



Advanced Test Equipment Rentals
www.atecorp.com 800-404-ATEC (2832)

Model 3148 & 93148

Log-Periodic Dipole Array Antenna

MANUAL



 **ETS·LINDGREN**™
An ESCO Technologies Company

EMC Test Systems, L.P. reserves the right to make changes to any products herein to improve functioning, design, or for any other reason. Nothing contained herein shall constitute EMC Test Systems, L.P. assuming any liability whatsoever arising out of the application or use of any product or circuit described herein. EMC Test Systems, L.P. does not convey any license under its patent rights or the rights of others.

© Copyright 2002 by EMC Test Systems, L.P. All Rights Reserved.
No part of this document may be copied by any means
without written permission from EMC Test Systems, L.P.

E-MAIL & INTERNET

Support@ets-lindgren.com
<http://www.ets-lindgren.com>

USA

1301 Arrow Point Dr., Cedar Park, TX 78613
P.O. Box 80589, Austin, TX 78708-0589
Tel 512.531.6400 Fax 512.531.6500

FINLAND

Euroshield OY
Mekaanikontie 1
27510, Eura, Finland
Tel 358.2.838.3300
Fax 358.2.865.1233

SINGAPORE

Lindgren RF Enclosures Asia-Pacific
87 Beach Road
#06-02 Chye Sing Building
Singapore 189695
Tel 65.536.7078 Fax 65.536.7093

Table of Contents

INTRODUCTION.....	1
STANDARD CONFIGURATION	2
OPTIONS	2
MOUNTING INSTRUCTIONS.....	3
ANTENNA SUPPORTS	3
EMISSIONS AND IMMUNITY	4
APPLICATION.....	5
TYPICAL DATA.....	7
SPECIFICATIONS	10
ELECTRICAL	10
PHYSICAL	10
MAINTENANCE	10
WARRANTY.....	11

INTRODUCTION

The ETS-Lindgren Model 3148 Log Periodic Dipole Array is a linearly polarized, broadband antenna designed to operate over the frequency range of 200 MHz to 2 GHz. The choice of scaling factors, the various diameters of each element, and the center-to-center spacing of the booms are such that excellent VSWR characteristics are obtained throughout the operating frequency range (See Model 3148 VSWR data in the “Typical Data” section of this manual). The precise design of the feed and positioning of the elements on the boom yield optimum phase relationship. This causes the active region, at any given frequency, to propagate RF energy towards the smaller elements leaving the elements behind it electrically dead.

The Model 3148 antenna fully satisfies CISPR-16 cross-polarization rejection requirement, and has better than 20 dB cross-polarization rejection below 1000 MHz. The constant gain of the antenna yields an antenna factor which varies linearly with frequency as shown in the “Typical Data” section of this manual. The variation is smooth; therefore, accurate interpolation of performance between specified frequency points is simple.

The Model 3148 Log-Periodic antenna is constructed of lightweight, corrosion-resistant aluminum, providing years of trouble-free indoor and outdoor service.

The antenna is provided with an integral mount and the necessary attachments to mount the antenna to either a tripod (with a ¼-20 threaded mount) or an ETS-Lindgren antenna mast. Individual antenna calibration data is included with each antenna.

The Model 93148 is a non-characterized version of the Model 3148. Should calibration/characterization be desired please contact our calibration department.

STANDARD CONFIGURATION

- Antenna
- Manual
- Individually calibrated at 1m per SAE ARP 958 and 3 and 10 m per ANSI C63.5. Actual antenna factors and a signed Certificate of Calibration Conformance included.

OPTIONS

Support Rod: Antenna mount with insert configured to accept EMCO or other tripods with standard ¼ in x 20 threads.

Tripods: ETS-Lindgren offers two nonmetallic, non-reflective tripods for use at both indoor and outdoor EMC test sites.

The Model 4-TR, constructed of linen phenolic and delrin, is designed with an adjustable center post for precise height adjustments. Maximum height for the 4-TR is 2.0 m (80.0 in), while minimum height is 94 cm (37.0 in). This tripod can support up to an 11.8 kg (26.0 lb) load.

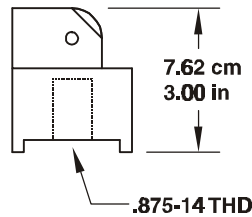
The 7-TR tripod has several different configurations, including options for manual or pneumatic polarization. This tripod provides increased stability for physically large antennas. Its unique design allows for quick assembly/disassembly and convenient storage. Quick height adjustment and locking wheels provide ease of use during testing. This tripod can support up to a 13.5 kg (30.0 lb) load. For the 7-TR series, maximum height is 2.17 m (85.8 in), with a minimum height of .8 m (31.8 in). The 7-TR is constructed of PVC and fiberglass components.

MOUNTING INSTRUCTIONS

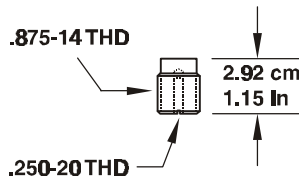
The Model 3148 Antenna consists of the following:

- 1 ea. Log Periodic Dipole Array Antenna
- 1 ea. Log Periodic Antenna Adaptor
- 1 ea. Thread Insert for the Adaptor

ANTENNA SUPPORTS



100989
Log Periodic Antenna Adaptor



105861B
Thread Insert

The bottom side of the antenna adaptor has a 7/8 in. by 14 threaded receptacle for mounting the adaptor on a tower or tripod, if this is not the desired receptacle size, thread the 1/4 in. by 20 thread insert into the adaptor. Take care not to cross thread this connection as permanent damage to the adaptor and insert could occur.

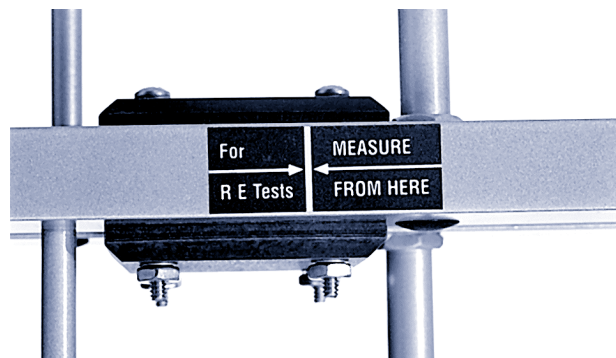
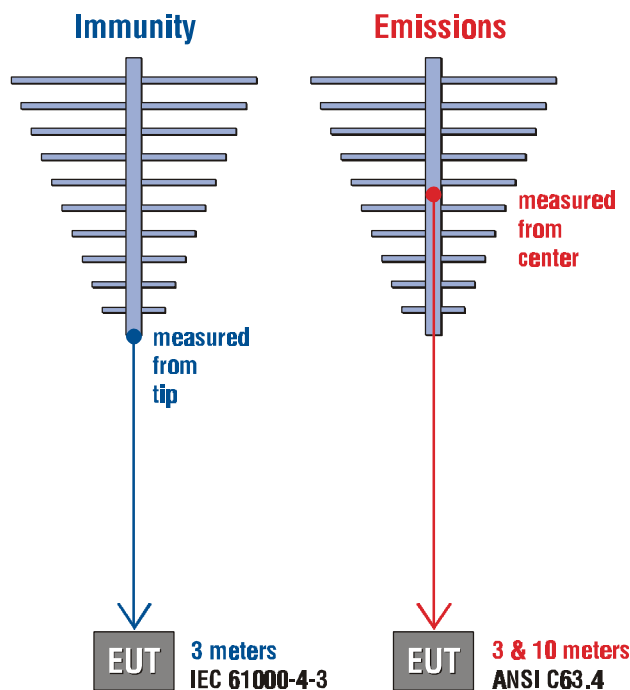
Next attach the antenna adaptor to the tower or tripod that will be used for testing. This can be accomplished by threading the mounting knob or threaded connector into the adaptor.

To mount the 3148 antenna, slide the adapter between the shoulders of the mounting bracket on the antenna. One side of the mounting bracket is fitted with a hex nut that in conjunction with

the knob provided will secure the assembly together. Thread the knob through the mounting bracket and adapter so that the knob threads through the hex nut last. Carefully tighten the knob to secure the antenna in place.

EMISSIONS AND IMMUNITY

The picture and diagrams below illustrate the convenient label that pinpoints the antenna's centerline and tip, serving as a reminder of where to perform measurements.



APPLICATION

Install the Model 3148 on an ETS-Lindgren tripod or antenna mast adapter. Connect an N-type coaxial cable from the antenna connector to a generator (immunity) or receiver (emissions). Both horizontal and vertical polarization are easily accomplished when the Model 3148 is mounted on a tower or tripod. Contact with any metallic or non-metallic structure can capacitively load the antenna which may cause inconsistent results. Therefore, care must be taken to ensure that no part of the dipole elements are in contact with the tripod or tower, particularly in vertically-polarized tests. Where possible, run the feed cable straight at least 1 meter or more back from the Model 3148 before dropping vertically.

For emissions measurements, electric field strength in db[V/m] is obtained from

$$E(\text{dBV/m}) = V(\text{dBV}) + AF(\text{dB1/m}) + \alpha(\text{dB}),$$

Where V is the receiver or spectrum analyzer voltage reading, AF is antenna factor (see attached calibration data), and α is cable loss in dB, if cable losses are non-negligible. For immunity testing, the electric field strength generated at a distance d can be approximated by

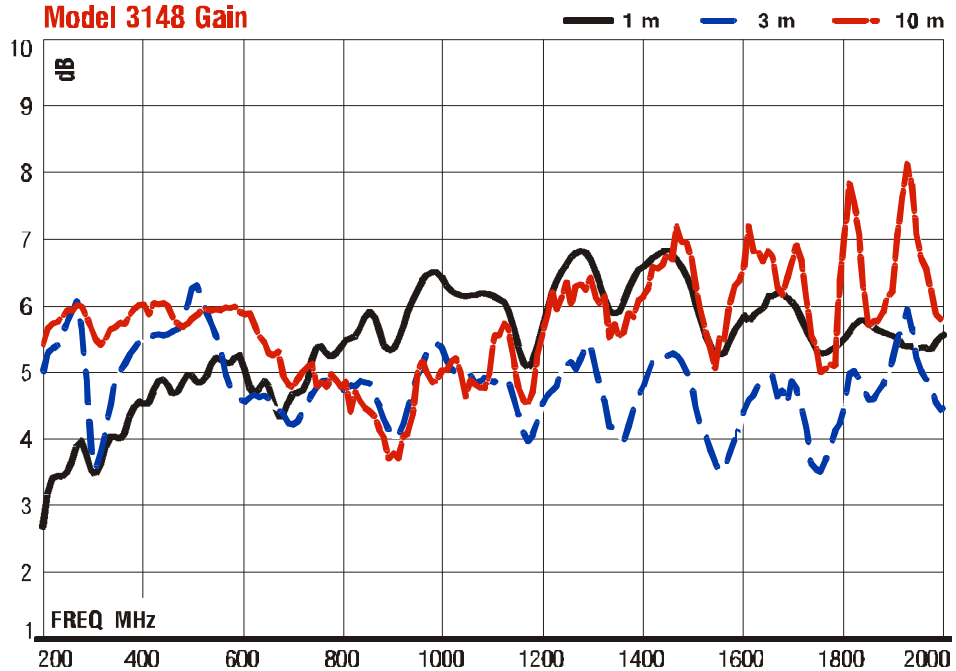
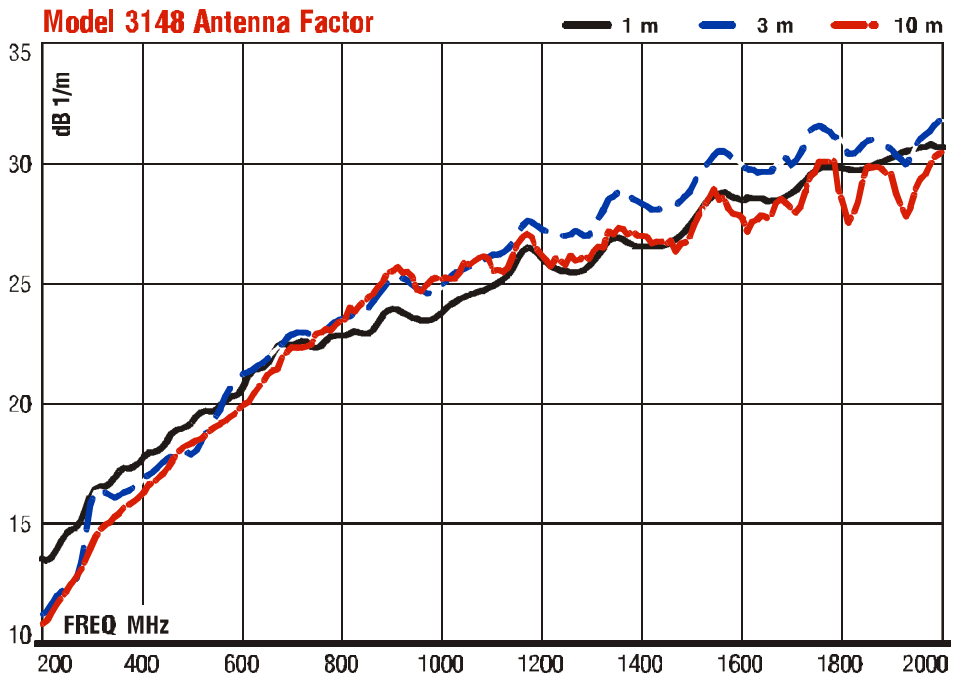
$$E(V/m) = \frac{\sqrt{30pg}}{d},$$

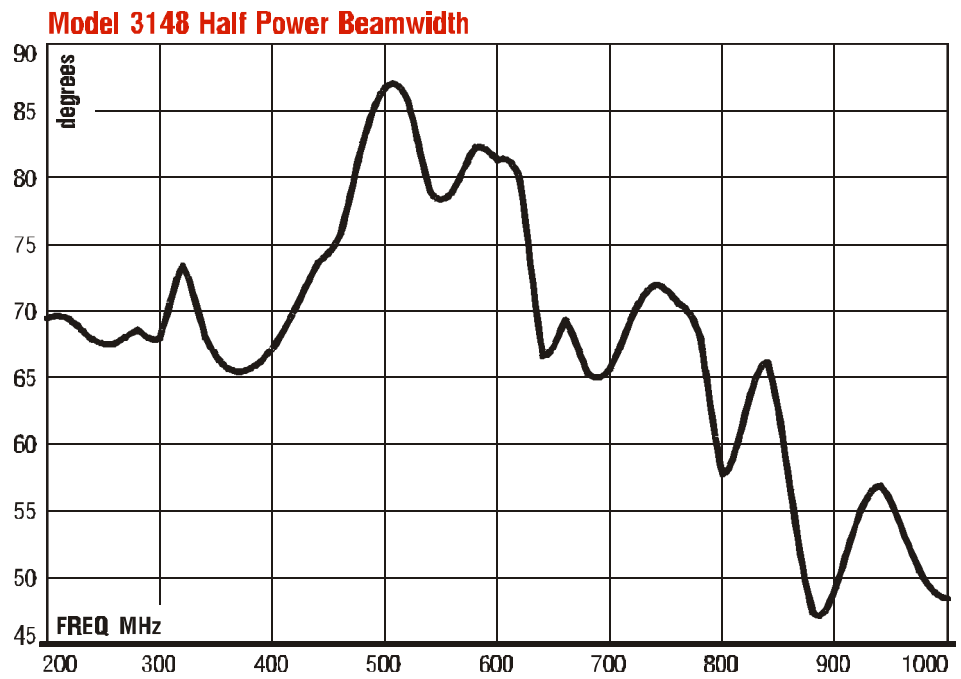
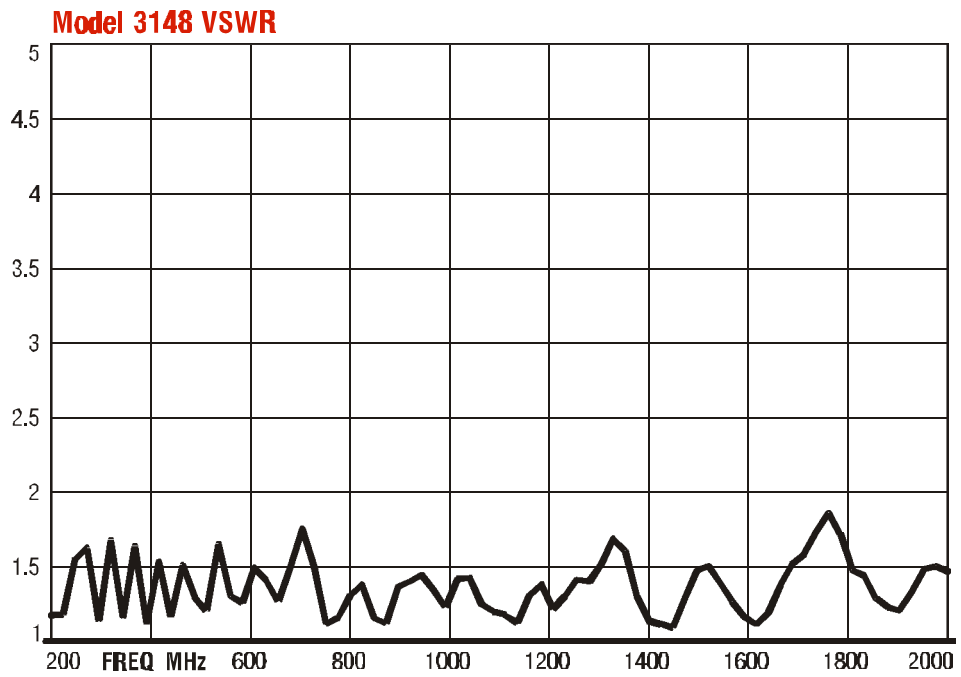
where d is in meters, g is the numeric gain ($10^{G[\text{dB}]/10}$, see attached calibration data), and P is antenna net input power in watts. An estimate of the power required in free space condition for any field strength E can be obtained from the forward power graphs in the "Typical Data" section, which shows power required in watts to generate 1 V/m. For any other field strength not shown, multiply the power in watts by the desired E -field squared, or

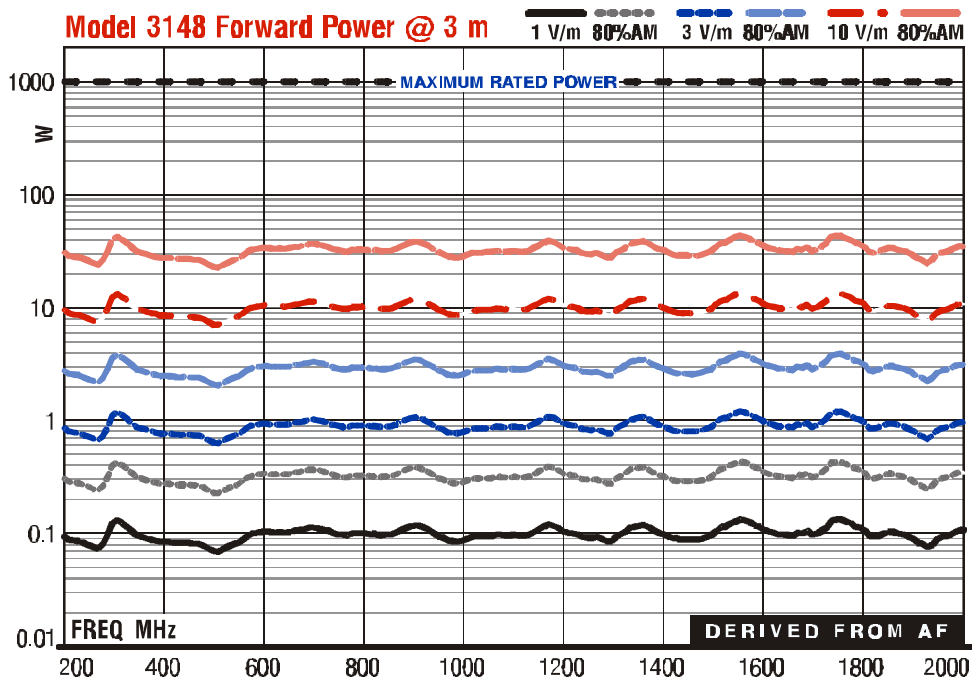
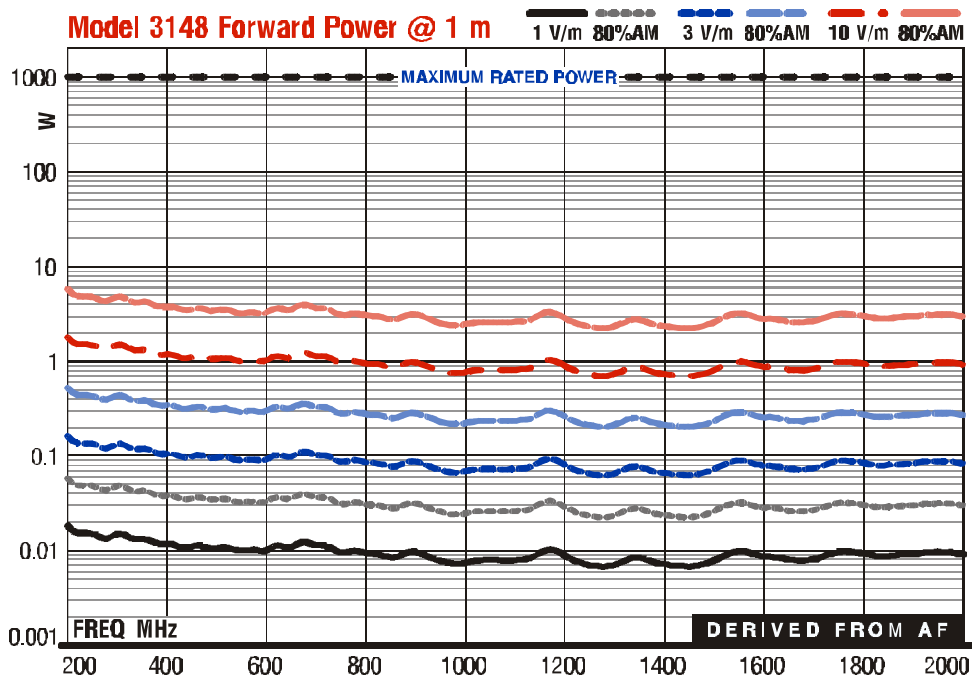
$$P(E \text{ V/m}) = E^2 P(1 \text{ V/m}).$$

Actual transmitted field strength should be verified using an ETS-Lindgren Model HI-6005 Electric Field Probe or equivalent. For IEC/EN 31000-4-3 type testing, the antenna tip can be placed at any distance between 1 and 3 meters from the EUT as long as the front face plane is illuminated according to the -0 , $+6$ dB uniform field specifications. It is usually necessary to place RF absorbing material between the EUT and antenna to suppress ground plane reflection to ensure the field uniformly, or conduct the immunity test in a fully-lined anechoic room. In general, closer distances require less power to create a given field strength.

TYPICAL DATA







SPECIFICATIONS

ELECTRICAL

Frequency Range	200 MHz – 2 GHz
VSWR Ratio	1.2:1 average 2.0:1 maximum
Maximum Continuous Power	1 kW
Peak Power	1.3 kW
Input Impedance (Nominal)	50 ohms
Symmetry	+/- 0.5 dB
Cross-Polarization rejection	Better than 20 dB below 1000 MHz
Connector	Type N female

PHYSICAL

Height	6.4 cm (2.5 in)
Width	85.6 cm (33.7 in)
Depth (length)	73.7 cm (29.0 in)
Weight	2.0 kg (4.5 lb)

MAINTENANCE

To ensure reliable and repeatable long-term performance, annual recalibration of your antennas by ETS-Lindgren's experienced technicians is recommended. Our staff can recalibrate almost any type or brand of antenna. Please call to receive a service order number prior to sending an antenna to us for calibration.

For more information about our calibration services or to place an order for antenna calibration visit our calibration website at <http://www.antennacalibration.com/>.

WARRANTY

EMC Test Systems, L.P., hereinafter referred to as the Seller, warrants that standard EMCO products are free from defect in materials and workmanship for a period of two (2) years from date of shipment. Standard EMCO Products include the following:

- ❖ Antennas, Loops, Horns
- ❖ GTEM cells, TEM cells, Helmholtz Coils
- ❖ LISNs, PLISNs, Rejection cavities & Networks
- ❖ Towers, Turntables, Tripods & Controllers
- ❖ Field Probes, Current Probes, Injection Probes

If the Buyer notifies the Seller of a defect within the warranty period, the Seller will, at the Seller's option, either repair and/or replace those products that prove to be defective.

There will be no charge for warranty services performed at the location the Seller designates. The Buyer must, however, prepay inbound shipping costs and any duties or taxes. The Seller will pay outbound shipping cost for a carrier of the Seller's choice, exclusive of any duties or taxes. If the Seller determines that warranty service can only be performed at the Buyer's location, the Buyer will not be charged for the Seller's travel related costs.

This warranty does not apply to:

- ❖ Normal wear and tear of materials
- ❖ Consumable items such as fuses, batteries, etc.
- ❖ Products that have been improperly installed, maintained or used
- ❖ Products which have been operated outside the specifications
- ❖ Products which have been modified without authorization
- ❖ Calibration of products, unless necessitated by defects

THIS WARRANTY IS EXCLUSIVE. NO OTHER WARRANTY, WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES PROVIDED BY THIS WARRANTY ARE THE BUYER'S SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT IS THE SELLER LIABLE FOR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Note: Please contact the Seller's sales department for a Return Materials Authorization (RMA) number before shipping equipment to us.