

Sorensen XEL-P Series - comprehensive remote control facilities

New XEL-P Series

Interface to every application

Bench and System use

The New Sorensen XEL-P series includes all of the manual control features of the XEL series, but adds comprehensive remote control facilities. The ultra-compact rack-modular sizing makes it ideally suited to rack mounted system applications, while its user-friendly manual controls are retained for bench top applications.

Rear Power Terminals

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

To meet the varying needs of today's engineers, a comprehensive array of interfaces is provided. RS-232, USB and LAN (Ethernet) with LXI support are provided as standard. An additional GPIB interface is also optionally available.

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.

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 and Vista.

LAN-Ethernet with LXI

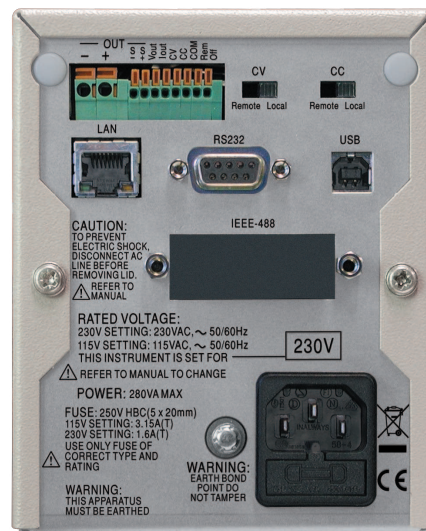
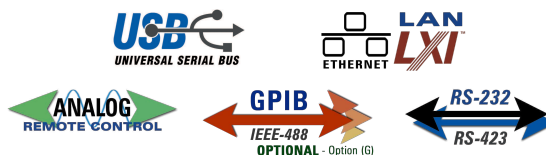
The LAN interface uses a standard 10/100 base-T Ethernet hardware connection with ICMP and TCP/IP Protocol for connection to a Local Area Network or direct connection to a single PC. This interface supports LXI and is the most appropriate for larger system use because of its scalable nature.

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.

Rack Mounting

Up to four single output units can be fitted into one rack width. Alternatively, any combination of singles and duals can be used - as in the example shown. The rack mount kit (shown) is 4U high and incorporates limited ventilation space above and below the power supplies. Blanking plates are provided for unused positions.



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*.

GPIB (option G)

GPIB (IEEE-488) interface in addition to USB, RS232 and LAN.

New XEL-P Additional Facilities

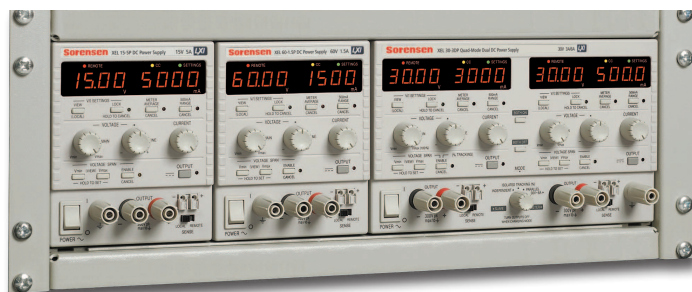
From the front, XEL-P models are identical to standard XEL models and retain all of their manual control features. On the dual output versions, a single digital interface controls both outputs.

The rear panel carries RS-232, USB and LAN (Ethernet) connectors, together with analog in and out, remote on/off control*, and duplicate output and sense terminals. All models can be additionally fitted with a GPIB interface (option G - factory fit only).

* Note: analog in/out and remote on/off are not fitted to the dual output versions.

Analog Remote Control

Single output XEL-P units include analog voltage control of voltage and current (non-isolated). Analog control outputs are also incorporated to enable easy parallel connection of multiple units in a master-slave configuration. Terminals for remote on/off control are also provided.



Sorensen XEL series - Technical Specifications

MODEL RANGE:

XEL 15-5	0 to 15V at 0 to 5A
XEL 30-3	0 to 30V at 0 to 3A
XEL 60-1.5	0 to 60V at 0 to 1.5A
XEL 30-3D	2 x (0 to 30V at 0 to 3A), or 1 x (0 to 30V at 0 to 6A)
XEL 120-0.75*	0 to 120V at 0 to 750mA
XEL 250-0.36*	0 to 250V at 0 to 360mA

* Specifications for 120V/250V models vary from other models in certain areas. Where this applies, the specification heading is marked with an asterisk, and the applicable values are shown on the final page of this brochure. 120V & 250V models available Q4, 2009

OUTPUT SPECIFICATIONS

Voltage/Current Levels

XEL 15-5	0V to 15V/0.1mA to 5A (75W max.)
XEL 30-3	0V to 30V/0.1mA to 3A (90W max.)
XEL 60-1.5	0V to 60V/0.1mA to 1.5A (90W max.)
XEL 30-3D	Dual outputs of 0V to 30V/0.1mA to 3A or single output of 0V to 30V/0.2mA to 6A (180W max.)
XEL 120-0.75	0 to 120V/0.01mA to 750mA (90W max.)
XEL 250-0.36	0 to 250V/0.01mA to 360mA (90W max.)

Note: Actual maxima for voltage and current are typically 1% greater than the figures given above.

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 <15ms.
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.

V-Span *

(Voltage Span Control)

The voltage adjustment range can be controlled by digital setting of the end-stop values of the coarse voltage control to any desired values. The range for Vmax is 0.1V to 15V/30V/60V depending on model. The range for Vmin is 0 to (Vmax - 0.1V).

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 Specification).

Output Performance

Ripple & Noise *:	Normal mode voltage: <0.4mV rms and 2mV p-p Normal mode current: <0.2mArms; <40uA on 500mA range. Common mode current: <5uA rms
Load Regulation:	Voltage - <0.01% + 2mV. Current - typically 0.01% + 500uA.

Voltage specification applies for any load change, measured at the output terminals. When using remote sense add 0.5mV per 0.1V drop in the +ve output lead (max. sense lead resistance 0.5).

Line Regulation:	Voltage <0.01% + 2mV for 10% line change. Current <0.01% + 250uA. for 10% line change.
Transient Response:	<50µs to within 50mV of setting for a 90% load change.
Temp. Coefficient:	Voltage: typically <(50ppm + 0.5mV)/°C Current: typically <(100ppm + 1mA)/°C; <(100ppm + 0.1mA)/°C on 500mA range.

Output Protection

Output Protection:	Output will withstand forward voltages of up to 20V above rated output voltage. Reverse protection by diode clamp for currents to 3A.
OVP and OCP Trips:	Voltage or current measured to be in excess of 105% of the rated maximum will cause the output to trip off.
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. Terminals can accept fixed shroud 4mm plugs, standard 4mm plugs, fork terminals and bare wires.
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Remote Sense

Sense Selection:	Voltage sensing is selected as Local or Remote by front panel switch.
Sense Terminals:	Spring loaded screw-less terminals.

METER SPECIFICATIONS

Display Type:	Dual 4-digit meters, 10mm (0.39") LED.
Voltage Meter *	
Resolution:	10mV
Accuracy:	± (0.1% of reading + 10mV)
Current Meter *	
Resolution:	1mA (0.1mA on 500mA range)
Accuracy:	± (0.3% + 3mA) to 3A; ± (0.5% + 3mA) to 6A; ± (0.3% + 0.3mA) on 500mA range
Meter Damping:	Normally 20ms, switchable to 2 sec for averaging rapidly varying loads.

ADDITIONAL SPECIFICATIONS - 4-MODE DUAL (XEL 30-3D)

The XEL 30-3D has four modes of operation:

Independent Mode

Each output is fully independent and isolated. Operation is equivalent to two single output power supplies.

Tracking Mode

The two outputs remains 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 30V are required, the outputs can be wired in series to generate 0 to 60V using only the Master voltage controls.

Track Accuracy: Slave voltage = ± (0.1% of Master voltage setting + 10mV)

Ratio (%) Tracking Mode

As Tracking, but the Slave voltage controls set an output voltage between 0% and 101% of the Master voltage. Once the Slave voltage has been set, varying the Master voltage will create the same percentage change in the Slave voltage setting.

Track Accuracy: % change in Slave voltage = % change of Master voltage ± 0.1% ± 10mV

Parallel Mode

In this mode, the Master operates as a single output power supply with double the current capability (0.2mA to 6A). The Slave is disabled and its displays are turned off.

Both On / Both Off

Each output has an independent DC On/Off control, however, additional control buttons are provided which turn both outputs on or off simultaneously. These buttons operate in all four modes.

GENERAL SPECIFICATIONS

Input

AC Input:	230V AC or 115V AC ± 10%, 50/60Hz. Installation Category II
Input Power:	Single output models - 280VA max.; Dual output models - 560VA 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:	Intelligent variable-speed low noise fan assists convection.

Safety & EMC

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

Physical

Size:	Single output models - 107mm x 131mm (¼ rack 3U) x 288mm, Dual output models - 214mm x 131mm (½ rack 3U) x 288mm (sizes exclude feet, knobs and terminals).
Weight:	Single output models - 4.5kg; Dual output models - 8.5kg

OPTIONS

Rack Mount (RM-XPDG-2)

19 inch 4U rack mount suitable for up to four single power supplies, two dual power supplies, or any mixture. Blanking plates are provided for unused positions. The 4U height provides limited ventilation space above and below the power supplies. Accuracy specifications apply for the temperature range 18°C to 28°C after 1 hour warm-up. Specifications subject to change without prior notice.

New XEL-P Series specifications (remote control models)

Additional specifications applying to the New PL-P and PLH-P Series are on the following page.

PLH Series specifications (items marked with *)

Specifications for PLH models vary from those of PL models in certain areas. Where this applies, the specification heading is marked with an asterisk, and the applicable values are shown on the final page of this brochure.

Sorensen XEL series & XEL-P series - Additional Technical Specifications

MODEL RANGE

General

New XEL-P series units offer remote control and read-back using analog, RS232, USB, LAN (LXI) interfaces. They retain all of the capabilities of the XEL Series when under manual control.

All of the specifications from the previous page therefore apply to the equivalent models in the XEL-P series. The following specifications are additional.

Versions with a GPIB interface are also available - see below.

Model Range

XEL 15-5P	0 to 15V at 0 to 5A
XEL 30-3P	0 to 30V at 0 to 3A
XEL 60-1.5P	0 to 60V at 0 to 1.5A
XEL 30-3DP	2 x (0 to 30V at 0 to 3A), or 1 x (0 to 30V at 0 to 6A)
XEL 120-0.75P*	0 to 120V at 0 to 750mA
XEL 250-0.36P*	0 to 250V at 0 to 360mA

* 120V & 250V models available Q4, 2009

REAR TERMINALS

Power and sense connections are duplicated on the rear panel using a screw-less connector block.

DIGITAL BUS INTERFACES - RS-232, USB, LAN (LXI)

The standard PL-P product offers full remote control and read-back using RS-232, USB or LAN (LXI-C). All interfaces are at ground potential and opto-isolated from the output terminals.

Note: Remote/Local Sense, and Operational Mode (XEL 30-3D-P) are manually selectable only.

RS-232

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

USB

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

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-C. (LXI is the abbreviation for Lan eXtensions for Instrumentation).

GPIB INTERFACE (Option G, factory fit only)

Option G adds a GPIB (IEEE-488) interface.

This is in addition to the RS-232, USB and LAN interfaces of the standard XEL-P product. The interface conforms with IEEE-488.1 and IEEE-488.2.

DIGITAL PROGRAMMING PERFORMANCE

Voltage Setting

Setting Resolution: 1mV
Setting Accuracy: $\pm (0.05\% + 10\text{mV})$

Current Setting

Setting Resolution: 0.1mA (0.01mA on 500mA range)
Setting Accuracy: $\pm (0.3\% + 0.005\text{A})$ to 3A, $\pm (0.5\% + 0.005\text{A})$ to 6A, $\pm (0.3\% + 0.5\text{mA})$ on 500mA range

Programming Speed

Command Delay: Typically <80ms (this must be added to any of the figures below)
Voltage Up Time: Typically <45ms* to 1%
Voltage Down Time: Typically <20ms* to 1% (full load); typically <150ms* to 1% (no load)

* The up and down times vary with model, current range and voltage step size. More information is contained in the operating manual which can be downloaded from our web site.

OVP and OCP PROTECTION

Measure-and-compare over-voltage and over-current protection are implemented in firmware and can be set via the remote interfaces only. Output trips Off for OVP and OCP conditions.

Setting resolution: 10mV and 1mA.
Response time: typically 500ms

ANALOG REMOTE CONTROL (single output models only)

Non-isolated analog voltage control of voltage and current. Analog control outputs are also provided to enable easy parallel connection of multiple units in a master-slave configuration.

Note that the XEL 30-3D-P does not have analog remote control.

Scaling

Reference Point: All control voltage are referenced to the positive output terminal
Set Voltage Input: 0V to 10V sets 0 to 100% of rated output (e.g. 0 to 30V for XEL 30-3-P).
Alternative scaling of 0V to 5V (selectable using internal link).
Set Current Input: 0V to 10V sets 0 to 100% of rated output (e.g. 0 to 3A for XEL 30-3-P).
Alternative scaling of 0V to 5V (selectable using internal link).
Voltage Output: 0 to 100% of rated output voltage generates 0V to 5V.
Current Output: 0 to 100% of rated output current generates 0V to 5V.

Accuracy

Set Voltage Input: $\pm (0.3\% + 10\text{mV})$; Input Impedance = 100k Ω
Set Current Input: $\pm (0.5\% + 0.005\text{A})$; Input Impedance = 64k Ω
Voltage Output: $\pm (0.3\% + 10\text{mV})$; Output Impedance = 125 Ω
Current Output: $\pm (0.5\% + 0.005\text{A})$; Output Impedance = 125 Ω

Note that Analog control of current can not be used with the low current range selected.

REMOTE ANALOG ON/OFF CONTROL (single output models only)

Non-isolated terminal which sets the output to Off when pulled low by gate signal or relay closure. Signal is reference to the positive output terminal.

Note that the XEL 30-3D-P does not have this facility.

GENERAL SPECIFICATIONS

Input

AC Input: 230V AC or 115V AC $\pm 10\%$, 50/60Hz. Installation Category II
Input Power: Single output models - 280VA max.; Dual output models - 560VA 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: Intelligent variable-speed low noise fan assists convection.

Safety & EMC

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

Physical

Size: Single output models - 107mm x 131mm (¼ rack 3U) x 315mm,
Dual output models - 214mm x 131mm (½ rack 3U) x 288mm
(sizes exclude feet, knobs and terminals).
Weight: Single output models - 4.9kg;
Dual output models - 8.6kg

DRIVER SOFTWARE SUPPLIED

IVI Driver

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

USB Driver

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

* LabView and LabWindows are trademarks of National Instruments.
HPVVE (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.

OPTIONS

Rack Mount (RM-XPDG-2)

19 inch 4U rack mount suitable for up to four single power supplies, two dual power supplies, or any mixture. Blanking plates are provided for unused positions. The 4U height provides limited ventilation space above and below the power supplies.

GPIB Interface (Option G)

Option G adds a GPIB (IEEE-488) interface. This is a factory-fit option only.

Accuracy specifications apply for the temperature range 18°C to 28°C after 1 hour warm-up. Specifications subject to change without prior notice.

Further Specifications for Sorensen XEL & XEL-P series

The 120V and 250V models are higher voltage variants of the XEL and XEL-P models. Single output models are offered with a voltage/current capability of 120V/0.75A and 250V/0.36A (90 watts each). 120V & 250V models available Q4, 2009.

Specifications for high voltage models are identical to those of New XEL models in most areas. Where different specifications apply, the specification heading within the main specifications pages is marked with an asterisk, and the applicable values are shown here.

OUTPUT SPECIFICATIONS

XEL 120 0 to 120V/0.01mA to 750mA (90W max.)
 XEL 250 0 to 250V/0.01mA to 360mA (90W max.)

Note: Actual maxima for voltage and current are typically 1% greater than the figures given above.

V-Span

(Voltage Span Control)

The voltage adjustment range can be controlled by digital setting of the end-stop values of the coarse voltage control to any desired values. The range for Vmax is 1V to 120V/250V depending on model. The range for Vmin is 0 to (Vmax - 1V).

Output Performance

Ripple & Noise: Normal mode voltage: <2mV rms and 8mV p-p
 Normal mode current: <0.1mArms
 Common mode current: <5uA rms

METER SPECIFICATIONS

Display Type: Dual 4-digit meters, 10mm (0.39") LED.

Voltage Meter *

Resolution: 100mV
 Accuracy: ± (0.1% of reading + 100mV)

Current Meter *

Resolution: 0.1mA (0.01mA on 75mA range)
 Accuracy: ± (0.3% + 0.3mA), ± (0.3% + 0.1mA) on 75mA range

Accuracy specifications apply for the temperature range 18°C to 28°C after 1 hour warm-up. Specifications subject to change without prior notice.



Remote Control Interfaces Table

Model	Analog	RS-232	USB	LAN (LXI)	GPIO
XEL 15-5					
XEL 30-3					
XEL 60-1.5					
XEL 30-3D					
XEL 120-0.75					
XEL 250-0.36					
XEL 15-5P	•	•	•	•	
XEL 30-3P	•	•	•	•	
XEL 60-1.5P	•	•	•	•	
XEL 30-3DP		•	•	•	
XEL 120-0.75P	•	•	•	•	
XEL 250-0.36P	•	•	•	•	
XEL 15-5PG	•	•	•	•	•
XEL 30-3PG	•	•	•	•	•
XEL 60-1.5PG	•	•	•	•	•
XEL 30-3DPG		•	•	•	•
XEL 120-0.75PG	•	•	•	•	•
XEL 250-0.36PG	•	•	•	•	•

Note: 120V & 250V models available Q4, 2009