AC Test System FX Series

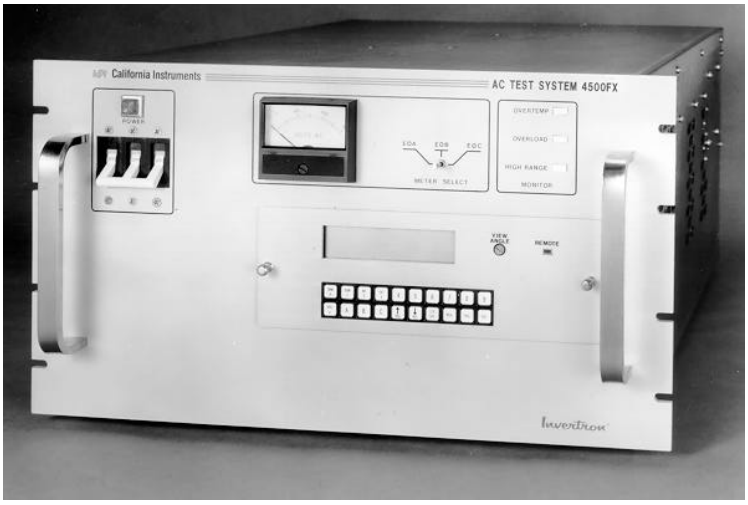
Precision Voltage and Current Source

Simulate High Power Levels For

- **Testing Watt-Hour Meters**
- **Characterization of circuit breakers and fuses**
- **Evaluation of high current relays & other switch devices**

FX Series Provides:

- **Computer Control for Automated Systems**
  Remote programming and collection of measurement data
- **Separate Single Phase Outputs of up to 200 A & 270V (L-N)**
  Simulation of power levels up to 54kW
- **Multiple Chassis Configurations for Two & Three-Phase Systems**
  Power level simulation up to 162 KW for Three-Phase Operation
- **Independent Full Capability Measurement System**
  Monitors load parameters without additional instrumentation



The FX Series

With the combined voltage and current source in a single compact chassis, the FX Series is the ideal choice for the simulation of high power levels. Either single or multi-phase, this versatile source can simulate power levels from just a few milliwatts to 54kW single phase or 162 kW three-phase and provides a universal system for both manual and programmable control applications.

Single Phase Systems

A single chassis includes a 1500 VA voltage source with 270V output (optional 312V L-N) and a 200 A Current Source, which is derived from exactly the same master oscillator as the voltage source. This means that the voltage and current outputs are at precisely the same frequency, although the phase relationship between the two may be varied to simulate different load power factors.

Multi-Phase Systems

For either two or three phase systems, additional chassis are added. The individual oscillators are clocked from a single master, with a phase lock to ensure phase angle integrity. In multi-phase systems, the phase angle of the voltage may be varied independently as well as the phase angle between the voltage and current source for each phase. The system can simulate two or three-phase outputs with a different P.F. on each phase. This is extremely important when evaluating measurement or control scenarios for multi-phase systems with unbalanced loads.

Wide Range Current Source

Whether the application is power simulation or just AC current, the FX Series provides a very wide range of controllable constant current output from 20 mA to 200 A. The current source section features three ranges to ensure good resolution at low current settings. In fact, the 2 A range is usable down to 20 mA. The 20 A to 200 A output is available via bus bar outputs, whereas outputs below 20 A are available at the rear panel barrier strip.

California Instruments

Fully Independent Measurement Capability

It is often difficult to provide accurate measurement capability at high power levels. In addition to the basic accuracy of the source, the FX Series provides a fully independent measurement system that may be used to verify the output settings or determine the load characteristics.

This independent measurement system is included in each controller, which means that independent and simultaneous monitoring of each phase is possible. The parameter that is displayed on the front panel of the source may be selected manually or by computer control. All measurement parameters may be interrogated by a computer controller.

Full Programmability

The entire system, either single or multi-phase, is programmed from a computer controller. The most popular control architecture is the IEEE-488 bus. However, other systems such as RS232C and VXI can be accommodated using a simple protocol translator. All set up parameters, such as Voltage, Current, Frequency and Phase Angle may be controlled. Additionally, in multi-phase systems the relative angle between phases can also be changed between 0° and 359°.

Measurement parameters may be selected and the result displayed on the front panel, output to the computer, or a combination of both. Computer control is particularly useful for the collection and tabulation of test results over a series of different conditions such as temperature, load or frequency. Graphical user interface programs are ideal for changing test requirements.

High Efficiency Design

The FX Series uses a pulse width modulated conversion technique which is extremely efficient and allows the single phase system to be packaged in just 10.5 inches of rack space at a weight of only 165 lb (75.2 kg). Additional benefits are: a) that the unit uses less power than traditional linear systems, and b) unit generates less heat.

Covers-on Calibration

Although periodic calibration is necessary for any precision system, down time and interference with the production or engineering evaluation operation can be disruptive. The FX Series however, allows routine calibration to be performed either from the front panel or via the IEEE-488 bus with the system in situ. Disruption is minimized and full calibration can be achieved in minutes.

All FX Series Models Conform to These Specifications

Measurements:

Volt Output:
- Range: 0.0 to 270 Volts
- Resolution: 0.1 Volt
- Accuracy: ±10 Digits of Resolution
- Temperature Coefficient: ±0.05 Volts per Degree C.

Phase Angle:
- Range: 0 to 360 degrees
- Resolution: 0.1 degree
- Accuracy: ±1 degree

Frequency:
- Range: 47 Hz to 66 Hz
- Resolution: 0.01 Hz
- Accuracy: ±0.02 Hz

Current Output:
- Range: 20.1-200A, 2.01-20A, 0.02-2A
- Resolution: 0.1A, 0.01A or 0.001A
- Accuracy: ±10 Digits of Resolution
- Temperature Coefficient: ±0.016% of full scale current per Degree C.

Power:
- Range: 0.0 to 5.4kW or 54kW
- Resolution: 0.001kW or 0.01kW
- Accuracy: ±10 Digits of Resolution
- Temperature Coefficient: ±0.06% of full scale per Degree C.

General:

Line Input:
- 47 Hz to 440 Hz
- 187 V - 252 V, L-L, 3ø
- 342 V - 456 V, L-L, 3ø with -UP option

Protection
- Overcurrent
- Overpower
- Short circuit
- Over voltage
- Sense Line Fault
- Digital Controller
  - Shuts down system
- Over-temperature
- All units have adjustable Current Limit on Voltage Output

Control:
- Front Panel Controls
  - 959XP Type
- Bus
  - IEEE-488.1
- Subsets
  - SH1, AH1, T6, L3, SR1, R12, DC1, DT1
- Data Transfer Rate
  - 200 K Bytes/sec.
- Language
  - Abbreviated Plain English (APE)

Front Panel Indicators:
- Power
- Over temperature
- Overload
- High Range
- Analog Volt Meter
- Input Circuit Breaker

Connectors:
- Input provided on rear terminal block (TB-1)
- Output provided on rear terminal block (TB-2) (voltage & low output current)
- Bus Bars (high output current)

Note: Remote Sense Mating Connectors are provided

Mechanical:

Height:	10.5 In. (26.7 cm)
Width:	19 In. (48.3 cm)
Depth:	23 In. (58.4 cm)
Weight:	165 Lbs (75 kg)

4500 FX General Specifications

SPECIFICATION	VOLTAGE OUTPUT	HIGH CURRENT OUTPUT	LOW CURRENT OUTPUT
RANGES:	Standard 0-270 V. All voltages are L-N. For other voltage ranges, please contact Factory.	Standard: 20.1 - 200 Amps. All current levels are rms.	Standard: 0.020 - 20 Amps. All current levels are rms.
ACCURACY:*	TRMS Sense: ±0.135V from 5 V to 135V. ±0.54V from 135V to 270V. All at 25°C±1°C (Based on TRMS reading)	Calibrates to ±0.02 Amps at five cardinal points within range.	a) Calibrates to ±0.002 Amps on 2-20 Amp range (5pts) b) Calibrates to ±0.0002 Amps on 0.02-2 Amps range (6 pts)
LOAD REGULATION:	TRMS Sense: ±0.05% FS, no load to full load.	±0.05% FS	±0.05% FS
LINE REGULATION:	±0.02% FS for ±10% line change	±0.05% FS	±0.05% FS
STABILITY (Amplitude):	±0.04 Volts per 24 hours.	±0.015% FS per 1000 hours at constant line and load; 25°C.	±0.05% of range per 24 hours.
DEFAULT VALUES:	5.0 volts (field selectable)	N/A - Output Shorted	0.2 A Output Shorted
FREQUENCY RANGE:	47 Hz to 66 Hz	45 Hz to 66 Hz	45 Hz to 66 Hz
FREQUENCY RESOLUTION:	0.01 Hz	0.01 Hz	0.01 Hz
FREQUENCY ACCURACY (25°C ±1°C):	±0.001% of programmed value	±0.001% of programmed value	±0.001% of programmed value
DEFAULT FREQUENCY (Initial Value):	Customer selectable (within range)	Customer selectable (within range)	Customer selectable (within range)
COMPLIANCE VOLTAGE:	N/A	0-7.5 V Operating 20.1-200 Amps	0-25V Operating 2-20 Amps 0-200V Operating 0.02-20 Amps
TOTAL POWER (RMS) OUTPUT:**	1500 VA	1500 VA	400 VA at 2 Amps 500 VA at 20 Amps
PHASE ACCURACY:	±1°	±1°	±1°
PHASE ANGLE PROGRAMMING:	0 to ±999.9 degrees in 0.35 degree increments	High/Low current output relative to Voltage output: 0 to ±999.9 degrees in 0.35 degree increments	High/Low current output relative to Voltage output: 0 to ±999.9 degrees in 0.35 degree increments
CURRENT LIMIT:	Adjustable Trip Setting	N/A	N/A
HARMONIC DISTORTION (to 30 kHz):	< 1% (with Linear Load) 0.5% Typical	1.5% Max. (with Linear Load) 0.8% Typical	1.5% Max. (with Linear Load) 0.8% Typical

* Accuracy is specified from 10% of Full Scale to Full Scale Output.
** Total Output power refers to power out of each individual channel.

All specifications subject to change without notice.

Order Example:

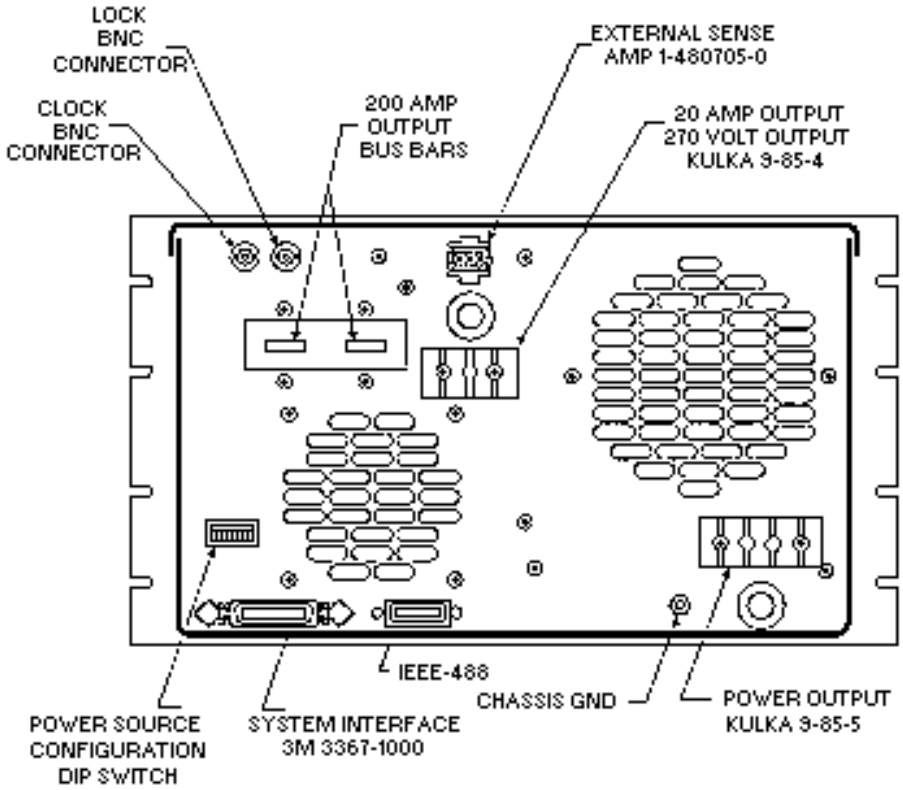
MODEL 4500FX-1P/200
Complete 200 Amps Single Phase System consisting of:
(1) 1500VA Voltage Source 0-270V, L-N
(1) 1500VA Current Source 20-200A
(1) 400VA Current Source 0.020-20A

MODEL 13500FX-3P/200
Complete 200 Amps Three Phase System consisting of:
(3) 4500FX-1P/200 Units, Phase Locked together

NOTE:
When ordering, please specify:
- Initialization values of:
  - Voltage Output
  - Frequency

Options:

OPTION	DESCRIPTION
-UP	Input Voltage for 4500FX (342-456V, L-L)
-1P/20 -3P/20	20 Amp Output Maximum (remove 20-200A Current Source)
-HV	High Voltage Output on Voltage Channel (0-312V, L-N)



Ordering Information
TERMS: Net 30 days
DELIVERY: Within 30 days ARO
F.O.B.: Factory San Diego, CA
SHIPMENT: Freight Collect

California Instruments:
Toll-Free: 800-4AC-POWER
800-422-7693
FAX: 858-677-0940
Email: sales@calinst.com
Web page: http://www.calinst.com