

Application Note

1606-XL480EP

- World-wide approvals (  ) for industry
- Input: AC 115/230V **Auto Select**
- Output: 24...28V / 480W (600W)

Input

Input voltage	AC 100...120V/200...240V, 47...63Hz Auto Select
Rated tolerances	
• Continuous operation	AC 85...132V resp. AC 184...264V
• Short-term (1 min) at 24V/20A	AC 85...140V resp. AC 170...280V
Input current	<10A (115V range) <5A (230V range)
Inrush current	<37A at AC 264V ($T_{amb} = +50^{\circ}\text{C}$, cold start)
Fuse loading	<8A ² s ($T_{amb} = +50^{\circ}\text{C}$, cold start)
If you intend to protect the primary side of the power supply with a fuse or a circuit breaker, a 15 A slow acting fuse (HBC) or a supplementary protector 1492-SPU1C150 is recommended (1492-SP1C160 for Europe). In order to meet local requirements, please consult local codes and regulations for proper installation.	
Harmonic current emissions EN 61000-3-2 (PFC)	
Transient handling	Transient resistance acc. to VDE 0160 / W2 (750V / 1.3ms), for <i>all</i> load conditions.
Hold-up time	30ms at 24V/20A, AC 230Vin 30ms at 24V/20A, AC 120Vin 15ms at 24V/20A, AC 100Vin

Efficiency, Reliability etc.

Efficiency	typ. 90% (AC 230V, 24V/20A)
Losses	typ. 53W (AC 230V, 24V/20A)
MTBF	519.000h acc. to Siemensnorm SN29500 (24V/20A, 230V, $T_{amb} = 40^{\circ}\text{C}$)
Life cycle (electrolytics)	The unit exclusively uses longlife electrolytics, specified for +105°C. High reliability, as • only five aluminium electrolytics and • no small aluminium electrolytics are used.



- 90% Efficiency
- Ideal for parallel operation
- **Overload behavior adjustable** (Continuous current / Hiccup)

Output

Output voltage	DC 24...28V, adjustable by (covered) front panel potentiometer. Adjust. range guaranteed
Output noise suppression	Radiated EMI values below EN50081-1, even when using long, unscreened output cables.
Ambient temperature range T_{amb}	Operation: $0^{\circ}\text{C}...+70^{\circ}\text{C}$ (> 60°C : Derating) Storage: $-25^{\circ}\text{C}...+85^{\circ}\text{C}$
Rated continuous loading with convection cooling:	
• $T_{amb}=0^{\circ}\text{C} - 60^{\circ}\text{C}$	24V/20A resp. 28V/18A short-term (<30s) 24V/25A resp. 28V/22A
Derating	12W/K (at $T_{amb} = 60...70^{\circ}\text{C}$)
Voltage regulation	better than 2% over all
Ripple	(incl. spikes (20MHz bandwidth), 50Ω measurement)
• Output charact. S	<20mV _{pp} (<0.1%)
• Output charact. P (S/P: Single/Parallel Mode)	<40mV _{pp} (In: AC 230V, Out: 24V/20A) <100mV _{pp} (In: AC 184V, Out: 24V/20A)
Over-voltage protection	At 33V ±10%: switch to hiccup mode
Front panel indicators:	
• Green LED on, when $V_{out} > U_T$, where U_T is appr. 2V below V_{out} adjusted (24V...28V)	
• Red LED on, when $V_{out} < U_T$	
Parallel operation	Yes, up to ten units
To achieve current sharing the output V/I characteristic can be altered to be 'softer' (25V at 0.4A, 24V at 20A). This is done by repositioning a bridge connection (without opening the unit).	
Power back immunity	max. 30V

Construction / Mechanics

Housing dimensions and Weight

- W x H x D 220mm x 124mm x 102mm (+ DIN rail)
- Free space for ventilation above/below 70mm recommended left/right 25mm recommended
- Weight 2.5kg

Design advantages: All connection blocks are easy to reach as mounted at the front panel; PVC insulated cable can be used for all connections, as the connection blocks are mounted in the cooler area on the underside of the unit.

Wire Size Input/Output:

Stranded 20...10 AWG (0.5...4 mm²), Solid 20...10 AWG (0.5...6 mm²)
Tightening Torque: 7 lbs in (0.8 Nm) recommended

Start / Overload Behavior

Startup delay	typ. 0.55s
Rise time	appr. 20...80ms, depending on load
Overload behavior (see characteristic on the right)	- Power Boost: Short-term (<30s) 125% output power without voltage drop. - Electronic current limiting, protects from overload and short-circuit. - High overload/short-circuit behavior ($V_{out} < 14V$) switchable between Overload Design and hiccup mode. Switching by jumper on bottom of the unit; it is not necessary to open the unit for this purpose.

Overload Design (continuous current):

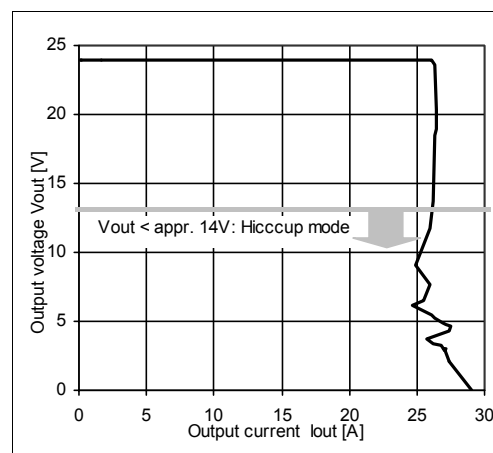
- No disconnection/hiccup, thus overloading is possible also for a longer period of time (load start-up), ideal for parallel operation.
- High overload/short-circuit current due to straight characteristic; each bias point of the V/I characteristic extends 20A.

Advantage: Due to the high and continuously supplied overload current the unit starts reliably even with awkward loads (DC-DC converters, motors). No 'sticking' such as can occur with fold-back characteristics, and secondary fuses trigger more reliably.

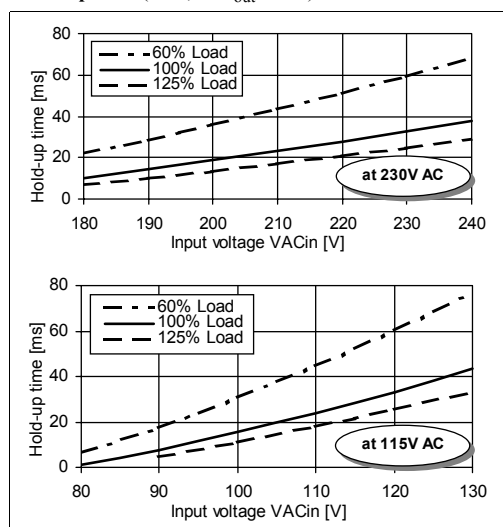
Hiccup mode:

- Unit switches off when high overload occurs ($V_{out} < \text{appr. } 14V$) with subsequent periodical switch-on attempts (hiccup mode):
 - Duration of switch-on attempts:
 - appr. 0.1s at short-circuit or appr. 1s at overload
 - Duration between switch-on attempts: appr. 1.5s
- $V_{out} > \text{appr. } 14V$: The output current is continuous. The V/I characteristic equals that of the Overload Design; each bias point of the V/I characteristic extends 20A.

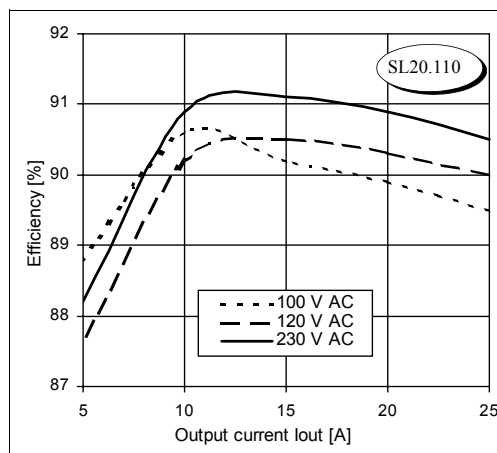
Output characteristic (typ.)



Hold-up time (min., at $V_{out}=24V$)



Efficiency (typ., at $V_{out}=24V$)



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