track and depth of different underground networks (cables and metallic pipelines). This lightweight user friendly instrument operates at multiple active frequencies and provides passive 50/60 Hz detection services as an excellent safety feature for identifying live underground utility cables. The IFL-1210 features a digital readout of the depth reading that helps to identify service depths prior to digging.

TECHNICAL SPECIFICATIONS

TRANSMITTER

Operating Frequency :	200-10000 Hz
Modes of Generation :	Continuous, Intermittent, tri-band (three frequencies)
Permissible Load Resistance :	0 … ∞
Specified Output Current:	
- Continuous and tri-band	0,1 … 10 A
- Intermittent	0,1 … 15 A
Max Output Power:	120 W (continuous) / 180 W
- Battery Operated	(intermittent)
- External Battery Operated	180 W (continuous) / 270 W (intermittent)
Protection :	IP 54
Dimensions:	305 x 270 x 194 mm
Weight:	12 Kg

RECEIVER

Operating Frequency :	Active: 512, 1024, 1450, 8928, 9820 Hz Passive: 50/60 Hz, 100 Hz, 12-24 KHz
Max Depth Measurement :	Up to 10 m
Max Depth of Detection :	Up to 25 m
Max Distance of Detection :	Up to 5 Km
Continuous Operating Time Without Lighting:	Up to 50 h
Operating Temperature:	-40 … +60 ºC
Dimensions :	720 x 110 x 150 mm
Weight :	1,7 Kg

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8. VOLTAGE/CONTINUITY/CURRENT TESTER T5-1000

The T5 Electrical Testers let you check voltage, continuity and current with one compact tool. With the T5, all you have to do is select volts, ohms, or current and the tester does the rest. OpenJaw™ current lets you check current up to 100A - without breaking the circuit. Its tough test leads stow neatly in the back of the tester, making it easy to tote the T5 in your tool pouch. Detachable SlimReach™ test probes are customized for national electrical standards. The test leads accept optional accessories such as clips and specialty probes.

TECHNICAL SPECIFICATIONS

Low battery indicator:	Yes
Dust/water resistance:	Yes
Low battery indicator:	Yes
Current sensor opening:	12.9 mm
Calibration cycle:	1 year
Test leads Type:	Heavy duty, flexible leads rated for 1000V use. Field replaceable leads terminate in male shrouded banana plugs
Probes:	One red, one black. of two tip. Detachable Slim-ReachT probe tips in one
Overvoltage category:	1000V ac/dc, CAT III

FEATURES

- Unique Open Jaw™ Construction
- AC/DC Volts, AC Current, Resistance
- Checks Current without Breaking Circuit
- Detachable Slim-Reach™ Customized Probe Tips
- Frequency Response 45 to 440 Hz
- Continuity Beeper <25
- Auto Off Mode

9. DIGITAL MULTIMETER 83V

The digital multimeter 83V has improved measurement functions, trouble-shooting features, resolution and accuracy to solve more problems on motor drives, in plant automation, power distribution and electro-mechanical equipment. The units are independently tested to comply with the 2nd edition of ANSI/ISA S82.01 and EN61010-1 CAT IV 600V/CAT III 1000V. They can withstand impulses in excess of 8,000 V and reduce risks related to surges and spikes.

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TECHNICAL SPECIFICATIONS

Voltage DC:	**Maximum Voltage:** 1000V
	Accuracy: ±(0.1%+1)
	Maximum Resolution: 100 µV
Voltage AC:	**Maximum Voltage:** 1000V
	Accuracy: ±(0.5%+2)
	AC Bandwidth: 5kHz
	Maximum Resolution: 0.1 mV
Current DC:	**Maximum Amps:** 10A(20 A for 30 seconds maximum)
	Amps Accuracy: ±(0.4%+2)
	Maximum Resolution: 0.01 mA
Current AC:	**Maximum Amps:** 10A(20 A for 30 seconds maximum)
	Amps Accuracy: ±(1.2%+2)
	Maximum Resolution: 0.01 mA
Resistance:	**Maximum Resistance:** 50 MΩ
Capacitance:	**Maximum Capacitance:** 9,999 µF
Frequency:	**Maximum Frequency:** 200 kHz

FEATURES

- Measure up to 1000 V ac and dc
- Measure up to 10 A, 20 A for up to 30 seconds
- Frequency to 200 kHz and % duty cycle
- Resistance, continuity and diode test
- 10,000 µF capacitance range for components and motor caps
- Min/Max-Average recording with Min/Max Alert to capture variations automatically
- Peak capture to record transients as fast as 250 µs
- Auto and manual ranging for maximum flexibility
- Large display digits and two-level bright white backlight for increased visibility

10. Cable Identification Live

Easily identify one cable from another. Whether you are in the trench or out of the trench, transformer to transformer, house to transformer, pole to transformer, or ground rod to ground rod you will be able to diagnose the situation quickly.

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- Primary or Secondary
- In or Out of the Trench
- Tx-Former to Tx-Former
- Tx-Former to Meter
- Engerized or Grounded
- Secondary, jacketed primary, or street light.
- Simple & Easy to Use

Much safer than the DC impulse method. Sometimes contractors leave excess cable in the ground. The three cables you see in the trench may be the same cable from a loop or coil. The Cable I.D. Live will avoid this problem.

E. HIGH VOLTAGE CONNECTING DEVICES

11. MAIN SWITCH HVS

The main high voltage switch along with the control panel form the heart of the testing process of the cable test van. The unit is air-insulated with a reliable and simple design. The switch once it receives power through the control panel it selects and gets locked to a particular instrument. Once the test is completed the unit automatically connects to ground making the operation of the cable test van safe.

12. CABLE DRUM RACK

External connections for the power cable test van are provided with a power feeding cable drum, a grounding cable drum and a high voltage cable drum.

Cable drums VD 4.137.001

- drum with power feeding cable 2 x 2.5 mm^2, length of cable 50 m
- drum with grounding cable with a cross-section 25 mm^2, length of cable 50 m
- drum with high voltage EPR shielded cable, length of cable 50 m
- auxiliary ground cable, length of cable 15 m

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F. ELECTRICAL SAFETY SYSTEM

13. ELECTRICAL SAFETY CHECK SYSTEM

The high voltage safety system provides protection to the operating personnel as follows:

- by monitoring the potential on the car (switching off if the potential is higher than 24V)
- by monitoring the earth resistance (switching off if the resistance is higher than 25 Ohm)
- by monitoring the door of the high voltage compartment (switching off if the door is open)
- with a manual emergency STOP
- with an automatic grounding of all high voltage test devices
- by testing objects after the completion of testing and in emergency cases
- with a visible break load switch
- by a sound signal and strobe-light when the laboratory is switch on

G. PROTECTIVE EQUIPMENT

14. VOLTAGE DETECTOR

Voltage Detectors are used to verify live or de-energized conductors. These testers may be used with rubber insulating gloves or hot sticks using the splined universal end fitting. Testers indicate the presence of voltage with an extra bright LED light and a distinctive audible signal. It is recommended that the tester be moved closer to conductor until warning is indicated, or it touches conductor, apparatus, or test point. Test the unit on a nearby energized conductor.

15. PERSONNEL PROTECTIVE EQUIPMENT/TOOL KIT

1	Earthing rod for discharging the high voltage cabin	1 unit
2	Dielectric gloves	2 pair
3	Dielectric boots	1 pair
4	Protective helmet	2 units
5	Grounding probe	1 unit
6	Tool Kit	1 unit

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H. CARRIER VEHICLE

16. IVECO EUROCARGO MLC100E22

Fig.1 Total view on the Van

Technical Specification

Engine Model	F4AE3681B – TECTOR
Type	Turbo Intercooler, Electronic Common Rail Injection
Cylinders	6
Capacity (litres)	5.88
Power	160 kw / 220 HP
Torque	680 Nm @ 1200 – 2100 rpm
Gearbox Type	Iveco ZF6S800, 6+1 speed fully synchronized
Suspension Front	Semi elliptic leaf springs
Suspension Rear	Semi elliptic leaf springs
Stabilizer bar	Front & rear
Shock Absorbers	Front & rear
Braking System Type	ABS, Emergency and Parking Brake, Air Drier, Ventilated disc brakes front and rear, 3 stage engine brake
Fuel Tank	200 lt with locking cap
Adblue Tank	25 lt
Electrical System Voltage	24 V

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Battery	2 x 12 V (143 Ah)
Alternator	28 V – 90 A
Wheels	225/75R17, 5 Michelin tubeless
GVW	10000 kg
Front Axle Capacity	3600 kg
Rear Axle Capacity	6800 kg
Chassis Length	6600 mm
Usable Frame Length	5400 mm
Usable Frame Width	2350 mm
Cruise Control	Yes
Automatic Electronic Tachograph	Yes

17. VEHICLE BODY

All testing, diagnostic and fault locating equipment is installed inside the specially made insulated truck body container. The container body is divided into technical and operator compartments separated by a partition wall. The technical compartment includes all the necessary tools and equipment for carrying out testing and inspections. Safety is an important feature of the cable test vans and hence all equipment is properly mounted and secured for transit. The operator compartment provides a pleasant environment to work in with more room and plenty of storage. It is equipped with cabinetry and workbenches that increase the operators' efficiency and productivity.

Fig 2 Total view on the Cable Test Van

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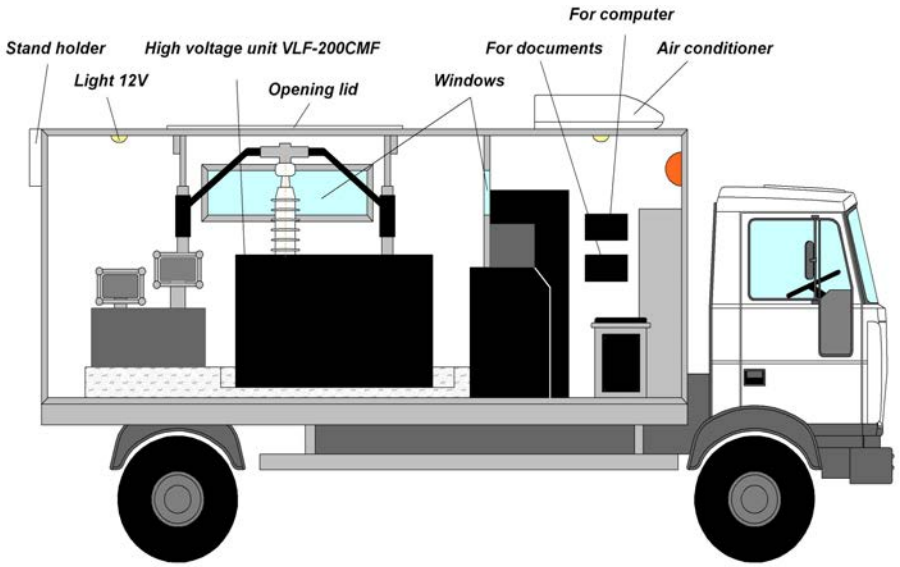
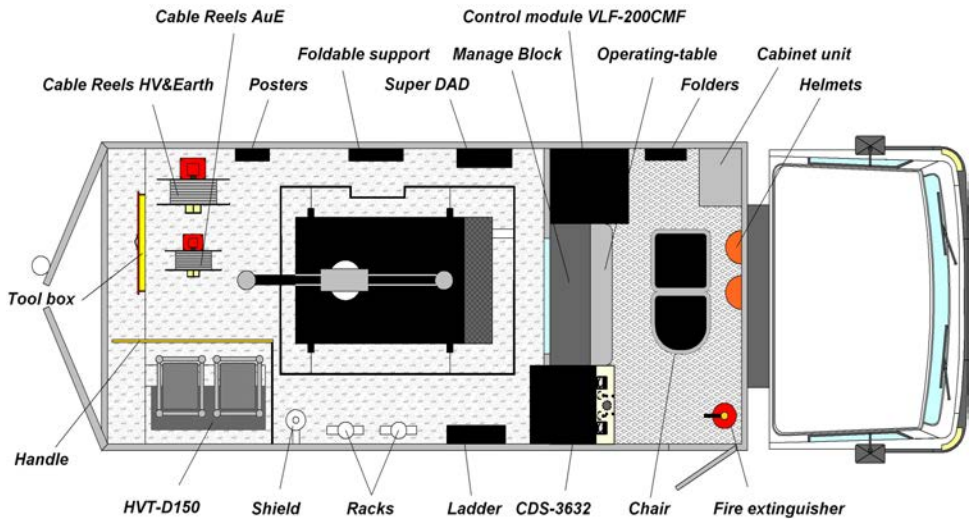
VAN CHARACTERISTICS

- Roof mounted air conditioner
- Internal lighting 230 VAC & 12V DC
- Insulated walls and roof for thermal and noise
- Special antistatic floor in operator area
- Special aluminium tread plate suitable for rough loading in high voltage area
- Partition wall, Operating desk & chair
- Drawers for storage of accessories
- Two rear doors, opening to 270 degrees with «recessed» handles and locks.
- One side door with «recessed» handle and lock.
- One side window in high voltage department.
- Swing two-folding upper roof with electric control and remote control.
- Spare wheel.
- Two separated compartments: operator compartment and high voltage compartment.
- Body is divided to two compartments: high voltage compartment and operator





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HVT-200L Laboratory Equipment Location Plan

The mobile laboratory is designed to be easy to operate and service. It is equipped with high quality insulated wall panelling and air conditioning. The body is divided into technical and operator compartments separated by a partition wall. The technical compartment includes all the necessary tools and equipment for carrying out testing and inspections. Safety is an important feature of the laboratories and hence all equipment is properly mounted and secured for transit. The operator compartment provides a pleasant environment to work in with more room and plenty of storage. It is equipped with cabinetry and workbenches that increase the operators' efficiency and productivity

FEATURES

- Roof mounted air conditioner
- Internal lighting 220 VAC & 12V DC
- Insulated walls and roof for thermal and noise
- Special antistatic floor in operator area
- Special aluminium tread plate suitable for rough loading in high voltage area
- Partition wall, Operating desk & Swivel chair
- Drawers for storage of accessories

High Voltage Compartment: it has high voltage transformer installed, 3 cable drums, tool cupboards, high voltage racks are installed, and also high voltage screen and stairs.

Operator compartment: it has the VLF module and the control panel of the Test van. It also has the operator table, chair and cupboard for devices. There is a built-in air conditioner with temperature control (heat/cold). On the control panel there is an industrial computer, responsible for supervising the work of the laboratory equipment. For ease of reference there are folders for storing documentary information.

- The Van has the step for going inside in laboratory for working on the equipment.
  The Test Van is mounted on the vehicle IVECO Cargo.

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Fig. 3 View on the operator room

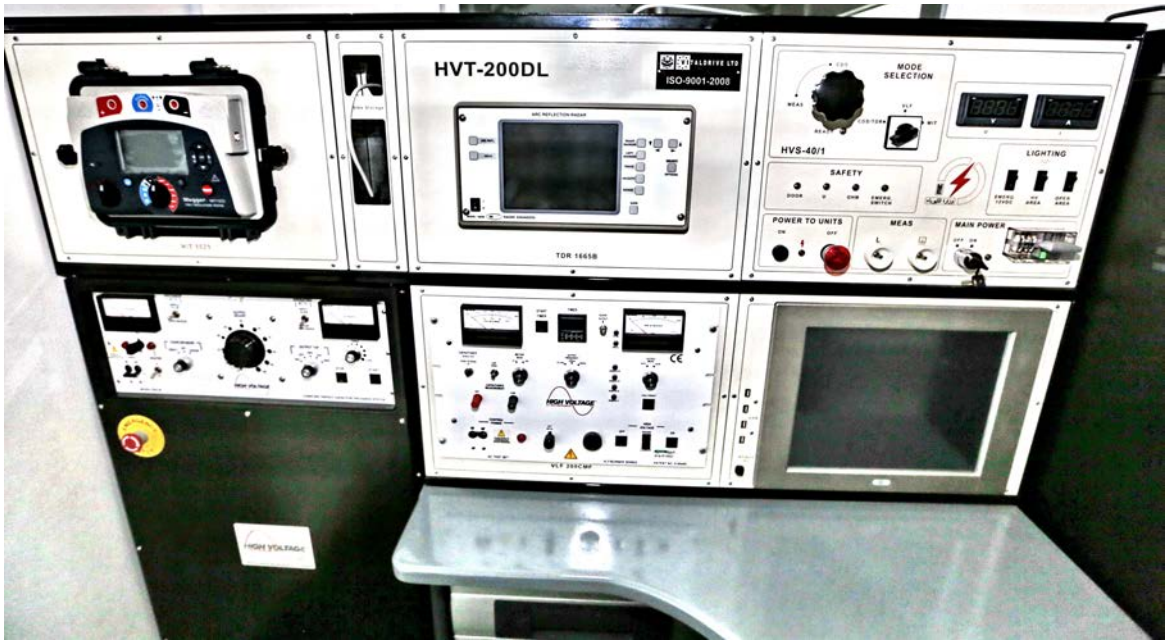

Fig.4 View on the manage panels.

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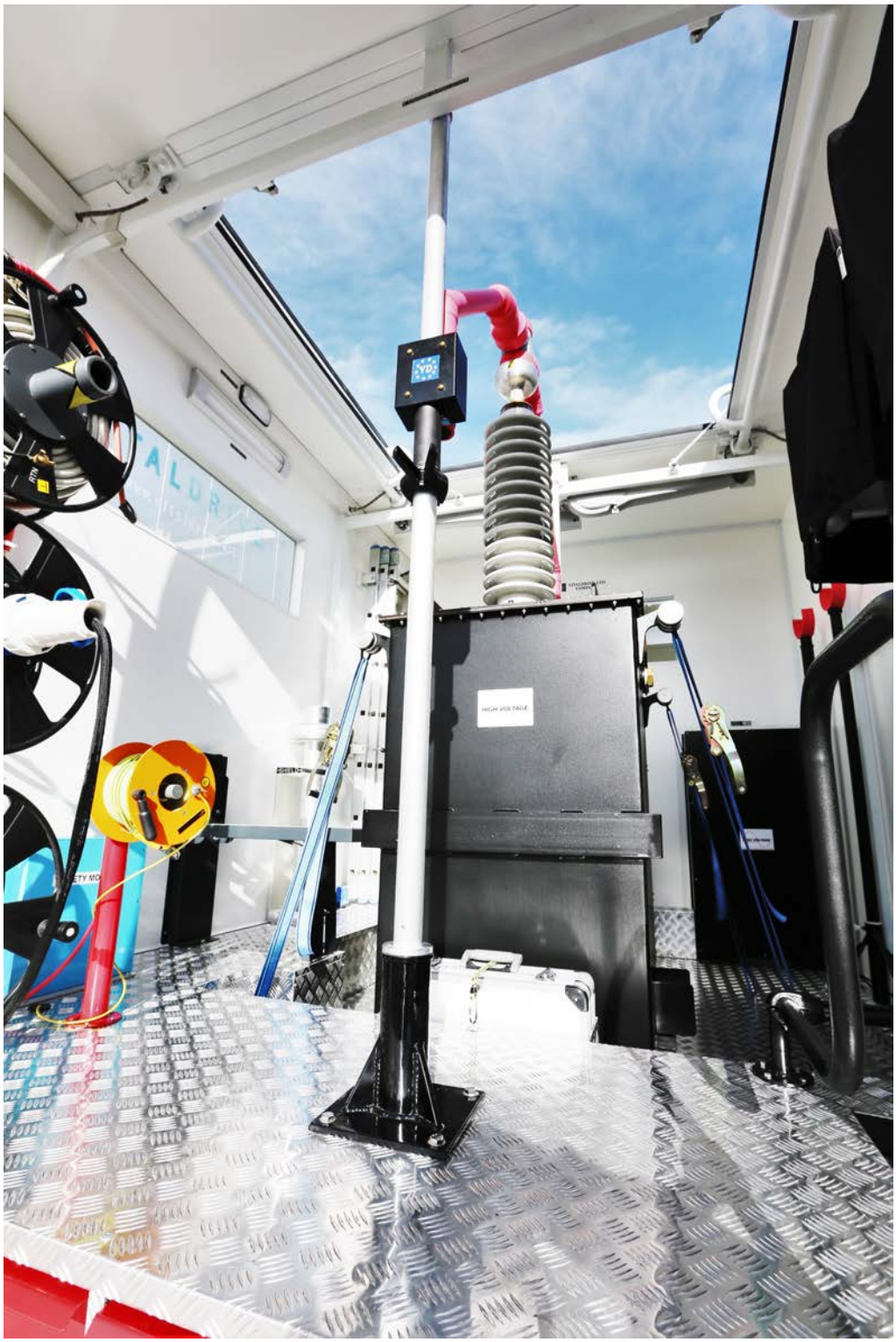

Fig. 5 View on the high voltage room

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Fig. 6 Scheme of high voltage supply to the testing object.

Fig. 7. View on the testing system.

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H. TRAINING

18. Training Seminars

Full training is provided for the cable test van personnel. Their training includes the full use of the equipment and covers the basic test van operations such as safety management, routine and preventative maintenance of equipment, high voltage testing and validation and test result recording. The training is highly participatory and experimental and trainees obtain hands on experience.

I. WARRANTY

19. Limited Warranty.

The laboratory has the limited warranty of 12 months. After the warranty period the manufacturer, by the request of the customer, carries out the after-warranty maintenance of the supplied equipment.

20. Contact information:

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