

**Voltage Range**  
0-6 V to  
0-600 VDC

**Current Range**  
0-300 A to  
0-2 A

# XFR Series *Zero Voltage "Soft" Switching*



The XFR Series is "today's technology". Zero voltage, or **"soft" switching**, provides significant benefits. Switching transients are virtually eliminated and noise performance is closer to linear levels. Efficiency is increased, heat generation is decreased, and stress on the switching transistors is reduced – improving reliability (MTBF). Unlike most competitors' products, the XFR Series generates full power at full rated current over its total operating range of 0 to 50° C without derating. Also, the XFRs are designed with excellent thermal management, unlike competitive products, so they can be stacked in rack mounts without leaving ventilation space between units. The low thermal generation and high efficiency of "soft" switching technology allows Xantrex to package **1200 watts in a 1.75-inch** (1 U) high, 19-inch rack mount chassis, providing **20% more power** than any competitive product in the same size package. Both the 1200 watt and 2800 watt models are the **smart choice** for research, product development and production test applications such as R&D, magnet control, product design, ATE, process control, electroplating and burn-in. The unique features of the XFR make it the best choice for **OEM** applications where high power and wide adjustment of output voltage or current is required in a full 19-inch rack package.

Nineteen 1200 and 2800 watt models

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

Analog programming standard, optional ISOL (isolated programming) option

Optional internal 16-bit GPIB (IEEE 488) and RS-232 control

Constant voltage or constant current operation with automatic crossover and mode indication

LabView® and LabWindows® drivers

OVP, current limit, thermal protection

Standby mode

Front panel button preview of voltage, current, OVP

Remote/local modes

Remote sense, 5 V line loss compensation

CE, CSA, UL approvals



## Electrical Specifications<sup>1</sup> for the XFR 2.8 kW Series (Specifications are subject to change without notice.)

Model	XFR 7.5-300	XFR 12-220	XFR 20-130	XFR 40-70	XFR 60-46	XFR 100-28	XFR 150-18	XFR 300-9	XFR 600-4
<b>Output Ratings:</b>									
Output Voltage	0-7.5 V	0-12 V	0-20 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	0-70 A	0-46 A	0-28 A	0-18 A	0-9 A	0-4 A
Output Power	2250 W	2640 W	2600 W	2800 W	2760 W	2800 W	2700 W	2700 W	2400 W
<b>Line Regulation:</b> <sup>2</sup>									
Voltage (0.01% of Vmax + 2 mV)	2.75 mV	3.2 mV	4 mV	6 mV	8 mV	12 mV	17 mV	32 mV	62 mV
Current (0.01% of Imax + 2 mA)	32 mA	24 mA	15 mA	9 mA	6.6 mA	4.8 mA	3.8 mA	2.9 mA	2.4 mA
<b>Load Regulation:</b> <sup>3</sup>									
Voltage (0.02% of Vmax + 5 mV)	6.5 mV	7.4 mV	9 mV	13 mV	17 mV	27 mV	35 mV	65 mV	125 mV
Current (0.02% of Imax + 5 mA)	65 mA	49 mA	31 mA	19 mA	14.2 mA	10.6 mA	8.6 mA	6.8 mA	5.8 mA
<b>Meter Accuracy:</b>									
Voltage (0.5% of Vmax + 1 count)	0.05 V	0.07 V	0.2 V	0.3 V	0.4 V	0.6 V	0.9 V	3 V	4 V
Current (0.5% of Imax + 1 count)	3 A	2 A	0.8 A	0.5 A	0.3 A	0.2 A	0.1 A	0.06 A	0.03 A
<b>Output Noise &amp; Ripple:</b>									
Voltage rms	4 mV	5 mV	6 mV	6 mV	6 mV	12 mV	15 mV	20 mV	35 mV
Voltage p-p (0-20 MHz)	50 mV	50 mV	60 mV	60 mV	60 mV	75 mV	100 mV	120 mV	200 mV
Current rms	400 mA	200 mA	100 mA	50 mA	30 mA	10 mA	5 mA	5 mA	0.7 mA
<b>Drift (8 hours):</b> <sup>4</sup>									
Voltage (0.05% of Vmax)	3.8 mV	6 mV	10 mV	20 mV	30 mV	50 mV	75 mV	150 mV	300 mV
Current (0.05% of Imax)	150 mA	110 mA	65 mA	35 mA	23 mA	14 mA	9 mA	4.5 mA	2 mA
<b>Temperature Coefficient:</b> <sup>5</sup>									
Voltage (0.02% of Vmax/°C)	1.5 mV	2.4 mV	4 mV	8 mV	12 mV	20 mV	30 mV	60 mV	120 mV
Current (0.03% of Imax/°C)	90 mA	70 mA	40 mA	25 mA	15 mA	9 mA	5.5 mA	2.7 mA	1.2 mA
<b>Program Slew Rate:</b> <sup>6</sup>									
Rise Time	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	170 ms	170 ms	170 ms	170 ms
<b>OVP Adjustment Range:</b>									
(5% to 110% of Vmax)	0.375-8.25 V	0.6-13.2 V	1-22 V	2-44 V	3-66 V	5-110 V	7.5-165 V	15-330 V	30-660 V
<b>Efficiency:</b> <sup>7</sup>									
	81%	84%	87%	86%	88%	89%	90%	90%	90%

## Interface Specifications<sup>1</sup> for the XFR 2.8 kW Series with RS-232 or GPIB Interface Installed (Specifications are subject to change without notice.)

Model	XFR 7.5-300	XFR 12-220	XFR 20-130	XFR 40-70	XFR 60-46	XFR 100-28	XFR 150-18	XFR 300-9	XFR 600-4
<b>Program Resolution (16-bit)</b>									
Voltage (mV)	0.13	0.2	0.34	0.67	1.01	1.68	2.52	5.04	10.1
Current (mA)	5.04	3.69	2.18	1.17	0.77	0.47	0.3	0.15	0.07
OVP (mV)	0.13	0.2	0.34	0.67	1.01	1.68	2.52	5.04	10.1
<b>Program Accuracy</b>									
Voltage (mV) (0.2%+10 mV)	25	34	50	90	130	210	310	610	1210
Current (mA) (0.3%+10 mA)	910	670	400	220	148	94	64	37	22
OVP (mV) (0.5%+100 mV)	138	160	200	300	400	600	850	1600	3100
<b>Readback Resolution (16-bit)</b>									
Voltage (mV)	0.13	0.2	0.34	0.67	1.01	1.68	2.52	5.04	10.1
Current (mA)	5.04	3.69	2.18	1.17	0.77	0.47	0.3	0.15	0.07
<b>Readback Accuracy</b>									
Voltage (mV) (0.2%+20 mV)	35	44	60	100	140	220	320	620	1220
Current (mA) (0.3%+20 mA)	920	680	410	230	158	104	74	47	32

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.

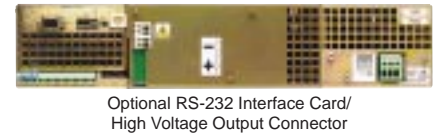
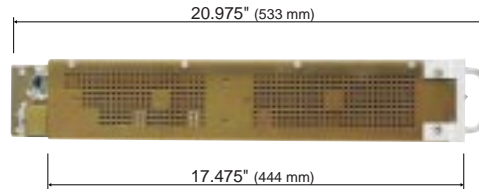
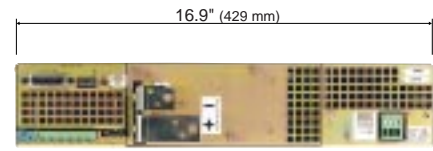
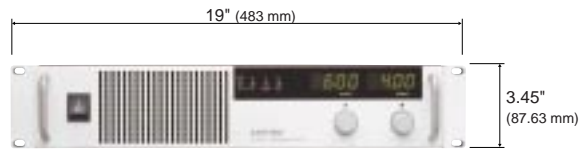
3 For 0-100% load variation, with constant nominal line voltage.

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 at full rated output with a resistive load.

7 Typical efficiency at 200 VAC input and rated output power.



## XFR 2.8 kW General Specifications (Specifications are subject to change without notice.)

<b>Operational AC Input Voltage</b>	190-264 VAC, 1 $\phi$ (22.6 A @ 208 VAC; 20.5 A @ 230 VAC typical), 47-63 Hz
<b>Switching Frequency</b>	Nominal 31 kHz (62 kHz output ripple)
<b>Time Delay</b>	7 s maximum from power on until output stable
<b>Voltage Mode Transient Response Time</b>	<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
<b>Maximum Voltage Differential</b>	$\pm$ 600 VDC from output to safety ground
<b>Remote On/Off and Interlock</b>	2.5-15 V signal or TTL-compatible input, selectable logic
<b>Remote Analog Programming</b>	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 * If not, see options below.
<b>Remote Analog Monitoring</b>	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output
<b>Remote Programming and Monitoring Accuracy</b>	< $\pm$ 1% of full scale output for the default range
<b>Maximum Remote Sense Line Drop Compensation</b>	5 V/line (Line drop is subtracted from total voltage available at supply output.)
<b>Operating Temperature Range</b>	0 to 50 $^{\circ}$ C
<b>Storage Temperature Range</b>	-20 to 70 $^{\circ}$ C
<b>Humidity Range</b>	30 to 90% RH, non-condensing
<b>Front Panel Voltage and Current Control</b>	10-turn voltage and current potentiometers
<b>Front Panel Voltage Control Resolution</b>	0.02% of maximum voltage
<b>AC Input Connector Type</b>	3-terminal, 34 A/250 V, wire clamp connector with strain relief cover
<b>Main Output Connector</b>	7.5 to 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
<b>Weight (one unit)</b>	Approximately 15 kg (33 lb.)
<b>Approvals</b>	CE-marked units meet IEC 1010-1 safety standard and EN50081-2 and EN50082-2 EMC standards. Additional standards: CSA C22.2 No. 1010.1, UL 3111-1, and FCC, part 15, Class A EMI standard, CSA certified, UL listed.

Consult the Operating Manual for complete product specifications.

XFR 2.8 kW Options		
<b>GPIB-XFR3</b>		GPIB Interface card (16-bit)
<b>HFS-XFR3</b>		Fiber Optic Serial Interface card (16-bit)
<b>RS-232-XFR3</b>		RS-232 Interface card (16-bit)
<b>ISOL-XFR3</b>		ISOL Interface card provides isolated analog control and readback of output voltage and current
<b>ISOL-420</b>		4-20 mA isolated analog control
<b>M2</b>		208 VAC 3 $\phi$ input
<b>M13A</b>		Locking knobs for front panel controls

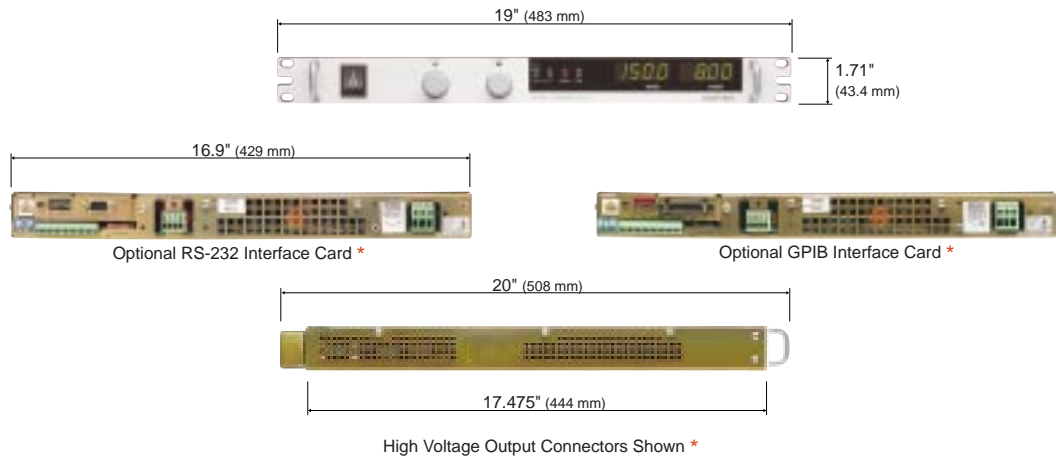
**Electrical** Specifications<sup>1</sup> for the **XFR 1.2 kW** Series (Specifications are subject to change without notice.)

Model	XFR 6-200	XFR 7.5-140	XFR 12-100	XFR 20-60	XFR 35-35	XFR 40-30	XFR 60-20	XFR 100-12	XFR 150-8	XFR 300-4	XFR 600-2
<b>Output Ratings:</b>											
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 <sup>9</sup>	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
<b>Line Regulation:</b> <sup>2</sup>											
Voltage (0.01% of Vmax+2 mV)	2.6 mV	2.75 mV	3.2 mV	4 mV	5.5 mV	6 mV	8 mV	12 mV	17 mV	32 mV	62 mV
Current (0.01% of Imax+2 mA)	22 mA	16 mA	12 mA	8 mA	5.5 mA	5 mA	4 mA	3.2 mA	2.8 mA	2.4 mA	2.2 mA
<b>Load Regulation:</b> <sup>3</sup>											
Voltage (0.02% of Vmax+5 mV)	6.2 mV	6.5 mV	7.4 mV	9 mV	12 mV	13 mV	17 mV	27 mV	35 mV	65 mV	125 mV
Current (0.02% of Imax+5 mA)	45 mA	33 mA	25 mA	17 mA	12 mA	11 mA	9 mA	7.4 mA	6.6 mA	5.8 mA	5.4 mA
<b>Meter Accuracy:</b>											
Voltage (0.5% of Vmax+1 count)	0.04 V	0.05 V	0.07 V	0.2 V	0.3 V	0.3 V	0.4 V	0.6 V	0.9 V	3 V	4 V
Current (0.5% of Imax+1 count)	2 A	0.8 A	0.6 A	0.4 A	0.3 A	0.3 A	0.2 A	0.07 A	0.05 A	0.03 A	0.02 A
<b>Output Noise &amp; Ripple:</b>											
Voltage rms	10 mV	5 mV	5 mV	5 mV	5 mV	5 mV	5 mV	5 mV	7 mV	10 mV	25 mV
Voltage p-p (0-20 MHz)	75 mV	40 mV	40 mV	60 mV	60 mV	60 mV	60 mV	60 mV	60 mV	80 mV	140 mV
Current rms	750 mA	175 mA	100 mA	85 mA	25 mA	25 mA	10 mA	5 mA	3 mA	2 mA	1 mA
<b>Drift (8 hours):</b> <sup>5</sup>											
Voltage (0.05% of Vmax)	3 mV	3.8 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)	100 mA	70 mA	50 mA	30 mA	17.5 mA	15 mA	10 mA	6 mA	4 mA	2 mA	1 mA
<b>Temperature Coefficient:</b> <sup>6</sup>											
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
<b>Program Slew Rate:</b> <sup>7</sup>											
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
<b>OVP Adjustment Range:</b>											
(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
<b>Efficiency:</b> <sup>8</sup>											
	75%	80%	82%	84%	84%	84%	84%	84%	87%	86%	85%

**Interface** Specifications<sup>1</sup> for the **XFR 1.2 kW** Series with RS-232 or GPIB Interface Installed (Specifications are subject to change without notice.)

Model	XFR 6-200	XFR 7.5-140	XFR 12-100	XFR 20-60	XFR 35-35	XFR 40-30	XFR 60-20	XFR 100-12	XFR 150-8	XFR 300-4	XFR 600-2
<b>Program Resolution (16-bit)</b>											
Voltage (mV)	0.10	0.13	0.2	0.34	0.59	0.67	1.01	1.68	2.52	5.04	10.1
Current (mA)	3.36	2.35	1.68	1.01	0.59	0.5	0.34	0.2	0.13	0.07	0.03
OVP (mV)	0.10	0.13	0.2	0.34	0.59	0.67	1.01	1.68	2.52	5.04	10.1
<b>Program Accuracy</b>											
Voltage (mV) (0.2%+10 mV)	22	25	34	50	80	90	130	210	310	610	1210
Current (mA) (0.3%+10 mA)	610	430	310	190	115	100	70	46	34	22	16
OVP (mV) (0.5%+100 mV)	130	138	160	200	275	300	400	600	850	1600	3100
<b>Readback Resolution (16-bit)</b>											
Voltage (mV)	0.10	0.13	0.2	0.34	0.59	0.67	1.01	1.68	2.52	5.04	10.1
Current (mA)	3.36	2.35	1.68	1.01	0.59	0.5	0.34	0.2	0.13	0.07	0.03
<b>Readback Accuracy</b>											
Voltage (mV) (0.2%+20 mV)	32	35	44	60	90	100	140	220	320	620	1220
Current (mA) (0.3%+20 mA)	620	440	320	200	125	110	80	56	44	32	26

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 Measured at full rated output with a resistive load.  
 5 Maximum drift over 8 hours with constant line, load, and temperature, after 30-minute warm-up.  
 6 Change in output per ° C change in ambient temperature, with constant line and load.  
 7 Measured with stepped 0-10 V analog programming source and a resistive load.  
 8 Typical efficiency at 100 VAC input and rated output power.  
 9 Derate output current on 6 V model by 1.5 A per ° C for operating temperatures 30-50° C.



## XFR 1.2 kW General Specifications (Specifications are subject to change without notice.)

<b>Operational AC Input Voltage</b>	85-130 VAC or 190-264 VAC, 1 $\phi$ (17 A @ 120 VAC; 8.8 A @ 230 VAC typical), 47-63 Hz. Automatic range detect. 6V model: 95-130 VAC or 190-264 VAC, 1 $\phi$
<b>Switching Frequency</b>	Nominal 78 kHz (156 kHz output ripple)
<b>Time Delay</b>	7 s maximum from power on until output stable
<b>Voltage Mode Transient Response Time</b>	<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
<b>Maximum Voltage Differential</b>	$\pm$ 600 VDC from output to safety ground
<b>Remote On/Off and Interlock</b>	2.5-15 V signal or TTL-compatible input, selectable logic
<b>Remote Analog Programming</b>	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 * <i>If not, see options below.</i>
<b>Remote Analog Monitoring</b>	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output
<b>Remote Programming and Monitoring Accuracy</b>	< $\pm$ 1% of full scale output for the default range
<b>Maximum Remote Sense Line Drop Compensation</b>	5 V/line (Line drop is subtracted from total voltage available at supply output.)
<b>Operating Temperature Range</b>	0 to 50 $^{\circ}$ C, 6 V model: Derate output current by 1.5 A per $^{\circ}$ C for operating temperatures 30-50 $^{\circ}$ C
<b>Storage Temperature Range</b>	-20 to 70 $^{\circ}$ C
<b>Humidity Range</b>	30 to 90% RH, non-condensing
<b>Front Panel Voltage and Current Control</b>	10-turn voltage and current potentiometers
<b>Front Panel Voltage Control Resolution</b>	0.02% of maximum voltage
<b>AC Input Connector Type</b>	3-terminal, 34 A/250 V, wire clamp connector with strain relief cover
<b>Main Output Connector</b>	7.5 to 40 V models: nickel-plated copper bus bars with bus bar shield; 60 V to 600 V models: 4-terminal wire clamp connector with strain relief
<b>Weight (one unit)</b>	Approximately 8.2 kg (18 lb.)
<b>Approvals</b>	CE-marked units meet IEC 1010-1 safety standard and EN50081-2 and EN50082-2 EMC standards. Additional standards: CSA C22.2 No. 1010.1, UL 3111-1, and FCC, part 15, Class A EMI standard, CSA certified, UL listed.

Consult the Operating Manual for complete product specifications.

<b>XFR 1.2 kW Options</b>	<b>GPIB-XFR</b>	GPIB Interface card (16-bit)
	<b>RS-232-XFR</b>	RS-232 Interface card (16-bit)
	<b>ISOL-XFR</b>	Isolated Interface card provides isolated analog control and readback of output voltage and current
	<b>ISOL-420</b>	4-20 mA isolated analog control
	<b>M13A</b>	Locking knobs for front panel controls