



## Application Note

# 1606-XL480F-3H

- World-wide approvals (  $\text{CE}$   $\text{UL}$   $\text{UL508}$  ) for industry
- Input: 3 AC 400V
- Output: 48...56V/480 W (600 W)

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

### Input

Input voltage	3 AC 400V, - 15 %, + 20 % 47...63 Hz, suitable for IT power systems	
Rated tolerances		
• Continuous operation	340...479V AC	or 450...700V DC
• Short-term (1 min) at 48V/10 A	300...550V AC	or 370...790V DC
Input current	3 x 1.5 A	
Inrush current	< 15 A at 440V 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 (PFC)	acc. to EN 61000-3-2	
Transient handling	Active transient filter incorporated, so transient resistance acc.to VDE 0160 / W2 (1300 V / 1.3 ms), for <i>all</i> load conditions.	
Hold-up time	> 11 ms at 48V/10 A, 400V AC	

### Efficiency, Reliability etc.

Efficiency	typ. 92 % (48V/10 A, 400V AC)	
Losses	typ. 42 W (48V/10 A, 400V AC)	
MTBF	310.000 h acc. to Siemensnorm SN 29500 (48V/10 A, 400V AC, $T_{amb} = +40^{\circ}\text{C}$ )	
Life cycle (electrolytics)	The unit exclusively uses longlife electrolytics, specified for +105°C. High reliability and lifetime, as <ul style="list-style-type: none"> <li>• only four aluminum electrolytics and</li> <li>• no small aluminum electrolytics are used.</li> </ul>	

### Output

Output voltage	48...56V DC, adjustable by (covered) front panel potentiometer, preset: 48.1V $\pm$ 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		
• $T_{amb}=0^{\circ}\text{C}...60^{\circ}\text{C}$	48V / 10 A (480 W)	resp. 56V / 9 A (504 W)
• $T_{amb}=0^{\circ}\text{C}...45^{\circ}\text{C}$	48V / 12.5 A (600 W)	resp. 56V / 11 A (616 W)
short-term (< 1 min.) also at 60°C permissible typ. 12 W/K (at $T_{amb}=+60^{\circ}\text{C}...+70^{\circ}\text{C}$ )		
Derating	typ. 12 W/K (at $T_{amb}=+60^{\circ}\text{C}...+70^{\circ}\text{C}$ )	
Voltage regulation	better than 2 % over all	
Ripple	< 50 mV <sub>pp</sub> (i.e. < 0.1 %) incl. spikes 20 MHz bandwidth, 50 $\Omega$ measurement	
Over-voltage protect.	At 61V $\pm$ 7%: switch to hiccup mode	
Front panel indicators:		
• Green LED on, when $V_{out} > U_T$ , where $U_T$ is appr. 4V below $V_{out}$ adjusted (48V...56V).		
• Red LED on, when appr. 28V < $V_{out}$ < $U_T$ .		
• Red LED flashes, when 0V < $V_{out}$ < appr. 28V.		
Parallel operation	Yes, up to ten units	
To achieve current sharing the output V/I characteristic can be altered to be 'softer' (48.8V at 0.1 A, 48V at 10 A). This is done by repositioning a bridge connection.		
Power Back Immunity	< 63V	

### Construction / Mechanics

Housing dimensions and Weight	220 mm x 124 mm x 102 mm (+ DIN rail)	
• W x H x D	220 mm x 124 mm x 102 mm (+ DIN rail)	
• Free space for ventilation	above/below 70 mm recommended right/left 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	appr. 20...80 ms, depending on load
Duration of switch-on attempts at	
• Initial application on mains	appr. 1.4 s
• Subsequent attempts	appr. 0.5 s
Hiccup operation at	$V_{out} < \text{appr. } 28V$
Duration between switch-on attempts	appr. 4 s

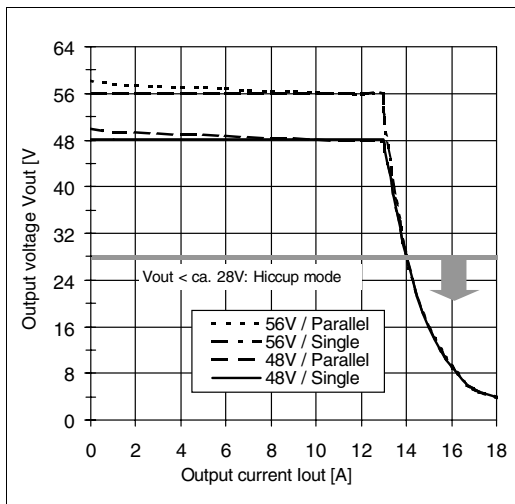
Electronic current limiting, protects against overload and short circuit:

- $V_{out} < \text{appr. } 28V$ : Periodical switch-on attempts (hiccup mode).
- $V_{out} > \text{appr. } 28V$ : The output current is continuous.  
The V/I characteristic of the supply is straight.

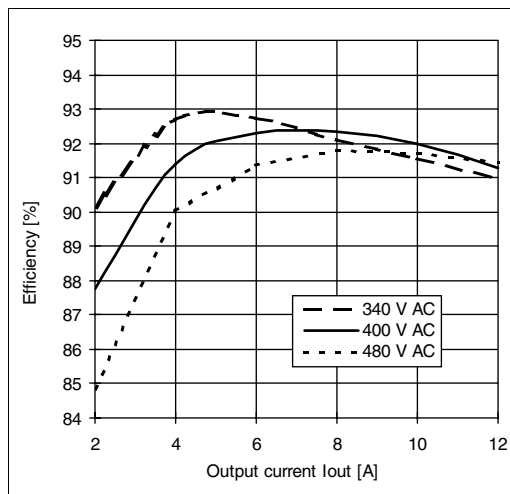
Advantages of the switch-on/overload behavior:

- 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.

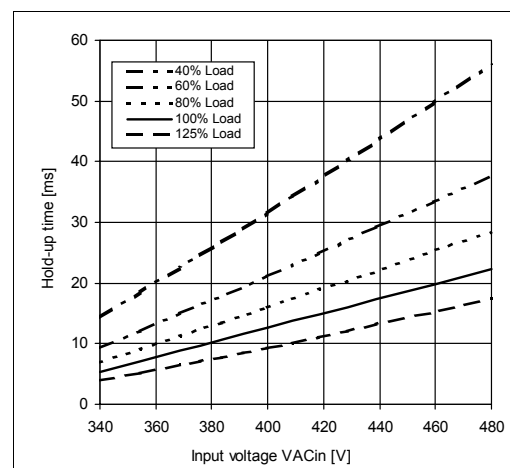
### Output V/I characteristic (typ.)



### Efficiency (typ., at $V_{out}=48V$ )



### Hold-up time (min., at $V_{out}=48V$ )



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.

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