

NEW



SVERKER 760

Relay Testing Unit

SVERKER 760, the test engineer's toolbox. The SVERKER 750 and 650 users will find it comfortably familiar and will be able to start work right away. The new feature for SVERKER 760 is the continuous phase-angle control.

The SVERKER 760 features many functions that make relay testing more efficient. To cite one example, its powerful measurement section can display (in addition to time, voltage and current) Z, R, X, S, P, Q, phase angle and $\cos \phi$. The voltmeter can also be used as a 2nd ammeter (when testing differential relays for example). All values are presented on a single easy-to-read display. Thanks to its built-in variable voltage source (amplitude and phase angle), SVERKER 760 can also test directional protective equipment efficiently. Automatic reclosing devices can also be tested – just as easily. Fine regulation of current is easy thanks to the built-in set of resistors.

Designed to comply with EU standards and other personal and operational safety standards, SVERKER 760 is also equipped with a serial port for communication with personal computers and the PC software SVERKER Win. Since the compact SVERKER 760 weighs only 18 kg (39 lbs), it's easy to move from site to site.

Two or more SVERKER 760 units can also be synchronized, which for example allows the user to connect three SVERKER 760's into a basic 3-phase test set.

APPLICATION

Relay Testing

SVERKER 760 is intended primarily for secondary testing of protective relay equipment. Virtually all types of single-phase protection can be tested.

SVERKER 760 is able to test three-phase protection that can be tested one phase at a time, and also a number of protective relay systems that require phase shifting. Moreover, automatic reclosing devices can be tested.

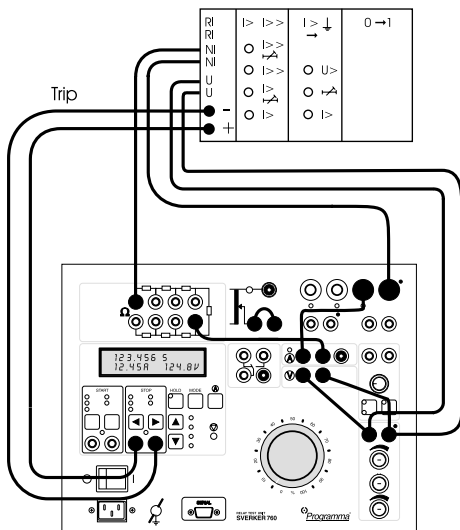
Examples of what SVERKER 750/760 can test: IEEE No.

Overcurrent relays	50/76
Inverse time overcurrent relays	51
Undercurrent relays	37
Ground fault relays	50
Directional overcurrent relays	67
Directional ground fault relays	67N
Overvoltage relays	59
Undervoltage relays	27
Directional voltage relays	91
Directional power relays	32
Power factor relays	55
Differential protection (differential circuits)	87
Distance protection equipment (phase by phase)	21
Negative sequence overcurrent relays	46N
Motor overload protection	51/86
Automatic reclosing devices	79
Tripping relays	94
Voltage regulating relays	
Overimpedance relays, Z>	
Underimpedance relays, Z	
Thermal relays	
Time-delay relays	

OTHER FIELDS OF APPLICATION

- Plotting excitation curves
- Current and voltage transformer ratio tests
- Burden measurement for protective relay test equipment
- Impedance measurement
- Efficiency tests
- Polarity (direction) tests

APPLICATION EXAMPLE



Testing the pick-up and drop-out

1. Connect as shown in the diagram.
 2. Select stop conditions, dry or wet contact.
 3. Select HOLD to freeze the current reading.
 4. Press button **SEL**/ $\text{\textcircled{A}}$ until you get a red light at the built-in ammeter.
- Note!** Maximum allowed current through the separate ammeter used in this connection example is 6 A. The other measurement points do not have this limitation.
5. Press the **MODE** button.
 6. Use the key \blacktriangledown to select Ω , φ , W, VA....
 7. Press **CHG** (Change)
 8. Select φ ($^\circ$, Iref) or ($^\circ$, Uref) by using the key \blacktriangledown .
 9. Press **SEL** (Select)
 10. Press **ESC**
 11. Set the voltage amplitude with the upper small knob.
 12. Make sure the main knob is set to 0.
 13. Turn on the SVERKER output by activating **ON** using the start switch \blacktriangledown .
 14. Set the phase-angle. Use the lower knob for fine adjustment, and the middle knob for step of 90° .

000ms 070°
0.100A 63.05V

- Note!** A small current flowing in the circuit is required to measure the phase angle.
15. Increase the current until the relay operates (pick-up). Read the value. Press the HOLD button twice to reset the display.
 16. Decrease the current until the relay drops out. Read the value.
- ### Testing the operation time
17. Increase the current to 1.5 times the pick-up value.
 18. Invoke the ON+TIME state by means of the start switch. The outputs will now remain turned on until the protective relay equipment operates.
 19. Read the time from the display. Check also the high current setting using the same procedure.

SPECIFICATIONS

AC Current outputs				
Range	No-load voltage (min)	Full-load voltage (min)	Full-load current (max)	Load/unload times On (max)/Off (min)
0-10 A	90 V	75 V	10 A	2/15 minutes
0-40 A	25 V	20 V	40 A	1/15 minutes
0-100 A	10 V	8 V	100 A	1/15 minutes
0-100 A	10 V	-	250 A	1 sec/5 minutes

The output transformer is equipped with built-in temperature protection. The primary side is protected by a miniature circuit breaker.

AC/DC outputs				
Range	No-load voltage (min)	Full-load voltage (min)	Full-load current (max)	Load/unload times On (max)/Off (min)
0-250 V AC	290 V	250 V	3 A	10/45 minutes
0-300 V DC	320 V	250 V	2 A	10/45 minutes

Separate AC voltage output			
Range	No-load voltage (min)	Full-load voltage (min)	Load current (max)
0-140 V AC	165 V	140 V	0.20 A/cont. 0.30 A/1 minute
Phase angle	Resolution	Accuracy	
0-359°	1°	±2°	

DC auxiliary output		
Range	Voltage	Max. current
20-130 V DC	130 V	0.4 A
130-220 V DC	220 V	0.4 A

Timer

Display options In seconds or in mains-voltage periods

Seconds *Range:* 0.000-99999.9 s
Accuracy: 1 ms.

Periods *Range:* 0.0-4999995 cycles at 50 Hz or 0.0-5999994 cycles at 60 Hz
Accuracy: 0.1 cycles

Max. input voltage 250 V AC or 275 V DC

Ammeter

Ranges *Internal range:* 0.00-250.0 A
External range: 0.000-6.000 A

Accuracies *Internal range:* 1%
External range: 1% for AC and 0.5% for DC

Measurement method True RMS for AC or average for DC.

Display option Reading can be displayed as a percentage of a presettable nominal value if so desired.

Max. current, ext. input 6 A AC or DC

Voltmeter

Range 0.00-600.0 V

Accuracy 1% for AC and 0.5% for DC

Measurement method True RMS for AC or average for DC

Display option Reading can be displayed as a percentage of a presettable nominal value if so desired. The voltmeter can also be used as a 2nd ammeter.

Max. input voltage 600 V AC or DC

Extra entities

AC Z (Ω , ϕ), Z (Ω), R, X (Ω , Ω), S (VA), Q (VAR), cos ϕ , ϕ ($^\circ$, Iref), and ϕ ($^\circ$, Uref)

DC R (Ω) and P (W)

Entity	Range	Accuracy
Cos ϕ (cap, ind)	-0.99 to + 0.99	± 0.04
Phase angle	000-359°	± 2°
Other entities	Up to 999 kX (X=unit)	

Make/Break contact

Max. current 1 A

Max. voltage 250 V AC or 120 V DC

The make/break contact is protected with a 1 A miniature circuit breaker.

Reclosing tests

Items measured Tripping times and reclosing times.

Display After test is finished a list of all times appears in display.

Breaker state feedback The make/break contact can be used to feed back the breaker state.

Max. number of reclosings 49

Max. testing time 999 s

Set of resistors

Resistors 0.5 to 2.5 k Ω

Other

Application field The instrument is intended for use in high-voltage substations and industrial environments.

Languages in menu English, German, French, Spanish and Swedish.

Mains voltage 230 V AC or 115 V AC ± 10%, 50-60 Hz

Dimensions instrument 350 x 270 x 220 mm (13.8" x 10.6" x 8.7")

Dimensions transport case 610 x 290 x 360 mm (24.0" x 11.4" x 14.2")

Weight 18 kg (39 lbs). 27 kg (59 lbs) with accessories and transport case.

Test lead set With touch-proof contacts.
2 x 0.25 m (10")/2.5 mm²
2 x 0.50 m (20")/2.5 mm²
8 x 2.0 m (80")/2.5 mm²
2 x 3.0 m (120")/10 mm² (with spade-tongue connectors).

Operating temperature 0 to +50°C (+32 to +122°F)

Storage temperature -40 to +70°C (-40 to +158°F)

ORDERING INFORMATION

SVERKER 760 Relay Testing Unit

Complete with test lead set GA-00030 and transport case GD-00182

Mains voltage: 115 V

Art.No: CD-21190

Mains voltage: 230 V

Art.No: CD-22390

1 Set of resistors

Fine regulation of current and voltage are easy thanks to the built-in set of resistors.

2 Display

Presents time, current, voltage and other entities. Also used to make many setting, after you enter the setting mode by pressing button marked MODE.

3 Freeze function (HOLD)

This makes it possible to measure voltages and current as short as a quarter of a mains-voltage period by immobilizing the reading on the display. Voltage and current readings are frozen when the timer stops. If the timer does not stop, the reading present when the current was interrupted is frozen on the display.

4 Start and stop conditions

The timer's start and stop inputs respond to changes, voltage or contact closing/openings. The timer's start input is also used when testing auto-reclosing relays, to synchronize two or more Sverker 760 units and to start generation with an external signal.

7 Start switch

Controls the turning on and off of the current source and timer. Can be set to one of four states.

ON+TIME. Starts generation and timing simultaneously. Used to test over... relays (...means current, voltage or some other entity). Generation continues a) until the protective relay equipment operates and stops the timer or b) until the maximum time expires or the start switch is released if time-limited generation has been selected.

OFF. Turns off the current source, whereupon generation is interrupted.

ON. Turns on the current source in the generating state.

OFF+TIME. Interrupts generation and starts the timer simultaneously. Used when testing under ...relays (...means current, voltage or some other entity). The timer is stopped when the protective relay equipment operates. When automatic reclosing is to be tested, Sverker 760 can be set so that new generation will start when the timer's start input is activated by the closing command.

11 Ammeter and voltmeter

Current and voltage are measured by the built-in ammeter and voltmeter. Resistance, impedance, phase angle, power and power factor can also be measured. Readings appear on the display. These instruments can also be used to take measurements in external circuits. The voltmeter can also be used as a 2nd ammeter (when testing differential relays for example).

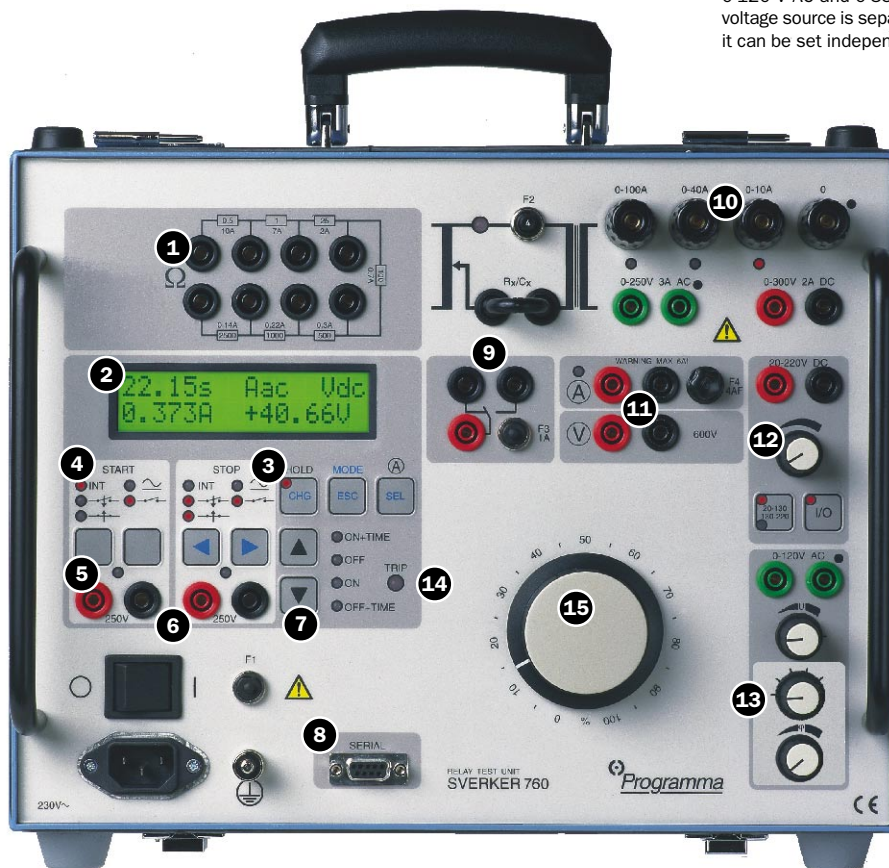
Current and voltage can be displayed either as amperes and volts or as percentages of a given current or voltage (the present settings of the protective relay equipment for example).

12 Auxiliary voltage source

Provides 20-220 V DC in two ranges. Equipped with overload protection and separated from the other outputs. Used frequently to supply the object being tested.

13 AC voltage source/phase-angle control

Intended primarily for use with voltage inputs to the protective relay equipment. Can provide 0-120 V AC and 0-359° phase shift. Since the AC voltage source is separated from the other outputs, it can be set independently of the current source.



5 Status indicator

The timer's start and stop inputs are each equipped with indicator lamps which, when lighted, indicate a closed circuit (useful for detecting contact closings/openings) or the presence of voltage. These indicator lamps make it possible (for example) to check circuits before starting a measurement cycle.

6 Timer inputs

The timer has separate start and stop inputs, and it can be used to measure both external cycles and sequences initiated by Sverker 760. The measured time appears on the display. Each input can be set to respond to the presence or absence of voltage (AC or DC) at a contact.

8 Computer communication interface

Sverker 760 is equipped with a serial port for communication with personal computers and the PC software Sverker Win.

9 Make/break contact

Changes state automatically when a test is started. Can be used (for example) to synchronize two or more Sverker 760 units, other external equipment or to switch the voltage applied to the protective relay equipment back and forth between non-faulty and faulty.

10 Current/voltage source

Provides 0-250 A AC, 0-250 V AC or 0-300 V DC, depending on the output that is being used. Settings are made using the main knob. The readings of current, voltage and other entities appear on the display. The start switch is used to turn the current source on and off. When time is being measured, this is done in synchronization with the timer.

14 Tripping indicator

Lights when a stop condition is fulfilled to indicate operation of the protective relay equipment. If the test being conducted incorporates timing, this indicator starts to blink when relay operation occurs.

15 Main knob

Used to set output from the current/voltage source.