Model 3100 Series

Conical Log Spiral Antennas

User Manual

ETS·LINDGREN™
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<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Initial Release</td>
<td>September, 2002</td>
</tr>
<tr>
<td>B</td>
<td>Updated Gain chart for Model 3101; rebrand</td>
<td>July, 2008</td>
</tr>
<tr>
<td>C</td>
<td>Updated illustrations in Circular Polarization</td>
<td>March, 2013</td>
</tr>
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### Notes, Cautions, and Warnings

<table>
<thead>
<tr>
<th>Note: Denotes helpful information intended to provide tips for better use of the product.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAUTION</strong> Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.</td>
</tr>
<tr>
<td><strong>WARNING</strong> Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.</td>
</tr>
</tbody>
</table>

See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.
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1.0 Introduction

The ETS-Lindgren Model 3100 Series Conical Log Spiral antennas are circularly polarized broadband antennas covering the frequency range of 100 MHz to 10 GHz. This family of antennas includes the Model 3101, Model 3102, and the Model 3103. The Conical Log Spiral antennas are designed specifically for EMI measurements and compliance testing as called for in various Military Standards.

Each antenna is constructed of a fiberglass cone upon which two logarithmic spirals of 50-ohm coaxial cable are securely fastened. Outside windings improve heat dissipation. The coaxial connectors are located in the phenolic base plate of the cone. A 1/4–20 adapter for a tripod or other mounting configuration is attached to the antenna near its horizontal center of gravity or at the antenna base plate.

The Conical Log Spiral antennas receive both circular polarized and linear polarized fields (with a 3-dB variance for linear fields) under normal operating conditions.

Model 3101, Model 3102, and Model 3103 are right-hand wound, and transmit and receive a left-hand circularly polarized wave. Model 3101L, Model 3102L, and Model 3103L are left-hand wound, and transmit and receive a right-hand circularly polarized wave.

During the manufacturing process each antenna is individually calibrated at 1 meter per SAE ARP 958. Typical antenna data is included beginning on page 21. Actual factors and a signed Certificate of Calibration Conformance are shipped with each antenna.

Standard Configuration

- Left-hand circular polarization
- Support rod
- Support base configured to accept ETS-Lindgren or other tripod mount with standard 1/4–20 threads
Optional Items

RIGHT-HAND CIRCULAR POLARIZATION

This option reverses the antenna windings for right-hand polarization. See Circular Polarization on page 19.

TRIPOD OPTIONS

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

- **4-TR Tripod**—Constructed of linen phenolic and delrin, designed with an adjustable center post for precise height adjustments. Maximum height is 2.0 m (80.0 in), and minimum height is 94 cm (37.0 in). This tripod can support up to an 11.8 kg (26.0 lb) load.
• **7-TR Tripod**—Constructed of PVC and fiberglass components, providing increased stability for physically large antennas. The unique design allows for quick assembly, disassembly, and convenient storage. Allows several different configurations, including options for manual or pneumatic polarization. Quick height adjustment and locking wheels provide ease of use during testing. Maximum height is 2.17 m (85.8 in), with a minimum height of 0.8 m (31.8 in). This tripod can support a 13.5 kg (30 lb) load.

**ETS-Lindgren Product Information Bulletin**

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS-Lindgren calibration service
- ETS-Lindgren contact information
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2.0 Maintenance

Before performing any maintenance, follow the safety information in the ETS-Lindgren Product Information Bulletin included with your shipment.

Maintenance of the Conical Log Spiral antennas is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Maintenance Recommendations

If the Conical Log Spiral antennas are used outdoors, periodically check them for water accumulation. Water has a high dielectric constant and can alter the performance of the antenna.

Annual Calibration

See the Product Information Bulletin included with your shipment for information on ETS-Lindgren calibration services.
Replacement and Optional Parts

Following are the part numbers for ordering replacement and optional parts for the Model 3100 Series Conical Log Spiral antennas.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Right-hand wound / left-hand circularly polarized wave:**istrates</td>
<td></td>
</tr>
<tr>
<td>● Model 3101: 3101</td>
<td></td>
</tr>
<tr>
<td>● Model 3102: 3102</td>
<td></td>
</tr>
<tr>
<td>● Model 3103: 3103</td>
<td></td>
</tr>
<tr>
<td><strong>Left-hand wound / right-hand circularly polarized wave:</strong></td>
<td></td>
</tr>
<tr>
<td>● Model 3101: 3101L</td>
<td></td>
</tr>
<tr>
<td>● Model 3102: 3102L</td>
<td></td>
</tr>
<tr>
<td>● Model 3103: 3103L</td>
<td></td>
</tr>
<tr>
<td><strong>Support Base</strong> (for all Model 3100 Series antennas)</td>
<td>101942B</td>
</tr>
<tr>
<td>Model 3101 Support Rod</td>
<td>101941</td>
</tr>
<tr>
<td>Model 3102 Support Rod</td>
<td>101943B</td>
</tr>
<tr>
<td>Model 3103 Support Rod</td>
<td>101944</td>
</tr>
</tbody>
</table>

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.
3.0 Specifications

**Electrical Specifications**

<table>
<thead>
<tr>
<th></th>
<th>Model 3101</th>
<th>Model 3102</th>
<th>Model 3103</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Range:</strong></td>
<td>200 MHz–1 GHz</td>
<td>1 GHz–10 GHz</td>
<td>100 MHz–1 GHz</td>
</tr>
<tr>
<td><strong>Impedance:</strong></td>
<td>50 Ω</td>
<td>50 Ω</td>
<td>50 Ω</td>
</tr>
<tr>
<td><strong>VSWR (Avg):</strong></td>
<td>2.4:1</td>
<td>1.6:1</td>
<td>1.9:1</td>
</tr>
<tr>
<td><strong>Maximum Continuous Power:</strong></td>
<td>100 Watts</td>
<td>50 Watts</td>
<td>100 Watts</td>
</tr>
<tr>
<td><strong>Short-Term Peak Power:</strong></td>
<td>150 watts</td>
<td>100 Watts</td>
<td>150 Watts</td>
</tr>
<tr>
<td><strong>Polarization:</strong></td>
<td>Circular</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Connector:</strong></td>
<td>Type N female</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Physical Specifications**

<table>
<thead>
<tr>
<th></th>
<th>Model 3101</th>
<th>Model 3102</th>
<th>Model 3103</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length:</strong></td>
<td>81.3 cm</td>
<td>38.1 cm</td>
<td>102.0 cm</td>
</tr>
<tr>
<td></td>
<td>32.0 in</td>
<td>15.0 in</td>
<td>40.0 in</td>
</tr>
<tr>
<td><strong>Diameter:</strong></td>
<td>33.0 cm</td>
<td>12.7 cm</td>
<td>66.0 cm</td>
</tr>
<tr>
<td></td>
<td>13.0 in</td>
<td>5.0 in</td>
<td>26.0 in</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>4.5 kg</td>
<td>3.6 kg</td>
<td>10.0 kg</td>
</tr>
<tr>
<td></td>
<td>10.0 lb</td>
<td>8.0 lb</td>
<td>22.0 lb</td>
</tr>
</tbody>
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4.0 Mounting Instructions

**CAUTION** Before connecting any components, follow the safety information in the ETS-Lindgren Product Information Bulletin included with your shipment.

**CAUTION** Do not mount the Model 3100 Series Conical Log Spiral antennas onto a 2x2 boom.

**Using Included Mounting Adapters**

The Model 3100 Series Conical Log Spiral antennas ship with these mounting adapters:

- **101942B Support Base**—Ships with all Model 3100 Series antennas

**Support Rod**

- **101941 Support Rod**—Ships with Model 3101

- **101943B Support Rod**—Ships with Model 3102

- **101944 Support Rod**—Ships with Model 3103
MODEL 3101

To use the included adapters to mount the Model 3101 to a 4-TR Tripod, a 7-TR Tripod, or a mast:

Do not cross thread any connections or permanent could occur.

1. Thread the support rod into the support base.
2. Thread the other end of the support rod into the mounting block on the antenna.
3. Attach the support base to the 4-TR, 7-TR, or mast.
MODEL 3102

To use the included adapters to mount the Model 3101 to a 4-TR Tripod, a 7-TR Tripod, or a mast:

Do not cross thread any connections or permanent could occur.

1. Align the through holes on the support rod with the back plate of the antenna.

2. Insert the mounting screws (included) into the through holes and back plate. Tighten to secure the rod into place. Do not over tighten.

3. Attach the support base to the 4-TR, 7-TR, or mast.
MODEL 3103

To use the included adapters to mount the Model 3101 to a 4-TR Tripod, a 7-TR Tripod, or a mast:

Do not cross thread any connections or permanent could occur.

1. Thread the support rod into the support base.
2. Thread the other end of the support rod into the mounting block on the antenna.
3. Attach the support base to the 4-TR, 7-TR, or mast.
5.0 Circular Polarization

Left-Hand Circular Polarization

- Feed point at tip of antenna
- Right-hand wound (looking from tip of antenna)

- Right-hand wound: Results in left-hand circular polarized wave looking in the propagation direction (from the rear of the antenna)
- Electric field (voltage) maxima propagates from tip of antenna to rear along spiral transmission line

- Electro-magnetic wave propagates away from antenna with the same polarization as the electric field vector at the point in space and time from which it was launched
Right-Hand Circular Polarization

Feed point at tip of antenna

Left-hand wound (looking from tip of antenna)

Left-hand wound: Results in right-hand circular polarized wave looking in the propagation direction (from the rear of the antenna)

Electric field (voltage) maxima propagates from tip of antenna to rear along spiral transmission line

Electro-magnetic wave propagates away from antenna with the same polarization as the electric field vector at the point in space and time from which it was launched
6.0 Typical Data

Typical data measurements taken at one-meter spacing.

Model 3101

MODEL 3101 ANTENNA FACTOR
MODEL 3101 GAIN

MODEL 3101 VSWR
Model 3102

Model 3102 Antenna Factor

Model 3102 Gain
MODEL 3102 VSWR

MODEL 3102 FORWARD POWER – 1 METER
Model 3103

MODEL 3103 ANTENNA FACTOR

MODEL 3103 GAIN
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Appendix A: Warranty

See the Product Information Bulletin included with your shipment for the complete ETS-Lindgren warranty for your Conical Log Spiral antennas.

DURATION OF WARRANTIES FOR CONICAL LOG SPIRAL ANTENNAS

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to two years.

<table>
<thead>
<tr>
<th>Product Warranted</th>
<th>Duration of Warranty Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 3100 Series Conical Log Spiral Antennas</td>
<td>2 Years</td>
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</tbody>
</table>