

Programma®
VIDAR
Vacuum tester



User's manual

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1 General

The VIDAR vacuum tester is used to test the ability of the breaking chamber in a vacuum circuit breaker to inhibit flashover. The rugged, light-weight, compact and portable VIDAR is ideal for field work.

The vacuum bottles in vacuum breakers do not last forever. Leakage starts after years or decades and the bottles fill with air making the breaker unreliable. In most cases the leakage process is rapid once it has started. In addition to leakage, dirt on the poles and on the exterior surface of the bottle can make it unsafe during operation. The mechanics of the breaker can become misaligned so that the distance between the poles no longer is adequate. Vidar, introduced in 1985, uses high voltage DC to test the integrity of vacuum breakers. There are some 2000 units of Vidar in field service all over the world that perform daily tests on the integrity of vacuum breakers.

Flashover threshold voltage

The curve shown in Fig. 1 illustrates the relationship between a vacuum chamber's internal pressure and its ability to inhibit flashover. This relationship permits the vacuum to be checked indirectly by measuring the voltage threshold. One special advantage of this method is that you do not need to disassemble the circuit breaker in order to test it.

The voltage shall be selected so that test point A (see diagram) is sufficiently far from point B (when the chamber is filled with air). However the electric stress in the chamber must not be too high. In normal situations the pressure is less than 10^{-2} mbar.

For guidance on test voltage refer to IEC 694 and ANSI C37-06 standards.

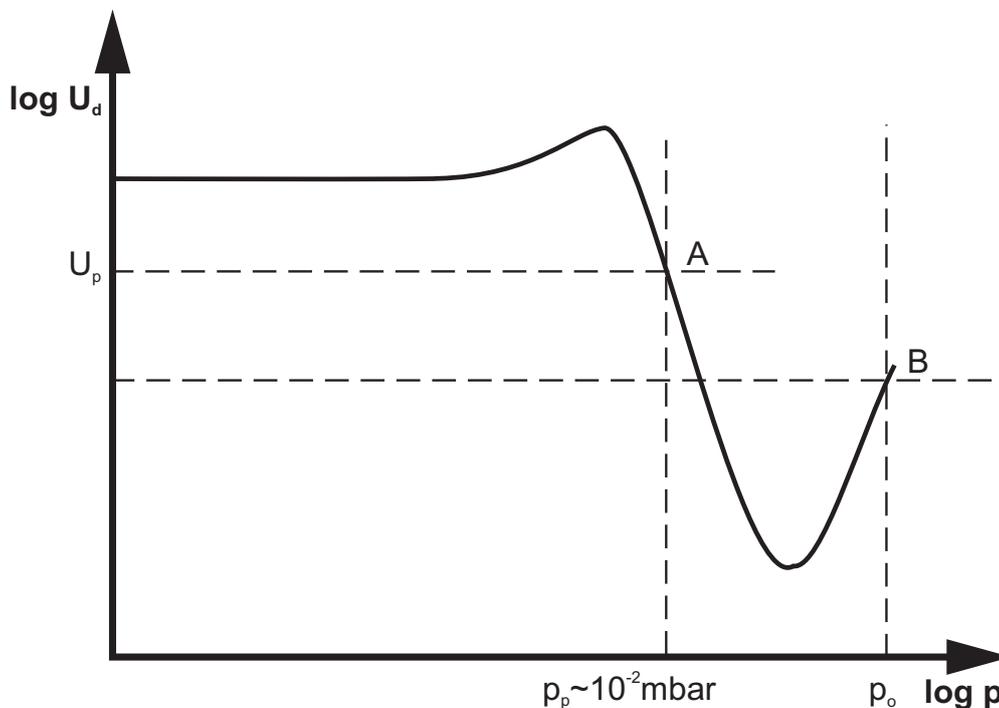


Fig. 1. Flashover threshold voltage plotted against pressure in vacuum chamber.

p : chamber pressure
 p_0 : atmos. pressure
 p_p : max. pressure on passing voltage test
 u_d : breakdown voltage
 u_p : test voltage

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Safety



Safety instructions

Important

Read the manual and comply with the following instructions before using the VIDAR.

Always comply with local safety regulations.

Warning

People with pacemakers must not use the VIDAR since a pacemaker can be disturbed by the electrical discharges.

When testing a circuit breaker that is permanently mounted you must make certain that there is no risk of burning out the collector busbar if it can not be disconnected.

Circuit breakers on vehicles and also circuit breakers of the plug-in type must be tested outside their holders.

Applying abnormally high voltage across a pair of contacts in vacuum may be dangerous. However, as a precautionary measure against possibility of application of higher than recommended voltage (or a contact spacing below normal), it is recommended that all operating personnel stands at least 3 m (10 ft) away in front of the breaker.

High voltage/current on input/output terminals.

Do not attempt to service the instrument yourself. Opening or removing covers may expose you to dangerous voltage. If you attempt to service the instrument yourself the warranty is no longer valid.

Do not use any accessories that are not intended for use together with the instrument.

Disconnect the instrument from the mains before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners.

Important

Always turn the equipment off before connecting.

Always use safety connecting leads.

Always connect protective earth (ground).

Never leave the instrument unattended while it is turned on.

Use only approved mains detachable cable set with the instrument. Main supply cables shall be rated for the maximum current for the equipment and the cable shall meet the requirements of IEC 60227 or IEC 60245. Mains supply cables certified or approved by a recognized testing authority are regarded as meeting this requirement.

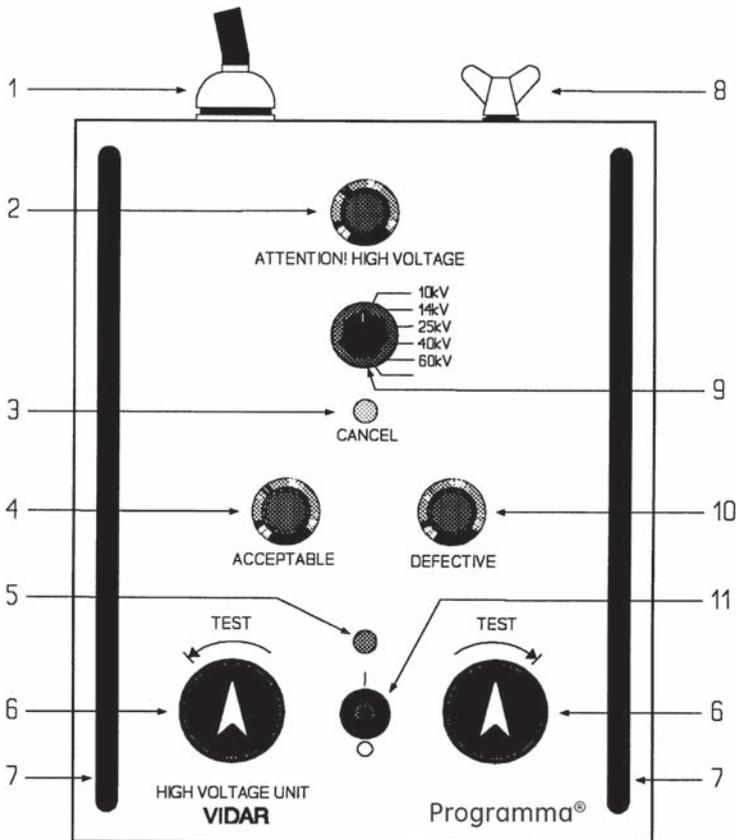
Unplug the instrument from the mains supply when it is left unattended or not in use.

Refer all servicing to Programma authorized personnel.

If you need to return the instrument, please use either the original crate or one of equivalent strength

3 Control panel

1. High voltage cable. For connection of the test voltage and ground to the vacuum breaking chamber.
2. Red HIGH-VOLTAGE warning lamp. Shows that the high voltage is applied.
3. Yellow CANCEL indicator lamp. Lights up when:
 - a) the test interval has exceeded one minute.
 - b) you try to conduct a one minute test less than two minutes after the latest test.
 - c) the HIGH-VOLTAGE indicator malfunctions.
4. Green ACCEPTABLE Indicator lamp. Lights up when the breaking chamber test result is positive.
5. Green POWER ON indicator lamp. Lights up when the VIDAR is connected to the mains voltage and the ON/OFF switch is turned ON.
6. SAFETY CONTROL KNOBS. Both knobs must be turned simultaneously to their TEST positions to apply high voltage to the object being tested.
7. Long handles.
8. Protective earth (ground) terminal.
9. Test voltage selector. Five standard voltages and one customized voltage, determined at the factory.
10. Red DEFECTIVE indicator lamp. Lights up when the breaking chamber test result is negative, when the flashover threshold voltage is too low.
11. Power ON/OFF.



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Operating instructions

4.1 Connecting



Important!

Read the manual and comply with the Safety instructions, see page 5, before using VIDAR.
Always comply with local safety regulations.

1. Check that the circuit breaker is in OPEN position.
2. Check that the master ON/OFF switch on the VIDAR is in OFF position and that the red HIGH-VOLTAGE warning lamp is not flashing.
3. Ground VIDAR (8).
4. Connect the part with the black crocodile clamp of the high-voltage cable (1) to the control mechanism side of the breaking chamber.
5. Connect the part with the red crocodile clamp of the high-voltage cable (1) to the other terminal on the breaking chamber.
6. Connect VIDAR to the mains power.

4.2 Conducting a test

1. Connect the VIDAR as instructed in section 4.1 Connecting.
2. Select the desired test voltage depending on the type of breaking chamber being tested.

Note For guidance on test voltage refer to IEC 694 and ANSI C37-06 standards.

3. Turn the power ON/OFF switch to the ON position. The green lamp beside the switch will light up.
4. Using both hands, turn the two SAFETY CONTROL KNOBS to their respective end limits and keep them in that position. The red HIGH-VOLTAGE warning lamp will flash.
 - a. If the green ACCEPTABLE lamp lights up and remains lighted for at least five seconds the test is complete and the breaking chamber can be considered in good condition. Release the SAFETY CONTROL KNOBS.
 - b. If the red DEFECTIVE lamp lights up and remains lighted for at least five seconds, release the SAFETY CONTROL knobs. Turn off the power and check the ground connection and other connections. Start again from point 3. If the red DEFECTIVE lamp lights up again, the breaking chamber must be considered defective.

Note Any metallic discharge sounds that are heard during the test are of no importance. The results shall be based solely on the lighting up of either the green ACCEPTABLE lamp or the red DEFECTIVE lamp.

5. When the test is completed turn the power ON/OFF switch on the VIDAR to its OFF position.

Note *The yellow indicator lamp lights if the test lasts longer than 1 minute. If you want to conduct a full time 1 minute test after that, there must be a 2 minutes pause before starting next test. (This pause permits proper resetting of VIDAR's internal timercounter.)*

Disconnection after testing

1. Check that the power ON/OFF switch is at the OFF position.
2. Remove the ground connection (black cable terminal) and connect it to the metallic part of the highvoltage cable (red cable terminal) before removing it from the circuit breaker.
3. Remove the copper line from the circuit breaker.

Note *Electrostatic charges can build up on:*

- a) adjacent insulated parts*
- b) the metallic centre-section of the breaking chamber*
- c) the entre centre part of dual breaking chambers due to the fact that the VIDAR uses DC.*

When a ground connection is established, it takes (depending on surface conditions) about 10 seconds for statically charged parts to assume ground potential. As a rule these electrostatic charges do not entail any serious risk.

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Troubleshooting

Fault	Cause	Remedy
Green POWER ON lamp does not light.	Probably no mains power.	Check the mains, the master ON/OFF switch and the automatic fuse adjacent to the mains nameplate.
Red HIGH-VOLTAGE warning lamp does not flash. Yellow CANCEL lamp lights up instead.	The lamp in the HIGH-VOLTAGE warning lamp is probably faulty.	Unscrew and remove the red protector lens (turn it anticlockwise). Push the lamp down, then twist slightly anticlockwise to release it from its bayonet socket. Pull the lamp out of its socket and replace it with a new one (Halogen 12 V, 5 W BA9 type, Programma Electric art. no. is 34-00020). Insert the light bulb in the socket, push the lamp down, then twist slightly clockwise. Replace the red protective lens by turning it clockwise.
Yellow CANCEL lamp lights up but glows weakly.	Wrong mains voltage.	Check to see that the mains voltage is the same as that shown on the mains nameplate.

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Specifications

Specifications VIDAR

Specifications are valid at nominal input voltage and an ambient temperature of +25°C, (77°F). Specifications are subject to change without notice.

Environment

<i>Application field</i>	The instrument is intended for use in high-voltage substations and industrial environments.
<i>Personal safety</i>	Maximum permissible transient current through the external load is 12 mA. Maximum discharge time for internal high-voltage circuit is 0.3 s.
<i>Temperature</i>	
<i>Operating</i>	0°C to +50°C (32°F to +122°F)
<i>Storage & transport</i>	-40°C to +70°C (-40°F to +158°F)
<i>Humidity</i>	5% – 95% RH, non-condensing

CE-marking

<i>LVD</i>	Low Voltage Directive 73/23/ EEC am. by 93/68/EEC
<i>EMC</i>	EMC Directive 89/336/EEC am. by 91/263/EEC, 92/31/EEC and 93/68/EEC

General

<i>Mains voltage</i>	115 / 230 V AC (switchable), 50 / 60 Hz
<i>Power consumption (max)</i>	69 VA
<i>Protection</i>	Overload cut-out
<i>Dimensions</i>	
<i>Instrument</i>	250 x 210 x 125 mm (9.8" x 8.3" x 4.9")
<i>Transport case</i>	460 x 430 x 210 mm (18.0" x 17" x 8.3")
<i>Weight</i>	6.9 kg (15.5 lbs) 10.7 kg (23.6 lbs) with accessories and transport case

Measurement section

Indicators

<i>Green lamp</i>	Indicates an approved breaking chamber, lights up when the current is below 0.3 mA
<i>Red lamp</i>	Indicates a defect breaking chamber, lights up if the current exceeds 0.3 mA
<i>Yellow lamp</i>	Indicate that the test was interrupted

Output

<i>Standard voltages, switchable</i>	10, 14, 25, 40 and 60 kV DC
<i>Customized voltage</i>	Between 10 and 60 kV DC. Determined at the factory. Default voltage is 50 kV
<i>Ripple</i>	Max 3%