4. INPUT

General Condition: T_A = 0… 45 °C unless otherwise noted.

PARAMETER		DESCRIPTION / CONDITION	MIN	NOM	MAX	UNITS
$V_{i\,nom}$	Nominal Input Voltage		100	230	230	VAC
V_i	Input Voltage Ranges	Normal operating ($V_{i\,min}$ to $V_{i\,max}$)	90		264	VAC
$V_{i\,red}$	Derated Input Voltage Range	See *Figure 20* and *Figure 40*	90		180	VAC
$I_{i\,max}$	Max Input Current				13	A_{rms}
$I_{i\,p}$	Inrush Current Limitation	$V_{i\,min}$ to $V_{i\,max}$, T_{NTC} = 25°C (*Figure 5)*			40	A_p
F_i	Input Frequency		47	50/60	64	Hz
PF	Power Factor	$V_{i\,nom}$, 50Hz, > 0.3 $I_{1\,nom}$	0.96			W/VA
$V_{i\,on}$	Turn-on Input Voltage[1]	Ramping up	80		87	VAC
$V_{i\,off}$	Turn-off Input Voltage[1]	Ramping down	75		85	VAC
η	Efficiency without Fan	$V_{1\,nom}$, 0.1·$I_{x\,nom}$, $V_{x\,nom}$, T_A = 25°C		90.3		%
		$V_{1\,nom}$, 0.2·$I_{x\,nom}$, $V_{x\,nom}$, T_A = 25°C		93.4		
		$V_{1\,nom}$, 0.5·$I_{x\,nom}$, $V_{x\,nom}$, T_A = 25°C		94.5		
		$V_{1\,nom}$, $I_{x\,nom}$, $V_{x\,nom}$, T_A = 25°C		93.8		
T_{hold}	Hold-up Time	After last AC zero point, V_1 > 10.8V, V_{SB} within regulation, V_i = 230 VAC, $P_{x\,nom}$	12			ms

4.1 INPUT FUSE

Quick-acting 16 A input fuses (5 x 20 mm) in series with both the L- and N-line inside the power supply protect against severe defects. The fuses are not accessible from the outside and are therefore not serviceable parts.

4.2 INRUSH CURRENT

The AC-DC power supply exhibits an X-capacitance of only 3.2 µF, resulting in a low and short peak current, when the supply is connected to the mains. The internal bulk capacitor will be charged through an NTC which will limit the inrush current.

NOTE:
Do not repeat plug-in / out operations within a short time, or else the internal in-rush current limiting device (NTC) may not sufficiently cool down and excessive inrush current or component failure(s) may result.

4.3 INPUT UNDER-VOLTAGE

If the sinusoidal input voltage stays below the input undervoltage lockout threshold Vi on, the supply will be inhibited. Once the input voltage returns within the normal operating range, the supply will return to normal operation again.

4.4 POWER FACTOR CORRECTION

Power factor correction (PFC) is achieved by controlling the input current waveform synchronously with the input voltage. A fully digital controller is implemented giving outstanding PFC results over a wide input voltage and load ranges. The input current will follow the shape of the input voltage. If for instance the input voltage has a trapezoidal waveform, then the current will also show a trapezoidal waveform.

[1] The Front-End is provided with a minimum hysteresis of 3 V during turn-on and turn-off within the ranges.

In addition, the PFC circuit has a stability region to be observed when operating the power supply at high input current amplitudes. At a low source inductance (<150 µH) the power supply will work stable up to its full maximum input current (13 Arms). If the source inductance is higher, the region with stable PFC operation is slightly reduced (as shown in *Figure 4)*. The power supply will also work in the unstable region, but it may exhibit a slight current oscillation during the sinusoidal peak.

4.5 EFFICIENCY

High efficiency (see *Figure 2)* is achieved by using state-of-the-art silicon power devices in conjunction with soft-transition topologies minimizing switching losses and a full digital control scheme. Synchronous rectifiers on the output reduce the losses in the high current output path. The speed of the fan is digitally controlled to keep all components at an optimal operating temperature regardless of the ambient temperature and load conditions.

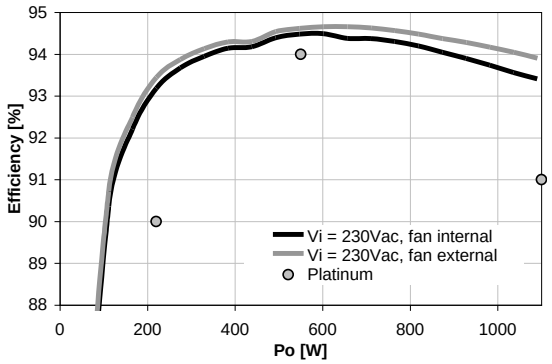

Figure 2. Efficiency vs. Load current (ratio metric loading)

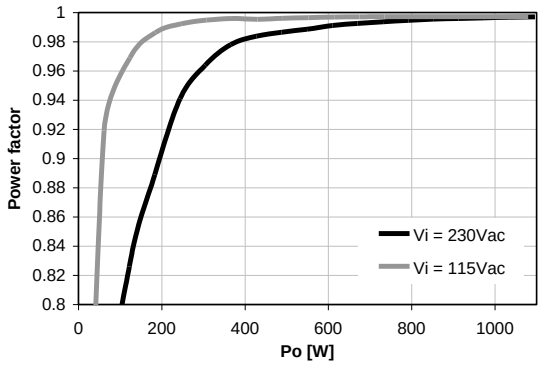

Figure 3. Power factor vs. Load current

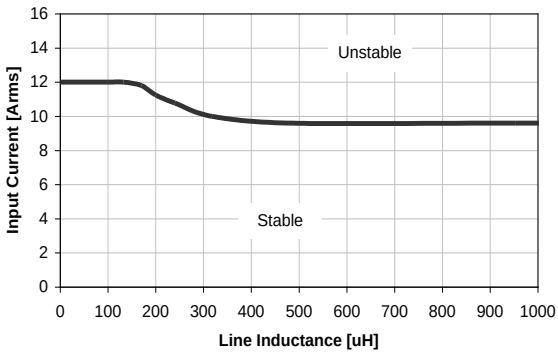

Figure 4. PFC Stability Region

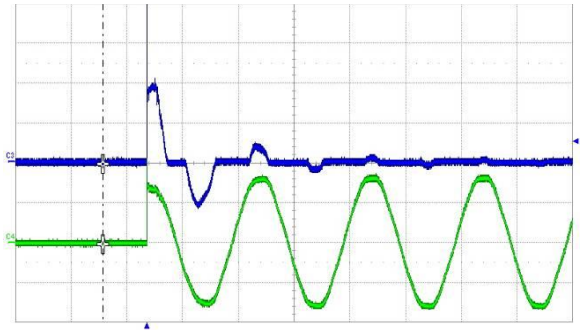

Figure 5. Inrush current, V_{in} = 230Vac, 90°
CH4: V_{in} (200V/div), CH3: I_{in} (20A/div)