

### 3. ABSOLUTE MAXIMUM RATINGS

Stresses in excess of the absolute maximum ratings may cause performance degradation, adversely affect long-term reliability, and cause permanent damage to the supply.

PARAMETER	CONDITIONS / DESCRIPTION	MIN	MAX	UNITS
$V_{i\ max}$	Maximum Input		300	VAC

### 4. INPUT

General Condition:  $T_A = 0 \dots 45\ ^\circ\text{C}$  unless otherwise noted.

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
$V_{i\ nom}$	AC Nominal Input Voltage	100	230	277	VAC
$V_i$	AC Input Voltage Ranges	Normal operating ( $V_{i\ min}$ to $V_{i\ max}$ )		300	VAC
$V_{i\ nom\ DC}$	DC Nominal input voltage	240		380	VDC
$V_{i\ DC}$	DC Input voltage ranges	Normal operating ( $V_{i\ min}$ to $V_{i\ max}$ )		400	VDC
$V_{i\ red}$	Derated Input Voltage Range	See Figure 20 and Figure 33		180	VAC
$I_{i\ max}$	Max Input Current	$V_i > 200\ \text{VAC}, >100\ \text{VAC}$		17	$A_{rms}$
$I_{i\ p}$	Inrush Current Limitation	$V_{i\ min}$ to $V_{i\ max}, 0^\circ\ T_{NTC} = 25^\circ\text{C}$ (Figure 5)		50	$A_p$
$F_i$	Input Frequency	47	50/60	63	Hz
$PF$	Power Factor	$V_{i\ nom}, 50\text{Hz}, > 0.3\ I_{i\ nom}$			W/VA
$V_{i\ on}$	Turn-on Input Voltage <sup>2</sup>	Ramping up		87	VAC
$V_{i\ off}$	Turn-off Input Voltage <sup>2</sup>	Ramping down		85	VAC
$\eta$	Efficiency without Fan	$V_{i\ nom}, 0.1 \cdot I_{x\ nom}, V_{x\ nom}, T_A = 25^\circ\text{C}$	90.0	91.85	%
		$V_{i\ nom}, 0.2 \cdot I_{x\ nom}, V_{x\ nom}, T_A = 25^\circ\text{C}$	93.0	94.40	
		$V_{i\ nom}, 0.5 \cdot I_{x\ nom}, V_{x\ nom}, T_A = 25^\circ\text{C}$	94.5	94.95	
		$V_{i\ nom}, I_{x\ nom}, V_{x\ nom}, T_A = 25^\circ\text{C}$	93.0	93.75	
$T_{hold}$	Hold-up Time	After last AC zero point, $V_i > 10.8\ \text{V}$ , $V_{SB}$ within regulation, $V_i = 230\ \text{VAC}, P_{x\ nom}$		12	ms

<sup>2</sup> The Front-End is provided with a minimum hysteresis of 3 V during turn-on and turn-off within the ranges

#### 4.1 INPUT FUSE

Quick-acting 25 A input fuses (6.3 × 32 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 4.3 $\mu\text{F}$ , 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 below 90sec interval time at maximum input, high temperature condition, 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 RMS value of input voltage (either AC or DC) stays below the input undervoltage lockout threshold  $V_{i on}$ , 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) (see *Figure 4*) 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. At DC input voltage the PFC is still in operation, but the input current will be DC in this case.

### 4.5 EFFICIENCY

The 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 rpm of the fan is digitally controlled to keep all components at an optimal operating temperature regardless of the ambient temperature and load conditions.

*Figure 3* shows efficiency when input voltage is supplied from a high voltage DC source.

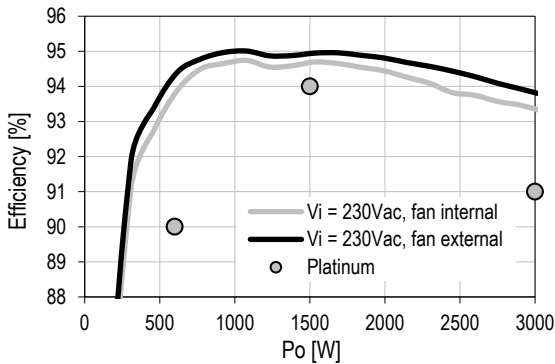


Figure 2 – AC Input Efficiency vs. Load current (ratio metric loading)

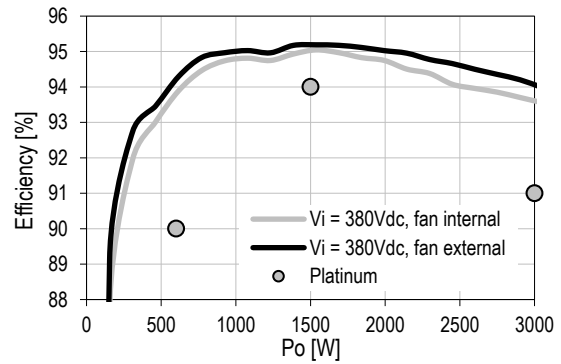


Figure 3 - DC Input Efficiency vs. load current (ratio metric loading)

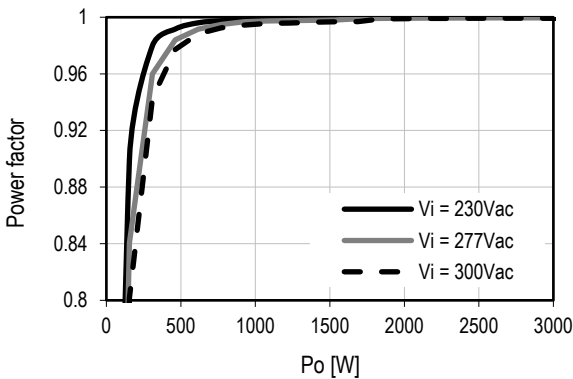


Figure 4 - Power factor vs. Load current

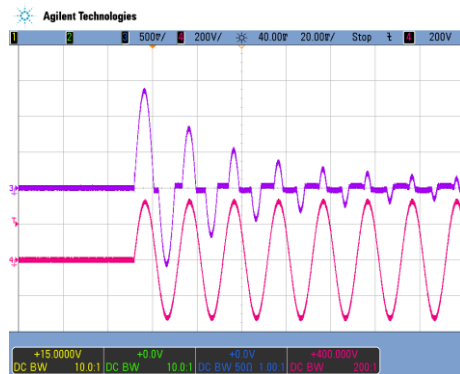


Figure 5 - Inrush current,  $V_{in} = 230 \text{ Vac}$ ,  $0^\circ$  phase angle  
CH4:  $V_{in}$  (200 V/div), CH3:  $I_{in}$  (10 A/div)