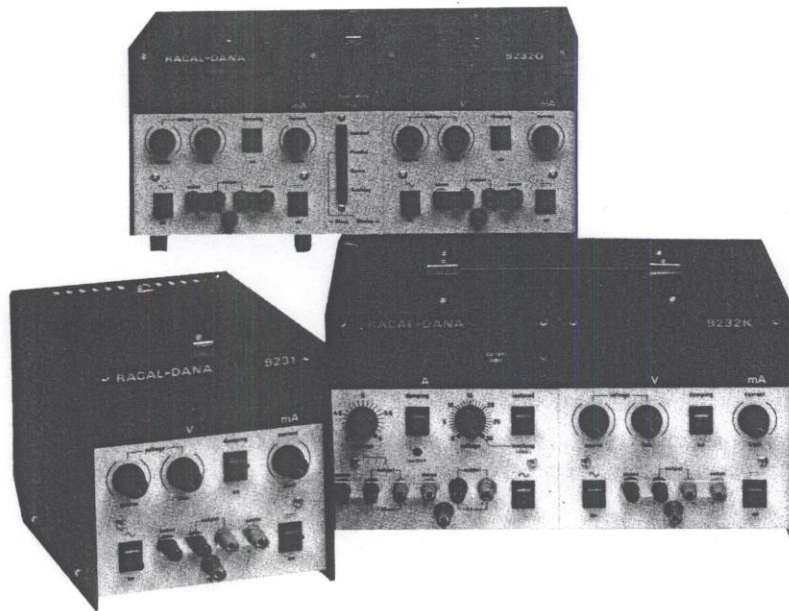


Precision Laboratory Power Supplies 9230 Series



Introduction

The Racal-Dana 9230 series laboratory bench power supplies are designed for applications where precision and clarity of indication are of paramount importance. In addition to fully variable operation in either constant voltage or constant current mode, they feature simultaneous digital monitoring of voltage and current with high accuracy and resolution. High resolution controls allow precise setting of the output, and the current limit can be accurately set at levels down to 1 mA, providing total circuit protection.

The output voltage is variable from 0 to 30 volts at currents up to 1 A on the 9231, and 2 A on the 9232. The 9234 provides up to 4 A at 0–15 volts.

A unique feature is the ability to set both voltage and current levels accurately before connection to the load and without shorting the output. Both input terminals are fully floating and provision is made for remote sensing via two additional front panel terminals.

Digital Accuracy and Resolution

The Racal-Dana 9230 series power supply units incorporate digital readouts with a $3\frac{3}{4}$ digit scale length (3999) to provide accuracy and resolution an order of magnitude higher than the best analog meters. High brightness wide angle LED's of 12.5 mm (0.5") height provide a clear, precise reading, viewable from up to 5 metres without the problems of parallax error or scale misinterpretation.

Two readouts per output are provided giving simultaneous monitoring with constant resolution of voltage and current thus eliminating any possibility of misinterpretation. Switchable damping is included on the current meter to simplify measurements on rapidly varying loads.

High Stability and Setting Accuracy

Integrated band-gap voltage reference diodes are used as the basis for stabilization of both voltage and current. These provide better stability and lower temperature coefficients than the zener diodes normally used. Voltage setting is by coarse and fine controls giving a setting

resolution of better than 0.005 volts. The current control uses a conductive plastic semi-logarithmic potentiometer to provide maximum resolution at all current settings.

The incorporation of a DC – output switch enables precise setting of voltage and current limit *before* the load is connected. With the switch in the "off" position, the current meter decimal points light up indicating that the meter is now displaying the value of the current limit. With the switch "on" the decimal points go out and the meter displays the value of current flowing. When the limit is reached, the decimal points flash to indicate that the power supply is operating in the constant current mode.

Remote Sense Feature

To enable full use to be made of the high precision of these power supplies under all circumstances, provision for remote sensing is incorporated. At high currents, the voltages at the source and load may be significantly different (two 0.1 ohm connecting leads will drop 0.2 volts at 1 Amp), but this problem can be eliminated by connecting the two "sense" terminals to the load instead of to the source.

This ensures that the voltage meter and stabilizing circuit monitor the true load voltage and therefore the effect of the connecting leads resistance on the power supply output impedance is removed.

Models 9231Q and 9232Q

The models 9231Q and 9232Q are dual units comprising two models in a single case. Push buttons allow selection of four separate modes of operation.

Isolated: Completely independent operation of the two supplies.

True Parallel: Converts the Master unit to a 0–2A or 0–4A supply.

Series: Internal series linking of the two supplies gives outputs up to 60 volts.

Series Tracking: Master voltage control sets up equal voltages on both supplies.

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Models 9231K and 9232K

Models 9231 and 9232 are also available combined with an additional K module to form a triple power supply.

The K module incorporates two supplies. The first is a high current 5 volt supply for logic work, featuring ± 1 volt variability, overvoltage crowbar, remote sense, and digital current metering. The second is a 0 to 30 volt supply which

Specifications

Model 9231/9232/9234

Input Voltage: 110, 120, 220, 240V AC $\pm 10\%$ at 48–63 Hz.

Output Voltage: 0–31V nominal (15V Model 9234).

Output Current: Model 9231 0–1.1A nominal. Model 9232 0–2.2A nominal. Model 9234 0–4A nominal*.

Output Terminations: 4mm terminals on 19mm (0.75") spacing, DC – output switch isolates positive terminal.

Sensing: Remote via 4mm terminals or Direct via shorting links (provided).

Line Stability: $<0.01\%$ of maximum output for 10% line change.

Load Regulation: $<0.01\%$ of maximum output for 90% load change.

Protection: Full short circuit and overload protection.

Ripple and Noise: <1 mV typically.

Output Impedance: <5 milliohms at 1 kHz.

Temperature Coefficient: $<0.01\%$ $^{\circ}\text{C}$ typically.

Transient Response: $<20\mu\text{sec}$ to $<50\text{mV}$ of setting for 100% load change.

Constant Current Output Impedance: 50kohm typically with voltage limit at maximum.

Voltage Controls: Continuously variable by coarse and fine controls, resolution 0.005 volts.

Current Limit: Continuously variable from 0 to 110% of maximum current rating. Automatic indication of constant current operation.

Meters: Dual 3 $\frac{3}{4}$ digit (3999 count) with 12.5mm (0.5") LED's. Reading rate 4 per second.

Meter Resolution: Voltage 0.01 volts over entire range. Current 0.001 amps over entire range.

Meter Accuracy 20 $^{\circ}\text{C}$ –25 $^{\circ}\text{C}$: Voltage 0.1% reading $\pm 0.05\%$ full scale. Current 0.3% reading $\pm 0.1\%$ full scale.

Current Meter Damping: Normally 20msec switchable to 2 secs for averaging of rapidly varying loads.

Operating Temperature Range: 0 $^{\circ}\text{C}$ to 45 $^{\circ}\text{C}$.

Weight: 9231 – 3.75kg (8.41lb); 9232 and 9234 – 4.7kg (10.6lb)

Dimensions: 175H x 155W x 235Dmm (6.9H x 6.15W x 9.25D inches.)

Electrical Safety: Designed to comply with IEC 348

*Model 9234 has switchable current limit delay making peak currents up to 7 amps available to fluctuating loads.

Model 9231T/9232T

Form: Dual unit consisting of two models of 9231 or 9232 each with specification given above.

Mode of Operation: Isolated – 2 independent supplies.

can be switched either to track with the 9231/2 supply, or can be operated independently in a fully floating mode.

All outputs are fully protected against short circuits and overloads, and overcurrent indication is built in.

Models 9231T and 9232T

Two single units may be supplied together as a twin unit.

Model 9231Q/9232Q

Form: Dual unit comprising two models 9231 or 9232 each to specification given above.

Modes of Operation: (via push button switches) Isolated – 2 independent supplies. True Parallel – to provide 0–2A (9231) or 0–4A (9232). Series – to provide 0–60V supply. Series tracking – master control sets equal voltage on each supply.

Tracking Accuracy: 0.3% of setting $\pm 0.1\%$ of full scale.

Weight: 7kg (15.7lb)

Dimensions: 175H x 345W x 235Dmm (6.9H x 13.6W x 9.25D inches.)

Model 9231K/9232K

Form: Either model 9231 or 9232 can be fitted with a module type K to form a triple power supply.

Output A

Output: $-5\text{V} \pm 1\text{V}$ fully floating 3.5 amps (9231 K) or 7.0 amps (9232 K).

Voltage Control: Via calibrated control.

Current Limit: Foldback current limit with automatic indication.

Current Metering: 3 $\frac{3}{4}$ digit (3999 count) with 12.5mm (0.5") LED's. Reading rate 4 per second. Switchable damping.

Overvoltage Crowbar: Dual Speed. User adjustable trip point 10msec at +5%, 1 μsec at +100%.

Sensing: Remote via 4mm terminals or direct via shorting links (provided).

Output B

Output: 0–30V fully floating or tracking 0.5 amps (9231 K) or 1.0 amp (9232 K).

Voltage Control: Via calibrated control, or tracking with 9231/9232.

Current Limit: Fixed at 110% of rated output LED overcurrent indication.

Other Electrical Parameters: As 9231/9232 specification.

Weight: 7kg (15.7lb) 9231 K; 9kg (20lb) 9232 K.

Dimensions: 175H x 310W x 235Dmm (6.9H x 12.2W x 9.25D inches.)

Ordering Information

| | |
|--------------|-------------------------------------|
| Model 9231: | Bench Power Supply (30V 1A) |
| Model 9231Q: | Bench Power Supply (Quad Mode Dual) |
| Model 9231K: | Bench Power Supply (Triple Output) |
| Model 9231T: | Dual Power Supply (30V 1A Dual) |
| Model 9232: | Bench Power Supply (30V 2A) |
| Model 9232Q: | Bench Power Supply (Quad Mode Dual) |
| Model 9232K: | Bench Power Supply (Triple Output) |
| Model 9232T: | Dual Power Supply (30V 2A Dual) |
| Model 9234: | Bench Power Supply (15V 4A) |