



38485

4G/3G 9 dBi MIMO
Cellular Antenna



Guarantee

This equipment is guaranteed against defects in materials and workmanship. We will repair or replace products which prove to be defective during the guarantee period as detailed on your invoice, provided they are returned to us prepaid. The guarantee will not apply to:

- Equipment which has been modified or altered in any way without the written permission of Campbell Scientific
- Batteries
- Any product which has been subjected to misuse, neglect, acts of God or damage in transit.

Campbell Scientific will return guaranteed equipment by surface carrier prepaid. Campbell Scientific will not reimburse the claimant for costs incurred in removing and/or reinstalling equipment. This guarantee and the Company's obligation thereunder is in lieu of all other guarantees, expressed or implied, including those of suitability and fitness for a particular purpose. Campbell Scientific is not liable for consequential damage.

Please inform us before returning equipment and obtain a Repair Reference Number whether the repair is under guarantee or not. Please state the faults as clearly as possible, and if the product is out of the guarantee period it should be accompanied by a purchase order. Quotations for repairs can be given on request. It is the policy of Campbell Scientific to protect the health of its employees and provide a safe working environment, in support of this policy a "Declaration of Hazardous Material and Decontamination" form will be issued for completion.

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Note that goods sent air freight are subject to Customs clearance fees which Campbell Scientific will charge to customers. In many cases, these charges are greater than the cost of the repair.



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About this manual

Please note that this manual was originally produced by Campbell Scientific Inc. primarily for the North American market. Some spellings, weights and measures may reflect this origin.

Some useful conversion factors:

Area: 1 in ² (square inch) = 645 mm ²	Mass: 1 oz. (ounce) = 28.35 g 1 lb (pound weight) = 0.454 kg
Length: 1 in. (inch) = 25.4 mm 1 ft (foot) = 304.8 mm 1 yard = 0.914 m 1 mile = 1.609 km	Pressure: 1 psi (lb/in ²) = 68.95 mb
	Volume: 1 UK pint = 568.3 ml 1 UK gallon = 4.546 litres 1 US gallon = 3.785 litres

In addition, while most of the information in the manual is correct for all countries, certain information is specific to the North American market and so may not be applicable to European users.

Differences include the U.S standard external power supply details where some information (for example the AC transformer input voltage) will not be applicable for British/European use. *Please note, however, that when a power supply adapter is ordered it will be suitable for use in your country.*

Reference to some radio transmitters, digital cell phones and aerials may also not be applicable according to your locality.

Some brackets, shields and enclosure options, including wiring, are not sold as standard items in the European market; in some cases alternatives are offered. Details of the alternatives will be covered in separate manuals.

Part numbers prefixed with a “#” symbol are special order parts for use with non-EU variants or for special installations. Please quote the full part number with the # when ordering.

Recycling information



At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the products life should be removed from the product and also be sent to an appropriate recycling facility.

Campbell Scientific Ltd can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories.

For further advice or support, please contact Campbell Scientific Ltd, or your local agent.



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Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.** FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.eu or by telephoning +44(0) 1509 828 888 (UK). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines.**
- Maintain a distance of at least one-and-one-half times structure height, or 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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1. Introduction

The 38485 antenna is a wideband, dual-port, directional-panel antenna with slant 45 polarization that covers US LTE700/Cellular/PCS/AWS/MDS and global GSM900/GSM1800/UMTS/LTE2600 bands. The antenna is designed for fixed installations and is ideal for both indoor and outdoor applications. It includes a UV-stable enclosure that provides years of use without degradation to either mechanical properties or aesthetics.

This antenna boosts both the received and sent signals to and from the attached cellular modem in a single direction. Because of its directivity, it can reject adjacent unwanted side signals, allowing for better signal reception while rejecting interference from adjacent signal sources. This high-gain, directional antenna has a narrow beam width that requires precise aiming at the cellular tower or Wi-Fi access point.



2. Specifications

The peak gain, standing wave ratio (SWR), and beam width specifications are frequency specific and provided in [Table 2-1](#) (p. 2).

Operating temperature range:	-40 to 70 °C (-40 to 158 °F)
Storage temperature range:	-40 to 85 °C (-40 to 185 °F)
Operating frequency range:	698 to 960 MHz; 1710 to 2700 MHz
Impedance:	50 ohm
Isolation	>25 dB
Front/back ratio:	21 dB
Maximum input power	50 W (per port at 25 °C)

Polarization	Slant $\pm 45^\circ$
Wind rating (operating)	150 km/h (93 mph)
Bands:	US LTE700/Cellular/PCS/AWS/MDS Global FSM900/SM1800/UMTS/LTE 2600 WiMAX 2300/2500
Radome and base material:	UL94 V0 rated (UV-resistant)
Radome and base colour:	White
Ingression protection:	IP55
Connector type:	Dual Type N female
Bracket mast diameter:	1.5 to 3 in
Dimensions:	295 x 295 x 82 mm (11.61 x 11.61 x 3.23 in)
Weight	1.46 kg (3.22 lb)

Frequency	Peak gain (typical)	Peak gain (maximum)	Average SWR	Horizontal 3 dB beam width	Vertical 3 dB beam width
700 MHz	8.7 dBi	9.1 dBi	< 2.0:1	65 to 74 °	66 to 70 °
850 MHz	9.0 dBi	9.7 dBi	< 1.9:1	59 to 65 °	61 to 65 °
900 MHz	9.8 dBi	10.4 dBi	<1.7:1	57 to 60 °	56 to 60 °
1800 MHz	7.5 dBi	8.5 dBi	< 1.6:1	56 to 85 °	57 to 84 °
1900 MHz	8.5 dBi	9.1 dBi	<1.5:1	52 to 64 °	46 to 62 °
2100 MHz	8.4 dBi	9.1 dBi	<1.5:1	52 to 82 °	46 to 72 °
2300 MHz	9.5 dBi	10.1 dBi	<1.6:1	58 to 63 °	57 to 66 °
2600 MHz	9.7 dBi	10.0 dBi	< 1.8:1	48 ° to 54 °	48 ° to 55 °

3. Precautions

Please read all instructions carefully before attempting to install and use this product.

The 38485 and all associated equipment should be installed in accordance with applicable local and national electrical code guidelines to ensure safe operation.

4. Siting

For best results, mount the 38485 facing towards the centre of the coverage area with a clear line-of-sight path between the antenna and active floor. Avoid mounting next to a column or vertical support that could create a shadow zone and reduce coverage. A clearance of 0.91 m (3 ft) around the antenna is recommended.

5. Installation

The 38485 includes a mount assembly that secures the antenna to a mast or pole using hose clamps and mast mount adapter. The antenna can also be directly mounted on a wall (see [FIGURE 5-3](#) (p. 4) for drilling dimensions and orientation). Mount the antenna with the cable connectors facing downward. Route cables between the base plate ribs and through the radome notch.

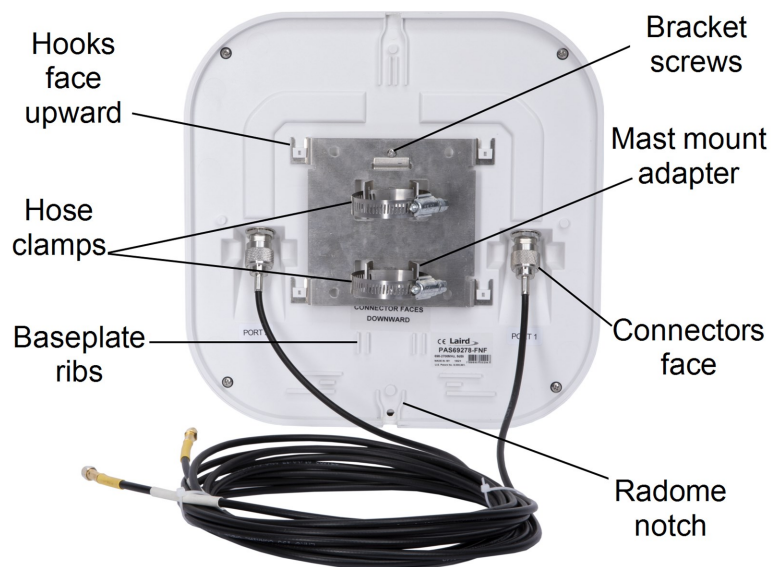


FIGURE 5-1. Wall/mast mounting bracket

Mast mounting:

1. Fasten the hose clamps to the mounting bracket.
2. Slide the antenna onto the bracket and tighten the two bracket screws.

3. Use the hose clamps to secure the antenna to the mast or pole.



FIGURE 5-2. 38485 mounted on a tower

Wall mounting:

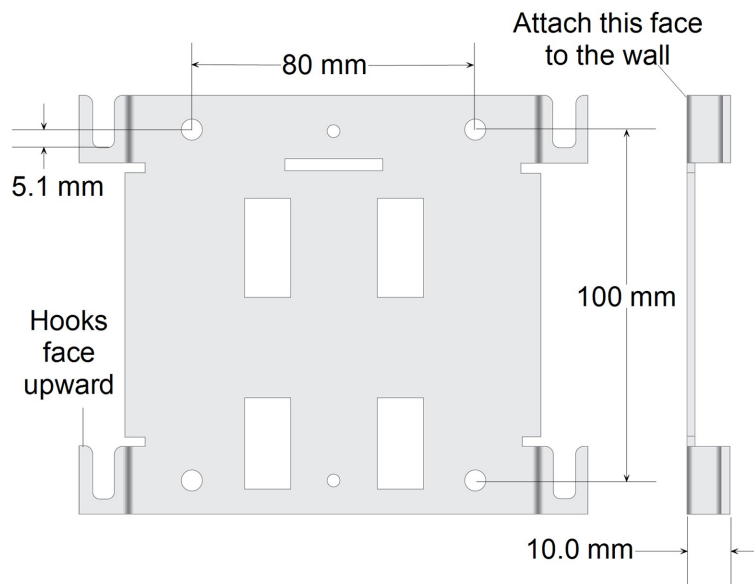


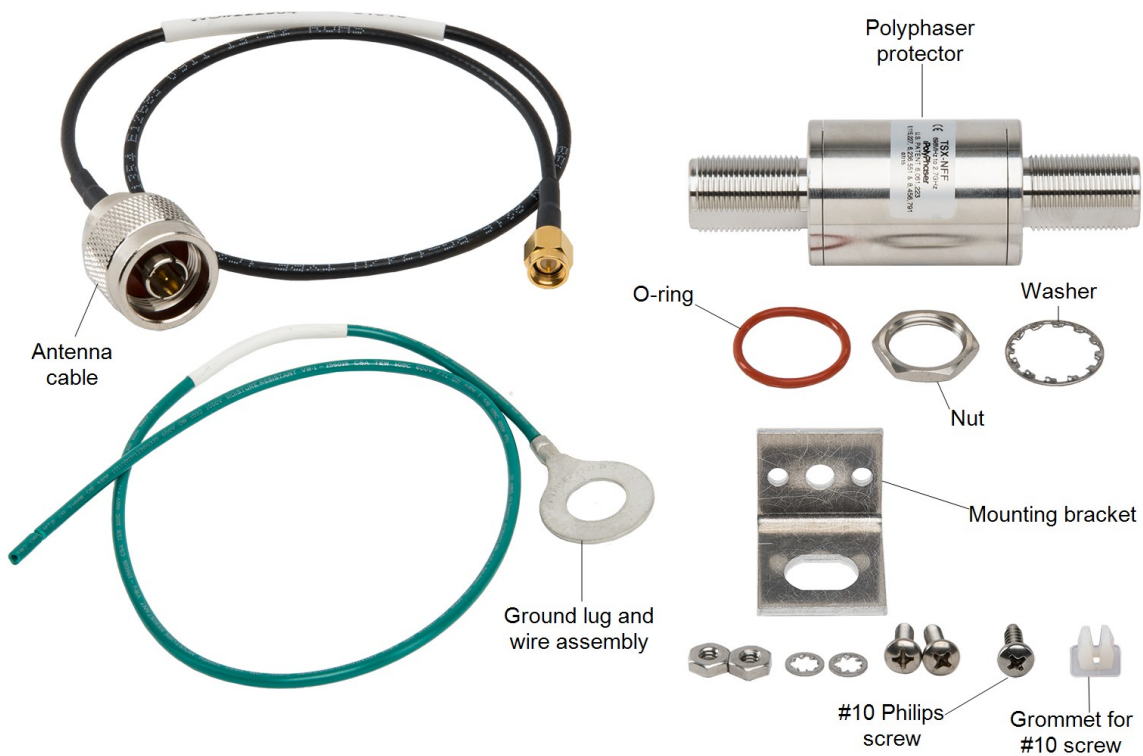
FIGURE 5-3. Wall mounting bracket: drilling dimensions and orientation

6. Surge protector kit (optional)

Campbell Scientific recommends installing two 31317 Surge Protection Kits—one for each antenna port. The 31317 Surge Protection Kits are not included with the antenna and must be purchased separately.

The 31317 Surge Protector Kit includes the following:

- Polyphaser protector
- RG174/U Antenna Cable, Type N Male to SMA Male (type N male connector fastens to the to the Polyphaser protector connector; the SMA male connector fastens to the antenna)
- Ground lug and wire assembly (position the lug between the connector and the enclosure wall or secure the lug using the nut and lock washer supplied)
- Surge protector flange mounting bracket and hardware for securing the polyphaser protector to an enclosure backplate



Campbell Scientific surge protector kits protect RF equipment by equalizing the potential difference between the centre pin of the coax cable and its shield. The kits include a capacitive-coupled gas tube protector with multi-strike capability. If properly grounded, the capacitor will

block low frequency surge currents induced onto the centre-pin from the antenna side until the gas tube reaches a high enough voltage to shunt the surge to ground.

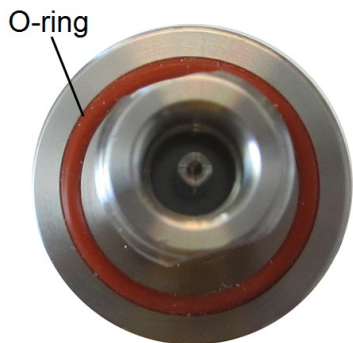
The protector gas tube lies between the centre conductor and the coax cable shield. During a surge event, the gas tube raises the centre conductor potential to the same potential as the shield. Once the centre conductor and shield are equalized, current cannot flow between the circuitry connected to the centre conductor and the shield/equipment chassis ground, thus protecting the equipment.

6.1 Surge protector enclosure installation

1. Use grommet and screw to secure the bracket to the enclosure backplate.

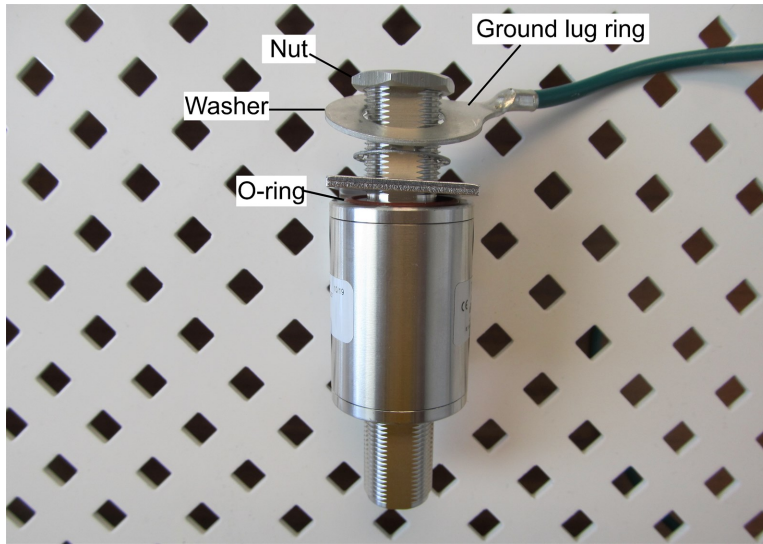


2. Place the O-ring on a connector of the Polyphaser protector.

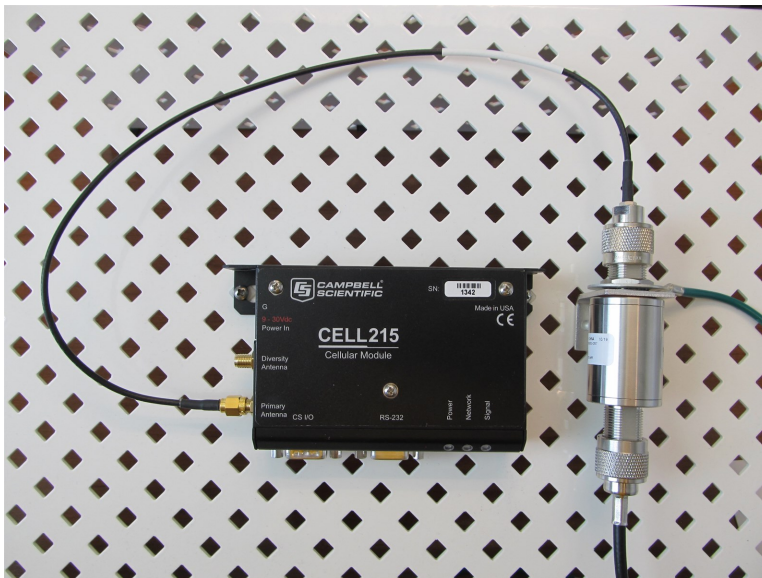


3. Insert that connector through the large hole in the bracket.

4. Place the washer, ground lug ring, and nut on the connector.



5. Connect the ground lug wire to the enclosure ground lug.
6. Connect cables to the Polyphaser protector, cell modem, and antenna.



6.2 Outdoor surge protector installation

Required equipment:

- Roll of self-vulcanizing tape (cold shrink tape), 25 mm x 3 m (1 inch x 10 feet)
- Scissors or tool for cutting the tape

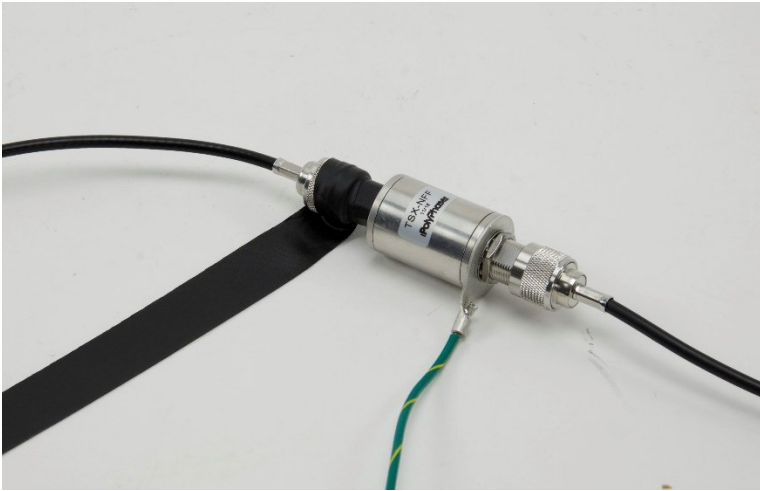
- Cleaning supplies to clean the surge protector and connections
- 31317 Surge Protector Kit

Procedure for connection:

1. Inspect connection components. If connectors are contaminated with dust, oil, or corrosion, thoroughly clean the connections without introducing liquid onto cable ends. Consider replacing connectors that have significant corrosion or cables that may have become water or oil soaked.
2. Clean the body of the Polyphaser protector.
3. Connect the Polyphaser protector to the antenna and use a SWR meter to ensure the measured surge protector value is in the 1.1:1 SWR range, which meets the protector SWR specification.
4. Place the washer, ground lug ring, and nut on a Polyphaser protector connector.
5. Connect cables to the Polyphaser protector.



6. On each connector, wrap tape in the direction of the threads. Apply tension while wrapping to ensure a good seal between the tape and connectors and between the tape layers.



7. Wrap both connectors a second time, contiguous with the surge protector, from end to end.



8. Extend the ground wire from the wrapping parallel to an antenna cable.

9. Use UV-resistant cable ties to secure the surge protector assembly to the mast that supports the antenna. To minimize moisture entry, point the end from which the ground wire emerges down.



6.3 Troubleshooting the surge protector

The surge protector kit protects RF equipment by equalizing the potential difference between the centre pin of the coax cable and its shield. High currents can damage the centre pin that makes the connection between the cable connector and protector. The protector can withstand 1,000 events at 500 A, 10/100 microsecond, or five events at 20,000 A, 8/20 microsecond surge. Expected life, without a surge strike, is 20 years. However, the actual Polyphaser lifespan varies because lightning has different current waveforms and return strokes. Tower size and placement, the ground conductivity, and number of storms per year also influence the life span.

At least every year, use the following procedure to check the surge protector:

1. Connect the Polyphaser protector to the antenna.
2. Connect the Polyphaser protector to the SWR meter.
3. Measure the SWR with the SWR meter. If the SWR value is greater than 2.5:1, replace the surge protector to avoid antenna damage.



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