Family of High Performance DC Power Supplies

- 5 models: 600 W with extended range
- Up to 400V and up to 33A
- LAN, USB, and Analog interfaces standard
- Small high density 1 U half rack package
- Built-in voltage and current measurement
- Full protection from overvoltage and overcurrent
- 85-265 Vac universal AC input
- Command compatibility for Keysight 603x, Sorenson DLM, and Xantrex XFR
- Conforms to LXI Class C specification

The Versatile Power Bench XR Series system DC power supplies give you just the right performance - at just the right price - in a compact (1 U) half rack width package. This family of affordable 600 W single-output programmable DC power supplies consists of 5 models for DC power applications. They provide stable output power, built-in voltage and current measurement, and output voltage and current from 30 V to 400 V and 2.5 A to 33 A.

These economical supplies offer many system-ready features like multiple standard I/O interfaces to simplify and accelerate test system development for R&D, design validation, and manufacturing engineers in the aerospace/defense, automotive, component and communications industries.

Small, high-density package saves you rack space
The Bench XR provides up to 600 W in a small space-saving 1 U high, half rack wide package. Its air vents are in the top, side and rear (not on the top or bottom only), so you can stack other instruments directly above or below it to save valuable rack space.

Easy front-panel operation
You can quickly and easily operate the power supply with its rotary knobs and button. Using the front panel controls, you can make coarse or fine adjustments of output voltage and current, protection settings, and set power-on states (last setting memory or factory default setting). The output voltage and current are displayed simultaneously, and OLED indicators show power supply status and operating modes. You can lock the front panel controls to protect against accidental power-supply parameter changes.

Extensive device protection
To safeguard your device from damage, the Bench XR Series power supplies provide over-temperature, over-current and over-voltage protection (OVP) to shut down the power supply output when a fault condition occurs.

Simplify system connections
The Bench XR Series power supplies come standard with Ethernet LAN, and USB 2.0, and Analog interfaces giving you the flexibility to use your I/O interface of choice today and in the future. The Bench XR compatible with the LXI Class C specifications.

Figure 1. Front panel control knobs make it easy to use the Bench XR series

Figure 2. Built in Ethernet, USB 2.0 and Analog Control enable easy system connections
Remote access and control
The built-in Web server provides remote access and control of the instrument via a standard browser such as Microsoft Internet Explorer. Using the Web browser, you can set up, monitor and operate the BENCH XR remotely (see figure 3).

Easy system integration and Configuration
To simplify system development, the BENCH XR comes standard with ? drivers. The BENCH XR supports the easy-to-use SCPI (Standard Commands for Programmable Instruments).

Command compatibility
The BENCH XR includes a compatibility command set for the Xantrex XFR series power supplies, the Sorensen DLM series power supplies, and the Keysight 603x series power supplies. This simplifies system integration when converting to the BENCH XR. For a comparison of these products, see application notes:
- Side-by-side comparison: Versatile Power BENCH XR Series Supply and Sorensen DLM DC Power Supply, AN ?
- Side-by-side comparison: Versatile Power BENCH XR Series Supply and Xantrex XFR AN ?

Wireless Remote Sense
The BENCH XR includes innovative wireless remote sense. With this technology no extra wires are required to gain all the benefits of wired remote sense.

Flexible configuration: connect multiple units in parallel and series
Should you need greater output power, the BENCH XR series power supplies give you the flexibility to connect in parallel up to four similarly rated units for greater output current and connect two similarly rated units in series for greater output voltage (see output terminal isolation information).

Analog programming and Monitoring
The output voltage and current can be programmed from zero to full scale by either an analog voltage 0 to 3 V, 0 to 5 V, 0 to 10 V or by resistances of 0 to 5 kΩ or 0 to 10 kΩ.

Universal AC input
All BENCH XR models have universal AC input so they can be automatically operated from any AC mains input voltage worldwide. They can be operated from line voltages of 85 – 265 Vac, 47 to 63 Hz, with no switch to set or fuses to change when you switch from one voltage standard to another. They also provide power factor correction.

Rack mounting
An optional rack mount kit is available. The rack mount kit makes it easy to integrate an BENCH XR into a test rack by providing all the necessary hardware to rack mount an BENCH XR series power supply in only 1 U of rack space.

Figure 3. Bench XR series web graphical user interface for remote access and control of the power supply
**Performance specifications**

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 40 °C.

<table>
<thead>
<tr>
<th>DC output ratings(^1)</th>
<th>(30-33) XR</th>
<th>(50-20) XR</th>
<th>(100-10) XR</th>
<th>(200-5) XR</th>
<th>(400-2.5) XR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>30 V</td>
<td>50 V</td>
<td>100 V</td>
<td>200 V</td>
<td>400 V</td>
</tr>
<tr>
<td>Current</td>
<td>33 A</td>
<td>20 A</td>
<td>10:00 AM</td>
<td>5:00 AM</td>
<td>2.5 A</td>
</tr>
<tr>
<td>Power</td>
<td>600 W</td>
<td>600 W</td>
<td>600 W</td>
<td>600 W</td>
<td>600 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output ripple and noise</th>
<th>CV p-p(^2)</th>
<th>20mV</th>
<th>25mV</th>
<th>50mV</th>
<th>100mV</th>
<th>200mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV rms(^2)</td>
<td>5mV</td>
<td>5mV</td>
<td>10mV</td>
<td>25mV</td>
<td>50mV</td>
<td></td>
</tr>
</tbody>
</table>

| Load regulation (change from 10% to 90% load) | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Line regulation (change from 90 to 132 VAC input or 180 to 260 VAC input)\(^2\) | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Programming accuracy\(^1\) | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Measurement Accuracy | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Transient recovery time\(^3\) | Time  | ≤1ms  | ≤1ms  | ≤1ms  | ≤1ms  | ≤1ms  |

**Supplemental Characteristics**

Supplemental characteristics are not warranted but are descriptions of typical performance determined either by design or type testing.

| Output response time (settle to within ±1% of the rated output, with a resistive load) | Up, full load | .08 s | .08 s | .08 s | .08 s | .08 s |
| Down, full load | .08 s | .08 s | .08 s | .08 s | .08 s |
| Down, no load | .5 s | .5 s | .5 s | .5 s | .5 s |

| Command response time\(^4\) | 50 ms |
| Data readback transfer time\(^5\) | 5 ms |

| Remote sense compensation | Volts/load lead | 1 V | 1 V | 1 V | 1 V | 1 V |

| Over-voltage protection | Range | 0.5-33 V | 0.5-55 V | 0.5-110 V | 0.5-220 V | 0.5-440 V |
| Accuracy | .1 V | .2 V | .4 V | .8 V | 1.6 V |

| Output ripple and noise\(^2\) | CC rms | 7 mA | 5 mA | 5 mA | 5 mA | 10 mA |

| Programming resolution measurement resolution | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Front panel display accuracy | Voltage | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| Current | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

**Notes:**

1. Minimum voltage is guaranteed to a maximum of 1% of the rated output voltage.
2. Minimum current is guaranteed to a maximum of 1% of the rated output current.
3. Up to 20 MHz (see application note AN? for measurement details)
4. Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current.
5. Voltage set point from 10% to 100% of rated output
6. Add this to the output response time to obtain the total programming time
7. Time to provide data back to the controller using LAN interface (does not include A/D conversion time.)
WARNING Shock Hazard
- For models up to 50 VDC rated output, no point on the output shall be more than ±50 VDC above or below chassis ground.

Supplemental Characteristics For All Model Numbers

Series and parallel capability
Parallel operation
Up to 4 units can be connected in master/slave mode

Series operation
Up to 2 units can be connected in series

Output terminal isolation
No output terminal may be more than 600 VDC from any other terminal or chassis ground

Analog programming
(of output voltage and current)
Input signal
Selectable; 0 to 3 V, 0 to 5 V or 0 to 10 V full scale

Input impedance
0 to 10 kΩ full scale

Environmental conditions
Environment
Indoor use, installation category II (AC input), pollution degree 2
Operating temperature
0°C to 40°C @ 100% load
Storage temperature
-20°C to 70°C
Operating humidity
30% to 90% relative humidity (no condensation)
Storage humidity
10% to 95% relative humidity (no condensation)

Altitude
- Up to 3000 meters.
- Derate the output current by 2%/100 m above 2000 m.
- Derate the maximum ambient temperature by 1 °C/100 m above 2000 m.

Regulatory compliance
EMC
- European EMC directive 89/336/EEC for Class A products
- This ISM device complies with Canadian ICES-001.
- Cet appareil ISM est conforme a la norme NMB-001 du Canada.

Safety
- European Low Voltage Directive IEC 60950
- US and Canadian safety standards
- Any LEDs used in this product are Class 1 as per IEC 825-1

Acoustic noise declaration
Emission directive:
- Sound pressure Lp <70 dB(A), At operator position,
*Normal operation,
*According to EN 27779 (Type Test).

AC input
Nominal input
100 – 240 VAC; 50/60 Hz
Input current 600W
7 A @ 100 VAC nominal;
4 A @ 200 VAC nominal

Input range
85 – 265 VAC; 47 – 63 Hz.

Power factor
0.99 at nominal input and rated output power

Efficiency
76% – 85% for 600 W units;

Inrush current
<20 A

Dimensions
(excluding connectors, and handles)
Height 44 mm (1.73 in)
Width 224 mm (8.82 in)
Depth 262 mm (10.3in)

Weight
2.6 Kg (5.8 lbs.)