




## Application Note

# 1606-XL480E-3W

- World-wide approvals (    ) for industry
- Input: 3 AC 400...500V
- Output: 24...28V/490 W
- Power boost up to 600 W



- Separate primary fuse not necessary
- Switchable operating mode (single/parallel)
- Switchable overload behavior options (Fuse Mode)

### Short description

This compact power supply unit is characterised by the variety of possibilities of application and low system costs. The fact that the **external fuses are no longer necessary** is an advantage as it saves cost and space. The switchable **Fuse Mode** and the extremely comprehensive **approvals package** including EN60204 make the XL480E-3W the unit of choice.

At a competitive price, it also offers **25A power boost, output noise suppression**, optional Single Mode or Parallel Mode, small dimensions, more than **500,000h MTBF** as well as easy installation. The unit can be connected to European and American power supply networks **without switching**.

### Input

Nominal Input voltage 3 AC 400...500V,  $\pm 15\%$   
47...63Hz, suitable for IT power systems

Rated tolerances

- Continuous operat. AC 340...576V resp. DC 450...820V
- Please ask for 'application notes' at operation with DC input voltage.

Input current 3 x 1.5A

Inrush current  $< 2.5A$  eff. resp.  $< 7A_{pk}$

If you intend to protect the primary side of the power supply with fuses or circuit breakers, 6 A (x3) slow acting fuses (HBC) or supplementary protectors 1492-SP3C060 are recommended. In order to meet local requirements, please consult local codes and regulations for proper installation.

2-phase operation: Operation is possible even if one phase fails. With high ambient temperature or high load,  $P_{out}$  is adjusted downwards. The red LED is on. Also see Overload Behavior.

EN 61000-3-2 (harmonic current emissions [PFC]) is fulfilled

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

Hold-up time  $> 11ms$  at 24.5V/20A,  $V_{in}$ : AC 400V

### Construction / Mechanics

Housing dimensions and Weight:

- W x H x D 150mm x 124mm x 121mm (+ DIN Rail)
- Weight 1.8kg
- Recomm. free space for conv. cool.: above/below 70mm, left/right 25mm

- 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

### Output

Output voltage DC 24...28V adjustable by (covered) front panel potentiometer, preset: 24.5V  $\pm 0.5\%$   
Adjusting range guaranteed

Output noise suppression Radiated EMI values below EN50081-1, even when using long, unshielded output cables.

Ambient temperature range Operation: 0°C...+70°C (>60°C with Derating)  
 $T_{amb}$  Storage: -25°C...+85°C

Derating 12W/K (@  $T_{amb} = +60^\circ C...+70^\circ C$ )

Rated continuous loading with convection cooling

- $T_{amb} = 0^\circ C...60^\circ C$  24.5V/20A (490W) resp. 28V/18A (504W)
- $T_{amb} = 0^\circ C...45^\circ C$  24.5V/25A (612W) resp. 28V/22A (616W) short-term (<1 min.) also at 60°C admissible

Output is protected against short-circuit, open circuit and overload.

Voltage regulation  $< 2\%$  static, jumper in 'Single Mode' position

Ripple/Noise  $< 30mV_{pp}$  ( $< 0.1\%$ ) incl. spikes  
(20MHz bandwidth, 50  $\Omega$  measurement)

Overvolt. protection At 33V  $\pm 10\%$ : switch to hiccup mode

Power back immunity max. 35V

Parallel operation Yes, up to ten units

To achieve current sharing:

- Plug jumper into pos. 'Output parallel use'. This alters the output V/I characteristic to be 'softer' (25V at 2A, 24V at 20A). The output voltage can still be adjusted.
- Missing jumper = 'Single Use', i.e. 'hard' characteristic

Front panel indicator:

- Green LED on, when  $V_{out} =$  set output voltage
- Red LED on, when  $V_{out} <$  set output voltage (with overload and overtemp. as well as overload with 2-phase op.)
- Red LED flashes after switch-off in the Fuse Mode

### Start Behavior

Start-up delay typ. 0.45s  
Rise time appr. 5...20ms, depending on load

## Efficiency, Reliability etc.

Efficiency	typ. 92% (24.5V/20A, $V_{in, rated}$ )
Losses	typ. 42W (24.5V/20A, $V_{in, rated}$ )
MTBF	504.000h acc. to Siemensnorm SN 29500 (24.5V/20A, AC 400V, $T_{amb} = +40^{\circ}C$ )

Life cycle (electrolytics):

The unit exclusively uses longlife electrolytics, specified for +105°C

High reliability and lifetime, as

- only 4 aluminum electrolytics and
- no small aluminum electrolytics are used.

## Overload Behavior

Two different operating mode options, switchable by plugging the front-panel OVL-jumper.

If the jumper is missing, the unit is in the Fuse Mode.

The unit is delivered preset in Continuous Mode.

### a) Continuous Mode (continuous current):

- Jumper is in the 'OVL cont. mode' position.
- When overload or short-circuit occurs, the unit continuously supplies current (see. diag. 1), no Hiccup.

**Advantage:** The unit starts reliably even with heavy, non-linear loads (high capacities, DC-DC converters, motors). The high short-circuit current triggers downstream fuses, and allows for selective configuration of electrical installations.

### b) Fuse Mode (Switch-off after typ. 4s):

- Jumper is in the 'OVL fuse mode' position.
- When overload, short-circuit or overload with 2-phase operation occurs or in case of overtemperature for more than typ. 4s, the unit switches off the output (residual volt. <3V without load, average short circuit current <0.1A)
- Definition of overload or short-circuit: The set output voltage in each case can no longer be maintained.
- The capacity to deliver current (Overload Design) (see diag. 1) remains unchanged during the typ. 4s delay time.
- **Red LED flashes** at switch-off.

**Feature:** With some applications, the Fuse Mode can replace the usual fusing on the secondary side. The Fuse Mode has closer tolerances than thermal trips. The release delay time of typ. 4s ensures that motors can be reliably operated.

### Re-start:

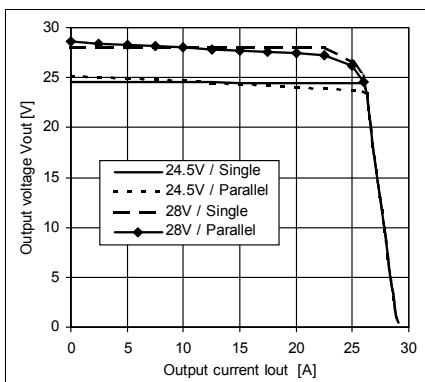
- by pushing the reset button on the unit's bottom panel.
- by disconnection from mains and re-start of the unit after >1 min.

## Overtemperature Protection

**Continuous Mode** Output voltage is adjusted downwards as long as overtemperature prevails

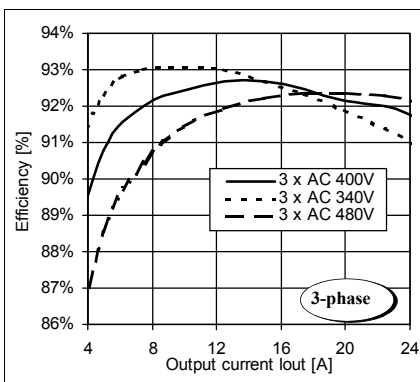
**Fuse Mode** Unit remains switched off after overheating until re-start (after cooling); (also see 'Re-start' above).

Output characteristic (typ.)



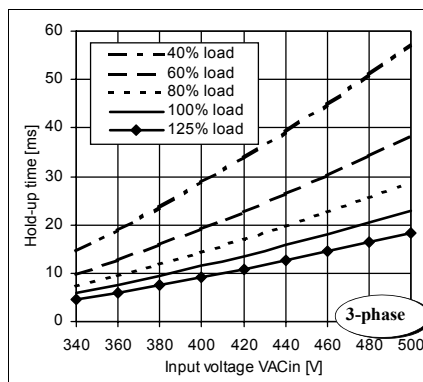
diag. 1

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



diag. 2

Hold-up time (min., @  $V_{out}=24.5V$ )



diag. 3

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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