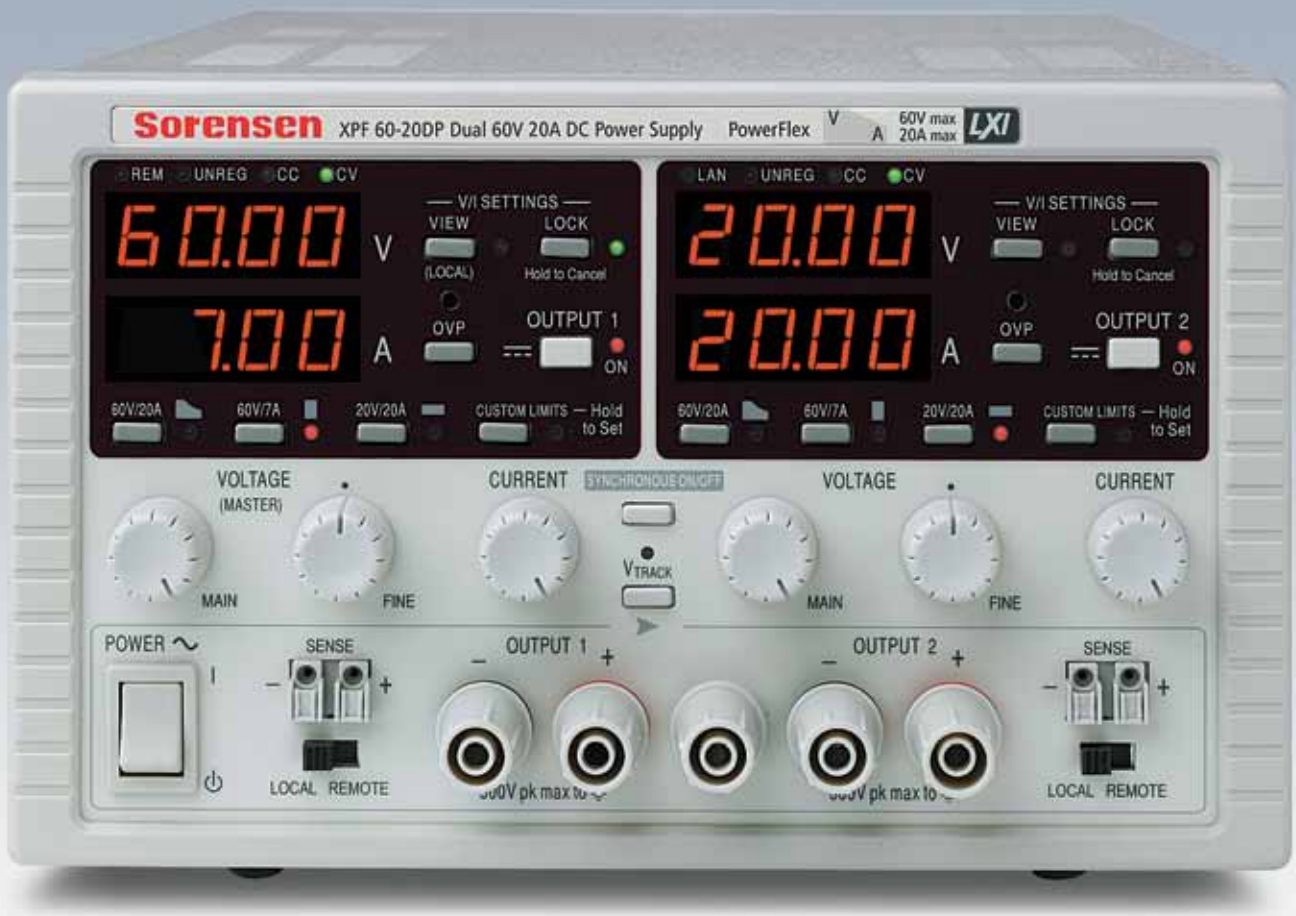
Sorensen XPF60-20D & XPF60-20DP

AMETEK®
PROGRAMMABLE POWER



- **Dual output PowerFlex dc power supply - 840 watts total power**
- High performance autoranging outputs, 60V and 20A maximum
- True analog controls with digital functionality including S-Lock
- isolated tracking for easy series/parallel use - up to 120V or 40A
- GPIB, RS-232, USB and LAN interfaces; LXI class C compliance

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XPF Series: Dual 420 watt PowerFlex dc power supply (840W total)

View and adjust setting limits at any time.

High accuracy four digit meters have a fixed resolution for consistent readings at-a-glance.

Range Control gives a choice of PowerFlex (60V/20A) or fixed range operation (60V/7A or 20V/20A).

True analog controls make adjustment quick and simple.

Voltage sensing can be changed between local and remote at the flick of a switch.

Safety binding post terminals can accept fixed-shroud 4mm plugs** as well as normal plugs, bare wires, and fork connectors.

S-Lock digitally locks voltage and current settings at the touch of a button.

DC output switches enable voltage and current to be set up before connecting the load.

Individual over-voltage protection for each output.

Custom Limits enables the analogue controls to cover any voltage or current range.

Both On/Off provides synchronous switching of the outputs.

Isolated voltage tracking facilitates tracking voltage rails or control for series or parallel wiring (120V max. or 40A max.).

Choose voltage and current combinations to suit your applications!

The XPF series is a different type of laboratory power supply designed to meet the need for flexibility in the choice of voltage and current.

A conventional power supply has a fixed current limit giving a power capability that reduces directly with the output voltage.

The PowerFlex design of the XPF series enables higher currents to be generated at lower voltages within an overall power limit envelope.

Each output can provide considerably higher current than a conventional power supply of the same maximum voltage and power (see power curve).

Example voltage & current combinations include 60V/7A, 42V/10A, 28V/15A, and 20V/20A.

Building upon success

The XPF60-20D is the latest models in the XPF series and were developed from the XPF60-20, one of the most successful power supplies ever.

Analog controls with digital stability

As technology has changed, many products have moved from analog controls to digital ones. Although digital controls suit many instruments, they do not necessarily suit a bench power supply.

Customer research shows that many users prefer the speed and simplicity of conventional analog controls for setting voltage and current. Digital controls may offer greater precision, but often at the expense of ease-of-use. With this in mind, the XPF60-20DP retains the true analog controls of its predecessor.

Lock your settings at the touch of a button !

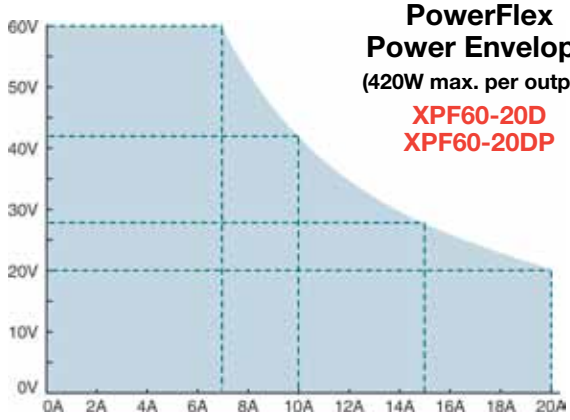
The main disadvantage of analog controls is stability and security. The settings of analog potentiometers can drift over time. More importantly, the settings can be changed accidentally with potentially serious consequences.

The XPF60-20DP incorporates S-Lock. One press of the Lock button transfers control of voltage and current from the analog controls to internal digital circuitry. This offers not just complete security, but exceptional stability as well with each setting controlled by an instrumentation quality DAC.

PowerFlex Power Envelope

(420W max. per output)

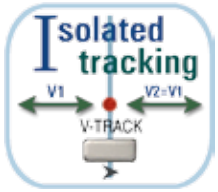
XPF60-20D
XPF60-20DP



Isolated voltage tracking for maximum flexibility

The two outputs of the XPF60-20DP are completely independent and electrically isolated from each other.

With V-Track selected, the two outputs remain electrically isolated, but the voltage control of the Master output sets an identical voltage on the Slave output.



This enables the user to create two rails of either polarity and to reference them to different grounds if necessary (e.g. digital ground and analog ground). Alternatively the outputs can be wired in series or parallel to create a voltage capability up to 120V or a current capability up to 40A with the voltage set using a single control.

Independent and simultaneous output control

The Both On/Both Off button is in addition to the individual switches for each output, and allow both outputs to be turned on or off synchronously by a single button press.

Synchronous switching of the outputs is of increasing importance for circuitry which can be damaged if one voltage rail is present without the other.

Low noise and good dynamic response

The PowerFlex regulation system used on the XPF60-20DP combines a high frequency pre regulator with a linear post regulator to give both low noise and good transient response. Each output can operate in constant voltage or constant current mode with automatic crossover and mode indication.

XPF Series: GPIB, RS-232, USB and LAN interfaces; LXI Class C compliance

- PowerFlex design gives variable voltage and current combinations within a maximum power envelope
- Up to 60V and up to 20A per output (420W maximum)
- Constant voltage or constant current operation
- Low output noise and good transient response
- PowerFlex or fixed-range operation plus custom limits
- True analogue controls with digital settings locking
- Independent outputs or isolated voltage tracking
- Outputs can be wired in series or parallel for 120V or 40A
- Variable OVP trips; safety binding-post terminals
- 4 digit fixed resolution meters; selectable remote sensing
- GPIB, RS-232, USB and LAN interfaces with LXI class C compliance
- Compact ½ rack 3U case size; front and rear terminals

Precision metering and remote sense

Separate voltage and current meters on each output give a resolution of 10mV and 10mA. The fixed resolution avoids the misinterpretation of readings that can occur with auto-ranging 3 or 3½ digit meters where the decimal point position moves as the reading changes.

Coarse and fine voltage controls are provided. The current control is logarithmic enabling low current levels to be set accurately. A View Settings button enables limit settings to be checked and adjusted at any time.

Each output incorporates remote sense terminals that can be enabled or disabled at the flick of a switch. Remote sensing is essential for maintaining precise regulation at the load and true metering of the load voltage.

Compact design uses minimum bench or rack space

Despite the high power output of 840 watts, the XPF60-20DP has a small bench footprint taking up less space on a crowded bench.

Range control offers even more flexibility

As an alternative to PowerFlex operation (60V/20A subject to a power limit), the XPF60-20DP can be used as a conventional fixed range power supply of either 60V/7A or 20V/20A at the press of a button.

Fixed range mode ensures that, whatever the load, the output can only be in constant voltage or constant current mode and never in power limit. Additionally finer resolution is provided on the current or voltage controls respectively.

A further button offers full customisation of voltage and current limits which can be set to suit the users application. This has the advantage that the controls cover the exact voltage and current range required, providing easier setting and reduced risk of error.

For example, the range could be set to 30V and 14A to create a 30 volt PSU of maximum current capability. Alternatively it could be set to 5V and 3A if this was all that was required for a particular application.

Safety binding-post terminals

XPF series power supplies are fitted with new designed output terminals. These can accept a 4mm safety plug with rigid insulating sleeve, a requirement specified by an increasing number of laboratories for safety reasons.

Bench and System use

As well as being suited to bench-top applications, the compact rack-modular sizing of the XPF60-20DP (½ rack 3U) makes it equally suited to rack mounted system applications.

Rear output terminals (with optional digital control)

Power and sense terminals are duplicated on the rear panel for rack mount applications or other situations where rear connection is more appropriate.

Digital remote control (optional)

To meet the varying needs of today's engineers, a comprehensive array of interfaces is provided. RS-232, USB, GPIB and LAN (Ethernet) with LXI support are provided as standard. Each of the digital bus interfaces provides full control of voltage, current, and output on/off, plus read-back of voltage, current and status. The interfaces are at ground potential and are opto-isolated from the output terminals.

GPIB The GPIB interface is compliant with IEEE-488.1 and IEEE-488.2. Currently GPIB remains the most widely used interface for system applications.

RS-232 An RS-232/RS-423 interface is provided for use with legacy systems. This type of serial interface remains in common useage and is perfectly satisfactory for the control of power supplies because data speed is not an issue.

USB USB provides a simple and convenient means of connection to a PC and is particularly appropriate for small system use. A USB driver is provided which supports Windows 2000, XP , Vista and Windows 7.

LAN (Ethernet) The LAN interface uses a standard 10/100 base-T Ethernet hardware connection with ICMP and TCP/IP Protocol for connection to a Local Area Network or direct connection to a single PC. This interface supports LXI and is highly appropriate for system use because of its scalable nature and low cost interconnection.

LXI Compliance

The LAN interface is compliant with LXI-C. LXI (LAN eXtensions for Instrumentation) is the next-generation, LAN-based modular architecture standard for automated test systems managed by the LXI Consortium, and is expected to become the successor to GPIB in many systems.

IVI Driver

An IVI driver for Windows is included. This provides support for common high-level applications such as LabView*, LabWindows*, and HP/Agilent VEE*.

Specifications for XPF60-20DP

OUTPUT SPECIFICATIONS (each output)

Voltage/Current/Power Levels

Voltage Range: 0V to 60V.
Current Range: 0A to 20A.
Note: Actual maxima for voltage and current are typically 1% greater than the figures given above.
Power Range: Up to 420W subject to power envelope.

POWER ENVELOPE

The maximum current at any voltage settings is limited by the power envelope which is set to give 7A at 60V rising to 20A at 20V under all ac supply conditions (both outputs loaded). At lower output voltages the power is restricted by the 20 amps current maximum.
See PowerFlex power envelope graph on previous page.

Output Setting & Control

Voltage Setting: By coarse and fine controls.
Current Setting: By single logarithmic control.
Output Mode: Constant voltage or constant current with automatic cross-over. CC indicator lit in constant current mode.
Output Switch: Electronic, non isolating. Preset voltage and current limit displayed when Output is off. Output rise time no load <10ms.
View Settings: With the output On, the meters show actual voltage and current. The preset levels can be viewed and adjusted at any time by pressing the View Settings button.
Status Indication: LED indication of Output On, V/I Limits, CV, CI, Power Limit, Remote, LAN status. Message on meter display for trip condition.

S-Lock

(Settings Lock) Voltage and current settings can be locked by a single button press. Lock accuracy is equal to the meter accuracy (see Meter Specifications).

Output Performance

Ripple & Noise: Typically <3mV rms, <15mV pk-pk, (5mV rms max.) in CV mode.
Load Regulation: Voltage - <0·01% of maximum output for any load change within the PowerFlex envelope (remote sense connected).
Current - <0·05% of maximum output for any load change within the PowerFlex envelope.
Line Regulation: Voltage - <0·01% of maximum output for a 10% line change.
Current - <0·01% of maximum output for a 10% line change.
Transient Response: <250µs to within 50mV of setting for a 5% to 95% load change.
Temp. Coefficient: Typically <100ppm/°C

Output Protection

Output Protection: Forward protection by Over-voltage Protection (OVP) trip.
Reverse protection by diode clamp for currents to 3A.
OVP Setting/Range: Via screwdriver adjustable preset on front panel. Range 1V to 66V
Over-temperature: Output trips off for over-temperature.
Safety Interlocks: Operations that could cause an unexpected change in voltage or current settings are interlocked with the output switch.

Output Connections

Output Terminals: Universal 4mm safety binding posts on 19mm (0·75") spacing at front Screw terminals at rear (XPF60-20DP only).
Terminals can accept fixed shroud 4mm plugs, standard 4mm plugs, fork terminals and bare wires.

Remote Sense

Sense Selection: Voltage sensing is selected as Local or Remote by front panel switch.
Sense Terminals: Sprung loaded screw-less terminals at front.
Screw terminals at rear (XPF60-20DP only).

METER SPECIFICATIONS (each output)

Display Type: Dual 4-digit meters, 10mm (0·39") LED.

Voltage Meter

Resolution/ Accuracy: 10mV / ± 0·1% of reading ± 2 digits

Current Meter

Resolution/ Accuracy: 10mA / ± 0·3% of reading ± 20mA

VOLTAGE TRACKING

Independent Mode

In the normal mode of operation, each output is fully independent and isolated. Operation is equivalent to two single output power supplies.

Voltage Tracking Mode

The two outputs remain isolated, but the Slave voltage controls are disabled and the Slave voltage is set equal to the Master voltage. This can be used to generate tracking bipolar voltages, or tracking unipolar voltages relative to different grounds.
When voltages greater than 60V are required, the outputs can be wired in series to generate 0 to 120V with the voltage controlled from the Master.
When currents greater than 20A are required, the outputs can be wired in parallel to create the equivalent of a 40A power supply with the voltage controlled from the Master.
Track Accuracy: Slave voltage = ± (0·1% of Master voltage setting + 10mV)

BOTH ON / BOTH OFF

Each output has an independent DC On/Off control, however, an additional control button is provided which turn both outputs on or off simultaneously.

DIGITAL BUS INTERFACES

The XPF60-20DP offers full remote control and read-back using RS-232, USB, GPIB or LAN (compliant with LXI class C). All interfaces are at ground potential and opto-isolated from the output terminals. Note: Remote/Local Sense, is manually selectable only.

RS-232

Standard 9-pin D connector. Baud rate 9,600.

USB

USB 2.0 connection (backwards compatible with USB 1.x). Operates as a virtual COM port.

GPIB (IEEE-488)

The interface conforms with IEEE-488.1 and IEEE-488.2.

Ethernet (LAN)

Standard 10/100 base-T hardware connection. ICMP and TCP/IP Protocol for connection to Local Area Network or direct connection to a single PC.

LXI Compliance

LAN interface is compliant with LXI class C. (LXI is the abbreviation for Lan eXtensions for Instrumentation).

DIGITAL PROGRAMMING PERFORMANCE

Voltage Setting

Resolution/Accuracy: 1mV / ± (0.05% +10mV)

Current Setting

Resolution/Accuracy: 1mA / ± (0.3% +5mA)

Programming Speed

Command Delay: Typically <25ms (this must be added to any of the figures below)
Voltage Up Time: <10ms* to 1%
Voltage Down Time: <80ms* to 1% (full load); <1.5s* to 1% (no load)
* The up and down times vary with range and voltage step size. More information is contained in the operating manual which can be downloaded from our web site.

DRIVER SOFTWARE SUPPLIED

IVI Driver

An IVI driver for Windows is supplied. This provides support for common applications such as LabView*, LabWindows*, HPVEE* etc.

USB Driver

An installation file is supplied which calls a standard Windows* USB driver.

** LabView and LabWindows are trademarks of National Instruments.*
HPVEE (now Agilent VEE) is a trademark of Agilent Technologies.
** USB interface is supported for Windows 2000, XP, and Vista.*
Windows is a trademark of Microsoft.

GENERAL SPECIFICATIONS

Input

AC Input: 110 to 240 volts ±10% 50/60Hz. Installation Category II.
Input Power: 1250VA max.

Temperature & Environmental

Operating Range: +5°C to +40°C, 20% to 80% RH
Storage Range: -40°C to + 70°C
Environmental: Indoor use at altitudes up to 2000m, Pollution Degree 2.
Cooling: Rear discharge variable speed fan.

Safety & EMC

Safety: Complies with EN61010-1
EMC: Complies with EN61326

Physical

Size: 210 x 130 mm (½ rack 3U) x 375mm
(size excludes feet, knobs and terminals).
Weight: 6.3kg

Accuracy specifications apply for the temperature range 18°C to 28°C after one hour warm-up.
AMETEK reserves the right to alter specifications without prior notice.