Agilent Technologies

# Agilent Technologies 910A and 910B Waveguide Termination

Operating and Service Manual

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# What You'll Find In This Manual…

# Warranty

Custom systems are warranted by contractual agreement between Agilent Technologies and the customer.

## Certification

*Agilent Technologies, Inc., certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST, formerly NBS), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.*

## Warranty

This Agilent Technologies system product is warranted against defects in materials and workmanship for a period corresponding to the individual warranty periods of its component products. Instruments are warranted for a period of one year. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that prove to be defective.

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For products returned to Agilent Technologies for warranty service, Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

**LIMITATION OF WARRANTY.** The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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The remedies available under this warranty will be defined in, and subject to, the terms and limitations of the warranties contained in the contract of sale. To the extent permitted by local law, this warranty applies only to branded Agilent Technologies products and not to products manufacture by others that may be sold or distributed by Agilent Technologies. Nothing in this warranty will be construed to limit any rights or remedies provided elsewhere in the contract of sale with respect to matters other than year 2000 compliance.

## Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

For assistance, call your local Agilent Technologies Sales and Service Office (refer to "Service and Support" on page vi).

# Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center. You can find a list of local service representatives on the web at:

`http://www.agilent.com/find/assist`

Click on “Contact Us” and select your country.

If you do not have access to the Internet, one of these centers can direct you to your nearest representative:

| | |
|---|---|
| **United States** | (800) 403-0801 |
| **Canada** | (877) 429-9969 |
| **Europe** | (41 22) 780.6111 (Switzerland)<br>(33 1) 69 82 66 66 (France)<br>(49 7031) 464-6222 (Germany)<br>(44 188) 9696622 (Great Britain) |
| **Japan** | 0120-32-0119 |
| **Latin America** | (11) 7297-3700 (Brazil) |
| **Australia/New Zealand** | 1-800-802-540 (Australia)<br>0800-738-378 (New Zealand) |
| **Asia-Pacific** | 080-047-669 |

# Safety and Regulatory Information

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument. This product has been designed and tested in accordance with international standards.

**WARNING**

**The WARNING notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

**CAUTION**

The **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

## Instrument Markings

| | |
|---|---|
|  | When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information. |
|  | This symbol indicates hazardous voltages. |
|  | The laser radiation symbol is marked on products that have a laser output. |
|  | This symbol indicates that the instrument requires alternating current (ac) input. |
|  | The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven. |
|  | The CSA mark is a registered trademark of the Canadian Standards Association. |
| 1SM1-A | This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPER 11, Clause 4). |
|  | This symbol indicates that the power line switch is ON. |
|  | This symbol indicates that the power line switch is OFF or in STANDBY position. |

## Safety Earth Ground

This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and secured against any unintended operation.

## Before Applying Power

Verify that the product is configured to match the available main power source as described in the input power configuration instructions in this manual. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

# Overview

The Agilent 910A and 910B are terminations for waveguide systems operating at low average power. They are designed so that virtually all the applied power is absorbed, thus assuring a low SWR. The 910A and 910B are useful when a matched load is required, such as in the measurement of the reflection coefficient of a discontinuity or obstacle in a waveguide system. The termination may be used with a slotted line, directional coupler, reflectometer, etc. Specifications for each model are given in Table 2 on page 2.

The Models 910A and 910B consist of a section of waveguide terminated in a tapered lossy material (polyiron) which absorbs power. The difference between the 910A and 910B models is in the waveguide sections. The 910A waveguide section is standard waveguide stock. The waveguide section of the 910B is precision machined aluminum which is held to close tolerance.

## Equipment Supplied

Each termination is supplied with a flange cover. The Agilent part numbers of the flange covers are as follows:

***Table 1 Flange Cover Part Numbers***

| Band | Part Number |
|---|---|
| X | 5040-0354 |
| P | 5040-0358 |

# Specifications

*Table 2 Specifications*

| Characteristic | P910A | X910B |
|---|---|---|
| Frequency range (GHz) | 12.4 to 18.0 | 8.20 to 12.4 |
| SWR (maximum) | 1.02 | 1.015 |
| Fits waveguide size | 0.702 x 0.391<br>WR62 | 1.00 x 0.500<br>WR90 |
| Equivalent Flange | UG419/U | UG39/U |
| Power rating | 1 W | 1 W |
| Length | 4.375 in<br>111 mm | 6.625 in<br>168 mm |
| Weight | 0.25 lb<br>0.11 kg | 1 lb<br>0.45 kg |

# Inspection and Shipping

## Mechanical Check

If damage to the shipping carton is evident, ask that the carrier's agent be present when termination is unpacked. Inspect the termination for mechanical damage to the flange, waveguide, or load. The load is brittle and could be broken if the package was mishandled. The surfaces of the load material should be smooth and the load body should taper to a fine point (area at very tip should be less than 0.020" at the widest point). Severe damage will be obvious, while damage that will degrade electrical performance may not. The best indication of electrical and mechanical condition is a standing-wave ratio (SWR) measurement (see "Performance Tests").

## Electrical Check

The electrical performance should be verified as soon as possible after receipt. See "Performance Tests".

## Claim for Damage

If termination is mechanically damaged or fails to meet specifications upon receipt, notify the carrier and your nearest Agilent Technologies office immediately. Refer to "Service and Support" on page vi. Retain the shipping carton and the padding material for the carrier's inspection. The Agilent Technologies office will arrange for the repair or replacement of your termination without waiting for the claim against the carrier to be settled.

## Repackaging for Shipment

The same kinds of containers and materials used in factory packaging can be obtained from Agilent Technologies. Refer to "Service and Support" on page vi.

If the Termination is being returned to Agilent Technologies for servicing, attach a tag indicating the type of service required, return address and model number. Also mark the container *FRAGILE* to assure careful handling.

In any correspondence refer to the Termination by full model number.

# Operation

### Protect Flanges

The 910A and 910B series are fitted with standard cover-type flanges (equivalent JAN type flanges are listed in Table 1). Keep the flange cover on when the 910A or 910B is not in use. Always protect the face of the flange from damage. Any scoring or burring of the waveguide mating surfaces causes discontinuity which results in an increase in SWR.

### Keep Out Dust and Moisture

Use the plastic flange cover supplied with the termination to keep out dust and moisture from the interior of the 910A or 910B when it is not in use.

### Protect Load

The low SWR of the 910A and 910B is due to both the shape and material of the load. The critical detail of the shape is the tip. The sharper the tip, the lower the SWR. Since the loads are relatively long and made of brittle material the tips are easily broken. To prevent damage to the tips observe the following:

- Do not subject the waveguide section to mechanical shock when in use.
- Do not direct air under pressure against the load when cleaning.
- Cover the flange with the supplied plastic cover when storing.

**CAUTION**

Do not drop the termination. The tip of the load is very fragile and may break off.

### Connecting the Termination

When connecting the termination, make sure the flanges are smooth and clean. If the flanges are badly damaged, return the termination to Agilent Technologies for precision (slightly convex) lapping.

# Performance Tests

The instrument can be tested to the accuracy of the specifications in Table 2 with an automatic network analyzer or equivalent equipment of suitable accuracy. If an automatic network analyzer is available, test the instrument using the procedures in the analyzer's operating manual.

# Repair and Replaceable Parts

If load damage is suspected, proceed as follows:

**CAUTION**

Handle loads with care. Load tips are easily broken.

1. Remove the screws which hold the end block in the waveguide. The load is mounted on an end block which fits into the body of the 910A or 910B. Screws extending through the waveguide body hold the end block in place on all except the X-band model (nuts and screws hold the end block in place on the X910B.
2. Carefully pull the end block out of the waveguide.
3. Carefully inspect the load, especially the tip area. The surfaces of the load material should be smooth and the load body should taper to a fine point. The area at the very tip should be less than 0.020" at the widest point. Severe damage will be obvious, while damage that will degrade electrical performance may not be obvious.
4. If the load is damaged in any way, replace it. Consult Table 3 for part numbers. Replacement loads for the 910A and 910B are pretested.
5. Mount the new load on the end block. Carefully reinstall the end block. The load is very brittle and should not be allowed to touch the sides of the waveguide body.

## Replaceable Parts

Table 3 provides a list of the loads and the end block, by each band. The main body of the 910A or 910 B is not considered replaceable. Since the load is more fragile, it probably will be damaged if the main body is damaged. Therefore, repair of only the main body is not practical.

To order a part listed in the replaceable parts table, quote the part number, indicate the quantity required, and address the order to the nearest Agilent Technologies office.

***Table 3 Replaceable Parts***

| Model | Load Part No. | CD | End Block Part No. |
|---|---|---|---|
| P910A | 5020-3203 | 0 | 00910-20006 |
| X910B | 5020-3206 | 3 | 00910-20007 |