




Application Note

1606-XL240E-3

- World-wide approvals (  ) for industry
- Input: 3 AC 400...500V (2-phase and 3-phase operation)
- Output: 24...28V / 240W

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**, the fully specified **2-phase operation** and the extremely comprehensive **approvals package** including EN60204 make the 1606-XL240E-3 the unit of choice.

At a competitive price, it also offers **12A power boost**, 20A short circuit current, **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 2 AC and 3 AC 400...500V
47...63Hz, suitable for IT power systems

Rated tolerances (at 24V/10A) 2-phase and 3-phase operation

- Continuous operat. AC 340...576V resp. DC 450...820V
- Short-term (1 min.) AC 300...620V resp. DC 400...890V
- Pls. ask for 'application notes' at operation with DC input voltage.

2-phase operation is specified and permissible. Connection to 3 phases is recommended due to reduced component stress.

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.

Input current 3 x 0.8/0.7A at AC 400/500V
(at 24V/10A) 2 x 1.2/1A at AC 400/500V

Inrush current (supply impedance acc. EN61000-3-3)

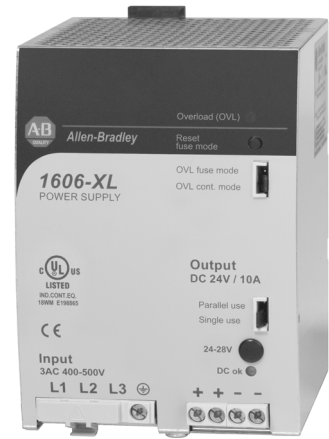
| | AC 400V | AC 500V | AC 575V | DC 820V |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Peak current | 15.4A | 15.4A | 17.0A | 17.9A |
| I^2t | <0.26A ² s | <0.44A ² s | <0.59A ² s | <0.72A ² s |

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

Transient handling Transient resistance acc. to VDE 0160/W2 (750V/1.3ms), for all load conditions

Emissions: 3-phase and 2-phase operation acc. to EN50081-1 (Class B)

Hold-up time >24ms (3-phase operat. @ AC 400V, 24V/10A)
>20ms (2-phase operat. @ AC 400V, 24V/10A)



- Power Boost up to 288W
- **Separate primary fuse not necessary**
- Switchable operating mode (single/parallel)
- **Switchable overload behavior options**

Output

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

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

Ambient temperature range Operation: 0°C...+70°C (>60°C with Derating)

T_{amb} Storage: -25°C...+85°C

Derating 6W/K (at T_{amb} = +60°C...+70°C)

Rated continuous loading with convection cooling

- T_{amb} = 0°C...60°C 24V/10A (240W) resp. 28V/8.6A (240W)
- T_{amb} = 0°C...45°C 24V/12A (288W) resp. 28V/10.3A (288W)

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

Voltage regulation <2% over all, jumper in 'Single Mode' position

Ripple/Noise <30mV_{pp} (20MHz bandwidth)

Overvolt. protection typ. 36V, max. 39V

Power back immunity min. 34V

Parallel operation Yes, up to five

To achieve current sharing:

- Plug jumper into pos. 'Output parallel use'. This alters the output V/I characteristic to be 'softer' (25V at 1A, 24V at 10A). The output voltage can still be adjusted.
- Missing jumper = 'Single Use', i.e. 'hard' characteristic

Front panel indicator:

- Green LED on, when V_{out} > 18V
- Red LED flashes after switch-off in the Fuse Mode

Construction / Mechanics

Housing dimensions and Weight

- W x H x D 89mm x 124mm x 117mm (+ DIN rail)

• Free space for con-vec- tion cooling above/below 50mm recommended
left/right 20mm recommended

- Weight 980g

Design advantages:

- All connection blocks are easy to reach as mounted on the front panel.
- PVC insulated cable can be used for all connections, as the connection blocks are mounted on 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

Efficiency, Reliability etc.

Efficiency / Power loss:

| | |
|-------------------|--|
| 3-phase operation | typ. 91.2% / $P_{loss} = 23.6W$ (400V) |
| | typ. 92% / $P_{loss} = 21.4W$ (500V) |
| 2-phase operation | typ. 90.9% / $P_{loss} = 24.5W$ (400V) |

MTBF acc. to Siemensnorm SN 29500 at 24V/10A, AC 400V, $T_{amb} = +40^{\circ}C$

| | |
|-------------------|----------|
| 3-phase operation | 543.000h |
| 2-phase operation | 525.000h |

Life cycle (electrolytics) The unit exclusively uses longlife electrolytics, specified for $+105^{\circ}C$

Start Behavior

| | |
|---------------|-----------------------------------|
| Startup delay | typ. 100ms |
| Rise time | appr. 5...20ms, depending on load |

Overload Behavior

Two different operating mode options, switchable by plugging the front-panel 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. 5s):

- Jumper is in the 'OVL fuse mode' position.
- When overload or short-circuit occurs for more than typ. 5s, the unit switches off the output.
- 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. 5s 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. 5s ensures that motors can be reliably operated.

Re-start:

- by pushing the reset button on the unit's front panel
- by disconnection from mains and re-start of the unit after > 1 min. or as soon as the red LED stops flashing

Overtemperature Protection

| | |
|-----------------|--|
| Continuous Mode | Switch-off and automatic re-start after cooling. |
| Fuse Mode | Unit remains switched off after overheating until restart (also see 'Re-start' above). |

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

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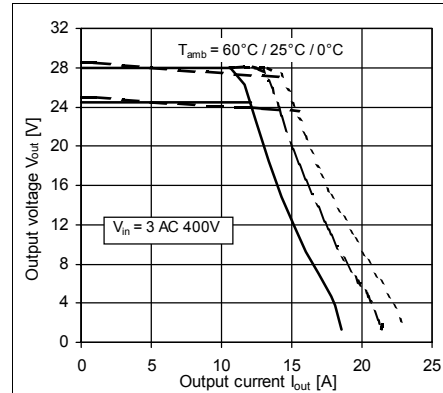
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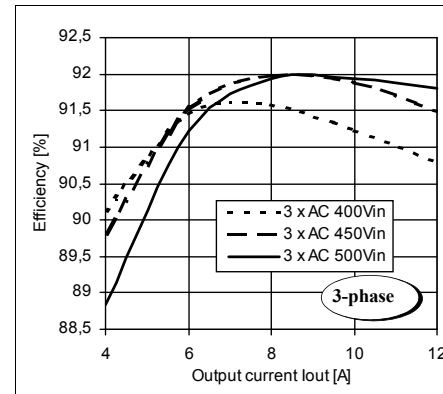
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Output characteristic (min.) diag. 1



Efficiency (typ., @ $V_{out} = 24.5V$) diag. 2



Hold-up time (typ., @ $V_{out} = 24.5V$) diag. 3

