The Xfactor

of Power Quality

Bulletin 1606 XLS
Bulletin 1606 XL
Bulletin 1606 XLP
Bulletin 1609 U
Bulletin 1497

Allen-Bradley
RELIANCE ELECTRIC
DODGE
ROCKWELL SOFTWARE
Rockwell Automation

1606XLS

the power of X

UNPARALLELED PERFORMANCE…SMALLEST SIZE

The Next Generation of Power Supplies, 1606-XLS has taken the solid design and performance characteristics of its predecessors and coupled them with new technology that has significantly reduced the size of the product while enhancing performance.

50% Reduction in Size

The 1606-XLS provides user with a significant space savings over existing solutions allowing new designs to take advantage of a smaller enclosure which results in a lower-cost solution. The design features the smallest per watt profile in the world.

- 1606-XLS240E – 10 A power supply is 60mm wide
- 1606-XLS120E – 5 A power supply is 40mm wide

70% Reduction in Wiring Time

The 1606-XLS performance line of Power Supplies have patented finger-actuated spring clamps that reduce the typical wiring time of traditional screw clamp terminations by as much as 70%. The spring clamps provide a very consistent, secure connection even in very harsh vibration or temperature fluctuation environments. The easy, snap-in-place DIN mount design eliminates the need for hole patterns, drilling, and screwing, which are commonly associated with back-of-panel mount power supplies.

Increased Peak Load Capacity

The 1606-XLS power supply has significant reserve current available to start very stubborn loads. The power supplies have 150% of rated power available for up to 5 seconds.

Industry Leading Efficiency

The products operate with an efficiency exceeding 92%. No other product in the industry can claim such performance. This results in a very cool running power supply which promotes an extended service life and reduces the heat directed at other components in the panel.

Active Power Factor Correction

The active power factor feature allows the product to meet IEC PFC standards for both 115 and 230V AC inputs. This results in very low power consumption to support the operation of the power supply.

Active Inrush Current Limiting

The presence of active inrush current limiting has one key advantage. Due to the minimal inrush during power supply start up, the circuit protection used on the primary side of the power supply can be sized very small with no fear of nuisance tripping.

Extended Service Life

The estimated service life of the bulletin 1606-XLS products will exceed 50,000 run hours when operated at 40 degrees Celsius at full-rated load.

Supports Special Applications

The 1606-XLS products have been designed for use in special applications. They meet the Semiconductor, Semi-F47, ride-thru specifications in addition to Class 1, Div 2 for Hazardous Locations.

GENERAL PURPOSE DIN-RAIL MOUNT SWITCHED MODE POWER SUPPLIES

Reliability and Safety

Both the standard and compact size units are durable, reliable, and fail-safe. The 1606-XL and 1606-XLP family of power supplies offers several solutions to increase the reliability and safety of the application.

- Prior to shipment all devices must pass a critical burn-in test to eliminate the possibility of a unit failing during commissioning.
- The intelligent circuit design results in minimal ripple and noise
- Protects against short and open circuits.
- The design features one of the smallest per watt profiles in the world.

Leading Edge Technology

The industry-leading service life is obtained through a design that incorporates long-life electrolytic capacitors in combination with a very low-thermal-loss circuit concept. With this leading edge technology, efficiency levels exceeding 90% are achieved. All devices provide superior Electro-Magnetic Compatibility (EMC) performance and most meet EN61000-3-2 harmonics standard for Power Factor Correction (PFC).

1606XLP

EXCELLENT PERFORMANCE IN THE SMALLEST PACKAGE

THE POWER TO

BULLETIN 1606

from over-sizing the system.

Reserve Power and Load Response

No need to oversize your system. The standard units are designed with a power boost that provides additional power reserves up to 25% without any reduction in output voltage. The overload design delivers up to 180% of nominal current continuously (e.g., without switch-off or hiccup) at a reduced voltage with no negative thermal effects. These robust power supplies prevent the designer

Parallel Connection Compatible

Virtually all units are specially designed for effective operation when wired in parallel. Their start-up and overload response is designed in such a way as to provide a smooth load distribution as required. This means an increase in performance and reliability without suffering possible damage as a result of an overload.

1606XL

1609U

INDUSTRIAL UNINTERRUPTIBLE POWER SUPPLIES (UPS)

The 1609 family of Industrial DIN Rail-Mounted Uninterruptible Power Supplies (UPS) is uniquely designed for the industrial market to provide back-up AC power to the control cabinet. The 1609 will provide back-up power to bridge dips, sags, or brief losses of power. If necessary, the 1609 will facilitate a safe shut-down of your industrial PC, PLC, data logging HMI, or any other critical device in the control scheme.

Features

- Rugged, Industrial Design
- The 1609 can be mounted to a heavy duty DIN-Rail or the back of a panel.
- Elevated Temperature Performance
  Operation up to 50°C
- Comprehensive Network Management
  The optional Network Management Card (1609-NMC) is monitored via RSView or via the on-board web browser.
- Dry contact I/O
  Standard relay outputs to signal "Battery On" or "Battery Low" in addition to Emergency Power OFF input contact.

Performance

- 96% efficiency
- Line interactive topology
- Pure sine wave output
- Power conditioning
- Noise Filtering
- Active Voltage Regulation

GLOBAL CONTROL CIRCUIT TRANSFORMERS

The Global Control Circuit Transformers are designed to reduce supply voltages to machine tool control circuits, providing greater safety to operators. IP2X finger-safe terminal covers are provided on all units and fuse covers for added workplace safety are available. These transformers also isolate the control circuits from power and lighting circuits. They are especially designed to accommodate the momentary current inrush caused when electromagnetic components are energized, without sacrificing secondary voltage stability per NEMA ICS2-100.

Features

Terminal Blocks

- Constructed from molded "high-impact" nylon resin
- Combination Phillips (#2) and slot screws available on 63…350 VA units, Slot screws only available on 500…2000 VA units

Enclosed Construction

- 63…350 VA transformers are enclosed in a nylon housing
- Thermal plastic, injection-molded cover

EN 60-529 Finger-Safe Protection

- Fuse cover, for added protection, available as an optional feature
- IP2X finger-safe terminal covers are provided on all units

Core and Coils

- High quality, high permeability silicon steel laminations minimize core losses
- All-welded construction
- Computer-designed, copper-wound coils for optimal performance

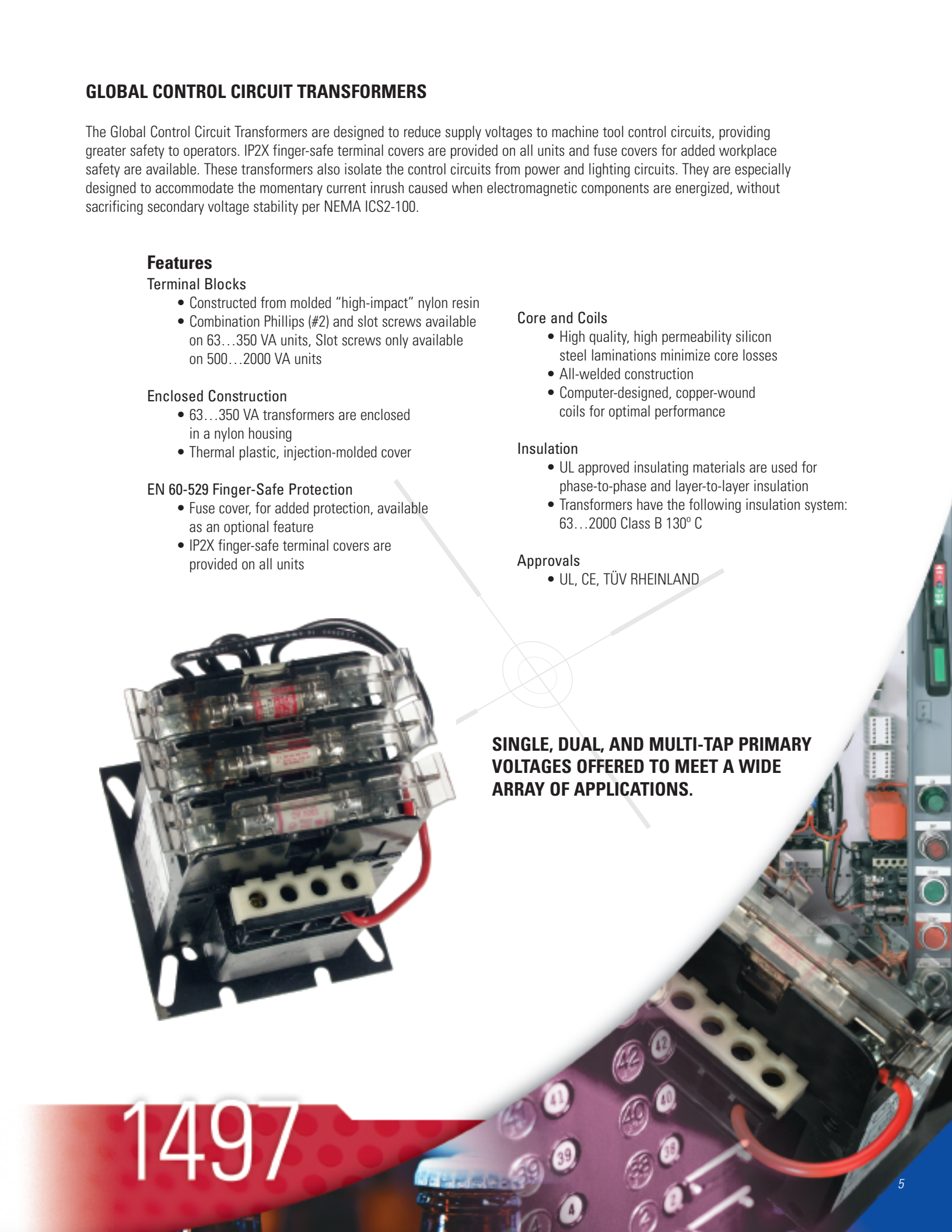
Insulation

- UL approved insulating materials are used for phase-to-phase and layer-to-layer insulation
- Transformers have the following insulation system: 63…2000 Class B 130° C

Approvals

- UL, CE, TÜV RHEINLAND

SINGLE, DUAL, AND MULTI-TAP PRIMARY VOLTAGES OFFERED TO MEET A WIDE ARRAY OF APPLICATIONS.



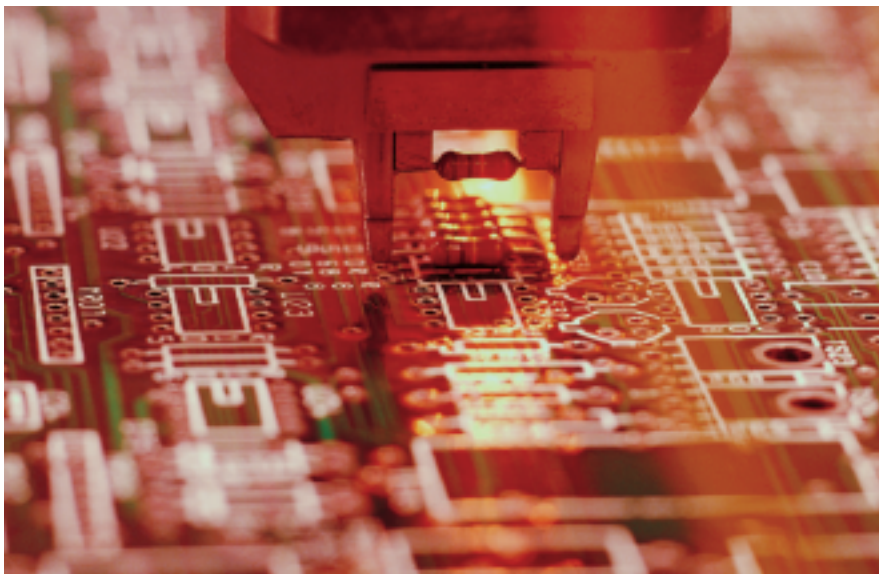
1497

1606

Products have been designed to meet various application requirements.

MEETS HAZARDOUS LOCATION RATING, CLASS 1 DIV 2

MEETS SEMICONDUCTOR F47 SAG IMMUNITY REQUIREMENTS



Refer to page 9 for a complete listing of Class 1 Div 2 products and Semi F47 products.

					
Bulletin	1606-XLP	1606-XL	1606-XLS	1609	1497
Type	**Switched Mode Power Supply Single Phase**	**Switched Mode Power Supply Single/Three Phase**	**Switched Mode Power Supply Single/Three Phase**	**Uninterruptible Power Supply**	**Control Circuit Transformer**
Features	• Low inrush current • Wide range input; auto select input • Superior overload design (continuous current, no hiccup) • NEC Class 2 "Limited Power" • Superior efficiency and temperature rating	• Low inrush current • PFC Choke • Wide range input; auto select input • Superior overload design (continuous current, no hiccup) • NEC Class 2 "Limited Power" • Selectable operating mode (single/parallel) • Superior efficiency and temperature rating • Output signals	• Ultra-small size • Extra-low inrush current • Active Power Factor Correction • Wide range AC/DC input; auto select input • Superior reserve power (can support 150% rated power for 3...5 seconds) • Superior efficiency and temperature rating • DC OK and Overload LED	• Rugged industrial design • DIN Rail or Back of Panel mountable • Elevated temperature performance (up to 50°C) • Comprehensive network management • Remote monitoring/configuration • "Dry contact" I/O • Line interactive • Pure sine wave output	• Wide VA range • Enclosed construction 63...350 VA • Terminal covers finger safe • Optional fuse covers available • Dual primary and secondary fuse block available to 500 VA • Class B insulation (130°C) • All welded construction
Output Power (Watts/VA)	25…100 W	60...960 W	80...480 W	325 W/500 VA	63..2000 VA
Input Voltage / Primary Voltage	85…264V AC 85…375V DC	85…132/176…264/340…576V AC 160...375/450…820V DC	85…276/323…552V AC 88…375/450…780V DC	120, 208/230V AC	208…600V
Efficiency	80...90%	87...93%	91.6...95%	96%	—
Output Voltage / Secondary Voltage	5, 10...12, 12, 15, 24, 48V DC	24, 36, 48V DC	24V DC	120, 208/230V AC	24…120V Multi-tap 115…230V (50 Hz)
Rated Output Current	1.3…4.2 A	2.5…40 A	3.4…20 A	4.2 A	—
Operating Temperature Range (Tamb)	-10…+70°C >60°C with derating	-10…+70°C >60°C with derating	-25…+70°C >60°C with derating	0…50°C	—
Non-Operating Temperature Range	-40…+85°C			-20…+60°C	—
Insulation	—	—	—	—	Class B 130°C
Certifications	cULs, CE	cULs, CE	cULs, CE	UL, CSA, CE	cULs, CE
Standards	EN 50081-1, EN 61000-6-2, EN 61000-3-2 (A14) UL 508 UL 1950	EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, EN 61000-3-2 (A14), EN 50081-1 UL 508 UL 1950	EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, EN 61000-3-2 (A14), EN 50081-1 UL 508 UL 1950	EN 50091-1-1, EN 50091-2 (Class 2) UL 1778	EN 60529
Special Application Products	• Compact Redundancy Module for 10…60V DC • 50 W Device with Removable Terminal Blocks • Buffer Module for Extended Ride-Through • Redundant Power Supplies • Redundancy Modules				
Product Selection	**Page 11**	**Page 11**	**Page 11**	**Page 23**	**Page 27**

Switched Mode Power Supplies

Product Overview/Product Sizing

Bulletin 1606 — Power Supplies ✶❄

- Quick mounting and connecting, innovative DIN-Rail mount, smallest in class
- 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

Standards Compliance

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

Table of Contents

Certifications

CE, c UL us LISTED, c UL us N223

✶ 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
‡ Dual UL rating with cURus 60950 relating to certified use in information technology.

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.

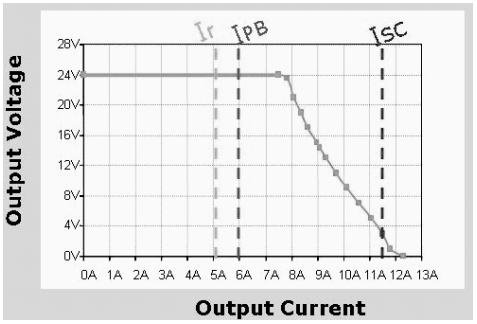
Notes:

- PowerBoost will deliver up to 25% additional current continuously at 40 deg C or less.
- ReservePower will deliver 150% of rated current for up to 4 sec.

Example:

Application: Single Phase 120V input, 24V output, 6 A continuos current @ 35 °C, with 9 A inrush current **Solution:** 1606-XL120D

Output Characteristic for XL120D (5 A) Power Supply



I_{RATED}: 5 A
$I_{SHORT\ CIRCUIT}$: >10 A
$I_{POWER\ BOOST}$: 6 A

Cat. No.	I_{RATED}	$I_{SHORT\ CIRCUIT\ (25°C)}$	$I_{POWER\ BOOST}$ or $I_{RESERVEPOWER}$
1606-XLS80E	3.4 A	5.2 A	5.4 A§
1606-XLS120E	5.0 A	9.0 A	7.5 A§
1606-XLS240E	10 A	21 A	15 A§
1606-XLS480E-3	20 A	29 A	30 A§
1606-XLSDNET4	3.8 A	4.0 A	—
1606-XLSDNET8	8.0 A	7.0 A	—
1606-XLP25A	5.0 A	5.0 A	—
1606-XLP30B	3.0 A	4.0 A	—
1606-XLP30E	1.3 A	1.9 A	—
1606-XLP36C	2.8 A	2.0 A	—
1606-XLP50B	4.2 A	4.3 A	—
1606-XLP50E	2.1 A	3.1 A	—
1606-XLP50EZ	2.1 A	3.1 A	—
1606-XLP50F	1.0 A	1.7 A	—
1606-XLP72E	3.0 A	4.5 A	—
1606-XLP90B	8.0 A	8.0 A	—
1606-XLP95E	3.9 A	7.0 A	—
1606-XLP100E	4.2 A	7.1 A	—
1606-XLP100F	2.1 A	3.6 A	—
1606-XL60D	2.5 A	4.5 A♣	—
1606-XL120D	5.0 A	10 A♣	6.0 A
1606-XL180B	15 A	21 A♣	—

Cat. No.	I_{RATED}	$I_{SHORT\ CIRCUIT\ (25°C)}$	$I_{POWER\ BOOST}$ or $I_{RESERVEPOWER}$
1606-XL240E	10 A	18 A♣	12 A
1606-XL240EP	10 A	18 A♣	12 A
1606-XL240FP	5.0 A	10 A♣	6.0 A
1606-XL480E	20 A	N/A➢	25 A
1606-XL480EP	20 A	22 A	25 A
1606-XL480EPT	20 A	22 A	25 A
1606-XL480GP	13.3 A	12 A	16.6 A
1606-XL480F	10 A	24 A	12.5 A
1606-XL120E-3	5.0 A	11 A♣	6.0 A
1606-XL240E-3	10 A	22 A♣	12 A
1606-XL480E-3	20 A	N/A➢	25 A
1606-XL480E-3W	20 A	25 A	25 A
1606-XL480F-3H	10 A	N/A➢	12.5 A
1606-XL720E-3	30 A	N/A➢	33 A
1606-XL960E-3	40 A	44 A	45 A
1606-XL960E-3S	40 A	44 A	45 A
1606-XLDNET4	4.0 A	3.8 A♣	—
1606-XLDNET8	8.0 A	6.0 A♣	—
1606-XL60DR	2.5 A	4.5 A♣	—
1606-XL120DR	5.0 A	10 A♣	6.0 A
1606-XL240DR	10 A	18 A♣	12 A

§ 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.

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

	30...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	XLP25A	—	—	—	—	—	—	—	—	—	—
10...12V	XLP30B	—	—	—	—	—	—	—	—	—	—
12...15V	—	XLP50B	—	—	XLP90B	—	XL180B	—	—	—	—
(+/-)12 and 15V	XLP36C	—	—	—	—	—	—	—	—	—	—
24...28V 1-Ph	XLP30E	XLP50E XLP50EZ	XL60D	XLP72E XLS80E	XLP95E XLP100E	XLS120E XL120D	—	XLS240E XL240E XL240EP	XL480E XL480EP XL480EPT	—	—
24...28V 3-Ph	—	—	—	—	—	XL120E-3	—	XL240E-3	XLS480E-3 XL480E-3 XL480E-3W XL480F-3H	XL720E-3	XL960E-3 XL960E-3S
36...43V	—	—	—	—	—	—	—	—	XL480GP	—	—
48...56V	—	XLP50F	—	—	XLP100F	—	—	XL240FP	XL480F	—	—
24V Redundant	—	—	XL60DR	—	—	XL120DR	—	XL240DR XLPRED	XLSRED XLRED20-30	XLRED20-30	XLRED40
DeviceNet	—	—	—	—	XLSDNET4 XLDNET4	—	—	XLSDNET8 XLDNET8	—	—	—

⌘ Example: For a 24...28 Volt, 3-Phase, 120 Watt power supply, the Catalog Number would be 1606-XL120E-3.

Special Applications

Meets NEC Class 2

- 1606-XLP25A
- 1606-XLP30B
- 1606-XLP30E
- 1606-XLP36C
- 1606-XLP50B
- 1606-XLP50E
- 1606-XLP50EZ
- 1606-XLP50F
- 1606-XLP72E
- 1606-XLP90B
- 1606-XLP95E
- 1606-XL60D
- 1606-XLDNET4
- 1606-XL60DR
- 1606-XLSDNET4

Meets ABS/GL/RINA (Marine)

- 1606-XLP25A
- 1606-XLP30E
- 1606-XLP36C
- 1606-XLP50E
- 1606-XLP50EZ
- 1606-XLP72E
- 1606-XLP90B
- 1606-XLP100E
- 1606-XLP100F
- 1606-XLPRED

Meets Hazardous Location Rating, Class 1 Div. 2

- 1606-XLS80E
- 1606-XLS120E
- 1606-XLS240E
- 1606-XLS480E-3
- 1606-XLSDNET4
- 1606-XLSDNET8
- 1606-XLSRED
- 1606-XLP25A
- 1606-XLP30B
- 1606-XLP30E
- 1606-XLP50B
- 1606-XLP50E
- 1606-XLP50EZ
- 1606-XLP72E
- 1606-XLP90B
- 1606-XLP95E
- 1606-XLP100E
- 1606-XLPRED
- 1606-XL240E
- 1606-XL240EP

Meets Semiconductor F47 Sag Immunity Requirements

Product	Input Mains Voltage	Output Current Range
• 1606-XLS80E	Full Range	Full Range
• 1606-XLS120E	Full Range	Full Range
• 1606-XLS240E	Full Range	Full Range
• 1606-XLS480E-3	Full Range	Full Range
• 1606-XLSDNET4	Full Range	Full Range
• 1606-XLSDNET8	Full Range	Full Range
• 1606-XLP30E	AC 200V or higher	Full Range up to 1.3 A
• 1606-XLP50E	AC 200V or higher	Full Range up to 2.1 A
• 1606-XLP100E	AC 200V or higher	Full Range up to 4.2 A
• 1606-XL60D	AC 120V or higher	Full Range up to 2.5 A
• 1606-XL120D	AC 120V or higher	Full Range up to 5 A
• 1606-XLDNET4	AC 120V or higher	Up to 3 A
• 1606-XL480E	AC 200V or higher	Full Range up to 20 A

Meets ODVA Requirements

- 1606-XLSDNET4
- 1606-XLSDNET8

Power Supply Cat. No. 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 table on page 11. Then, use this breakdown for verification and explanation only.

1606 – XL 240 E P – 3

a *b* *c* *d* *e*

a

Power Supply Type	
Code	Description
XLP	Compact family
XL	Standard family
XLS	Performance family

b

Rated Output Watts	
Code	Description
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

d

Special Functions	
Code	Description
R	Redundancy module
P	Power factor correction
S	Special output signals
L	Load sharing
T	Remote shutdown
Z	Removeable Terminations
X	Semi-Regulated
	Can be left blank

e

3-Phase Variations	
Code	Description
-3	Three phase
-3H	Three phase, input voltage 400V AC and 450...700V DC
-3W	Three phase, wide input range
-3S	Three phase, special output signals

Bulletin 1606 Product Selection Table

	Output Power	Output Voltage	Output Current	Input Circuit Protection/UL Test Level	Inrush Current	Parallel Operation (inclined Characteristics)	Meets EN 61000-3-2 (PFC Harmonics)	Cat. No.
Performance Single and Three Phase	80 W	24…28V DC	3.4 A	6 A SLOW BLOW FUSE OR 1492-SPU1C060/20 A♣	<7.0 A	Yes	Yes	1606-XLS80E
	120 W	24…28V DC	5.0 A	6 A SLOW BLOW FUSE OR 1492-SPU1C060/20 A♣	<4.9 A	Yes	Yes	1606-XLS120E
	240 W	24…28V DC	10 A	6 A SLOW BLOW FUSE OR 1492-SPU1C060/20 A♣	<7.6 A	Yes	Yes	1606-XLS240E
	480 W	24…28V DC	20 A	6 A (X3) SLOW BLOW FUSE OR 1492-SP3C060	<4.0 A	Yes	Yes	1606-XLS480E-3
	91 W	24V DC	3.8 A	6 A SLOW BLOW FUSE OR 1492-SPU1C060/20 A♣	<4.9 A	Yes	Yes	1606-XLSDNET4
	192 W	24V DC	8.0 A	6 A SLOW BLOW FUSE OR 1492-SPU1C060/20 A♣	<7.6 A	Yes	Yes	1606-XLSDNET8
Compact Single Phase	25 W	5…5.5V DC	5.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP25A
	30 W	10…12V DC	3.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP30B
		24…28V DC	1.3 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP30E
	36 W	+/- 12/15V DC	2.8 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP36C
	50 W	12…15V DC	4.2 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP50B
		24…28V DC	2.1 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP50E
		24…28V DC	2.1 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP50EZ
		48…56V DC	1.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<18 A	—	N/A	1606-XLP50F
	72 W	24…28V DC	3.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<30 A	—	N/A	1606-XLP72E
	90 W	12…15V DC	8.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<30 A	Yes	Yes	1606-XLP90B
	95 W	24…28V DC	3.9 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<30 A	—‡	Yes	1606-XLP95E
	100 W	24…28V DC	4.2 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<30 A	Yes‡	Yes	1606-XLP100E
		48…56V DC	2.1 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/15 A♣	<30 A	Yes‡	Yes	1606-XLP100F
Standard Single Phase	60 W	24V DC	2.5 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A♣	<18 A	—	Yes	1606-XL60D
	120 W		5.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A♣	<11 A	—	Yes	1606-XL120D
	180 W	12…15V DC	15 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A♣	<21 A	—	No	1606-XL180B
	240 W	24…28V DC	10 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A♣	<21 A	—	No	1606-XL240E
				10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A♣	<21 A	—	Yes	1606-XL240EP
		48…56V DC	5.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A♣	<21 A	—	Yes	1606-XL240FP
	480 W	24…28V DC	20 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A♣	<23 A	Yes‡	No	1606-XL480E
				10 A SLOW BLOW FUSE OR 1492-SPU1C100	<18 A @ 25°C	Yes‡	Yes	1606-XL480EP
				10 A SLOW BLOW FUSE OR 1492-SPU1C100	<18 A @ 25°C	Yes‡	Yes	1606-XL480EPT
		36…43V DC	13.3 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100	<18 A @ 25°C	Yes‡	Yes	1606-XL480GP
		48…56V DC	10 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100	<18 A @ 25°C	Yes‡	No	1606-XL480F
Standard Three Phase	120 W	24…28V DC	5.0 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<25 A	—	Yes	1606-XL120E-3
	240 W		10 A	6 A (X3) SLOW BLOW FUSE OR 1492-SP3C060/15 A♣	<17 A	Yes‡	Yes	1606-XL240E-3
	480 W		20 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<11 A	Yes‡	Yes	1606-XL480E-3
			20 A	6 A (X3) SLOW BLOW FUSE OR 1492-SP3C060/16 A♣	<7 A	Yes‡	Yes	1606-XL480E-3W
		48…56V DC	10 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<15 A	Yes‡	Yes	1606-XL480F-3H
	720 W	24…28V DC	30 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<17 A	Yes‡	Yes	1606-XL720E-3
	960 W		40 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<30 A	Yes‡	Yes	1606-XL960E-3
			40 A	10 A (X3) SLOW BLOW FUSE OR 1492-SP3C100	<30 A	Active current sharing	Yes	1606-XL960E-3S
1606-XL Special Modules								
Special Modules	480 W	23…27.8V DC	20 A	N/A	—	—	N/A	1606-XLBUFFER
	40 W	5.1V DC	8.0 A	N/A	<5 A	—	No	1606-XLDC40A
	96 W	24V DC	4.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A♣	<11 A	—	Yes	1606-XLDNET4
	196 W	24V DC	8.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A♣	<21 A	—	No	1606-XLDNET8
	60 W	24V DC	2.5 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A✦♣	<18 A	Yes‡	N/A	1606-XL60DR
	120 W		5.0 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/16 A✦♣	<11 A	Yes‡	Yes	1606-XL120DR
	240 W		10 A	10 A SLOW BLOW FUSE OR 1492-SPU1C100/10 A✦♣	<21 A	Yes‡	No	1606-XL240DR
	720 W	V_{in} -.5V typ	30 A	N/A❄	N/A	—	N/A	1606-XLRED20-30
	960 W	V_{in} -.6V typ	40 A	N/A§	N/A	—	N/A	1606-XLRED40
	384 W	V_{in} 1 -.9V typ	16 A➢	N/A	N/A	—	N/A	1606-XLPRED
	480 W	V_{in} 1 -.9V typ	20 A➢	N/A	N/A	—	N/A	1606-XLSRED

✦ Used with a pair of identical power supplies to offer N+1 redundancy.
❄ To be used alongside 20, 30 and 40 A power supplies.
‡ Single/parallel operation (inclined characteristic) selectable (jumper).
§ To be used alongside 40 A power supplies (or smaller).
♣ 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.
➢ See product specifications for proper use.

Accessories

Description	Cat. No.
Back of panel bracket for XL	1606-XLA
Back of panel bracket for XLS	1606-XLB

1606-XLS Performance Specifications

				
	1606-XLS80E	**1606-XLS120E**	**1606-XLS240E**	**1606-XLS480E-3**
Output Volts/Watts	24…28V/80W	24…28V/120W	24…28V/120W	24…28V/480W
Input Voltage❄	AC 100…240V, DC 110...300V	AC 100…240V, DC 110...300V	AC 100…240V, DC 110...300V	3 AC 380…480V, DC 600V
Operational Range	85…276 V AC, 88…375 V DC	85…264 V AC, 88…360 V DC	85…276 V AC, 88…375 V DC	323…552 V AC, 450…780 V DC
Hold-up Time	27…174 ms	33…59 ms	27 ms	19 ms
Rated Input Current	8.0 A (AC 100V), 1.0 A (AC 240V)	1.4 A (AC 100V), 0.65 A (AC 240V)	2.8 A (AC 100V), 1.2 A (AC 240V)	0.9 A (AC 380V), 0.65 A (AC 480V)
Efficiency	typ. 90.0%	typ. 92.7%	typ. 91.8%	typ. 94.8%
Output Voltage	24…28V	24…28V	24…28V	24…28V
Rated Output Current	3.4 A (at 24V) 3.0 A (at 28V)	5 A (at 24V) 4.5 A (at 28V)	10 A (at 24V) 9 A (at 28V)	20 A (at 24V) 17.5 A (at 28V)
ReservePower (typ. 4 sec.)	5.4 A (at 24V) 5.0 A (at 28V)	7.5 A (at 24V) 6.7 A (at 28V)	15 A (at 24V) 13.5 A (at 28V)	30 A (at 24V) 26 A (at 28V)
Line/Load Regulation (typ.)	<0.036%/<0.18%			
Ripple/Noise	<100 mV_{PP}	<50 mV_{PP}	<50 mV_{PP}	<100 mV_{PP}
Operating Temperature Range (T_{amb})	-25...+70 °C >60 °C with derating			
Non-Operating Temperature Range	-40...+85 °C			
MTBF♣	>650 000 hours	>831 000 hours	>581 000 hours	>690 000 hours
Dimensions (W x H x D)	32 x 124 x 102 mm	40 x 124 x 117 mm	60 x 124 x 117 mm	65 x 124 x 127 mm
Weight	420 g	620 g	900 g	870 g
Certifications/Standards✶	1, 2, 3, 5, 6, 7			
Special Features	Active PFC; Class 1 Div. 2; Semi F47			

		
	1606-XLSDNET4	**1606-XLSDNET8**
Output Volts/Watts	24V/91W	24V/192W
Input Voltage❄	AC 100…240V; DC 110...300V	
Operational Range	85…264 V AC 88…360 V DC	85…276 V AC 88…375 V DC
Hold-up Time	43 ms (AC 120V) 77 ms (AC 240V)	38 ms (AC 120V) 41 ms (AC 240V)
Rated Input Current	1.1 A (AC 100V) 0.5 A (AC 240V)	2.3 A (AC 100V) 1.0 A (AC 240V)
Efficiency	typ. 92.4%	typ. 92.7%
Output Voltage	24V	
Rated Output Current	3.8 A	8 A
Line/Load Regulation (typ.)	<0.04%/<0.146%	
Ripple/Noise	< 50 mV_{pp}	
Operating Temperature Range (T_{amb})	-25...+70 °C >60 °C with derating	
Non-Operating Temperature Range	-40...+85 °C	
MTBF♣	>581 000 hours	>831 000 hours
Dimensions (W x H x D)	40 x 124 x 117 mm	60 x 124 x 117 mm
Weight	620 g	900 g
Certifications/Standards✶	1, 2, 3, 5, 6, 7	
Special Features	NEC Class 2 power supply; Active PFC; ODVA Approved; Class 1 Div. 2; Semi F47	Active PFC; ODVA Approved; Class 1 Div. 2; Semi F47

✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 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
❄ 47...63Hz
♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

1606-XLP Compact Single Phase Specifications

					
	1606-XLP25A	**1606-XLP30B**	**1606-XLP30E**	**1606-XLP36C**	**1606-XLP50B**
Output Volts/Watts	5...5.5V/25 W	10...12V/30 W	24...28V/30 W	±12V/±15V/36 W	12...15V/50 W
Input Voltage❄	AC 100...240V wide range; DC 85...370V	AC 100...240V wide range; DC 85...375V		AC 100...240V wide range; DC 85...375V	AC 100...240V wide range; DC 85...375V
Operational Range	85...264 V AC				
Hold-up Time	>170 ms (AC 230V) >19 ms (AC 100V)	>170 ms (AC 230V) >18 ms (AC 100V)	>190 ms (AC 230V) >19 ms (AC 100V)	>180 ms (AC 230V) >18 ms (AC 100V)	>170 ms (AC 230V) >17 ms (AC 100V)
Rated Input Current	<0.5 A (AC 100V) <0.35 A (AC 196V)	<0.6 A (AC 100V) <0.25 A (AC 240V)	<0.6 A (AC 100V) <0.35 A (AC 196V)	<0.65 A (AC 100V) <0.4 A (AC 196V)	<1.0 A (AC 100V) <0.6 A (AC 196V)
Efficiency	typ. >80%	typ. 84%	typ. 87.5%	typ. 86%	typ. 90%
Output Voltage	5...5.5V 5.1V preset	10...12V 12V preset (with jumper), 10...12V adjustable (without jumper)	24...28V 24.5V preset	±12V (without jumper), ±15V (with jumper) ±15V preset	12...15V 15V preset (with jumper) 12...15V adjustable (without jumper)
Rated Output Current	5 A (at 5.1V), 4.5 A (at 5.5V)	3 A (at 10V), 2.5 A (at 12V)	1.3 A (at 24.5V), 1 A (at 28V)	0...2.8 A (+12V), 0...1.4 A (-12V) 0...2.4 A (+15V), 0...1.4 A (-15V)	4.2 A (at 12V), 3.4 A (at 15V)
Line/Load Regulation (typ.)	<0.18%/<0.72%	<0.083%/<0.33%	<0.036%/<0.18%	<0.06%/<0.10%	<0.06%/<0.40%
Ripple/Noise	<50 mV_{pp}	<10 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}	<100mV_{pp}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C: 0.5 W/K derating				
Non-Operating Temperature Range	-40...+85 °C				
MTBF♣	600 000 hours	appr. 650 000 hours		600 000 hours	appr. 600 000 hours
Dimensions (W x H x D)	45 x 75 x 91 mm				
Weight	240 g	250 g	230 g	240 g	260 g
Certifications/Standards✶	1, 2, 3, 5, 6				
Special Features	NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2	NEC Class 2 power supply; Class 1 Div. 2	NEC Class 2 power supply; Class 1 Div. 2; Semi F47	Output voltage adjustable: DC ±12V without jumper or DC ±15V with jumper; NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2	Output voltage adjustable: DC 12...15V without jumper or DC 15V with jumper; NEC Class 2 power supply; Class 1 Div. 2

					
	1606-XLP50E	**1606-XLP50EZ**	**1606-XLP50F**	**1606-XLP72E**	**1606-XLP90B**
Output Volts/Watts	24...28V/50 W		48...56V/50 W	24...28V/72 W	12...15V/90 W
Input Voltage❄	AC 100...240V wide range; DC 85...375V			AC 100...120/220...240V manual select; DC 220...375V	AC 100...120/220...240V; DC 220...375V
Operational Range	85...264 V AC			85...132/184...264 V AC	
Hold-up Time	>171 ms (AC 230V) >17 ms (AC 100V)		>170 ms (AC 230V) >17 ms (AC 100V)	>40 ms (AC 230V) >25 ms (AC 100V)	>40 ms (230V) >20 ms (AC 196V, AC 100V)
Rated Input Current	<1.0 A (AC 100V) <0.6 A (AC 196V)			<1.6 A (AC 100V) <0.8 A (AC 220V)	<1.9 A
Efficiency	typ. 88.5%		typ. 90%	typ. 89%	typ. 88.5%
Output Voltage	24...28V 24.5V preset		48...56V 48V preset	24...28V 24.5V preset (at 2.9 A)	12...15V Preset at 12V
Rated Output Current	2.1 A (at 24.5V), 1.8 A (at 28V)		1.05 A (at 48V), 0.9 A (at 56V)	3 A (at 24V), 2.6 A (at 28V)	7.5 A (at 12V), 6 A (at 15V)
Line/Load Regulation (typ.)	<0.036%/<0.18%		<0.017%/<0.21%	<0.036%/<0.43%	<0.06%/<0.50%
Ripple/Noise	<50 mV_{pp}		<200 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C: 1 W/K derating			-10...+70 °C >60 °C: 1.5 W/K derating	-10...+70 °C >60 °C: 1 W/K derating
Non-Operating Temperature Range	-40...+85 °C				
MTBF♣	appr. 600 000 hours			appr. 600 000 hours	appr. 500 000 hours
Dimensions (W x H x D)	45 x 75 x 91 mm			45 x 75 x 91 mm	73 x 75 x 103 mm
Weight	240 g			260 g	360 g
Certifications/Standards✶	1, 2, 3, 5, 6			1, 2, 3, 5, 6	1,2,3,5,6,7
Special Features	NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2; Semi F47	Removeable Terminations; NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2	NEC Class 2 power supply	NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2	NEC Class 2 power supply; ABS/GL/RINA (Marine); Class 1 Div. 2

✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 5) Safety standards = IEC/EN 60950, EN 50178, 6) EMC standards = EN 50081-1, EN 61000-6-2, 7) EN 61000-3-2 (A14)

❄ 47...63Hz

♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

Switched Mode Power Supplies

Compact and Standard Single Phase Specifications

1606-XLP Compact Single Phase and 1606-XL Single Phase Specifications

						
	1606-XLP95E	**1606-XLP100E**	**1606-XLP100F**	**1606-XL60D**	**1606-XL120D**	**1606-XL180B**
Output Volts/Watts	24...28V/95 W	24...28V/100 W	48...56V/100 W	24V/60 W	24V/120 W	12...15V/180 W
Input Voltage❄	AC 100...120/220...240V auto select; DC 220...375V			AC 100...120/200...240V manual select; DC 160...375V	AC 100...120/200...240V manual select; DC 210...375V	AC 100...120/220...240V; DC 240...375V
Operational Range	85...132/184...264 V AC			85...132/176...264 V AC		
Hold-up Time	>40 ms (AC 230V) >20 ms (AC 100V)			>20 ms (AC 196V)	>37 ms (AC 196V)	>81 ms (AC 230V) >84 ms (AC 120V) >45 ms (AC 100V)
Rated Input Current	<2.0 A (AC 100V) <0.95 A (AC 220V)	<2.1 A (AC 100V) <1.0 A (AC 220V)		<1.3 A (115V)/<0.7A (230V)	<2.6 A (115V)/<1.4 A (230V)	<5A (115V)/<2.3 A (230V)
Efficiency	typ. 90%		typ. 91%	typ. 87.5%	typ. 90%	typ. >87%
Output Voltage	24...28V 24.5V preset		48...56V 48V preset	24V	24V	12...15V Preset at 12V
Rated Output Current	3.9 A (at 24.5V), 3.2 A (at 28V)	4.2 A (at 24.5V), 3.6 A (at 28V)	2.1 A (at 48V), 1.8 A (at 56V)	2.5 A	5 A	15 A (at 12V), 12 A (at 15V)
Power Boost	—	—	—	—	6 A	18 A
Line/Load Regulation (typ.)	<0.036%/<0.43%	<0.036%/<0.40%	<0.017%/<0.40%	<0.04%/<0.21%	<0.04%/<0.21%	<0.06%/<0.50%
Ripple/Noise	<50 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}	<25 mV_{pp}	<50 mV_{pp}	<50 mV_{pp}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C: 2 W/K derating			-10...+70 °C >60 °C with derating		0...70 °C >60 °C with derating
Non-Operating Temperature Range	-40...+85 °C			-40...+85 °C		
MTBF♣	appr. 500 000 hours			740 000 hours	520 000 hours	<425,000 hours
Dimensions (W x H x D)	73 x 75 x 103 mm			49 x 124 x 102 mm	64 x 124 x 102 mm	120 x 124 x 102 mm
Weight	360 g			460 g	620 g	980 g
Certifications/Standards✶	1, 2, 3, 5, 6, 7			1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6, 7	1,2,3,5,6
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)	NEC Class 2 power supply; Semi F47	Semi F47	

					
	1606-XL240E	**1606-XL240EP**	**1606-XL240FP**	**1606-XL480E**	**1606-XL480EP**
Output Volts/Watts	24...28V/240 W	24...28V/240 W	48...56V/240 W	24...28V/480 W	
Input Voltage❄	AC 100...120/200...240V manual select; DC 240...375V			AC 200...240V; DC 270...370V	AC 100...120/200...240V
Operational Range	85...132/176...264 V AC			184...264 V AC	85...132/184...264 V AC
Hold-up Time	>25 ms (AC 196V)	>20 ms (AC 196V)	>25 ms (AC 196V)	>20 ms (AC 230V)	>30 ms (AC 120/230V)
Rated Input Current	<6 A (115V)/<2.8 A (230V)			5 A	10 A (115V)/5 A (230V)
Efficiency	typ. 90%	typ. 89%	typ. 90%	typ. 91%	typ. 90.5%
Output Voltage	24...28V 24.5V preset	24...28V 24.5V preset	48...56V 48.5V preset	24...28V Front panel potentiometer	
Rated Output Current	10 A (at 24V), 8.6 A (at 28V)		5 A (at 48V), 4.3 A (at 56V)	20 A (at 24V), 18 A (at 28V)	
Power Boost	12 A		6 A	25 A (22 A)	
Line/Load Regulation (typ.)	<0.036%/<0.18%	<0.036%/<0.18%	<0.017%/<0.18%	<0.036%/<0.21%	<0.036%/<0.20%
Ripple/Noise	<30 mV_{pp}	<30 mV_{pp}	<50 mV_{pp}	< 20 mV_{pp} (single operation) <40 mV_{pp} (parallel operation)	
Operating Temperature Range (T_{amb})	0...+70 °C >60 °C with derating				
Non-Operating Temperature Range	-40...+85 °C				
MTBF♣	425 000 hours	225 000 hours	425 000 hours	310 000 hours	519 000 hours
Dimensions (W x H x D)	120 x 124 x 102 mm			220 x 124 x 102 mm	
Weight	980 g	1195 g	980 g	1800 g	2500 g
Certifications/Standards✶	1, 2, 3, 5, 6	1, 2, 3, 5, 6, 7		1,2,3,5,6	1,2,3,5,6,7
Special Features	Class 1 Div. 2	Class 1 Div. 2	PFC choke	Single/parallel operation (inclined characteristic) selectable (jumper); Semi F47; ‡	PFC choke; Overload behavior selectable (hiccup/continuous current); ‡

✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 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

❄ 47...63Hz

‡ Low inrush current

♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

1606-XL Single Phase Specifications, Continued

			
	1606-XL480EPT	**1606-XL480GP**	**1606-XL480F**
Output Volts/Watts	24...28V/480 W	36...43V/480 W	48...56V/480 W
Input Voltage❄	AC 100...120/200...240V		
Operational Range	85...132/184...264 V AC		
Hold-up Time	30 ms (AC 120/230V)	>27 ms (AC 230V)	30 ms (AC 230V)
Rated Input Current	10 A (115V)/5 A (230V)		
Efficiency	typ. 90.5%	typ. 92%	typ. 93%
Output Voltage	24...28V Front panel potentiometer	36...43V Front panel potentiometer	48...56V Front panel potentiometer
Rated Output Current	20 A (at 24V), 18 A (at 28V)	13.3 A (at 36V), 11.2 A (at 43V)	10 A (at 48V), 8.6 A (at 56V)
Power Boost	25 A (22 A)	16.6 A (14 A)	12.5 A (10.7 A)
Line/Load Regulation (typ.)	<0.036%/<0.20%	<0.023%/<0.26%	<0.017%/<0.27%
Ripple/Noise	< 20 mV_{pp} (single operation) <40 mV_{pp} (parallel operation)	<30 mV_{pp} (single operation) <80 mV_{pp} (parallel operation)	<40 mV_{pp} (single operation) <80 mV_{pp} (parallel operation)
Operating Temperature Range (T_{amb})	0...+70 °C >60 °C with derating		
Non-Operating Temperature Range	-40...+85 °C		
MTBF♣	519 000 hours		
Dimensions (W x H x D)	220 x 124 x 102 mm		
Weight	2500 g		1800 g
Certifications/Standards✶	1, 2, 3, 5, 6, 7		1, 2, 3, 5, 6
Special Features	PFC choke; ‡	Selectable single/parallel operation (inclined characteristic); PFC choke; ‡	‡

1606-XL Three Phase Specifications

				
	1606-XL120E-3	**1606-XL240E-3**	**1606-XL480E-3**	**1606-XL480E-3W**
Output Volts/Watts	24...28V/120 W	24...28V/240 W	24...28V/480 W	24...28V/490 W
Input Voltage❄	3Ø AC 400...500V wide range; DC 450...820V	3Ø AC 400...500V wide range; DC 450...820V	3Ø AC 480V; DC 550...820V	3Ø AC 400...500V wide range; DC 450...820V
Operational Range	340...576 V AC		408...576 V AC	340...576 V AC
Hold-up Time	>16 ms (3Ø AC 400V) >10 ms (2Ø AC 400V)	>24 ms (3Ø AC 400V) >20 ms (2Ø AC 400V)	>11 ms	>11 ms (3Ø AC 400V)
Rated Input Current	3 x 0.5 A	3 x 0.8/0.7 A @ 400/500V	3 x 1.5 A	
Efficiency	typ. 89%	typ. 92%	typ. 92%	typ. 92%
Output Voltage	24...28V 24.5V preset	24...28V 24.5V preset	24...28V 24V preset	24...28V 24.5V preset
Rated Output Current	5 A (at 24V), 4.3 A (at 28V)	10 A (at 24V) 8.6 A (at 28V)	20 A (at 24V), 18 A (at 28V)	
Power Boost	6 A	12 A (up to 288 W)	25 A	
Line/Load Regulation (typ.)	<0.036%/<0.18%	<0.036%/<0.18%	<0.036%/<0.20%	<0.036%/<0.20%
Ripple/Noise	<25 mV_{PP}	<30 mV_{PP}	<20 mV_{PP}	<30 mV_{PP}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C with derating	0...+70 °C >60 °C with derating	0...+70 °C >60 °C with derating	
Non-Operating Temperature Range	-40...+85 °C			
MTBF♣	410 000 hours	543 000 hrs. (3-ph), 525 000 hrs. (2-ph)	310 000 hours	504 000 hours
Dimensions (W x H x D)	73 x 124 x 117 mm	89 x 124 x 117 mm	220 x 124 x 102 mm	150 x 124 x 121 mm
Weight	730 g	980 g	1800 g	
Certifications/Standards✶	1, 2, 3, 5, 6, 7			
Special Features	PFC choke	Overload behavior selectable (FUSE Mode/continuous current); 2-phase operation admissible, Single/parallel operation (inclined characteristic); PFC choke; ‡	Single/parallel operation (inclined characteristic) selectable (jumper); PFC choke; ‡	Single/parallel operation (inclined characteristic) selectable; Overload behavior selectable (FUSE Mode/continuous current); PFC choke; ‡

✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 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
❄ 47...63Hz
‡ Low inrush current
♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

Switched Mode Power Supplies

Standard Three Phase Specifications, Continued

1606-XL Three Phase Specifications, Continued

				
	1606-XL480F-3H	**1606-XL720E-3**	**1606-XL960E-3**	**1606-XL960E-3S♣**
Output Volts/Watts	48...56V/480 W	24...28V/720 W	24...28V/960 W	
Input Voltage❄	3Ø AC 400V; DC 450...700V	3Ø AC 400...500V wide range; DC 450...820V	3Ø AC 400...500V wide range	
Operational Range	340...479 V AC	340...576 V AC		
Hold-up Time	>11 ms	>10 ms (3Ø AC 400V)	>15 ms (3Ø AC 400V)	
Rated Input Current	3 x 1.5 A	3 x 2.0 A	3 x 3.0 A	
Efficiency	typ. 92%	typ. 92.5%	typ. 92.5%	
Output Voltage	48...56V 48.1V preset	24...28V front panel potentiometer	24...28V front panel potentiometer	
Rated Output Current	10 A (at 48V), 9 A (at 56V)	30 A (at 24V), 26 A (at 28V)	40 A (at 24V), 35 A (at 28V)	
Power Boost	12.5 A	33 A	45 A	
Line/Load Regulation (typ.)	<0.017%/<0.20%	<0.036%/<0.20%	<0.036%/<0.25%	
Ripple/Noise	<50 mV_{PP}	<20 mV_{PP} (single operation) <40 mV_{PP} (parallel operation)	<50 mV_{PP}	
Operating Temperature Range (T_{amb})	0...+70 °C >60 °C with derating			
Non-Operating Temperature Range	-40...+85 °C			
MTBF§	310 000 hours	425 000 hrs. @ AC 400V, 360 000 hrs. @ AC 480V	305 000 hours	268 000 hours
Dimensions (W x H x D)	220 x 124 x 102 mm	240 x 124 x 112 mm	275 x 124 x 117 mm	
Weight	1800 g	2000 g	3300 g	
Certifications/Standards✶	1, 2, 3, 5, 6, 7			
Special Features	Single/parallel operation (inclined characteristic) selectable (jumper); PFC choke; ‡	PFC choke; ‡	Single/parallel operation (inclined characteristic) selectable (jumper); passive load sharing; PFC choke; ‡	Parallel operation through active current sharing; Output signals (Power-Fail, Shut-Down, internal current measurement, overtemperature warning); PFC choke; ‡♣

✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 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

❄ 47...63Hz

‡ Low inrush current

§ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

♣ 1606-XL960E-3S Signalling details below:

"Shut Down" Input

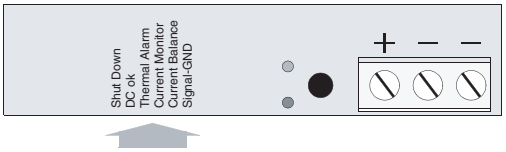
Function: Turning the unit on or off using logic signal (remote monitoring) Unit switches off when Input is connected to "Signal GND" terminal (DU ≤ 1V) or the input has a voltage of +20...28V with respect to the "Signal GND" terminal (max. 20 mA).

"DC Ok" Output

Function: Indicating whether the unit is operating properly. Output can directly energize a relay or a control light.
Signalling: 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 k ohm 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.
Signalling: 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

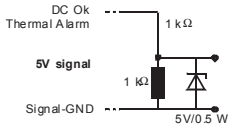
Function: Measuring the output current (power output). Output signal is proportional to the output current of the unit.
Connection: Made with respect to the "Signal GND" terminal (signal output).
Important: Do not connect to the power output (terminals + and -).
Signalling:
Voltage measuring: Voltage 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).



1606-XL Special Modules

					
	Buffer Module	DC/DC Converter	DeviceNet	DeviceNet	N+1 Redundancy
	1606-XLBUFFER	1606-XLDC40A	1606-XLDNET4	1606-XLDNET8	1606-XL60DR
Output Volts/Watts	22.5V...27.8V/480 W	DC 5.1V ±1%	24V/96 W	24V/196 W	24V/60 W
Input Voltage❄	DC 24V (DC 24...28.8V)	DC 18...36V	AC 100...120V/200...240V manual select; DC 210...375V	AC 100...120V/200...240V manual select; DC 240...375V	AC 100...120V/200...240V manual select; DC 160...375V
Operational Range	23...35 V DC	18...36 V DC	85...132/176...264 V AC		
Hold-up Time	>0.2s (20 A)	>10 ms (DC 24 Vin)	>37 ms (AC 196V)	>25 ms (AC 196V)	>20 ms (AC 196V)
Rated Input Current	charging current <600 mA	<2.9 A/<1.5 A	<2.0 A (115V)/<1.1 A (230V)	<5.0 A (115V)/<2.3 A (230V)	<1.3 A (115V)/<0.7 A (230V)
Efficiency	N/A	typ. 82%	typ. 88%	typ. 90%	typ. 86.5%
Output Voltage	Vin -1V: 23...27.8V 22.5V fixed	DC 5.1V ±1% selectable from 4.5 to 5.5V	24V	24V	24V
Rated Output Current	0...20 A	8 A	4 A	8 A	2.5 A
Power Boost	—	—	—	—	—
Line/Load Regulation (typ.)	—	<0.18%/<0.45%	<0.04%/<0.5%	<0.04%/<1.0%	<0.04%/<3.0%➢
Ripple/Noise	<200 mV_{PP}	<50 mV_{PP}	<25 mV_{PP}	<30 mV_{PP}	<30 mV_{PP}
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C with derating	0...+70 °C >60 °C with derating	-10...+70 °C >60 °C with derating	0...+70 °C >60 °C with derating	-10...+70 °C >60 °C with derating
Non-Operating Temperature Range	-40...+85 °C				
MTBF§	480 000 hours	510 000 hours	520 000 hours	390 000 hours	700 000 hours
Dimensions (W x H x D)	64 x 124 x 102 mm	49 x 124 x 102 mm	65 x 124 x 102 mm	120 x 124 x 102 mm	49 x 124 x 102 mm
Weight	740 g	470 g	620 g	980 g	470 g
Certifications/Standards✶	1, 2, 3, 5, 6	1, 5, 6	1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6	1, 2, 3, 5, 6
Special Features	Selectable buffered voltage; ‡	MOSFET inverse battery protection; ‡	*Electronically limited to 4 A; NEC Class 2 power supply; Semi F47	*Electronically limited to 8 A; RDY relay contact; N+1 redundancy; plug connectors	RDY relay contact; N+1 redundancy; plug connectors; NEC Class 2 power supply

						
	N+1 Redundancy	N+1 Redundancy	N+1 Redundancy	N+1 Redundancy	N+1 Redundancy	N+1 Redundancy
	1606-XL120DR	1606-XL240DR	1606-XLRED20-30	1606-XLRED40	1606-XLPRED	1606-XLSRED
Output Volts/Watts	24V/120 W	24V/240 W	30 A Dual redundancy module	40 A Single redundancy module	10 A Dual redundancy	20 A Dual redundancy
Input Voltage❄	AC 100...120/200...240V manual select; DC 210...375V	AC 100...120/200...240V manual select; DC 240...375V	DC 24V (max. 35V)		DC 10...60V	DC 10...60V
Operational Range	85...132/176...264 V AC		18...36 V DC		10...60V DC	10...60V DC
Hold-up Time	>37 ms (AC 196V)	>25 ms (AC 196V)	—	—	—	—
Rated Input Current	<2.6 A (115V)/<1.4 A (230V)	<6 A (115V)/<2.8 A (230V)	20...30 A (max. 35 A)	0...40 A (max. 50 A)	Single input: 10 A max. Dual input: 16 A max. total	Single input: 20 A max. Dual input: 20 A max. total
Efficiency	typ. 89%	typ. 89%	typ. >97%	typ. >97%	—	—
Output Voltage	24V	24V	Vin -0.5V typ.	Vin -0.6V typ.	Vin -0.9V typ.	Vin -0.9V typ.
Rated Output Current	5 A	10 A	20...30 A (max. 35 A)	0...40 A (max. 50 A)	0...10 A	0...20 A
Power Boost	6 A	12 A	—	—	—	—
Line/Load Regulation (typ.)	<0.04%/<3.0%➢	<0.04%/<3.0%➢	N/A	N/A	N/A	N/A
Ripple/Noise	<30 mV_{PP}	<30 mV_{PP}	—	—	—	—
Operating Temperature Range (T_{amb})	-10...+70 °C >60 °C with derating	0...+70 °C >60 °C with derating	-10 °C...+70 °C		-40 °C...+70 °C >60 °C with derating	-25 °C...+70 °C >60 °C with derating
Non-Operating Temperature Range	-40...+85 °C					
MTBF§	480.000 hours	390.000 hours	—	—	—	—
Dimensions (W x H x D)	64 x 124 x 102 mm	120 x 124 x 102 mm	48 x 124 x 102 mm	48 x 124 x 117 mm	45 x 75 x 91 mm	32 x 124 x 102 mm
Weight	620 g	980 g	625 g	646 g	136 g	290 g
Certifications/Standards✶	1, 2, 3, 5, 6, 7	1, 2, 3, 5, 6	1, 2, 3, 6		1, 2, 3, 6	1, 2, 3, 6
Special Features	RDY relay contact; N+1 redundancy; plug connectors		Dual redundancy module for 2x35 A; N+1 redundancy	Single redundancy module for 2.5-50 A; N+1 redundancy	Redundancy for DC 10 ...60V applications; ABS/GL/RINA (Marine); Class 1 Div. 2	Redundancy for DC 10 ...60V applications; Class 1 Div. 2

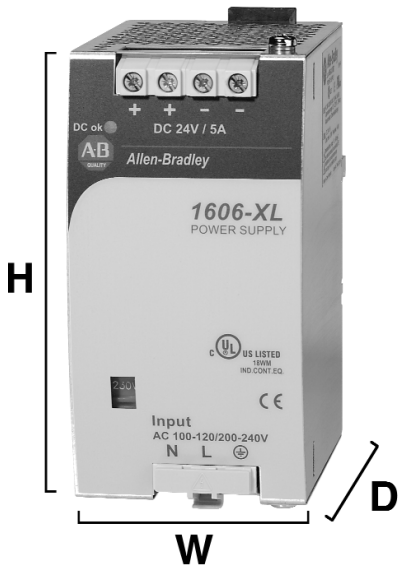
✶ 1) = CE, 2) = UL508 (cULus LISTED), 3) = UL1950 (cURus), 5) Safety standards = IEC/EN 60950, EN 50178, 6 EMC standards = EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, 7) = EMC standards = EN 61000-3-2 (A14), EN 50081-1
❄ 47...63Hz
‡ Low inrush current
§ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C
➢ Parallel Mode Load Regulation

Approximate Dimensions and Wire Size

Approximate dimensions are shown in inches (mm) unless otherwise indicated. Dimensions are not to be used for manufacturing purposes.

Bulletin 1606 Dimensions Table

Catalog Number	W	H	D*	Wire Size❄ (Input and Output unless otherwise noted)
1606-XLS80E	1.26 in (32 mm)	4.88 in (124 mm)	4.02 in (102 mm)	**Input**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²) **Output**❄ Stranded 28...12 AWG (0.3...2.5 mm²) Solid 28...12 AWG (0.3...4 mm²)
1606-XLS120E	1.57 in (40 mm)	4.88 in (124 mm)	4.61 in (117 mm)	
1606-XLSDNET4				
1606-XLS240E	2.36 in (60 mm)	4.88 in (124 mm)	4.61 in (117 mm)	**Input/Output**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XLS480E-3	2.56 in (65 mm)	4.88 in (124 mm)	5.00 in (127 mm)	
1606-XLSDNET8	2.36 in (60 mm)	4.88 in (124 mm)	4.61 in (117 mm)	
1606-XLSRED	1.26 in (32 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XLP25A	1.77 in (45 mm)	2.95 in (75 mm)	3.58 in (91 mm)	**Input/Output**❄ Stranded 28...12 AWG (0.3...2.5 mm²) Solid 28...12 AWG (0.3...4 mm²)
1606-XLP30B				
1606-XLP30E				
1606-XLP36C				
1606-XLP50B				
1606-XLP50E				
1606-XLP50EZ				
1606-XLP50F				
1606-XLP72E				
1606-XLPRED				
1606-XLP95E	2.87 in (73 mm)	2.95 in (75 mm)	4.06 in (103 mm)	
1606-XLP100E				
1606-XLP100F				
1606-XLP90B				
1606-XL60D	1.93 in (49 mm)	4.88 in (124 mm)	4.02 in (102 mm)	**Input/Output**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XL120D	2.56 in (64 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL180B	4.72 in (120 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL240E				
1606-XL240EP				
1606-XL240FP				
1606-XL480E	8.6 in (220 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL480EP				
1606-XL480EPT				
1606-XL480GP				
1606-XL480F				
1606-XL120E-3	2.87 in (73 mm)	4.88 in (124 mm)	4.61 in (117 mm)	**Input/Output**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XL240E-3	3.50 in (89 mm)	4.88 in (124 mm)	4.61 in (117 mm)	
1606-XL480E-3	8.66 in (220 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL480E-3W	5.91 in (150 mm)	4.88 in (124 mm)	4.76 in (121 mm)	
1606-XL480F-3H	8.66 in (220 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL720E-3	9.45 in (240 mm)	4.88 in (124 mm)	4.41 in (112 mm)	
1606-XL960E-3	10.83 in (275 mm)	4.88 in (124 mm)	4.61 in (117 mm)	**Input**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XL960E-3S				**Output**❄ Stranded 22...8 AWG (0.5...10 mm²) Solid 22...8 AWG (0.5...16 mm²)
1606-XLBUFFER	2.56 in (65 mm)	4.88 in (124 mm)	4.02 in (102 mm)	**Input/Output**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XLDC40A	1.93 in (49 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XLDNET4	2.56 in (65 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XLDNET8	4.72 in (120 mm)	4.88 in (124 mm)	4.02 in (102 mm)	**Input/Output**❄ Stranded 22...10 AWG (0.2...2.5 mm²) Solid 22...10 AWG (0.2...2.5 mm²)
1606-XLP50EZ	1.77 in (45 mm)	2.95 in (75 mm)	3.58 in (91 mm)	**Input/Output**❄ Stranded 22...12 AWG (0.2...2.5 mm²) Solid 22...12 AWG (0.2...2.5 mm²)
1606-XL60DR	1.93 in (49 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL120DR	2.56 in (64 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XL240DR	4.72 in (120 mm)	4.88 in (124 mm)	4.02 in (102 mm)	
1606-XLRED20-30	1.89 in (48 mm)	4.88 in (124 mm)	4.02 in (102 mm)	**Input/Output**❄ Stranded 20...10 AWG (0.5...4 mm²) Solid 20...10 AWG (0.5...6 mm²)
1606-XLRED40	1.89 in (48 mm)	4.88 in (124 mm)	4.61 in (117 mm)	



* Depth measurement does not include DIN rail.
❄ The wire sizes indicated refer only to the connection capability of the terminal.
For proper operation, the correct wire size must be used (based on accurate determination of the electrical characteristics and loading of the system).

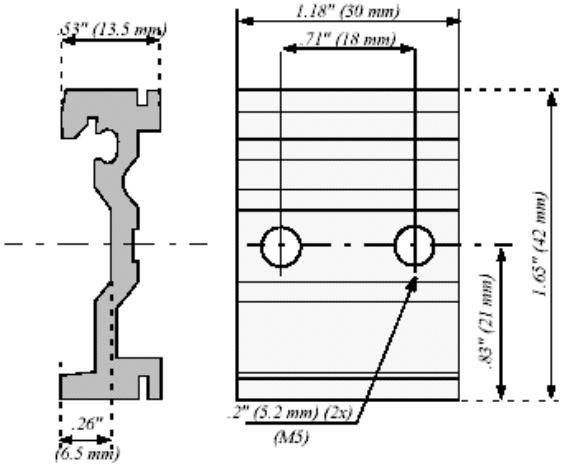
1606-XLA Back of Panel Mounting Bracket for XL Power Supplies

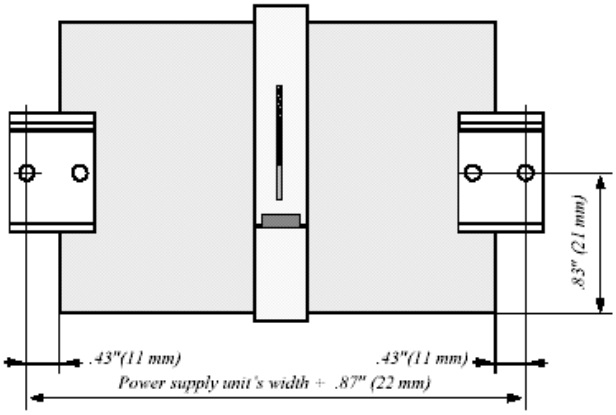
Instead of snapping the power supply onto a DIN-rail, you also can mount it to the back of the panel. This set consists of two aluminum profiles which replace the existing profiles at the back of the unit.

Notes:

- You need one set per unit.
- In addition, two screws are required per set (e.g. M5 x 12 or corresponding sheet-metal screws; they are not included in the set.)

Approximate Dimensions (mm)





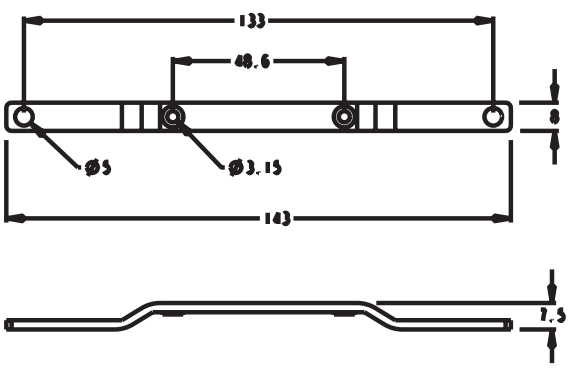
1606-XLB Back of Panel Mounting Bracket for XLS Power Supplies

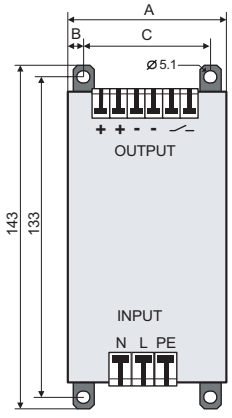
Instead of snapping the power supply onto a DIN-rail, you also can mount it to the back of the panel. This set consists of two steel brackets which replace the existing DIN-rail aluminum brackets at the back of the unit.

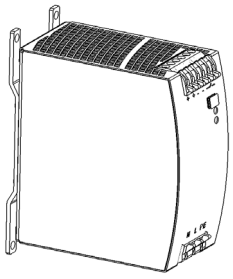
Note:

- You need one set per unit.

Approximate Dimensions (mm)





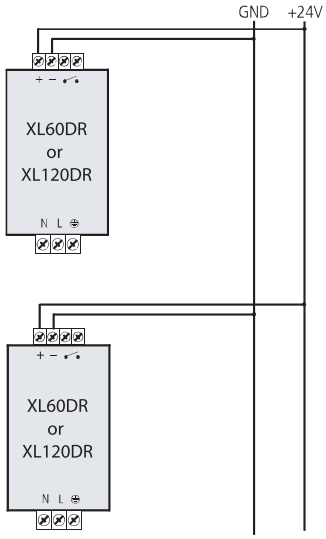


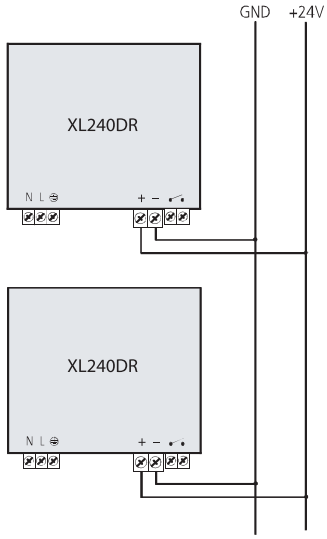
mm	A	B	C
1606-XLS80E	32	4.8	22.5
1606-XLS120E	40	5.3	29.5
1606-XLS240E	60	5.8	48.5
1606-XLS480E-3	65	6.3	40
1606-XLSRED	32	4.8	22.5

1606-XL Redundancy Capabilities

The 1606-XL family has two cost effective methods for providing redundancy to applications that are critical and can not risk failure.

1606-XL60DR, XL120DR and XL240DR Redundant Power Supplies

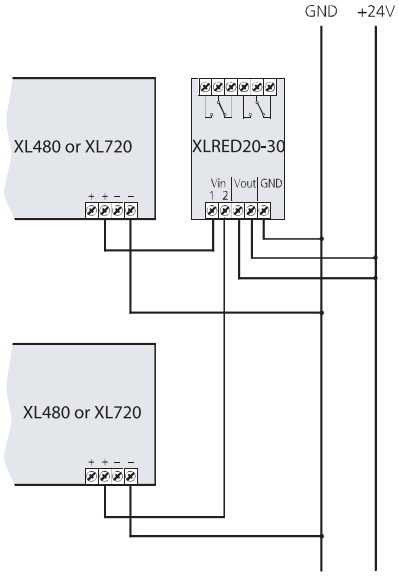


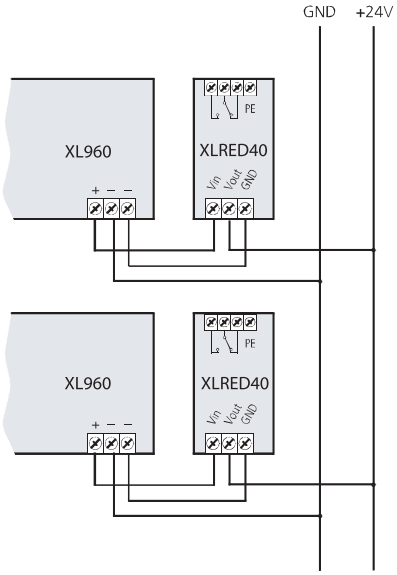


The 1606-XL60DR, XL120DR and XL240DR are enhanced versions of the standard power supplies.

- Each device has internal diodes which provide isolation against DC bus problems corrupting working supplies.
- Provides “DC ok” output relay to allow remote monitoring of DC power status.
- Utilizes pluggable terminals for easy installation.

1606-XLRED20-30 and 1606-XLRED40 Redundancy Modules





The 1606-XLRED20-30 and 1606-XLRED40 allow redundant wiring of 20 to 40 amp power supplies.

- Devices provide isolation of power supplies via diodes.
- Provide remote monitoring of DC power status of each power supply.
- A single XLRED20-30 can be used per pair of identical 20 or 30 amp power supplies.
- One XLRED40 is required for every 40 amp power supply.

1606-XLPRED

- When used in 1 + 1 redundant systems (like XLRED20-30) limited to 8 A (short circuit) per power supply
- When used in 1 + 1 redundant system (like XLRED40) limited to 13 A (short circuit)
- See product technical data sheets for more application information.

1606-XLSRED

- When used in 1 + 1 redundant systems (like XLRED20-30) limited to 10 A (short circuit) per power supply
- When used in 1 + 1 redundant system (like XLRED40) limited to 20 A (short circuit)
- See product instruction manual for more application information.

1606-XLBuffer

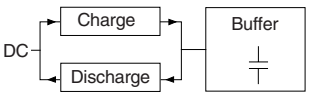
Features

- Buffering for 24V loads
- Guaranteed hold-up time: 0.2s/20A to 3.6s/1A
- Fit for industrial use: Energy storage in electrolytic caps., no accumulators
- Clear status indication by Status LED and signalling terminals
- No batteries requiring replacement

Short Description

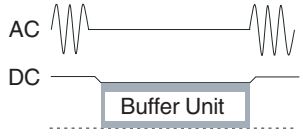
The buffer unit is a supplementary device for regulated DC 24V power supplies. It buffers load currents during typical mains faults and switching events or load peaks.

Working principle



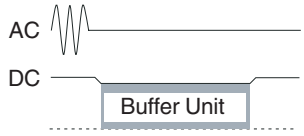
In times when the power supply provides sufficient voltage, the buffer unit stores energy in integrated electrolytic capacitors. In case of a mains voltage fault, this energy is released again in a regulated process.

Bridges mains faults without interruption



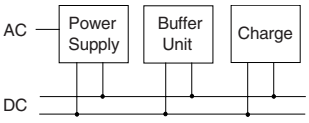
Statistics show that 80 percent of all mains faults last less than 0.2s. These mains faults are completely bridged by the buffer unit and will have no influence on the DC power. This increases the reliability of the system as a whole.

Extended hold-up time



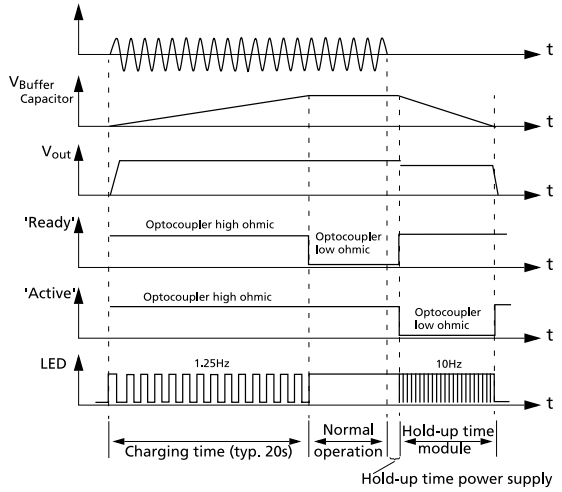
Once the main power fails or is switched off, the buffer unit will continue to provide the load current for a defined period of time. Process data can be saved and processes can be terminated before the DC power switches off. Controlled restarts are subsequently possible.

Easy to handle, expandable and maintenance-free



The buffer unit does not require any control wiring. It can be added in parallel to the load circuit at any given point. Any given number of buffer units can be installed in parallel to increase the output capacity or the hold-up time. The dual terminals allow for easy wiring.

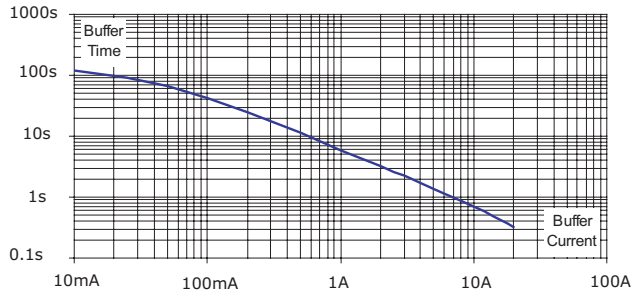
Operating Modes



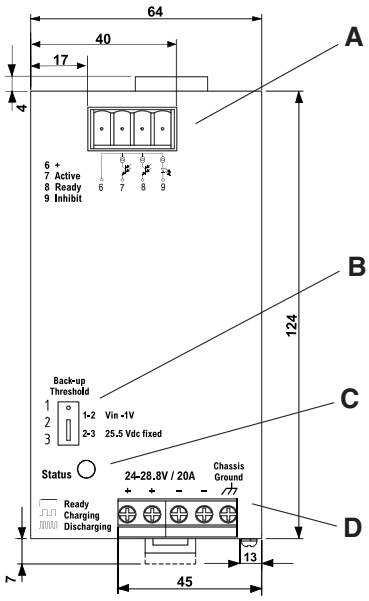
Activation Threshold

"22.5V fixed"	Buffering starts if terminal voltage <22.5V, voltage
"Vin -1V"	Buffering starts if terminal voltage decreases by more than 1V, faster than typ. 0.54V/s. Voltage is kept at that level. Buffering ends when voltage
Noise (spikes)	>200mV$_{PP}$ (20MHz bandw., 50Ω–measurement,

Hold-up Time



Operating Indicators and Elements



A - Signaling terminals:

- 7 Active: unit is buffering
- 8 Ready: unit is on stand-by
- 9 Inhibit: Initiates buffer discharging, inhibits recharging of capacitor array

B - Jumper back-up threshold:

- Position 1-2: variable: Vin -1V. Buffering if voltage decreases faster than typical 0.54V/s and greater than 1V
- Position 2-3: DC 22.5V fixed. Voltage buffering starts at Vin less than 22.5V

C - Status LED

Indicates charge status of buffer capacitor array

D - Power In/Out terminals: dual terminals

- + (positive)
- - (negative)
- Housing connection 'chassis ground'

Bulletin 1609 — Industrial Uninterruptible Power Supply

- Rugged Industrial Design
- DIN Rail mountable or Back of Panel mountable
- Elevated Temperature Performance (Up to 50 deg C)
- Comprehensive Network Management
- Remote Monitoring/Configuration
- "Dry Contact" I/O
- Line Interactive
- Pure Sine Wave Output

Table of Contents

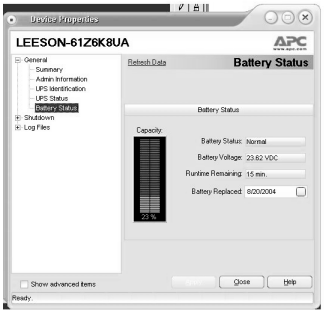
Standards Compliance and Certifications

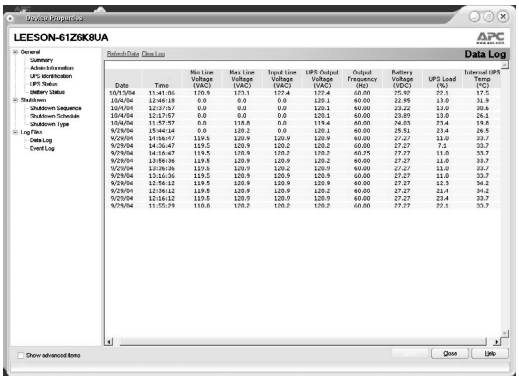
- UL1778
- CE
- CSA
- FCC

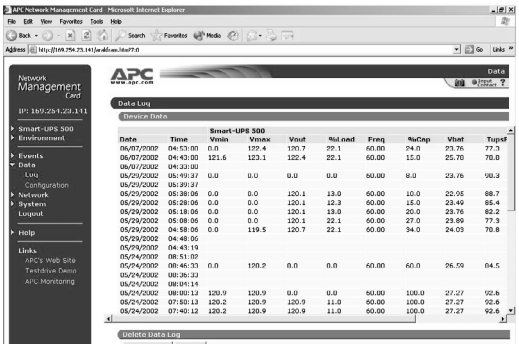
Product Overview

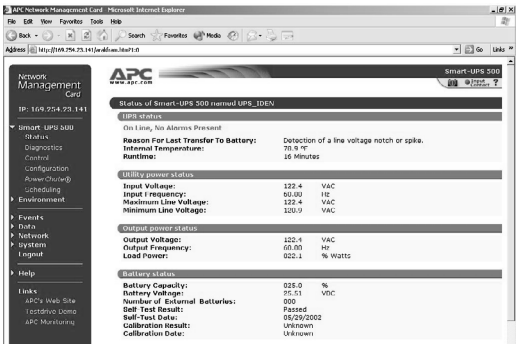
The 1609 has multiple options for remote management. The device is shipped with a DB9 serial cable for serial communication. The product can be configured with the optional 1609-NMC Network Management Card for Ethernet communications. The serial connection utilizes the APC PowerChute® software, the 1609-NMC has an integrated web browser tool. The Network Management Tools allow the user to:

- Log data
- Fault notification
- Customize output relays
- Remote device management
- Log events
- Customize input contacts
- Monitor temperature
- Operating system shutdown
- Can be viewed through RSView with generic SNMP/OPC server









Catalog Number Explanation

1609 – U (a) 500 (b) N (c) H (d) C (e)

a

Power Supply Type	
Code	Description
U	Uninterruptible Power Supply

b

Rated Output Power	
Code	Description
500	500 VA (325 W)

c

Input/Output Voltage	
Code	Description
N	115V AC
E	208/230V AC

d

Special Functions	
Code	Description
S	Standard Battery
H	High Temp. Battery

e

Network Management	
Code	Description
C	NMC included
	Can be left blank

Product Selection

Bulletin 1609 Product Selection Table

Output Power	Input Voltage	Operating Temperature	Cat. No.	
			Without Network Management Card	With Network Management Card
500 VA (325 W)	115V AC	0...40 °C	1609-U500NS	1609-U500NSC
		0...50 °C	1609-U500NH	1609-U500NHC
	208/230V AC	0...40 °C	1609-U500ES	1609-U500ESC
		0...50 °C	1609-U500EH	1609-U500EHC

Accessories

Description	Output Power	Cat. No.
40 °C Replacement Battery	500 VA (325 W)	1609-500SBAT
50 °C Replacement Battery	500 VA (325 W)	1609-500HBAT
Network Management Card		1609-NMC

Uninterruptible Power Supplies

Specifications

Electrical Ratings		1609-U500N . . .	1609-U500E . . .	Notes
Input	V nom.	120V	230V	—
	Capacity	500 VA (325 W)		Transfer points adjustable via software. Low transfer points for the 120V/230V are: 106V, 103V, 100V, 97V and 208V, 200V, 192V respectively. The High transfer points for the 120V/230V are: 127V, 130V, 133V, 136V and 253V, 257V, 261V, 265V respectively.
	Voltage Range, default	81…143V	160…287V	Transfer points adjustable via software.
	Voltage Range, widest, on line	75…153V	150…300V	—
	Current nom.	4.12 A	2.20 A	—
	Capacity Frequency	47…63 Hz		Auto-adjusting
	PFC	Load power factor is reflected in the input line current		—
Output	V nom.	120V	208/230V	—
	Capacity	500 VA (325 W)		—
On Line	Output Range, default	106…127V	208…253V	This voltage range is the default, controlled by transfer points coded in the UPS
	Output Voltage Range, widest	97…136V	196…265V	By setting the highest, high transfer point and the lowest, low transfer point with software
	Transfer Point Accuracy	+/- (2% of the transfer voltage + 1.3)	+/- (2% of the transfer voltage + 2.6)	in volts AC
On Battery	Frequency	Nominal +/- 3 Hz (Locked), Nominal +/- 0.5 Hz (Free-running) +/- 2%		Typical
	THD	<5% at full (linear) load +/- 2%		Typical
	Crest Factor	3:1		—
Efficiency	On Battery	77%		Typical with resistive load
	On Line	96%		Typical with resistive load
Protection	Surge	EN50091-2		—
	Overload	On Line: alarm at 107%, limited by breakers On Battery: shutdown at 107%		—
	Output Short On Line	Input circuit breakers and/or premises branch protection		—
	Output Short On Battery	Electric current limit, shutdown outputs, and latch off		—
	Thermal Protection	None		—
	Bypass	N/A		—
Regulatory	Safety	UL 1778, CSA, IEC 60950	UL 1778, CSA, IEC 60950-1, EN50091-1-1	—
	EMC	FCC (Class A)	EN50091-2 (Class A)	—
	Markings	UL, CSA, FCC, CE	UL, CSA, FCC, CE	—
Battery Pack	Run Time	9.0 minutes (0.67 p.f.)		325 W full load
		18 minutes (0.67 p.f.)		163 W half load
	Type	Standard: Sealed Lead Acid, valve regulated High Temp.: Sealed Lead Battery		Hot swappable, user replaceable
	Voltage	24V		—
	Charger	Temperature compensated current limited, float charger		—
	Recharge Time	Less than 3 hours to 90% capacity		—
	Lifetime	2…4 years @ 25 °C ambient		—
Environment	Temperature	0…40 °C (operating), 0…50 °C (operating - high temp. option) -20…60 °C (short term storage)		—
	Altitude	10000 ft (operating)		Maximum power is derated at higher altitudes
	Humidity	0…95% non-condensing (operating)		—
	Heat Output	On Line, Full Load: 137 BTU per hour On Line, Full Load, Charging: 190 BTU per hour On Battery, Full Load: 1706 BTU per hour		—
	Audible Noise	<45 dB @ 1 meter (full load)		Typical
Communication	DB9	Serial and Contact Closures		Serial communication only when USB is unused
	Dry Contact	Low battery, on battery		N.O., N.C. options for both
	EPO	Via Dry Contact Closure		—
	Network	Via optional Smart-Slot Card (1609-NMC)		—

ATTENTION

CAUTION

- Wiring of the UPS should be performed by a qualified electrician. Use appropriate size wires.
- In 230V AC applications, the UPS must be protected with a circuit breaker that complies with European standards for branch rated protection per the country of installation.
- In 208V AC applications, the 1609-U500E must be protected by a dual pole, 10 A branch rated circuit breaker with UL489 rating.
- The 120V AC 1609-U500N has supplementary circuit breaker protection. The unit should be protected by a single pole, 15 A branch rated circuit breaker with a UL489 rating.

Allen-Bradley part number 1492-MCAA115 is suggested.

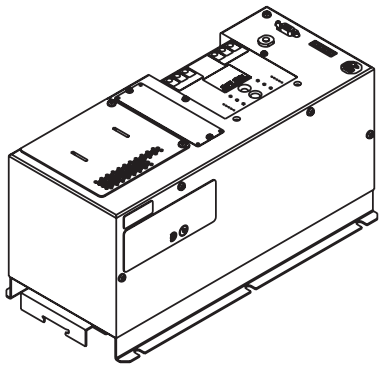
- **The branch circuit breaker must be off prior to wiring the unit.**

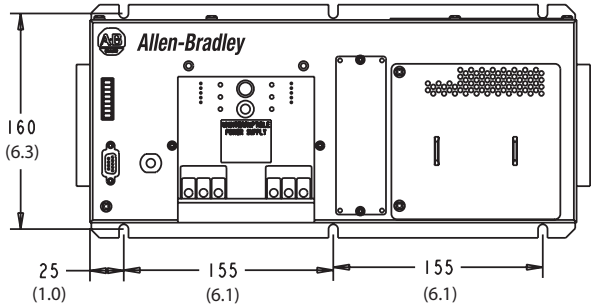
Note

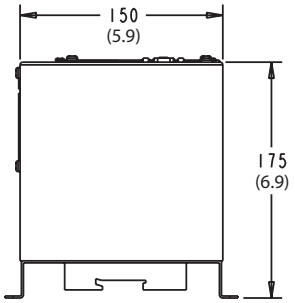
208V AC applications: The 1609-U500E ships ready for 230V AC sources. When operating the UPS in 208V AC applications, the UPS low transfer voltage settings are adjusted through the PowerChute® software or the Network Management Card.

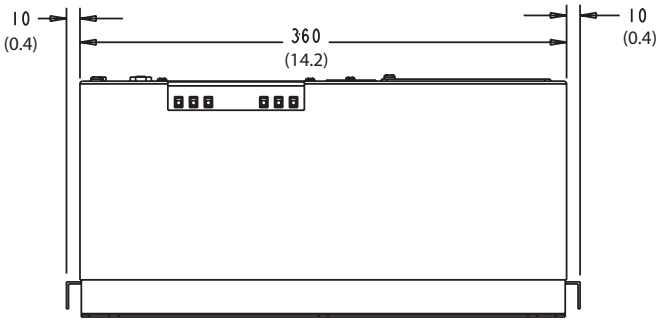
Refer to the PowerChute® User Guide or the Network Management Card instructions for details.

Approximate dimensions are shown in millimeters (in.) unless otherwise indicated. Dimensions are not to be used for manufacturing purposes.









Approximate Shipping Weights

Output Power	Input Voltage	Cat. No. Without Network Management Card	Approx. Shipping Weight kg (lbs)	Cat. No. With Network Management Card	Approx. Shipping Weight kg (lbs)
500 VA (325 W)	115V AC	1609-U500NS	14.5 (31.9)	1609-U500NSC	15 (33)
		1609-U500NH	13.4 (29.5)	1609-U500NHC	13.9 (30.6)
	208/230V AC	1609-U500ES	14.5 (31.9)	1609-U500ESC	15 (33)
		1609-U500EH	13.4 (29.5)	1609-U500EHC	13.9 (30.6)

Control Circuit Transformers

Overview/Cat. No. Explanation

Cat. No. 1497-B-HXJX-3-N Control Circuit Transformer, 3-pole Fuse Block with Optional Cat. No. 1491-R150 Fuse Cover

Cat. No. 1497-C-BASX-0-N Control Circuit Transformer, Non-Fused

Bulletin 1497 — Control Circuit Transformers

63…2000 VA

Bulletin 1497 Global Control Circuit Transformers are designed to reduce supply voltages to control circuits.

The complete line of transformers is available with optional factory-installed or panel-mount primary and secondary fuse block. A dual primary and secondary fuse block is pre-wired and mounted on top of the transformer up to 500 VA.

Bulletin 1497 offers single, dual, and multi-tap primary voltages.

Table of Contents

Standards Compliance

- IEC, EN61558
- NEMA, ICS2-1993, Part 1 Sect. 9.2
- UL 506

Certifications

- cULus

Your order must include the cat. no. of the control circuit transformer selected.

Cat. No. Explanation

Bulletin 1497 Multi-Tap Transformers

1497 – A – M1 – 3 – N

a *b* *c* *d*

a

VA Rating	
Code	Description
A	63 VA
B	80 VA
C	130 VA
D	200 VA
E	250 VA
F	350 VA
G	500 VA
H	750 VA
J	800 VA
K	1000 VA
L	1600 VA
M	2000 VA

b

Primary and Secondary Voltage		
Code	Primary	Secondary
M1	240V, 208V	120V (60 Hz)
M2	240V, 208V	24V (60 Hz)
M3	240V, 208V	24V, 120V (60 Hz)
M4	415V, 400V, 380V	115V, 230V (50 Hz)
M5	415V, 400V, 380V	24V (50 Hz)

c

Fuse Block Options	
Code	Block Options
0	0 Primary, 0 Secondary
1	0 Primary, 1 Secondary
2	2 Primary, 0 Secondary
3	2 Primary, 1 Secondary

d

Factory Installed Options	
Code	Description
N	No Secondary Fuse, No Cover

Bulletin 1497 Transformers

1497 – A – BADX – 3 – N

a *b* *c* *d*

a

VA Rating	
Code	Description
A	63 VA
B	80 VA
C	130 VA
D	200 VA
E	250 VA
F	350 VA
G	500 VA
H	750 VA
J	800 VA
K	1000 VA
L	1600 VA
M	2000 VA

b

Primary and Secondary Voltage		
Code	Primary	Secondary
HX	208V (60 Hz)	—
AX	240V (60 Hz), 220V (50 Hz)	—
BA∗	240/480V (60 Hz), 220/440V (50 Hz)	—
CX	600V (60 Hz), 550V (50 Hz)	—
DX❄	—	120V (60 Hz)
JX	—	24V (60 Hz)
SX	—	120V (60 Hz), 110V (50Hz)
JK	—	24V (50 Hz) 26V (60 Hz)

c

Fuse Block Options	
Code	Block Options
0	0 Primary, 0 Secondary
1	0 Primary, 1 Secondary
2	2 Primary, 0 Secondary
3	2 Primary, 1 Secondary

d

Factory Installed Options	
Code	Description
N	No Secondary Fuse, No Cover

∗ When the primary code **BA** is selected and a 120V AC secondary is desired, the secondary code **SX** should be selected.
❄ Not available for use with primary code **BA**.

Selecting a Control Circuit Transformer

For proper transformer selection, three characteristics of the load circuit must be determined in addition to the minimum voltage required to operate the circuit. These are total steady-state (sealed) VA, total inrush VA, and inrush load power factor.

- Total steady-state (sealed) VA is the volt-amperes that the transformer must deliver to the load circuit for an extended period of time — the amount of current required to hold the contact in the circuit.
- Total inrush VA is the volt amperes that the transformer must deliver upon initial energization of the control circuit. Energization of electromagnetic devices takes 30…50 milliseconds. During this inrush period, the electromagnetic control devices draw many times normal current — 3…10 times normal is typical.
- Inrush load power factor is difficult to determine without detailed vector analysis of all the load components. Such an analysis is generally not feasible. Therefore, a safe assumption is 40% power factor.

Selection Process

1. Determine the total inrush VA of the control circuits from the table below, *Typical Magnetic Motor Starter and Contactor Data 60 Hz, 120 Volt, 3-Pole*. Do not neglect the current requirements of indicating lights and other devices that do not have an inrush VA but are re-energized at the same time as the other components in the circuit. Their total VA should be added to the total inrush VA.
2. Refer to the table below, *Regulation Data — Inrush VA*. If the supply circuit voltage (Step 1) is reasonably stable and fluctuates not more than ± 5%, refer to the 90% secondary voltage column. If it fluctuates as much as ± 10%, refer to the 95% secondary voltage column. Go down the column selected until at the inrush VA closest to, but not less than, the inrush VA of the control circuit.
3. Read to the far left side of the chart. The transformer's continuous nominal VA rating is now selected. The secondary voltage that will be delivered under inrush conditions will be either 85%, 90%, or 95% of the rated secondary voltage, depending on the column selected from the table below, *Regulation Data — Inrush VA*. The total sealed VA of the control circuit must not exceed the nominal VA rating of the transformer selected from the table below, *Typical Magnetic Motor Starter and Contactor Data 60 Hz, 120 Volt, 3-Pole*.
4. Refer to the specification tables on the following pages to select a transformer according to the required continuous nominal VA, and primary and secondary voltage combinations.

Regulation Data — Inrush VA

Inrush VA at 40% Power Factor				Power Factor Adjustments	
Nominal VA Rating	85%	90%	95%	Power Factor	Multiply By
63	347	289	216	100%	0.64
80	338	290	229	90%	0.67
130	907	745	541	80%	0.71
200	1267	1039	754	70%	0.78
250	1394	1116	781	60%	0.82
350	2870	2298	1584	50%	0.91
500	3786	3013	2065	40%	1.00
750	7360	5763	3786	30%	1.11
800	7360	5763	3786	20%	1.29
1000	8837	6785	4329	10%	1.50
1600	14921	11328	7070	—	—
2000	20500	14850	9100	—	—

Typical Magnetic Motor Starter and Contactor Data 60 Hz, 120 Volt, 3-Pole

	NEMA Size						
Contactor	0	1	2	3	4	5	
Bulletin 500	192	192	240	660	1225	1490	VA Inrush
	29	29	29	45	69	96	VA Sealed

Transformer Replacement — Top Mounted Fuse Block ♣ — Fuses Not Included

	Cat. Nos.			
	Secondary 24V (60 Hz)		Secondary 120V (60 Hz)	
	Previous	Current	Previous	Current
VA	Primary 208V (60 Hz)			
63	1497-N45P	1497-A-HXJX-3-N	1497-N28P	1497-A-HXDX-3-N
80	1497-N48P	1497-B-HXJX-3-N	1497-N1P	1497-B-HXDX-3-N
130	1497-N51P	1497-C-HXJX-3-N	1497-N15P	1497-C-HXDX-3-N
200	1497-N54P	1497-D-HXJX-3-N	1497-N4P	1497-D-HXDX-3-N
250	1497-N57P	1497-E-HXJX-3-N	1497-N7P	1497-E-HXDX-3-N
350	1497-N60P	1497-F-HXJX-3-N	1497-N10P	1497-F-HXDX-3-N
500	1497-N63P	1497-G-HXJX-3-N	1497-N18P	1497-G-HXDX-3-N
VA	Primary 240/480V (60 Hz)✶			
63	1497-N46P	1497-A-BAJK-3-N	1497-N27P	1497-A-BASX-3-N
80	1497-N49P	1497-B-BAJK-3-N	1497-N2P	1497-B-BASX-3-N
130	1497-N52P	1497-C-BAJK-3-N	1497-N16P	1497-C-BASX-3-N
200	1497-N55P	1497-D-BAJK-3-N	1497-N5P	1497-D-BASX-3-N
250	1497-N58P	1497-E-BAJK-3-N	1497-N8P	1497-E-BASX-3-N
350	1497-N61P	1497-F-BAJK-3-N	1497-N11P	1497-F-BASX-3-N
500	1497-N64P	1497-G-BAJK-3-N	1497-N19P	1497-G-BASX-3-N
VA	Primary 600V (60 Hz)❄			
63	1497-N47P	1497-A-CXJK-3-N	1497-N29P	1497-A-CXSX-3-N
80	1497-N50P	1497-B-CXJK-3-N	1497-N3P	1497-B-CXSX-3-N
130	1497-N53P	1497-C-CXJK-3-N	1497-N17P	1497-C-CXSX-3-N
200	1497-N56P	1497-D-CXJK-3-N	1497-N6P	1497-D-CXSX-3-N
250	1497-N59P	1497-E-CXJK-3-N	1497-N9P	1497-E-CXSX-3-N
350	1497-N62P	1497-F-CXJK-3-N	1497-N12P	1497-F-CXSX-3-N
500	1497-N65P	1497-G-CXJK-3-N	1497-N20P	1497-G-CXSX-3-N

✶ Also rated 220/440V Primary, 110V Secondary 50 Hz, and 220/440V Primary, 24V Secondary 50 Hz.
❄ Also rated 550V Primary, 110V Secondary 50 Hz, and 550V Primary, 24V Secondary 50 Hz.
♣ Top-mounted fuse blocks are not available for transformers 750 VA and higher.

Transformer Replacement — No Fuse Block

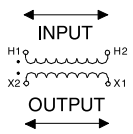
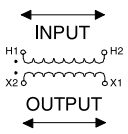
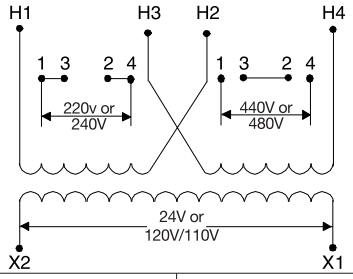
	Cat. Nos.			
	Secondary 24V (60 Hz)		Secondary 120V (60 Hz)	
	Previous	Current	Previous	Current
VA	Primary 208V (60 Hz)			
63	1497-N45	1497-A-HXJX-0-N	1497-N28	1497-A-HXDX-0-N
80	1497-N48	1497-B-HXJX-0-N	1497-N1	1497-B-HXDX-0-N
130	1497-N51	1497-C-HXJX-0-N	1497-N15	1497-C-HXDX-0-N
200	1497-N54	1497-D-HXJX-0-N	1497-N4	1497-D-HXDX-0-N
250	1497-N57	1497-E-HXJX-0-N	1497-N7	1497-E-HXDX-0-N
350	1497-N60	1497-F-HXJX-0-N	1497-N10	1497-F-HXDX-0-N
500	1497-N63	1497-G-HXJX-0-N	1497-N18	1497-G-HXDX-0-N
750	—	1497-H-HXJX-0-N	1497-N33	1497-H-HXDX-0-N
1000	—	1497-K-HXJX-0-N	1497-N36	1497-K-HXDX-0-N
1600	—	—	1497-N39	1497-L-HXDX-0-N
2000	—	—	1497-N42	1497-M-HXDX-0-N
VA	Primary 240/480V (60 Hz)‡			
63	1497-N46	1497-A-BAJK-0-N	1497-N27	1497-A-BASX-0-N
80	1497-N49	1497-B-BAJK-0-N	1497-N2	1497-B-BASX-0-N
130	1497-N52	1497-C-BAJK-0-N	1497-N16	1497-C-BASX-0-N
200	1497-N55	1497-D-BAJK-0-N	1497-N5	1497-D-BASX-0-N
250	1497-N58	1497-E-BAJK-0-N	1497-N8	1497-E-BASX-0-N
350	1497-N61	1497-F-BAJK-0-N	1497-N11	1497-F-BASX-0-N
500	1497-N64	1497-G-BAJK-0-N	1497-N19	1497-G-BASX-0-N
750	—	1497-H-BAJK-0-N	1497-N34	1497-H-BASX-0-N
1000	—	1497-K-BAJK-0-N	1497-N37	1497-K-BASX-0-N
1600	—	—	1497-N40	1497-L-BASX-0-N
2000	—	—	1497-N43	1497-M-BASX-0-N
VA	Primary 600V (60 Hz)§			
63	1497-N47	1497-A-CXJK-0-N	1497-N29	1497-A-CXSX-0-N
80	1497-N50	1497-B-CXJK-0-N	1497-N3	1497-B-CXSX-0-N
130	1497-N53	1497-C-CXJK-0-N	1497-N17	1497-C-CXSX-0-N
200	1497-N56	1497-D-CXJK-0-N	1497-N6	1497-D-CXSX-0-N
250	1497-N59	1497-E-CXJK-0-N	1497-N9	1497-E-CXSX-0-N
350	1497-N62	1497-F-CXJK-0-N	1497-N12	1497-F-CXSX-0-N
500	1497-N65	1497-G-CXJK-0-N	1497-N20	1497-G-CXSX-0-N
750	—	1497-H-CXJK-0-N	1497-N35	1497-H-CXSX-0-N
1000	—	1497-K-CXJK-0-N	1497-N38	1497-K-CXSX-0-N
1600	—	—	1497-N41	1497-L-CXSX-0-N
2000	—	—	1497-N44	1497-M-CXSX-0-N

‡ Also rated 220/440V Primary, 110V Secondary 50 Hz, and 220/440V Primary, 24V Secondary 50 Hz.
§ Also rated 550V Primary, 110V Secondary 50 Hz, and 550V Primary, 24V Secondary 50 Hz.

Control Circuit Transformers

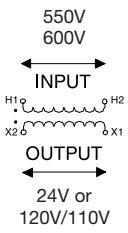
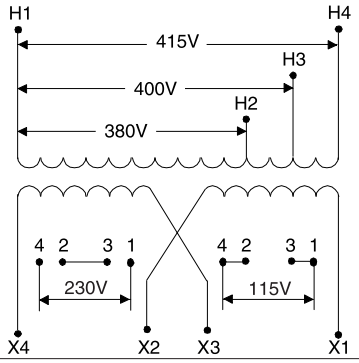
Product Selection, Continued

Note: Refer to page 27 for information on how to select a control circuit transformer.

	Cat. Nos.					
	Primary 208V (60 Hz) 		Primary 240V (60 Hz)/220V (50 Hz) 		Primary 240/480V (60 Hz) or 220/440V (50 Hz) 	
Continuous VA	Secondary 24V (60 Hz)	Secondary 120V (60 Hz)	Secondary 24V (60 Hz)/ 24V (50 Hz)	Secondary 120V (60 Hz)/ 110V (50 Hz)	Secondary 24V (60 Hz) or 24V (50 Hz)	Secondary 120V (60 Hz) or 110V (50 Hz)
63	1497-A-HXJX-0-N	1497-A-HXDX-0-N	1497-A-AXJK-0-N	1497-A-AXSX-0-N	1497-A-BAJK-0-N	1497-A-BASX-0-N
80	1497-B-HXJX-0-N	1497-B-HXDX-0-N	1497-B-AXJK-0-N	1497-B-AXSX-0-N	1497-B-BAJK-0-N	1497-B-BASX-0-N
130	1497-C-HXJX-0-N	1497-C-HXDX-0-N	1497-C-AXJK-0-N	1497-C-AXSX-0-N	1497-C-BAJK-0-N	1497-C-BASX-0-N
200	1497-D-HXJX-0-N	1497-D-HXDX-0-N	1497-D-AXJK-0-N	1497-D-AXSX-0-N	1497-D-BAJK-0-N	1497-D-BASX-0-N
250	1497-E-HXJX-0-N	1497-E-HXDX-0-N	1497-E-AXJK-0-N	1497-E-AXSX-0-N	1497-E-BAJK-0-N	1497-E-BASX-0-N
350	1497-F-HXJX-0-N	1497-F-HXDX-0-N	1497-F-AXJK-0-N	1497-F-AXSX-0-N	1497-F-BAJK-0-N	1497-F-BASX-0-N
500	1497-G-HXJX-0-N	1497-G-HXDX-0-N	1497-G-AXJK-0-N	1497-G-AXSX-0-N	1497-G-BAJK-0-N	1497-G-BASX-0-N
750	1497-H-HXJX-0-N	1497-H-HXDX-0-N	1497-H-AXJK-0-N	1497-H-AXSX-0-N	1497-H-BAJK-0-N	1497-H-BASX-0-N
800	1497-J-HXJX-0-N	1497-J-HXDX-0-N	1497-J-AXJK-0-N	1497-J-AXSX-0-N	1497-J-BAJK-0-N	1497-J-BASX-0-N
1000	1497-K-HXJX-0-N	1497-K-HXDX-0-N	1497-K-AXJK-0-N	1497-K-AXSX-0-N	1497-K-BAJK-0-N	1497-K-BASX-0-N
1600	—	1497-L-HXDX-0-N	—	1497-L-AXSX-0-N	—	1497-L-BASX-0-N
2000	—	1497-M-HXDX-0-N	—	1497-M-AXSX-0-N	—	1497-M-BASX-0-N
With 2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block ♣ — Fuses Not Included						
63	1497-A-HXJX-3-N	1497-A-HXDX-3-N	1497-A-AXJK-3-N	1497-A-AXSX-3-N	1497-A-BAJK-3-N	1497-A-BASX-3-N
80	1497-B-HXJX-3-N	1497-B-HXDX-3-N	1497-B-AXJK-3-N	1497-B-AXSX-3-N	1497-B-BAJK-3-N	1497-B-BASX-3-N
130	1497-C-HXJX-3-N	1497-C-HXDX-3-N	1497-C-AXJK-3-N	1497-C-AXSX-3-N	1497-C-BAJK-3-N	1497-C-BASX-3-N
200	1497-D-HXJX-3-N	1497-D-HXDX-3-N	1497-D-AXJK-3-N	1497-D-AXSX-3-N	1497-D-BAJK-3-N	1497-D-BASX-3-N
250	1497-E-HXJX-3-N	1497-E-HXDX-3-N	1497-E-AXJK-3-N	1497-E-AXSX-3-N	1497-E-BAJK-3-N	1497-E-BASX-3-N
350	1497-F-HXJX-3-N	1497-F-HXDX-3-N	1497-F-AXJK-3-N	1497-F-AXSX-3-N	1497-F-BAJK-3-N	1497-F-BASX-3-N
500	1497-G-HXJX-3-N	1497-G-HXDX-3-N	1497-G-AXJK-3-N	1497-G-AXSX-3-N	1497-G-BAJK-3-N	1497-G-BASX-3-N

♣ Top-mounted fuse blocks are not available for transformers 750 VA and higher.

Note: Refer to page 27 for information on how to select a control circuit transformer.

	Cat. Nos.		
	Primary∗ 600V (60 Hz)/550V (50 Hz) 		Primary 380V, 400V, 415V (50 Hz) 
Continuous VA	Secondary 24V (60 Hz)/24V (50 Hz)	Secondary 120V (60 Hz)/110V (50 Hz)	Secondary 115V/230V (50 Hz)
63	1497-A-CXJK-0-N	1497-A-CXSX-0-N	1497-A-M4-0-N
80	1497-B-CXJK-0-N	1497-B-CXSX-0-N	1497-B-M4-0-N
130	1497-C-CXJK-0-N	1497-C-CXSX-0-N	1497-C-M4-0-N
200	1497-D-CXJK-0-N	1497-D-CXSX-0-N	1497-D-M4-0-N
250	1497-E-CXJK-0-N	1497-E-CXSX-0-N	1497-E-M4-0-N
350	1497-F-CXJK-0-N	1497-F-CXSX-0-N	1497-F-M4-0-N
500	1497-G-CXJK-0-N	1497-G-CXSX-0-N	1497-G-M4-0-N
750	1497-H-CXJK-0-N	1497-H-CXSX-0-N	1497-H-M4-0-N
800	1497-J-CXJK-0-N	1497-J-CXSX-0-N	1497-J-M4-0-N
1000	1497-K-CXJK-0-N	1497-K-CXSX-0-N	1497-K-M4-0-N
1600	—	1497-L-CXSX-0-N	1497-L-M4-0-N
2000	—	1497-M-CXSX-0-N	1497-M-M4-0-N
With 2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block ♣ — Fuses Not Included			
63	1497-A-CXJK-3-N	1497-A-CXSX-3-N	1497-A-M4-3-N
80	1497-B-CXJK-3-N	1497-B-CXSX-3-N	1497-B-M4-3-N
130	1497-C-CXJK-3-N	1497-C-CXSX-3-N	1497-C-M4-3-N
200	1497-D-CXJK-3-N	1497-D-CXSX-3-N	1497-D-M4-3-N
250	1497-E-CXJK-3-N	1497-E-CXSX-3-N	1497-E-M4-3-N
350	1497-F-CXJK-3-N	1497-F-CXSX-3-N	1497-F-M4-3-N
500	1497-G-CXJK-3-N	1497-G-CXSX-3-N	1497-G-M4-3-N

∗ Transformers with 600V primary do not carry the CE mark.
♣ Top-mounted fuse blocks are not available for transformers 750 VA and higher.

Fuse Sizing Charts

Important: Select the fuse to protect the control circuit conductors in accordance with the National Electrical Code.

Primary Fuse Sizing Chart (When Only Primary Protection is Used)

Maximum Amp Rating for Current Limiting Class CC Fuses Based on Transformer Primary Voltage

VA	208V	220V	240V	277V	347V	380V	400V	415V	440V	480V	500V	550V	600V	690V
63	0.75	0.75	0.75	0.5	0.5	0.4	0.4	0.4	0.4	0.25	0.25	0.25	0.25	0.25
80	1	1	1	0.75	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.25
130	1.5	1.5	1.5	1.25	1	1	0.75	0.75	0.75	0.75	0.75	0.5	0.5	0.5
200	2.5	2.5	2.5	2	1.5	1.5	1.5	1.25	1.25	1.25	1	1	1	0.75
250	3	3	3	2.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.25	1.25	1
350	5	4	4	3	3	2.5	2.5	2.5	2	2	2	1.5	1.5	1.5
500	4	3	3	5	4	3	3	3	3	3	3	2.5	2.5	2
750	6	5	5	4	3	5	5	5	5	4	4	4	3	3
800	6	6	5	4	3	3	3	5	5	5	4	4	4	3
1000	8	7	6	6	4	4	4	4	3	3	3	5	5	4
1600	12	12	11	9	7	7	6	6	6	5	5	4	4	3
2000	12	11	13	12	9	8	8	8	7	6	6	6	5	4

Primary Fuse Sizing Chart (When Primary and Secondary Protection is Used)

Maximum Amp Rating for Current Limiting Class CC Fuses Based on Transformer Primary Voltage

VA	208V	220V	240V	277V	347V	380V	400V	415V	440V	480V	500V	550V	600V	690V
63	0.75	0.75	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.25	0.25	0.25
80	1.5	1.5	1.5	1	1	1	1	0.75	0.75	0.75	0.75	0.5	0.5	0.5
130	3	2.5	2.5	2	1.5	1.5	1.5	1.5	1.25	1.25	1.25	1	1	0.75
200	4	4	4	3	2.5	2.5	2.5	2	2	2	2	1.5	1.5	1
250	6	5	5	4	3	3	3	3	2.5	2.5	2.5	2	2	1.5
350	8	7	7	6	5	4	4	4	3	3	3	3	2.5	2.5
500	6	5	5	9	7	6	6	6	5	5	5	4	4	3
750	9	8	7	6	5	9	9	9	8	7	7	6	6	5
800	9	9	8	7	5	5	5	8	8	8	8	7	6	5
1000	12	10	10	9	7	6	6	6	5	5	5	8	8	7
1600	15	15	15	12	11	10	10	9	9	8	8	7	6	5
2000	20	20	20	18	14	12	12	12	10	10	10	9	8	7

Secondary Fuse Sizing Chart

Maximum Amp Rating for Current Limiting Midget Fuses

VA	24V	110V	115V	120V	230V
63	4	0.75	0.75	0.75	0.4
80	5	1	1	1	0.5
130	9	1.8	1.8	1.8	0.9
200	13	2.5	2.5	2.5	1.25
250	15	3.2	3.2	3.2	1.5
350	20	4.5	4.5	4.5	2.5
500	30	6.25	6.25	6.25	3
750	45	9	9	9	4.5
800	45	9	9	9	4.5
1000	60	12	12	12	6
1600	100	20	20	20	10
2000	—	25	25	25	12

Fuse Block Kits — For Use when Fuse Block is Not Integrated with the Transformer

Cat. No. 1491-R165
1-Pole Fuse Block

Cat. No. 1491-R167
2-Pole Fuse Block

Cat. No. 1491-R171
3-Pole Fuse Block

Cat. No. 1491-R169
3-Pole Fuse Block

Cat. No. 1491-R150
Fuse Cover without Fuse

These control circuit fusing kits are intended to be used for control circuit transformer protection and protection of control circuits capable of delivering no more than 200 000 RMS symmetrical amps, 600V maximum.

Description∗	Cat. No.
Fuse Cover — Per Pole	1491-R150
One-Pole Kit — Panel-Mounted (Midget Fuse)†	1491-R165
Two-Pole Kit — Panel-Mounted (Two Class CC Fuses)†	1491-R162
Two-Pole Kit — Panel-Mounted (Two Midget Fuses)†	1491-R167
Three-Pole Kit — Panel-Mounted (One Midget Fuse/Two Class CC Fuses)†	1491-R169
Three-Pole Kit — Panel-Mounted (Three Class CC Fuses)†	1491-R171
Single-Pole Kit — Bulletin 500 Line Controller Mounted (Class CC Fuses)‡	599-FR04
One-Pole Kit — Panel-Mounted (31…60 A Class J Fuse)	1491-R173
One-Pole Kit — Panel-Mounted (61…100 A Class J Fuse)	1491-R175

∗ For control circuit transformers with a 350 VA or larger rating, it is recommended that Bussmann Type FNQ-R, Ferraz-Shawmut Type ATDR, Littelfuse Type KLDR time delay fuses, or equivalent be used for primary fusing.

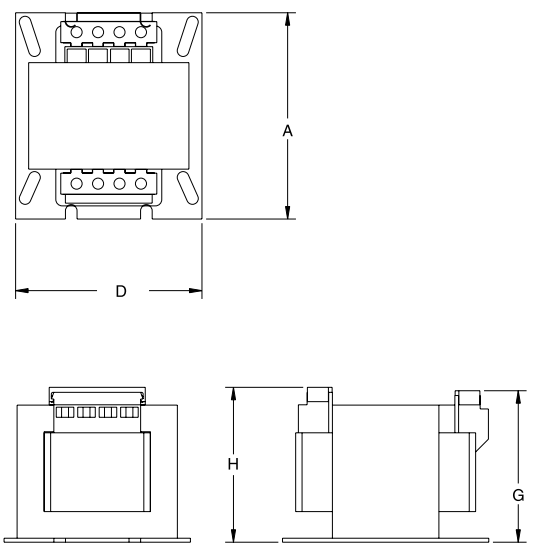
† These kits use only Class CC or Midget fuses (rated 0.5…30 A) such as those offered by the following manufacturers:
- Bussmann KTK-R
- Ferraz-Shawmut ATM R
- Littelfuse KLK

‡ Cat. No. 599-FR04 is rated for 6 A fuse maximum. Controller mounting applies to size 0…5 devices only.

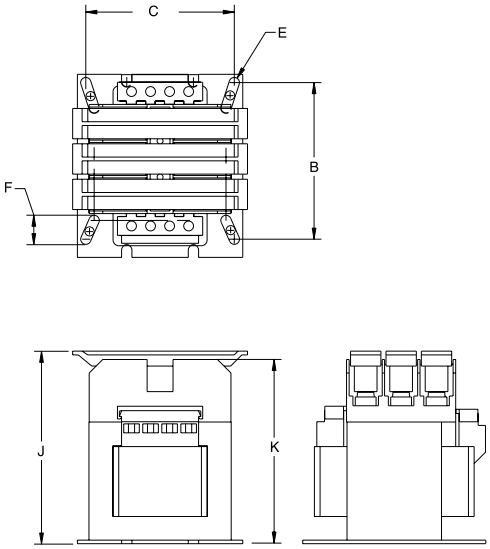
Control Circuit Transformers

Approximate Dimensions and Shipping Weights

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

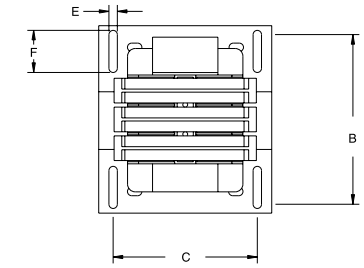


Transformer without Fusing

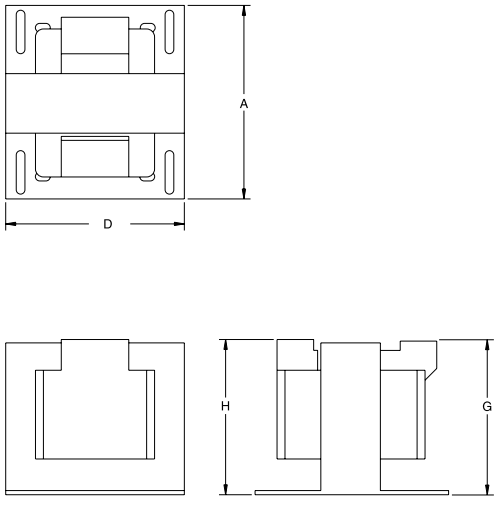


Transformer with Fuse Holder and Covers

VA	A	B	C	D	E	F	G	H	J	K	Approximate Shipping Wt. lbs (kg)	
											Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
63	3-7/8 (98.00)	3-1/4 (82.55)	3-1/8 (79.38)	3-1/2 (88.90)	7/32 (5.54)	22/32 (18.29)	2-27/32 (72.39)	2-3/8 (73.91)	4-5/64 (103.51)	3-57/64 (99.01)	4-1/2 (2.04)	4-4/5 (2.18)
80	3-7/8 (98.00)	3-1/4 (82.55)	3-1/8 (79.38)	3-1/2 (88.90)	7/32 (5.54)	22/32 (18.29)	2-27/32 (72.39)	2-3/8 (73.91)	4-5/64 (103.51)	3-57/64 (99.01)	4-1/2 (2.04)	4-4/5 (2.18)
130	3-7/8 (98.00)	3-1/4 (82.55)	3-1/8 (79.38)	3-1/2 (88.90)	7/32 (5.54)	22/32 (18.29)	3-3/8 (85.60)	3-13/32 (86.61)	4-45/64 (119.5)	4-35/64 (115.44)	6-7/10 (3.04)	7-3/20 (3.24)



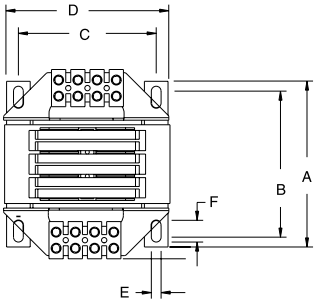
Transformer with Fuse Holder and Covers

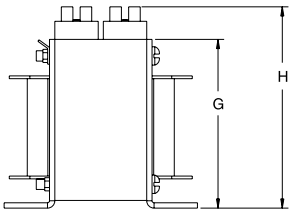


Transformer without Fusing

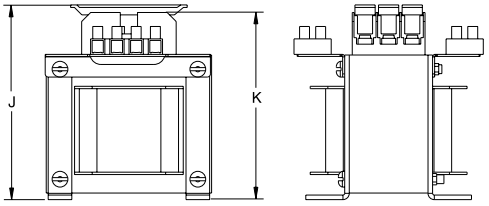
VA	A	B	C	D	E	F	G	H	J	K	Approximate Shipping Wt. lbs (kg)	
											Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
200	4-7/8 (123.95)	4-7/16 (112.78)	3-3/4 (95.25)	4-1/2 (114.30)	7/32 (5.59)	1-1/8 (28.70)	3-3/8 (85.60)	3-29/32 (86.61)	5-21/64 (135.26)	5-11/64 (131.44)	8-2/5 (3.81)	8-7/10 (3.95)
250	4-7/8 (123.95)	4-7/16 (108.20)	3-3/4 (95.25)	4-1/2 (114.30)	7/32 (5.59)	1-1/8 (28.70)	3-7/8 (98.30)	3-29/32 (98.30)	5-21/64 (135.26)	5-11/64 (131.44)	10-2/5 (4.72)	10-4/5 (4.90)
350	4-7/8 (123.95)	4-7/16 (108.20)	3-3/4 (95.25)	4-1/2 (114.30)	7/32 (5.59)	1-1/8 (28.70)	3-7/8 (98.30)	3-29/32 (98.30)	5-21/64 (135.26)	5-11/64 (131.44)	13-2/5 (6.08)	13-4/5 (6.26)

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.



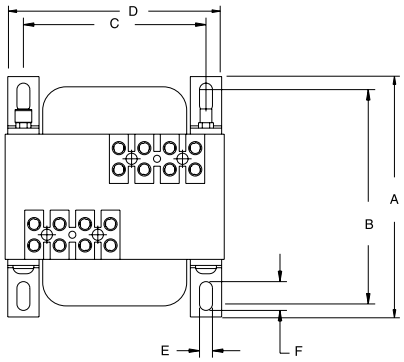


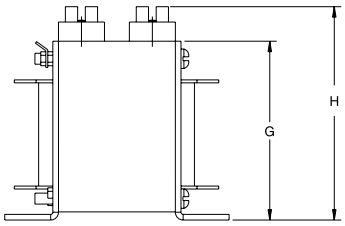
Transformer without Fusing

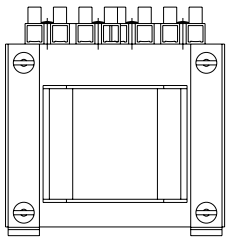


Transformer with Fuse Holder and Covers

VA	A	B	C	D	E	F	G	H	J	K	Approximate Shipping Wt. lbs (kg)	
											Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
500	5-1/4 (133.35)	4-33/64 (114.81)	4-3/8 (111.25)	5-1/4 (133.35)	5/16 (7.87)	45/64 (18.03)	4-17/32 (114.81)	5-1/2 (139.70)	6-3/16 (156.97)	5-15/16 (150.62)	17-3/5 (7.98)	17-19/20 (8.14)







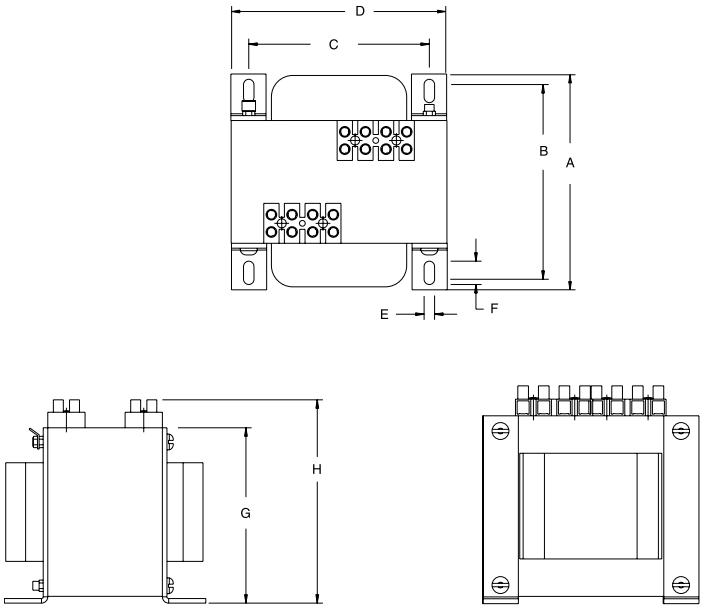
Transformer without Fusing

VA	A	B	C	D	E	F	G	H	Approximate Shipping Wt. lbs (kg)	
									Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
750	5-3/4 (146.05)	5 (127.51)	4-3/8 (111.25)	5-1/4 (133.35)	5/16 (7.87)	45/64 (18.03)	4-9/16 (114.81)	5-19/32 (137.41)	21-1/2 (9.75)	—
800	5-3/4 (146.05)	5 (127.51)	4-3/8 (111.25)	5-1/4 (133.35)	5/16 (7.87)	45/64 (18.03)	4-9/16 (114.81)	5-19/32 (137.41)	21-1/2 (9.75)	—

Control Circuit Transformers

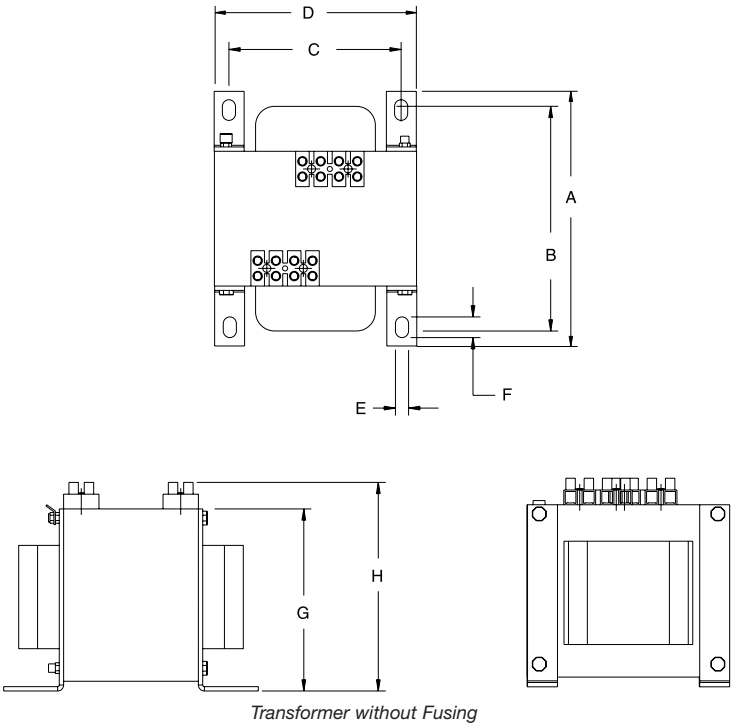
Approximate Dimensions and Shipping Weights, Continued

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.



Transformer without Fusing

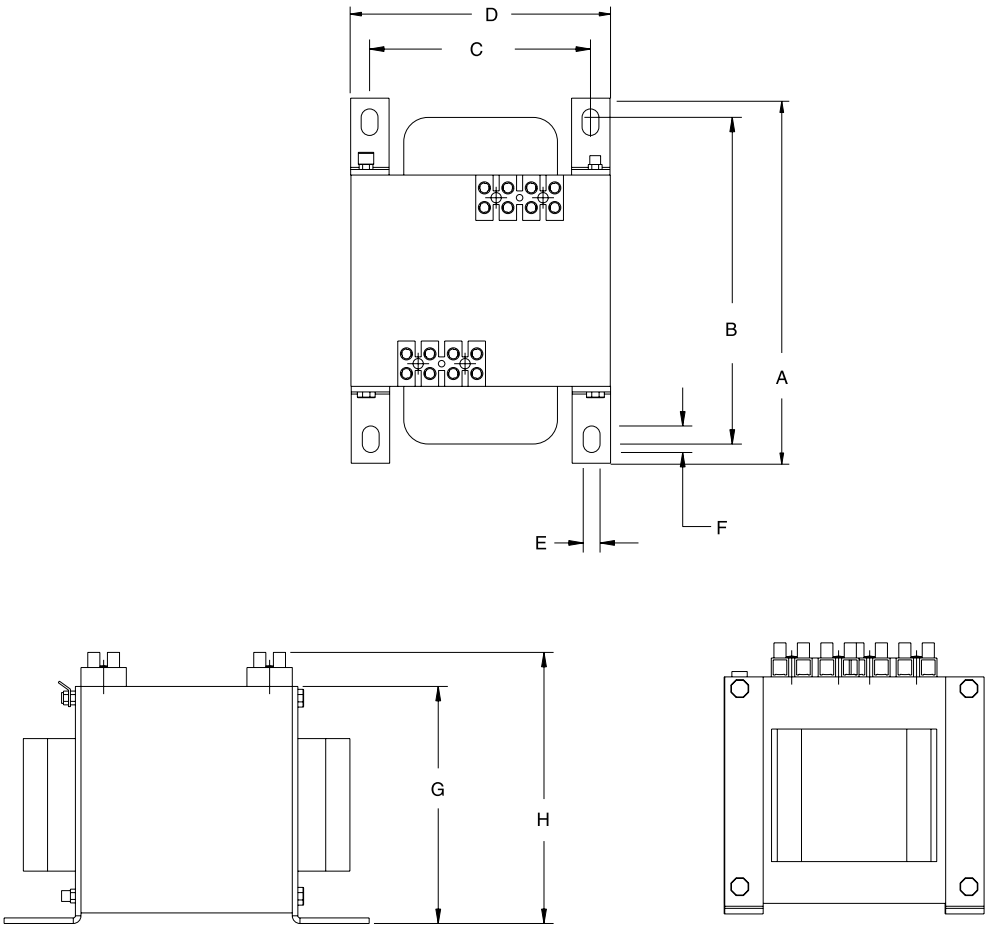
VA	A	B	C	D	E	F	G	H	Approximate Shipping Wt. lbs (kg)	
									Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
1000	6-3/8 (161.92)	5-3/8 (136.53)	5-5/16 (134.94)	6-3/8 (161.92)	5/16 (7.87)	45/64 (18.03)	5-33/64 (140.21)	6-1/2 (162.56)	37-1/5 (16.87)	—



Transformer without Fusing

VA	A	B	C	D	E	F	G	H	Approximate Shipping Wt. lbs (kg)	
									Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
1600	8-1/2 (215.90)	7-1/4 (184.15)	5-3/4 (143.76)	6-3/4 (171.45)	7/16 (10.92)	45/64 (18.03)	5-3/4 (146.05)	7-1/16 (168.66)	50-4/5 (23.04)	—

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.



Transformer without Fusing

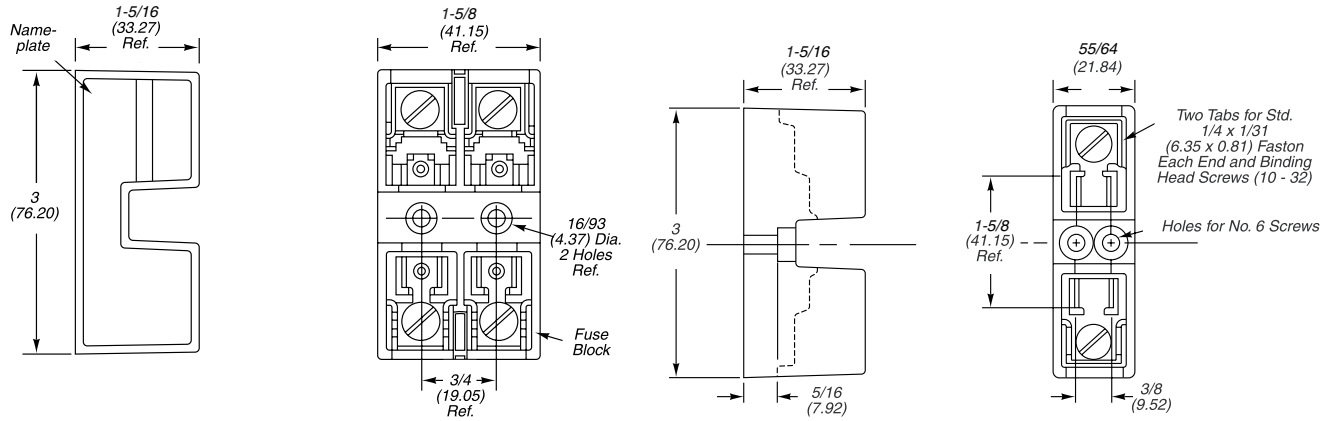
VA	A	B	C	D	E	F	G	H	Approximate Shipping Wt. lbs (kg)	
									Without Top-Mounted Fuse Block	2-Pole Primary and 1-Pole Secondary Top-Mounted Fuse Block
2000	9-1/2 (241.30)	8-1/4 (209.55)	5-3/4 (143.76)	6-3/4 (171.45)	7/16 (10.92)	45/64 (18.03)	5-11/64 (149.86)	7-1/16 (172.47)	61 (27.67)	—

Control Circuit Transformers

Approximate Dimensions and Shipping Weights, Continued

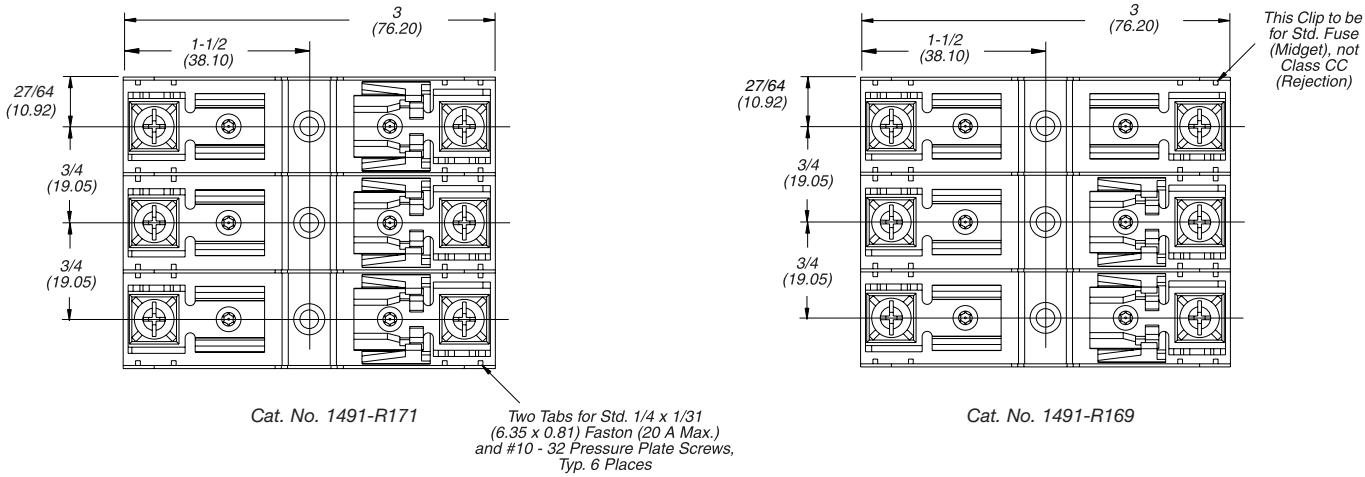
Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

Note: Electrical clearance required to top of fuse block.



Cat. No. 1491-R162
Cat. No. 1491-R167

Cat. No. 1491-R165



Cat. No. 1491-R171

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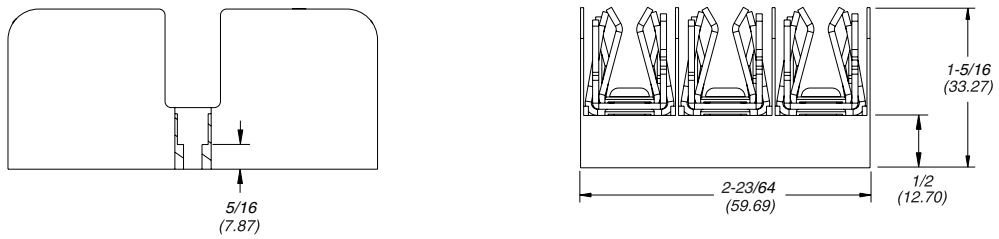

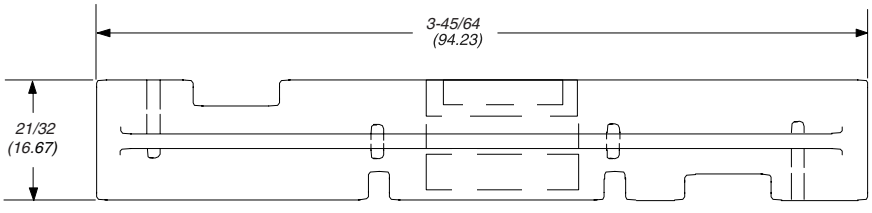

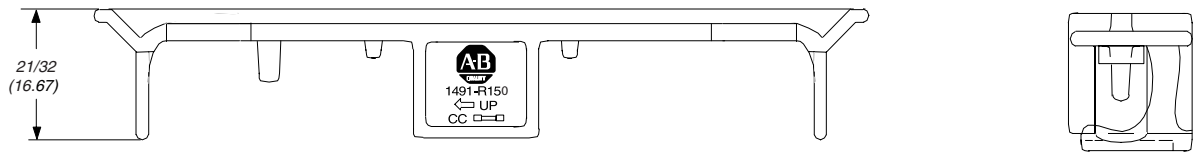

Cat. No. 1491-R150

THE ULTIMATE IN RELIABILITY AND SAFETY

Safety and reliability continue to gain increased importance in many industrial applications. The 1606-XL family of power supplies offers several solutions to increase the reliability and safety of the application. The N+1 redundancy modules provide a cost effective means for providing back-up power in the event the primary power supply fails. The "Buffer" module provides added reliability for conditions of "Brown-out" when input power is unreliable.

The **1606-XL60DR, XL120DR** and **XL240DR** power supplies have designed-in N+1 redundancy capability. When wired in parallel with an identical device, they provide N+1 redundancy with no need for any other hardware. They support 2.5, 5 and 10 A applications.

The **1606-XLRED40** provides N+1 redundancy for standard 40 A power supplies. It is designed for high load applications. One device used per power supply. "Dry" relay contact output available for remote monitoring.

The **1606-XLRED20-30** provides N+1 redundancy for two standard 20 A or 30 A power supplies simultaneously. "Dry" relay contact outputs available for remote monitoring of each power supply.

Maintenance-Free DC-UPS Alternative

The "Buffer" unit is a supplementary device, compatible with 5 to 40 A, single-phase and 3-phase supplies, that provides DC power back-up for all types of AC power faults. This unit is an excellent maintenance-free DC-UPS alternative over standard DC-UPS when the reliability of input power is marginal.

Applications are not interrupted due to voltage dips and drops up to 40sec/100mA, 4 sec/1A, 250msec/20A. The hold-up time has been significantly enhanced for applications less than 1A. The buffer unit provides remote monitoring capability that facilitates a controlled shutdown in the event of a complete power failure. It also provides additional power for short and heavy peak loads. Any number of units can be installed in parallel to increase power buffer or back-up time.

1606-XLBuffer

Signal Port (plug-able)
Remote monitoring

Selector for Back-up Threshold Mode
Flexibility in response options

Smart Status LED
Visual indication of unit status

Power Port Dual Poles Terminal
Wire to multiple loads with need for terminal block

1606XLP

All Allen-Bradley power supplies are burn-in tested to ensure reliability during system start-up.

Excellent Performance in the Smallest Package

Compact power supplies feature the same advances in design and performance as the standard devices. In addition, our compact units provide an additional space and cost savings alternative for 25 to 100 watt applications. All units are exceptionally compact in a frame size that is 50% smaller than most other comparable units.

Though the package size of our compact unit is very small, there is no sacrifice in performance. Typical efficiencies for the entire line range from 85% to 90%. Because of the high efficiencies, the devices generate minimal heat to the cabinet. These units will operate in harsh environments that support full-load current up to 60 degrees C. On a single unit, AC or DC input is accepted. The compact units are designed for excellent performance when used in parallel with multiple units. Most units deliver up to 150% of nominal current continuously during overload with no hiccup interruption.

Time Saving Installation

Our compact version has a patented DIN rail bracket that allows for easy snap in place installation. Virtually all compact versions are shipped with spring clamp terminations that require no tools to engage the clamp. All that is required is to strip and insert the wires and then deflect the actuating lever with your finger. It has been proven that spring clamps provide a very stable, consistent electrical connection over time and under conditions of vibration.

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