CT-7500 Series 2™

Digital Circuit Breaker Analyzer

Vanguard Instruments Company

www.vanguard-instruments.com

CT-7500 Series 2

The CT-7500 S2 is an easy to use, stand-alone, microprocessor-driven EHV circuit-breaker analyzer. It can operate either in Time-Travel analyzer mode or in Quick-Shot mode (for on-line timing). In Time-Travel mode, the CT-7500 S2 can fully analyze a circuit-breaker's performance by testing the contact time, stroke, velocity, over-travel, and contact wipe. Contact-motion analysis can be performed for all breaker contact operations (Open, Close, Open – Close, Close – Open, and Open – Close – Open). The CT-7500 S2's timing window is selectable between 1-second, 10-second, or 20-second periods. The 10-second and 20-second timing windows are ideal for timing long duration events such as circuit-switcher contact testing.

Quick-Shot Mode

In Quick-Shot mode, the CT-7500 S2 captures the breaker's trip or close time, the trip/close-coil current "fingerprint," and the battery supply voltage while the breaker is still in service. The trip/close time is derived from the time of trip, or close-coil initiation, to the breaker's bushing current-break-or-make as detected by an AC clamp-on current sensing probe.

With a simple connection, the Quick-Shot mode can detect a breaker's operating conditions with little or no down time. In Quick-Shot mode, the first trip operation time of the breaker is captured. If a breaker has been in service for a long period of time and sitting in close position, the first trip time of the breaker may be slow possibly due to a sticky mechanism. The Quick-Shot mode is very useful in such cases because traditional breaker timing may not detect this condition since several operations may have occurred before the first timing test is conducted.

Conventional Time-Travel Analysis Mode

The CT-7500 S2 is available in models with either 3 (CT-7500-3 S2), 6 (CT-7500-6 S2), or 12 (CT-7500-12 S2) dry-contact inputs. All models feature three digital travel transducer input channels.

Contact Timing Inputs

Dry-contact input channels are used for timing breaker contacts. Each contact input channel can detect main contact and insertion-resistor contact times in milli-seconds and cycles.

Rapidly

Voltage Monitoring Inputs

One analog voltage input channel, designated as V1, is dedicated to monitoring a circuit-breaker's DC power supply or coil voltage (0 – 255 volts, DC or peak AC). A second voltage input channel, designated as V2, is dedicated to detecting the voltage on/off status (presence or absence) of an A/B switch.

Trip/Close Current Monitoring

A built-in Hall-effect current sensor records the Trip/Close current level and duration. The breaker's operate-coil current waveform duration (effectively, a performance "fingerprint" or "current profile") can be used as a diagnostic tool for analyzing a breaker's performance.

Breaker Stroke and Velocity

Three digital travel transducer channels are available on the CT-7500 S2 for measuring circuit-breaker velocity, stroke, over-travel, and bounce-back. Unlike other transducer types, the digital transducer requires neither calibration nor setup. A breaker's contact-velocity is calculated based on the contact's travel distance over a period of time. A special feature is also available to "slow-close" test a breaker and obtain a test result report.

Breaker Initiate Features

A built-in solid-state initiate device is used to operate a breaker from the CT-7500 S2. The operational modes include Open, Close, Open – Close, Close – Open, and Open – Close – Open. Multiple operations, such as Open – Close and Open – Close – Open, can be initiated by using programmable delay time or by sensing a breaker's contact condition.

Resistor Type Transducer Input

One resistor type input channel is also available on the CT-7500 S2. This input channel allows the unit to measure circuit-breaker motion by directly interfacing with resistive type transducers. The transducer resistance ranges from 200 ohms to 10K Ohms.

Internal Test Record Storage

The CT-7500 S2 can store up to 150 test records in Flash EEPROM. Test records can be retrieved and printed on the built-in thermal printer, or they can be transferred to a PC via the unit's RS-232C or USB interface.

Internal Breaker Test Plan Storage

The CT-7500 S2 can store up to 99 circuit-breaker test plans. Test plans are comprised of all circuit-breaker performance specifications (stroke, velocity, and contact time). A test plan can be used to immediately test a circuit-breaker. A pass/fail report is then generated by comparing actual performance with the specifications in the stored test plan. Test plans can also be generated on a PC and transferred to the CT-7500 S2 via the unit's RS-232C or USB interface.

Computer Interface

The CT-7500 S2 can be computer-controlled via its RS-232C or USB interface. A Windows® XP/Vista-based Breaker-Analysis software application is provided with each unit. Using this software, circuit-breakers can be timed from the PC. Test records can be retrieved from the CT-7500 S2 and then stored on the PC for future analysis and report generation. Circuit-breaker test plans can also be created on the PC and transferred to the CT-7500 S2. Additionally, test records can be exported in Microsoft® Excel format for further analysis.

Digital Circuit Breaker Analyzer

Analyze OCB, Vacuum, and SF6 Circuit Breakers with Vanguard's CT-7500 S2

Diagnostic Capabilities

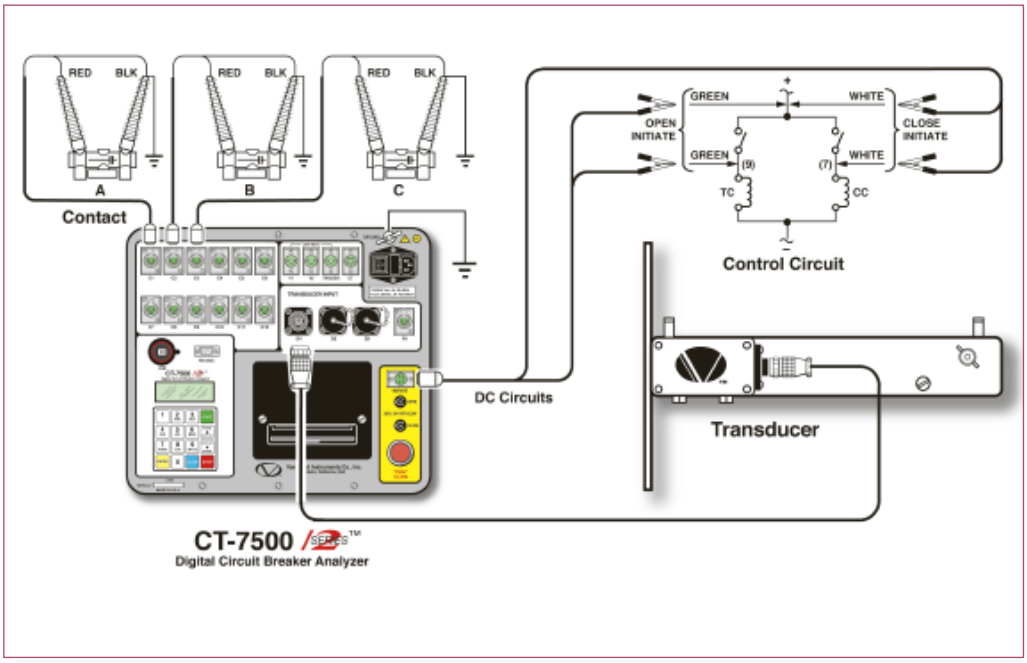
The CT-7500 S2 can perform diagnostics on its internal electronics. Diagnostics can be performed to verify contact cable connections and to test the travel transducer's electronics.

User Interface

The CT-7500 S2 features a back-lit LCD screen (20 characters by 4 lines) that is viewable in both bright sunlight and low-light levels. A rugged, 16-key, membrane keypad is used to control the unit.

Built-in Thermal Printer

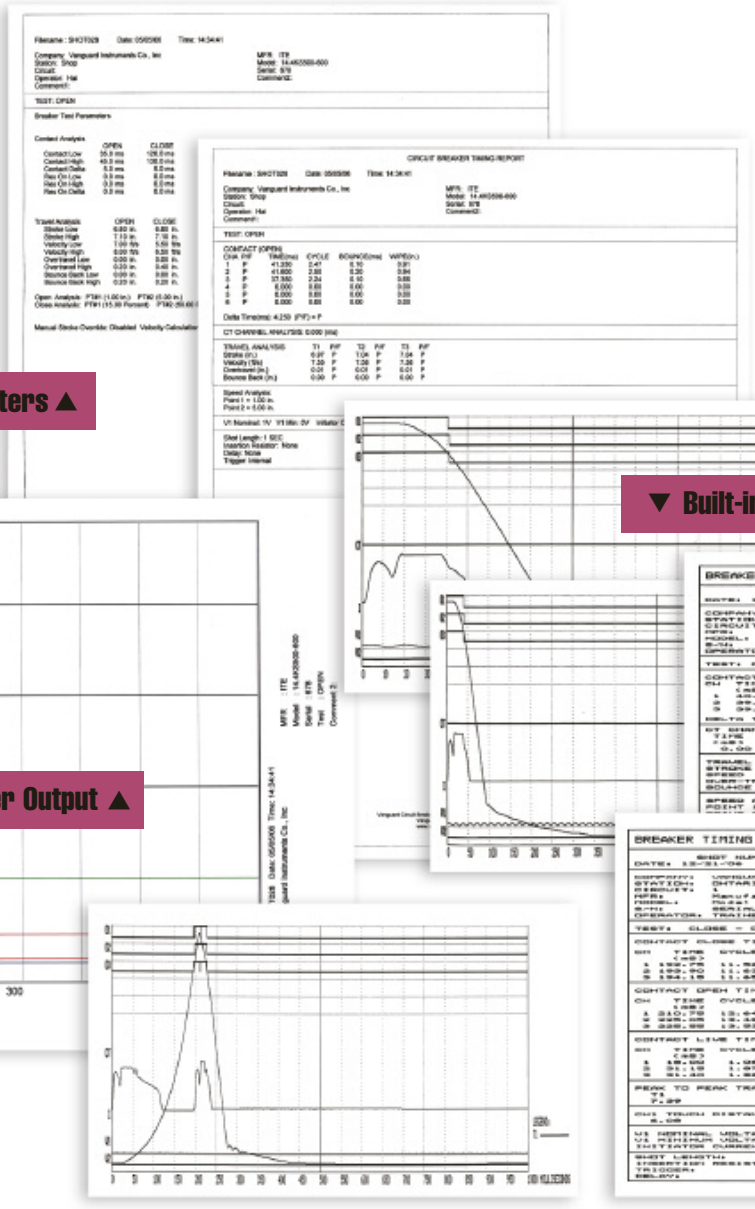
The CT-7500 S2's built-in 4.5-inch wide thermal printer can print the breaker contact analysis results in both tabular and graphic formats.



Microcomputer Accuracy in an

Graphic and
Tabulated Printouts

CT-7500 S2
Digital Circuit Breaker Analyzer



EEPROM Stored Test Parameters ▲

▼ Built-in Thermal Printer Output

PC Printer Output ▲

Ordering Information

CT-7500 Series 2 Digital Circuit Breaker Timer

CT-7500, 3 Contact Channels, Cables, PC Software	Part No: CT-7500-3 S2
CT-7500, 6 Contact Channels, Cables, PC Software	Part No: CT-7500-6 S2
CT-7500, 12 Contact Channels, Cables, PC Software	Part No: CT-7500-12 S2
CT-7500 Shipping Case	Part No: CT-7500-CASE
4.5-inch Printer Paper	Part No: Paper-TP4

See Page 107
for Travel Transducer
Ordering Information

Digital Circuit Breaker Analyzer

Inexpensive Digital Circuit Breaker Tester

FEATURES

- Quick-Shot mode for on-line timing
- Captures first trip time
- Built-in 4.5-inch wide thermal printer
- Initiate breaker operation
- Digital travel transducer requires no setup or calibration
- Detects main contact and insertion-resistor contact on the same input channel
- Stores up to 150 test records and 99 test plans
- RS-232C and USB computer interfaces
- Supports resistor type transducer

SPECIFICATIONS

TYPE	Portable circuit-breaker analyzer
PHYSICAL SPECIFICATIONS	16"W x 11"H x 14"D (40.6 cm x 29.9 cm x 35.6 cm); Weight: less than 25 lbs (11.3 kg)
INPUT POWER	100 – 120 Vac or 200 – 240 Vac (selectable), 50/60Hz
DRY-CONTACT INPUTS	3, 6 or 12 dry-input channels (depending on model). Each channel detects main and insertion-resistor contacts
TIMING WINDOWS	1-second, 10-seconds, or 20-seconds
TIMING RESOLUTIONS	±50 micro-seconds @ 1-second duration, ±500 micro-seconds @ 10-second duration, ±1.0 milli-seconds @ 20-second duration
TIMING ACCURACY	0.05% of reading ±0.05 ms @ 1-second duration
DRY-CONTACT CHANNEL PROTECTION	All contact inputs are grounded until test; input channels are protected against static discharge
DRY-CONTACT DETECTION RANGE	Closed: less than 20 ohms; Open: greater than 5,000 ohms
RESISTOR DETECTION RANGE	50 – 5,000 ohms
CT CURRENT SENSOR	One, non-contact, 0 – 100 Amperes
TRIGGER INPUT VOLTAGE	Open/Close: 30 – 300V, DC or peak AC
VOLTAGE SENSING INPUT RANGE	V1: analog input; 0 – 255V DC or peak AC; Sensitivity ±1V V2: voltage presence/absence detector input; 30 – 300V DC or peak AC
BREAKER OPERATIONS	Initiate Open, Close, Open– Close, Close – Open, Open – Close – Open
BREAKER INITIATE CAPACITY	30A, 250Vac/dc max
INITIATE CURRENT READING RANGE	One, non-contact, Hall-effect sensor, 0 – 20 amp range, dc to 5Khz
DIGITAL TRAVEL TRANSDUCER INPUTS	3 digital travel transducer channels; Linear range, 0.0 – 60.0 in (±0.01 in); Rotary range: 0 – 360 degrees (±0.36 degrees)
RESISTOR TYPE TRANSDUCER INPUT	200 Ohms – 10K Ohms
CONTACT TRAVEL POINT DIFFERENCE	Measures "slow-close" contact-point distances; results can be printed
DISPLAY	Back-lit LCD Screen (20 characters by 4 lines); viewable in bright sunlight and low-light levels
PRINTER	Built-in 4.5-inch wide thermal printer can print both graphic contact travel waveforms and tabulated test results
INTERNAL TEST RECORD STORAGE	Stores up to 150 test records and 99 test plans
COMPUTER INTERFACES	One RS-232C port, One USB port
PC SOFTWARE	Windows® XP/Vista-based Breaker-Analysis software is included with purchase price
SAFETY	Designed to meet UL 6101A-1 and CAN/CSA C22.2 No 1010.1-92 standards
ENVIRONMENT	Operating: -10°C to 50°C (+15°F to +122°F); Storage: -30°C to70°C (-22°F to +158°F)
HUMIDITY	90% RH @ 40˚C (104˚F) non-condensing
ALTITUDE	2,000m (6,562 ft) to full safety specifications
OPTIONS	Transportation case (available for the CT-7500 S2 and the travel transducers)
WARRANTY	One year on parts and labor

Note: The above specifications are valid at nominal voltage and ambient temperature of +25°C (+77°F). Specifications are subject to change without notice.

Vanguard Instruments Company, Inc.

Vanguard Instruments Co., (VIC), was founded in 1991. Currently, our 28,000 square-foot facility houses Administration, Design & Engineering, and Manufacturing operations. From its inception, VIC's vision was, and is to develop and manufacture innovative test equipment for use in testing substation EHV circuit breakers and other electrical apparatus.

The first VIC product was a computerized circuit-breaker analyzer, which was a resounding success. It became the forerunner of an entire series of circuit-breaker test equipment. Since its beginning, VIC's product line has expanded to include microcomputer-based, precision micro-ohmmeters, single and three-phase transformer winding turns-ratio testers, winding-resistance meters, transformer tap-changing controllers, megaohm resistance meters, and a variety of other electrical utility maintenance support products.

VIC's performance-oriented products are well suited for the utility industry. They are rugged, reliable, accurate, user friendly, and most are computer controlled. Computer control, with innovative programming, provides many automated testing functions. VIC's instruments eliminate tedious and time-consuming operations, while providing fast, complex, test-result calculations. Errors are reduced and the need to memorize long sequences of procedural steps is eliminated. Every VIC instrument is competitively priced and is covered by a liberal warranty.

Vanguard products are available from:

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