

Multi-tap Current and Voltage Transformer Analyzer **CVA500**

- Solution for testing of CTs, VTs, and CVTs
- Multi-tap CTs testing with a single-step cable setup
- Automated test mode
- Variable test voltage up to 2 kV 50 or 60 Hz
- CT knee point detection up to 2 kV
- Full range of CT tests
- Metering CTs accuracy class assessment
- All IEC-based classes, including class 0.1
- All IEEE-based classes, including class 0.15
- Protection CTs ALF and Vb assessment
- Insulation resistance measurement with 1 kV DC
- 10.1-inch touch screen display
- Built-in 112 mm (4.4") thermal printer



Description

The new powerful DV Power Current and Voltage Transformer Analyzer CVA500 with a large 10.1-inch touch screen display represents an evolution testing technology that provides user-friendly and fast test execution of the full range of current transformer (CT), voltage transformer (VT), and capacitive voltage transformer (CVT) tests.

CVA500 simultaneously measures CT knee point, turns ratio, polarity, and winding resistance in all taps. The automated test feature performs all these measurements in one test, including CT demagnetization, insulation resistance, and burden test, without any operator intervention. This significantly reduces testing time and helps to avoid possible issues caused by operators.

The CT knee point (saturation) testing method uses the variable 50/60 Hz AC voltage (up to 2000 V). CVA500 applies a sinusoidal voltage at mains frequency (50 or 60 Hz) directly to the low-voltage CT terminals.

CVA500 measures CT ratio and phase errors for 4 different burdens and for 8 different primary currents. This way it is possible to check CT accuracy class. It also measures CT composite error as well as instrument security factor FS (for IEC-based metering CTs), accuracy limit factor ALF (for IEC-based protection CTs), and secondary terminal voltage Vb (for IEEE-based protection CTs). Pass/fail assessment is made automatically based on the selected standard and CT class.

Application

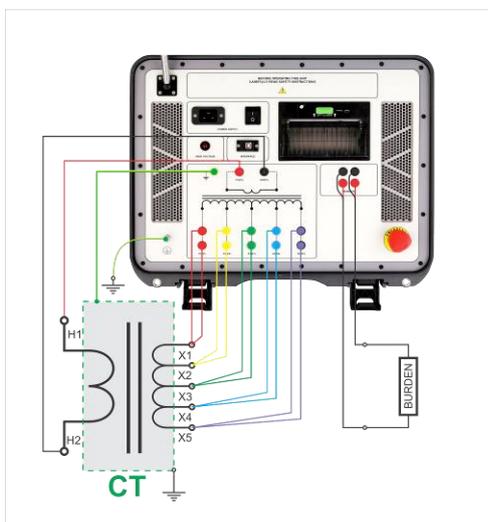
The list of instrument application includes a full range of tests:

- Saturation curve and knee point for CTs
- Ratio and phase errors for 4 different burdens and 8 different primary currents, for CTs
- Composite error for CTs
- Instrument security factor FS for IEC-based measurement CTs
- Accuracy limit factor ALF for IEC-based protection CTs
- Secondary terminal voltage V_b for IEEE-based protection CTs
- Turns ratio, polarity, and phase angle tests for CTs, VTs, and CVTs
- Demagnetization for CTs
- Winding resistance for CTs, VTs and CVTs
- Insulation resistance for CTs, VTs and CVTs
- Burden test for CTs, VTs, and CVTs

Connecting CVA500 to Test Objects

Multi-tap CT

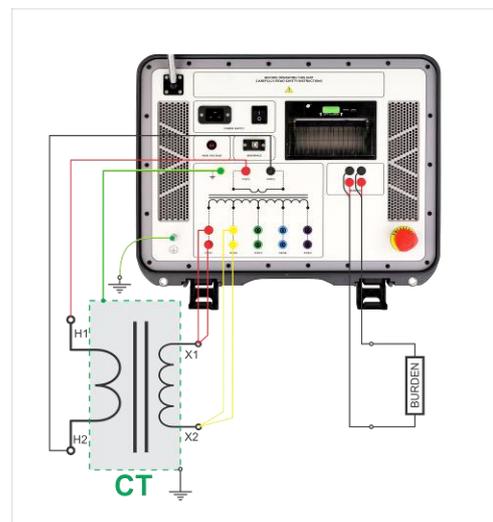
CVA500 allows one-time connection to all CT measurement terminals including primary side, up to 5 taps on the secondary side, CT grounding point, and burden. An internal sophisticated relay matrix enables performing all previously mentioned measurements in one test without any operator intervention and cables reconnection.



Connecting CVA500 to a multi-tap CT

Single-tap CT

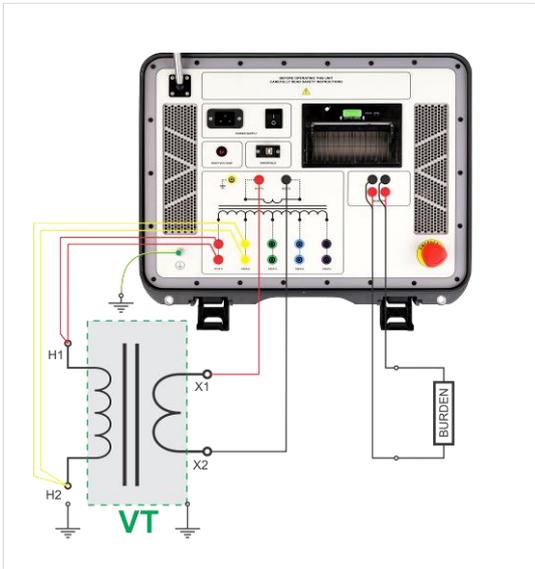
When single-tap CTs are tested, X1 and X2 terminals should be used for connecting to CT secondary. CVA500 allows one-time connection to all CT measurement terminals including primary side, secondary side, CT grounding point, and burden.



Connecting CVA500 to a single-tap CT

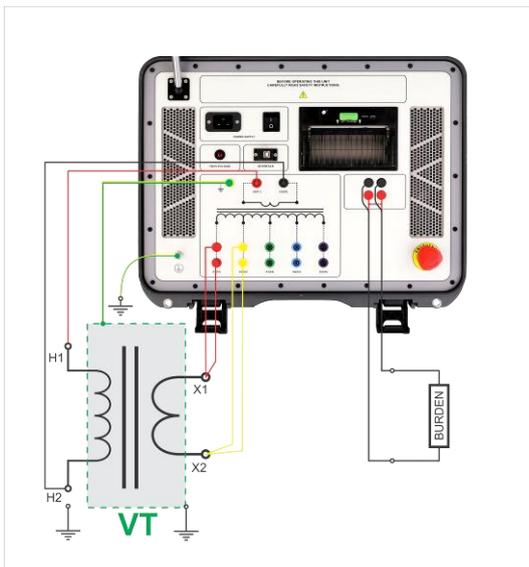
VT

For testing VT turns ratio and primary winding resistance, X1 and X2 terminals of CVA500 should be connected to VT primary side, and H1 and H2 terminals of CVA500 should be connected to VT secondary side.



Connecting CVA500 to a VT – turns ratio test and primary winding resistance test

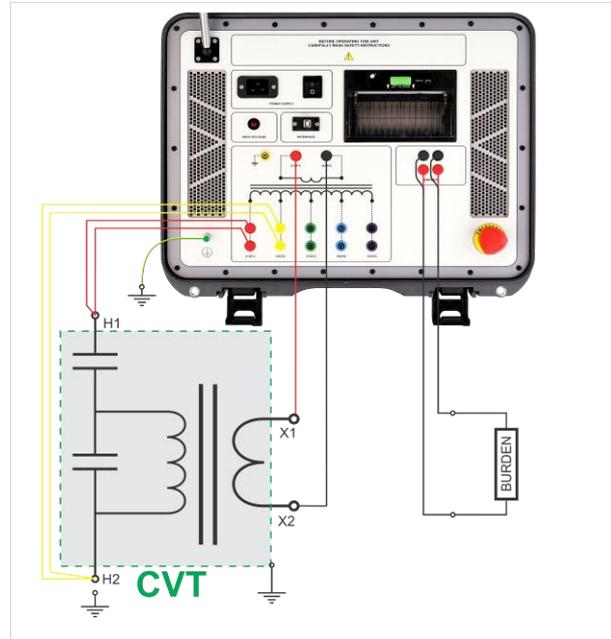
For testing VT secondary winding resistance and insulation resistance, X1 and X2 terminals of CVA500 should be connected to VT secondary side, and H1 and H2 terminals of CVA500 should be connected to VT primary side.



Connecting CVA500 to a VT – secondary winding resistance test and insulation resistance test

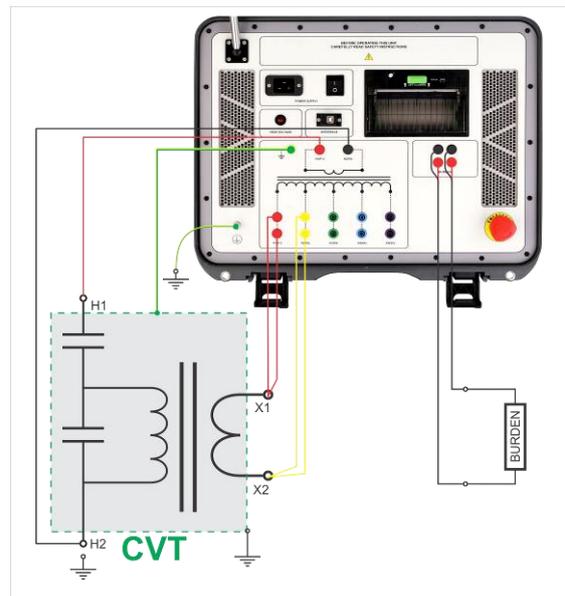
CVT

For testing CVT turns ratio, X1 and X2 terminals of CVA500 should be connected to CVT primary side, and H1 and H2 terminals of CVA500 should be connected to CVT secondary side.



Connecting CVA500 to a CVT – turns ratio test

For testing CVT secondary winding resistance and insulation resistance, X1 and X2 terminals of CVA500 should be connected to CVT secondary side, and H1 and H2 terminals of CVA500 should be connected to CVT primary side.



Connecting CVA500 to a CVT – secondary winding resistance test and insulation resistance test

Benefits and Features

High Output Power

The high output power allows a real saturation of the CT by using a nominal 50 or 60 Hz frequency. The maximum output power is 2000 VA. The CVA500 generates the AC test voltage up to 2000 V and the test currents up to 5 A.

Fast and Automated Multiple Tests

CVA500 has a unique feature that allows performing all available measurements – turns ratio, polarity, saturation, demagnetization, winding resistance, insulation resistance, and burden test – at once. The one-time connection system enables performing all previously mentioned tests without the need to reconnect cables.

Saturation Test

The CT saturation test is performed using the relevant standards ANSI 10/50, IEEE C57.13.1, IEC 61869, IEC 60044-1, or IEC 60044-6. The test voltage is raised and decreased automatically by the device. The device allows the connection of all tests leads to multiple CT output terminals (X1, X2, X3, X4, and X5). CVA500 draws saturation curves graphs and calculates the knee point in compliance with selected standard. One test covers testing up to 10 possible combinations of X1 to X5 and plots up to 10 saturation curves.

Knee Point Detection up to 2 kV

CT knee points up to 2 kV are measured by applying AC voltage of rated 50 or 60 Hz frequency.

Ratio and Polarity Test

CVA500 performs no-load turns ratio measurement by applying a voltage at the CT secondary side (or VT/CVT primary side) and comparing it with the measured induced voltage at the CT primary side (or VT/CVT secondary side). Polarity test indicates result as an “OK” (in-phase) or a “Reversed” (out-of-phase), and also shows the measured phase angle in degrees. The ratio and polarity test can be performed on the VTs and CVTs as well.

Winding Resistance Test

CVA500 measures winding resistance by injecting DC current and measuring the voltage drop across the winding. The resistance value is calculated using Ohm’s law. Winding resistance temperature compensation is also taken into consideration. Wide resistance measurement range, up to 10 k Ω , enables measurement of VT primary winding resistance.

Demagnetization

CVA500 has an automated CT demagnetization feature. The test voltage is increased until the CT is saturated, after which the test voltage is automatically slowly decreased to zero to demagnetize the CT.

Burden Test

The measurement of burden provides information about the connected load on the instrument transformer secondary side. A burden is isolated from all instrument transformer secondary connections for this test. CVA500 can inject rated CT secondary current (up to 5 A AC) or apply rated VT/CVT secondary voltage (up to 120 V). Measured burden parameters (voltage, current, angle ϕ , $\cos\phi$, impedance, and power) are displayed on the screen and printed on the test report. The test verifies the actual burden and confirms its compatibility with nameplate specifications.

Insulation Resistance Test

CVA500 provides the insulation resistance test by using test voltages of 1 kV DC and 500 V DC. The device automatically switches the connections to perform all three insulation tests (primary winding to ground, secondary winding to the ground, and primary winding to secondary winding). The operator can also measure insulation resistance between other points of interest (for example, between one secondary winding and other secondary windings).

Ratio and Phase Error

If saturation/knee point, no-load turns ratio, and winding resistance tests are performed, CVA500 automatically calculates CT ratio and phase errors for 4 different burdens and for 8 different primary currents.

Accuracy Class Check

Based on measured ratio and phase errors for different burdens and different primary currents, CVA500 can be used for checking CT accuracy class. Extremely accurate measurement of very low excitation currents makes it possible to check even the most precise CT classes (0.1 class for IEC and 0.15 class for IEEE). Pass/fail assessment is made automatically based on the selected standard and CT class.

Composite Error

If saturation/knee point and winding resistance tests are performed, CVA500 automatically calculates CT composite error. Pass/fail assessment is made automatically based on the selected standard and CT class.

Instrument Security Factor FS

If saturation/knee point and winding resistance tests are performed, CVA500 automatically measures instrument security factor FS (for IEC-based measurement CTs). The measurement is performed using both direct and indirect test method, and both results are provided. Pass/fail assessment is made automatically based on the selected standard and CT class.

Accuracy Limit Factor ALF

If saturation/knee point and winding resistance tests are performed, CVA500 automatically calculates accuracy limit factor ALF (for IEC-based protection CTs). The measurement is performed using both direct and indirect test method, and both results are provided. Pass/fail assessment is made automatically based on the selected standard and CT class.

Secondary Terminal Voltage Vb

If saturation/knee point and winding resistance tests are performed, CVA500 automatically calculates secondary terminal voltage Vb (for IEEE-based protection CTs classes C, K, and T). Pass/fail assessment is made automatically based on the selected standard and CT class.

Large 10.1" Graphical Touch Screen Display

CVA500 comes equipped with a large 10.1" graphical touch screen display. This makes test preparation, test execution, and analysis of test results as easy as possible. Test templates can be prepared and saved in the office, making the test execution in the field possible with only a few clicks. All test results are presented both numerically and graphically, for easy and convenient analysis.

Memory

CVA500 has an internal SD card of 32 GB memory space. This enables saving tens of thousands of results and templates.

DV-TR Software

CVA500 can be fully operated by using DV-TR software. The software shows both numerical and graphical results which help supervisors to analyze the results. The test reports can be automatically generated. The software is included in the purchase price.

Built-in Thermal Printer

CVA500 comes with 112 mm (4.4") wide built-in thermal printer. All numerical and graphical results can be printed.

Safety Strobe Light

CVA500 has dedicated output for safety strobe light. The strobe is equipped with magnets so it can be easily attached to the tested object. It provides rotating light whenever the test is in progress. This brings additional safety for the test personnel. The strobe is optional accessory.

Technical Data

Mains Power Supply

- Connection: according to IEC/EN60320-1; UL498, CSA 22.2
- Input voltage: 90 – 264 V AC
- Input frequency: 50 or 60 Hz

Output AC Source

- Up to 2000 V AC (Ratio and saturation test)
- 1 A or 5 A AC (CT burden test)
- Up to 120 V AC (VT/CVT burden test)

Output DC Source

- 500 V or 1000 V DC (Insulation resistance test)
- Up to 5 A DC (Winding resistance test)

Turns Ratio

- Measurement range: 0.8 – 20000
- Resolution: 5 digits
- Typical accuracy:
 - 0.8 – 2 000: $\pm 0.02\%$
 - 2 000 – 5 000: $\pm 0.03\%$
 - 5 000 – 20 000: $\pm 0.05\%$

Phase Angle

- Measurement range: 0 – 360°
- Resolution: 0.01°
- Typical accuracy: $\pm 0.05^\circ$

Saturation (Knee Point)

- Voltage measurement range: 0 – 2100 V
- Resolution: 0.1 V
- Typical accuracy: $\pm 0.05\%$ @ ≥ 5 V
 $\pm 0.5\%$ @ < 5 V
- Current measurement range: 0 – 1 A / 10 A
- Resolution: 0.1 mA @ < 1 A
1 mA @ ≥ 1 A
- Typical accuracy: $\pm(0.05\% \text{ rdg} + 0.05\% \text{ FS})$

Winding Resistance (CT, VT, CVT Secondary)

- Measurement range: 0 – 999.9 Ω
- Resolution: 4 digits
- Typical accuracy: $\pm(0.2\% \text{ rdg} + 2 \text{ m}\Omega)$

Winding Resistance (VT Primary)

- Measurement range: 0 – 99.99 k Ω
- Resolution: 4 digits
- Typical accuracy: $\pm(0.2\% \text{ rdg} + 2 \text{ }\Omega)$

Insulation Resistance

- Measurement range: 0 – 20 G Ω
- Range / resolution:

0 – 99.99 M Ω	0.01 M Ω
100.0 – 999.9 M Ω	0.1 M Ω
1000 – 20000 M Ω	1 M Ω
- Typical accuracy:
 - $\pm(3\% \text{ rdg} + 0.2 \text{ per G}\Omega)$ @ 1000 V DC
 - $\pm(3\% \text{ rdg} + 0.4 \text{ per G}\Omega)$ @ 500 V DC

Burden (CT)

- Voltage measurement range: 0 – 45 V
- Resolution: 0.001 V
- Typical accuracy: $\pm 0.05\%$ @ ≥ 5 V
 $\pm 0.5\%$ @ < 5 V
- Current measurement range: 0 – 1 A / 7 A
- Resolution: 0.001 A
- Typical accuracy: $\pm(0.05\% \text{ rdg} + 0.05\% \text{ FS})$

Burden (VT, CVT)

- Voltage measurement range: 0 – 300 V
- Resolution: 0.001 V
- Typical accuracy: $\pm 0.05\%$ @ ≥ 5 V
 $\pm 0.5\%$ @ < 5 V
- Current measurement range: 0 – 1 A / 7 A
- Resolution: 0.01 mA
- Typical accuracy: $\pm(0.05\% \text{ rdg} + 0.05\% \text{ FS})$

Display

- 10.1" graphical touch screen display

PC Interface

- USB
- Ethernet

Internal Memory

- SD card 32 GB

Environmental Conditions

- Operating temperature:
-20 °C – +55 °C / -4 °F – +131 °F
- Storage & transportation:
-40 °C – +70°C / -40 °F – +158 °F
- Humidity: 0% – 95% relative humidity, non-condensing

Dimensions and Weight

- Dimensions (W x H x D):
505 x 257 x 409 mm / 19.9 x 10.1 x 16.1 in
- Weight: 20.5 kg / 45.2 lbs

Warranty

- 3 years + additional 1 year upon registration
[on DV Power official website](#)

Printer

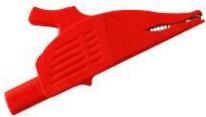
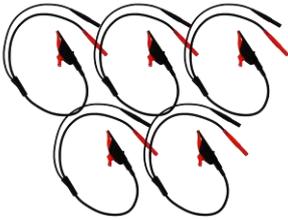
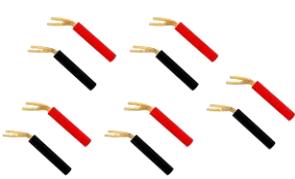
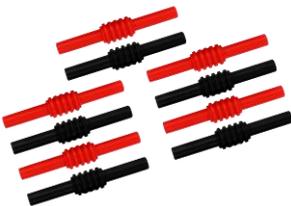
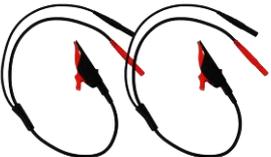
- Built-in thermal printer
- Paper width 112 mm / 4.4 in
- Operating temperature:
-10 °C – +60 °C / +14 °F – +140 °F
- Storage temperature:
-20 °C – +70 °C / -4 °F – +158 °F
- Humidity: 10% – 85% relative humidity, non-condensing

Applicable Standards

- Installation/Overvoltage category: II
- Pollution degree: 2
- Safety: LVD 2014/35/EU (CE Conform)
Standard EN 61010-1:2010
- EMC: Directive 2014/30/EU (CE Conform)
Standard EN 61326-1:2013

All specifications herein are valid at ambient temperature of +25 °C (+77 °F) and standard accessories. Specifications are subject to change without notice.

Accessories

			
Plastic transport case with wheels	Primary side cables set 4 x 10 m with banana plugs	TTA clamps with banana plugs (red)	TTA clamps with banana plugs (black)
			
Dolphin clip (red)	Dolphin clip (black)	Secondary side cables set 10 x 5 m with banana plugs	Secondary side cables set 5 x 0.5 m with dolphin clips (Kelvin)
			
Cable lug adapter set	Flex wire adapter set	Cable coupler set	Grounding cable set 1 x 5 m with dolphin clip
			
Burden cables set 2 x 5 m with dolphin clips (Kelvin)	Ground (PE) cable	Cable plastic case – medium size	Safety strobe light with 5 m cable

Ordering Info

Instrument	Article No
Multi-tap Current and Voltage Transformer Analyzer CVA500	CVA500X-N-W3

Included Accessories
Built-in thermal printer 112 mm (4.4 in)
Windows-based DV-TR PC software
USB cable
Ethernet cable
Mains power cable
Ground (PE) cable
Debug adapter
Plastic transport case with wheels

Standard Accessories	Article No
Primary side cables set 4 x 10 m (32.8 ft) with banana plugs	PR4-10-ABPBP
TTA clamps with banana plugs (red)	TTA-CL0-2RBP
TTA clamps with banana plugs (black)	TTA-CL0-2BBP
Dolphin clip (red)	DOLPIN-CL-R0
Dolphin clip (black)	DOLPIN-CL-B0
Secondary side cables set 10 x 5 m (16.4 ft) with banana plugs	S10-05-ABPBP
Cable lug adapter set	CABLE-LUG-10
Flex wire adapter set	WIRE-FLEX-10
Secondary side cables set 5 x 0.5 m (1.64 ft) with dolphin clips (Kelvin)	S05-0Z5-BPDC
Cable coupler set	CABLE-CPL-10
Grounding cable set 1 x 5 m (16.4 ft) with dolphin clip	GND1-05-BPDC
Burden cables set 2 x 5 m (16.4 ft) with dolphin clips (Kelvin)	BUR2-05-BPDC
Cable plastic case – small size	CABLE-CAS-01

Optional Accessories	Article No
Safety strobe light with 5 m cable	SFTY-STRB-05
Thermal paper roll 112 mm (4.4 in)	PRINT-112-RO
Cable bag	CABLE-BAG-00
Cable plastic case – medium size	CABLE-CAS-02
Cable plastic case with wheels – medium size	CABLE-CAS-W2
Cable plastic case – large size	CABLE-CAS-03
Cable plastic case with wheels – large size	CABLE-CAS-W3