




## Application Note

# 1606-XL480E-3



- World-wide approvals (    ) for industry
- Input: 3 AC 400V/3 AC 480V
- Output: 24...28V/480 W (600 W)

- 92% efficiency
- Ideal for parallel operation
- Simple fusing

### Input

Input voltage	XL480E-3: AC 480V, - 15 %, + 20 % (XL480E: AC 230V, s. separate data sheet) 47...63 Hz, Suitable for IT power systems	
Rated Tolerances		
• Continuous operation	408...576V AC	resp. 550...820V DC
• Short term (1 min) at 24V/20 A	360...620V AC	resp. 450...890V DC
Input current	3 x 1.5 A	
Inrush current	< 15 A at 440V AC, < 17 A at 480V AC	
Inrush current limiting done with a fixed 47R resistor (not a thermistor) which is bridged after the unit is running, so losses are minimised. That means no reset time even at a warm-start.		
Fuse loading	< 2 A <sup>2</sup> s	
If you intend to protect the primary side of the power supply with fuses or circuit breakers, 10 A (x3) slow acting fuses (HBC) or a supplementary protectors 1492-SP3C100 are recommended. In order to meet local requirements, please consult local codes and regulations for proper installation.		
Harmonic current emissions acc. EN 61000-3-2 (PFC)		

Transient handling Active transient filter incorporated, so transient resistance acc. to VDE 0160 / W2 (1300 V / 1.3 ms), for all load conditions.

Hold up time > 11 ms at 24V/20 A,  $V_{in, nom}$

### Efficiency, Reliability etc.

Efficiency	typ. 92 %	(24V/20 A, $V_{in, nom}$ )
Losses	typ. 42 W	(24V/20 A, $V_{in, nom}$ )
MTBF	310.000 h acc. to Siemensnorm SN 29500 (24V/20 A, $V_{in, nom}$ , $T_{amb} = +40^{\circ}C$ )	
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>	

### Output

Output voltage	24...28V DC, adjustable by (covered) front panel potentiometer; preset: 24V $\pm$ 0.5% Adjusting range guaranteed
Output noise suppression	Radiated EMI values below EN50081-1, even when using long, unscreened output cables.
Ambient temperature range	Operation: 0°C...+70°C (>60°C: Derating) $T_{amb}$ Storage: -25°C...+85°C
Rated continuous loading with convection cooling	
• $T_{amb} = 0^{\circ}C \dots 60^{\circ}C$	24V / 20 A (480 W) resp. 28V / 18 A (504 W)
• $T_{amb} = 0^{\circ}C \dots 45^{\circ}C$	24V / 25 A (600 W) resp. 28V / 22 A (616 W) short-term also at 60 °C
Derating	typ. 12 W/K (at $T_{amb} = +60^{\circ}C \dots +70^{\circ}C$ )
Voltage regulation	better than 2% over all
Ripple	< 20 mV <sub>pp</sub> (i.e. < 0.1 %) incl. spikes 20 MHz bandwidth, 50 $\Omega$ measurement
Over-voltage protection	At 32V $\pm$ 10%: switch to hiccup mode
Front panel indicators:	<ul style="list-style-type: none"> <li>• Green LED on, when <math>V_{out} &gt; U_T</math>, where <math>U_T</math> is ca. 2 V below <math>V_{out}</math> adjusted (24V...28V)</li> <li>• Red LED on, when <math>14V &lt; V_{out} &lt; U_T</math></li> <li>• Red LED flashes, when <math>0V &lt; V_{out} &lt; 14V</math></li> </ul>
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	> 30V

### Construction / Mechanics

Housing dimensions and Weight	
• W x H x D	220 mm x 124 mm x 102 mm (+ DIN rail)
• Free space for ventilation above/below 70 mm recommended	left/right 25 mm recommended
• Weight	1.8 kg

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. 0.2 s
Rise time	ca. 20...80 ms, depending on load
Duration of switch-on attempts at	
• Initial application on mains	ca. 1.4 s
• Subsequent attempts	ca. 0.5 s
Hiccup operation at	$V_{out} < ca. 14V$
Duration between switch-on attempts	ca. 4 s

Electronic current limiting, protects against overload and short circuit:

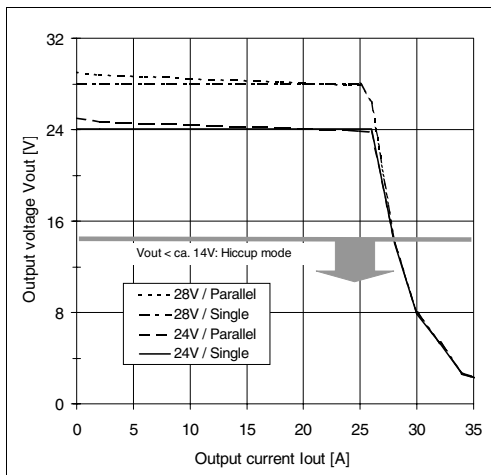
- $V_{out} < ca. 14V$ : Periodical switch-on attempts (hiccup-mode).
- $V_{out} > ca. 14V$ : The output current is continuous.

The V/I characteristic of the supply is straight.

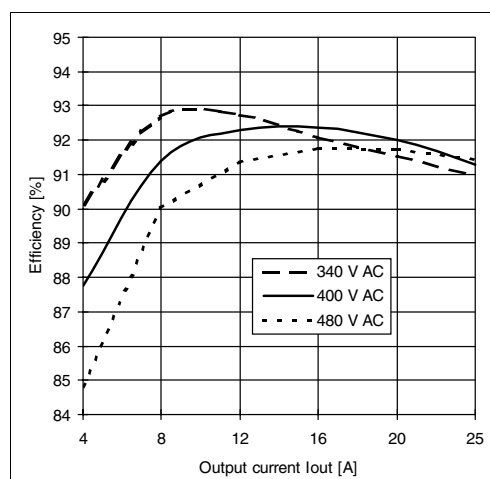
Advantages of the switch-on/overload behavior:

- 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.

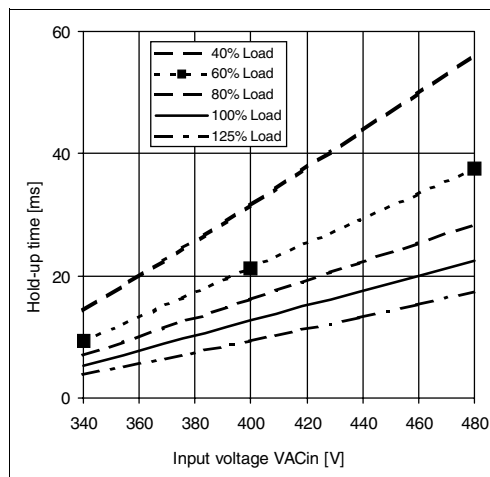
Output V/I characteristic (typ.)



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



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



Specifications valid for 3x400V AC input voltage, +25°C ambient temperature, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice.

With 480V input some values may differ.

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