Smart choice for power

xantrex

Programmable DC Power Supply Catalog

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xantrex™

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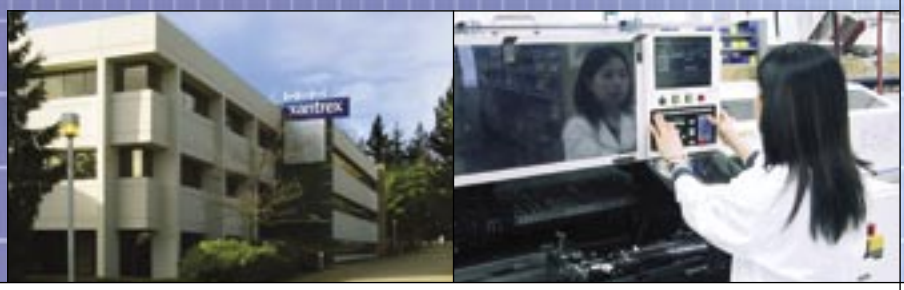
Programmable DC Power Supplies



About Xantrex

Xantrex Technology has been developing advanced power electronics products since 1983. We offer a complete line of programmable DC power supplies ranging in power from 30 W to 12 kW in full, half and quarter rack packages. Our variable output DC power supplies are the best quality on the market. They are ideal for laboratory, ATE, R&D, product design, product test and bulk power applications.

Xantrex power electronics products are also used in renewable power applications such as solar, wind, microturbines and fuel cells; backup power solutions for homes and small businesses during electric grid disruptions, and to provide auxiliary electricity in boats, recreational vehicles, heavy duty trucks and cars.

Xantrex is a public company listed on the Toronto Stock Exchange (TSX:XTX). Headquartered in Vancouver, British Columbia, the company has additional facilities in Arlington, Washington; Livermore, California; Miami, Florida and Barcelona, Spain.

Our Customers

Xantrex programmable power supplies are trusted by a range of companies including: American Power Conversion (APC), Andrew Amplifiers, Applied Materials, AVAYA, Axcelis, BAE Systems, Boeing, Cisco, Daimler Chrysler, EMC, Ericsson, Ford, Garmin, General Dynamics, General Motors, Hamilton Sundstrand, Hella Lighting, IBM, INDRA, Intel, LAM Research, Lockheed-Martin, Marconi Communications, Moog, Motorola, NASA, Northrop Grumman, Nortel, Parker Hannifin, Pepperl & Fuchs, Schlumberger, Seagate Technology, Siemens, Smiths Aerospace, Square D, Schneider Electric, Trimble Navigation, Varian Semiconductor, Westinghouse and Xerox.

Contents

Power Supply Selector

	Model	Output Power	Output Voltage	Output Current	Internal Control Interfaces						Use		Page
					GPIB-M	GPIB	RS-232	USB	Analog	Ethernet	Rack	Bench	
Single Output													
	**XDC**	12 kW	0-10 VDC to 0-600 VDC	0-1200 A to 0-20 A	●	●	●		●		■		2
		6 kW	0-10 VDC to 0-600 VDC	0-600 A to 0-10 A	●	●	●		●		■		
	**XPR**	6 kW	0-10 VDC to 0-600 VDC	0-600 A to 0-10 A					●		■		8
	**XFR**	2.8 kW	0-7.5 VDC to 0-600 VDC	0-300 A to 0-4 A	●	●	●		●	●	■		11
		1.2 kW	0-6 VDC to 0-600 VDC	0-200 A to 0-2 A	●	●	●		●	●	■		
	**XHR**	1 kW	0-7.5 VDC to 0-600 VDC	0-130 A to 0-1.7 A	●	●	●		●	●	■	■	15
	**XPD**	500 W	0-7.5 VDC to 0-120 VDC	0-67 A to 0-4.5 A	●	●	●		●		■	■	18
	**HPD**	300 W	0-15 VDC to 0-60 VDC	0-20 A to 0-5 A		●	●		●		■	■	21
	**XT**	60 W	0-7 VDC to 0-250 VDC	0-6 A to 0-0.25 A	●	●	●		●		■	■	24
Multiple Output													
	**XMP**	2.4 kW	0-8 VDC to 0-160 VDC	0-80 A to 0-1.25 A		●	●				■	■	30
Laboratory													
	**XDL**	105-215 W	0-35 VDC to 0-56 VDC	0-0.5 A to 0-5 A		●	●	●			■	■	35
	**XPF**	175-840 W	0-35 VDC to 0-42 VDC	0-20 A to 0-10 A								■	38
	**XPH**	175-420 W	0-18 VDC to 0-150 VDC	0-10 A to 0-2 A								■	40
	**XPL**	30-125W	0-18 VDC to 0-56 VDC	0-3.3 A to 0-1 A								■	42

XDC Series

12 kW & 6 kW

XDC 6 kW

XDC 12 kW

Digital DC power supply

Digitally Controlled DC Power Supplies

Product names:	XDC 12 kW	XDC 6 kW
Voltage range:	0-10 VDC to 0-600 VDC	0-10 VDC to 0-600 VDC
Current range:	0-1200 A to 0-20 A	0-600 A to 0-10 A
Power:	12 kW	6 kW

The Xantrex Digital Control (XDC) Series provide 6 kW or 12 kW of clean, reliable power for ATE, burn-in, magnet charging, OEM, product test, and other test and measurement applications. With an embedded controller, the XDC Series has a unique menu-driven auto sequencing capability. This powerful feature allows for complex test sequences to be entered and saved via the front panel without the need for external computers or software. Tests unique to a user's application are now possible with the XDC Series.

The XDC Series offers up to ten different test programs, each with up to 99 voltage level steps varying from milliseconds to days. Programs can be executed by a manual or external trigger, or via a computer interface; a technician can single step through a sequence, run "n" times or run continuously when triggered from the front panel or remotely. This stand-alone capability can be used for constructing simple voltage ramps, battery charging and simulation of battery voltage at engine start-up, component testing, and MIL 704E testing. Additionally, up to ten configurations of differing protection and output set points may be stored, recalled at any time or set for default at start-up.

Simple, high power systems can also be configured by adding parallel power supplies that are controlled from a master XDC unit by a CANbus communications link.

Features

- Embedded controller for menu driven auto sequencing
- Zero voltage "soft switching"
- Power factor correction (PFC)
- Constant power mode
- Ten store/recall locations
- Ten 99-step, menu-driven auto sequencing
- Nine self-protection mechanisms
- Current sharing for parallel operation
- LabVIEW® and LabWindows® drivers
- Remote sense with 5V line loss compensation
- RS-232 interface standard
- Isolated analog programming standard

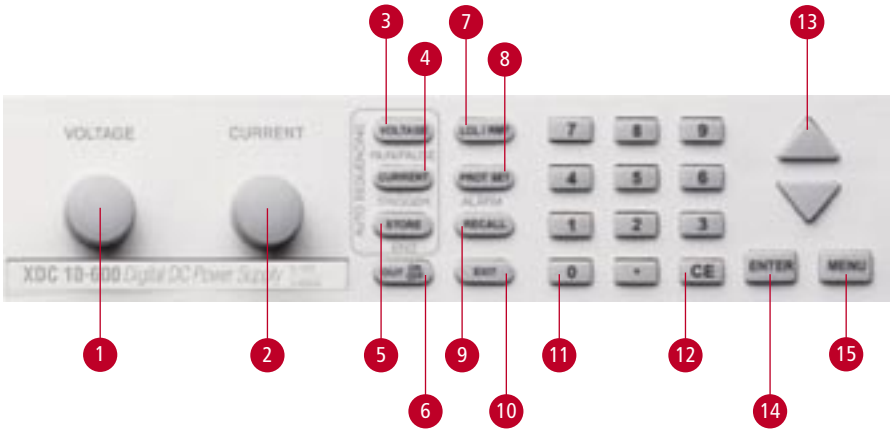
Options

- GPIB interface card
- CANbus communications link
- 3-phase 342-500 VAC 3 wire and safety ground, 47-63 Hz

Five year warranty

XDC Front Panel

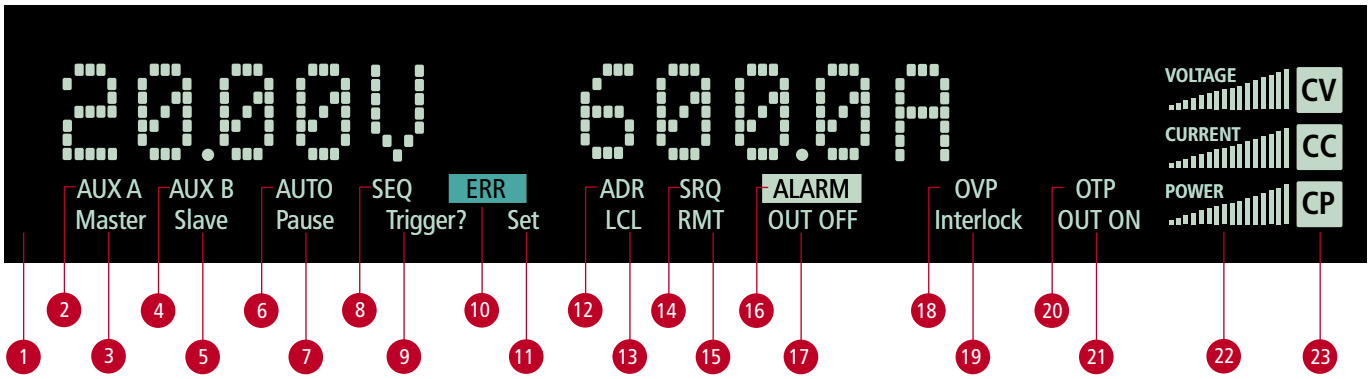
Front Control Panel



1. Precision digital encoded VOLTAGE knob
2. Precision digital encoded CURRENT knob
3. VOLTAGE set / Auto sequence RUN/PAUSE
4. CURRENT set / Auto sequence TRIGGER
5. STORE settings / Auto sequence END
6. OUTPUT ON or OFF
7. LOCAL or REMOTE
8. PROTECTION SETPOINTS / ALARM response
9. RECALL Settings/Auto Sequence PGM
10. EXIT (cancel)
11. Numeric keypad for data entry
12. CLEAR entry
13. UP/DOWN arrows for menu navigation and scrolling
14. ENTER
15. MENU access

Display

1. Main display of outputs and setpoints
2. AUXILIARY line A is true
3. MASTER in current share configurations
4. AUXILIARY line B is true
5. SLAVE in current share configurations
6. AUTO SEQUENCE OPERATION
7. Auto sequence program is in PAUSE
8. AUTO SEQUENCE SETUP mode
9. Auto sequence waiting for a TRIGGER signal
10. ERROR occurrence
11. SETTING or SETPOINT to be entered
12. Power supply is being ADDRESSED
13. Power supply is under LOCAL control
14. GPIB SERVICE REQUEST
15. Power Supply is under REMOTE control
16. Operating outside set ALARM parameters
17. OUTPUT is disabled
18. Has exceeded and OVER VOLTAGE trip point
19. External safety INTERLOCK line disabled the power supply output
20. OVER TEMPERATURE PROTECTION disabled the power supply output
21. OUTPUT is ON
22. Graphical representation of output VOLTAGE, CURRENT and POWER
23. Constant VOLTAGE, CURRENT or POWER modes



XDC 12 kW Electrical Specifications

Models	10-1200	20-600	30-400	40-300	60-200	80-150	100-120	150-80	300-40	600-20
Output Ratings										
Output Voltage [1]	0-10 V	0-20 V	0-30 V	0-40 V	0-60 V	0-80 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current [2]	0-1200 A	0-600 A	0-400 A	0-300 A	0-200 A	0-150 A	0-120 A	0-80 A	0-40 A	0-20 A
Output Power	12000 W	12000 W	12000 W	12000 W	12000 W	12000 W	12000 W	12000 W	12000 W	12000 W
Line Regulation [3]										
Voltage	1 mV	1 mV	2 mV	2 mV	2 mV	3 mV	3 mV	5 mV	7 mV	7 mV
Current	300 mA	100 mA	50 mA	30 mA	30 mA	30 mA	20 mA	20 mA	10 mA	10 mA
Load Regulation [4]										
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	15 mV	30 mV
Current	300 mA	50 mA	50 mA	30 mA	30 mA	20 mA	20 mA	10 mA	10 mA	10 mA
Meter Accuracy										
Voltage (0.15% of Vmax)	15 mV	30 mV	45 mV	60 mV	90 mV	120 mV	150 mV	225 mV	450 mV	900 mV
Current (0.5% of Imax)	6 A	3 A	2 A	1.5 A	1 A	750 mA	600 mA	400 mA	200 mA	100 mA
Output Noise (0-20 MHz)										
Voltage (p-p)	85 mV	80 mV	70 mV	70 mV	70 mV	75 mV	75 mV	80 mV	80 mV	95 mV
Output Ripple (rms)										
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV	12 mV	15 mV	15 mV	20 mV	20 mV
Current[5]	500 mA	100 mA	50 mA	50 mA	30 mA	30 mA	30 mA	30 mA	20 mA	20 mA
Drift (30 minutes) [6]										
Voltage (0.04% of Vmax)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.6% of Imax)	7200 mA	3600 mA	2400 mA	1800 mA	1200 mA	900 mA	720 mA	480 mA	240 mA	120 mA
Drift (8 hours) [7]										
Voltage (0.02% of Vmax)	2 mV	4 mV	6 mV	8 mV	12 mV	16 mV	20 mV	30 mV	60 mV	120 mV
Current (0.04% of Imax)	480 mA	240 mA	160 mA	120 mA	80 mA	60 mA	48 mA	32 mA	16 mA	8 mA
Temperature Coefficient [8]										
Voltage (0.04% of Vmax/°C)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.06% of Imax/°C)	720 mA	360 mA	240 mA	180 mA	120 mA	90 mA	72 mA	48 mA	24 mA	12 mA
OVP Adjustment Range										
(0% to 103% of Vmax)	0-10.3 V	0-20.6 V	0-30.9 V	0-41.2 V	0-61.8 V	0-82.4 V	0-103 V	0-154.5 V	0-309 V	0-618 V
Efficiency [9]	85%	87%	87%	87%	89%	89%	90%	90%	91%	91%

XDC 12 kW Interface Specifications with RS-232 (standard) or GPIB Interface (optional) Installed

Models	10-1200	20-600	30-400	40-300	60-200	80-150	100-120	150-80	300-40	600-20
Program Accuracy [10]										
Voltage (mV) (0.1% of Vmax)	10	20	30	40	60	80	100	150	300	600
Current (mA) (0.5% of Imax)	6000	3000	2000	1500	1000	7500	600	400	200	100
OVP (mV) (0.1% of Vmax)	10	20	30	40	60	80	100	150	300	600
Power (W) (0.5% of Pmax)	60	60	60	60	60	60	60	60	60	60
Readback Accuracy										
Voltage (mV) (0.15% of Vmax)	15	30	45	60	90	120	150	225	450	900
Current (mA) (0.5% of Imax)	6000	3000	2000	1500	1000	750	600	400	200	100
Power (W) (0.5% of Pmax)	60	60	60	60	60	60	60	60	60	60

Specifications are subject to change without notice.

1. Minimum output voltage is <0.3% of rated voltage at zero output setting.
2. Minimum output current is <0.2% of rated current at zero output setting when measured with rated load resistance.
3. For input voltage variation over the AC input voltage range, with constant rated load.
4. For 0-100% load variation, with constant nominal line voltage.
5. Current mode noise is measured from 10% to 100% of rated output voltage, full current, unit in CC mode.
6. Maximum drift over 30 minutes with constant line, load, and temperature, after power on.
7. Maximum drift over 8 hours with constant line, load, and temperature, after 30 minute warm-up.
8. Change in output per °C change in ambient temperature, with constant line and load.
9. Typical efficiency at nominal input voltage and full output power.
10. Accuracy specifications apply for settings in range of 1% to 100% of rated output.

XDC 6 kW Electrical Specifications

Models	10-600	20-300	30-200	40-150	60-100	80-75	100-60	150-40	300-20	600-10
Output Ratings										
Output Voltage [1]	0-10 V	0-20 V	0-30 V	0-40 V	0-60 V	0-80 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current [2]	0-600 A	0-300 A	0-200 A	0-150 A	0-100 A	0-75 A	0-60 A	0-40 A	0-20 A	0-10 A
Output Power	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W
Line Regulation [3]										
Voltage	1 mV	1 mV	2 mV	2 mV	3 mV	3 mV	3 mV	5 mV	7 mV	10 mV
Current	150 mA	50 mA	50 mA	30 mA	20 mA	20 mA	20 mA	10 mA	5 mA	5 mA
Load Regulation [4]										
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	15 mV	30 mV
Current	150 mA	50 mA	50 mA	30 mA	30 mA	20 mA	20 mA	10 mA	10 mA	10 mA
Meter Accuracy										
Voltage (0.15% of Vmax)	15 mV	30 mV	45 mV	60 mV	90 mV	120 mV	150 mV	225 mV	450 mV	900 mV
Current (0.5% of Imax)	3 A	1.5 A	1A	750 mA	500 mA	375 mA	300 mA	200 mA	100 mA	50 mA
Output Noise (0-20 MHz)										
Voltage (p-p)	85 mV	80 mV	70 mV	70 mV	70 mV	75 mV	75 mV	80 mV	80 mV	95 mV
Output Ripple (rms)										
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV	12 mV	15 mV	15 mV	20 mV	20 mV
Current[5]	500 mA	100 mA	50 mA	50 mA	30 mA	30 mA	30 mA	30 mA	20 mA	20 mA
Drift (30 minutes) [6]										
Voltage (0.04% of Vmax)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.6% of Imax)	3600 mA	1800 mA	1200 mA	900 mA	600 mA	450 mA	360 mA	240 mA	120 mA	60 mA
Drift (8 hours) [7]										
Voltage (0.02% of Vmax)	2 mV	4 mV	6 mV	8 mV	12 mV	16 mV	20 mV	30 mV	60 mV	120 mV
Current (0.04% of Imax)	240 mA	120 mA	80 mA	60 mA	40 mA	30 mA	24 mA	16 mA	8 mA	4 mA
Temperature Coefficient [8]										
Voltage (0.04% of Vmax/°C)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.06% of Imax/°C)	360 mA	180 mA	120 mA	90 mA	60 mA	45 mA	36 mA	24 mA	12 mA	6 mA
OVP Adjustment Range										
(0% to 103% of Vmax)	0-10.3 V	0-20.6 V	0-30.9 V	0-41.2 V	0-61.8 V	0-82.4 V	0-103 V	0-154.5 V	0-309 V	0-618 V
Efficiency [9]	85%	87%	87%	87%	89%	89%	90%	90%	91%	91%

XDC 6 kW Interface Specifications with RS-232 (standard) or GPIB Interface (optional) Installed

Models	10-600	20-300	30-200	40-150	60-100	80-75	100-60	150-40	300-20	600-10
Program Accuracy [10]										
Voltage (mV) (0.1% of Vmax)	10	20	30	40	60	80	100	150	300	600
Current (mA) (0.5% of Imax)	3000	1500	1000	750	500	375	300	200	100	50
OVP (0.1% of Vmax)	10	20	30	40	60	80	100	150	300	600
Power (W) (0.5% of Pmax)	30	30	30	30	30	30	30	30	30	30
Readback Accuracy										
Voltage (mV) (0.15% of Vmax)	15	30	45	60	90	120	150	225	450	900
Current (mA) (0.5% of Imax)	3000	1500	1000	750	500	375	300	200	100	50
Power (W) (0.5% of Pmax)	30	30	30	30	30	30	30	30	30	30

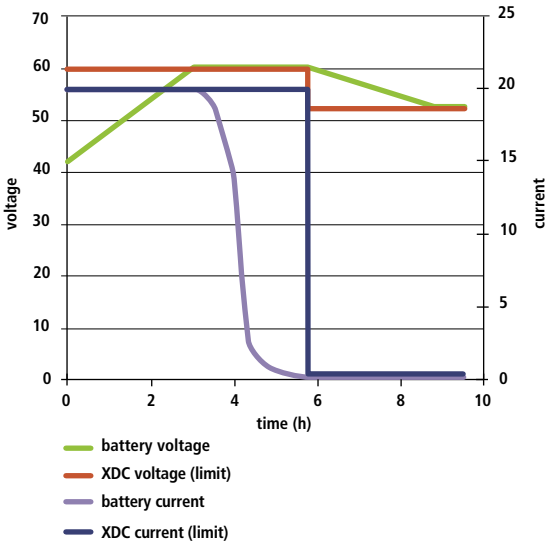
Specifications are subject to change without notice.

1. Minimum output voltage is <0.3% of rated voltage at zero output setting.
2. Minimum output current is <0.2% of rated current at zero output setting when measured with rated load resistance.
3. For input voltage variation over the AC input voltage range, with constant rated load.
4. For 0-100% load variation, with constant nominal line voltage.
5. Current mode noise is measured from 10% to 100% of rated output voltage, full current, unit in CC mode.
6. Maximum drift over 30 minutes with constant line, load, and temperature, after power on.
7. Maximum drift over 8 hours with constant line, load, and temperature, after 30 minute warm-up.
8. Change in output per °C change in ambient temperature, with constant line and load.
9. Typical efficiency at nominal input voltage and full output power.
10. Accuracy specifications apply for settings in range of 1% to 100% of rated output.

XDC Series Sequence Programming Examples

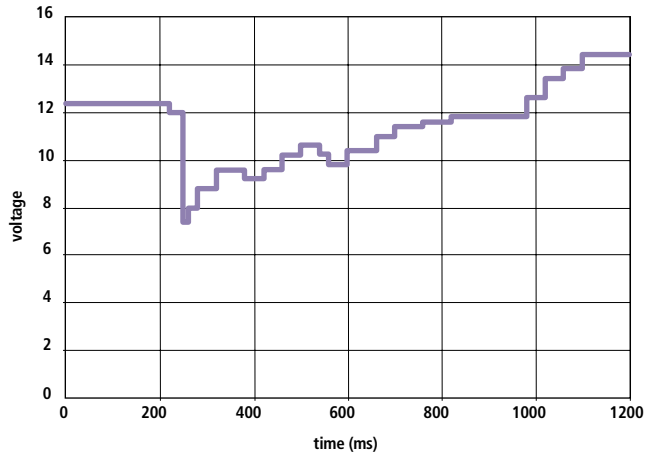
Automated Charging of a 48 V Battery

Automating battery charging with the XDC allows you to initiate a bulk charging mode with voltage/current limits plus OVP. The power supply can also be programmed for a float charge mode that holds the battery voltage at a slightly lower level for a sustained charge.



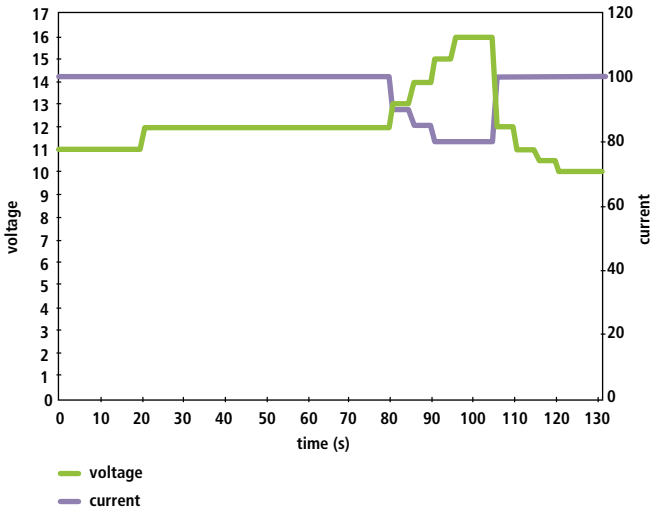
Simulation of Automotive Battery Voltage at Engine Start-up

The XDC simulates automotive battery voltage at engine start-up to test devices that operate off the battery. This process ensures the devices operate effectively during the voltage drop and recovery time that occurs when the starter pulls a large current surge from the battery.



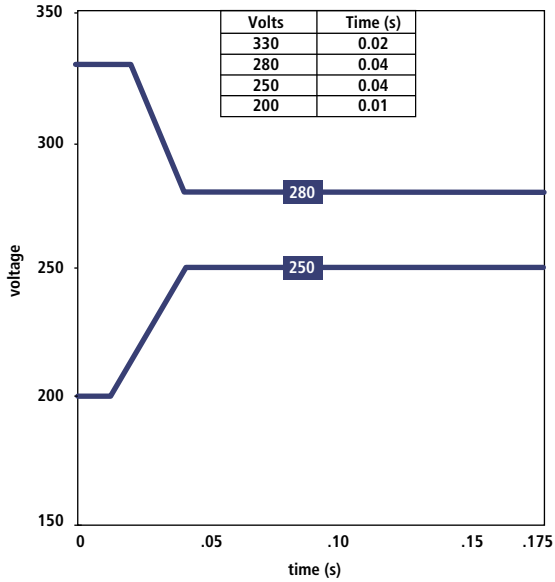
Inverter Test Sequence

The XDC automates test sequences, such as those for power inverters, without the use of any external programming source. This can streamline and reduce manufacturing test times and costs.



MIL-STD-704E Testing

Simulation of voltage transient envelopes of 270 V DC systems for testing devices that must conform to MIL-STD-704E.



XDC 6 kW and 12 kW General Specifications

Operational AC Input Voltage	3-phase 190-242 VAC (47-63 Hz) (standard); 3-phase 342-500 VAC, 47-63 Hz, 3 wire and safety ground (optional)	
Switching Frequency	Typical 31 kHz; 62 kHz output ripple	
Power Factor (minimum)	0.95 (nominal 208 Vrms) 0.9 (nominal 400 Vrms HV input option)	
Voltage Mode Transient Response Time	<3 ms (6 kW model) and <20 ms (12 kW model) for output voltage to recover within 0.75% of rated output voltage after a step change in load current from 50% to 100% of rated output or from 100% to 50%	
Maximum Voltage Differential	±600 VDC from output to safety ground	
Remote On/Off and Interlock	4-15 V signal or TTL-compatible input	
Remote Analog Programming	Voltage and current programming inputs; 0-5 V, 0-10 V (default) voltage sources. Galvanically isolated from supply output.	
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output. Galvanically isolated from supply output.	
Remote Programming and Monitoring Accuracy	<±0.5% of full scale output	
Maximum Remote Sense Line Drop Compensation	5 V/line (Line drop is subtracted from total voltage available at supply output.)	
Operating Temperature Range	0 to 50°C	
Storage Temperature Range	–40 to 85°C	
Humidity Range	30 to 95% RH, non-condensing	
Front Panel Voltage and Current Control	Rotary encoder knobs or keypad entry	
Front Panel Voltage Control	Resolution 0.002% with keypad	
AC Input Connector Type	4-terminal, wire clamp connector with strain relief cover	
Main Output Connector	10 V to 150 V models: nickel-plated copper bus bars with bus bar shield; 300 V to 600 V models: 4-terminal wire clamp connector with strain relief	
Weight	XDC 6 kW: Approximately 75 lb/34 kg XDC 12kW: Approximately 170 lb./ 77kg	
Dimensions (H x W x D)	XDC 6 kW: 5.2 x 19 x 21.0" (133 x 483 x 533 mm) XDC 12kW: 10.4 x 19 x 22.2" (263 x 483 x 564 mm)	
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; CSA C/US certified to UL3111-1 and CSA C22.2 No 1010.1 Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001 Class A.	
XDC Options	GPIB-XDC	Multi-channel GPIB Interface Card
	CAN-XDC	Multi-channel CANbus interface for linking multiple XDC units
	HV	3-phase 342-500 VAC 3-wire and safety ground, 47-63 Hz

Specifications subject to change without notice.

XPR Series

6 kW

Simple, high power solution for bulk power

An Analog Controlled DC Power Supply with Power Factor Correction

Product name:	XPR
Voltage range:	0-10 VDC to 0-600 VDC
Current range:	0-600 A to 0-10 A
Power:	6 kW

The Xantrex XPR Series of analog-controlled power supplies is designed for bulk power applications where analog functionality is preferred over digital programming. The power supplies are ideal for applications such as burn-in, electroplating, battery charging, and steering magnets.

The XPR features zero voltage "soft switching" technology that ensures low temperature operation while eliminating high voltage transients that stress power transistors. This switching technology is a more reliable and lower noise solution than what has been available in the past.

The XPR series features an analog control for resistive or voltage programming of the output voltage and current limits. Each power supply includes a straightforward front panel that features a seven segment LED display with several status and alarm indicators, and ten-turn knobs for voltage and current control. The front panel buttons allow users to conveniently set and view the over voltage protection set points, view the output voltage and current limits, and enable output shutdown. It also provides the flexibility of toggling control of the power supply between the front panel and the remote analog control.

Features

- Zero voltage "soft switching"
- Power factor correction (PFC)
- Remote sense with 5V line loss compensation
- Simultaneous display of output voltage and current
- Automatic voltage/Current mode crossover
- Auxilliary status lines for monitoring power supply conditions
- Remote interlock
- Parallel connected units for higher power requirements
- Analog programming and readback capabilities

Protection Features

- Over voltage protection
- Over temperature protection
- Sense protection

Options

- Isolated analog control (ISOL)

Five year warranty

XPR 6 kW Electrical Specifications

Models	10-600	20-300	30-200	40-150	60-100	80-75	100-60	150-40	300-20	600-10
Output Ratings										
Output Voltage [1]	0-10 V	0-20 V	0-30 V	0-40 V	0-60 V	0-80 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current [2]	0-600 A	0-300 A	0-200 A	0-150 A	0-100 A	0-75 A	0-60 A	0-40 A	0-20 A	0-10 A
Output Power	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W	6000 W
Line Regulation [3]										
Voltage	1 mV	1 mV	2 mV	2 mV	3 mV	5 mV	7 mV	7 mV	10 mV	20 mV
Current	150 mA	50 mA	50 mA	30 mA	20 mA	20 mA	20 mA	10 mA	5 mA	5 mA
Load Regulation [4]										
Voltage	10 mV	10 mV	20 mV	20 mV	20 mV	25 mV	25 mV	25 mV	30 mV	80 mV
Current	150 mA	50 mA	50 mA	30 mA	30 mA	20 mA	20 mA	10 mA	10 mA	10 mA
Meter Accuracy										
Voltage (0.5% of Vmax + 1 count)	0.06 V	0.2 V	0.25 V	0.3 V	0.4 V	0.5 V	0.6 V	1.75 V	2.5 V	4 V
Current (0.5% of Imax + 1 count)	4 A	2.5 A	2.0 A	1.75 A	0.6 A	0.48 A	0.4 A	0.3 A	0.2 A	0.06 A
Output Noise (0-20 MHz)										
Voltage (p-p)	85 mV	80 mV	70 mV	70 mV	70 mV	75 mV	75 mV	80 mV	80 mV	110 mV
Output Ripple (rms)										
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV	12 mV	15 mV	15 mV	20 mV	20 mV
Current [5]	500 mA	100 mA	50 mA	50 mA	30 mA	30 mA	30 mA	30 mA	20 mA	20 mA
Drift (30 minutes) [6]										
Voltage (0.04% of Vmax)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.6% of Vmax)	3600 mA	1800 mA	1200 mA	900 mA	600 mA	450 mA	360 mA	240 mA	120 mA	60 mA
Drift (8 hours) [7]										
Voltage (0.02% of Vmax)	2 mV	4 mV	6 mV	8 mV	12 mV	16 mV	20 mV	30 mV	60 mV	120 mV
Current (0.04% of Imax)	240 mA	120 mA	80 mA	60 mA	40 mA	30 mA	24 mA	16 mA	8 mA	4 mA
Temperature Coefficient [8]										
Voltage (0.04% of Vmax/°C)	4 mV	8 mV	12 mV	16 mV	24 mV	32 mV	40 mV	60 mV	120 mV	240 mV
Current (0.06% of Imax/°C)	360 mA	180 mA	120 mA	90 mA	60 mA	45 mA	36 mA	24 mA	12 mA	6 mA
OVP Adjustment Range										
(0% to 110% of Vmax)	0-11 V	0-22 V	0-33 V	0-44 V	0-66 V	0-88 V	0-110 V	0-165 V	0-330 V	0-660 V
Efficiency [9]	85%	87%	87%	87%	89%	89%	90%	90%	91%	91%

Specifications subject to change without notice.

1. Minimum output voltage is <0.3% of rated voltage at zero output setting.
2. Minimum output current is <0.2% of rated current at zero output setting when measured with rated load resistance.
3. For input voltage variation over the AC input voltage range, with constant rated load.
4. For 0-100% load variation, with constant nominal line voltage.
5. Current mode noise is measured from 10% to 100% of rated output voltage, full current, unit in CC mode.
6. Maximum drift over 30 minutes with constant line, load, and temperature, after power on.
7. Maximum drift over 8 hours with constant line, load, and temperature, after 30 minute warm-up.
8. Change in output per °C change in ambient temperature, with constant line and load.
9. Typical efficiency at nominal input voltage and full output power.

XPR 6 kW General Specifications

Operational AC Input Voltage	3-phase 190-242 VAC (optional 3-phase 342 - 500 VAC) 3 wire and safety ground, 47-63 Hz	
Switching Frequency	Typical 31 kHz; 62 kHz output ripple	
Power Factor (minimum)	0.95 (nominal 208 Vrms) 0.9 (nominal 400 Vrms HV input option)	
Voltage Mode Transient Response Time	3 ms for output voltage to recover within 0.75% of rated output of previous level after step change in load current between 50% & 100%.	
Maximum Voltage Differential	±600 VDC from output to safety ground	
Remote On/Off and Interlock	4-15 V signal or TTL-compatible input, selectable logic	
Remote Analog Programming	Voltage and current programming inputs; 0-5 V, 0-10 V (default) voltage sources. Galvanically isolated from supply output	
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output. Galvanically isolated from supply output	
Remote Programming & Monitoring Accuracy	1% of full scale output voltage for voltage programming	
Maximum Remote Sense Line Drop Compensation	5 V/line (Line drop is subtracted from total voltage available at supply output.)	
Operating Temperature Range	0 to 50°C	
Storage Temperature Range	–40 to 85°C	
Humidity Range	<95% RH, non-condensing	
Front Panel Voltage and Current Control	10-turn voltage and current potentiometers	
Front Panel Voltage Control Resolution	0.02% of Vmax	
AC Input Connector Type	4-terminal, wire clamp connector with strain relief cover	
Main Output Connector	10 V to 100 V models: nickel-plated copper bus bars with bus bar shield; 150 V to 600 V models: 4-terminal wire clamp connector with strain relief	
Weight	Approximately 75 lb. (34 kg)	
Dimensions (H x W x D)	5.2 x 19 x 22.8" (133 x 483 x 533mm)	
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; CSA C/US certified to UL3111-1 and CSA C22.2 No 1010.1; Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001, Class A.	
XPR Options	ISOL-XPR6	ISOL interface card provides isolated analog control
	HV	3-phase 342-500 VAC 3-wire and safety ground 47-63 Hz

Specifications subject to change without notice.

XFR Series

2.8 kW & 1.2 kW

XFR 1.2 kW

XFR 2.8 kW

Zero voltage, "soft switching" for low noise, high efficiency, and high reliability

Low Profile DC Power Supply with Zero Voltage "Soft Switching"

Product names:	XFR 2.8 kW	XFR 1.2 kW
Voltage range:	0-7.5 VDC to 0-600 VDC	0-6 VDC to 0-600 VDC
Current range:	0-300 A to 0-4 A	0-200 A to 0-2 A
Power range:	2250 W to 3000 W	1050 W to 1225 W

The Xantrex Full Rack (XFR) Series provides 1.2 kW and 2.8 kW of power for research, product development, and production test applications such as magnet control, ATE, process control, electroplating and burn-in. The XFR series is ideal for OEM applications where high power and a wide adjustment of output voltage or current is required. The XFR Series is designed for excellent thermal management so each unit can be conveniently stacked in rack mounts without leaving ventilation space between each unit.
The XFR Series features zero voltage "soft switching" which virtually eliminates switching transients, resulting in lower noise performance that is closer to linear levels. Soft switching also increases efficiency, decreases heat generation, and reduces stress on the switching transistors — resulting in higher reliability.

Features

- Analog programming
- Zero voltage "soft switching"
- Constant voltage or constant current operation with automatic crossover and mode indication
- Standby/Remote/Local modes
- Front panel button preview of voltage, current, OVP
- Remote sense, 5 V line loss compensation
- LabVIEW® and LabWindows® drivers

Protection Features

- Over voltage protection
- Over temperature protection

Options

- Isolated analog control (ISOL)
- RS-232 interface card
- GPIB interface card
- GPIB-multichannel
- Ethernet interface card
- Rackmount kit

Five year warranty

XFR 2.8 kW Electrical Specifications[1]

Models	7.5-300	12-220	20-130	33-85	40-70	60-46	100-28	150-18	300-9	600-4
Output Ratings										
Output Voltage	0-7.5 V	0-12 V	0-20 V	0-33 V	0-40 V	0-60 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current	0-300 A	0-220 A	0-130 A	0-85 A	0-70 A	0-46 A	0-28 A	0-18 A	0-9 A	0-4 A
Output Power	2250 W	2640 W	2600 W	2085 W	2800 W	2760 W	2800 W	2700 W	2700 W	2400 W
Line Regulation [2]										
Voltage	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	15 mV	15 mV
Current	20 mA	20 mA	5 mA	4 mA	4 mA	3 mA	3 mA	3 mA	3 mA	3 mA
Load Regulation [3]										
Voltage	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	15 mV	15 mV
Current	20 mA	20 mA	10 mA	5 mA	5 mA	4 mA	4 mA	4 mA	4 mA	3 mA
Meter Accuracy										
Voltage (1% of Vmax + 1 count)	0.09 V	0.13 V	0.3 V	0.43 V	0.5 V	0.7 V	1.1 V	1.6 V	4 V	7 V
Current (1% of Imax + 1 count)	4 A	2.3 A	1.4 A	0.95 A	0.8 A	0.56 A	0.38 A	0.19 A	0.1 A	0.05 A
Output Noise (0-20 MHz)										
Voltage (p-p)	50 mV	50 mV	50 mV	60 mV	60 mV	60 mV	100 mV	100 mV	100 mV	175 mV
Output Ripple (rms)										
Voltage	5 mV	5 mV	7 mV	7 mV	7 mV	7 mV	14 mV	15 mV	20 mV	35 mV
Current	250 mA	150 mA	60 mA	60 mV	70 mA	30 mA	10 mA	7 mA	7 mA	3 mA
Drift (8 hours) [4]										
Voltage (0.05% of Vmax)	3.75 mV	6 mV	10 mV	16.5 mA	20 mV	30 mV	50 mV	75 mV	150 mV	300 mV
Current (0.05% of Imax)	150 mA	110 mA	65 mA	42.5 mA	35 mA	23 mA	14 mA	9 mA	4.5 mA	2 mA
Temperature Coefficient [5]										
Voltage (0.02% of Vmax/°C)	1.5 mV	2.4 mV	4 mV	6.6 mV	8 mV	12 mV	20 mV	30 mV	60 mV	120 mV
Current (0.03% of Imax/°C)	90 mA	66 mA	39 mA	25.5 mA	21 mA	13.8 mA	8.4 mA	5.4 mA	2.7 mA	1.2 mA
Program Slew Rate [6]										
Rise time	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	170 ms	170 ms	170 ms	170 ms
Fall time	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	170 ms	170 ms	170 ms	100 ms
OVP Adjustment Range										
(5% to 110% of Vmax)	0.375-8.25 V	0.6-13.2 V	1-22 V	1.65 - 36.6 V	2-44 V	3-66 V	5-110 V	7.5-165 V	15-330V	30-660 V
Efficiency [7]	80%	82%	85%	85%	87%	90%	90%	90%	91%	91%

XFR 2.8 kW Interface Specifications with RS-232 or GPIB Interface Installed[1,8]

Models	7.5-300	12-220	20-130	33-85	40-70	60-46	100-28	150-18	300-9	600-4
Program Accuracy										
Voltage (mV)	10(±0.12%)	75(±0.12%)	75(±0.12%)	75(±0.3%)	75(±0.3%)	150(±0.3%)	150(±0.35%)	225(±0.35%)	225(±0.35%)	300(±0.35%)
Current (mA)	900(±0.15%)	750(±0.15%)	500(±0.15%)	425(±0.1%)	350(±0.15%)	250(±0.1%)	140(±0.15%)	120(±0.1%)	80(±0.1%)	80(±0.1%)
OVP (mV)	80	200	330	330	400	600	1000	1500	3000	6000
Readback Accuracy										
Voltage (mV)	30(±0.12%)	75(±0.12%)	75(±0.2%)	75(±0.3%)	75(±0.3%)	150(±0.35%)	150(±0.35%)	225(±0.35%)	225(±0.35%)	300(±0.35%)
Current (mA)	900(±0.1%)	750(±0.1%)	500(±0.1%)	425(±0.1%)	350(±0.1%)	250(±0.1%)	140(±0.1%)	120(±0.1%)	80(±0.1%)	80(±0.1%)

Specifications subject to change without notice.

1. Specifications indicate typical performance at 25° C ±5°C, nominal line input of 208 VAC.
2. For input voltage variation over the AC input voltage range, with constant rated load.
3. For 0-100% load variation, with constant nominal line voltage.
4. Maximum drift over 8 hours with constant line, load and temperature, after 30 minute warm-up.
5. Change in output per °C change in ambient temperature, with constant line and load.
6. Measured with stepped 0-10 V analog programming source and a resistive load.
7. Typical efficiency at nominal input voltage and rated output power.
8. Apply accuracy specifications according to the following voltage program accuracy example: Set a model 20-130 power supply to 10 volts. The expected result will be within the range of 10 volts ± 75 mV ± 0.12% of the set voltage of 10 volts.

XFR 1.2 kW Electrical Specifications[1]

Models	6-200	7.5-140	12-100	20-60	35-35	40-30	60-20	100-12	150-8	300-4	600-2
Output Ratings											
Output Voltage	0-6 V	0-7.5 V	0-12 V	0-20 V	0-35 V	0-40 V	0-60 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current	0-200 A [8]	0-140 A	0-100 A	0-60 A	0-35 A	0-30 A	0-20 A	0-12 A	0-8 A	0-4 A	0-2 A
Output Power	1200 W	1050 W	1200 W	1200 W	1225 W	1200 W	1200 W	1200 W	1200 W	1200 W	1200 W
Line Regulation [2]											
Voltage	2.5 mV	2.5 mV	2.5 mV	2.5 mV	2.5 mV	2.5 mV	2.5 mV	2.5 mV	2.5 mV	5 mV	10 mV
Current	20 mA	10 mA	10 mA	4 mA	4 mA	4 mA	4 mA	2 mA	2 mA	1 mA	1 mA
Load Regulation [3]											
Voltage	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	3 mV	5 mV	10 mV	60 mV
Current	20 mA	10 mA	8 mA	8 mA	5 mA	5 mA	9 mA	4 mA	4 mA	4 mA	4 mA
Meter Accuracy											
Voltage (1% of Vmax + 1 count)	0.07 V	0.09 V	0.13 V	0.3 V	0.4 V	0.5 V	0.7 V	1.1 V	1.6 V	4 V	7 V
Current (1% of Imax + 1 count)	2.5 A	1.5 A	1.1 A	0.7 A	0.45 A	0.4 A	0.3 A	0.13 A	0.09 A	0.05 A	0.03 A
Output Noise (0-20 MHz)											
Voltage (p-p)	50 mV	50 mV	55 mV	50 mV	50 mV	50 mV	55 mV	55 mV	60 mV	115 mV	190 mV
Output Ripple (rms)											
Voltage	5 mV	5 mV	5 mV	8 mV	8 mV	8 mV	6 mV	8 mV	13 mV	22 mV	50 mV
Current	530 mA	250 mA	250 mA	300 mA	60 mA	60 mA	15 mA	12 mA	6 mA	3 mA	1 mA
Drift (8 hours) [4]											
Voltage (0.05% of Vmax)	3 mV	3.75 mV	6 mV	10 mV	17.5 mV	20 mV	30 mV	50 mV	75 mV	150 mV	300 mV
Current (0.05% of Imax)	200 mA	70 mA	50 mA	30 mA	17.5 mA	15 mA	10 mA	6 mA	4 mA	2 mA	1 mA
Temperature Coefficient [5]											
Voltage (0.02% of Vmax/°C)	1.2 mV	1.5 mV	2.4 mV	4 mV	7 mV	8 mV	12 mV	20 mV	30 mV	60 mV	120 mV
Current (0.03% of Imax/°C)	60 mA	42 mA	30 mA	18 mA	10.5 mA	9 mA	6 mA	3.6 mA	2.4 mA	1.2 mA	0.6 mA
Program Slew Rate [6]											
Rise time	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	170 ms	170 ms	170 ms	170 ms
Fall time	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	170 ms	170 ms	170 ms	170 ms
OVP Adjustment Range											
(5% to 110% of Vmax)	0.3-6.6 V	0.375-8.25 V	0.6-13.2 V	1-22 V	1.75-38.5 V	2-44 V	3-66 V	5-110 V	7.5-165 V	15-330 V	30-660 V
Efficiency [7]	75%	78%	81%	81%	83%	83%	86%	84%	84%	85%	85%

XFR 1.2 kW Interface Specifications with RS-232 or GPIB Interface Installed[1,9]

Models	6-200	7.5-140	12-100	20-60	35-35	40-30	60-20	100-12	150-8	300-4	600-2
Program Accuracy											
Voltage (mV)	10(±0.12%)	10(±0.12%)	75(±0.12%)	75(±0.12%)	75(±0.3%)	75(±0.3%)	150(±0.25%)	150(±0.35%)	225(±0.35%)	225(±0.35%)	300(±0.35%)
Current (mA)	500(±0.12%)	500(±0.1%)	460(±0.1%)	250(±0.1%)	200(±0.1%)	150(±0.15%)	120(±0.1%)	80(±0.1%)	80(±0.1%)	80(±0.1%)	75(±0.1%)
OVP (mV)	130	80	200	330	350	400	600	1000	1500	3000	6000
Readback Accuracy											
Voltage (mV)	30(±0.12%)	30(±0.12%)	75(±0.12%)	75(±0.12%)	75(±0.12%)	75(±0.12%)	150(±0.25%)	150(±0.35%)	225(±0.1%)	225(±0.1%)	300(±0.1%)
Current (mA)	500(±0.1%)	500(±0.1%)	460(±0.1%)	250(±0.1%)	200(±0.1%)	150(±0.1%)	120(±0.1%)	80(±0.1%)	80(±0.1%)	80(±0.1%)	75(±0.1%)

Specifications subject to change without notice.

1. Specifications indicate typical performance at 25° C ±5°C, nominal line input of 120 VAC.

2. For input voltage variation over the AC input voltage range, with constant rated load.

3. For 0-100% load variation, with constant nominal line voltage.

4. Maximum drift over 8 hours with constant line, load, and temperature, after 30-minute warm-up.

5. Change in output per °C change in ambient temperature, with constant line and load.

6. Measured with stepped 0-10 V analog programming source and a resistive load.

7. Typical efficiency at 100 VAC input and rated output power.

8. Derate output current on 6 V model by 1.5 A per °C for operating temperatures 30-50°C.

9. Apply accuracy specifications according to the following voltage program accuracy example:
Set a model 20-60 power supply to 10 volts. The expected result will be within the range of
10 volts ± 75 mV ± 0.12% of the set voltage of 10 volts.

XFR 1.2 kW and 2.8 kW General Specifications

Operational AC Input Voltage	XFR 2.8 kW: 190-264 VAC, 1Φ (24.3 A @ 208 VAC; 20.5 A @ 230 VAC typical), 47-63 Hz; Option: M2 3Φ 208 VAC input XFR 1.2 kW: 85-130 VAC or 190-264 VAC, 1Φ (17 A @ 120 VAC; 8.8 A @ 230 VAC typical), 47-63 Hz. Automatic range detect.	
Switching Frequency	XFR 2.8 kW: Nominal 31 kHz (62 kHz output ripple) XFR 1.2 kW: 6 V to 40 V models: nominal 78 kHz (156 kHz output ripple); 60 V to 600 V models: nominal 62.5 kHz (125 kHz output ripple).	
Time Delay	7 sec maximum from power on until output stable	
Voltage Mode Transient Response Time	<3 ms for output voltage to recover within 0.5% of its rated voltage after a step change in load current of up to 10% to 90% of rated output	
Maximum Voltage Differential	±600 VDC from output to safety ground	
Remote Start/Stop and Interlock	2.5-15 V signal or TTL-compatible input, selectable logic	
Remote Analog Programming	Voltage and current programming inputs (source must be isolated): 0-5 k, 0-10 k resistances; 0-5 V, 0-10 V (default) voltage sources	
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V, 0-10V (default) ranges for 0-100% of output	
Remote Programming & Monitoring Accuracy	1% zero to full scale output for the default range	
Maximum Remote Sense Line Drop Compensation	5 V/line (Line drop is subtracted from total voltage available at supply output.)	
Operating Temperature Range	XFR 2.8 kW: 0 to 50°C XFR 1.2 kW: 0 to 50°C; 6 V model: for rack mounted units, derate output current by 1.5 A per °C for operating temperatures between 30 - 50°C	
Storage Temperature Range	–20 to 70°C	
Humidity Range	Up to 90% RH, non-condensing	
Front Panel Voltage and Current Control	10-turn voltage and current potentiometers	
Front Panel Voltage Control Resolution	0.02% of maximum voltage	
AC Input Connector Type	3-terminal, 34 A, 250 V, wire clamp connector with strain relief cover	
Main Output Connector	XFR 2.8 kW: 7.5 - 100 V models: nickel-plated copper bus bars with bus bar cover and strain relief; 150V to 600 V models: 4-terminal, wire clamp connector with cover and strain relief; XFR 1.2 kW: 6 - 40 V models: nickel-plated copper bus bars with bus bar shield; 60 - 600 V models: 4-terminal wire clamp connector with strain relief	
Weight	XFR 2.8 kW: Approximately 33 lb (15 kg) XFR 1.2 kW: Approximately 18 lb (8.2 kg)	
Dimensions (H x W x D)	XFR 2.8 kW: 3.5 x 19.0 x 21.0" (88.9 x 429.4 x 533.5 mm) XFR 1.2 kW: 1.7 x 19.0 x 20.0" (43.2 x 429.4 x 508.1 mm)	
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; UL Listed to UL3111-1; CSA certified to CSA C22.2 No 1010.1; Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001, Class A.	
XFR 2.8 Options	GPIB-XFR3	GPIB interface card
	GPIB-M-XFR3	Multi-channel GPIB interface card
	CAN-XFR3	CANbus interface for hardware linking multiple units (used with GPIB-M)
	RS232-XFR	RS-232 interface
	ISOL-XFR3	ISOL interface card provides isolated analog control and readback
	M2	3-phase 208 VAC input
XFR 1.2 Options	GPIB-XFR1	GPIB interface card
	GPIB-M-XFR1	Multi-channel GPIB interface card
	CAN-XFR1	CANbus interface for hardware linking multiple units (used with GPIB-M)
	RS232-XFR1	RS-232 interface card
	ISOL-XFR1	ISOL interface card provides isolated analog control and readback
	RM-XFR	19 inch rackmount kit

Specifications subject to change without notice.

XHR Series

1 kW

Compact half-rack with soft switching, power factor correction. Available with or without front panel connectors for a bench or system.

Provides 1000 Watts from a 120 Volt / 15 A Outlet

Product name:	XHR
Voltage range:	0-7.5 VDC to 0-600 VDC
Current range:	0-130 A to 0-1.7 A
Power range:	975 W to 1089 W

The Xantrex XHR Series provides 1000 W of DC power in a compact half-rack package. The supplies are designed for benchtop and system use, and as an ideal companion for other half-rack instruments in a test console. Its unique size also eliminates the need for a blank panel to preserve vertical rack space for OEM applications.

The XHR is power factor corrected for low current draw — only 11 A at 120 VAC for 1000 W — and reduced generation of input current harmonics. Zero voltage or "soft switching" virtually eliminates switching transients for high efficiency, low noise and high reliability. It is also stackable, with a small footprint, front panel binding post connectors, and a low current requirement with universal input, making the XHR ideal for bench-top applications.

Features

- Universal input 85-250 VAC
- Power Factor Correction (PFC)
- Zero voltage "soft switching"
- Simultaneous front panel display of output voltage and current
- Constant voltage or constant current operation
- Front and rear connectors
- Ten-turn front panel knobs
- Standby mode
- Remote sense with 5 V line loss compensation
- LabVIEW® and LabWindows® drivers

Protection Features

- Over voltage protection
- Over temperature protection

Options

- Isolated analog control (ISOL)
- RS-232 interface card
- GPIB interface card
- GPIB-multichannel
- Ethernet interface card
- Rackmount kit

5 year warranty

XHR 1 kW Electrical Specifications[1]

Models	7.5-130	20-50	33-33	40-25	60-18	100-10	150-7	300-3.5	600-1.7
Output Ratings									
Output Voltage	0-7.5 V	0-20 V	0-33 V	0-40 V	0-60 V	0-100 V	0-150 V	0-300 V	0-600 V
Output Current	0-130 A	0-50 A	0-33 A	0-25 A	0-18 A	0-10 A	0-7 A	0-3.5 A	0-1.7 A
Output Power	975 W	1000 W	1089 W	1000 W	1080 W	1000 W	1050 W	1050 W	1020 W
At the front panel binding posts									
Output Current	0-30 A	0-30 A	0-30 A	0-25 A	0-18 A	0-10 A	0-7 A	0-3.5 A	0-1.7 A
Output Power	225 W	600 W	990 W	1000 W	1080 W	1000 W	1050 W	1050 W	1020 W
Line Regulation [2]									
Voltage	1 mV	1 mV	1 mV	1 mV	1 mV	1.5 mV	3 mV	10 mV	20 mV
Current	5 mA	2 mA	1 mA	1 mA	1 mA	1 mA	0.5 mA	0.5 mA	0.5 mA
Load Regulation [3]									
Voltage	1.5 mV	1.5 mV	1.5 mV	1.5 mV	1.5 mV	1.5 mV	4 mV	10 mV	20 mV
Current	15 mA	15 mA	8 mA	7 mA	4 mA	3 mA	3 mA	2.5 mA	2.5 mA
Meter Accuracy									
Voltage (0.5% of Vmax + 1 count)	0.05 V	0.2 V	0.3 V	0.3 V	0.7 V	1.1 V	1.6 V	4 V	7 V
Current (0.5% of Imax + 1 count)	0.8 A	0.4 A	0.3 A	0.3 A	0.19 A	0.11 A	0.08 A	0.05 A	0.03 A
Output Noise (0-20 MHz)									
Voltage (p-p)	50 mV	50 mV	50 mV	50 mV	50 mV	50 mV	75 mV	100 mV	300 mV
Output Ripple (rms)									
Voltage	7.5 mV	5 mV	5 mV	5 mV	5 mV	5 mV	7.5 mV	20 mV	60 mV
Drift (8 hours) [4]									
Voltage (0.05% of Vmax)	3.75 mV	10 mV	16.5 mV	20 mV	30 mV	50 mV	75 mV	150 mV	300 mV
Current (0.5% of Imax)	130 mA	50 mA	33 mA	25 mA	18 mA	10 mA	7 mA	3.5 mA	1.7 mA
Temperature Coefficient [5]									
Voltage (0.02% of Vmax/°C)	1.5 mV	4 mV	6.6 mV	8 mV	12 mV	20 mV	30 mV	60 mV	120 mV
Current (0.03% of Imax/°C)	39 mA	15 mA	9.9 mA	7.5 mA	5.4 mA	3 mA	2.1 mA	1.1 mA	0.48 mA
Maximum Remote Sense									
Line Drop Compensation [6]	3 V/line	5 V/line	5 V/line	5 V/line	5 V/line	5 V/line	5 V/line	5 V/line	5 V/line
OVP Adjustment Range									
(5%to 110% of Vmax)	0.375-8.25 V	1-22 V	1.65-36.3 V	2-44 V	3-66 V	5-110 V	7.5-165 V	15-330 V	30-660 V
Efficiency [7]	81%	83%	83%	83%	84%	84%	85%	85%	85%

XHR 1 kW Internal Interface Specifications with RS-232 or GPIB Interface Installed[1,8]

Models	7.5-130	20-50	33-33	40-25	60-18	100-10	150-7	300-3.5	600-1.7
Program Accuracy									
Voltage (mV)	10 (±0.12%)	75 (±0.12%)	75 (±0.12%)	75 (±0.3%)	150 (±0.25%)	150 (±0.35%)	225 (±0.35%)	225 (±0.35%)	300 (±0.35%)
Current (mA)	900 (±0.1%)	750 (±0.1%)	500 (±0.1%)	350 (±0.15%)	250 (±0.1%)	140 (±0.15%)	120 (±0.1%)	80 (±0.1%)	80 (±0.1%)
OVP (mV)	80	200	330	400	600	800	1500	3000	6000
Readback Accuracy									
Voltage	30 (±0.12%)	75 (±0.12%)	75 (±0.12%)	75 (±0.3%)	150 (±0.25%)	150 (±0.35%)	225 (±0.35%)	225 (±0.35%)	300 (±0.35%)
Current	900 (±0.1%)	750 (±0.1%)	500 (±0.1%)	350 (±0.1%)	250 (±0.1%)	140 (±0.15%)	120 (±0.1%)	80 (±0.1%)	80 (±0.1%)

Specifications subject to change without notice.

1. Specifications indicate typical performance at 25° C ± 5° C, nominal line input of 120 VAC.

2. For input voltage variation over the AC input voltage range, with constant rated load.

3. For 0-100% load variation, with constant nominal line voltage. Measured at the rear panel output connector unless stated otherwise.

4. Maximum drift over 8 hours with constant line, load, and temperature, after 30-minute warm-up.

5. Change in output per °C change in ambient temperature, with constant line and load.

6. Line drop is subtracted from total voltage available at supply output.

7. Typical efficiency at 115 VAC input and rated output power.

8. Apply accuracy specifications according to the following voltage program accuracy example:
Set a model 20-50 power supply to 10 volts. The expected result will be within the range of
10 volts ± 75 mV ± 0.12% of the set voltage of 10 volts.

XHR 1 kW General Specifications [1]

Operational AC Input Voltage	85-250 VAC, 47-63 Hz; power factor corrected. Derate maximum output power to 900 W for AC input less than 95 V	
Maximum Input Current	13 A maximum at 100 VAC, 11 A maximum at 120 VAC, 6 A maximum at 220 VAC	
Power Factor	0.99 minimum for full load and 120 VAC input	
Switching Frequency	7.5 V to 300 V models: nominal 125 kHz (250 kHz output ripple); 600 V model: nominal 62.5 kHz (125 kHz output ripple)	
Time Delay	4 sec maximum from power on until output stable	
Voltage Mode Transient Response Time	1 msec for output voltage to recover within 0.5% of its previous level after a step change in load current of up to 50% of rated output	
Maximum Voltage Differential	±600 VDC from output to safety ground	
Remote Start/Stop and Interlock	2.5-15 V signal or TTL-compatible input, selectable logic	
Remote Analog Programming	Voltage and current programming inputs (source must be isolated): 0-5 k, 0-10 k resistances; 0-5 V (default), 0-10 V voltage sources	
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V (default), 0-10 V ranges for 0-100% of output	
Remote Programming & Monitoring Accuracy	1% zero to full scale output for the default range	
Operating Temperature Range	0 to 40° C	
Storage Temperature Range	–40 to 85° C	
Humidity Range	Up to 80% RH, non-condensing	
Front Panel Voltage and Current Control	10-turn voltage and current potentiometers	
Front Panel Voltage Control Resolution	0.02% of maximum voltage	
AC Input Connector Type	IEC 320 connector	
Main Output Connector	7.5 to 40 V models: nickel-plated copper bus bars; 60 to 600 V models: 4-terminal wire clamp connector for DC output and local sense	
Weight (one unit)	Approximately 14 lb (6.4 kg)	
Dimensions (H x W x D)	3.4 x 8.5 x 18.6" (86.4 x 216.0 x 472.2 mm)	
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; CSA C/US certified to UL61010-1B and CSA C22.2 No 1010.1; Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001, Class A.	
XHR Options	GPIB-XHR	GPIB interface card
	GPIB-M-XHR	Multi-channel GPIB interface card
	CAN-XHR	CANbus interface for hardware linking multiple units (used with GPIB-M)
	RS-232-XHR	RS-232 interface card
	ISOL-XHR	ISOL interface card provides isolated analog control and readback
	RM-XHR	19-inch rackmount kit for up to two XHR power supplies
	M13A	Locking knobs for front panel controls
	M22A	No front binding post

Specifications subject to change without notice.

XPD Series

540 W

Highest power density in a quarter rack

Compact 500 Watt Quarter-Rack DC Power Supply

Product name:	XPD
Voltage range:	0-7.5 VDC to 0-120 VDC
Current range:	0-67 A to 0-4.5 A
Power range:	500 W to 540 W

The Xantrex XPD Series features the smallest 500 W programmable power supply available. The XPD Series is ideal for benchtop, ATE and OEM applications where a wide range of output voltage or current is needed in a compact unit.

The XPD can be combined in a mix-and-match configuration with the quarter-rack 300 W HPD series and 60 W XT series. Each unit features zero voltage "soft switching" to virtually eliminate switching transients. This switching technology contributes to high efficiency, low noise, and high reliability. The XPD series also features power factor correction (PFC) technology to enable low current draw and to greatly reduce generation of input current harmonics.

Features

- Analog programming
- Universal input
- Zero voltage "soft switching"
- Power factor correction (PFC)
- Front and rear connectors
- Ten-turn front panel knobs
- Remote sense with 5 V line loss compensation
- LabVIEW® and LabWindows® drivers

Protection Features

- Over voltage protection
- Over temperature protection
- Sense line protection

Options

- RS-232 interface card
- GPIB interface card
- GPIB-multichannel
- Rackmount kit

Five year warranty

XPD 500 W Electrical Specifications[1]

Models	7.5-67	18-30	33-16	60-9	120-4.5
Output Ratings					
Output Voltage [2]	0-7.5 V	0-18 V	0-33 V	0-60 V	0-120 V
Output Current [3]	0-67 A	0-30 A	0-16 A	0-9 A	0-4.5 A
Output Power	502.5 W	540 W	528 W	540 W	540 W
Line Regulation [4]					
Voltage	2 mV	2 mV	3 mV	3 mV	3 mV
Current	2 mA	2 mA	2 mA	2 mA	2 mA
Load Regulation [5]					
Voltage	2 mV	4 mV	4 mV	4 mV	5 mV
Current	4 mA	4 mA	4 mA	4 mA	4 mA
Meter Accuracy					
Voltage (1% of Vmax + 1 count)	0.2 V	0.3 V	0.5 V	0.7 V	2.2 V
Current (1% of Imax + 1 count)	0.8 A	0.4 A	0.3 A	0.2 A	0.2 A
Output Noise (90-20 MHz)					
Voltage (p-p)	45 mV	45 mV	45 mV	45 mV	60 mV
Output Ripple					
Voltage	3 mV	3 mV	3 mV	5 mV	10 mV
Current [6]	150 mA	50 mA	30 mA	30 mA	15 mA
Drift (60 minutes) [7]					
Voltage (0.15% of Vmax)	11.3 mV	27 mV	49.5 mV	90 mV	180 mV
Current (0.3% of Imax)	201 mA	90 mA	48 mA	27 mA	13.5 mA
Drift (8 hours) [8]					
Voltage (0.03% of Vmax)	2.3 mV	5.4 mV	9.9 mV	18 mV	36 mV
Current (0.05% of Imax)	34 mA	15 mA	8 mA	4.5 mA	2.3 mA
Temperature Coefficient [9]					
Voltage (0.015% of Vmax/°C)	1.2 mV	2.7 mV	5 mV	9 mV	18 mV
Current (0.02% of Imax/°C)	13.4 mA	6 mA	3.2 mA	1.8 mA	0.9 mA
OVP Adjustment Range					
(5% to 110% of Vmax)	0.4-8.3 V	0.9-19.8 V	1.7-36.3 V	3-66 V	6-132 V
Efficiency [10]	81%	83%	85%	85%	84%

XPD 500 W Internal Interface Specifications with RS-232 or GPIB Interface Installed[11]

Models	7.5-67	18-30	33-16	60-9	120-4.5
Program Accuracy					
Voltage (mV)	10 (±0.12%)	75 (±0.12%)	75 (±0.12%)	150 (±0.3%)	180 (±0.25%)
Current (mA)	250 (±0.1%)	140 (±0.1%)	115 (±0.15%)	80 (±0.15%)	80 (±0.1%)
OVP (mV)	80	200	330	600	1200
Readback Accuracy					
Voltage (mV)	30 (±0.12%)	75 (±0.12%)	75 (±0.2%)	150 (±0.3%)	180 (±0.25%)
Current (mA)	250 (±0.1%)	140 (±0.1%)	115 (±0.15%)	80 (±0.15%)	80 (±0.1%)

Specifications subject to change without notice.

1. All electrical specifications are represented at the full operating temperature range for all models, unless otherwise stated.

2. Minimum output voltage is <0.15% of rated voltage at zero output setting.

3. Minimum output current is <0.2% of rated current at zero setting when measured with rated load resistance. Front output current limited to 30 A maximum.

4. For input voltage variation over the AC input voltage range, with constant rated load.

5. For 0-100% load variation, with constant nominal line voltage.

6. Current mode noise is measured from 10% to 100% of rated output voltage, full current.

7. Maximum drift over 60 minutes with constant line, load, and temperature, after power up.

8. Maximum drift over 8 hours with constant line, load, and temperature, after 60 minute warm-up.

9. Change in output per °C change in ambient temperature, with constant line and load.

10. Typical efficiency at 120 V and full output power.

11. Interface specifications at 25°C ± 5°C, nominal line input of 120 VAC.
Apply accuracy specifications according to the following voltage program accuracy example:
Set a model 18-30 power supply to 10 volts. The expected result will be within the range of
10 volts ± 75 mV ± 0.12% of the set voltage of 10 volts.

XPD 500 W General Specifications

Operational AC Input Voltage	85-264 VAC, 47-63 Hz; power factor corrected. Derate maximum output power to 450 W for AC input less than 95 V.	
Maximum Input Current	7 A maximum at 100 VAC, 6 A maximum at 120 VAC, 3 A maximum at 220 VAC	
Power Factor	0.98 minimum for full load at nominal voltage	
Input Harmonic Distortion	Current harmonics meet IEC 1000-3-2	
Switching Frequency	125 kHz (250 kHz output ripple)	
Time Delay	3 s maximum, from power on to output stable	
Voltage Mode Transient Response Time	1 ms for output voltage to recover within 0.5% of its previous level after a step change in load current of up to 50% of rated output	
Maximum Voltage Differential	±300 VDC from output to safety ground	
Remote On/Off and Interlock	5-15 V signal or TTL-compatible input, selectable logic. TTL input impedance: 2 k (in series with one diode drop)	
Remote Analog Programming (Full Scale Input)	Voltage and current programming inputs (source must be floating): 0-10 V voltage sources. Input impedance (V and I): 20 k	
Remote Programming & Monitoring Accuracy	1% of full scale output for the default range	
Operating Temperature Range	0 to 50°C	
Storage Temperature Range	–40 to 85°C	
Humidity Range	up to 95% RH, non-condensing	
Front Panel Voltage and Current Control	10-turn voltage and current potentiometers	
Front Panel Voltage Control Resolution	0.02% of maximum voltage	
AC Input Connector Type	IEC 320 connector, appropriate power cord provided for destination country	
Main Output Connector	Front panel: 5-way binding posts. Maximum current limit 30 A; Rear Panel: 7.5-18 V models: Bus bars; 33-120 V models: wire clamp connectors.	
Weight	9.0 lb. (4.1 kg.)	
Dimensions (H x W x D)	5.2 x 4.2 x 13" (134.7 x 109.2 x 330 mm)	
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; CSA C/US certified to UL3111-1 and CSA C22.2 No 1010.1; Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001, Class A.	
XPD Options	GPIB-XPD	GPIB interface card
	GPIB-M-XPD	Multichannel GPIB interface card
	CAN-XPD	CANbus interface for hardware linking multiple units (used with GPIB-M)
	RS232-XPD	RS-232 interface card
	RH-XHS	19-inch rackmount kit for up to four XPD, HPD or XT power supplies
	M13	Locking bushings
	M13A	Locking knobs

Specifications subject to change without notice.

HPD Series

300 W

High power density with near linear performance

300 Watt DC Power Supply with Near-Linear Performance

Product name:	HPD
Voltage range:	0-15 VDC to 0-60 VDC
Current range:	0-20 A to 0-5 A
Power range:	300 W

The Xantrex High Power Density (HPD) Series provides 300 W of reliable DC power in a quarter-rack wide unit. The HPD Series power supplies are ideal for benchtop, ATE and OEM applications where a wide adjustment of output voltage or current is required in a compact unit.

The HPD series uses switch-mode technology combined with linear post regulation to provide performance comparable to an all-linear design. The HPD series features excellent line and load regulation with low noise and good transient response. The series is available in single and dual output in a single unit for benchtop use. For systems applications, multiple units can be rack-mounted in configurations of up to four independent 300 W outputs.

Features

- Low noise and ripple
- Excellent line/load regulation
- Constant voltage or constant current operation with automatic crossover and mode indication
- Current limit
- Front and rear outputs
- Remote sense
- LabVIEW® and LabWindows® drivers

Protection Features

- Over voltage protection with analog programming

Options

- Analog programming interface card
- RS-232 interface card
- GPIB interface card
- Rack-mount kit

Five year warranty

HPD 300 W Electrical Specifications[1]

Models	15-20	30-10	60-5
Output Ratings			
Output Voltage	0-15 V	0-30 V	0-60 V
Output Current	0-20 A	0-10 A	0-5 A
Output Power	300 W	300 W	300 W
Line Regulation [2]			
Voltage	2 mV	2 mV	2 mV
Current	3 mA	2 mA	1.5 mA
Load Regulation [3]			
Voltage	2 mV	2 mV	2 mV
Current	3 mA	2 mA	1.5 mA
Meter Accuracy			
Voltage (1% of Vmax + 1 count)	0.25 V	0.4 V	0.7 V
Current (1% of Imax + 1 count)	0.3 A	0.2 A	0.06 A
Output Noise (0-20 MHz)			
Voltage (p-p)	75 mV	75 mV	100 mV
Output Ripple (rms)			
Voltage	5 mV	5 mV	5 mV
Drift (8 hours) [4]			
Voltage (0.02% of Vmax)	3 mV	6 mV	12 mV
Current (0.03% of Imax)	6 mA	3 mA	1.5 mA
Temperature Coefficient [5]			
Voltage (0.015% of Vmax/°C)	2.25 mV	4.5 mV	9 mV
Current (0.02% of Imax/°C)	4 mA	2 mA	1 mA

HPD 300 W Internal Interface Specifications with RS-232 or GPIB Interface Installed[1,6]

Models	15-20	30-10	60-5
Program Accuracy			
Voltage (mV)	60 (±0.1%)	70 (±0.1%)	90 (±0.12%)
Current (mA)	75 (±0.12%)	50 (±0.12%)	25 (±0.1%)
OVP (mV)	1500	3000	6000
Readback Accuracy			
Voltage (mV)	45 (±0.3%)	90 (±0.3%)	175 (±0.3%)
Current (mA)	75 (±0.12%)	40 (±0.12%)	25 (±0.1%)

Specifications subject to change without notice.

1. Specifications indicate typical performance at 25° C ± 5°C, nominal line input of 120 VAC.

2. For input voltage variation over the AC input voltage range, with constant rated load.

3. For 0-100% load variation, with constant nominal line voltage.

4. Maximum drift over 8 hours with constant line, load, and temperature, after 60-minute warm-up.

5. Change in output per °C change in ambient temperature, with constant line and load.

6. Apply accuracy specifications according to the following voltage program accuracy example:
Set a model 15-20 power supply to 10 volts. The expected result will be within the range of
10 volts ± 60 mV ± 0.1% of the set voltage of 10 volts.

HPD 300 W General Specifications

Operational AC Input Voltage	Single unit: 104-127 VAC at 6 Arms; Dual Unit: 104-127 VAC at 12 Arms, 47-63 Hz
Switching Frequency	100 kHz (nominal)
Voltage Mode Transient Response Time	<500 µs recovery to 50 mV band for ±50% load change in the range of 25% to 100% of the rated load
Operating Ambient Temperature	0 to 30°C for full rated output. Above 30°C, derate output linearly to zero at 70°C.
Storage Temperature Range	–55 to 85°C
Humidity Range	0 to 80% RH, non-condensing
Front Panel Voltage and Current Control	10-turn voltage and 1-turn current potentiometers (10-turn current optional)
Front Panel Voltage Control Resolution	0.02% of maximum voltage
AC Input Connector Type	IEC 320 connector
Weight	Approximately 7.7 lb (3.5 kg)
Dimensions (H x W x D)	5.2 x 4.2 x 11.7" (132 x 109.2 x 297 mm)
Approvals	CE-marked units meet: EN61010-1, EN61000-6-2 and EN61000-6-4; CSA C/US certified to UL61010-1B and CSA C22.2 No 1010.1; Meets USA EMC standard: FCC, part 15B, class A; Meets Canadian EMC standard: ICES-001, Class A.

Analog Programming (with optional APG interface installed)

Remote On/Off and Interlock	2 to 25 VDC high. <0.8 VDC low. User-selectable.	
Remote Analog Programming Option	0-10 VDC for 0-100% of rated voltage or current ±1.0%, 0-10kΩ for 0-100% of rated voltage or current ±1.0%	
Remote Monitoring	0-10 VDC for 0-100% or rated voltage or current ±1.0%	
Over Voltage Protection Trip Range	3 V to full output ±10%	
Tracking Accuracy	±1% for series operation	
HPD Options	GPIB-HPD	GPIB Interface card
	RS232-HPD	RS-232 Interface card
	APG-HPD	Analog programming interface card
	M2	200-250 VAC Input (50/60 Hz)
	M2S	Switch selectable input 110 VAC or 220 VAC
	M11	10-turn current potentiometer
	M13A	Locking knobs for front panel controls
	RM-XHS	19-inch rack mount kit for up to four HPD, XPD or XT power supplies

Specifications subject to change without notice. Contact Xantrex for custom voltage and current combinations, dual configurations and other options.

XT Series

60 W

Linear benchtop and system supply

60 Watt Linear Performance DC Power Supply

Product name:	XT
Voltage range:	0-7 VDC to 0-250 VDC
Current range:	0-6 A to 0-0.25 A
Power range:	42 W to 60 W

The Xantrex XT Series provides 60 W of programmable linear DC power in a quarter-rack package suited for both benchtop and system applications. XT Series power supplies are ideal for OEM applications where a wide adjustment of output voltage or current is required in a compact package.

The XT Series is available in single, dual, triple and quadruple output in a single unit for benchtop use. For systems applications, multiple single units can be rack mounted in configurations of up to four independent 60 W outputs.

Features

- Low noise and ripple
- Excellent line/load regulation
- Fast transient response
- Constant voltage or constant current operation with automatic crossover and mode indication
- Current limit
- Front and rear outputs
- Remote sense
- LabVIEW® and LabWindows® drivers

Protection Features

- Over voltage protection with analog programming

Options

- Analog programming interface card
- RS-232 interface card
- GPIB interface card
- GPIB-multichannel
- Rack-mount kit

Five year warranty

XT 60 W Electrical Specifications[1]

Models	7-6	15-4	20-3	30-2	60-1	120-0.5	250-0.25
Output Ratings							
Output Voltage	0-7 V	0-15 V	0-20 V	0-30 V	0-60 V	0-120 V	0-250 V
Output Current	0-6 A	0-4 A	0-3 A	0-2 A	0-1 A	0-0.5 A	0-0.25 A
Output Power	42 W	60 W	60 W	60 W	60 W	60 W	60 W
Line Regulation [2]							
Voltage	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV	3 mV
Current	0.4 mA	0.4 mA	0.4 mA	0.3 mA	0.3 mA	0.3 mA	0.25 mA
Load Regulation [3]							
Voltage	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV	3 mV
Current	0.4 mA	0.4 mA	0.4 mA	0.3 mA	0.3 mA	0.3 mA	0.25 mA
Output Noise & Ripple (20 Hz – 20 MHz)							
Voltage	<1 mVrms	<1 mVrms	<1 mVrms	<1 mVrms	<1 mVrms	<1 mVrms	<1 mVrms
Current	<1 mArms	<1 mArms	<1 mArms	<1 mArms	<1 mArms	<1 mArms	<1 mArms
Meter Accuracy							
Voltage (1% of Vmax + 1 count)	0.08 V	0.25 V	0.3 V	0.4 V	0.7 V	2.2 V	3.5 V
Current (1% of Imax + 1 count)	0.07 A	0.05 A	0.04 A	0.03 A	0.02 A	0.006 A	0.003 A
Drift (8 hours) [4]							
Voltage (0.02% of Vmax)	1.4 mV	3 mV	4 mV	6 mV	12 mV	24 mV	50 mV
Current (0.03% of Imax)	1.8 mA	1.2 mA	0.9 mA	0.6 mA	0.3 mA	0.15 mA	0.075 mA
Temperature Coefficient [5]							
Voltage (0.015% of Vmax/°C)	1.05 mV	2.25 mV	3 mV	4.5 mV	9 mV	18 mV	37.5 mV
Current (0.02% of Imax/°C)	1.2 mA	0.8 mA	0.6 mA	0.4 mA	0.2 mA	0.1 mA	0.05 mA

XT 60 W Internal Interface Specifications with RS232 or GPIB Interface Installed[1,6]

Models	7-6	15-4	20-3	30-2	60-1	120-0.5	250-0.25
Program Accuracy							
Voltage (mV)	10 (±0.1%)	20 (±0.1%)	20 (±0.15%)	30 (±0.15%)	200 (±0.15%)	400 (±0.15%)	800 (±0.15%)
Current (mA)	110 (±0.15%)	70 (±0.15%)	50 (±0.15%)	40 (±0.15%)	26 (±0.2%)	13 (±0.2%)	7 (±0.2%)
OVP (mV)	70	150	200	300	200	1200	2400
Readback Accuracy							
Voltage (mV)	10 (±0.15%)	10 (±0.1%)	10 (±0.1%)	15 (±0.1%)	35 (±0.15%)	70 (±0.15%)	140 (±0.15%)
Current (mA)	110 (±0.15%)	70 (±0.15%)	50 (±0.15%)	40 (±0.15%)	26 (±0.2%)	13 (±0.2%)	7 (±0.2%)

Specifications subject to change without notice.

1. Specifications indicate typical performance at 25° C ± 5° C, nominal line input of 115 VAC.

2. For input voltage variation over the AC input voltage range, with constant rated load.

3. For 0-100% load variation, with constant nominal line voltage.

4. Maximum drift over 8 hours with constant line, load, and temperature, after 30-minute warm-up.

5. Change in output per °C change in ambient temperature, with constant line and load.

6. Apply accuracy specifications according to the following voltage program accuracy example:
   Set a model 15-4 power supply to 10 volts.
   The expected result will be within the range of 10 volts ± 20 mV ± 0.1% of the set voltage of 10 volts.

XT 60 W General Specifications

Operational AC Input Voltage	Standard: 115 VAC ±10%. 57-63 Hz; Optional: 110/220/230/240 VAC ±10%, 47-63 Hz
AC Input Current	Single Unit: 1.2 A, Dual Unit: 2.4 A, Triple Unit: 3.6 A, Quad Unit: 4.8 A, at 115 VAC
Voltage Mode Transient Response Time	<100 µs recovery to 0.05% band, ±50% load change in the range of 25% to 100% of the rated load
Operating Ambient Temperature	0 to 30°C for full rated output. Above 30°C, derate output linearly to zero at 70°C
Storage Temperature Range	–55 to 85°C
Humidity Range	Up to 80% RH, non-condensing
Front Panel Voltage and Current Control	10-turn voltage and 1-turn current potentiometers (10-turn current optional)
Front Panel Voltage Control Resolution	0.02% of maximum voltage
AC Input Connector Type	IEC 320 connector
Weight	Approximately 7.7 lb (3.5 kg)
Dimensions (H x W x D)	5.2 x 4.2 x 11.7" (132 x 109 x 297 mm)
Approvals	CSA certified to CSA C22.2 No. 107.1. Meets USA EMC standard FCC Part 15B Class A; meets Canadian EMC standard: ICES-001, Class A (Models up to and including 120V)

Analog Programming (with optional APG interface installed)

Remote On/Off and Interlock	2 to 25 Vdc high. <0.8 Vdc low. User-selectable.	
Remote Analog Programming Option	0-10 VDC for 0-100% or rated voltage or current ±0.1%, 0-10 kΩ for 0-100% of rated voltage or current ±0.1%	
Remote Monitoring	0-10 VDC for 0-100% of rated voltage or current ±0.1%	
Over Voltage Protection Trip Range	3 V to full output +10%	
Tracking Accuracy	±1% for series operation	
XT Options	GPIB-XT	GPIB Interface card
	GPIB-M-XT	Multichannel GPIB interface card
	CAN-XT	CANbus interface for hardware linking multiple units (used with GPIB-M)
	RS232-XT	RS-232 Interface card
	APG-XT	Analog programming interface card
	RM-XHS	19-inch rack mount kit for up to four XT, XPD or HPD power supplies
	M1	110 VAC Input (50/60 Hz)
	M2	220 VAC Input (50/60Hz)
	M3	230 VAC Input (50/60Hz)
	M4	240 VAC Input (50/60Hz)
	M11	10-turn current potentiometer
	M13A	Locking knobs for front panel controls
	M43	Switch Selectable Input 110 VAC or 220 VAC

Specifications subject to change without notice. Contact Xantrex for custom voltage and current combinations, dual configurations and other options.

Customization

As programmable DC power specialists, we have modified our standard power supplies and designed new ones from the ground up to suit a variety of unique customer needs. We have done it well, to which the number of customer referrals and repeat orders will attest. We have done it often, as the volume of work will confirm (more than 18 years of experience in customized solutions). And with our on-site manufacturing plant, we have done it quickly.

Our sales engineers work closely with you, providing application analysis, determining your requirements, suggesting alternatives, and reviewing costs. We will modify an existing stock power supply or build you a prototype according to your requirements. Tell us about your custom voltage/current combination requirements. All modifications are documented and tested to meet our high quality standards.

Ordering a custom product has never been easier.

How do we meet your specialized power supply requirements? First, we take down the details and complete an internal RFQ (Request For Quotation). This form records the details – exact features and specifications required and the quantities requested. Next, we develop the engineering and pricing analysis. This information is forwarded to you for your approval. Once you agree to the analysis, each modification requirement is assigned an "M" number. This is our way of identifying your request. If a particular modification is in high demand, it may become a standard feature on the related power supply.

Below is a small sample of product modifications that we have completed for our customers.

XDC 6 kW
M1 - XDC 60-100 modified to XDC 56-120 (6720W)
M4 - Ruggedized mechanical assembly
M32 - Conformal coating

XFR 2.8 kW
M1 - XFR 20-130 modified to XFR 24-110
M2 - 208 VAC 3φ input
M5 - Failure summarizing alarm
M20 - XFR 100-28 modified to XFR 80-37
M23 - XFR 60-46 modified to XFR 50V 60A (3000 W output)

XFR 1.2 kW
M12 - Remote shutdown via switch
M10 - Recessed front panel potentiometers
M32 - Conformal coating

XHR
M16 - XHR 300-2 modified for 1.99 A display
M25 - Standard XHR modified for DC input
M77 - 115 VAC ± 10% 400 Hz input

XPD
M22A - No front binding post and sense points
M32 - Conformal coating

HPD
M32 - Standard HPD 30-10 modified to HPD 32-9.5
M23 - Bus bar "L" shaped brackets attached to barrier strip

Call today to find out how we can build the right power supply for you.
Contact your nearest representative/distributor or call Xantrex directly: 1-800-667-8422 or 1-604-422-8595.

Interfaces

Xantrex offers several standard and optional control interfaces.

ANALOG (APG)
- Standard on XFR, XHR, XDC, and XPD Series
- Optional for XT and HPD Series
- Internal analog programming of voltage and current
- Program and readback common is at same potential as the power supply negative output
- Over Voltage Protection (OVP)
- Remote On/Off switch
- Master/Slave tracking
- User-selectable 5 V or 10 V (full-scale) external control voltage for XFR and XHR series, 10 V only for XT and HPD series
- Resistive control

ISOLATED ANALOG (ISOL)
- Standard on XDC Series.
- Optional for XFR and XHR Series only
- 4-20 mA isolated analog control optional for XFR Series only
- Remote programming connectors fully isolated from supply output
- Internal analog programming and readback of voltage and current
- For precision control in "noisy" environments
- Signals can be biased at any potential relative to the power supply's return line within its maximum voltage differential specification

ETHERNET/RS-232
- Optional for XFR and XHR Series
- Digital interface for use with stand alone personal computers and personal computers on the network
- Auto sensing 10/100Base-7 network interface
- User programmable isolated fault, polarity, isolation and auxiliary, user-defined output signals
- LED status signals: error, address, remote/local operation and over voltage protection
- Software calibration

GPIB (IEEE 488.2)
- Internal single channel digital interface using IEEE 488.2 standard communications protocol
- Easy to use SCPI command set
- Service Request and Local Lockout capabilities
- LabView® and LabWindows® virtual instrument drivers
- User-programmable isolated fault, polarity, isolation outputs and remote input disconnect
- LED status signals: isolation, polarity, error, system malfunction, address and OVP
- Software calibration

GPIB-M (Multichannel)
- 16-bit programming and readback of voltage and current
- Programmable soft limits for voltage and current
- LED status signals: remote operation, service request and shutdown; (XFR and XHR only) error, addressed, over voltage protection, auxiliary status bits
- Software calibration
- Automatic voltage/current mode crossover
- Shutdown or warning for over- and under- programmed trip points
- Programmable auxiliary status lines for monitoring power supply conditions
- Remote interlock and trigger lines
- Selectable standby, programmed sequence and other power-on defaults
- Active current sharing with parallel connected units for higher power requirements
- CANbus communications link for multichannel addressing, and master/slave current sharing
- Extensive SCPI command set for control and status monitoring

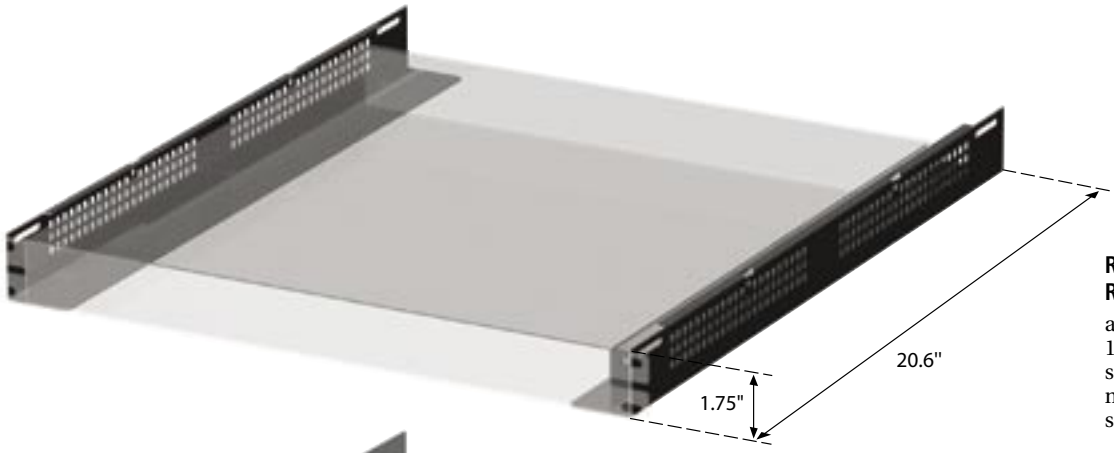
RS-232
- Digital interface for use with personal computers
- 16-bit resolution for programming and readback
- Operates over longer distances than GPIB
- LabView® and LabWindows® virtual instrument drivers
- User-programmable isolated fault, polarity, isolation outputs and remote input disconnect
- LED status signals: isolation, polarity error, system malfunction, address and OVP
- Software calibration

USB/GPIB/RS-232
- Optional for XDL Series only
- Windows device driver is supplied to create a virtual COM porty enabling USB to be used with applications that do not directly support it
- RS-232: Single instrument or addressable RS-232 chair (ARC) system
- GPIB: conforms with IEEE 488.1 and IEEE 488.2
- All three interfaces incorporate full control, readback and status reporting

HFS FIBER OPTIC INTERFACE
- Available for XFR 2.8 kW only
- First commercially available fiber optics control interface for a programmable DC power supply
- Optical isolation for high voltage computer-controlled applications in the semiconductor industry

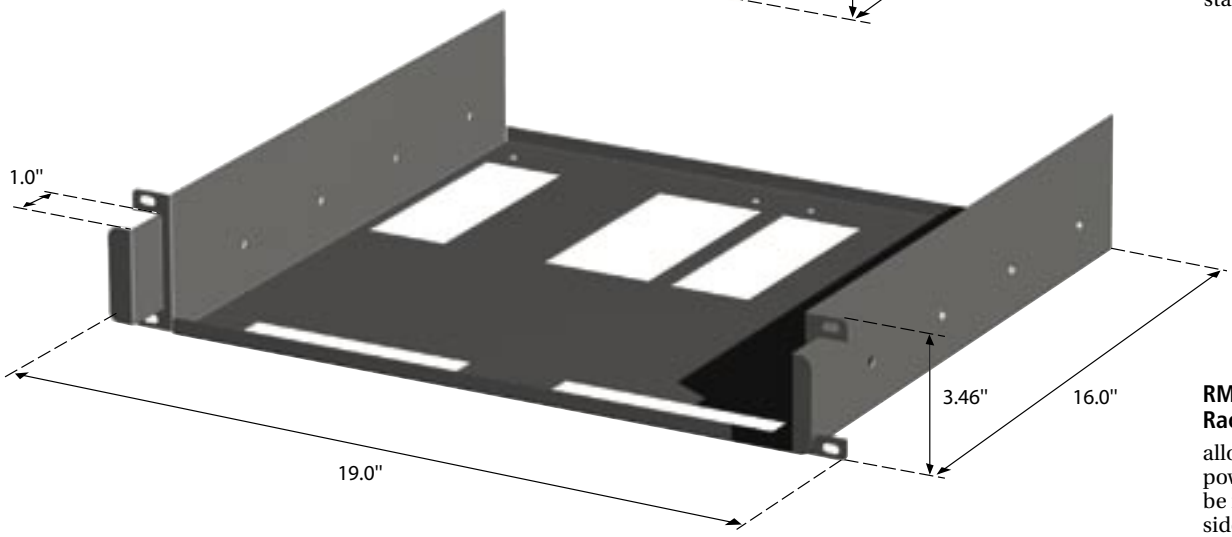
CANbus
- Hardware link for linking multiple units
- Multiple addressing with one GPIB address
- Current sharing (master/slave)

Rack Mount Kits



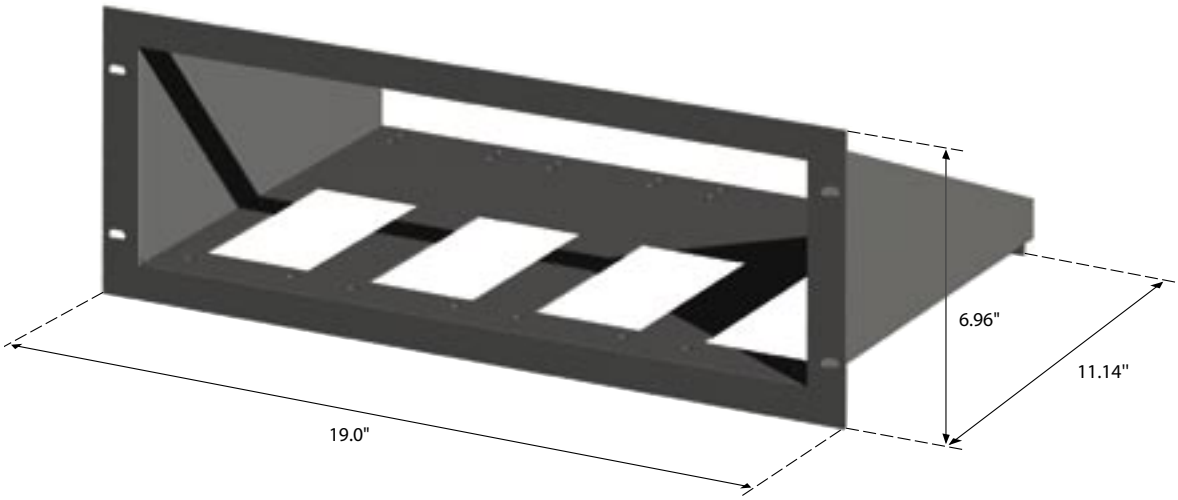
RM-XFR
Rack Mount Kit

allows one XFR 1.2 kW power supply to be mounted in a standard 19” rack.



RM-XHR
Rack Mount Kit

allows two XHR power supplies to be mounted side-by-side in a standard 19” rack.



RM-XH
Rack Mount Kit

allows up to four combined models of XPD, HPD and XT power supplies to be mounted side-by-side in a standard 19” rack.

XMP 2600

2.4 kW

Modular Multiple Output DC Power system

A Customizable Multiple Output DC Power Supply System

Product name:	XMP 2600
Voltage range:	0-8 VDC to 0-160 VDC
Current range:	0-80 A to 0-1.25 A
Power range:	160 W to 2400 W (2600 W intermittent)

The Xantrex Module Power (XMP) 2600 is a multiple output programmable power supply suited to ATE applications. Designed for maximum flexibility, the XMP includes a controller that allows for the inclusion of up to eight different power modules in one mainframe. The XMP can be customized with either high or low power modules. Each module can be configured with different voltage and current ratings.

The provides up to 2.4 kW of power for research, product development and production test applications such as ATE, burn-in and electronics tests. Designed for maximum flexibility, the XMP mainframe includes a controller that allows for the inclusion of up to eight different power modules in a single mainframe. The XMP power system can be customized with power modules of different power ratings ranging from 160 W to 3.2 kW.

A single XMP mainframe can be configured to hold up to several kilowatts of modules, with power being drawn from each module independently of the others with an overall output power of 2.4 kW. All XMP functions can be programmed remotely through a GPIB or RS-232 interface, or manually through the convenient front panel keypad and LCD display. No other power system provides this level of configurability in a single unit.

Features

- 22 modules with power levels icon to 2.4 kW
- Up to 99 steps auto sequencing
- Up to 10 multi-channel store/recall settings
- Polarity and isolation relays standard
- GPIB or RS-232 interface standard
- Power envelope: 2.4 kW, 2.6 kW intermittent
- Individual module processor control
- External synchronization
- Ramp function
- Software-based calibration
- Front panel keypad
- Low ripple and noise
- Remote sense compensation
- Power Factor Correction (PFC)

Protection Features

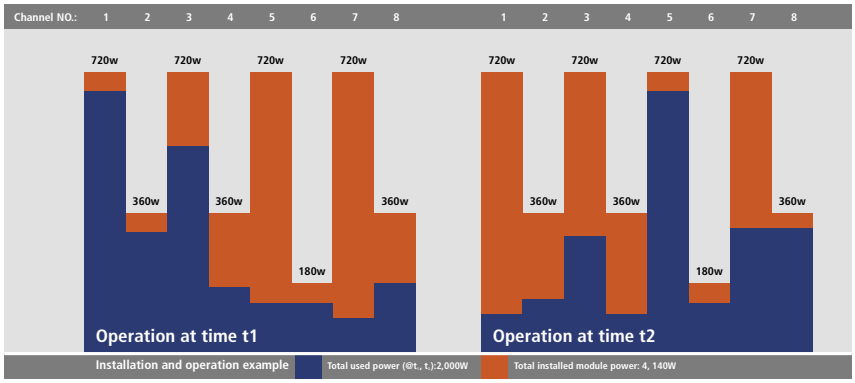
- Workpoint window warning (voltage and current levels are monitored to operate within set values)
- Five programmable current limit protections
- Automatic or programmable over voltage and over current protection
- Sense line disconnect protection
- Output disconnect relay protection
- Selectable power module group shut down
- Global power module shut down
- Programmable shutdown on non-fault events
- Front panel operation lockout
- Programmable events generation
- Controller communications monitoring
- On/Off output hardware indication
- Over temperature protection
- Power envelope protection
- AC input voltage out-of-range protection

Three year warranty

Power Flexibility

Power modules come in a variety of sizes and power ratings: 1/8 width, ranging from 160 W to 720 W; 2/8 width, ranging from 640 W to 1.6 W; and 3/8 width high power modules ranging from 2.8 kW to 3.2 kW, limited by the XMP mainframe power envelope.

Power Flexibility: 2.4 kW continuous, 2.6 kW intermittent



The XMP offers power flexibility, allowing users to draw available power from different channels at different times from the same power system. It is available with 2.4 kW continuous and 2.6 kW intermittent usable power. To ensure the power envelope is not violated, the XMP controller constantly monitors the power system. In case of a brief violation, it provides up to 2.6 kW of overall power for up to 30 seconds and automatically alerts the host. In case of a severe violation (above 2.6 kW), it will automatically shut down the power system. An XMP mainframe will hold 6 kW of power modules.

Programming Functions

The XMP is programmable by using a simple set of commands via GPIB or RS-232C communication links. Its extensive command set covers all of the XMP features and complies with the IEEE488.2 standard. LabVIEW®, LabWindows/CVI®, TestPoint® and AtEasy® drivers are available for easy integration.

- Voltage and current setting
- OV and OC protection
- Individual and global output ON/OFF
- Built-in output relays
- Five current limit types
- Work point window warning
- Re-programming delay
- Local panel lockout
- Power-on values retain or initialize
- Multi-channel store and recall settings
- Output synchronization
- Maskable events and SRQ generation
- Selectable response to controller's communications time-out
- Versatile modules shut-down on-fault setups
- Two-level, six frequencies simulated ripple

Readback Functions

- Load voltage, output voltage and load current readback
- All programmed parameters
- System and channel status
- System and channel errors
- Synchronization Command Execution

XMP 2600 Module Specifications[1]

Module Order Code	A1	B1	C1	D1	E1	A2	B2	C2	D2	E2
Module Width	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**	**1/8**
Output Ratings										4
Power	160 W	180 W	180 W	200 W	200 W	320 W	360 W	360 W	400 W	400 W
Voltage	8 V	18 V	36 V	80 V	160 V	8 V	18 V	36 V	80 V	160 V
Current	20 A	10 A	5 A	2.5 A	1.25 A	40 A	20 A	10 A	5 A	2.5 A
Programming Accuracy										
Voltage (0.03% of Vmax +...)	3 mV	7 mV	12 mV	26 mV	60 mV	5 mV	10 mV	15 mV	30 mV	65 mV
O.V.P. (2% of Vmax +...)	90 mV	180 mV	340 mV	740 mV	980 mV	90 mV	181 mV	342 mV	744 mV	988 mV
Current (0.12% of Imax +...)	8 mA	4 mA	2 mA	1 mA	0.5 mA	24 mA	9 mA	5 mA	3 mA	2 mA
O.C.P. (2% of Imax +...)	16 mA	8 mA	4 mA	2 mA	1 mA	32 mA	16 mA	8 mA	4 mA	2 mA
Average Programming Resolution										
Voltage	2.5 mV	12 mV	15 mV	24 mV	122 mV	2.5 mV	12 mV	15 mV	24 mV	122 mV
OVP	2.5 mV	12 mV	15 mV	24 mV	122 mV	2.5 mV	12 mV	15 mV	24 mV	122 mV
Current	15 mA	12.5 mA	2.25 mA	1.63 mA	1.31 mA	20 mA	15 mA	12.5 mA	2.25 mA	1.63 mA
OCP	15 mA	12.5 mA	2.25 mA	1.63 mA	1.31 mA	20 mA	15 mA	12.5 mA	2.25 mA	1.63 mA
Ripple and Noise (20 Hz to 20 MHz)										
Rms	1.8 mV	2 mV	2.5 mV	7 mV	12 mV	2 mV	2.5 mV	4 mV	12 mV	25 mV
Peak-Peak	12 mV	14 mV	19 mV	42 mV	85 mV	13 mV	15 mV	25 mV	70 mV	150 mV
Load Regulation										
Constant Voltage	1.5 mV	1.8 mV	2 mV	3 mV	6 mV	1.5 mV	2 mV	2.5 mV	4 mV	7 mV
Constant Current	8 mA	4 mA	2 mA	1 mA	0.5 mA	18 mA	10 mA	6 mA	3 mA	2 mA
Line Regulation										
Constant Voltage	2 mV	2.5 mV	3 mV	4 mV	6 mV	2.5 mV	3 mV	3.5 mV	5 mV	7 mV
Constant Current	8 mA	4 mA	2 mA	1 mA	0.5 mA	18 mA	10 mA	6 mA	3 mA	2 mA
Readback Accuracy										
Voltage Readback (0.03% of Vmax +...)	6 mV	12 mV	23 mV	42 mV	85 mV	12 mV	24 mV	46 mV	90 mV	180 mV
Current Readback (0.12% of Imax +...)	8 mA	4 mA	2 mA	1 mA	0.5 mA	26 mA	9 mA	5 mA	3 mA	2 mA
Average Readback Resolution										
Voltage Readback	2.5 mV	12 mV	15 mV	24 mV	122 mV	2.5 mV	12 mV	15 mV	24 mV	122 mV
Current Readback	15 mA	12.5 mA	2.25 mA	1.63 mA	1.31 mA	20 mA	15 mA	12.5 mA	2.25 mA	1.63 mA
Transient Response Time (mSec) [2]	<0.8	<0.8	<0.8	<0.8	<0.8	<0.9	<0.9	<0.9	<0.9	<0.9

Specifications subject to change without notice.

1. Specifications refer to a chassis with only the specified module installed, with nominal resistive load (90% of rated current at the rated voltage) and the power supply sensing locally at the rear terminals, at 25°C.
2. The time it takes for the output to recover within 75 mV of its previous level following a step change in load current of up to 10% of the rated module's current.
3. Available without internal polarity and disconnect relays.
4. The maximum output power is limited by the mainframe controller.

A4	B3	C3	D3	E3	B4	C4	D4	E4	C5	D5	E5
2/8	**1/8**	**1/8**	**1/8**	**1/8**	**2/8**	**2/8**	**2/8**	**2/8**	**3/8**	**3/8**	**3/8**
640 W	720 W	720 W	720 W	720 W	1,440 W	1,440 W	1,600 W	1,600 W	2,880 W[4]	3,200 W[4]	3,200 W[4]
8 V	18 V	36 V	80 V	160 V	18 V	36 V	80 V	160 V	36 V	80 V	160 V
80 A	40 A	20 A	9 A	4.5 A	80 A	40 A	20 A	10 A	80 A	40 A	20 A
8 mV	12 mV	17 mV	34 mV	75 mV	16 mV	20 mV	38 mV	80 mV	25 mV	48 mV	98 mV
98 mV	182 mV	344 mV	748 mV	996 mV	196 mV	375 mV	800 mV	1,100 mV	398 mV	874 mV	1,240 mV
46 mA	28 mA	10 mA	4 mA	2 mA	58 mA	38 mA	15 mA	8 mA	178 mA	64 mA	29 mA
74 mA	36 mA	18 mA	9 mA	5 mA	140 mA	40 mA	20 mA	10 mA	296 mA	128 mA	58 mA
2.5 mV	12 mV	15 mV	24 mV	122 mV	12 mV	15 mV	24 mV	122 mV	15 mV	24 mV	122 mV
2.5 mV	12 mV	15 mV	24 mV	122 mV	12 mV	15 mV	24 mV	122 mV	15 mV	24 mV	122 mV
40 mA	20 mA	15 mA	3.25 mA	2.13 mA	40 mA	20 mA	15 mA	12.5 mA	40 mA	20 mA	15 mA
40 mA	20 mA	15 mA	3.25 mA	2.13 mA	40 mA	20 mA	15 mA	12.5 mA	40 mA	20 mA	15 mA
4 mV	5 mV	9 mV	23 mV	50 mV	12 mV	35 mV	80 mV	180 mV	88 mV	198 mV	446 mV
25 mV	30 mV	50 mV	125 mV	250 mV	68 mV	100 mV	250 mV	550 mV	210 mV	596 mV	1,330 mV
2.5 mV	2.5 mV	3 mV	5 mV	8 mV	3.5 mV	4 mV	6 mV	10 mV	6 mV	9 mV	14 mV
49 mA	24 mA	13 mA	8 mA	4 mA	69 mA	32 mA	18 mA	10 mA	76 mA	37 mA	22 mA
3 mV	3.5 mV	4 mV	6 mV	8 mV	4 mV	5 mV	7 mV	9 mV	7.5 mV	11 mV	14 mV
49 mA	24 mA	13 mA	8 mA	4 mA	69 mA	32 mA	18 mA	10 mA	107 mA	59 mA	29 mA
25 mV	29 mV	55 mV	110 mV	200 mV	38 mV	66 mV	134 mV	240 mV	78 mV	146 mV	294 mV
40 mA	28 mA	10 mA	4 mA	2 mA	64 mA	39 mA	15 mA	8 mA	188 mA	67 mA	32 mA
2.5 mV	12 mV	15 mV	24 mV	122 mV	12 mV	15 mV	24 mV	122 mV	15 mV	24 mV	122 mV
40 mA	20 mA	15 mA	3.25 mA	2.13 mA	40 mA	20 mA	15 mA	12.5 mA	40 mA	20 mA	15 mA
<1	<1	<1	<1	<1	<2	<2	<2	<2	<4	<4	<4

XMP 2600 General Specifications

Operational AC Input Voltage	
170 V-265 V, 45 to 66 Hz	Iin < 20 A nominal
Nomimal 120 V, Power output < 1 kW	Iin < 15 A nominal
Power cord length	2 m
Power Factor Correction (PFC)	Power factor correction to meet EN61000-3-2 Current Harmonics and EN61000-3-3 Voltage Fluctuations (IEC555)
Inrush current	Up to 100% of specified nominal current
Input mains protection	Circuit breaker switch on the front panel
Environmental conditions	
Storage temperature	-20°C to 70°C
Operating temperature	0°C to 55°C (LCD to 50°C)
Derate output current/power	1% per °C from 30°C to 55°C
Approvals	
CE-marked units meet: EN61010-1, EN61326, EN61000-3-2, and EN61000-3-3; UL Listed to UL61010-1; Meets USA EMC Standard FCC Part 15B Class A	
Temperature Coefficient	
Voltage Programming	0.01% per °C
Current Programming	0.02% per °C
Voltage Readback	0.01% per °C
Current Readback	0.02% per °C
Long Term Drift	Output change after 30 min. warm-up, over an interval of 8 hours under constant load, line and temperature conditions is 0.03%.
Remote Sensing	Up to 4 V can be dropped over the two load lines together (i.e. 1.5 V + 2.5 V). At 2.5 V a warning event will be generated, alerting over sense voltage drop condition, and at 4V the module will be shut down. The load lines drop subtracts from the voltage available for the load.
Output Programming Response	Time Rise and fall time with full resistive load (10 to 90% and 90 to 10%) is 30-640 mSec.
Isolation	Output terminals can be floated up to +/- 240 VDC from chassis ground
Dimensions without feet (H x W x D)	5.25 x 19 x 22.5" (132.6 x 482.6 x 570.0 mm)
Weight	
XMP mainframe with controller	26.2 lb (11.9 kg)
1/8 width module	3.9 lb (1.75 kg)
2/8 width module	5.5 lb (2.5 kg)
3/8 width module	7.5 lb (3.4 kg)

Specifications subject to change without notice.

XDL Series

105 W to 215 W

High precision DC linear power supplies

Digital Controlled DC Linear Power Supplies

Product name:	XDL
Voltage range:	0-35 VDC to 0-56 VDC
Current range:	0-0.5A to 0-5A
Power range:	105 W to 215 W

The Xantrex XDL Series represents the 'next generation' of high performance laboratory power supplies. Using linear technology and unrivalled performance in regulation, output noise and dynamic performance is achieved. High precision is also achieved by using instrumentation quality 16 bit DAC to control voltage and current enabling voltage set points at 1mV resolution. As the XDL is highly accurate, it can be used as a calibration source for some handheld DMMs.

Direct Numeric Keypad Entry and Incremental Rotary Control
Unlike other digitally controlled units, the XDL Series provides both numeric and rotary control while the illuminated keys and display legends provide instant confirmation of settings and status. Precise settings can be made by direct numeric entry using the 0 to 9 keypad. For gradual settings, a jog wheel is available for incremental or decremental changes in voltage steps of 0.1V, 1mV or 10mV and current steps of 0.1A down to 0.1mA. The jog wheel can be engaged permanently or disabled.

Multiple Ranges For Greater Flexibility
The XDL Series provides multiple ranges for voltage and current settings. Each model offers three output ranges per output.

Setting Memories
For added convenience the Xantrex XDL series provides storage of up to ten power supply set-ups in non-volatile memory (30 set-ups for a triple). Upon shut down of the power supply, the settings are saved and automatically restored at switch-on.

OVP and OCP Trips with Alarm Output
The XDL Series provides fully adjustable over-voltage and over-current protection. The over voltage and over current protection feature provides a fail safe mode of operation to prevent an accidental or incorrect setting, as well as protect against undesired load conditions. A trip condition switches the rear panel alarm signal which enables other equipment to be controlled. Alarms can also be activated by over temperature and excess voltage on the sense terminals.

Features

- Very high precision, very low noise, excellent dynamics
- Advanced user interface with direct numeric entry and incremental rotary control
- Ten store/recall setup locations
- Thirty store/recall setup locations
- Fully isolated outputs for maximum flexibility
- Constant voltage or constant current operation with automatic crossover and mode indication
- Switchable auxiliary output of 5.0V/3.3V/2.7V
- Switchable remote sense
- Excellent line/load regulation
- Power output display

Protection Features

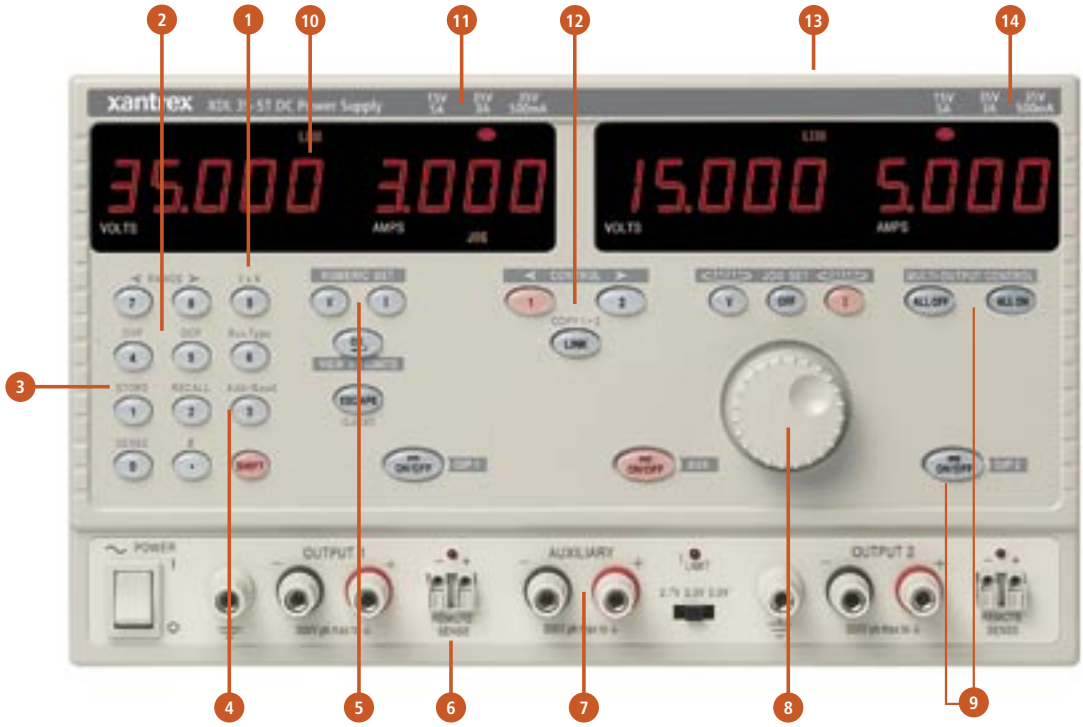
- Over voltage protection
- Over current protection
- Over temperature protection
- Sense protection

Options

- GPIB, RS-232 and USB interface card (P models)
- 230 VAC input factory set (Option HV)

Three year warranty

XDL Series



XDL Front Panel

1. Watts display (V x A)
2. Variable over-voltage & over-current protection trips
3. Up to 30 memory stores for voltage & current settings
4. Fully bus programmable via GPIB, RS232 or USB (P models)
5. Direct numeric setting of voltage or current
6. Remote or local sense with keypad selection
7. Auxiliary output with selectable voltage
8. Rotary control of voltage and current
9. Individual output switches plus master control
10. 16-bit precision, 1mV setting resolution
11. Multiple ranges for increased flexibility
12. Linked mode control for tracking operation or series and parallel wiring
13. Duplicate rear terminals (P models)
14. Current resolution down to 0.1mA

USB/GPIB/RS232 Interface
The multiple interface card enables remote control and readback via either USB, GPIB or RS232. On triple output models, the single interface address controls all three outputs. The USB interface is for medium speed PC connectivity and enables multiple devices to be connected. A Windows® device driver is supplied, which creates a virtual COM port, enabling USB to be used in applications that do not directly support it. The GPIB interface conforms to IEEE488.2 and IEEE488.1.

Remote Sense and Local Sense
The XDL series provides full remote sense capability via dedicated sense terminals to maintain regulation at the load. When remote sense is not required, internal local sensing can be selected.

Linked and Copy Mode
The XDL triple output models have two identical independent and isolated outputs. In situations where the user wishes to set similar voltages and current on both outputs, the “linked” mode is available. When linked, all adjustments are simultaneously applied to both outputs. The “copy” function allows all the settings of one output to be duplicated on the other prior to linking. For greater flexibility and convenience, the outputs can be linked when set to different voltages or current, allowing separate settings to be recalled into the linked mode memories for simultaneous recall.

XDL Series

XDL Electrical Specifications

Models		35-5	35-5T	35-5P	35-5TP	56-4	56-4P
Output Ranges	Range 1	0-35 V, 0-3 A	0-35 V, 0-3 A	0-35 V, 0-3 A	0-35 V, 0-3 A	0-56 V, 0-2 A	0-56 V, 0-2 A
	Range 2	0-15 V, 0-5 A	0-15 V, 0-5 A	0-15 V, 0-5 A	0-15 V, 0-5 A	0-25 V,0-4 A	0-25 V, 0-4 A
	Range 3	0-35V,0-500.0 mA	0-35V,0-500.0 mA	0-35V,0-500.0 mA	0-35V,0-500.0 mA	0-56V,0-500.0 mA	0-56V,0-500.0 mA
Outputs		1	3	1	3	1	1
Output Power		105 W	215 W	105 W	215 W	112 W	112 W
Interface (GPIB/RS-232/USB)		No	No	Yes	Yes	No	Yes
Voltage Setting	By floating point numeric entry or rotary jog wheel; resolution 1mV						
Current Setting	By floating point numeric entry or rotary jog wheel; resolution 1mA or 0.1mA depending on range						
Setting Accuracy	Voltage - 0.03% ± 5 mV. Current 0.2% ± 5mA, 0.5mA						
Output Mode	Operation in constant voltage or constant current modes with automatic cross-over and mode indication by LEDs.						
DC Output Switch	Sets output voltage and current levels to zero when Off.						
Output Terminals	4mm terminals on 19mm (0.75") spacing						
Load Regulation	Voltage: <0.01% + 2mV Current: <0.01% + 250µA; <0.01% + 50µA on 500mA range (measured at output terminals using remote sense)						
Line Regulation	Voltage: <0.01% + 2mV for 10% line change Current: <0.01% + 250µA; <0.01% + 50µA on 500mA range						
Ripple and Noise	Typically <0.35%Vrms 2mVp-p CV mode, and <0.2mArms, <20µArms (500 mA range) CI mode						
Transient Response	50µs to within 15mV of set level for a change in load current from full load to half load or vice versa						
Temperature Coeffcient	<±(50ppm+0.5mV)/ °C (voltage)						
Remote Sense	Eliminates up to 0.5V drop per lead. Remote sense operation selected from front panel and indicated by LED						
Sense Terminals	Recessed sprung sockets for direct insertion of wires. Duplicated on rear terminal block (P versions only)						

XDL General Specifications

Operational AC Input Voltage	115V or 230V ± 10% (adjustable internally, option HV for factory set 230 VAC input), 50/60 Hz. Installation Category II
Operating Temperature Range	5 °C to 40 °C, 20% to 80% RH
Storage Temperature Range	-40 °C to 70 °C
Dimensions (H x W x D)	6.3 x 5.5 x 11.4"/160 x 140 x 290 mm (XDL 35-5, XDL 35-5P, XDL 56-4, XDL 56-4P), 6.3 x 11.0 x 11.4"/160 x 280 x 290 mm (XDL 35-5T, XDL 35-5TP)
Weight	11.9 lb/5.4 kg (XDL 35-5, XDL 56-4) 12.1 lb/5.5 kg (XDL 35-5P, XDL 56-4P) 23.1 lb/10.5 kg (XDL 35-5T) 23.3 lb/10.6 kg (XDL 35-5TP)
Benchtop Operation	Folding legs are incorporated that can be used to angle the front panel upwards when required
Rack Mount Operation	19 inch 4U mount for up to three single output units or one triple plus one single Blanking plates available for un-used sections
Warranty	3 years
Approvals	CE-marked units meet: EN61010-1 and EN61326

Specifications subject to change without notice.

XPF Series

350 W to 840 W

Flexible voltage and current output with PowerFlex℠

PowerFlex Dual Isolated Output DC Power Supply

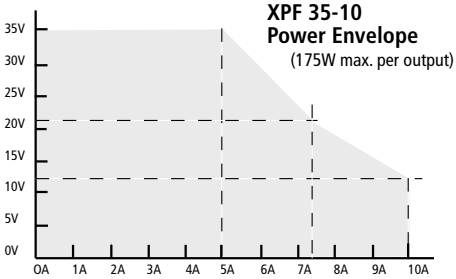
Product names:	XPF
Voltage range:	0-35 VDC to 0-42 VDC
Current range:	0-10 A to 0-20 A
Power range:	175 W to 840 W

The Xantrex XPF Series provides 175 to 840 W of DC power. The XPF with PowerFlex™ design is a dual output power supply. It has two completely independent and isolated outputs. If required, the outputs can be wired in series or parallel to achieve up to double the maximum voltage or double the maximum current.

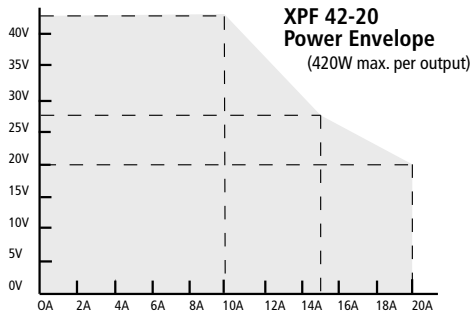
The PowerFlex™ design enables flexibility in generating a wider range of voltage and current within a power envelope in a single power supply compared to a conventional programmable power supply with fixed limits of the same power level.

Typically, the maximum voltage and maximum current are not required simultaneously. The PowerFlex™ design enables higher currents to be generated at lower voltages within an overall power limit envelope.

PowerFlex™ is achieved by using the latest switch-mode technology with advanced techniques used to achieve noise and RFI figures comparable with an all linear design.



The maximum current at any voltage setting is limited by the power envelope which is set to give 5A at 35V rising to 10A at 12V under all AC supply conditions (both outputs loaded). At lower voltages the power is restricted by the 10 amps current maximum.



The maximum current at any voltage setting is limited by the power envelope which is set to give 10A at 42V rising to 20A at 20V under all AC supply conditions (both outputs loaded). At lower voltages the power is restricted by the 20 amps current maximum.

Features

- Power Factor Correction (PFC)
- Individual On/Off switch per output
- Dual isolated outputs
- PowerFlex design gives variable voltage/current combinations
- Coarse and fine voltage controls
- Separate digital voltage and current meters for each output
- High setting resolution
- Remote sense

Protection Features

- OVP protection per output

Options

- 220-240 VAC input factory set (Option HV)

Three year warranty

XPF Series

XPF Electrical Specifications

Models	35-10	42-20	
Output Ratings			
Output Voltage	0 - 35 V	0 - 42 V	
Output Current	0 - 10 A	0 - 20 A	
Outputs	2	2	
Output Power	up to 175 W per output	up to 420 W per output	(See XPF 35-10 and XPF 42-20 PowerFlex power envelope graphs)
OVP Range	10% - 110% of maximum output voltage		
Voltage Setting	By coarse and fine controls		
Current Setting	By single logarithmic control		
Output Impedance	Typically <5mΩ in constant voltage mode. Typically >5kΩ in constant current mode (voltage limit at max.)		
Line Regulation	<0.01% of max. output for a 10% line voltage change		
Load Regulation	<0.05% of max. output (XPF 35-10) and <0.01% of max. output (XPF 42-20) for a 90% load change		
Ripple & Noise	5 mV rms max, typically 2 mV rms, <20 mV pk-pk, (20 MHz bandwidth) both outputs fully loaded (7A @ 25V), CV mode. (XPF 35-10)		
	Typically <1mV rms, <5mV pk-pk, (20 MHz bandwidth) both outputs loaded (10A @ 42V) CV mode (XPF 42-20)		
Transient Response	<2ms to within 100mV of set level (XPF 35-10) and < 250µs to within 50 mV of set level (XPF 42-20) for 90% load change		
Temperature Coefficient	Typically <100ppm /°C		
Output Protection	Forward protection by OVP trip; maximum voltage that should be applied to the terminals is 50 V. Reverse protection by diode clamp for reverse currents up to 3 A.		
Status Indication	LED indication of Output On, CV, CI and Power Limit. Message on display for over-voltage trip.		
Output Switch	Push-push switch operating electronic power control. Preset voltage and current are displayed when the output is off.		
Output Terminals	4mm terminals on 19mm (0.75") pitch. 15 A max rating (XPF 35-10) and 30 A max. rating (XPF 42-20)		
Sensing	Remote sensing via a front panel terminal block or local sensing (at output terminals). Selection by slide switch.		
Meter Resolution	10 mV, 10 mA		
Meter Accuracy			
Voltage	0.2% ± 1 digit		
Current	0.5% ± 1 digit		

XPF General Specifications

AC Input	110V - 120V AC or 220V-240V AC +/- 10% (adjustable internally, option HV for factory set 220-240 VAC input) 50/60 Hz. Installation Category II.
Cooling	Convection (XPF 35-10), Fan (XPF 42-20)
Power Consumption	600 VA max. (XPF 35-10)
	1100 VA max. (XPF 42-20)
Operating Temperature Range	5 °C to 40 °C, 20% to 80% RH
Storage Range	-40 °C to 70 °C
Environmental	Indoor use at altitudes to 2000m, Pollution Degree 2
Safety	Complies with EN61010-1
EMC	Complies with EN61326
Dimensions (H x W x D)	5.1 x 8.3 x 14.8" (130 x 210 x 375 mm)
Weight	11 lb. (5kg)
Warranty	3 years
Approvals	CE-marked units meet: EN61010-1 and EN61326

Specifications subject to change without notice.

XPH Series

175 W to 420 W

Compact high power/low cost benchtop DC power supplies

Compact High Power Bench DC Power Supplies

Product name:	XPH
Voltage range:	0-18 VDC to 0-150 VDC
Current range:	0-10A to 0-2A
Power range:	175 W to 420 W

The Xantrex XPH Series provides 175 to 420 W of programmable DC power. The XPL is a compact, high performance low cost power supply suited for benchtop applications.

The XPH Series uses combined switch-mode pre-regulation with linear post-regulation to provide performance comparable with an all linear design. The XPH features excellent line and load regulation with low noise and good transient response. The XPH Series is available in a single, dual and triple output for benchtop use.

The XPH dual output models have two independent and isolated outputs with its own on-off switch. The outputs can be wired in either series or parallel to provide higher voltage or higher current output. All outputs are intrinsically short circuit proof, and are protected against external voltages and reverse currents. The XPH triple output model has the same features as the dual output model with an additional switchable fixed output of 3.3V and 5V.

Output voltages up to 150V

The XPH-M Series is a dual output 300 W power supply with Multi-Mode capability. This enables it to operate as a dual power supply with two independent and isolated outputs, or as a single power supply of double the power. As a dual, each output provides 0 to 75V at 0 to 2A (mode A). As a single the output can be selected as either 0 to 75V at 0 to 4A (mode B) or 0 to 150V at 0 to 2A (mode C). In single modes, the unused half of the unit becomes completely inoperative and its displays are blanked.

Higher currents and remote sense

The XPH-R series are single output power supplies similar in size and weight to the standard XPH series but offering higher output currents. To match their higher current capability, XPH-R models include switchable remote sensing and XPH extended voltmeter resolution.

Suitable for 42V Automotive

The XPH 42-20 provides 420 W of power within a highly compact and lightweight unit. It can provide current of up to ten amps at voltages up to 42V in both constant voltage and constant current modes. The choice of 42V enables it to be used as a test source for the new generation of automotive electrical parts which will use 42V (18 cell batteries) instead of 14V (6 cell batteries), thus reducing currents and hence wiring losses. Switchable remote sense is provided to remove the effects of connection lead resistance at high current.

Features

- Low noise
- Excellent line/load regulation
- Coarse and fine voltage controls
- Constant voltage or constant current operation with automatic crossover and mode indication
- Individual On/Off switch per output (not including fixed output)
- Switchable 3.3V/5V output on triple output model
- Switchable remote sense

Options

- 220-240 VAC input factory set (Option HV)

Three year warranty

XPH Series

XPH Electrical Specifications

Models	18-10	35-5	35-4D	35-4T	42-10	75-2D
Output Ratings						
Output Voltage	0-18V	0-35V	0-35V	0-35V	0-42V	0-75V
Output Current	0-10A	0-5A	0-4A	0-4A	0-10A	0-2A
Outputs	1	1	2	3	1	2
Output Power	180W	175W	280W	305W	420W	300W
Operating Mode	Constant voltage or constant current with automatic cross-over and indication					
Voltage Setting	By coarse and fine controls					
Current Setting	By single logarithmic control					
Output Impedance	Typically <5mΩ in constant voltage mode. Typically >50kΩ (XPH35-4, XPH75-2D), >20kΩ (XPH35-5, XPH42-10), >10kΩ (XPH18-10)					
Line regulation	<0.01% of max. output for a 10% line voltage change					
Load regulation	<0.01% of max. output for a 90% load change, <0.1% (XPH75-2D in Mode C)					
Ripple & Noise	Typically <2 mV rms, <10 mV pk-pk, <15 mV (XPH75- 2D), CV mode (20 MHz bandwidth)					
Transient Response	<200µs to within 50mV of set level for 90% load change (mode A only XPH75-2D)					
Temperature Coefficient	Typically <100ppm /°C					
Output Protection	Outputs will withstand forward voltages up to 40V (XPH 35-5. XPH 35-4D, XPH 35-4T) or 85V/170V (XPH 75-2D)					
Status Indication	Output ON lamps. Constant current mode lamps					
Output Switch	Electronic. Preset voltage/current displayed with output off.					
Output Terminals	4mm terminals on 19mm (0.75') pitch. Special safety terminals on XPH 75-2D					
Meters (main outputs)						
Meter Types	Separate 3 digit meters for voltage and current with 14mm (0.56") LED displays. Reading rate 4/sec (4 digit voltmeter on XPH 75-2D)					
Meter Resolutions	100 mV, 10mA					
Meter Accuracy						
Voltage	0.3% ± 1 digit					
Current	0.6% ± 1 digit					
Remote Selection	Switch selectable as Local or Remote					
Connection	Remote sense connections via spring loaded connectors					

XPH General Specifications

Cooling	Convection (Fan assisted for XPH 42-10)
Output Terminals	
Standard Type	4mm "binding post" terminals suitable for plugs or wires
XPH 75-2D only	As above but with fully "touch proof" construction
Optional (all models)	4 mm safety sockets, suitable for shrouded plugs
AC Input	110V to 240V ± 10%, 50/60 Hz (XPH 35-5, XPH 35-4D, XPH 35-4T, XPH 75-2D) Factory set: 110 to 120 VAC ± 10% or 220-240 VAC ±10%, 50/60Hz Installation Category II (XPH 18-10, XPH 42-10)
Consumption	400 VA (XPH 35-5, XPH 18-10) 500 VA (XPH 35-4D, XPH 35-4T, XPH 75-2D) 800 VA (XPH 42-10).
Operating Range	5 °C to 40 °C, 20% to 80% RH
Storage Range	-40 °C to 70 °C
Environmental	Indoor use at altitudes to 2000m, Pollution Degree 2
Safety	Complies with EN61010-1
EMC	Complies with EN61326
Dimensions (H x W x D)	6.3 x 5.5 x 12.6" (160 x 140 x 320 mm) (XPH 35-5, XPH 18-10, XPH 42-10) 6.3 x 10.2 x 12.6" (160 x 260 x 320 mm) (XPH 35-4D, XPH 35-4T, XPH 75-2D)
Unit Weight	6.2 lb/2.8 kg (XPH 35-5, XPH 18-10) 7.9 lb/3.6 kg (XPH 42-10) 9.5 lb/4.3 kg (XPH 35-4D, XPH 35-4T) 9.7lb/ 4.4 kg (XPH 75-2D)
Warranty	3 years
Approvals	CE-marked units meet: EN61010-1 and EN61326

Specifications subject to change without notice.

XPL Series

30 W to 125 W

Compact, low power/low cost benchtop DC power supplies

Compact Linear Bench DC Power Supplies

Product name:	XPL
Voltage range:	0-18 VDC to 0-56 VDC
Current range:	0-3.3A to 0-1A
Power range:	30 W to 125 W

The Xantrex XPL Series provides 30 to 125 W of programmable linear DC power. The XPL is a compact, high performance low cost power supply suited for benchtop applications.

The XPL Series uses linear regulation for high performance. The XPL Series features excellent line and load regulation with low noise and good transient response. The XPL Series is available in a single, dual and triple output for benchtop use.

The XPL dual output model has two independent and isolated outputs each with a 0 to 30V, 0 to 2A capability and its own on-off switch. The outputs can be wired in either series or parallel to provide voltages up to 60 volts or currents up to 4 amps. All outputs are intrinsically short circuit proof, and are protected against external voltages and reverse currents. The XPL triple output model has the same features as the dual output model with an additional switchable fixed output of 3.3V and 5V.

Features

- Low Noise
- Excellent line/load regulation
- Coarse and fine voltage controls
- Constant voltage or constant current operation with automatic crossover and mode indication
- Individual On/Off switch per output (not including fixed output)
- Switchable 3.3V/5V output on triple output model

Options

- 230 VAC input factory set (Option HV)

Three year warranty

XPL Series

XPL Electrical Specifications

Models	18-3	30-1	30-2	30-2D	30-2T	56-1
Output Ratings						
Output Voltage	0-18 V	0-30 V	0-30 V	0-30 V	0-30 V	0-56 V
Output Current	0-3.3 A	0-1 A	0-2 A	0-2 A	0-2 A	0-1.1 A
Outputs	1	1	1	2	3	1
Output Power	60 W	30 W	60 W	120 W	125 W	60 W
Operating Mode	Constant voltage or constant current with automatic cross-over and indication					
Voltage Setting	By coarse and fine controls					
Current Setting	By single logarithmic control					
Line Regulation	<0.01% of max. output for a 10% line voltage change					
Load Regulation	<0.01% of max. output for a 90% load change					
Output Impedance	Typically <5mΩ in constant voltge mode. Typically >50kΩ in constant current mode					
Ripple & Noise (20 MHz)	Typically <1mV rms (CV mode)					
Transient Response	<20µs to within 50mV of set level for 90% load change					
Temperature Coefficient	Typically <100ppm/°C					
Output Protection	Outputs will withstand forward voltages of up to 20 V above the rated output voltage. Reverse protection by diode clamp for current up to 3 A.					
Status Indication	Ouptut ON lamps. Constant current mode lamps					
Output Switch	Electronic. Preset voltage and current displayed when output is off					
Output Terminals	4mm terminals on 19mm (0.75") pitch					
Meter Resolutions	100 mV, 10 mA					
Meter Accuracy						
Voltage	0.3% ±1 digit					
Current	0.6% ±1 digit					

XPL General Specifications

AC Input	115 V or 230 VAC ±10% (adjustable internally, option HV for factory set 230 VAC input) Installation Category ll
Power Consumption	85 VA (XPL 30-1) 160 VA (XPL 30-2, XPL 18-3, XPL 56-1) 320 VA (XPL 30-2D, XPL 30-2T)
Operating Range	5 °C to 40 °C , 20% to 80% RH
Storage Range	- 40 °C to +70 °C
Environmental	Indoor use at altitudes to 2000m, Pollution Degree 2
Cooling	Silent fan-less convection cooling
Safety	Complies with EN61010-1
EMC	Complies with EN61326
Dimensions (H x W x D)	6.3 x 5.5 x 11.6"/160 x 140 x 295 mm (XPL 30-1, XPL30-2, XPL 18-3, XPL 56-1) 6.3 x 10.2 x 11.6"/160 x 260 x 295 mm (XPL 30-2D, XPL 30-2T)
Weight	7.5 lb/3.4 kg (XPL 30-1) 9.7 lb/4.4 kg (XPL30-2, XPL 18-3 XPL 56-1) 16.5 lb/7.5 kg (XPL 30-2D, XPL 30-2T)
Warranty	3 years
Approvals	CE-marked units meet: EN61010-1 and EN61326

Specifications subject to change without notice.

Advantage of Soft Switching Technology

By Mark Edmunds, P. Eng.
Xantrex Technology Inc.

Xantrex was the first company to offer programmable DC power supplies that use "soft switching" technology. Xantrex programmable DC power supplies use this superior switch-mode topology, reducing high frequency noise, while improving both efficiency and reliability.

Hard Switching

Traditional high frequency switch-mode supplies, which rely on generating an AC waveform in the range of 100 kHz to 200 kHz to drive the main power transformer, have used power transistors to "hard-switch" the unregulated input voltage at this rate. This means that a transistor turning on will have the whole raw input voltage, typically in the range of 350 volts, across it as it changes state. During the actual switching interval (less than 0.5 microsecond), there is a finite period as the transistor begins to conduct, where the voltage begins to fall at the same time as current begins to flow. This simultaneous presence of voltage and current across the transistor means that power is being dissipated within the device. A similar event occurs as the transistor turns off, with the full current flowing through it. (See Figure 1.)

Designers that use a hard-switching topology are in a no-win situation when they try to reduce wasted power, and still meet the EMC directive. As the switching period is reduced through the use of improved driving circuitry, the faster rise and fall times generate more high frequency energy that is radiated and conducted out of the unit as unacceptable radio frequency interference (RFI). If the rise and fall times are intentionally slowed to reduce the radio frequency interference, the power losses in the transistor increase proportionally, increasing the thermal stress on the part, thus reducing its lifespan. In this way, older hard switching topologies are a compromise between electrical efficiency reduction and EMC "noise" trade-offs.

Soft Switching

More recently, new power conversion topologies have been developed that dramatically reduce the power dissipated by the main power transistors during the switching interval, while at the same time nearly eliminating much of the generated radio frequency energy, or high frequency "noise". The most common technique employed has been a constant frequency resonant switching scheme, which ensures that the actual energy being dissipated by the active device is reduced to nearly zero. This method, commonly called "Zero Voltage Switching" (ZVS) or "Soft Switching" uses the parasitic output capacitance of the power transistors (typically MOSFETs) and the parasitic leakage inductance of the power transformer as a resonant circuit. Using this resonant circuit, the output inductance, the parasitic drain-source body diodes of the MOSFETs, and an appropriate switching sequence allows the voltage across each transistor to swing to zero before the device turns on and current flows. Likewise, at turn-off, the voltage differential across the transistor swings to zero before it is driven to a non-conductive state. With this scheme, current is only flowing through the transistors when they are fully "on", and doing useful work transferring energy to the output of the supply. The power dissipation within the transistor that would normally occur during the switching interval has effectively been eliminated. (See Figure 2.) Unwanted high-frequency voltage and current transients during the switching period – the culprits that supply much of the RF noise radiated and conducted out of the power supply – are also dramatically reduced due to the smooth resonant transition. With the noise effectively reduced at its source, enhancing filtering at the input and output of the unit ensures that the unit is well within the noise limits set by international standards.

With "soft switching" techniques, reduction in wasted power will often improve the efficiency of a unit by more than 2%. While this does not sound significant, it can account for a saving of more than 20 W in a 1000 W power supply. This 20 W is power that would have been dissipated by the main power transistors, the most critical and most heavily stressed semi-conductors in any switch mode power supply. Reducing the power here lowers their junction temperature, giving increased thermal operating margins and consequently a longer life for the power supply. Not only does a "soft switching" power supply generate significantly less electrical noise, it achieves greater efficiency, longer mean time between failures (MTBF), and higher immunity to the effects of other equipment operating nearby.

“Soft” Switching

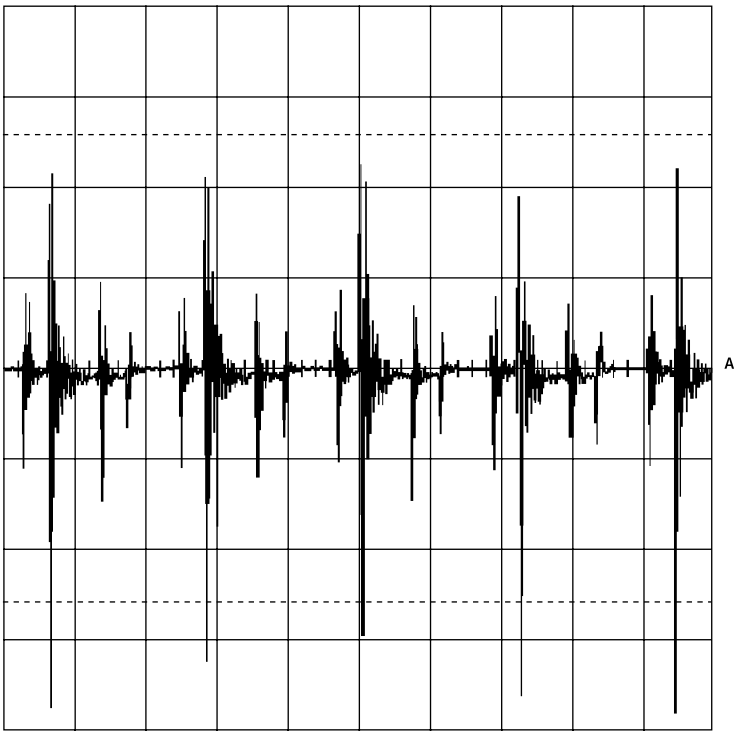


Figure 1.

“Hard Switching” topology power loss waveform for a bridge MOSFET (320 W/div) showing high instantaneous peak power loss during each switching cycle.

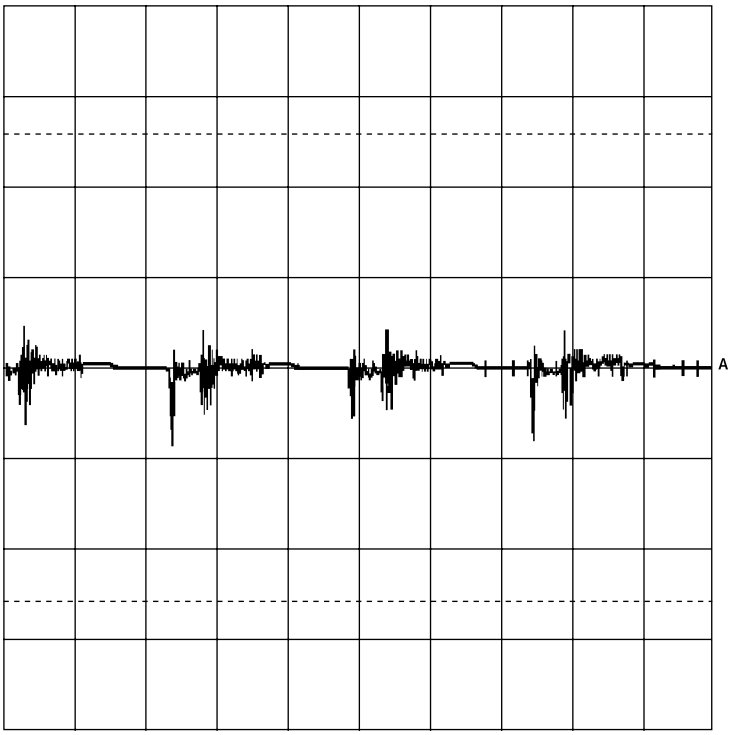


Figure 2.

“Soft Switching” topology power supply with the same rating as that in Figure 1. Power loss waveform for a bridge MOSFET (320 W/div). Instantaneous peak power is now reduced to less than one-quarter the level in the “hard switching” version.

Xantrex Power Supplies and Inductive Loads

Although we take great care to ensure all our power products are stable when supplying current to a variety of loads, a highly inductive load may cause the output to oscillate.

Output oscillation is to be expected since the output of a power supply is highly capacitive and the internal feedback loop has a necessarily finite bandwidth. When an inductive load is present and the output voltage is stepped or adjusted quickly, the output voltage will exhibit either continuous oscillation, or damped oscillation that settles after a few cycles.

The frequency of oscillation is a function of the output capacitance of the power supply and the value of the inductor connected. The situation can be approximated with a classic LCR series circuit with the resistance of the inductor coil representing the "R". This resistance "R" is usually too small to be effective in damping the oscillation.

To aid in damping the oscillatory nature of such a circuit, a resistor can be placed directly across inductor. The value of the resistor will be determined by the size of the inductance present. A good starting point is to try a resistor approximately equal (in Ω) to:
The value, C_{out}, represents the output

$$\sqrt{L_{load}\,(\text{Henrys}) \div C_{out}\,(\text{Farads})}$$

capacitance of the power supply. The output capacitance of each model of Xantrex power supplies can be found in its operating manual or contact a Xantrex sales application engineer for the correct value. The power rating of the resistor should be at

$$(1.5 \times V_{out}{}^{2}) \div R_{damping}$$

Figures A and B illustrate the effect of different values of damping resistance for a given inductive load and output capacitance. An XHR300-2 model (with an output capacitance of 120 µF) is used as the capacitive power source with a load inductance of 2 Henrys. A step change in programmed output current of 1.5A is used to demonstrate the response of this circuit.

The graphs show that when using a 510 Ω resistor, the output voltage rises to a large initial value and then attempts to swing below zero volts. The output rectifiers of the power supply will clamp the output at approximately -1 volt. In this example, the value of parallel resistance is insufficient and a non-linear, sustained oscillation of the output may be expected.

With 120 Ω in parallel, there is still a damped oscillation, but a smaller overshoot in inductor current. However, a 75 Ω damping resistor results in a large improvement in output voltage transient response and no overshoot in inductor current. The final value of coil current is slightly less due to the loading of the parallel resistor, but this can be easily compensated for by a small increase in the programmed current limit of the XHR. As you can see from the steady state value of output voltage in Figure A, if a 75 Ω damping resistor is chosen, the resistor will dissipate approximately: $18^2 \div 75 = 4.3$W. A 75 Ω , 10W resistor would be appropriate for this application.

Caution: When powering a highly inductive load, we recommend that a blocking diode be used on the output of the Xantrex power supply. This will protect the supply from any reverse voltages entering the power supply outputs due to the collapse of coil current. If you are unsure of the diode specifications required, please contact a Xantrex sales application engineer for assistance.

Figure 3. Output voltage with different values of parallel damping resistor
Output capacitance=120uF. Load inductance = 2 Henrys

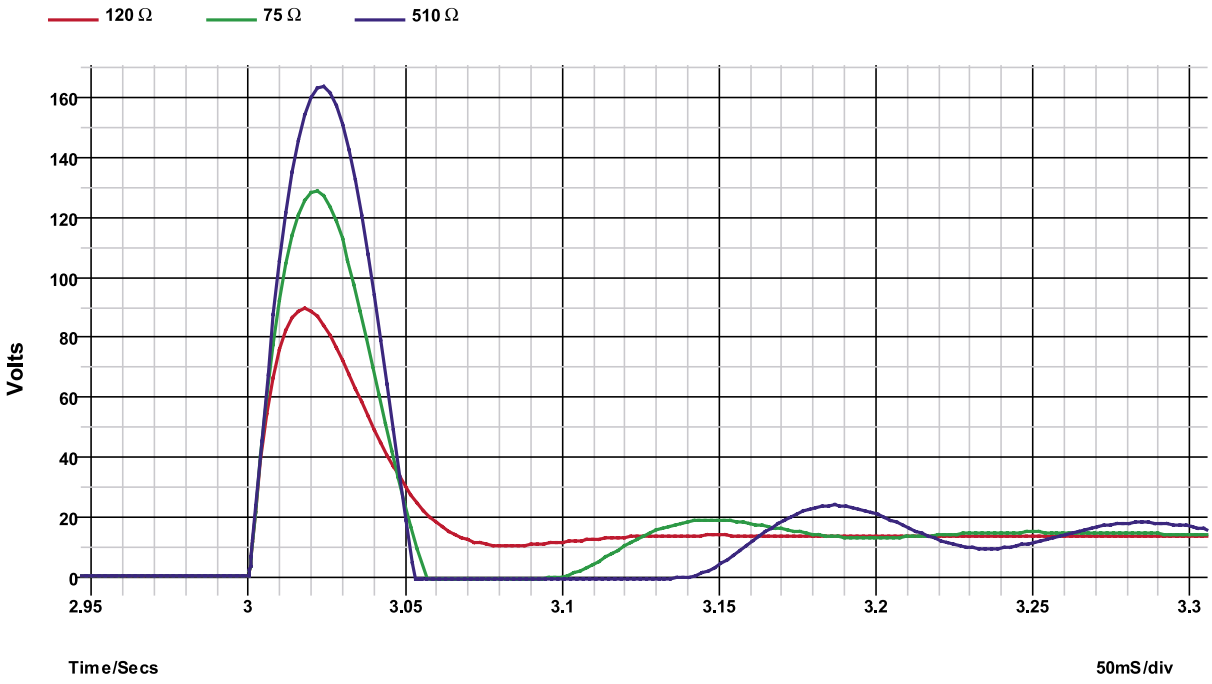
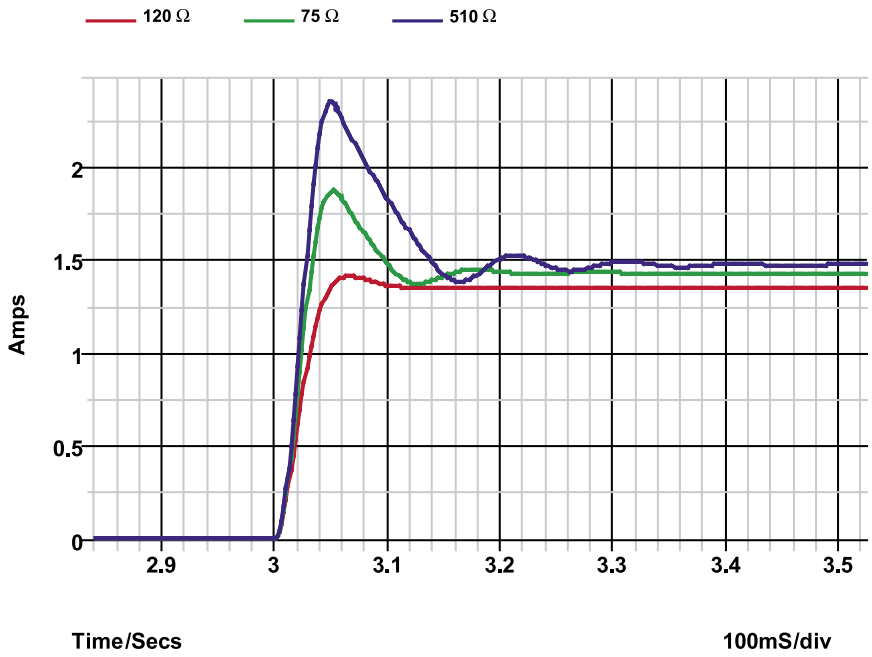
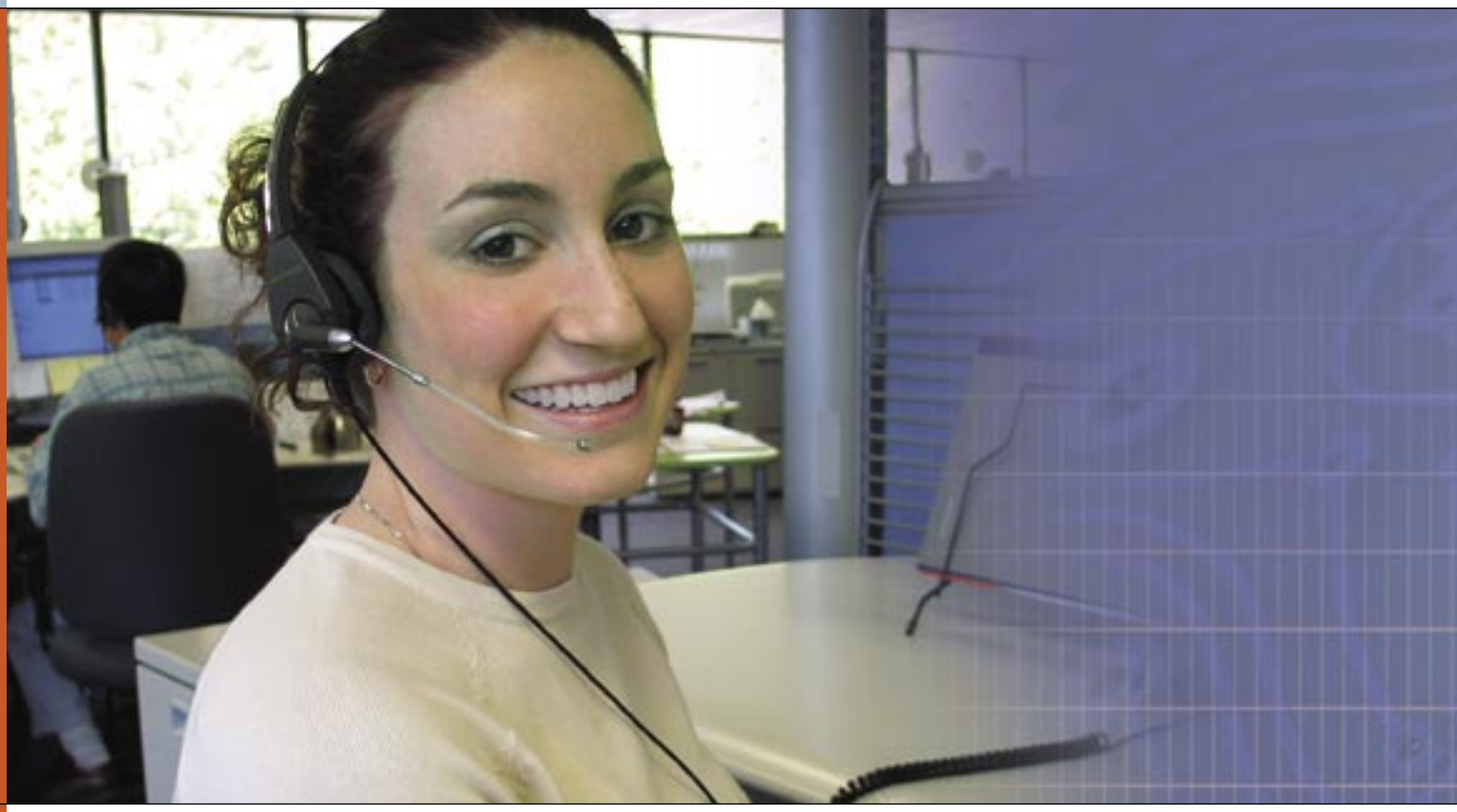


Figure 4. Inductor coil current with different values of resistive damping



How to Order



How to Order

To find a local Xantrex representative, please visit the following link on our website: http://www.xantrex.com/applications/prgnasales.asp

To order directly from Xantrex, the following options are available:

Purchase order

Email or fax your purchase order to our Order Management team:

- Tel: 1-800-667-8422 x2760
- Fax: 604-420-1591
- Email: ordermanagement@xantrex.com

Our Order Management Team will send you an order acknowledgement confirming your scheduled ship date within 24 hours of receiving your order if you provide the following information:

- Your company purchase order #
- Model number & description
- Accessories (installed or separate)
- Billing address
- Ship to address
- Pre-payment method: Visa, Mastercard, American Express, check or money order.

Advance payment is required for your first order; subsequent orders can be on account based on credit approval.

On-line

In North America, you can order many of our programmable power products online. Please visit the "Buy" link at www.xantrex.com for more information.

Evaluation Units

If you require an evaluation unit for electrical and mechanical testing, please contact a Sales Application Engineer:

- Tel: 1-800-667-8422
- Fax: 604-421-3056
- Email: prg.info@xantrex.com

They will arrange for a 30-day evaluation at no charge. Please note that evaluation units kept beyond 30 days will be invoiced.

Parts

To order service parts, please contact:
Xantrex Factory Service Center

- Tel: 1-800-667-8422
- Fax: 604-420-1591
- Email: customerservice@xantrex.com

Order Cancellations

Orders must be cancelled in writing. A restocking fee may be applied to cancelled orders at Xantrex's discretion.

Returns

To return a power supply, you will need a Return Materials Authorization (RMA) form. Please call 1-800-667-8422 or 1-604-422-8595 or complete the RMA request form on our website. When you phone in, we will send you an RMA with an RMA number; please complete this form and send it back to us. The RMA number is assigned to aid us in tracking your power supply. No returns will be accepted without a valid RMA number on the outside of the return package.

Contact Information

Our sales application engineers offer technical assistance with product selection and quotations.

- Tel: 1-800-667-8422
- Fax: 604-421-3056
- Email: prg.info@xantrex.com

Order Management representatives provide order status and placement

- Tel: 1-800-667-8422 x2760
- Fax: 604-420-1591
- Email: ordermanagement@xantrex.com

For Technical Support/Troubleshooting

- Tel: 1-800-670-0707
- Fax: 1-604-421-3056
- Email: customerservice@xantrex.com

Xantrex Factory Service Center

- Tel: 1-800-667-8422
- Fax: 604-420-1591
- Email: customerservice@xantrex.com