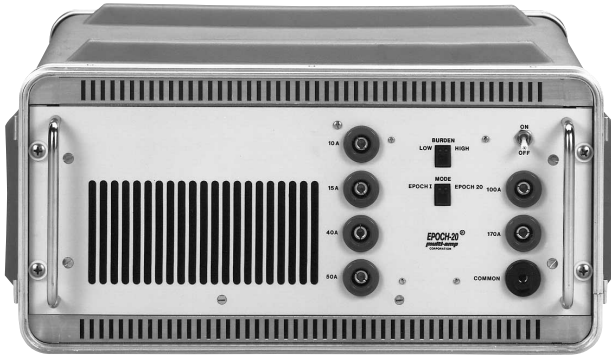


EPOCH-20® High-Current Output Unit



- 600 VA of high current
- Completely compatible with PULSAR® and EPOCH-10® protective relay test equipment
- Up to 187 Amperes maximum output

DESCRIPTION

The EPOCH-20® is a high-current output unit designed to be controlled by the PULSAR® in combination with the High-Current Interface Module to produce a rugged, portable, high-current, high-volt/ampere test set.

The EPOCH-20 also can be controlled by the EPOCH-10® Relay Test Set.

PULSAR/EPOCH-20 or EPOCH-10/EPOCH-20 combination uses microprocessor-based, digitally synthesized sine wave generators and solid-state regulated power amplifiers to provide sinusoidal voltage and current outputs with precise control of the phase angle relationships.

These combinations will produce accurate test results even with a fluctuating power source or when testing nonlinear or highly saturable relays.

An optional IEEE-488 interface transforms the EPOCH-10/EPOCH-20 combination into a programmable automatic test system when used with an external controller or computer. Amplitude and/or phase angle can be set to desired values, step-changed, ramped or pulsed to new values.

IEEE Device No.	Relay Types	Specify
50	Instantaneous Overcurrent up to 187 amperes at 600 VA	One EPOCH-20 and PULSAR with High-Current Interface Module or one EPOCH-10
51	Overcurrent up to 187 amperes at 600 VA	
67	Directional Overcurrent up to 187 amperes at 600 VA	
87	Differential	One EPOCH-20 and PULSAR with Interface Module or two EPOCH-10s
21	Distance (open-delta)	
21	Distance (wye)	One EPOCH-20 and PULSAR with Interface Module OR One EPOCH-20 and three EPOCH-10s OR Three EPOCH-20s and three EPOCH-10s OR Three EPOCH-20s and PULSAR with Interface Modules

APPLICATIONS

The PULSAR/EPOCH-20 or EPOCH-10/EPOCH-20 combination is designed to test both complex protective relays which require phase-shifting capability and simpler relays, including all overcurrent relays. The table above lists the different types of relays by device numbers along with the different combinations of PULSAR or EPOCH-10s and EPOCH-20s required to test them.

FEATURES AND BENEFITS

Each EPOCH-20 incorporates many standard features to reduce set-up time, simplify test procedures and increase accuracy.

- The EPOCH-20 is completely compatible with PULSAR via the High-Current Interface Module and the EPOCH-10.
- Output high-current source has a 3-minute duty cycle rating at 600 volt-amperes.
- Numerous protective circuits are incorporated, including thermal protection of the power amplifiers and overvoltage protection of the input circuit.
- Tough polyethylene plastic, sealed enclosure provides high shock and vibration resistance. Rubber sealed lids protect the test set from water and dust intrusion.
- To simulate the worst of field conditions, the EPOCH-20 has been tested and qualified in accordance with MIL-STD-810 for temperature, shock and vibration.

SPECIFICATIONS**Input (specify one)**

115 V \pm 10%, 50/60 Hz, 20 A

OR

230 V \pm 10%, 50/60 Hz, 20 A

Output**Output Current**

To provide a variety of test circuit impedances, six output taps with two ranges are provided.

High Ranges: 600 VA rms

2.00 to 10.00 A at 60 V max
 3.00 to 15.00 A at 40 V max
 8.00 to 40.00 A at 15 V max
 10.00 to 50.00 A at 12 V max
 20.00 to 100.0 A at 6 V max
 34.00 to 170.0 A at 3.5 V max

Low Ranges: 300 VA rms

2.00 to 10.00 A at 30 V max
 3.00 to 15.00 A at 20 V max
 8.00 to 40.00 A at 7.5 V max
 10.00 to 50.00 A at 6 V max
 20.00 to 100.0 A at 3 V max
 34.00 to 170.0 A at 1.75 V max

Resolution

Four Ranges: 0.01 A

Two Ranges: 0.1 A

Overrange Capability

The EPOCH-20 has an overrange capability of \pm 10% for each tap with a maximum output current of 187 A on the 170-A tap.

Duty Cycle

Three minutes at full-rated VA output (i.e., 10 A at 60 V). Fifteen-minute recovery time

Accuracy

Typical: \pm 0.5% of setting

Maximum: \pm 1% of setting

Alarm will indicate when amplitude, phase angle, or waveform is in error.

Distortion

Less than 1% typical, 3% max

Output of EPOCH-10/EPOCH-20 Combination

Frequency

■ Synchronized to input power source

■ 60-Hz crystal-controlled

■ 50-Hz crystal-controlled

Accuracy

■ Synchronized, tracks input frequency

■ \pm 0.006 Hz for 60-Hz crystal control \pm 0.01

■ \pm 0.005 Hz for 50-Hz crystal control (0.01%)

Output of PULSAR and Interface Module Connected to EPOCH-20

The High-Current Interface Module provides a variable frequency signal to the EPOCH-20 High-Current Output Unit. Output frequency is continuously displayed for each channel with large, high-intensity LEDs with the following ranges:

5.000 to 99.999 Hz

100.01 to 999.99 Hz

Frequency Accuracy: \pm 10 ppm at $23^\circ \pm 2^\circ$ C

Current Phase Angle Control

Angle is adjusted on the EPOCH-10 control unit by 4-digit, pushbutton control with large LED display of setting.

Range: 0.0 to 359.9 $^\circ$

Resolution: 0.1 $^\circ$

Accuracy: less than \pm 0.3 $^\circ$ typical, \pm 1.0 $^\circ$ max

Control Section

The control unit for the EPOCH-20 high-current section can be either PULSAR or an EPOCH-10. Thus the excellent operating and control features of PULSAR or the EPOCH-10 are used to control the EPOCH-20.

Note: When the EPOCH-20 is in use, the current output of the EPOCH-10 control unit is inoperative. All EPOCH-10s can control an EPOCH-20 high-current section. When the high-current section of the EPOCH-20 is not needed, the EPOCH-10 can be used independently or slaved together with other EPOCH units.

Harmonic Generator

Both the PULSAR and EPOCH-10 control units incorporate a special harmonic generator to test relays that include harmonic restraint elements such as transformer current differential relays. This harmonic circuit provides the capability of converting the output current of the EPOCH-20 to either a second, third, or fifth harmonic of the frequency. By simple use of a panel switch on the EPOCH-10, selection can be made for 60-, 120-, 180-, 300- or 50-, 100-, 150-Hz range.

Temperature

Operating

32 to 122° F (0 to 50° C)
Reduced duty cycle above 113° F (45° C)

Storage

77 to 158° F (25 to 70° C)

Dimensions

With Lids On

10.75 H X 21 W X 24.5 D in.
(273 H X 533 W X 622 D mm)

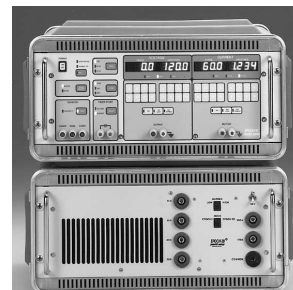
With Lids Off

10.75 H X 21 W X 18.5 D in.
(273 H X 533 W X 470 D mm)

Weight

With Lids On: 83 lb (37.7 kg)

With Lids Off: 77 lb (34.9 kg)



The EPOCH-20 with the EPOCH-10 control unit

ORDERING INFORMATION

Item (Qty)	Cat. No.
PULSAR - Refer to PULSAR catalog entry	
EPOCH-20	EPOCH20-STD
EPOCH-20 without enclosures, fits standard, 19-in.[483-mm] rack	EPOCH20-RK
Included Accessories	
Carrying case	11437
Fuses, 1.0 A, 250 V (5)	4139
Ground lead (1)	11258
High-current leads	
Black (1)	10708
Red (1)	11245
Power cord	11266
Interconnect cables	
Control (1)	10574
Signal (1)	11307
Instruction manual (1)	11275

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