1606-XLE120E & 1606-XLE120EC 24V, 5A; Single Phase Input

1606-XLE120E & 1606-XLE120EC

24V,5A Single Phase Input

POWER SUPPLY

- Ultra-small size
- Extra-low inrush current
- Active power factor correction
- Wide range AC/DC input
- Superior efficiency and temperature rating
- DC-OK

1. GENERAL DESCRIPTION

The 1606-XLE supplies are cost optimized power supplies without compromising quality, reliability and performance. The 1606-XLE120E is part of the XLE power supply family, existing alongside the high featured XLS family.

The 1606-XLE includes all the essential basic functions and the devices have a power reserve of 20%. This extra current may even be used continuously at temperatures up to +45°C. The most important features are the small size, the high efficiency and the wide temperature range.

The Auto-select input makes worldwide installation and usage very simple. Defects or system failures caused by wrongly set switches can not occur.

2. SPECIFICATION QUICK REFERENCE

Output voltage	DC 24V	
Adjustment range	24 - 28V	
Output current	5 – 4.3A	ambient <60°C
	6 – 5,1A	ambient <45°C
Output power	120W	ambient <60°C
	144W	ambient <45°C
Output ripple	< 50mVpp	20Hz to 20MHz
Input voltage	AC 100-120 / 200-240V	Auto-select Input
Line frequency	50-60Hz	±6%
AC Input current	typ. 2.05 / 1.23A	at 120 / 230Vac
Power factor	typ. 0.56 / 0.47	at 120 / 230Vac
AC Inrush current	typ. 3A peak	
DC Input	not allowed	
Efficiency	typ. 89.4 / 90.2%	at 120 / 230Vac
Losses	typ. 14.5 / 13.2W	at 120 / 230Vac
Temperature range	-25°C to +70°C	operational
Derating	3W/°C	+60 to +70°C
Hold-up time	typ. 80 / 78ms	at 120 / 230Vac
Dimensions	32x124x117mm	WxHxD

3. AGENCY APPROVALS

c UL US LISTED IND. CONT. EQ. UL 508	c TÜV US UL 60950-1
CE EMC, LVD	

4. RELATED PRODUCTS

1606-XLB	Wall mount bracket
1606-XLSRED	Redundancy Module
1606-XLBUFFER	Buffer unit

1606-XLE120E & 1606-XLE120EC 24V, 5A; Single Phase Input

5. AC-INPUT

AC input	nom.	AC 100-120V / 200-240V	see Fig. 5-1
AC input range		90-132Vac	100-120V range, continuous operation
		180-264Vac	200-240V range, continuous operation
		85-90Vac	Short term or with output derating
		264-300Vac	< 0.5s
Input frequency	nom.	50 – 60Hz	±6%

		AC 100V	AC 120V	AC 230V	
Input current	typ.	2.34A	2.05A	1.23A	at 24V, 5A see Fig. 5-3
Power factor *	typ.	0.58	0.56	0.47	at 24V, 5A see Fig. 5-1
Crest factor **	typ.	2,9	3,1	3,7	at 24V, 5A
Start-up delay	typ.	710ms	800ms	540ms	see Fig. 5-2
Rise time	typ.	8ms	8ms	8ms	0mF, 24V, 5A, see Fig. 5-2
	typ.	25ms	25ms	25ms	5mF, 24V, 5A, see Fig. 5-2
Turn-on overshoot	max.	400mV	400mV	400mV	see Fig. 5-2
Turn-on voltage	typ.	80Vac	80Vac	N / A	steady-state value, see Fig. 5-1
Shut-down voltage	typ.	55Vac	55Vac	N / A	steady-state value, see Fig. 5-1

* The power factor is the ratio of the true (or real) power to the apparent power in an AC circuit.
** The crest factor is the mathematical ratio of the peak value to the RMS value of the input current waveform

Fig. 5-1 Input voltage range

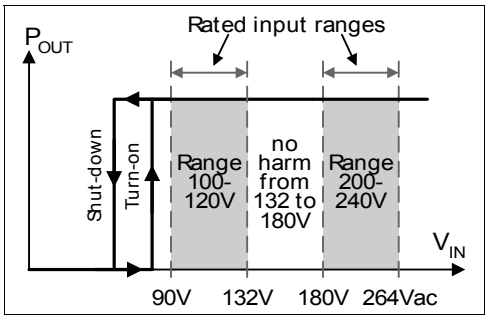


Fig. 5-2 Turn-on behavior, definitions

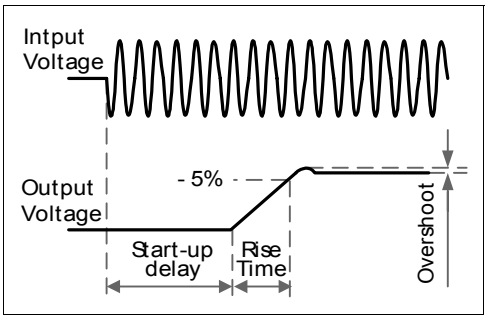


Fig. 5-3 Input current vs. output load

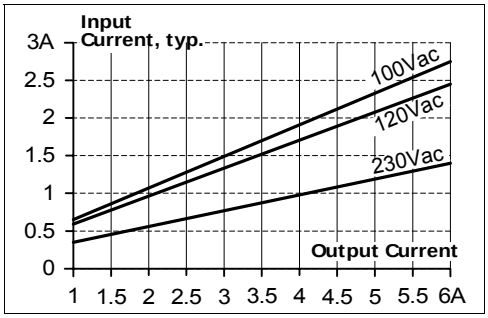
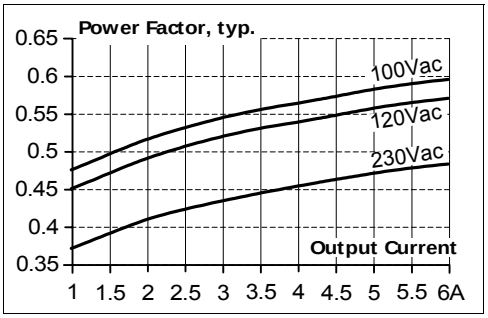


Fig. 5-4 Power Factor vs. output load



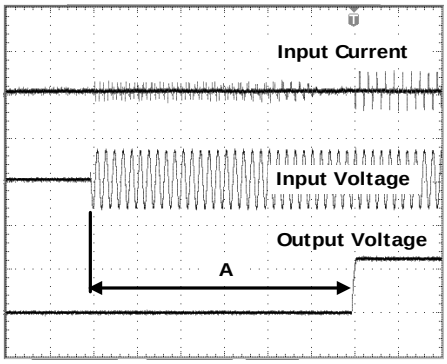
1606-XLE120E & 1606-XLE120EC 24V, 5A; Single Phase Input

6. Input Inrush Current Surge

An active inrush limitation circuitry limits the input inrush current after turn-on of the input voltage.
The charging current into EMI suppression capacitors is disregarded in the first milliseconds after switch-on.

		AC 100V	AC 120V	AC 230V	
Inrush current	max.	$10A_{peak}$	$10A_{peak}$	$10A_{peak}$	-25°C to +70°C
	typ.	$3A_{peak}$	$3A_{peak}$	$3A_{peak}$	-25°C to +70°C
Inrush energy	typ.	$1A^2s$	$1A^2s$	$1A^2s$	-25°C to +70°C

Fig. 6-1 Input inrush current, typical behavior



A:	Start-up delay = Inrush delay
Input:	230Vac
Output:	24V, 5A
Ambient:	25°C
Upper curve:	Input current 10A / DIV
Medium curve:	Input voltage 500V / DIV
Lower curve:	Output voltage 20V / DIV
Time scale:	100ms / DIV

7. Hold-up Time

		AC 100V	AC 120V	AC 230V	
Hold-up Time	typ.	109ms	165ms	161ms	2,5A, 24V, see Fig. 7-1
	typ.	50ms	80ms	78ms	5A, 24V, see Fig. 7-1
	typ.	37ms	62ms	63ms	6A, 24V, see Fig. 7-1

Fig. 7-1 Hold-up time vs. input voltage

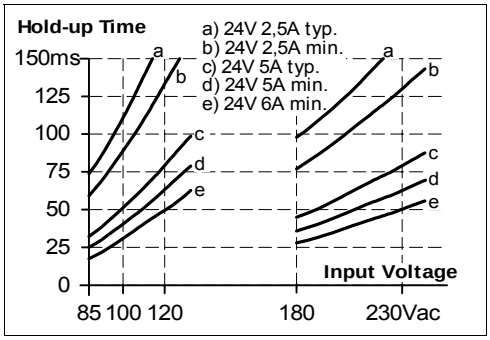
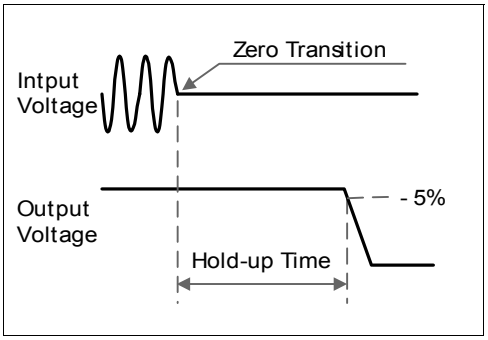


Fig. 7-2 Shut-down behavior, definitions



Note: At no load, the hold-up time can be up to several seconds. The green DC-ok lamp is on during this time.

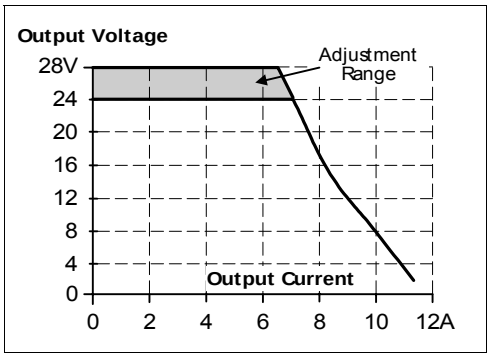
1606-XLE120E & 1606-XLE120EC 24V, 5A; Single Phase Input

8. OUTPUT

Output voltage	nom.	24V	
Adjustment range	min.	24-28V	guaranteed
	max.	30V	at clockwise end position of potentiometer
Factory setting		24.1V	±0.2%, at full load, cold unit
Line regulation	max.	70mV	90 to 132Vac or 180 to 264Vac
Load regulation	max.	100mV	static value, 0A → 5A → 0A
Ripple and noise voltage	max.	50mVpp	20Hz to 20MHz, 50Ohm
Output capacitance	typ.	1 800µF	
Output current	nom.	6A *	at 24V, ambient < 45°C, see Fig. 8-1
	nom.	5A	at 24V, ambient < 60°C, see Fig. 8-1
	nom.	5.1A *	at 28V, ambient < 45°C, see Fig. 8-1
	nom.	4.3A	at 28V, ambient < 60°C, see Fig. 8-1
Output power	nom.	144W *	ambient < 45°C
	nom.	120W	ambient < 60°C
Short-circuit current	min.	10A	load impedance 200mOhm, see Fig. 8-1
	max.	14A	load impedance 200mOhm, see Fig. 8-1

* The unit may respond with a thermal shut-down when continuously loaded with more than 120W and operated with a mains voltage of 100V or below.

Fig. 8-1 Output voltage vs. output current, typ.



Peak current capability (up to several ms)

The power supply can deliver a peak current which is higher than the specified short term current. This helps to start current demanding loads or to safely operate subsequent circuit breakers.

The extra current is supplied by the output capacitors inside the power supply. During this event, the capacitors will be discharged and causes a voltage dip on the output. Detailed curves can be found in chapter 25.1.

Peak current voltage dips	typ.	from 24V to 18.5V	at 10A for 50ms, resistive load
	typ.	from 24V to 22V	at 25A for 2ms, resistive load
	typ.	from 24V to 20V	at 25A for 5ms, resistive load