

# ORTEC

100 MIDLAND ROAD, OAK RIDGE, TENNESSEE, 37830  
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# INSTRUCTION MANUAL 446 & 447 HIGH VOLTAGE POWER SUPPLY

# ORTEC<sup>®</sup>

## INSTRUCTION MANUAL 446 & 447 HIGH VOLTAGE POWER SUPPLY

Serial No. \_\_\_\_\_

Purchaser \_\_\_\_\_

Date Issued \_\_\_\_\_



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446-0101-B1	ORTEC Operational Block Diagram

# **STANDARD WARRANTY FOR ORTEC ELECTRONIC INSTRUMENTS**

## **DAMAGE IN TRANSIT**

Shipments should be examined immediately upon receipt for evidence of external or concealed damage. The carrier making delivery should be notified immediately of any such damage, since the carrier is normally liable for damage in shipment. Packing materials, waybills, and other such documentation should be preserved in order to establish claims. After such notification to the carrier, notify ORTEC of the circumstances so that we may assist in damage claims and in providing replacement equipment when necessary.

## **WARRANTY**

ORTEC warrants its electronic products to be free from defects in workmanship and materials, other than vacuum tubes and semiconductors, for a period of twelve months from date of shipment, provided that the equipment has been used in a proper manner and not subjected to abuse. Repairs or replacement, at ORTEC option, will be made without charge at the ORTEC factory. Shipping expense will be to the account of the customer except in cases of defects discovered upon initial operation. Warranties of vacuum tubes and semiconductors, as made by their manufacturers, will be extended to our customers only to the extent of the manufacturers' liability to ORTEC. Specially selected vacuum tubes or semiconductors cannot be warranted. ORTEC reserves the right to modify the design of its products without incurring responsibility for modification of previously manufactured units. Since installation conditions are beyond our control, ORTEC does not assume any risks or liabilities associated with the methods of installation, or installation results.

## **QUALITY CONTROL**

Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

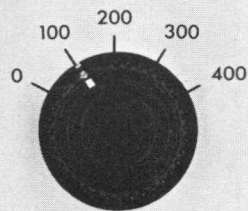
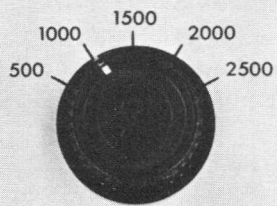
## **REPAIR SERVICE**

ORTEC instruments not in warranty may be returned to the factory for repairs or checkout at modest expense to the customer. Standard procedure requires that returned instruments pass the same quality control tests as those used for new production instruments. Please contact the factory for instructions before shipping equipment.

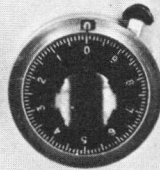
**ORTEC<sup>®</sup>**

MODEL 446

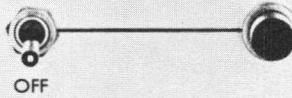
**HIGH VOLTAGE  
POWER SUPPLY**



0-100



POWER  
ON



500-3000 VDC, 0-10mA

## ORTEC 446 and 447 HIGH VOLTAGE POWER SUPPLIES

## 1. DESCRIPTION

ORTEC 446 and 447 High Voltage Power Supplies provide the well-regulated, highly stable voltage supply necessary for photomultiplier tubes, ionization chambers, and Li-drifted semiconductor detectors but are not recommended for use with surface barrier silicon detectors. ORTEC 428 Detector Bias Supply is preferred for these devices. The 446 and 447 are supplied in a NIM standard module for maximum convenience. The 446 is designed for 115V ac input and 447 for 220V ac input. The specifications for the two models are otherwise identical. Both provide an output voltage continuously adjustable from 500 to 3000 volts with 0-10 milliamps current capability and switch selectable positive or negative polarity. The 446 and 447 are housed in dual-width NIM standard modules, completely conforming to the standards of TID-20893 (Rev.).

## 2. SPECIFICATIONS

### ORTEC 446

INPUT: 103-129 volts, 47-65 Hz, 50 watts nominal. Power is supplied via a three-wire captive line cord with standard NEMA male connector.

OUTPUT: 500 to 3000 volts, continuously adjustable, 0 to 10 milliamps current capability.

OUTPUT VOLTAGE CONTROLS: 3 range selector controls: 500-2500V in four 500 volt steps, 0-400V in four 100 volt steps, and 0-100V ten-turn potentiometer with calibrated dial for fine adjustment.

OUTPUT POLARITY: positive or negative. Controlled by a switch located on the rear panel, to prevent inadvertent switching of polarity.

REGULATION: Not more than 0.0025% variation in output voltage for combined line and load variations within the operating range.

OUTPUT VOLTAGE STABILITY: <0.01% per hour (and <0.03% per any 24-hour period) variation in output voltage at constant line voltage, load and ambient temperature, after 30 minute warm-up period.

OUTPUT RIPPLE: <10 mV peak to peak from 2-50,000 Hz

CALIBRATION ACCURACY: difference between control settings and actual output voltage no more than  $\pm 0.25\%$  of selected setting.

RESETTABILITY: output voltage can be reset to 0.1% accuracy or better.

OVERLOAD PROTECTION: built-in overload and short circuit protection with automatic power restoration upon fault clearance. Maximum allowance output current 13 mA.

TEMPERATURE STABILITY: <50 ppm change in output voltage per °C change in ambient temperature after one hour warm-up period.

OPERATING TEMPERATURE: 0-50°C

OUTPUT CONNECTORS: 2 high voltage output connectors, Kings KV-79-13 or equivalent.

### ORTEC 447

INPUT: 206-258 volts, 47-63 Hz, 50 watts nominal. All other specifications identical to 446.

NOTE: Please order ORTEC 446 for 115V ac operation and ORTEC 447 for 220V ac. The two units are otherwise identical.

DIMENSIONS: Standard double-width module, 2,70 x 8.714 inches, per TID-20893 (Rev.).



### 3. INSTALLATION INSTRUCTIONS

#### 3.1 General

The 446 or 447 is normally used in conjunction with other modular electronics and plugged into the ORTEC 401A Bin. As such, it is rack mounted, and therefore, it is necessary to ensure that vacuum tube equipment operating in the same rack has sufficient cooling air circulating to prevent any localized heating of the all-transistor circuitry used throughout the 446 and 447. The temperature of equipment mounted in racks can easily exceed the recommended maximum unless precautions are taken; the 446 and 447 should not be subjected to temperatures in excess of 50°C (120°F).

#### 3.2 Connection to Power

The 446 and 447 contain all required power supplies to operate and receive input power by way of a 3-wire captive line cord with a standard NEMA male connector. The 446 should operate only on nominally 110V, 60 cycle ac power and the ORTEC 447 should operate on nominally 220V, 50 cycle ac power. These power supplies may be operated outside the 401A Bin when desired, since they are totally self-contained.

#### 3.3 Connecting Into A System

- A. Check to see that the power switch is in the OFF position.
- B. Plug the ac power cord into the appropriate receptacle.
- C. Check the polarity switch on the rear panel of the power supply to see that it indicated the appropriate polarity of high voltage.
- D. Connect high voltage cables from the connectors located on the rear panel of the power supply to those instruments to be powered.
- E. Turn on high voltage power supply and select the desired voltage.

NOTE: This power supply should not be used with semiconductor detectors of the surface barrier silicon type, since these detectors will be destroyed if over-voltage exists even momentarily. The power supply recommended for use with these detectors is the ORTEC 428.

#### 4. CORRECTIVE MAINTENANCE

These units should rarely require more than cleaning to prevent leakage paths being created by dust collection. If a malfunction is noted, it is important to assure that it is truly within the unit by disconnecting the unit from its position in a system and performing routine diagnostic tests with a voltmeter. The power supply is short-circuit protected and under a short circuit the output voltage will go to zero; if an external short circuit is applied to the power supply, the short circuit must be removed before the power supply will come back up to its full voltage.

##### Troubleshooting

The troubleshooting procedures for this power supply should consist of simply removing the output load and measuring the output voltage and then applying a load and monitoring the output voltage to observe whether the power supply regulates or not. Internal dc measurements in the field may be performed since typical dc voltages are indicated on the schematic diagram. Caution should be observed when measuring voltages within this power supply because of the personnel hazard associated with the high voltages. The 446 and 447 or any ORTEC product may be returned to the factory for repair service at any time at nominal cost. The standardized procedures require that each repaired instrument receive the same extensive quality control tests that a new instrument receives.

**BIN/MODULE CONNECTOR PIN ASSIGNMENTS  
FOR AEC STANDARD NUCLEAR INSTRUMENT MODULES  
PER TID-20893**

<b>Pin</b>	<b>Function</b>	<b>Pin</b>	<b>Function</b>
1	+3 volts	23	Reserved
2	-3 volts	24	Reserved
3	Spare Bus	25	Reserved
4	Reserved Bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 volts
7	Coaxial	*29	-24 volts
8	200 volts dc	30	Spare Bus
9	Spare	31	Carry No. 2
*10	+6 volts	32	Spare
*11	-6 volts	*33	115 volts ac (Hot)
12	Reserved Bus	*34	Power Return Ground,
13	Carry No. 1	35	Reset
14	Spare	36	Gate
15	Reserved	37	Spare
*16	+12 volts	38	Coaxial
*17	-12 volts	39	Coaxial
18	Spare Bus	40	Coaxial
19	Reserved Bus	*41	115 volts ac (Neut.)
20	Spare	*42	High Quality Ground
21	Spare	G	Ground Guide Pin
22	Reserved		

*\*These pins are installed and wired in parallel in the ORTEC 401A Modular System Bin.*



**ORTEC** INCORPORATED

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