

# SL POWER TE90 Family

90 W Single Output External Power



Advanced Energy’s SL Power TE90 series of desktop and wall-plug AC-DC external power adapter comprises four output models. All models feature industrial safety approvals and accept a universal input of 90 to 264 VAC. These compact switch-mode power supplies feature output overvoltage, overtemperature, overload protection, with short-circuit protection on all output models. TE90 series power adapters provide up to 90 Watts of output power with IP22 rated enclosure and meets DoE Efficiency Level VI Requirements.

## AT A GLANCE

### Total Power

Up to 90 Watts

### Input Voltage

90 to 264 VAC

### # of Outputs

Single

## SPECIAL FEATURES

- Universal Input 90 to 264 VAC  
Input Range Desktop and Wall-Plug Versions
- Up to 90 W of AC-DC Power
- IP22 Rated Enclosure\*
- Meets EN55011/CISPR11, FCC Part 15.109 Class B Conducted & Radiated Emissions, with 6db Margin
- Meets “Heavy Industrial” Levels of EN61000 EMC Requirements
- >8 Years E-Cap Life
- 3 Years Warranty
- Meets DoE Efficiency Level VI and EU CoC Tier 2 Requirements No Load Input Power Average Efficiency
- RoHS/REACH Compliant

## SAFETY

- CSA/IEC/EN/UL62368-1



Note: \*IP22 does not include interchangeable blade versions.

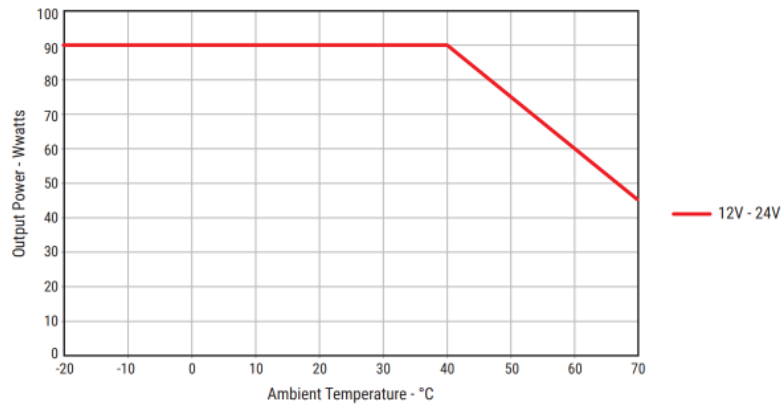
## ELECTRICAL SPECIFICATIONS

Input	
Input range	90 to 264 VAC, 47 to 63 Hz, 1 $\emptyset$
Input current	1.2 A @ 115 VAC, 0.6 A @ 230 VAC
Inrush current	60 A max., cold start @ 264 VAC input
Input fuses	F1, F2: 5A, 250VAC fuses (line & neutral lines) provided on all models
Earth leakage current	Input to GND <500 $\mu$ A @ 264 VAC, 60 Hz, NC Output to GND <4 mA @ 264 VAC, 60 Hz, NC
Efficiency	Meets US DoE Efficiency Level VI and EU CoC Tier 2 average efficiency levels
Common mode noise	High frequency (100 kHz to 20 MHz): <40 mA pk-pk
No load input power	<0.15 W meets DoE Efficiency Level VI and EU CoC Tier 2 requirements
Output	
Output voltage	See models chart on page 5
Output power	90 W continuous - See models chart for specific voltage model ratings
Turn on time	Less than 1 Sec @ 115 VAC, full load
Hold-up time	20 mS min., at full load, 100 VAC input
Ripple and noise	See models chart on page 5
Transient response	500 $\mu$ s response time for return to within 0.5% of final value for any 50% load step over the range of 5% to 100% of rated load, $\Delta i/\Delta t < 0.2$ A/ $\mu$ s. Max voltage deviation is $\pm 3.5\%$
Reliability	
MTBF	>500,000 hours, full load, 110 & 220 VAC input, 25 $^{\circ}$ C amb., per Telcordia 332 Issue 6
E-Cap life	>8 years life based on calculations at 115 VAC/60 Hz & 230 VAC/50 Hz, ambient 25 $^{\circ}$ C at 24 hrs per day, 365 days/year, 6 power up cycles per day. (80% load on 12 V model)
Protection	
Overtemperature protection	Will shutdown upon an overtemperature condition, auto-recovery
Overload protection	130% to 180% of rating, hiccup mode
Overvoltage protection	130% to 150% of output voltage (max. 60 V on 48 V model), hiccup mode
Short circuit protection	Hiccup mode, auto-recovery
Safety	
Safety standards	Approved to EN/CSA/IEC/UL62368-1
Drop test	1.4 m from table top to wooden platform, 6 faces
Shock	Operating: Half-sine, 20 gpk, 10 mS, 3 axes, 6 shocks total Non-Operating: Half-sine waveform, impact acceleration of 100 G, Pulse duration of 6 mS Number of shocks: 3 for each of the three axis
Isolation	
Isolation	Input to Output: 4000 VAC Input to Ground: 1500 VAC Output to Ground: 1500 VAC

Note:

All specifications are typical at nominal input, full load, at 25 $^{\circ}$ C ambient unless noted.

## DERATING CHART



## EMI/EMC COMPLIANCE

Conducted emissions	EN55011/CISPR22 Class B, FCC Part 15.107, Class B: 6db margin type, at 115/230 VAC
Radiated emissions	EN55022/CISPR22 Class B, FCC Part 15.109, Class B: 3db margin type, at 115/230 VAC
Common mode noise	High frequency (100 kHz to 20 MHz): <40 mA pk-pk
Electro-static discharge (ESD) immunity on power ports	EN55024/IEC61000-4-2, Level 4: ±8 kV contact, ±15 kV air, Criteria A
Radiated RF EM fields susceptibility	EN55022/EN61000-4-3, 10 V/m, 80 MHz to 2.7 GHz, 80% AM at 1 kHz
Electrical Fast Transients (EFT)/Burst immunity	EN55024/IEC61000-4-4, Level 4, ±4 kV, 100 kHz rep rate, 40 A, Criteria A
Surges, line to line (Diff mode) and line to ground (CMN mode)	EN55024/IEC61000-4-5, Level 4, ±2 kV DM, ±4 kV CM, Criteria A
Conducted disturbances induced by RF fields	EN55022/IEC61000-4-6, 10 Vrms - Level 4 in ISM and amateur radio bands between 0.15 MHz and 80 MHz, 80% AM at 1 kHz
Rated power frequency magnetic fields	EN55024/IEC1000-4-8, Level 4: 30 A/m, 50/60 Hz
Voltage interruptions, Dips, Sags & Surges	EN55024/IEC/EN61000-4-11: --100% dip for 10 mS, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees; 20 mS at 0 degrees, Criteria A --100% dip for 5000 mS (250/300 cycles), Criteria B --60% dip for 100 mS, Criteria B --30% dip for 500 mS, Criteria A
Harmonic current emissions	EN55011/EN61000-3-2, Class A
Flicker test	EN61000-3-3

## Note:

Performance criteria are based on EN55024. According to the standards, performance criteria are defined as following:

A – Normal performance during and after the test

B – Temporary degradation, self-recoverable

C – Temporary degradation, operator intervention required to recover the operation

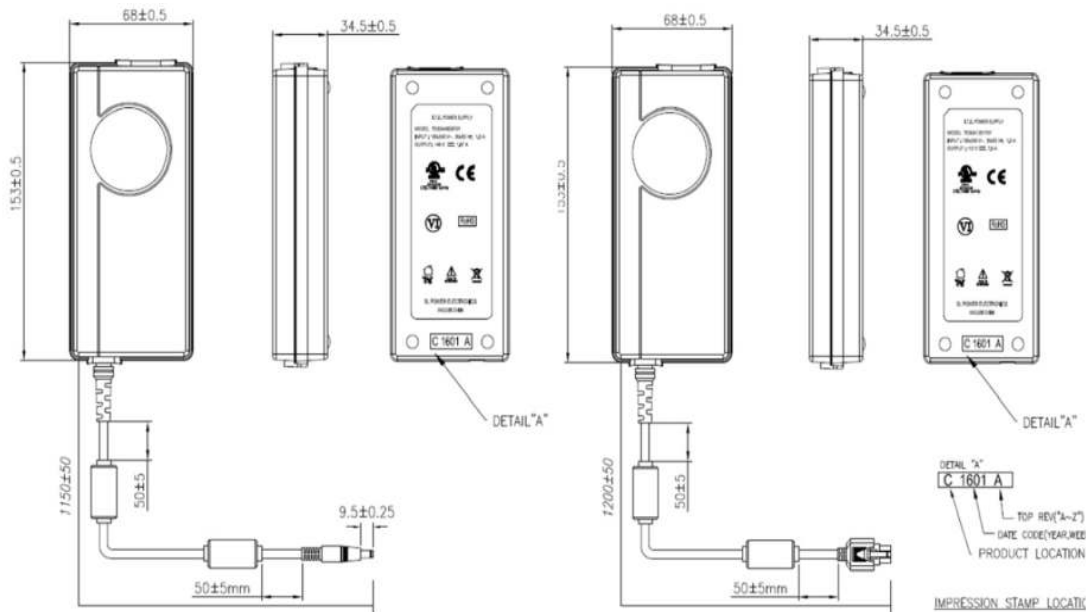
D – Permanent damage

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	-20°C to +70°C Derate above 40°C.
Storage temperature	-40°C to +85°C
Relative humidity	5% to 95%, non-condensing
Weight	600 grams
Temperature derating	See derating chart
Altitude	Operating: to 5000 m Non-operating: -500 ft to 40000 ft
Vibration	Operating: 0.003 g/Hz, 1.5 grams overall, 3 axes, 10 min/axis, 1 Hz to 500 Hz Non-Operating: random waveform, 3 minutes/axis, 3 axes and sine waveform, Vib. frequency/acceleration: 10 to 500 Hz/1 g, sweep rate of 1 octave/minutes, Vibration time of 10 sweeps/axes, 3 axes
Shock	Operating: half-sine, 20 gpk, 10 mS, 3 axes, 6 shocks total Non-Operating: half-sine waveform, impact acceleration of 100 G, pulse duration of 6 mS, Number of shocks: 3 for each of the 3 axes

Note:  
All specifications are typical at nominal input, full load, at 25°C ambient unless noted.

MECHANICAL DRAWING

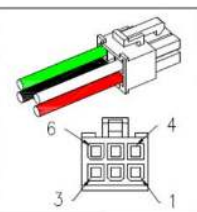


15 V though 24 V Models: 2.5 x 5.5 x 9.5 mm Barrel Connector, center positive

12 V Model: Output Connector: 6-pin Molex 39-01-2060 or equiv. Pins 1, 4 = (+), pins 3, 6 = (-), pins 2, 5 = NC

- Notes:
1. All dimensions in mm.
  2. The unit should not be covered or enclosed to protect against excessive case temperature rise.
  3. Pins 4,5,6 are located closest to the locking tab.

LEADWIRE HOOK-UP		
PIN #	FUNCTION	COLOR
1	+V	RED
2	NC	-
3	COMMON	BLACK
4	+V	WHITE
5	NC	-
6	COMMON	GREEN
	BRAID	FG4



## MODEL SELECTION

Model Number	Output Voltage	Output Current	Output Power	Ripple & Noise <sup>1</sup>	Line Regulation	Load Regulation	Output Connector	Input Configuration
TE90A1251F01	12.0 V	7.50 A	90 W	120mV pk-pk	± 1%	± 5%	6-pin Molex Type <sup>2</sup>	Class I Desktop, IEC60320 C14 Receptacle <sup>3</sup>
TE90A1503F01	15.0 V	6.00 A	90 W	150mV pk-pk	± 1%	± 5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, Center Positive	
TE90A1803F01	18.0 V	5.00 A	90 W	180mV pk-pk	± 1%	± 5%		
TE90A2403F01	24.0 V	3.75 A	90 W	240mV pk-pk	± 1%	± 5%		
TE90A1251F01	12.0 V	7.50 A	90 W	120mV pk-pk	± 1%	± 5%	6-pin Molex Type <sup>2</sup>	Class II Desktop, IEC60320 C8 Receptacle
TE90A1503F01	15.0 V	6.00 A	90 W	150mV pk-pk	± 1%	± 5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, Center Positive	
TE90A1803F01	18.0 V	5.00 A	90 W	180mV pk-pk	± 1%	± 5%		
TE90A2403F01	24.0 V	3.75 A	90 W	240mV pk-pk	± 1%	± 5%		
TE90A1251F01	12.0 V	7.50 A	90 W	120mV pk-pk	± 1%	± 5%	6-pin Molex Type <sup>2</sup>	Class II Desktop, IEC60320 C18 Receptacle
TE90A1503F01	15.0 V	6.00 A	90 W	150mV pk-pk	± 1%	± 5%	2.5 x 5.5 x 9.5mm Straight Barrel Type, Center Positive	
TE90A1803F01	18.0 V	5.00 A	90 W	180mV pk-pk	± 1%	± 5%		
TE90A2403F01	24.0 V	3.75 A	90 W	240mV pk-pk	± 1%	± 5%		

## Notes:

1. Measured at the output connector, with noise probe directly across output and load terminated with 0.1  $\mu$ F ceramic and 10  $\mu$ F low ESR capacitors.
2. Molex p/n 39-01-2060 or equivalent. See outline drawing for pinout information.
3. For input Class I models: For AC GND connected to output common (-), insert a "B" in the part number where the "A" is located (TE90B1251F01).
4. All specifications are typical at nominal input, full load, at 25°C ambient unless noted.

## CONNECTOR INFORMATION

Standard models include a 2.5 x 5.5 x 9.5 mm straight barrel type connector (Ault #3), center positive. Other standard options are listed below. The "03" in the standard model number is replaced by the applicable digits below.

Connector No.	Description	Connector No.	Description
02	2.1 x 5.5 x 9.5 mm straight barrel plug - Center positive 	44	2.1 x 5.5 x 9.5 mm straight barrel plug, locking - Center positive 
03	2.5 x 5.5 x 9.5 mm straight barrel plug - Center positive (Standard models) 	45	2.5 x 5.5 x 9.5 mm straight barrel plug, locking - Center positive 
12	5-pin DIN - 180 male connector (Pins 3,5 = (+); pins 1,2,4 = (-)) 	48	3-pin Snap n Lock, Kycon Kpp - 3P or equivalent (Pin 1 = (+); pin 2 = (-)) 
22	6-pin DIN male connector (Pins 1,2 = (+); pins 4,5 = (-)) 	49	4-pin Snap n Lock, Kycon Kpp - 4P or equivalent (Pins 1,3 = (+); pins 2,4 = (-)) 
23	8-pin DIN male connector (Pins 3,7 = (+); pins 1,4,6,8 = (-); shell = FG) 	51	6-pin Minifit - Molex 39-01-2060 or equivalent (Pins 1,4 = (+); pins 3,6 = (-)) 
32	9-pin "D" type, female (Pin 8 = (+); pin 5 = (-); all others = NC) 	65	Stripped and tinned leads 
33	2.5 x 5.5 x 12.5 mm straight barrel plug - Center positive 	70	2.1 x 5.5 x 11 mm right angle barrel plug (High retention) - Center positive 
40	2.1 x 5.5 x 9.5 mm right angle barrel plug - (High retention) - Center positive 	71	2.5 x 5.5 x 11 mm right angle barrel plug (High retention) - Center positive 
41	2.5 x 5.5 x 9.5 mm right angle barrel plug - (High retention) - Center positive 	72	2.1 x 5.5 x 9.5 mm straight barrel plug (High retention, no spark) - Center positive 
42	2.1 x 5.5 x 11 mm straight barrel plug - (High retention) - Center positive 	73	2.5 x 5.5 x 9.5 mm straight barrel plug (High retention, no spark) - Center positive 
43	2.5 x 5.5 x 11 mm straight barrel plug - (High retention) - Center positive 	74	EIAJ#5 style connector - Central positive 

## EFFICIENCY LEVEL VI INFORMATION

Single-Voltage External AC-DC Power Supply, Basic-Voltage		
Nameplate Output Power (Pout)	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode (W)
Pout ≤ 1 W	$\geq 0.5 \times P_{out} + 0.16$	≤0.100
1 W < Pout ≤ 49 W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤0.100
<b>49 W &lt; Pout ≤ 250 W</b>	<b>≥0.880</b>	<b>≤0.210</b>
Pout > 250 W	≥0.875	≤0.500
Single-Voltage External AC-DC Power Supply, Low-Voltage		
Nameplate Output Power (Pout)	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode (W)
Pout ≤ 1 W	$\geq 0.517 \times P_{out} + 0.087$	≤0.100
1 W < Pout ≤ 49 W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤0.100
<b>49 W &lt; Pout ≤ 250 W</b>	<b>≥0.870</b>	<b>≤0.210</b>
Pout > 250 W	≥0.875	≤0.500



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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

**PRECISION | POWER | PERFORMANCE | TRUST**

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