



KINTRONIC LABS™

An ISO 9001 registered company

KTL FM DUMMY LOAD DL-50K-FM

INSTALLATION INSTRUCTIONS



INSTALLATION INSTRUCTIONS – KTL DUMMY LOAD DL-50K-FM

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INTRODUCTION

The DL-50K-FM is a low reflection and non-radiating test load designed to dissipate a maximum FM transmitter output power of 50kW. It is used primarily to assist in troubleshooting operational problems with transmitting equipment. The load can be used for the following specific purposes:

- transmitter maintenance under non-radiating conditions;
- making transmitter routine tests and adjustments, and
- substituting for a circuit loading element within the frequency range limits of the load.

Kintronic Labs Inc. has prepared this manual to ensure the most effective use of the RF test load DL-50K-FM. However, before attempting to use this product, it is important that this manual be carefully reviewed.

Particular attention should be given to cautionary remarks and statements which involve the proper operation of the product and the safety of the operator. Please carefully read over the following:

*****WARNING*****

**VERTICAL CABINET HOUSING WILL BECOME
HOT DURING OPERATION – DO NOT TOUCH**

This unit may be operated at full power rating only when ambient air temperature is not above 110°F (43.33°C).

*****CAUTION*****

**THE INTERLOCK SHOULD BE PROPERLY
CONNECTED TO RF POWER SOURCE TO PREVENT
DAMAGE IN THE EVENT OF MALFUNCTION**

Loss of air flow for even a short period of time can result in resistor failure. The interlock will enable the transmitter to be shut down instantly and automatically in case of excessive temperature.

*****WARNING*****

**DISCONNECT AC POWER
BEFORE SERVICING THE UNIT**

INSTALLATION

1. Unpack unit from shipping container and inspect for possible shipping damage.

--- NOTE ---

When using an in-line watt meter to measure RF power, a transition segment with a minimum length of 18 inches must be inserted between the meter and load to prevent inaccurate meter readings due to temperature sensitivity of most meters. Also avoid mounting the meter in the hot air discharge path from the load.

2. Place unit in operating location. Be sure that there is sufficient clearance on each side for free flow of air through the intake and outlet grates—exhaust air must not be directed back to the intake. Do not install the unit near other heat sources.
3. Use the unit grounding stud to provide a secure electrical ground separate from the AC power cord. See Figure 1.
4. Check that AC power switch is in the **OFF** position and connect the power cord to a 115 VAC source.
5. Use connector provided to prepare an interlock cable for the associated RF transmitter. See Figure 5 and accompanying text for explanation of interlock circuit operation.
6. Connect transmission line to the RF termination input.

--- NOTE ---

Connection of the transmission line to the RF input connector should be performed carefully to prevent damage to the mounting studs. Avoid any bending or shearing stress to the RF input connector studs.

--- The RF Test Load DL-50K-FM is now ready for operation ---

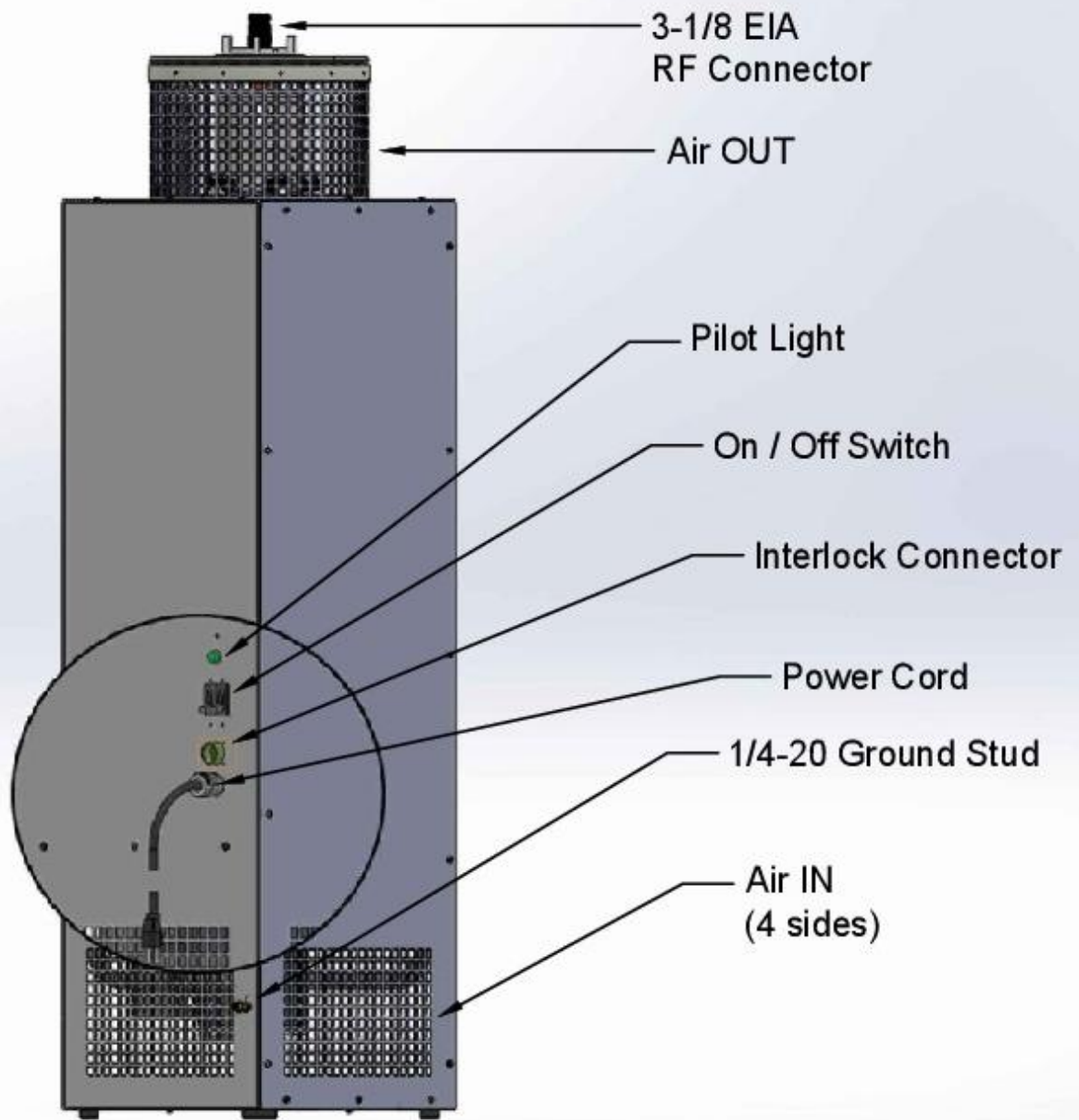


Figure 1. Component Location

OPERATION

1. Check that installation requirements were properly carried out particularly with regards to the following:
 - a. Be sure that there is no obstruction to air flow at both intake and exhaust grating.
 - b. Be sure that there exists an electrical ground to unit frame which is separate from ac power line ground.

***** CAUTION *****

**THE INTERLOCK SHOULD BE PROPERLY
CONNECTED TO RF POWER SOURCE TO PREVENT
DAMAGE IN THE EVENT OF MALFUNCTION**

2. Connect ac power source of transmitter to interlock jack so that RF output will be disabled in event of malfunction. Figure 2 shows circuit conditions with unit turned **ON**.

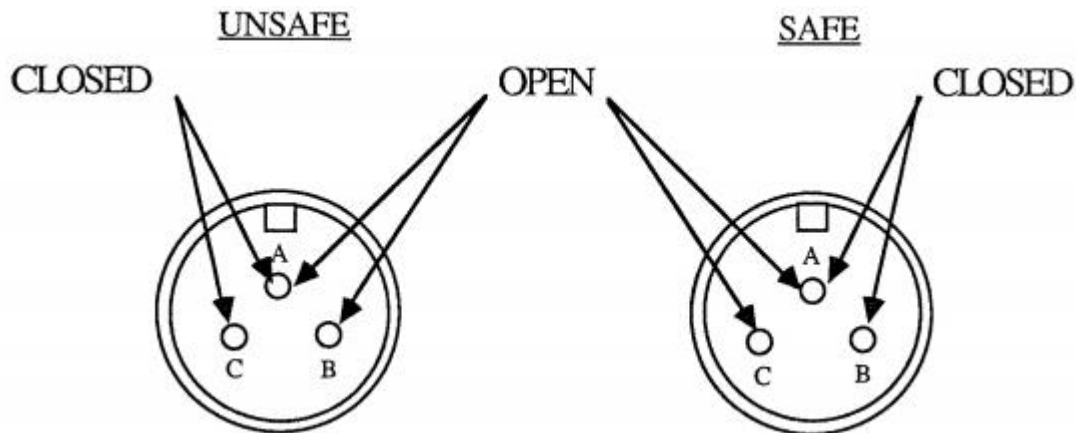


Figure 2. Interlock Jack

3. Connect transmitter RF cable to load RF input. If necessary, provide support to prevent any shearing or bending stress to connector.

***** CAUTION *****

**DO NOT APPLY RF POWER TO LOAD
UNLESS FAN IS RUNNING**

4. Apply ac power to fan by pushing the remote On Switch to **ON**. The pilot light should illuminate and the fan energize.
5. Check that air is flowing freely into and out of the gratings.
6. While performing the following steps, be sure that transmitter power output does not exceed 50 kW.

***** WARNING *****
VERTICAL CABINET HOUSING WILL BECOME
HOT DURING OPERATION – DO NOT TOUCH

7. Apply power to the transmitter and proceed with normal operation.
8. To discontinue operation:
 - a. Shut down transmitter.
 - b. Allow fan to run until exhaust air is close to ambient temperature.
 - c. Move load power switch to OFF.

TROUBLESHOOTING

<u>SYMPTOM OR TROUBLE</u>	<u>POSSIBLE CAUSE</u>
No indication of AC power	Defective Switch. Open Fuse. Low or no line voltage.
Fan will not start.	Defective thermostat switch
Unit overheats.	Panel not secured. Excessive RF input. Low line voltage. Ambient air too hot.
Interlock will not close.	Activated sensor circuit. Defective sensor switches (SW2/3).

MAINTENANCE

***** WARNING *****

DISCONNECT AC POWER BEFORE SERVICING UNIT

Access to components can be gained by removal of blank panels.

PERIODIC INSPECTION AND SERVICING

1. The RF input connector should be kept clean at all times. It is recommended that a protective cover be placed over the RF connector when the coaxial cable is not installed.
2. The following should be performed at intervals of one to six months depending upon usage:
 - a. Remove accumulations of dust, dirt and other obstructions to air flow.
 - b. Fan blades should be inspected and brushed clean.
 - c. Inspect and tighten hardware as required.
3. Cabinet may be cleaned with mild detergent and warm water.
4. Fan motor bearings are permanently lubricated and should need no servicing.

LOAD TESTS AND REPAIRS

1. The load should be stabilized at room temperature before making any measurements.
2. A network analyzer or other instrument capable of measuring impedance and VSWR in the VHF band should be used to measure VSWR across resistive load at RF input connector.
3. Use matching coaxial adapters (50 Ω) between the measurement instrument and RF input to load.
4. Impedance measurements should be made at frequencies that fall within the frequency range of particular load used.
5. If high VSWR is noted, the DC resistance of the load may be checked at the RF connector. A good quality volt-ohmmeter should be used for dc resistance measurements.
6. Any value between 47.5 and 52.5 Ω is acceptable. Individual resistors should measure within 10% of indicated value.

THEORY OF OPERATION

The DL-50K-FM RF Test Load consists of a resistor load assembly cooled by an electric fan. An interlock circuit provides protection for load resistors against excessive high temperature, loss of AC power to fan motor or loss of air flow.

Thirty-two 400 Ω resistors are arranged in two series banks of sixteen parallel resistors each (see Figure 3). Each bank of sixteen parallel resistors provides 25 Ω of resistance. Together, the two series banks provide 50 Ω resistance. This resistance can be measured between the center and outer conductors of the coaxial connector.

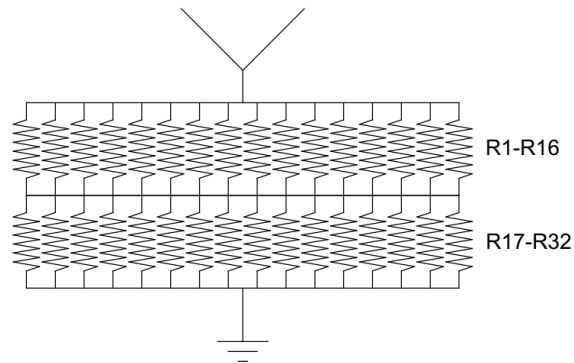


Figure 3. Load Resistor Configuration

The resistor load assembly consists of thirty-two resistors and resistor shield. The resistor load assembly is designed to maintain a 1.15:1 or less VSWR through 110 MHz. Thus, when RF energy is applied to the 3-1/8 inch (7.94cm) EIA coaxial connector, most of the RF energy is converted to heat energy.

The resultant heat energy is dissipated into the surrounding air. The fan, located beneath the load resistors, causes a higher volume of air to pass over the resistors than would be possible by convection cooling alone. The increased volume of air removes heat at a higher rate thereby permitting the load to operate with higher input power levels.

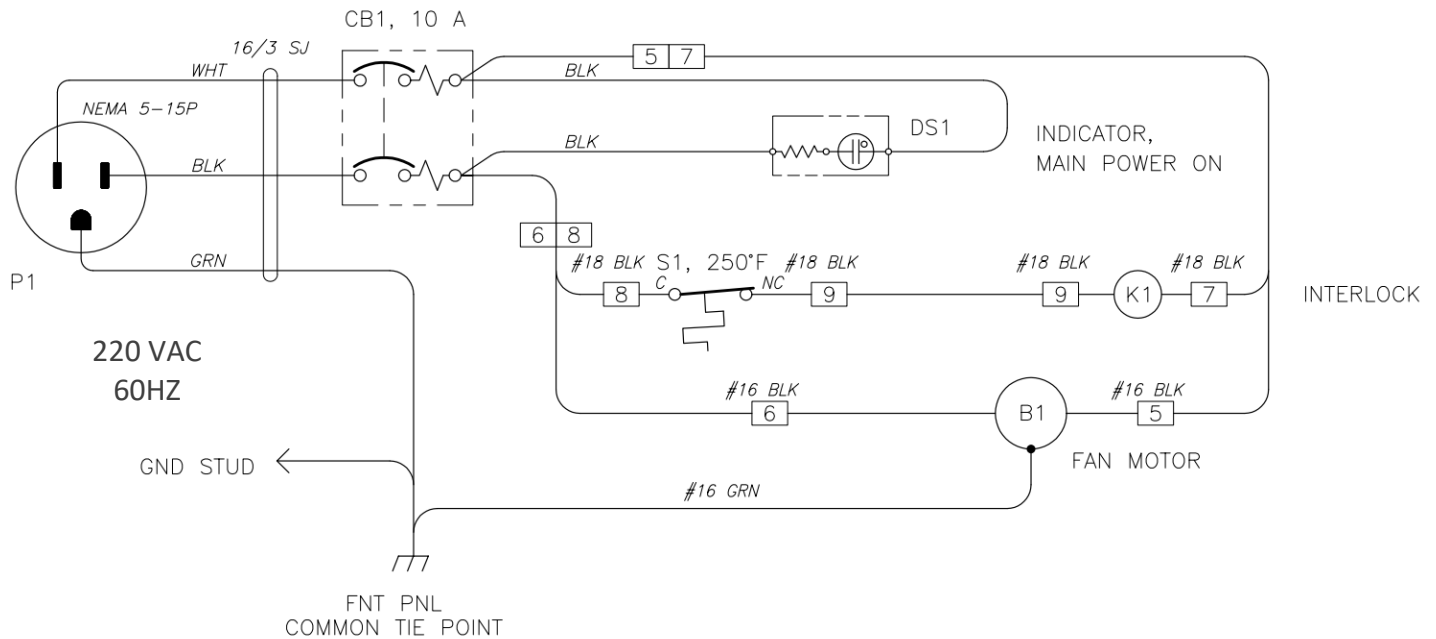


Figure 4. Power Circuit Schematic

Figure 4 is the schematic diagram for the DL-50K-FM AC circuit. The 220 VAC circuit is controlled and protected by a 10 amp circuit breaker CB1. The power indicator lamp DS1, fan motor B1 and interlock components K1 and S1 comprise a separate sub-circuits.

Interlock relay K1 and over-temperature switch S1 are in series. Thus, an AC power failure, loss of air flow or excessive heat will trigger the interlock fault condition.

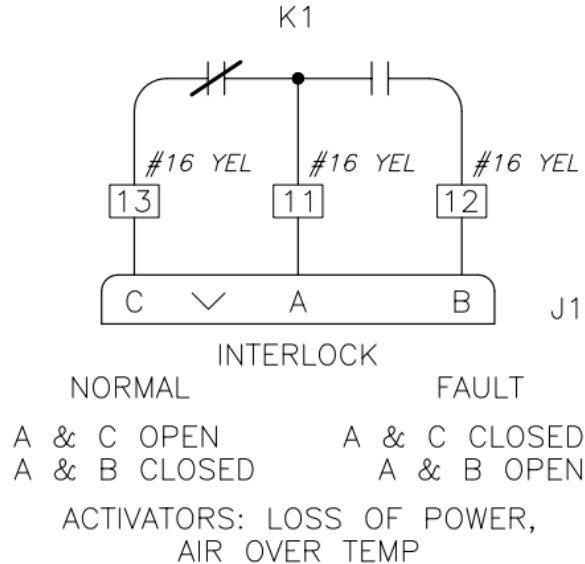


Figure 5. Interlock Relay Schematic

Figure 5 is the schematic of the interlock relay circuit. An interlock protects the coaxial load, when used properly, by shutting down the coaxial RF input power should a fault develop in the operation of the air

cooling system. The cabinet internal temperature is monitored by over-temperature switch S1. The normally closed position of the switch supplies voltage to the coil of interlock relay K1 which presents a SAFE condition to connector J1.

An over-temperature condition (250°F) will cause over-temperature switch SW1 to open. This will interrupt the current flow to interlock relay K1 and indicate the presence of a fault condition. When properly used, the interlock provides the user with an automatic means for shutting down the RF power source to the coaxial load.

Should the fan motor fail to operate, interlock relay K1 will present an UNSAFE condition. The pilot light DS1 is on when the fan operates and off when the fan is de-energized.

When over-temperature switch S1 senses load temperature in excess of 250°F the contacts will open and de-energize interlock relay K1 and present a fault condition. Load over-temperature may be caused by loss of air flow, AC power failure or high ambient temperatures.

Under normal operating conditions, relay contacts K1a (NC) open; relay contacts K1b (NO) close. Thus, a closed path exists between pins A and B, and an open path exists between pins A and C of receptacle J1.

In the event of power failure, contacts K1a revert to normally closed position and contacts K1b revert to normally open position. Thus, an open path exists between pins A and B, and a closed path exists between pins A and C of receptacle J1.

Loss of air flow or excessive heat will also open the circuit to relay coil K1 and cause the above fault condition. In order to ensure proper interlock operation, the customer must select the pin configuration that will disable RF power source should a fault condition occur.

APPENDICES

Recommended Spare Parts for DL-50K-FM, 60 Hz model

<u>Reference No.</u>	<u>Description</u>	<u>Part No.</u>
R1-32	400Ω resistor	KTL-FM400
CB1	Circuit Breaker	W92-X112-10
S1	Over-temperature Switch	STO-250
K1	Interlock Relay	KUP14A55120VAC
B1	Fan Motor	46N363
DS1	Pilot Indicator	39435
J1	Interlock Plug	MS3102A16S-5P
P2	Mating Interlock Socket	MS3106A16S-5S

SPECIFICATIONS

MAILING ADDRESS: PO Box 845, Bristol, TN 37621-0845

SHIPPING ADDRESS: 144 Pleasant Grove Rd., Bluff City, TN 37681

PHONE: +1 423 878-3141 e-mail: KTL@kintronic.com website: www.kintronic.com

DL-50K-FM, 60Hz model

RF CHARACTERISTICS

Rated power, continuous	55 kW
Frequency range	DC to 110 MHz
VSWR (maximum)	1.15:1
Impedance, nominal	50 Ω
Input connector	3-1/8" EIA, male

POWER REQUIREMENTS

Voltage	220 VAC, 60Hz, 1 Φ
Current	10 Amps

COOLING UNIT

Type	Forced air
Fan Motor	3/4 HP, 1725 RPM
Displacement	1900 cfm
Ambient Temperature (maximum permitted)	113°F (45°C)
Over-temp Switch Setting	250°F (121.1°C)

DIMENSIONS

Width	20-3/8 inches
Depth	20-3/8 inches
Height	65-1/8 inches
Weight	115 pounds

FACTORY SERVICE

Kintronic Laboratories, Inc.

Shipping Address: 144 Pleasant Grove Rd., Bluff City, TN 37618

Mailing Address: PO Box 845, Bristol, TN 37621

Phone: (423) 878-3141

E-mail: ktl@kintronic.com

12 MONTH LIMITED WARRANTY

Kintronic Laboratories, Inc. warrants each unit of its manufacture to be free from defects in material and workmanship for a period of 12 months. Our obligation under this Warranty is limited to servicing and/or replacing defective parts of any unit returned to our factory for that purpose, and to making good at our factory any part or parts thereof, except those parts which normally wear out and have a short life, such as, but not limited to, bulbs, fuses, belts, filter cartridges, semi-conductor devices, seals and wear items, within 12 months after shipment from our plant as determined by original invoice to the original purchaser.

Repaired materials and associated labor are covered for a 6 month period only on the work performed. Similarly, repair parts sold separately are covered for a six month period and are limited to repair or replacement of the part(s) at our plant.

The defective equipment must be brought to our attention in writing and must be returned to us only if we have so authorized in writing, with round-trip transportation charges having been prepaid by buyer, for examination and correction by us, if the defect is covered under this Warranty, as determined by our inspection. If the defect has been caused by misuse, customer installation error, abnormal conditions of operation, neglect, repair or attempted repair by anyone not authorized by **Kintronic Laboratories, Inc.**, or if the repairs are for ordinary, minor adjustments, calibration adjustments, and/or ordinary maintenance items, the same are deemed not to be covered by this Warranty and will be repaired, corrected and/or replaced and will be billed under the normal rate schedules of **Kintronic Laboratories, Inc.** In such case, an estimate will be submitted by **Kintronic Laboratories, Inc.** to customer before such work is undertaken and a written authorization to proceed will be required of buyer prior to initiation of repair functions.

If any fault develops, the following steps should be taken:

1. Notify us, giving full details of the difficulty, and include the model number and serial number, your name, email, and telephone number. On receipt of this information, we will give you service instructions and/or shipping instructions.
2. On receipt of shipping instructions, forward the unit, round-trip freight prepaid and insured to the factory and repairs will be made at the factory subject to the foregoing.

Kintronic Laboratories, Inc. reserves the right to make changes in design at any time without incurring any obligation to install same on units previously sold.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of **Kintronic Laboratories, Inc.** and **Kintronic Laboratories, Inc.** neither assumes nor authorizes any other person to assume for them, any other liability in connection with the sale of **Kintronic Laboratories, Inc.** products.

This Warranty applies regardless of conditions to the contrary that are included as part of the buyer's purchase order.

THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE AND THE SAME ARE HEREBY DISCLAIMED IN WHOLE OR IN PART, BY THE SELLER, AS BUYER HAS THOROUGHLY EXAMINED AND INSPECTED THE SUBJECT EQUIPMENT AND HAS ACCEPTED THE SAME IN "AS IS" CONDITION. IN THE EVENT LOCAL LAWS PROHIBIT THIS DISCLAIMER, THE DURATION OF THESE WARRANTIES SHALL BE LIMITED TO THE LENGTH OF TIME OF THIS WARRANTY.

The obligation of **Kintronic Laboratories, Inc.** under this Warranty is limited strictly to the terms set forth herein above and buyer, consumer or user of the products shall claim no setoff or counterclaim from any monies which may be due and owing **Kintronic Laboratories, Inc.** as a result of the sale of such product to such buyer, consumer or user, and **Kintronic Laboratories, Inc.** shall not be liable for any damages of any kind, whether incidental or consequential or otherwise, except for repair or replacement as set forth above.