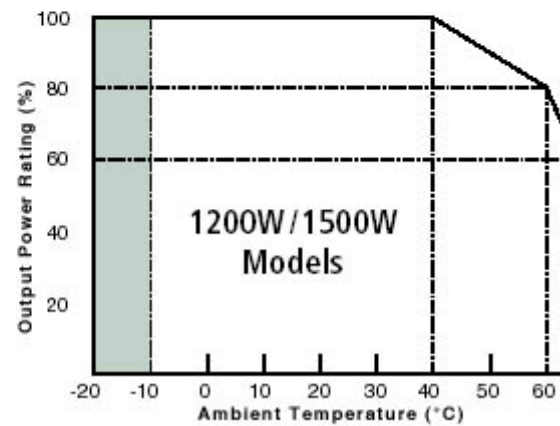
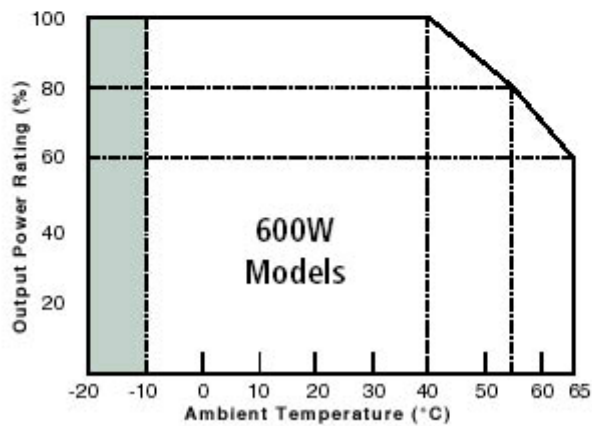
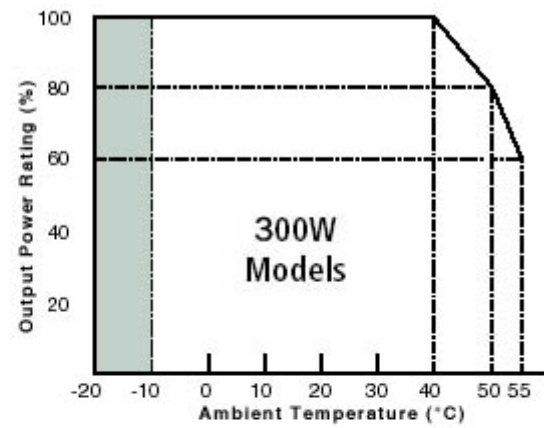
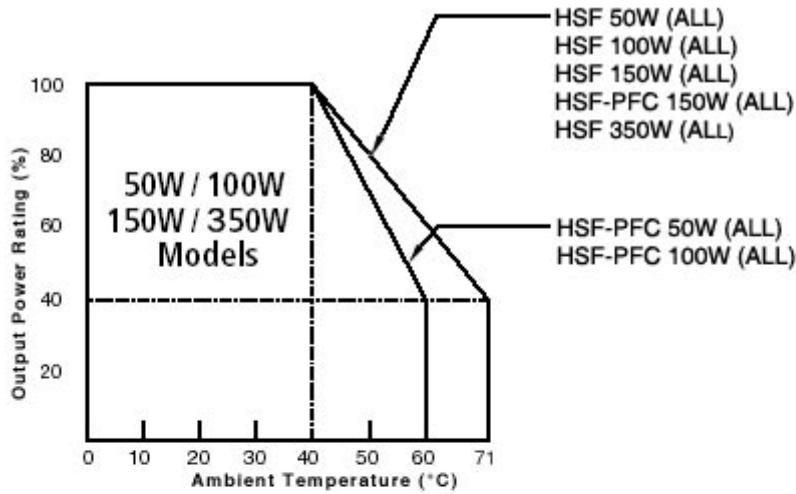


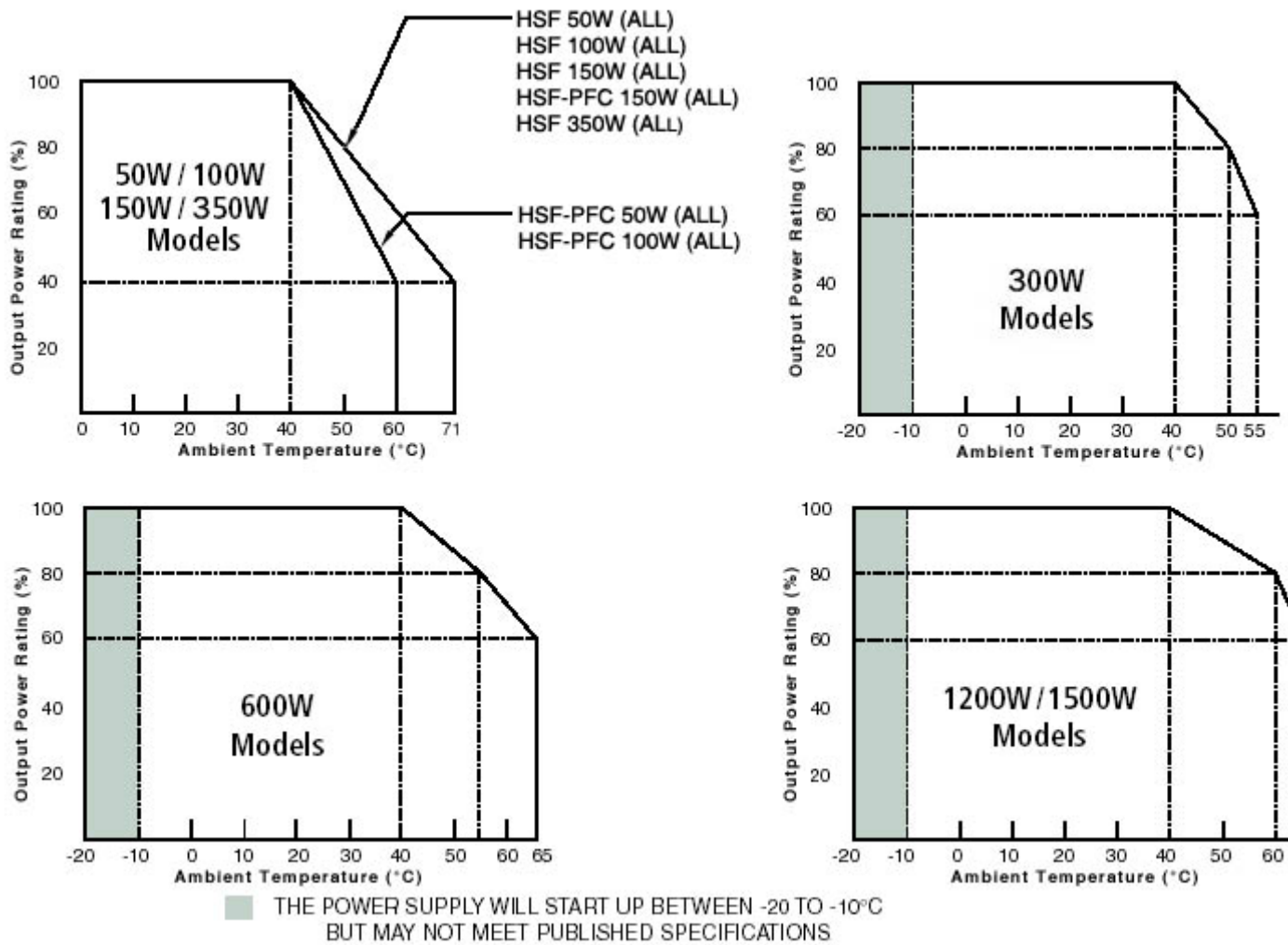
## HSF MODEL TABLE: 300W

MODEL	OUTPUT VOLTS (V d-c)	ADJUSTMENT RANGE <sup>(1)(2)</sup> (V d-c)			OVP SETTING VOLTS <sup>(4)</sup> (V d-c)	OUTPUT CURRENT <sup>(5)</sup> (AMPS d-c) 0-40°Cs	OVERCURRENT SETTING <sup>(6)</sup> (A d-c)	RIPPLE/ NOISE <sup>(7)</sup> (mV p-p)
		EXTERNAL RESISTANCE OR VOLTAGE	FRONT PANEL TRIMPOT	MINIMUM <sup>(3)</sup>				
HSF 5-60	5	0 - 5.5	1.8 - 5.5	1.8	5.7 - 7.0	60	63-78	80/120
HSF 5-60M			0 - 5.5	0				
HSF 12-27	12	0 - 13.8	5.5 - 13.8	5.5	14.3 - 16.8	27	28.4-35.1	120/150
HSF 12-27M			0 - 13.8	0				
HSF 12-27MZ								
HSF 15-22	15	0 - 17.4	6.5 - 17.4	6.5	18.0 - 24.0	22	23.1-28.6	120/150
HSF 15-22M			7 - 17.4	7				
HSF 15-22MZ			0 - 17.4	0				
HSF 24-14	24	0 - 28.2	6.5 - 28.2	6.5	29.3 - 33.6	14	14.7-18.2	150/200
HSF 24-14M			7- 28.2	7				
HSF 24-14MZ			0 - 28.2	0				
HSF 28-12	28	0- 33	6.5 - 33	6.5	34.2 - 39.2	12	12.6-15.6	150/200
HSF 28-12M			7- 33	7				
HSF 28-12MZ			0- 33	0				
HSF 48-7	48	0 - 52.2	6.5 - 52.2	6.5	54.5 - 59.8	7	7.4-9.1	200/200
HSF 48-7M			7- 52.2	7				
HSF 48-7MZ			0 - 52.2	0				

- (1) Using trimpot to attain voltages outside the specified adjustment range may trigger undervoltage or overvoltage faults.
- (2) 0V is approximate (logic 0: 0-0.4V d-c).
- (3) Observe minimum for proper functioning of alarm relay, optional meter and LED.
- (4) When undervoltage or overvoltage is detected, output is shut OFF. Recovery is either by opening then reconnecting short across  $\pm RC$  terminals (no delay), or by removing, and after approximately 40 seconds, reapplying AC input power.
- (5) See **Power vs Temperature** for power derating.
- (6) Square type. If overcurrent condition continues beyond 30 seconds, the output is shut OFF. Recovery is the same as for undervoltage or overvoltage fault; see Note (4) above.
- (7) Ripple and noise specifications are 1.5 times indicated values for temperature range of -10 to 0°C. Ripple and noise levels above are satisfied when conditions are 0 to 100% load, 0 to 65°C (derated from 50 to 65°C per **Power vs Temperature** for power derating, derated from 40 to 65°C for 3.3V model), and bandwidth  $\leq 100\text{MHz}$ .



■ THE POWER SUPPLY WILL START UP BETWEEN -20 TO -10°C  
 BUT MAY NOT MEET PUBLISHED SPECIFICATIONS



- **Power Factor Correction (PFC)** standard on all except older models (350W Series includes PFC).
- **User configurable**
  - multi-output 3U power rack for up to (3) 350W modules, (6) 150W modules, (8) 50W or 100W modules, or (4) 300W, 600W, or 1200W/1500W modules in a rack, as well as many combinations within a rack and the ability to parallel racks for added power.
  - multi-output 1U power rack for up to (4) 50, 100 or 150 watt modules, as well as many combinations within a rack and the ability to connect racks in parallel or series for added power or redundancy.
  - For example, the 1500W models with the RA 19-4C Rack Adapter can be configured as two N+1 redundant systems of 1500W each, a single N+1 system of up to 4500W, or a single parallel combination producing up to 6000 watts of d-c. Built-in current balancing and OR-ing diodes allow all these configurations. Two similarly populated racks could be connected in parallel for a 6000W redundant system, or the racks could be connected in series to increase voltage (500V d-c max.).
- **Front panel meter** optional feature (300W, 600W, 1200W/1500W Models only).
- **Parallel for N+1 redundancy.**
- **Or-ing diodes** built in.
- **Local voltage control** trimming from front panel.

- **Remote voltage control** of 300W, 600W, 1200W/1500W modules via trimpot or voltage source.
- **Remote ON/OFF** of 300W, 600W, 1200W/1500W modules using either an external power source (voltage applied to RC terminals) or by mechanical or logical closure of a contact (without external power source). (Available as an option for 50W, 100W and 150W HSF-PFC and HSF-1UR models; [contact factory](#) for details.)
- **Individual current monitor** (Available as an option for 50W, 100W and 150W HSF-PFC and HSF-1UR models and for 300W, 600W and 1200/1500 HSF models; [contact factory](#) for details.)
- **Plug-in construction.** Easy mount and dismount.
- **Keyed construction** to prevent incorrect module placement. The HSF are keyed according to their voltage rating. When the corresponding rack adapter key (pin) is installed by a user, only an HSF of the correct voltage can be inserted into the keyed slot.
- **Built-in EMI filter** attenuates the conducted noise below the requirements of both FCC and VDE 0871 for Class B computing devices.
- **Separate remote error sense terminals:** (all except 1200W/1500W models) to compensate for voltage drop of connecting wires
- **Forced current share** is used to configure an N+1 system. When the current share bus of paralleled HSF are connected together, the load current divides equally. If one unit fails, the remaining units will divide the load equally among themselves and continue to supply uninterrupted current to a critical load. The failed unit is isolated by built-in or-ing diodes.
- **Built-in alarm relay** provides either normally open (close on failure) or normally closed (open on failure) contacts that may be used to provide an external failure indication. 300W, 600W and 1200W/1500W modules also have a logic alarm signal ( $\pm$ PF) that performs the same function.
- **24 pin connector** used to obtain mains power and provide output via corresponding mating connector in the rack adapter.
- **Reset Button** (300W, 350W, 600W and 1200W/1500W units only) to restore the output if the unit shuts down after sensing an over- or undervoltage condition, thermal overload, or fan malfunction.
- **Safety:** Designed to meet UL: 60950; CSA:C22.2 60950; TUV: EN60950 (a-c input only).
- **CE Mark:** Units are CE marked per the Low Voltage Directive (LVD),73/23/EEC and 93/68/EEC.
- **Bellcore Requirements:** Designed to meet NEBS GR-63-CORE. Certification passed: RA 19-6B with six HSF 150W units tested per GR-63-CORE, Level 4 (Earthquake and office vibration).

## HSF 300W, 600W, 1200W/1500W GENERAL SPECIFICATIONS

SPECIFICATION	RATING DESCRIPTION			CONDITION
	3000W	600W	1200W/1500W	
Temperature	Operating	-10 to +40°C		See <b>Power vs. Temperature</b> for operation at reduced power up to 65 °C
	Startup	-20 to -10°C		
	Storage	-30° to +75°C		
Humidity	Up to 95% RH			Non-condensing Operating & Storage
Shock	30g, 3 axes	20g, 3 axes	20g, 3 axes	Non-operating 3 shocks each axis, 11 msec ±5msec pulse duration
Vibration	5-10Hz: 10mm amplitude, 3 axes			Non-operating 1 hour each axis
	10-200Hz: 2g, 3 axes	10-55Hz: 2g, 3 axes	10-55Hz: 2g, 3 axes	
Isolation	Output-Case	500V d-c, 100M Ohms		25°C, 65% RH
Mounting	Plug-in rack Housing			Model: Ra 19-4C
Withstand Voltage	Input-Output	3KV a-c for 1 minute		Cutout current 20mA <sup>(1)</sup>
	Input-Case	2KV a-c for 1 minute		Cutout current 20mA <sup>(1)</sup>
	Output-case	500V a-c for 1 minute		Cutout current 100mA <sup>(1)</sup>
Safety	Designed to meet: UL: 60950; CSA: C22.2 60950; TUV: EN60950		UL: 60950-1; CSA: C22.2 60950; TUV: IEC 60950-1	Standards do not apply for d-c input operation.
Conducted Noise	FCC Class B; VCCI Class B EN55011-B EN 55022-B			Designed to meet.
Radiated Noise	FCC Class B; VCCI Class B EN55011-B EN 55022-B			Designed to meet.
Input Harmonics	Current	EN 61000-3-2		Designed to meet.
Immunity	EN61000-6-2			Designed to meet.
ESD Immunity	EN 61000-4-2 Level 4			normal operation (HSF 5-60M: Level 3)
Radiation Field Immunity	EN 61000-4-3 Level 3			normal operation
Fast Transient Burst Immunity	EN 61000-4-4 Level 3			normal operation
Surge Immunity	EN 61000-4-5 Level 4			No damage (HSF 5-60M: Level 3)
Conducted Noise Immunity	EN 61000-4-6 Level 3			normal operation
Magnetic Field	EN 61000-4-8 Level 4			normal operation (HSF 5-60M: Level 3)
Voltage Dips/Short Interruption Immunity	EN 61000-4-11			
Dimensions	mm	132.5 x 108.9 x 482.6		
	H x D x L inches	5.2 x 4.228 x 16.86		
Weight	8.0 lbs, 3.7 Kg	9.0 lbs, 4.1 Kg	9.0 lbs, 4.1 Kg	RA 19-4C: 22 Lbs, 10.0Kg
Cooling	Forced Air flow (fan)			

(1) Temperature: 15°C to 35°C and Humidity: 10% to 85% RH.

## HSF INPUT CHARACTERISTICS: 300W, 600W, 1200W/1500W

SPECIFICATION	RATING DESCRIPTION			CONDITION	
	300W	600W	1200W/1500W		
Nominal Input Voltage	100-120V a-c, <sup>(1)</sup> 200-240V a-c			0-100% load, -10 to +40°C	
Input Voltage Range	85-264V a-c <sup>(1)</sup> 110-370V d-c			Rated load	
Input Frequency Range	Nominal: 50-60Hz Range: 47-440Hz <sup>(2)</sup>			Rated load	
Input Current	max	4.4A rms 3.6A for 3.3V model	8.4A rms	12A rms	100-120V a-c
	max	2.2A rms 1.8A for 3.3V model	4.2A rms 8A for 24V model	10A rms 8A for 24V model	200-240V a-c
Surge Current	typ	15A typ 20A max first surge	15Arms 30A first surge	15A rms 20A first surge	100V a-c, 100% load, 25°C
	max	30A typ 40A max first surge	30Arms 60A first surge	30A rms 20A first surge	240V a-c, 100% load, 25°C
Leakage Current	0.24 mA typ <sup>(3)</sup> 0.3 mA max <sup>(3)</sup>			at 120V a-c, 60Hz EN60950	
	0.31 mA typ <sup>(4)</sup> 0.38 mA max <sup>(4)</sup>			at 240V a-c, 60Hz EN60950	
Power Factor	typ	0.99		100V a-c, rated output	
	typ	---	0.95	0.95	240V a-c, rated output
Switching Frequency	nom	---	140 KHz	140 KHz	
Input Fuse Value		250V, 10A	250V, 15A	250V, 25A	

(1) See **POWER VS INPUT VOLTAGE** for 1200W/1500W models.

(2) At 440Hz the leakage current may exceed ULVDE safety specification.

(3) At 120V a-c, 60Hz, IEC 950 and UL 1950.

(4) At 240V a-c, 60Hz, IEC 950 and UL 1950.

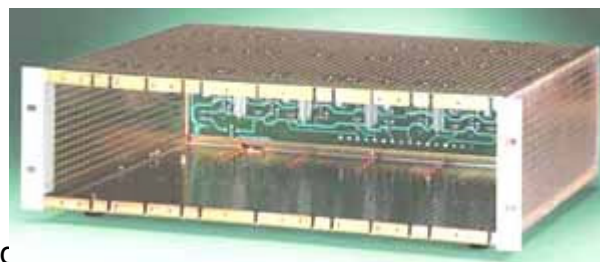
HSF OUTPUT CHARACTERISTICS: 300W, 600W, 1200W/1500W							
SPECIFICATION		300W	600W	1200W/1500W			CONDITION
				24V	36V	48V	
Source Effect	typ	0.1%					Single phase, 95-132V ac or 190-264V a-c
	max	0.2%					
Load Effect	typ	0.2%	0.3%	2.5%	2.0%	1.5%	10% to 100% load
	max	0.4%	0.6%	3.3%	2.5%	2.0%	
Temperature Effect	typ	0.5%					Nominal input, rated load 0° to 40°C
	max	1.0%					
Combined Effect	typ	0.9%					Includes source, load and temperature
	max	1.8%					
Time Effect (1) (Drift)	typ	0.2%					0.5 hr - 8 hr at 25°C
	max	0.5%					
Recovery Characteristic	excursion	<±4%					Step load, 50-100%, rise time >50µs
	recovery	±1% in < 1msec					

(1) 5V Model requires air cooling, 6 cfm min.



**Kepeco Series RA 19-(X)B Rack Adapter**

Kepeco Series RA 19 Rack Adapters are specifically designed for the installation of Kepeco's Series HSF hot swap power supplies into 19-inch EIA standard equipment racks. These racks allow redundancy between power supplies contained within the rack as well between ic



- RA 19-(X)B rack adapters accommodate Kepeco 3U 50W, 100W, 150W (Series HSF-PFC and Older HSF 50W, 100W, 150W and 350W (Series HSF) power supplies. RA 19-(X)B models are recognized by UL and CSA.
- The RA 19-1U rack adapter accommodates 1U height 50W, 100W and 150W low profile (1U size) power supplies (Series HSF-1UR) and older Series 50W and 100W HSF-1U)
- The RA 19-4C rack adapter accommodates Kepeco 3U 300W, 600W, and 1200W/1500W (series HSF) power supplies. This rack adapter features two setbacks to accommodate both swing racks and limited depth applications.

Individual racks may also be connected in parallel for greater output current or series for greater output voltage. Optional brackets are now available to allow RA 19(X)B rack adapters to be installed in 23-inch or 24-inch racks. Other Series RA 19 rack adapters are compatible with standard extenders for 23-inch or 24-inch racks.

**Kepeco RA 19-4C Rack Adapter**



There are six standard RA 19-(X)B models, one RA 19-1U model, and one RA 19-4C model:

- RA 19-3B for 3U 350W HSF power supplies (1/3 rack)
- RA 19-6B for 3U 150 Watt HSF-PFC (or HSF) power supplies (1/6 rack)
- RA 19-8B for 3U 50 Watt or 100 Watt HSF-PFC (or HSF) power supplies (1/8 rack)
- RA 19-4B for a mix of the 3U 1/3 (two), 1/6 and 1/8 rack sizes
- RA 19-5B for a mix of the 3U 1/3 (one), 1/6 and 1/8 rack sizes
- RA 19-7B for a mix of the 3U 1/6 and 1/8 rack sizes
- RA 19-1U for 1U size HSF-1UR (or HSF-1U) 50W, 100W or 150W power supplies (1/4 rack),
- RA 19-4C for 3U HSF 300W, 600W, 1200/1500W power supplies (1/4 rack),

*Kepeco RA 19-1U Rack Adapter*  
Filler panels are available to fill unused slots.



The rear panel contains the fixed power and signal connections. The other side of the rear panel is an internal PCB back plate which has connectors which interface directly with the power and signal connectors of HSF Series power supplies, permitting hot swappable insertion and extraction. User-configurable keying ensures that only the correct power supply can be installed in a keyed slot.

The HSF Power Supplies each provide a normally closed (N.C.) and normally open (N.O.) line referenced to common (COM) for use as an alarm at the users discretion. The alarm circuit is independent from the power configuration (series, parallel or independent). The N.C. line opens upon failure, the N.O. line closes upon failure. The 300W, 600W, and 1200W/1500W modules also have a logic alarm signal ( $\pm$ PF) that performs the same function.

All mechanical and electrical specifications are contained in the mechanical outline drawings. The rack adapter is user-configurable for parallel, series, or independent power supply operation. Forced current sharing and OR'ing diodes for N+1 redundancy are built in to the HSF power supplies.

HSF 150W Series Power Modules and the RA 19-6B Rack Adapter have been tested and deemed compliant with the requirements for physical protection of Network Equipment-Building System (NEBS) for earthquake zone 4 per GR-63-CORE, including both damage resistance and functional performance requirements. This means that the power assembly suffered no physical damage as a result of the testing and provided full specified performance both during and after exposure to the test environment.