

MULTI-AMP® CB-8100 Series

- **High-current output —**
60,000 A for Model
CB-8160 or 35,000 A
for Model CB-8130
- **Compact, one-piece
construction**
- **Digital ammeter and timer**
- **Model CB-8160 capable of
testing breakers rated to
6000 A, and Model CB-8130
capable of testing breakers
rated to 3000 A**

Universal Circuit Breaker Test Sets

DESCRIPTION

Incorporating the latest technological advancements, the Multi-Amp® CB-8100 Series is specifically designed to test low-voltage power circuit breakers and molded-case circuit breakers equipped with thermal, magnetic or solid-state trip devices by simulating an overload or fault condition.

Each test set is an integrated test system which provides a variable, high-current output and incorporates all control circuitry and instrumentation necessary to accurately, efficiently and safely test direct-acting circuit breakers. Improved transformer and circuit design results in a very high-capacity test set in a very compact size.

APPLICATIONS

Universal in application, the test sets will test virtually all low-voltage, molded-case and metal-clad, direct-acting ac circuit breakers produced by General Electric, Westinghouse, Federal Pacific Electric, Square D, Gould, ABB, ITE, Siemens and other manufacturers.

Models CB-8130, 8131 and 8132 are rated for testing breakers up to 3000 amperes, and Models CB-8160, 8161 and 8162 are rated for testing breakers up to 6000 amperes. Rugged and reliable, Multi-Amp circuit breaker test sets will provide years of trouble-free operation.

The test sets also may be used for other high-current applications such as ratioing current transformers, performing heat runs or primary injection testing of high-voltage breakers and their associated protective relays.

All CB-8100 Series test sets have identical features, instrumentation and operational characteristics. The only changes in the specifications among the units are their size, weight and maximum output current capacity.

FEATURES AND BENEFITS

- **Compact enclosure:** Improvements in transformer and circuit design have resulted in a very high-capacity test set in a single, relatively small enclosure. For safety and mobility, the test set is housed in a single, rugged, sheet-metal enclosure with a low center of gravity, tow ring, lifting eyes and large locking swivel casters with brakes.

To increase maneuverability, all four casters swivel; however, they can also be easily locked into a fixed position when desired. Its compact size permits easy movement through narrow doors. Controls and instrumentation are positioned so the operator can simultaneously observe the circuit breaker under test.

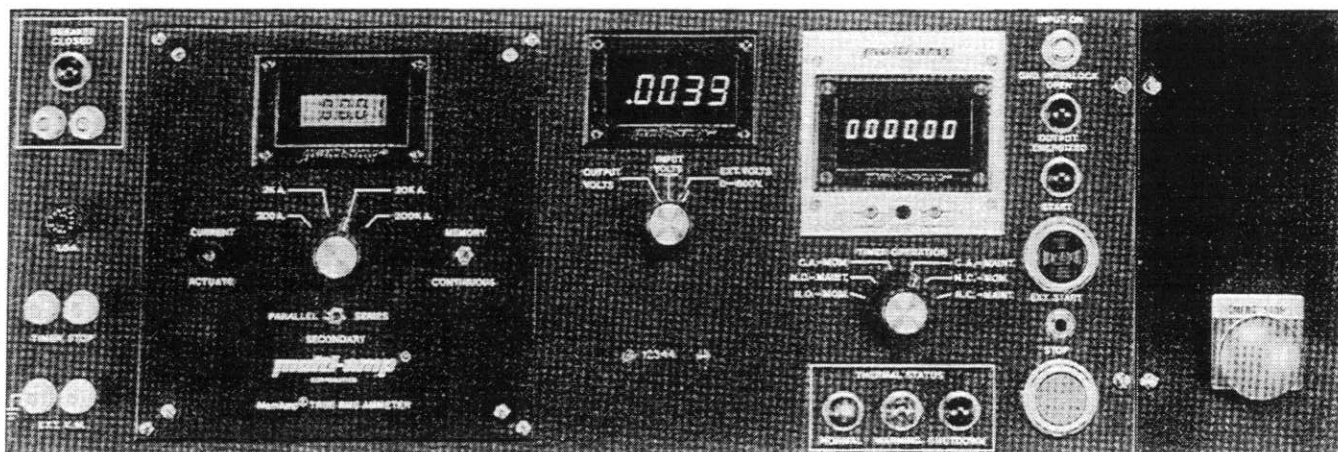
- **Zero dc offset:** Use of SCRs instead of a contactor to initiate the output of the test set eliminates closing-time error

and thereby ensures precise initiation at the zero crossover point of the output current waveform every time. Initiation at the zero crossover point ensures symmetrical output current by eliminating dc offset in the current waveform; therefore, accurate and repeatable test results are ensured even with very short-duration currents, as when conducting tests of instantaneous or short-time-delay trip elements.

- **Initiating control circuit:** provides both "momentary" and "maintained" modes to control output duration. The momentary mode automatically pulses the output approximately four cycles to perform instantaneous trip tests, or to avoid damage or overheating of the device under test while setting the test current.

In the maintained mode, the output remains energized until manually turned off or, during timing test, until the device under test operates, which both stops the timer and de-energizes the output.

- **Construction:** Built for years of trouble-free, reliable operation, the test set includes rugged instrumentation and controls designed to withstand the vibration and shock of frequent transportation without the need to remove them from the test set.



Simple and sturdy controls reduce the need for operator training and the possibility of equipment failure.

Maximum Output Current

At rated input voltage, the CB-8100 Series will produce the following outputs:

Model No.	Output Current		
	Maximum Continuous Current	Maximum Current Through a Circuit Breaker	Maximum Current Through a Short Circuit
CB-8130	4500 A	35,000 A	60,000 A
CB-8131	4446 A	28,000 A	48,000 A
CB-8132	4446 A	28,000 A	48,000 A
CB-8160	6250 A	60,000 A	100,000 A
CB-8161	6175 A	50,000 A	80,000 A
CB-8162	6175 A	50,000 A	80,000 A

Duty Cycle

The test set will supply the rated continuous current indicated above for 30 minutes, followed by 30 minutes off.

Instrumentation

MemAmp™ Digital Ammeter

Operating Mode (switch-selected)

Memory
Continuous

Digital Display: 3¹/₂-digit display with 0.4-in. (10-mm) numerals

Ranges (switch-selected)

0 to 199.9 A
1.999 kA
19.99 kA
199.9 kA

Overall Ammeter System

Accuracy

Instrument: $\pm 0.5\%$ of reading,
 $\pm 0.1\%$ of full scale

Transducer: $\pm 1\%$ of reading

Digital Timer

Display: 6-digit display with 0.375-in. (9-mm) numerals

Ranges (switch-selected)

0 to 99.9999 s
0 to 9999.99 s
0 to 99999.9 cycles

Accuracy

Seconds Mode: \pm least significant digit (0.0001 or 0.01, depending on range in use) or $\pm 0.0025\%$ of reading, whichever is greater

Cycles Mode: ± 0.5 cycle

Digital Voltmeter

Operating Mode (switch-selected)

Input voltage
Output voltage
External voltage

Digital Display: 3¹/₂-digit display with ± 0.5 -in. (13-mm) numerals

Ranges (autoranging)

0 to 1.999/19.99/199.9/600 V

Accuracy: $\pm 0.25\%$ of reading, \pm LSD

OPTIONAL ACCESSORIES

Protective Cover

A tough cover made of heavyweight, reinforced, vinyl-coated nylon is available for protecting the test set from oil, dust or other particulate matter during storage. It conforms to MIL-C-43006D and passes MIL-C-20696B test for oil and hydrocarbon resistance. It will withstand continuous exposure to temperatures ranging from -40 to 82°C (-40 to 180°F), and the fire-retardant material is treated with fungal and ultraviolet ray inhibitors.

Model CBS-3 Stabs

Stab Sets CBS-1 and CBS-2 accommodate all circuit breakers listed under the Output Connections section of the test set's specifications. However, each of the breakers listed under the heading of CBS-3 requires a different set of stabs designed specifically for that one type of breaker.

Dimensions and Weight

Model No.	WEIGHT		DIMENSIONS	
	lb	kg	H X W X D (in.)	H X W X D (cm)
CB-8130	1000	465	46 X 46 X 28 in.	117 X 117 X 71 cm
CB-8131	1000	465	46 X 46 X 28 in.	117 X 117 X 71 cm
CB-8132	1040	472	46 X 46 X 28 in.	117 X 117 X 71 cm
CB-8160	1200	545	46 X 55 X 28 in.	117 X 117 X 71 cm
CB-8161	1200	545	46 X 55 X 28 in.	117 X 117 X 71 cm
CB-8162	1250	567	46 X 55 X 28 in.	117 X 117 X 71 cm

- **Protection:** Fuse, circuit breaker and overload protective devices are incorporated. The output-initiating SCRs are forced-air cooled, and temperature sensors provide protection from overheating. Emergency-stop push-button is provided to de-energize all input power to the test set.

- **Ground safety interlock:** An interlock circuit ensures that the test set chassis is connected to system ground before the output of the test set can be energized.

- **Accessory outlet:** A ground-fault-protected 120-volt outlet with a capacity of 1.2 kVA is provided for convenient connection of accessory equipment. Other voltages are available internally for customer-installed outlets.

INSTRUMENTATION AND CONTROLS

- **MemAmp™ Digital Ammeter:** Specifically designed and manufactured to accurately measure the short-duration currents utilized when testing and determining instantaneous trip points, this is a high-accuracy, solid-state instrument with a digital display.

For measuring short-duration currents, this instrument includes a read-and-hold memory circuit which retains the reading until the output is again initiated. If the output is again initiated, the meter automatically resets, and then measures and indicates the output current. It will also function as a standard ammeter which continuously measures the output current. A low range is provided for measuring the low-amplitude currents associated with ground trip elements.

- **Digital timer:** A specially designed Multi-Amp solid-state, digital timer is incorporated to measure the elapsed time of the test in either seconds or cycles. It features extensive shielding and noise-suppression circuitry to ensure accurate and reliable operation under the most demanding field conditions. Accuracy of the timer, which incorporates a crystal-controlled oscillator, is independent of the power-line frequency.

- **Timer control circuitry:** No electro-mechanical relay or relay contacts are used anywhere in the timer-initiating circuit. A completely solid-state circuit automatically starts the timer when the output current starts to flow and automatically stops it when the device under test operates. This circuit will accommodate a variety of test conditions including:

1. When testing a circuit breaker or a device which has no auxiliary contacts to monitor (such as a single-pole circuit breaker), the timer starts

when the output current starts to flow and stops when the output current is interrupted.

2. When testing a device and monitoring normally closed contacts, the timer starts when the output current starts to flow and stops when the contacts open.

3. When testing a device and monitoring normally open contacts, the timer starts when the output current starts to flow and stops when the contacts close.

- **Digital voltmeter:** This solid-state instrument can be used to measure the input voltage to the test set or the output voltage from the test set. It can also be used as a diagnostic tool to evaluate contact condition by measuring the voltage drop across breaker contacts while subject to high current.

- **Panel indicators:** Panel lamps, which are incorporated for operator safety and convenience, indicate:

1. Input power to test set ON
2. Output of test set ENERGIZED
3. Breaker under test CLOSED
4. Thermal NORMAL, WARNING or SHUTDOWN
5. Ground interlock OPEN

- **External initiate circuit:** allows initiation of the test from a remote location when desired

SPECIFICATIONS

Input

Because the CB-8100 Series is used all over the world to test low-voltage circuit breakers, there are a number of test sets designed to contend with the many different input voltages and frequencies. When ordering, select the test set which best suits the power system available. The input power requirements for the CB-8100 Series are as follows:

Model No.	Input Voltage (single-phase)	Input Frequency	Input Current
CB-8130	460 V $\pm 5\%$	60 Hz	200 A
CB-8131	380 V $\pm 5\%$	50 Hz	200 A
CB-8132	415 V $\pm 5\%$	50 Hz	200 A
CB-8160	460 V $\pm 5\%$	60 Hz	350 A
CB-8161	380 V $\pm 5\%$	50 Hz	350 A
CB-8162	415 V $\pm 5\%$	50 Hz	350 A

Output

Output Circuit: The output of the test set is easily adjustable from zero to the maximum of current available through the impedance of the device under test. Two output ranges are provided to accommodate a variety of load circuit impedances. The maximum current available from the test set is determined primarily by the impedance of the load circuit. The duration of the available current is determined primarily by thermal conditions within the test set.

Output Connections: To provide maximum utilization of the output available from the test set, each set is equipped with a Multi-Amp stab adapter board and stab sets CBS-1 and CBS-2 for use with drawout style, metal-clad breakers. The stabs eliminate the significant losses that occur if leads are used to connect the breaker under test to the test set. Cables must be used when testing molded-case breakers or other devices which will not connect directly to the stabs.

The standard stabs supplied with each unit accommodate all of the following breakers:

AK-15	DB-50	K-225	LA-1600
AK-35	DB-75	K-600	G-25A
AK-50	DB-100	K-1600	FP-15
AKR-30	KA	LA-25	FP-25
DB-15	KB	LA-50	FP-50
DB-25	KC	LA-600	

The following list includes the most common breakers requiring CBS-3 stabs; however, if stabs are required for other drawout style breakers, designate the specific breaker(s) to be accommodated by manufacturer, model or type, frame size and coil rating. (Each breaker requires a different set.)

AL-2-50	DK-25	KDON-1600
AL-2-75	DS-206	KE
AL-2-100	DSL-206	KD
AK-75	DS-416	KDA
AK-100	DSL-416	L-75
AKU-25	DS-532	LA-75
AKU-50	DS-632	LA-3000
AKR-75	DS-840	LA-4000
AKR-100	FP-75	LG
DA-50	FP-100	LX1600
DA-75	KDE	RS-25
DA-100	K-2000	R-50
DBL-25	K-3000	SCB-2000
DBL-50	K-4000	
DK-15	KDON-600	

Input Autotransformer

If the nominal input voltage for the test set is not available, or if use at various locations requires the use of a variety of input voltages, specify an autotransformer (listed in the following table) appropriate for the CB-8100 Series test set selected.

Each multitapped autotransformer is equipped with a power ON/OFF switch, appropriate sockets, plugs, interconnect and tap selector cables, and is housed in a rugged sheet-metal enclosure with casters and handles.

All voltages are single-phase with a tolerance of $\pm 5\%$. Input taps of 240 V and below are not recommended for obtaining maximum output of Models CB-8160, CB-8161 and CB-8162. For other combinations of input and output voltages, contact Technical Sales.

Model No.	Input Tap Voltages	Output Volts	Frequency (Hz)	Weight (lb/kg)	Dimensions H X W X D (in./cm)
AT-1	208, 230, 575	460	60	620/282	24 X 23 X 23 61 X 58 X 58
AT-4	208, 230, 575	380	50	640/290	24 X 23 X 23 61 X 58 X 58

ORDERING INFORMATION

Item (Qty)	Cat. No.
Model CB-8130	CB-8130
Model CB-8131	CB-8131
Model CB-8132	CB-8132
Model CB-8160	CB-8160
Model CB-8161	CB-8161
Model CB-8162	CB-8162

Included Accessories

Standard stab sets	CBS-1 and CBS-2
Leads	
Continuity test leads, 12 ft [3.7 m] (1)	2998
Timer leads, 12 ft [3.7 mm] (2)	2997

Item (Qty)	Cat. No.
Input connector, red, 460 V (2)	2505
Stab series bar (1)	5532
Fuses	
Fuse 500 V, 6 A (2)	9377
Fuse 250 V, 1.5 A (5)	950
Instruction manual (1)	5531

Optional Accessories

Input autotransformer	AT-1 or AT-4
Leads included with input autotransformer	
Interconnect leads (2)	2979
Jumper lead (1)	8139
Protective cover	PC-1
CBS-3 stabs	Contact Technical Sales



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