Allen-Bradley

Application Note

1606-XL480E-3

- World-wide approvals (CE cULus cULus LISTED) 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 $< 2\ A^2s$

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. EN 61000-3-2
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, Vin_{nom}

Efficiency, Reliability etc.

Efficiency	typ. 92 % (24V/20 A, Vin_{nom})
Losses	typ. 42 W (24V/20 A, Vin_{nom})
MTBF	310.000 h acc. to Siemensnorm SN 29500 (24V/20 A, Vin_{nom}, T_{amb} = +40 °C)
Life cycle (electrolytics)	The unit exclusively uses longlife electrolytics, specified for +105 °C. High reliability, as • only four aluminium electrolytics and • no small aluminium electrolytics are used.

Output

Output voltage	24...28V DC, adjustable by (covered) front panel potentiometer; preset: 24V ±0.5% Adjusting range guaranteed
Output noise suppression	Radiated EMI values below EN50081-1, even when using long, unscreened output cables.
Ambient temperature range T_{amb}	Operation: 0°C...+70°C (>60°C: Derating) Storage: -25°C...+85°C
Rated continuous loading with convection cooling	
• T_{amb}=0°C...60°C	24V/ 20 A (480 W) resp. 28V / 18 A (504 W)
• T_{amb}=0°C...45°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°C...+70°C)
Voltage regulation	better than 2% over all
Ripple	< 20 mV_{PP} (i.e. < 0.1 %) incl. spikes 20 MHz bandwidth, 50 Ω measurement
Over-voltage protection	At 32V ± 10%: switch to hiccup mode
Front panel indicators:	• Green LED on, when $V_{out} > U_T$, where U_T is ca. 2 V below Vout adjusted (24V...28V) • Red LED on, when $14V < V_{out} < U_T$ • Red LED flashes, when $0V < V_{out} < 14V$
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 mm²), Solid 20...10 AWG (0.5...6 mm²)
Tightening Torque: 7 lbs in (0.8 Nm) recommended

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Start / Overload Behavior

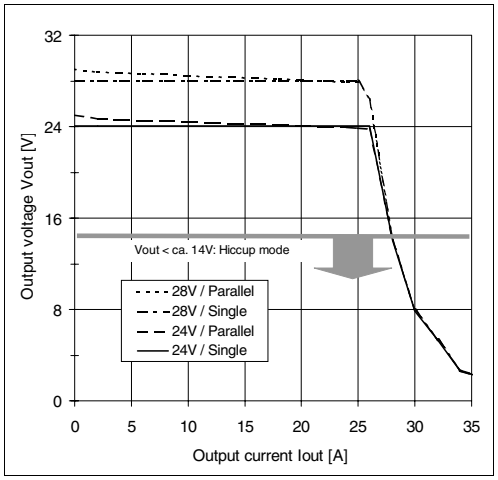
Startup delay	typ. 0.2 s
Rise time	ca. 20...80 ms, depending on load
Duration of switch-on attempts at	
• Initial application on mains	ca. 1.4 s
• Subsequent attempts	ca. 0.5 s
Hiccup operation at	V_{out} < ca. 14V
Duration between switch-on attempts	ca. 4 s

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.

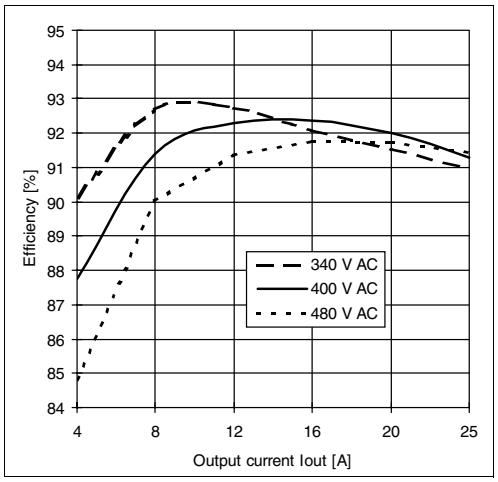
The V/I characteristic of the supply is straight.

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.

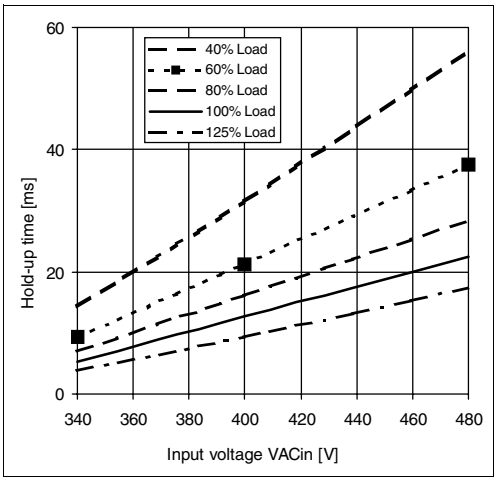
Output V/I characteristic (typ.)



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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