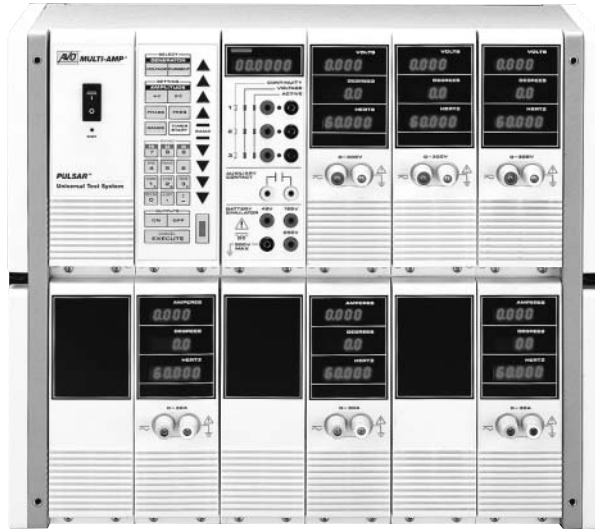


PULSAR®

Universal Protective Relay Test System



- Complete three-phase test system in one unit
- Modular design for system customization
- Steady-state and dynamic testing
- Transient testing via DFR replay and EMTP/ATP simulation
- Capable of GPS satellite synchronized testing

DESCRIPTION

The PULSAR® Universal Protective Relay Test System represents the next generation in protective relay testing. This one-unit, modular system lets you select the testing capabilities you need now and expand as your requirements change.

The PULSAR base unit includes the chassis, back plane, and input power and control module.

Current and Voltage Amplifier Modules

The system is customized by adding a timer module and the number of current and voltage amplifier modules needed for specific testing applications.



Modules slide out easily so you can configure the system to meet your applications.

For example, adding the timer, one current amplifier module and one voltage amplifier module to the base unit provides a variable ac/dc current and voltage output, adjustable phase angle and frequency settings, and comprehensive control, timing and monitoring circuits. This configuration tests single-phase relays.

Add up to three current and three voltage amplifier modules to create a full, three-phase relay test system in one portable unit.

High-Current Output Units and Interface Module

For high-current applications, PULSAR can be connected to the Multi-Amp EPOCH-20, and EPOCH-II, High-Current Output Units. The Multi-Amp High-Current Interface Module provides the control interface between PULSAR and the EPOCH-20 or EPOCH-II to provide high-current, high-volt/ampere output for single-, three- or six-phase testing. For specifications on the Interface Module, the EPOCH-20 and EPOCH-II, refer to catalog entries for these models.

Designed for Convenience

PULSAR is small and lightweight enough to be carried to job sites by one technician. For durability, the unit is housed in a rugged field enclosure for use at substations and power plants. PULSAR is designed for easy setup and operation. A standard wall outlet is the only power source needed.

High-intensity LEDs display all outputs throughout the test, and PULSAR automatically changes output ranges to reduce testing time.

Manual or Computerized Control

PULSAR can be operated manually by simple, front-panel controls or combined with any IBM® or compatible PC and the Megger AVTS™ software package for automated steady-state, dynamic and transient testing.



PULSAR performs computerized tests with IBM, or compatible PCs, even notebooks.

APPLICATIONS

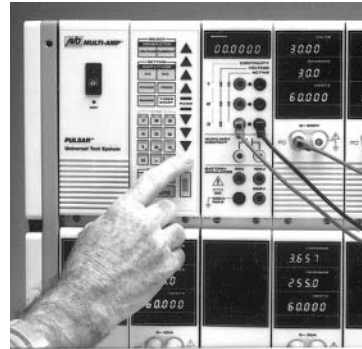
PULSAR is designed to test virtually any relay, from simple overcurrent relays to complex three-phase, microprocessor-based relays requiring phase-shifting capability. This table lists relays by IEEE device number and matches them with the required combination of current and voltage amplifier modules.

IEEE Device Number	Relay Types	Select Modules (Qty) Based on Relay Type	
2	Time-Delay Starting Relay	Pulsar Base Unit plus: 1 Voltage Amplifier 1 Current Amplifier 1 Timer, Monitor and Battery Simulator Module	
21	Distance (1φ)		
24	Volts/Hertz		
27/59	AC/DC Under/Overvoltage Relay		
32	Directional Power (1φ)		
37/76	DC Under/Overcurrent Relay		
40	Loss of Field		
50	Instantaneous Overcurrent (up to 30 A)*		
51	Overcurrent (up to 30 A at 150 VA)*		
67	Directional Overcurrent		
67N	Ground Directional Overcurrent	All the above relays plus: Distance (open-delta) Distance, Ground Synchronizing/Auto-Synch Directional Power (open-delta) Phase Balance Current Phase Sequence Voltage (open-delta) AC Reclosing Relay Differential Instantaneous (up to 60 A at 300 VA)* Directional Overcurrent	
81	Frequency		
82	DC Reclosing Relay		
85	Carrier or Pilot Wire Relay		
86	Lock-out Relay		
94	Tripping Relay		
21	Distance (3φ wye) Voltage and Current.		Pulsar Base Unit plus: 3 Voltage Amplifiers 3 Current Amplifiers 1 Timer, Monitor and Battery Simulator Module
32	Directional Power (3φ)		
46N	Negative Sequence Overcurrent		
50/51	Instantaneous (up to 90 A at 450 VA)*		
67	Directional Overcurrent		

* For higher currents or volt-amperes, refer to catalog entries on these models.

FEATURES AND BENEFITS

- Complete, three-phase test system: PULSAR can be configured to provide complete three-phase variable current, voltage, frequency, phase angle, dc voltage, dc current, control, timing and monitoring functions.
- Unique, modular design: PULSAR modules plug in and slide out easily for system configuration. You can purchase any number of modules for configuration using one or more PULSAR units. This feature also allows for prompt replacement of modules during



Under manual control, you can easily change settings with the ramp up-and-down keys.

service.

- Simple, manual control: With the system's multiple-channel outputs, you can easily change amplitude, phase angle or frequency settings by pushing the ramp up-and-down keys.
- Totally automated testing: PULSAR, combined with the advanced software capabilities of AVTS, automates steady-state and dynamic testing, and performs transient testing via DFR replay or EMTP/ATP simulation.
- Steady-state and dynamic testing capability, including dc offset: Either manually through front-panel controls or via computer control, the operator can test virtually any relay.
- Performs transient tests: Acceptance tests or troubleshooting can be accomplished by replaying digitally recorded faults or EMTP simulations in the IEEE COMTRADE Standard C 37.111.
- Performs end-to-end tests: When combined with AVTS software and a portable GPS satellite receiver, PULSAR performs satellite-synchronized, end-to-end dynamic or transient tests for troubleshooting complex protection schemes.
- Continuous LED displays: Large, high-intensity LEDs remain active even when the test set is under computer control so the operator can see all outputs all the time. Amplitudes, phase angle and frequency of all current and voltage outputs are displayed continuously and simultaneously.
- Automatic range changing: PULSAR automatically performs range changes under load to reduce testing time.

CUSTOMIZE PULSAR FOR SPECIFIC APPLICATIONS

Base unit includes Input Power and Control Module

Add to the base unit the Timer, Monitor and Battery Simulator Module

Add one, two, or three Voltage Amplifier Modules

Add one, two, or three Current Amplifier Modules

- Immediate error indication: Audible and visual alarms signal when amplitude, phase angle or waveform of the outputs is in error.
- Wide-frequency bandwidth: This feature provides the current and potential outputs to second, third and fifth harmonic, or virtually any desired harmonic within the operating range of the unit.
- Creates user-defined waveforms for special test applications: The operator can use any computer to generate square waves, half-waves, sine waves and analytical sine waves. This includes per-unit values of amplitude, selected harmonics at various phase angles and dc offset with exponential decay.
- Built-in RS-232 interface: The interface works with standard communication ports on any IBM or compatible computer, even a notebook PC.
- Tests high instantaneous relays: Output of two or three current amplifier modules can be connected in parallel to increase the maximum current available to 60 amperes (two modules) or 90 amperes (three modules) for testing high instantaneous overcurrent relays.
- Output potential of two voltage amplifier modules can be summed together to increase the maximum potential to 600 volts if the load is not grounded for testing high instantaneous over-voltage relays.

SPECIFICATIONS

Temperature Range

Operating: 32 to 122° F (0 to 50° C)

Storage: -13 to +158° F (-25 to +70° C)

Humidity Range

0 to 90% RH, noncondensing

Environmentally Tested

To simulate the worst field conditions, PULSAR was tested and certified in accordance with Military Standard MIL-STD-810 for temperature, shock and vibration resistance as a Class 3 instrument.

Enclosure

For field use, PULSAR can be ordered housed in a tough, polyethylene-plastic, sealed enclosure.



Rubber-sealed lids protect the test set from water and dust intrusion. Carrying handles are located on the top and sides for convenience.

For laboratory use, PULSAR can be ordered housed in a laboratory style configuration. The unit comes with panels and carrying handles mounted on the side of the chassis.

For protection in transit, the laboratory unit comes with a rugged, retracting-wheel carrying case. As the handle is extended, the sturdy wheels swing out of their recesses, and the case becomes a luggage cart and transit case in one.

The foam-lined case is designed to protect PULSAR from normal shock and vibration in transit.

PULSAR also can be ordered without enclosures for mounting in a standard, 19 in. (483 mm) rack.

Dimensions

Field Enclosure

With lids on

20 H x 22 W x 12.5 D in.

508 H x 558.8 W x 317.5 D mm

With lids off

20 H x 22 W x 10.25 D in.

508 H x 558.8 W x 260.4 D mm

Lab Enclosure

15.75 H x 18.75 W x 8.75 D in.

400 H x 476.3 W x 222.3 D mm

Weight

Weight varies depending on the number of modules in the system. The weight shown below is for a complete three-phase test system, including the timer module, three current amplifier modules and three voltage amplifier modules.

Field Enclosure

With lids on

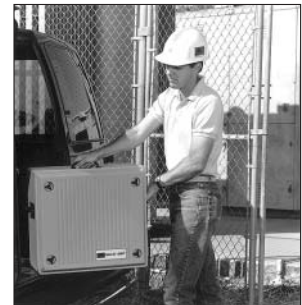
73 lb (33.2 kg) approx

With lids off

64 lb (29.1 kg) approx

Lab Enclosure

57.5 lb (26.1 kg) approx



One technician can easily carry PULSAR.



The laboratory-style unit comes with a retracting-wheel carrying case for easy transport.

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Mumbai INDIA,
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