SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The Elgar TrueWave™ Models TW 5250, TW 3500, and TW 1750 use transformerless, direct coupled amplifiers and a DSP-based sine wave controller for testing a variety of complex electronics.

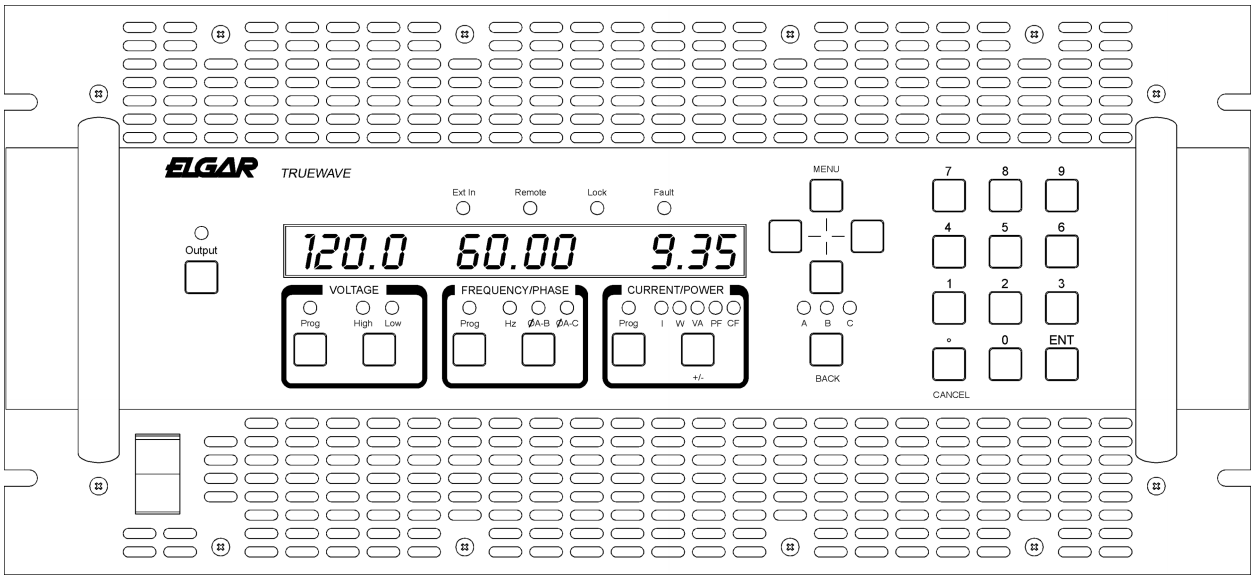

Figure 1-1 Elgar TrueWave AC Power Source (Rack Mount Version)

Programming is accomplished at the front panel or with a personal computer (PC). The TrueWave communicates with the PC through a GPIB or RS-232 interface. Programming commands are defined in the TW Programming Manual, Elgar Document No. M161469-02.

One to three phase AC sine wave or DC output is specified by pushbutton/LED menu-based control. Incremental and absolute voltage and current setpoints are available at the TW front panel. The TW incorporates a hierarchical menu system to set system parameters.

The TrueWave sources are true DC as well as AC power supplies. Up to 312 VRMS are available in AC or AC+DC modes. Multi-phase models can be switched to single or three-phased operation via the front panel or the GPIB.

A wide frequency range of DC or 40 Hz to 500 Hz is available for a broad array of applications. Utilizing the latest in AC switch mode technology, the TW has less than -60 dB of noise and ripple with total harmonic distortion (THD) of <0.5%. A crest factor

of 4.0 provides high peak-to-RMS current capability. An optional input power factor correction (PFC) of .99 is also available.

1.2 INPUT SPECIFICATIONS

Voltage	187 to 264 VRMS, 3Ø L-L (3 wire), or 342 to 457 VRMS, 3Ø L-L (4 wire), or, for 1750 VA only, 187 to 264, 1Ø.
Power Factor	0.99 for PFC input configured units 0.6 for USA rectifier configured units 0.35 for International rectifier.
Efficiency	70% minimum at full load.
Ride Through	3 msec with rectifier input configuration, 10 msec with PFC input configuration.
Frequency	47 to 63 Hz minimum.

1.3 OUTPUT SPECIFICATIONS (at 25°C unless specified)

Calibration Interval	1 year.
Waveshape	DC and sine.
Dropout	Dropout of an integer number of cycles on any combination of phases, at any phase angle, and at any programmable frequency is possible via GPIB command. Sub-integer number of cycles can be achieved by varying the phase angle. Programming is referenced to phase A and all phase dropouts coincide. (Some variable propagation delay will occur.)
Power, Reactive	1750, 3750, or 5250 VARMS maximum as configured.
Load Power Factor	0 lagging to 0 leading.
Voltage Programming Range	Range 1: 1 minimum to 156 VRMS maximum, Range 2: 2 minimum to 312 VRMS maximum.

Voltage Programming Accuracy (GPIB/Front panel) without load	0.1% maximum of full scale.
Voltage Programming Resolution (GPIB/Front panel)	0.03% VRMS maximum (12 bits).
Voltage Programming Accuracy (Analog)	2% of full scale.
Voltage Stability, excluding external analog control	0.1% maximum with constant line, load, temperature
Current Programming Range per channel	Range 1: 0 to 13.0 Amps RMS maximum, Range 2: 0 to 6.5 Amps RMS maximum
Current Programming Accuracy (GPIB/Front Panel)	1% of full scale + 0.5% of actual
Current Programming Resolution (GPIB/Front panel)	0.03% maximum (12 bits)
Current Stability (in constant current mode)	0.5% of setting after 10 minute warmup
Inductive Output Impedance (high range)	104μh typical in low output impedance mode, 796.5μh ± 2% in standard reference impedance mode
Resistive Output Impedance (high range)	0.050Ω typical in low output impedance mode, 0.4Ω ± 2% in standard reference impedance mode
Load Transient Recovery, Voltage mode	0.5 msec maximum to within 2% of final value
Noise	>60 dB RMS below full scale
Distortion, Output Voltage	0.5% THD maximum
Line Voltage Regulation, Voltage mode	0.05% maximum of full scale for ±10% line change

Load Voltage Regulation	0.15% maximum of full scale
Lead drop	5 VRMS total (sum of both lead drops)
Current Crest Factor	4.0 minimum
Frequency Range	45 to 500 Hz minimum
Frequency Drift	100 ppm maximum of programmed value per ºC
Frequency Programming Accuracy (GPIB/Front panel)	0.1% maximum of programmed value
Frequency Programming Resolution (GPIB/Front panel)	0.1 Hz maximum
Phase Programming Accuracy	1º maximum
Phase Programming Resolution	0.1º minimum
Overvoltage Protection Accuracy	1% of full scale + 1% of actual maximum peak voltage
Overvoltage Protection Range	116% of rated output
Overvoltage Protection Response Time	0.1 msec maximum
Overcurrent Protection Accuracy	1% of full scale + 1% of reading maximum
Overcurrent Protection Range	115% of rated output
Overcurrent Protection Response Time	0.1 msec maximum
Overcurrent Protection Effect	Shutdown or constant current, selectable

1.4 FRONT PANEL DISPLAY

Output Voltage Accuracy	0.3% of full scale plus 0.2% of reading maximum
Output Voltage Resolution	0.1 VRMS maximum

Output Current Accuracy	0.3% of full scale + 0.5% of reading maximum
Output Current Resolution	0.01 Amps RMS maximum
Output Power Range	0 to 1900 W per phase minimum
Output Power Accuracy	2.5% of full scale maximum
Output Power Resolution	10 W maximum
Crest Factor Accuracy	1% of full scale maximum for output > 200VA
Power Factor Accuracy	4% of full scale maximum for output > 200VA
Frequency Accuracy	0.25% of reading
Output Phase Accuracy	0.5%
Output Phase Resolution	0.3%

1.5 GPIB AND RS-232 READBACK

Output Voltage Accuracy	0.3% of full scale + 0.2% of reading maximum
Output Voltage Resolution	0.1 VRMS maximum
Output Current Accuracy	0.3% of full scale + 0.5% of reading maximum
Output Current Resolution	0.01 Amps RMS maximum
Output Power Range	0 to 1900 W per phase minimum
Output Power Accuracy	2.5% of full scale maximum
Output Power Resolution	10 W maximum
Crest Factor Accuracy	1% maximum for output > 200VA
Power Factor Accuracy	4% maximum for output > 200VA
Output Phase Accuracy	0.5%
Output Phase Resolution	0.3%

1.6 MEASUREMENTS

1.6.1 Parameters Measured

- 1- to 3-Phase to Neutral RMS Output Voltages
- 1- to 3-Phase to Phase Voltages are Calculated
- 1- to 3-Phase RMS Output Currents
- 1- to 3-Phase Peak Current
- Output Frequency
- 1- to 3-Phase Power
- 1- to 3-Phase VA
- Power Factor of Load Calculated from 1 or 3 Phases
- Crest Factor of Load Calculated from 1 or 3 Phases
- Output Phase B and C Relative to Phase A

1.7 PROTECTION AND SAFETY

Overvoltage Shutdown: Programmable for 15V to 255V peak, 156V range; 30V to 510V peak, 312V range.

Undervoltage Shutdown: Automatic, not programmable.

Programmable Current Limit Shutdown: Can be set to 1% of range; 0.5A to 13A for 156V range, 0.5A to 6.5A for 312V range.

Programmable Current Limit with Timed Shutdown: Can be set to 1% of range; the timeout can be set from 100 msec to 10 sec.

Overtemperature Shutdown: Automatic, not programmable.

1.8 AGENCY REQUIREMENTS

The TrueWave conforms to the following agency requirements:

- European Community CE, including:
  EN61010-1 1993
  EN55011 Group 1, Class A
  EN50082-21995
- FCC Part 15, Class A

1.9 PHYSICAL SPECIFICATIONS (All Models)

Height: 8.75" (222 mm)

Width: 19" (483 mm)

Depth: 23.5" (597 mm)

Weight: TW 5250 – 115 lbs. (52 kg)
TW 3500 – 89 lbs. (40 kg)
TW 1750 – 63 lbs. (28 kg)

Cooling: Air is drawn in from the front, top, and sides and exhausted through the rear of the chassis.

1.10 ENVIRONMENTAL DATA

Operating Temperature: 0°C to 45°C (32°F to 113°F).
Note temperature measured at air inlet of TW. If cabinet mounted, cabinet inlet air may be rated at lower maximum temperature due to warming of inlet air.

Storage Temperature: -40°C to 70°C (-40°F to 158°F).

Humidity (Non-condensing): 0 to 85% at 31°C (88°F);
derate to 50% at 40°C (104°F).

Operating Shock: 10g for 11 ms.

Operating Vibration: 1g, 5 to 55 Hz dwell on resonances for 2 minutes maximum.

Altitude: Operating 6,560 ft., Non-operating 40,000 ft.

1.11 OTHER STANDARD FEATURES

- **1- to 3-Phase Programmable**
- **IEEE 488.2 Interface**
- **SCPI Protocol**
- **Waveform Trigger Output**
  (1 MegΩ Load Drive; positive edge is at 0° ±30μs, 0 to 5V logic)
- **SYNC OUT. User programmed for:**

  Cycle Start, all cycles
  For loads ≥2 kΩ: Vout ≤1V Low State; Vout ≥2.4V High State;
  Negative edge is at 0° ±30μs.
- **CLOCK/LOCK**

  CLOCK pulses at programmed frequency for loads ≥2 kΩ Vout ≤1V Low State; Vout ≥2.4V High State. Negative edge is at 0° ±30μs.

  LOCK locks output to input 'TTL' frequency; signal needs to supply pull down current of 15 mA with voltage drop of ≤0.6V; no pull up needed. Negative edge is at 0° ±30μs.
- **LOCK Specifications**

  Frequency range is 40.00 Hz to 500.00 Hz.

  Tracking range is ±10% of programmed center frequency.

  Duty cycle is 50% ±10%.

  Slew rate is .02% of input frequency/second, maximum, which produces a maximum phase shift of 5° from the lock input falling edge to the output rising edge.

  The rising edge of the output will be locked to the falling edge of the lock input and will have less than a 30 μsec propagation delay.

  Maximum output jitter when locked is <1% of lock input period.

  PLL lock is achieved in <5 seconds.

- **External Amplitude Modulation**

  0 to 5 VRMS provides 0 to ≥20% output amplitude modulation (±2% of full scale output).

- **External Direct Input**

  Normal Amplifier, 0 to 5 VRMS (DC to 500 Hz) or ±5 VDC input for zero to full scale programmed voltage output (±2% of full scale output).

- **External Gain Control**

  0 to ±7.07 VDC provides zero to full scale programmed voltage output (±2% of full scale output).

- **External Input Impedance**

  ≥10 kΩ.

- **System Firmware**

  System firmware is stored in flash memory. This makes it possible to upgrade the firmware without disassembling or returning the unit.

1.12 OPTIONS

- Parallelable for Additional Power above 5250 VA requires accessory attachment cable.

- Input Power Factor Correction to 0.99

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.