Laboratory Power Supplies

XFR Series

1,2 kW and 2,8 kW
Zero Voltage „Soft“ Switching

Voltage Range0-6 V to 0-600 VDC
Current Range 0-300 A to 0-2 A

Zero voltage „soft“ switching for high efficiency, low noise and high reliability
Analog programming standard, optional ISOL (isolated programming) option
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

The XFR Series with it's 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 to package 1200 watts in a 1.75-inch (1 U) high, 2800 Watt in a 3,5 inch (2U) high 19-inch rack mount chassis, providing 20% more power than any competitive product in the same size package.

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

Operational AC Input Voltage	85-130 VAC or 190-264 VAC, 1f (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, 1f
Switching Frequency	Nominal 78 kHz (156 kHz output ripple)
Time Delay	7 s 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 On/Off 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 * If not, see options below.
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output
Remote Programming and Monitoring Accuracy	<±1% of 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	0 to 50° C, 6 V model: Derate output current by 1.5 A per ° C for operating temperatures 30-50 ° C
Storage Temperature Range	–20 to 70° C
Humidity Range	30 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	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
Weight (one unit)	Approximately 8.2 kg (18 lb.)
Approvals	CE-marked units meet EN61010-1 safety standard and EN61000-6-4 and EN61000-6-2 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.

Contact Zentro-Elektrik for complete product specifications.

Electrical Specifications[1] 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
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 A9	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 (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
Load Regulation: [3]											
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
Meter Accuracy:											
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
Output Noise & Ripple:											
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
Drift (8 hours): [5]											
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
Temperature Coefficient: [6]											
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: [7]											
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%	80%	82%	84%	84%	84%	84%	84%	87%	86%	85%

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 warmup.
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 Options

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

XFR 2.8 kW Options

GPIB-XFR3	GPIB Interface card (16-bit)
HFS-XFR3	Fiber Optic Serial Interface card (16-bit)
RS-232-XFR3	RS-232 Interface card (16-bit)
ISOL-XFR3	ISOL Interface card provides isolated analog control and readback of output voltage and current
ISOL-420	4-20 mA isolated analog control
M2	208 VAC 3f input
M13A	Locking knobs for front panel controls

Contact Zentro-Elektrik for custom voltage and current combinations and other options.

XFR 2,8 kW General Specifications (Specifications are subject to change without notice.)

Operational AC Input Voltage	190-264 VAC, 1f (22.6 A @ 208 VAC; 20.5 A @ 230 VAC typical), 47-63 Hz
Switching Frequency	Nominal 31 kHz (62 kHz output ripple)
Time Delay	7 s 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 On/Off 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 * If not, see options below.
Remote Analog Monitoring	Voltage and current monitor outputs 0-5 V, 0-10 V (default) ranges for 0-100% of output
Remote Programming and Monitoring Accuracy	<±1% of 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	0 to 50° C
Storage Temperature Range	–20 to 70° C
Humidity Range	30 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	7.5 to 100V models: nickel-plated copper bus bars with bus bar cover and stain relief; 150V to 600V models: 4-terminal, wire clamp connector with cover and strain relief
Weight (one unit)	Approximately 15 kg (33 lb.)
Approvals	CE-marked units meet EN61010-1 standard and EN61000-6-4 and EN61000-6-2 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.

Electrical Specifications 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
Output Ratings:									
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
Line Regulation: [2]									
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
Load Regulation: [3]									
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
Meter Accuracy:									
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
Output Noise & Ripple:									
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
Drift (8 hours): [4]									
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
Temperature Coefficient: [5]									
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 m	25 mA	15 mA	9 mA	5.5 mA	2.7 mA	1.2 mA
Program Slew Rate: [6]									
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
OVP Adjustment Range:									
(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
Efficiency: [7]	81%	84%	87%	86%	88%	89%	90%	90%	90%

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.