

## Application Note

# 1606-XL480E



- World-wide approvals (  $\text{CE}$   $\text{UL}$   $\text{UL}$  ) for industry
- Input: AC 230V
- Output: 24...28V / 480W (600W)

- 91% efficiency
- Ideal for parallel operation
- Simple fusing

### Input

Input voltage	AC 230V, +15%, -20% 47...63Hz (1606-XL480E-3: 3 AC 400/480V, see separate data sheet)
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#### Rated Tolerances

• Continuous operation	AC 184...264V resp. DC 270...370V
• Short term (1 min) at 24V/20 A	AC 170...280V resp. DC 250...400V

Input current	5A
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Inrush current	typ. 33A at AC 264V
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If you intend to protect the primary side of the power supply with a fuse or a circuit breaker, a 10 A slow acting fuse (HBC) or a supplementary protector 1492-SPU1C100 is recommended. In order to meet local requirements, please consult local codes and regulations for proper installation.

Fuse loading	$<10\text{A}^2\text{s}$
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To be fused with a 10A, B-type 'circuit-breaker' switch based on the usual thermomagnetic overload sensing principle (used anyway to fuse the input lines). In addition, the unit contains an internal fuse (not accessible)

Harmonic current emissions (PFC)	Available on request
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Transient handling	Active transient filter incorporated, so transient resistance acc.to VDE 0160 / W2 (750V/ 1.3ms), for <i>all</i> load conditions.
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Hold up time	>20ms at AC 230V, 24V/20A
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### Efficiency, Reliability etc.

Efficiency	typ. 91% (AC 230V, 24V/20A)
Losses	typ. 48W (AC 230V, 24V/20A)
MTBF	310.000h acc. to Siemensnorm SN 29500 (24V/20A, AC 230V, $T_{\text{amb}} = +40^\circ\text{C}$ )

Life cycle (electrolytics)	The unit exclusively uses longlife electrolytics, specified for +105°C. High reliability, as <ul style="list-style-type: none"> <li>• only four aluminium electrolytics and</li> <li>• no small aluminium electrolytics are used.</li> </ul>
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### Output

Output voltage	DC 24...28V adjustable by (covered) front panel potentiometer, preset: 24.0V $\pm 0.5\%$ Adjustment range guaranteed
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Output noise suppression	Radiated EMI values below EN50081-1, even when using long, unscreened output cables.
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Ambient temperature range $T_{\text{amb}}$	Operation: 0°C...+70°C (>60°C: Derating) Storage: -25°C...+85°C
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#### Rated continuous loading with convection cooling

• $T_{\text{amb}}=0^\circ\text{C} - 60^\circ\text{C}$	24V/20A (480W) resp. 28V/18A (504W)
• $T_{\text{amb}}=0^\circ\text{C} - 45^\circ\text{C}$	24V/25A (600W) resp. 28V/22A (616W) short-term also at 60°C

Derating	typ. 12W/K (at $T_{\text{amb}} = +60^\circ\text{C} \dots +70^\circ\text{C}$ )
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Voltage regulation	better than 2% over all
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Ripple	(incl. spikes (20MHz bandwidth), 50Ω measurement)
• Output charact. S	$<20\text{mV}_{\text{pp}}$ ( $<0.1\%$ )
• Output charact. P (S/P: Single/Parallel Mode)	$<40\text{mV}_{\text{pp}}$ (In: AC 230V, Out: 24V/20A) $<100\text{mV}_{\text{pp}}$ (In: AC 184V, Out: 24V/20A)

Over-voltage protection	At 33V $\pm 10\%$ : switch to hiccup mode
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Front panel indicators:	<ul style="list-style-type: none"> <li>• Green LED on, when <math>V_{\text{out}} &gt; U_T</math>, where <math>U_T</math> is ca. 2 V below <math>V_{\text{out}}</math> adjusted (24V...28V)</li> <li>• Red LED on, when <math>14\text{V} &lt; V_{\text{out}} &lt; U_T</math></li> <li>• Red LED flashes, when <math>0\text{V} &lt; V_{\text{out}} &lt; 14\text{V}</math></li> </ul>
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Parallel operation	Yes, up to ten units
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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	>30V
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## 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 1800g

### 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 mm<sup>2</sup>), Solid 20...10 AWG (0.5...6 mm<sup>2</sup>)

Tightening Torque: 7 lbs in (0.8 Nm) recommended

## Start / Overload Behavior

Startup delay	typ. 0.5s
Rise time	ca. 20...80ms, depending on load

### Duration of switch-on attempts at

- Initial application ca. 1.4s on mains
- Subsequent attempts ca. 0.5s

Hiccup operation at  $V_{out} < ca. 14V$

Duration between switch-on ca. 4s attempts

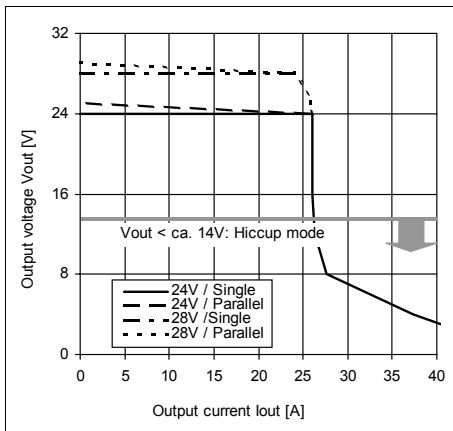
Electronic current limiting, protects against overload and short circuit:

- $V_{out} < ca. 14V$ : Periodical switch-on attempts (hiccup-mode).
- $V_{out} > ca. 14V$ : The output current is continuous.  
The V/I characteristic of the supply is straight.

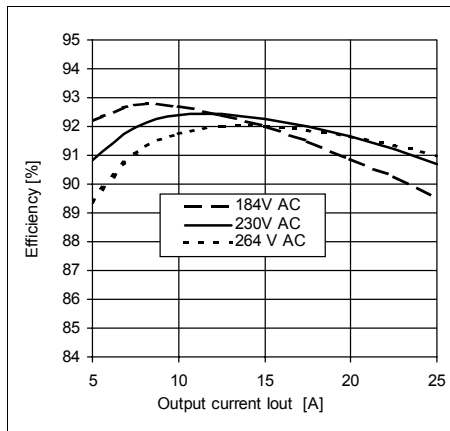
Advantages of the switch-on/overload behavior:

- Safer switch-on into highly non-linear loads with large starting currents
- Short-term overloads result in current limiting and not in an immediate shut-down.
- Parallel operation of several units possible.  
Proper switch-on performance is obtained.

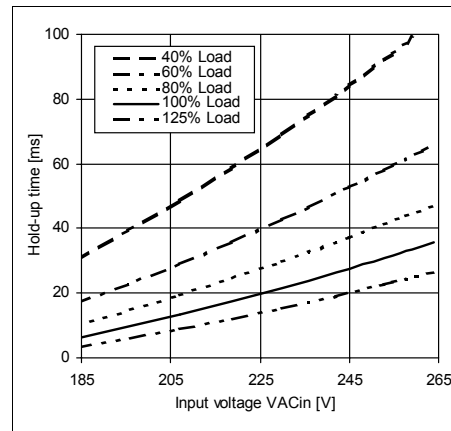
Output characteristic (typ.)



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



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



Specifications valid for 230V AC input voltage, +25°C ambient temperature, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice

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