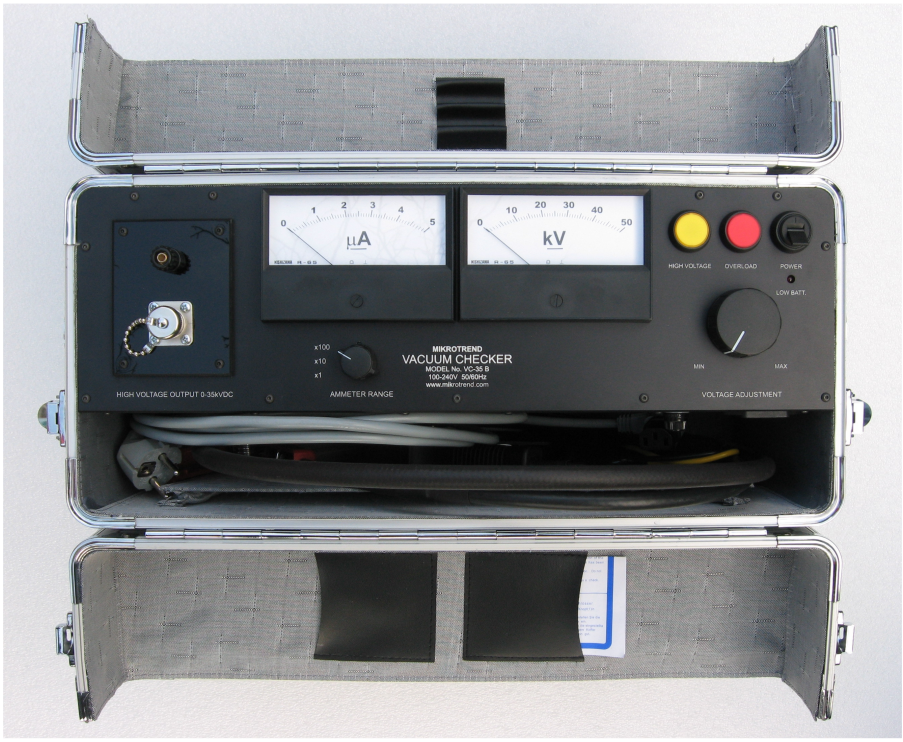
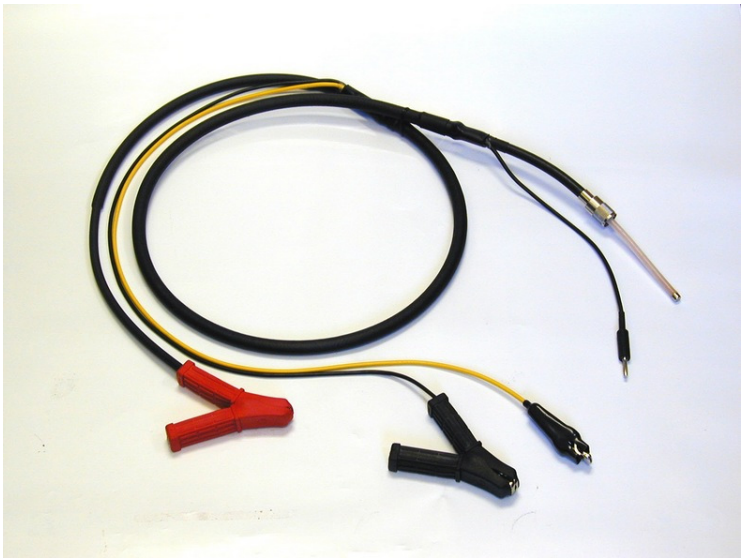
Vacuum Checker
VC-35
User manual





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X-Ray Concerns

IEEE Switchgear Committee, Spring 2008.

A few facts should be mentioned:

At all voltages X-ray emission is zero when the interrupter is in the closed position.
At MV voltages (up to 38kVrms) X-ray emission is zero or negligible.
Generally for MV circuit breakers significant X-rays could only be generated at test voltages exceeding 38kV. However once the system volts gets to much higher voltages such as 145kV then the possibility of X-ray emission becomes significant, although not generally a safety issue. The real issue for designers is that it is possible for the interrupters to irradiate their local surroundings over a long period, and this may have a detrimental effect on polymeric components or electronics mounted in the circuit breaker locally to the interrupters.

Contents

1. Overview

Continuous adjustable High voltage source 1...37kVDC
Designed to be used in Industrial and Power substations environment
Multi purpose testing of Vacuum Circuit breakers, cable insulation etc...
True ammeter reading (guard screened test leads)
Single scale voltmeter
Overload protected
Line variations independent
Built in battery
Detachable high voltage cable with integrated cable storage space
Rugged, portable and reliable, simple tu use
Acoustic and visual signalisation when operated

Vacuum circuit breakers do not last forever.
Air is leaking inside vacuum chamber, dirt on the poles and on the exterior surface of the interrupter can reduce insulation, the mechanics of the breaker can become misaligned and the distance between the poles is no longer adequate.
Any of this will change flashover point of Vacuum Circuit Breaker.
VC-35 is portable High voltage DC source for generation of negative voltages from **0...37kVDC**.
It is designed for shop an on-site testing of Vacuum Circuit Breakers, cable insulation etc...
High Voltage is generated by high voltage transformer and a full wave capacitive voltage multiplier with silicon rectifiers.
Accurate voltage measurements are made directly at the output and current measurements are taken in the return leg.
Test leads are compensated for leakage currents with cable guard screen for **true ammeter reading**.
Safe discharging of both the test object and the high voltage transformer occur whenever the high voltage is turned off. **VC-35** can be used powered from it`s own battery power supply, approx. 15 minutes with full battery charge.
VC-35 is packaged in a handy carrying case and well suited for field applications.

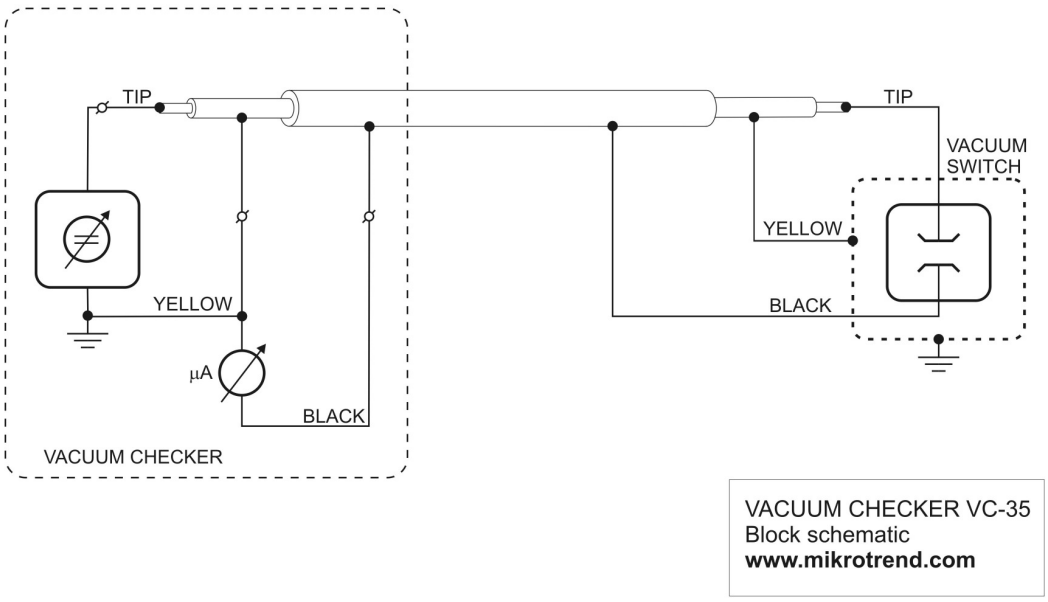

Figure 1: VC-35 Measuring principle

2. Connection and use

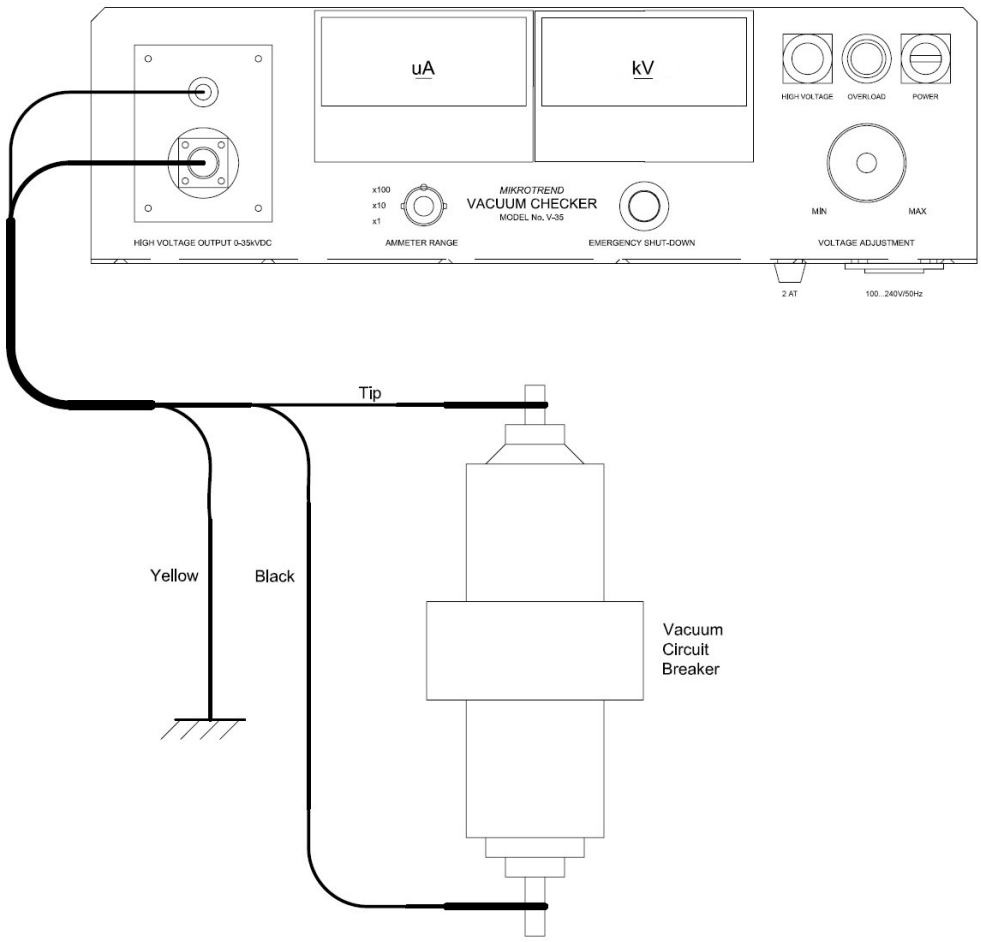

Figure 2: VC-35 Connection diagram

WARNING: HANDLING HIGH VOLTAGES!

TO PREVENT ELECTRIC SHOCK OR INJURY DURING MEASUREMENT DO NOT TOUCH CABLE CLIPS WITH HANDS

ALL WORK SHOULD BE DONE BY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION, OPERATION, AND HAZARDS INVOLVED WITH THE EQUIPMENT.

1. The Vacuum Circuit Breaker must be disconnected from High Voltage bus-bars and in OPEN position.
2. Prior to connecting mains, VC-35 power switch must be switched OFF.
3. Connect the power cable (100…240 VAC).
4. Set the "VOLTAGE ADJUSTMENT" into the position "MIN".
5. At first set ammeter range x100.
6. Connect the H.V. cable to VC-35.
7. Connect the yellow wire of H.V. cable to system ground.
8. Connect the red connector (negative) of H.V. cable to one pole of the Vacuum Circuit Breaker.
9. Connect the black connector (positive) of H.V. cable to other pole of the Vacuum Circuit Breaker.
10. Turn the "POWER" switch ON. Yellow lamp "HIGH VOLTAGE" shall light-up. Buzzer shall beep.
11. Slowly increase voltage using "VOLTAGE ADJUSTMENT" knob until you reach test voltage specified for Vacuum Circuit Breaker. Read the current on microammeter.
    For guidance on allowed leakage currents refere to vacuum chamber manufacturer's specification and IEC 694 or ANSI C37-06 standards.
    When the current through the Vacuum Circuit Breaker is greater then 0,5mA, VC-35 will automatically power-off. "OVERLOAD" lamp shall light-up.
12. VC-35 may be operated from built-in battery supply approx. 15minutes. For full output voltage the battery must be fully charged.
13. Charging battery:
    Leave the power cable of VC-35 connected for 14 hours or more. The "POWER" switch during charging may be in "OFF" position.

3. Technical specifications

The specifications are valid at nominal input voltage, ambient temperature between 0...+50°C and relative humidity less then 90%.

Personal safety:	Maximum transient current through the external load is 10 mA. Maximum discharge time for internal high-voltage circuit is 0,5 sec.
Output voltages:	0...37 kVDC, load > 100 Mohm, Ripple 5% max.
Output current:	0,5 mA max, limited
Voltmeter range:	0...50kV
Ammeter range:	x1 0...5 uA x10 0...50 uA x100 0...500 uA
Signalisation:	
RED lamp:	Overload (>0,5mA)
YELLOW lamp:	High Voltage "ON"
Sound signal:	High Voltage "ON "
Working temperature range:	0...+50°C (32°F…+122°F)
Storage temperature range:	-40…+70°C (-40°F…+158°F)
Relative humidity:	less then 90%, non condensing
Mains voltage:	100...240V, 50/60Hz, 2A max.
Built-in battery:	Sealed Gel Lead Acid Rechargable 12V, 2Ah.
Battery charger:	Constant voltage, 14 hours full charge.
Dimensions:	Alu-case, 210x335x460 mm
Weight:	7,5Kg Instrument alone 9Kg with battery and connection cables
High voltage cable lenght:	1,6 m

4. Troubleshooting and maintenance

1. Maximum voltage can not be reached:

1. Check battery. If necessary recharge battery. Replace battery every 5...8 years.

2. Check High Voltage connector for dirt and or moisture. Clean both sides of connector (on the case and on the cable) with soft tissue and isopropil alcohol. Do not use other solvents.

3. Check ambient air humidity. When higher than 90%, full output voltage may not be reachable. Periodicaly replace desiccant (Silica-Gel) on the bottom of instrument case or when necessary.

Figure 3: Battery compartment

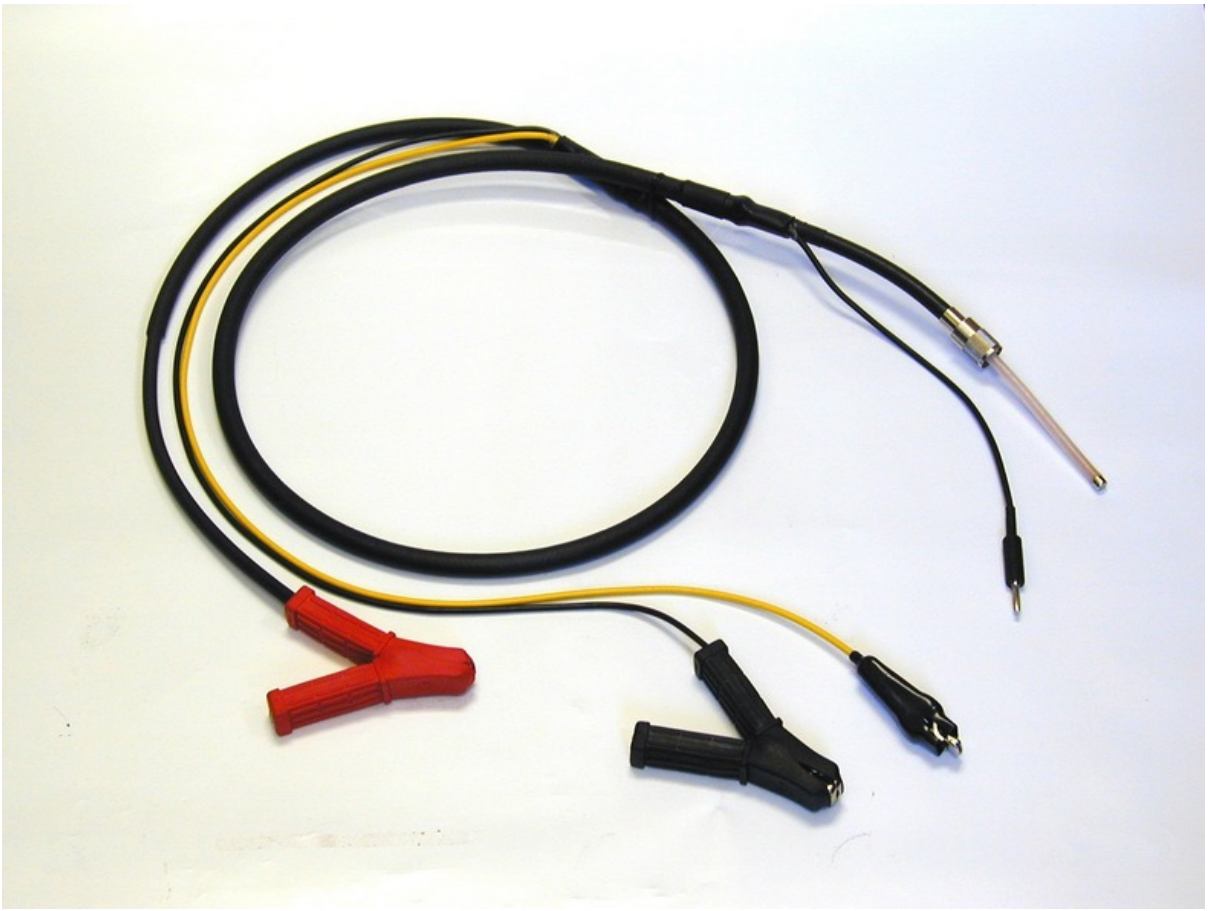

Figure 4: High voltage cable assy

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