Sorensen XFR Series

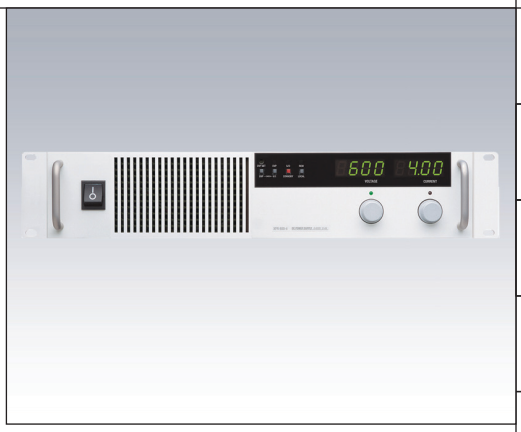
2.8 kW

DC Power Supply with Zero Voltage "Soft Switching"

7.5–600 V

4–300 A

- 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



~	190	208	230
≋		208	230

ETHERNET GPIB RS232

The Sorensen XFR Series provides 2.8 kilowatts 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 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.

AMETEK
Programmable Power
9250 Brown Deer Road
San Diego, CA 92121-2267
USA

AMETEK®
PROGRAMMABLE POWER

XFR Series : Product Specifications

Common	
Switching Frequency	XFR 2.8 kW: Nominal 31 kHz (62 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, 0-10 V (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.)
Front Panel Voltage and Current Control	10-turn voltage and current potentiometers
Front Panel Voltage Control Resolution	0.02% of maximum voltage
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
Approvals	NRTL approved and CE-marked to UL Std. No. 61010-1, CAN/CSA-C22.2 No. 61010-1-04, EN 610101-1 (Equipment Class I, Pollution Degree 2, Installation Category II) Meets USA EMC standard: FCC, part 15B, Class A; Meets Canadian EMC standard: ICES-001, Class A.

Input	
Input Voltage Ranges	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
AC Input Connector	Type 3-terminal, 34 A, 250 V, wire clamp connector with strain relief cover

Protection Features
Over-voltage protection
Over-temperature protection

Environmental	
Operating Temperature	XFR 2.8 kW: 0 to 50°C
Storage Temperature	-20°C to 70°C
Humidity (Non-condensing)	Up to 90% RH, non-condensing

Physical	XFR 2.8 kW
Dimensions	Width: 19" (429.4 mm) Height: 3.5" (88.9 mm) Depth: 21" (533.5 mm)
Weight	33 lb (15 kg)

Model	Output Voltage	Output Current	Output Power	Line Regulation[2]	
				Voltage	Current
XFR 7.5-300	0-7.5 V	0-300 A	2250 W	2.75 mV	32 mA
XFR 12-220	0-12 V	0-220 A	2640 W	3.2 mV	24 mA
XFR 20-130	0-20 V	0-130 A	2600 W	4 mV	15 mA
XFR 33-85	0-33 V	0-85 A	2805 W	5.3 mV	10.5 mA
XFR 40-70	0-40 V	0-70 A	2800 W	6 mV	9 mA
XFR 60-46	0-60 V	0-46 A	2760 W	8 mV	6.6 mA
XFR 100-28	0-100 V	0-28 A	2800 W	12 mV	4.8 mA
XFR 150-18	0-150 V	0-18 A	2700 W	17 mV	3.8 mA
XFR 300-9	0-300 V	0-9 A	2700 W	32 mV	2.9 mA
XFR 600-4	0-600 V	0-4 A	2400 W	62 mV	2.4 mA

XFR Series : Product Specifications

2.8 kW

Model	Load Regulation[3]		Meter Accuracy	
	Voltage	Current	Voltage (1% of Vmax + 1 count)	Current (1% of Imax + 1 count)
XFR 7.5-300	6.5 mV	65 mA	0.09 V	4 A
XFR 12-220	7.4 mV	49 mA	0.13 V	2.3 A
XFR 20-130	9 mV	31 mA	0.3 V	1.4 A
XFR 33-85	11.6 mV	22 mA	0.43 V	0.95 A
XFR 40-70	13 mV	19 mA	0.5 V	0.8 A
XFR 60-46	17 mV	14.2 mA	0.7 V	0.56 A
XFR 100-28	27 mV	10.6 mA	1.1 V	0.38 A
XFR 150-18	35 mV	8.6 mA	1.6 V	0.19 A
XFR 300-9	65 mV	6.8 mA	4 V	0.1 A
XFR 600-4	125 mV	5.8 mA	7 V	0.05 A

Model	Output Noise (0-20MHz)	Output Ripple (rms)	
	Voltage (p-p)	Voltage	Current
XFR 7.5-300	100 mV	10 mV	1600 mA
XFR 12-220	100 mV	10 mV	1200 mA
XFR 20-130	100 mV	10 mV	400 mA
XFR 33-85	100 mV	15 mV	300 mA
XFR 40-70	150 mV	15 mV	200 mA
XFR 60-46	150 mV	15 mV	100 mA
XFR 100-28	175 mV	25 mV	80 mA
XFR 150-18	200 mV	25 mV	40 mA
XFR 300-9	400 mV	40 mV	20 mA
XFR 600-4	500 mV	100 mV	10 mA

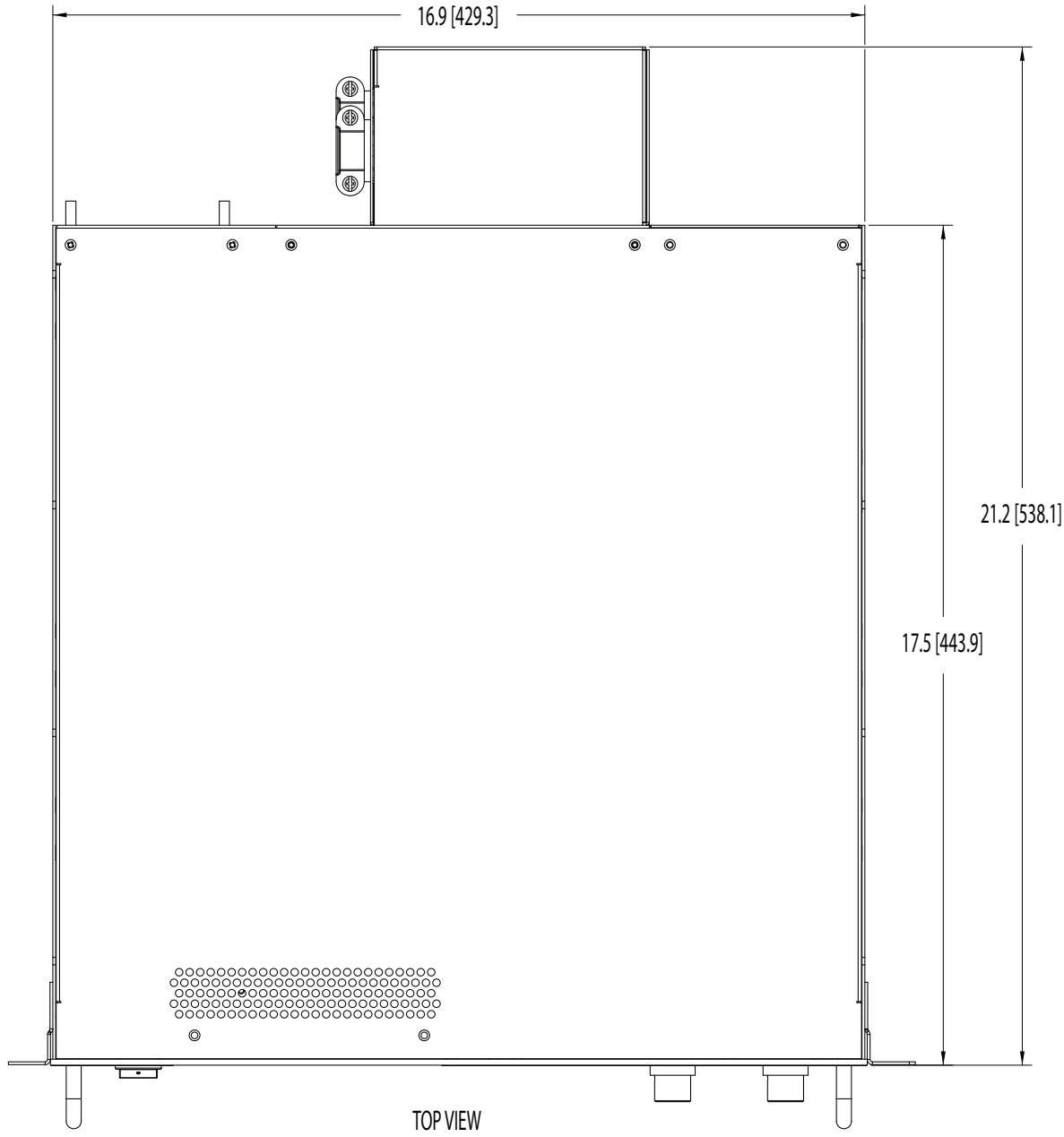
Model	Drift (8 hours)[4]		Temp Coeffcient[5]	
	Voltage (0.05% of Vmax)	Current (0.05% of Imax)	Voltage (0.02% of Vmax °C)	Current (0.03% of Vmax °C)
XFR 7.5-300	3.75 mV	150 mA	1.5 mV	90 mA
XFR 12-220	6 mV	110 mA	2.4 mV	66 mA
XFR 20-130	10 mV	65 mA	4 mV	39 mA
XFR 33-85	16.5 mA	42.5 mA	6.6 mV	25.5 mA
XFR 40-70	20 mV	35 mA	8 mV	21 mA
XFR 60-46	30 mV	23 mA	12 mV	13.8 mA
XFR 100-28	50 mV	14 mA	20 mV	8.4 mA
XFR 150-18	75 mV	9 mA	30 mV	5.4 mA
XFR 300-9	150 mV	4.5 mA	60 mV	2.7 mA
XFR 600-4	300 mV	2 mA	120 mV	1.2 mA

Model	Program Slew Rate[6]		OVP Adjustment Range (5% to 110% of Vmax)	Efficiency[7]
	Rise time	Fall time		
XFR 7.5-300	100 ms	100 ms	0.375-8.25 V	80%
XFR 12-220	100 ms	100 ms	0.6-13.2 V	82%
XFR 20-130	100 ms	100 ms	1-22 V	85%
XFR 33-85	100 ms	100 ms	1.65 - 36.6 V	85%
XFR 40-70	100 ms	100 ms	2-44 V	87%
XFR 60-46	100 ms	100 ms	3-66 V	90%
XFR 100-28	170 ms	170 ms	5-110 V	90%
XFR 150-18	170 ms	170 ms	7.5-165 V	90%
XFR 300-9	170 ms	170 ms	15-330 V	91%
XFR 600-4	170 ms	100 ms	30-660 V	91%

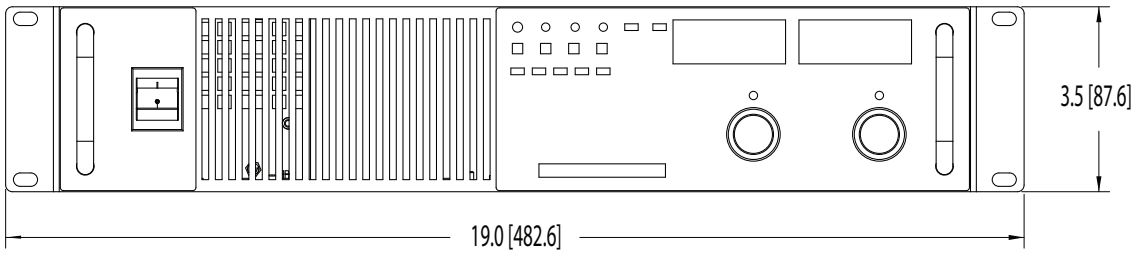
Interface Specifications with RS-232 or GPIB Interface Installed*

Model	Program Accuracy			Readback Accuracy	
	Voltage (mV)	Current (mA)	OVP (mV)	Voltage (mV)	Current (mA)
XFR 7.5-300	10 +0.12%	900 +0.15%	40	30 +0.12%	900 +0.1%
XFR 12-220	75 +0.12%	750 +0.15%	75	75 +0.12%	750 +0.1%
XFR 20-130	75 +0.12%	500 +0.15%	100	75 +0.2%	500 +0.1%
XFR 33-85	75 +0.3%	425 +0.1%	175	75 +0.3%	425 +0.1%
XFR 40-70	75 +0.3%	350 +0.15%	200	75 +0.3%	350 +0.1%
XFR 60-46	150 +0.3%	250 +0.1%	300	150 +0.35%	250 +0.1%
XFR 100-28	150 +0.35%	140 +0.15%	500	150 +0.35%	140 0.1%
XFR 150-18	225 +0.35%	120 +0.1%	750	225 +0.35%	120 +0.1%
XFR 300-9	225 +0.35%	80 +0.1%	1500	225 +0.35%	80 +0.1%
XFR 600-4	300 +0.35%	80 +0.1%	3000	250 +0.35%	80 +0.1%

XFR Series : Diagram



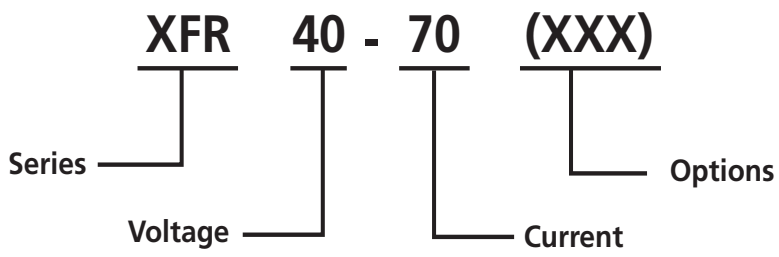
TOP VIEW



FRONT VIEW

XFR 2.8

Model Number Description



XFR 2.8 Options and Accessories

MGA / MGB*	GPIB / IEEE 488.1
MGP	Multi-channel GPIB / IEEE 488.2
MCA	CANbus interface for hardware linking multiple units (used with GPIB-M)
MRA / MRB*	RS-232 interface
MIA	ISOL interface card provides isolated analog control and readback
M2	3-phase 208 Vac input

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 V. The expected result will be within the range of 10 V ± 75 mV ± 0.12% of the set voltage of 10 V.

* MGB/MRB 600V output only. MGA/MRA for output less than 600V GB 600V output only. MGA for output less than 600V

Notes