Bulletin 1606 — Power Supplies∗❄

- Quick mounting and connecting, innovative DIN-Rail mount, smallest in class
- UL Listed NEC Class 2; Class 1, Div. 2; Semi F47; ODVA Approved
- Low inrush current limiting
- PFC Active or Passive
- Wide range input; auto select input
- Superior overload design (continuous current, no hiccup)
- NEC Class 2 'Limited Power' options
- Selectable operating mode (single/parallel)
- Superior efficiency and temperature rating

Special Modules

- Brownout buffer, DC to DC converter, N+1 redundancy, DC UPS

Standards Compliance

- World-wide Certifications
- NEC Class 2
- Class 1 Div. 2 (T3A)
- cULus, CE, C-Tick, ATEX
- SEMI F47 Compatible
- ABS/GL/RINA (Marine)

Certifications

CE cULus LISTED cULus N223

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∗ Not all features apply to all power supplies; see individual power supply descriptions for specifics
❄ A more detailed list of performance specifications can be found at the Allen-Bradley web site http://www.ab.com/industrialcontrols/products/power_supplies/index.html

How to Select a Bulletin 1606 Power Supply

The Bulletin 1606 line of Power Supplies is designed with "reserve power" thereby eliminating the need to oversize your power supply to start high inrush loads.

Steps to size a Power Supply

1. Determine the "Average" continuous current of the load and the typical inrush current.

2. Select a power supply where the rated load is at/or below the current of the device and the Peak Current is less than the short-circuit rating of the power supply.

Notes:

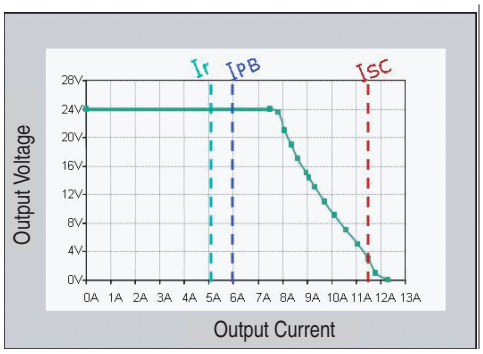
- ReservePower will deliver up to 25% additional current continuously.
- PowerBoost will deliver 150% of rated current for up to 5 s.

Example:

Application: Single Phase 120V input, 24V output, 5 A continuous current with 7.5 A inrush current

Solution: 1606-XLS120E

Output Characteristic for XLS120E (5 A) Power Supply



I_{RATED}: 5 A
$I_{SHORT\ CIRCUIT}$: >9 A
$I_{POWER\ BOOST}$: 7.5 A

Cat. No.	I_{RATED} [A]	$I_{SHORT\ CIRCUIT}$ (25 °C) [A]	$I_{POWER\ BOOST}$ or $I_{RESERVEPOWER}$ [A]
1606-XLS80E	3.3	5.2	5.4§
1606-XLS120E	5	9	7.5§
1606-XLS240E	10	21	15§
1606-XLS480E	20	30	30§
1606-XLS480E-3	20	29	30§
1606-XLSDNET4	3.8	4	—
1606-XLSDNET8	8	7	—
1606-XLE80E	3.3	5.5	3.6
1606-XLE120E	5	11	6
1606-XLE240E	10	16	12

§ Products with ReservePower.
♣ Short circuit current values are temperature dependent for the selected product; i.e., the higher the ambient temperature, the lower the short circuit current.
➢ Hiccup Overload design.

Quick Guide

Bulletin 1606-(number from table) ⌘ Power Supply Quick Guide

	15...40 W	50 W	60 W	72...80 W	90...100 W	120 W	180 W	240 W	480 W	720 W	960 W
5...5.5V	XLP15A XLP25A	—	—	—	—	—	—	—	—	—	—
10...12V	XLP30B	—	—	—	—	—	—	—	—	—	—
12...15V 1-Ph	XLP15B	XLP50B	XLP60BQ XLP60BQT	—	XLP90B	—	XL180B	—	—	—	—
12...15 V 3-Ph	—	—	—	—	XLE96B	—	—	—	—	—	—
(+/-)12 and 15V	XLP36C	—	—	—	—	—	—	—	—	—	—
24...28V 1-Ph	XLP15E XLP30E XLP30EQ	XLP50E XLP50EZ	XL60D XLP60EQ XLP60EQT	XLS80E XLE80E XLP72E	XLP95E XLP100E	XLS120E XLS120EA XLE120E XLE120EC XLE120EE XLE120EN	—	XLS240E XLS240EC XLE240E XLE240EP XLE240EE XLE240EN	XLS480E XLS480EA XLS480EC XLS480EE	—	XLS960EE
24...28V 2-Ph/3-Ph	—	—	—	—	XLP90E-2 XLP100E-2	XLE120E-2	—	XL240E-3C XLE240E-3	XLS480E-3 XLS480E-3C	XL720E-3	XLE960DX-3N XLS960E-3
36...43V	—	—	—	—	—	—	—	—	XLS480G-3	—	—
48...56V 1-Ph	—	XLP50F	—	—	XLP100F	—	—	XLE240F	XLS480F	—	XLS960FE
48...56V 3-Ph	—	—	—	—	—	—	—	XLE240F-3	XLS480F-3	—	XLE960MX-3N XLS960F-3
24V Redundant	—	—	XL60DR	—	—	XL120DR	—	XL240DR	—	—	—
DeviceNet	—	—	—	XLEDNET3	XLSDNET4	—	—	XLSDNET8	—	—	—

⌘ Example: For a 24...28 Volt, 3-Phase, 120 Watt power supply, the **Cat. No.** would be **1606-XL120E-3**.

Special Applications

Bulletin Number	NEC Class 2	ABS/GL Marine	Hazardeous Location Rating, Class 1 Div 2	ODVA Requirements	Conformal Coating	ATEX
1606-XLE	XLE80E	All XLE Power Supplies	All XLE Power Supplies	XLEDNET3	XLE120EC	—
1606-XLP	XLP15A XLP15B XLP15E XLP25A XLP30B XLP30E XLP36C XLP50B XLP50E XLP50EZ XLP50F XLP72E XLP90B XLP90E-2 XLP95E	XLP15A XLP15B XLP15E XLP25A XLP30E XLP36C XLP50E XLP50EZ XLP72E XLP90B XLP100E XLP100F XLPRED	XLP15A XLP15B XLP15E XLP25A XLP30B XLP30E XLP50B XLP50E XLP50EZ XLP72E XLP90B XLP95E XLP100E XLPRED	—	—	—
1606-XLS	XLSDNET4	ALL XLS Power Supplies	All XLS Power Supplies*	XLSDNET4 XLSDNET8	XLS240EC XLS480E-C XLS480E-3C	XLS120EA XLS240EA XLS480EA

* Cat. No. 1606-XLS240K does not have Hazardeous Location Rating.

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Catalog Number Explanation

Important: The following cat. no. breakdown is for explanation purposes only. It is not a product configurator. Not all combinations of fields are valid product cat. nos. First, select the desired power supply using the Product Selection tables. Then, use this breakdown for verification and explanation only.

1606 –	XLS	480	E		–	3
	a	*b*	*c*	*d*		*e*

a

Power Supply Type	
Code	Description
XLP	Compact family
XLS	Performance family
XLE	Essential family

b

Rated Output Watts	
Code	Description
15	15 W
25	25 W
30	30 W
36	36 W
40	40 W
50	50 W
60	60 W
72	72 W
80	80 W
90	90 W
95	95 W
100	100 W
120	120 W
180	180 W
240	240 W
480	480 W
720	720 W
960	960 W

c

Output Voltage	
Code	Description
A	5V DC
B	10...12V DC or 12...15 V DC
C	Dual +/- 12 and 15V DC
D	24V DC
E	24...28V DC
F	48...56V DC
G	36...43V DC
M	48V DC

d

Special Functions	
Code	Description
	Can be left blank
C	Conformal coating
R	Redundancy module
P	Power factor correction
Z	Removeable Terminations
X	Semi-Regulated
E	Regional voltage; 230V AC input only
N	Regional voltage; 120V AC input only
A	ATEX

e

Multi-Phase Variations	
Code	Description
	Can be left blank
-2	Two phase
-3	Three phase
-3C	Three phase, conformal coating
-3H	Three phase, input voltage 400V AC and 450...700V DC
-3N	Three phase, input voltage 480V AC
-D	360...900V - DC Only

Note: Special output signals are only available with the 960 W power supply.

Product Selection

1606-XLS Performance — Single- and Three-Phase

Single-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection♣	Steady State Input Current 120/230 [V AC]	Parallel Operation	DC OK Relay	Cat. No.
100...240V AC, 110...300V DC	80	24…28	3.3	6 A Slow Blow Fuse or **Cat. No. 1489-A1C060**	1.41/0.82	Yes	—	**1606-XLS80E**
	120	24…28	5		1.10/0.62	Yes	✓	**1606-XLS120E**
	120	24…28	5		1.10/0.62	Yes	✓	∗ **1606-XLS120EA**
	180	12…15	15		1.65/0.93	Yes	✓	**1606-XLS180B**
	240	24…28	10	6 A Slow Blow Fuse or **Cat. No. 1489-A1C060**	2.22/1.22	Yes	✓	**1606-XLS240E**
	240	24…28	10		2.22/1.22	Yes	✓	∗ **1606-XLS240EA**
	240	24…28	10		2.22/1.22	Yes	✓	➢ **1606-XLS240EC**
	240	48…56	5		2.22/1.22	Yes	✓	**1606-XLS240F**
	240	28…32	8		2.22/1.22	Yes	✓	**1606-XLS240K**
	480	24…28	20	10 A Slow Blow Fuse or **Cat. No. 1489-A1C100**	4.56/2.48	Yes	✓	**1606-XLS480E**
	480	24…28	20		4.56/2.48	Yes	✓	➢ **1606-XLS480EC**
	480	24...48	20		4.56/2.48	Yes	✓	∗ **1606-XLS480EA**
200...240V AC	480	48…56	10		4.56/2.48	Yes	✓	**1606-XLS480F**
100...240V AC, 110...300V DC	480	36…42	13.3		4.56/2.48	Yes	✓	**1606-XLS480G**
200...240V AC, 220...300V DC	960	24…28	40		—/4.6	Yes	✓	**1606-XLS960EE**

♣ Unit has internal (not accessible/replaceable) input fuse. Additional protection is not required if used on branch circuits ≤ UL test levels. Consult local codes and regulations for installation.
➢ The **C** suffix in the Cat. No. indicates that the product has **conformal coating**.
∗ The **A** suffix in the Cat. No. indicates that the product carries the **ATEX** rating.

1606-XLP Compact — Single- and Two-Phase

Single-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection	Steady State Input Current 120/230 [V AC]	Parallel Operation	DC OK Relay	Cat. No.
100…240V AC, 85…375V DC	15	5…5.5	3	10 A Slow Blow Fuse or **Cat. No. 1489-A1C100**/ 15 A♣	0.28/.017	Yes	—	**1606-XLP15A**
		12…15	1.3		0.28/.017		—	**1606-XLP15B**
		24…28	0.6		0.28/.017		—	**1606-XLP15E**
	25	5…5.5	5		0.60/0.30	Yes	—	**1606-XLP25A**
	30	10…12	3		0.60/0.25	Yes	—	**1606-XLP30B**
		24…28	1.3		0.60/0.35			**1606-XLP30E**
					0.54/0.30		—	1606-XLP30EQ
	36	+/- 12/15V	2.8		0.65/0.40	No	—	**1606-XLP36C**
	50	12…15	4.2		1.00/0.60	Yes	—	**1606-XLP50B**
		24…28	2.1		0.77/0.44	Yes	—	**1606-XLP50E**
		24…28	2.1		1.00/0.60	Yes	—	**1606-XLP50EZ**
		48…56	1		1.00/0.60	Yes	—	**1606-XLP50F**
	54	12...15	4.5		0.91/0.54	Yes	—	1606-XLP60BQ
	54	12...15	4.5		0.97/0.61	Yes	—	1606-XLP60BQT
	60	24...48	2.1		0.98/0.58	Yes	—	1606-XLP60EQ
	60	24...48	2.1		1.05/0.66	Yes	—	1606-XLP60EQT
100…120/220…240V AC, 220…375V DC	72	24…28	3		1.60/0.80	Yes	—	**1606-XLP72E**
	90	12…15	7.5		1.90/0.90	Yes‡	—	**1606-XLP90B**
100…200/200…240V AC, 220…375V DC	95	24…28	3.9		2.00/0.95	No	—	**1606-XLP95E**
	100	24…28	4.2		2.10/1.00	Yes‡	—	**1606-XLP100E**
		48…56	2.1		2.10/1.00	Yes‡	—	**1606-XLP100F**

Two-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection	Steady State Input Current 400...480 [V AC]	Parallel Operation	DC OK Relay	Cat. No.
380…480V AC	90	24…28	3.75	10 A Slow Blow Fuse or **Cat. No. 1489-A1C100**/ 20 A♣	2 x 0.36	No‡	—	**1606-XLP90E-2**
380…480V AC	100	24…28	4.2		2 x 0.40	Yes‡	—	**1606-XLP100E-2**

♣ Unit has internal (not accessible/replaceable) input fuse. Additional protection is not required if used on branch circuits ≤ UL test levels.
‡ Single/parallel operation (inclined characteristic) selectable (jumper). Consult local codes and regulations for installation.

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Bulletin 1606 Back-of-Panel Brackets

Instead of snapping the power supply onto a DIN Rail, you can mount it to the back of the panel. This set consists of two steel brackets which replace the existing DIN Rail aluminum brackets at the back of the unit.

Note: You need one set per unit.

Description	Cat. No.
Back-of-panel bracket for XLS and XLE power supplies, **below 20 A**	**1606-XLB**
Back-of-panel bracket for XLS and XLE power supplies, **20 A and above**	**1606-XLC**

Bulletin 1606-XLP

	1606-XLP95E	1606-XLP100E	1606-XLP100F	1606-XLP100E-2
Output Volts/Watts	24...28V/95 W	24...28V/100 W	48...56V/100 W	24...28V/100 W
Input Voltage (47...63 Hz)	100...120/220...240V AC auto select; 220...375V DC			2Ø, 380...480V AC
Operational Range	85...132/184...264V AC			323..552V AC
Hold-up Time	>40 ms (230V AC) >20 ms (100V AC)			>48 ms (400V) >85 ms (480V)
Rated Input Current	<2.0 A (100V AC) <0.95 A (220V AC)	<2.1 A (100V AC) <1.0 A (220V AC)		<0.46 A (400V) <0.40 A (480V)
Efficiency	typ. 90%		typ. 91%	typ. 89%
Output Voltage	24...28V 24.5V preset		48...56V 48V preset	24...28V Preset at 24.5V
Rated Output Current	3.9 A (@ 24.5V), 3.2 A (@ 28V)	4.2 A (@ 24.5V), 3.6 A (@ 28V)	2.1 A (@ 48V), 1.8 A (@ 56V)	4.2 A (@ 24V), 3.6 A (@ 28V)
Power Boost	—	—	—	—
Ripple/Noise	<50 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C: 2 W/K derating			
Non-Operating Temperature Range	-40...+85 °C			
MTBF♣	appr. 500 000 hours			
Dimensions (W x H x D)	73 x 75 x 103 mm			
Weight	360 g			
Certifications/Standards✶	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 5, 6, 9	1, 2, 3, 5, 6, 9	
Special Features	NEC Class 2 power supply; Class 1 Div. 2	Single/parallel operation (inclined characteristic) select on front panel; ABS/GL/RINA (Marine); Class 1 Div. 2; Semi F47	Single/parallel operation (inclined characteristic) select on front panel; ABS/GL/RINA (Marine)	

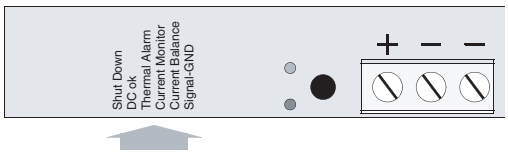
✶ 1) = CE, 2) = UL 508 (cULus LISTED), 3) = UL 1950 (cURus), 4) = CSA C22.2, No. 60950, 5) Safety standards = IEC/EN 60950, EN 50178, 6) EMC standards = EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, 7) EMC standards = EN 61000-3-2 (A14), EN 50081-1, 9)ABS/GL/RINA (Marine)
♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

"DC Ok" Output

Function: Indicating whether the unit is operating properly. Output can directly energize a relay or a control light.
Signaling: Output signal is at a "high" level (24V, current source) in normal operation (no overload, overheating, short circuit). When the output signal switches to "low" level (no power at output), Vout remains for 5 ms (nominal) at nominal load.
Connection (signal common): Connection is made with respect to the "Signal GND" terminal (signal output).
Important: Do not connect to the power output (terminals + and -).
Permissible load: resistance - min. 300 Ω, e.g. 24V relay, control lights (LEDs need no series resistance), Evaluation logic.
For 5V signal: In order to receive a 5V signal: switch a 5V Zener diode (0.5 W) and 1 kΩ resistance in parallel between this output and the "Signal GND" terminal.

"Thermal Alarm" Output

Function: Output gives warning shortly before and while overtemperature state occurs. Output can directly control a relay or a control light.
Signaling: Output signal is at a "high" level (24V, current source) in normal operation (no overtemperature). At overtemperature, the output switches to "low". Only when the temperature in the unit increases further will the unit reduce its output current (power output).
Connection and permissible load: same as for "DC ok" output.



"Current Monitor" Output

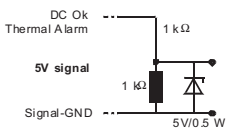
Function: Measuring the output current (power output). Output signal is proportional to the output current of the unit.
Connection: Made with respect to the "Signal GND" terminal (signal output).
Important: Do not connect to the power output (terminals + and -).
Signaling:
Voltage measuring: Voltage at signal output is 1V per 10 A output current (Ri(voltmeter) > 100 k ohm)
Current measurement: Current at signal output is 1 mA per 10 A output current (Ri(ammeter) < 100 W)

"Current Balance" In-/Output

Function: Using these terminals, parallel operating units ensure an equal load sharing (active balancing). Balancing also works reliably with decoupling diodes at the power output (redundancy).
Connection: Connect together "Current Balance" outputs of all units involved.
Important: Signal common here is the - terminal of the power output, not the "Signal GND". Do not connect the "Signal GND" terminals to each other!

"Signal GND" Terminal

Function: Grounding terminal for all signal terminals (not for "Current Balance").
Connection instructions: Do not connect this terminal with terminals + or - of the unit (not even over a load: risk of overload). Do not connect this terminal with terminals of other units (not even with the "Signal GND" terminal of another unit).
Permissible load: Maximum current load: 0.3 A. Terminal is fused internally with a self-healing fuse (polyswitch).



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