

Variable Attenuators (Step & Continuously)



- /// Wide Choice of Attenuation & Frequency Ranges.
- /// High Reliability & Long Life
- /// Rugged Construction & Connectors
- /// Rotational Stops Included on most models
- /// Low Cost Designs - Model 3056
- /// Custom Designs Available

General Information

In this section of the catalog, each Manual Step and Variable Attenuator is outlined utilizing individual data sheets containing product features, specifications, and outline drawings. These data sheets are preceded by a quick reference guide to help you select the Manual Step and Variable(s) that fits your needs. The page number for each Step Attenuator data sheet is given in the quick reference guide.

NOTE: *EXPRESS* Shipment available via www.argosysales.com or 800-542-4457. Check with distributor for current products and stocking quantities.



Continuously Variable Attenuators...dc-4.2 GHz



| Frequency Model Number | Average Range (GHz) | Peak Power (Watts) | Residual Power (Watts) | Maximum Insertion Loss (dB) | Attenuation Range (dB) | Maximum SWR | Connector Type | Page No. |
|------------------------|---------------------|--------------------|------------------------|-----------------------------|------------------------|--------------|----------------|----------|
| ♦ 940-60 940-114 | dc-4.0 dc-2.0 | 5 | 500 | 6 | 60 114 | 1.80 1.60 | SMA/N SMA/N | 136 |



Manual Step Attenuators...dc-26.5 GHz



| Model Number | Frequency Range (GHz) | Incremental Attenuation Range (dB) | Insertion Loss (dB) | Average Power (Watts) | Peak Power (Watts) | Maximum SWR | Connector Type | Page No. |
|--|------------------------------|---|---|-----------------------|--------------------|--|----------------|----------|
| ♦ 3003 3006 3007 | dc-2.50 dc-1.25 dc-2.5 | 0-70/10 0-100/10 0-10/1 | 0.3 0.2 0.3 | 1 | 100 | 1.20 1.20 1.30 | SMA | 139 |
| ♦ 3010 3014 | dc-2.5 dc-1.25 | 0-70/1 0-110/1 | 0.7 0.5 | | | 1.35 1.30 | | |
| ♦ 3053 ♦ 3054 | dc-6.0 dc-6.0 | 0-10/1 0-70/1 | 0.3-0.7* 0.8-1.3* | | | 1.3-1.4* 1.3-1.55* | SMA | 141 |
| 3056 <i>New</i> | dc-3.0 | 0-70/1 | 0.25-0.35* | 1 | 100 | 1.30-1.40* | SMA | 138 |
| AC9009 ♦ AC9003 AC9004 AC9010 AC9011 | dc-4.0 | 0-9/1 0-69/1 0-99/1 0-60/10 0-90/10 | 0.3 0.6 0.6 0.4 0.5 | 2 | 200 | 1.25 1.35 1.35 1.35 1.35 | SMA | 143 |
| ♦ AF9009 ♦ AF9003 AF9004 AF9010 AF9011 | dc-18.0 | 0-9/1 0-69/1 0-99/1 0-60/10 0-90/10 | 0.3-1.0* 0.6-1.5* 0.6-1.5* 0.4-1.0* 0.5-1.0* | 2 | 200 | 1.60 1.75 1.75 1.60 1.60 | SMA | |
| 9012-9 9012-70 | dc-26.5 | 0-9/1 0-70/10 | 1.0-1.5* 1.0 or 2% | 2 | 200 | 1.45-1.50* | 2.92mm | 149 |
| AC115A AC116A AC117A AC118A AC119A | dc-4.0 | 0-9/1 0-60/10 0-69/1 0-90/10 0-99/1 | 0.3 0.3-0.4** 0.5-0.6** 0.4-0.5** 0.5-0.6** | 2 | 200 | 1.25-1.30* 1.25-1.30* 1.50 1.25-1.30* 1.35-1.70* | SMA/N | 146 |
| AF115A AF116A AF117A AF118A AF119A | dc-18.0 | 0-9/1 0-60/10 0-69/1 0-90/10 0-99/1 | 0.7-1.0** 0.7-1.0** 1.2-1.5** 0.8-1.02** 1.2-15** | 2 | 200 | 1.60 1.60 1.70 1.60 1.70 | SMA/N | |



* VARIES WITH FREQUENCY.

- ♦ EXPRESS Shipment available via www.argosysales.com or 800-542-4457.
Note: Other models may also be available from Express delivery.

Frequently Asked Questions about Variable & Manual Step Attenuators....

What are the applications for Weinschel's variable/manual step attenuators?

Continuously Variable Attenuators are used in applications where the need exists for controlling signal levels continuously without interrupting the circuit. Most Weinschel models are in linear scales, and have low frequency sensitivity with broad frequency coverage, resulting from the use of proven Aeroflex / Weinschel resistive films. The resistive elements located in these Variable Attenuators provide long-term stability over temperature and humidity.



Manual Step Attenuators are primarily used in areas demanding broadband accuracy with low SWR and accurate repeatability over large attenuation ranges. The Weinschel Step Attenuators utilize the excellent performance characteristics of the Weinschel fixed coaxial attenuators. The Weinschel step attenuators are widely used in many types of ATE and OEM systems operating throughout the world.

Aeroflex / Weinschel offers a selection of different attenuation ranges and frequency ranges to select from. These range from 0 to 10 dB in 1 dB steps up to 0 to 100 dB in 10 dB steps and frequency ranges from dc to 40 GHz. High volume fabrication techniques, including injection molding, stamping, broaching and thick film printing ensure a cost effective and uniform product.

What is the difference between insertion loss and incremental attenuation?

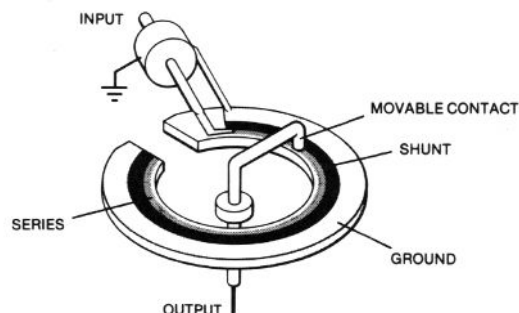
Step and variable attenuators have insertion loss and also incremental attenuation. Insertion loss is the loss through the attenuator when all cells are switched to zero dB. It is the residual loss of the device itself. Insertion loss usually increases with frequency reaching several dB at the higher frequencies and generally has very flat frequency response. Incremental attenuation is the attenuation values of the attenuators cells relative to the insertion loss. Since insertion loss is always present, the performance of a step or variable attenuator is always given as incremental attenuation relative to insertion loss. Insertion loss is considered part of the fixed performance of the system path in which the step or variable attenuator is located.

What types of variable attenuators does Weinschel offer?

There are several designs of continuously variable attenuator available in the marketplace: Piston, card, tee, and resistive center conductor. Weinschel offers only the Variable Card Attenuator Design.



Weinschel's 940 series uses a card resistor on a disk with a movable coaxial contact (shown below) similar in nature to a potentiometer and provides an incremental range of 114 dB incremental range at 2 GHz and 60 dB at 4 GHz. Because the shunt film is connected to ground permanently, in order to achieve the extended attenuation range, the minimum loss of this type attenuator is higher (4 to 6 dB).



Variable Attenuators



Specifications-Con't

CONNECTOR: SMA or Type N connector per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connector.

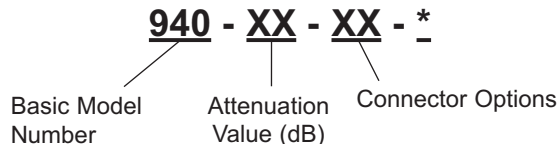
| Connector Options | INPUT (J1) | OUTPUT (J2) |
|-------------------|-------------|-------------|
| 11 | SMA, Female | SMA, Female |
| 12 | SMA, Female | SMA, Male |
| 22 | SMA, Male | SMA, Male |
| 33 | N, Female | N, Female |
| 34 | N, Female | N, Male |
| 44 | N, Male | N, Male |

CONSTRUCTION: Aluminum body and stainless steel connector; gold plated beryllium copper contacts. Knob is included with each unit.

WEIGHT: Net 1,570 g (3 lbs, 8 oz)

MODEL NUMBER DESCRIPTION:

Example:

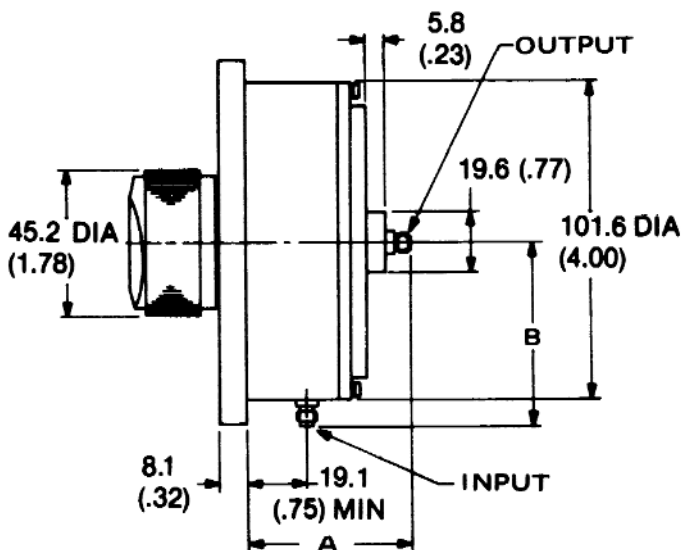
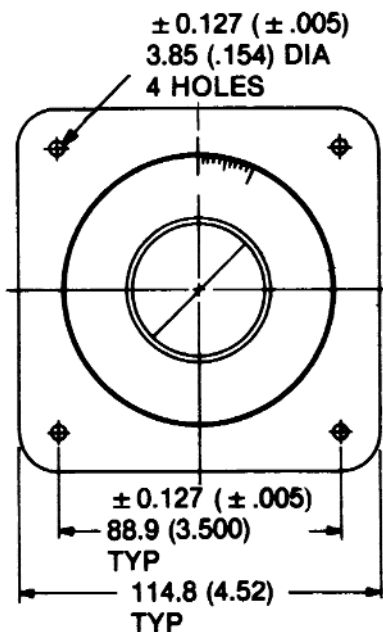


* Add -1 for long life version.

ACCESSORIES

ATTENUATOR STAND, MODEL 940 Z: This stand allows a user to easily mount any Model 940 for those bench applications.

PHYSICAL DIMENSIONS:



| Model No. | DIM A | DIM B |
|-----------|-------------|-------------|
| 940-XX-11 | 52.3 (2.06) | 58.2 (2.29) |
| 940-XX-12 | 55.6 (2.19) | 58.2 (2.29) |
| 940-XX-22 | 55.6 (2.19) | 61.5 (2.42) |
| 940-XX-33 | 61.0 (2.40) | 68.1 (2.68) |
| 940-XX-34 | 66.0 (2.60) | 68.1 (2.68) |
| 940-XX-44 | 66.0 (2.60) | 71.9 (2.83) |

NOTE:

- All dimensions are given in mm (inches) and are maximum, unless otherwise specified.
- Unit available with RoHS compliant materials, specify when ordering.

Model 3056 RF Manual Step Attenuator

dc to 3.0 GHz



1 Watt

SMA Connectors

RoHS



ATTENUATION ACCURACY (dB):

| Frequency (GHz) | Accuracy |
|-----------------|-----------|
| dc - 3.0 | ± 0.30 dB |

MAXIMUM SWR & INSERTION LOSS:

| Frequency (GHz) | SWR | Loss (dB) |
|-----------------|------|-----------|
| dc-1.0 | 1.15 | 0.15 |
| 1.0-2.0 | 1.20 | 0.20 |
| 2.0-3.0 | 1.35 | 0.25 |

Features

- /// Rotational Stops Included
- /// Cost Effective OEM Design - Optimized for Wireless Communication System Applications.
- /// Custom Designs Available

Specifications

NOMINAL IMPEDANCE: 50 Ω
FREQUENCY RANGE: dc to 3.0 GHz
ATTENUATION RANGE/STEPS: 0-10 dB in 1.0 dB steps
TEMPERATURE RANGE: -20 °C to +85 °C
POWER RATING: 1 watt **average** @ 25°C ambient temperature, derated linearly to 0.25 watt @ 85°C. 100 watts **peak** (5 μsec pulse width; 0.5 % duty cycle).

CONNECTOR: SMA female connector per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connector.

SHAFT ROTATION: Clockwise for increasing attenuation

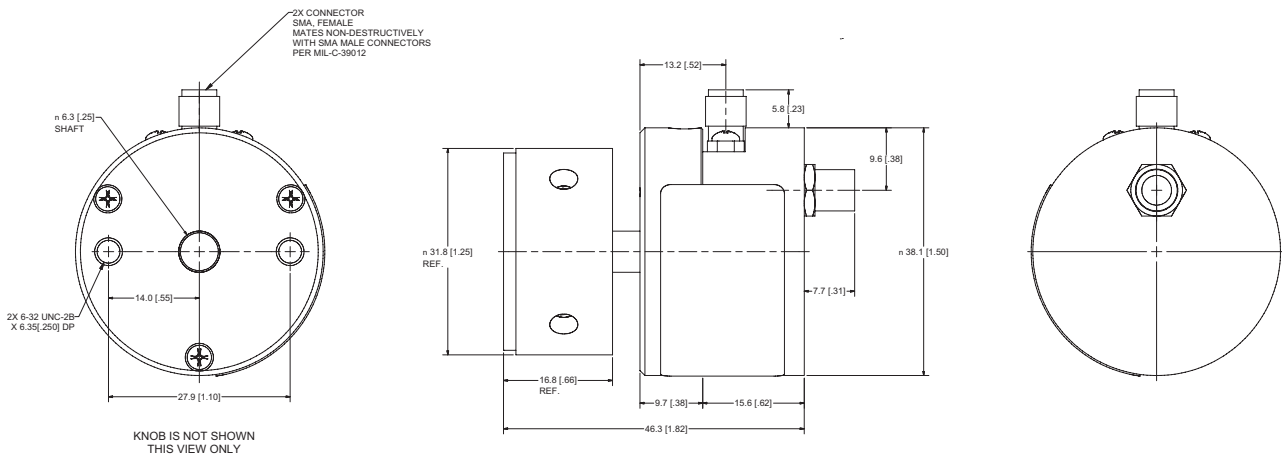
STEP ANGLE: 30.0°

CONSTRUCTION: Machined aluminum body. Knob is included with each unit.

WEIGHT: Net 110 g (4 oz)

NOTE: Minimum quantities apply. Contact factory or local sales representative for more information.

PHYSICAL DIMENSIONS:



NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise specified.

Specifications-Con't

MAXIMUM SWR & ZERO INSERTION LOSS:

| Model | Frequency (GHz) | SWR | Loss (dB) |
|-------|-----------------|------|-----------|
| 3003 | dc - 2.5 | 1.20 | < 0.3 |
| 3006 | dc - 1.25 | 1.20 | < 0.2 |
| 3007 | dc - 2.5 | 1.30 | < 0.3 |
| 3010 | dc - 2.5 | 1.35 | < 0.7 |
| 3014 | dc - 1.25 | 1.30 | < 0.5 |

INCREMENTAL PHASE SHIFT: ~0.25° per dB x f(GHz)

CONSTRUCTION: Shafting and external hardware and connector shells: CRES Type 303, per ASTM-A582 passivated per QQ-P-35. Housing: AL ALLOY Gold Flash. Knob is included with each unit.

TEST DATA: Test data is available at additional cost.

WEIGHT: Single drum: Net 125 g (4.4 oz)
Dual drum: Net 201 g (9.9 oz)

SWITCHING LIFE: 1,000,000 steps

REPEATABILITY: ±0.1 dB over frequency range and rated life

ROTATION STOPS: Supplied on 10 dB step drums (not supplied on 1 dB drums).

MODEL NUMBER DESCRIPTION:

Example:

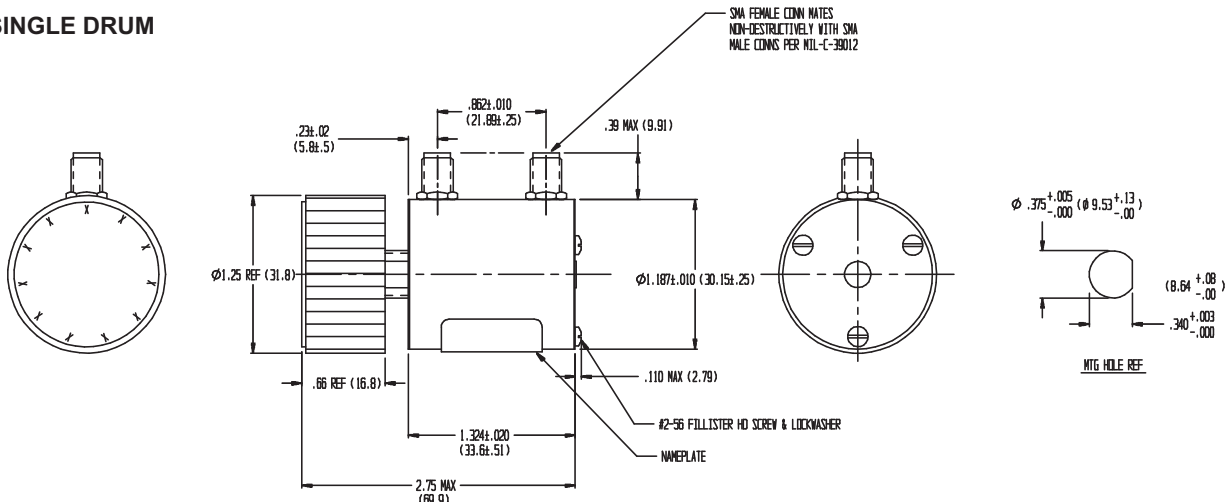
3010 - 100

Basic Model Number

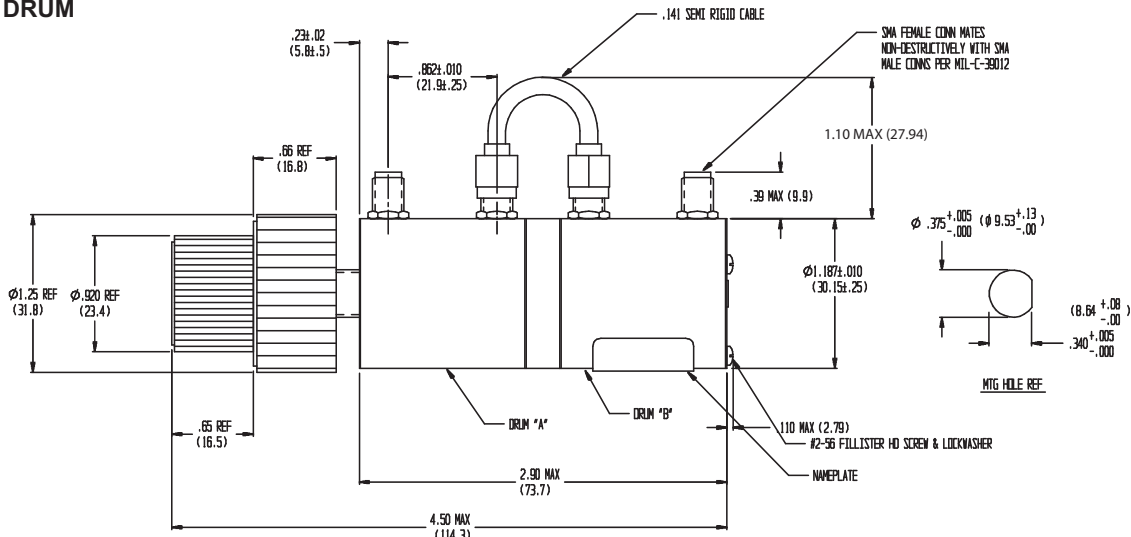
Additional Options no longer available. Add -100 Only!

PHYSICAL DIMENSIONS:

SINGLE DRUM



DUAL DRUM



Variable Attenuators



Models 3053 & 3054 Manual Step, Ruggedized SMA Connectors

dc to 6.0 GHz
1 Watt



Specifications

NOMINAL IMPEDANCE: 50 Ω
 FREQUENCY RANGE: dc to 6.0 GHz
 INCREMENTAL ATTENUATION RANGE/STEPS:
 Model 3053: 0-10 dB in 1 dB steps
 Model 3054: 0-70 dB in 1 dB steps
 POWER COEFFICIENT: < 0.006 dB/dB/watt
 TEMPERATURE COEFFICIENT: 0.0004 dB/dB/ $^{\circ}$ C
 TEMPERATURE RANGE:
 Operating: -40 $^{\circ}$ C to +65 $^{\circ}$ C
 Non-Operating: -54 $^{\circ}$ C to +85 $^{\circ}$ C

Features

- /// **High Reliability** - Repeatability better than 0.1 dB over frequency range and life. Weinschel patented detent mechanism, tested to 1,000,000 operations at +75 $^{\circ}$ C, operates dependably even down to -40 $^{\circ}$ C.
- /// **Product Uniformity** - High volume fabrication techniques, including injection molding, stamping, broaching and thick film printing ensure a cost effective and uniform product.
- /// **Low Frequency Sensitivity** - Typically 0.1 to 0.2 dB up to 2.5 GHz.
- /// **Shock Resistant** - 100% spring contact system withstands mechanical and thermal shock and eliminates the need for epoxy or solder.
- /// **Wide Selection** - Wide choice of attenuation ranges and increments in standard stock models. Single and dual drum configurations available.
- /// **Knob Included** - Knobs for both single and dual drum models are included with every attenuator. Characters are screened on the face of the knob insert which is coated with a clear layer of epoxy for protection.

Special Configurations

Some modifications to the basic configuration of the 3000 Series can be made during manufacturing. Examples of these special configurations are shafts having special lengths and ends; clockwise shaft rotation; modified mounting arrangements; and provisions for add-on items such as concentric potentiometer and ganged switches.

ATTENUATION ACCURACY:

| Model | Accuracy |
|-------|---|
| 3053 | \pm 0.3 dB |
| 3054 | \pm 0.3 dB or 2% (dc to 3 GHz) \pm 0.3 dB or 3.5% (3 to 6 GHz) |

POWER RATING: 1 watts **average** @ 25 $^{\circ}$ C ambient temperature, derated linearly to 0 watts @ 65 $^{\circ}$ C. 100 watts **peak** (5 μ sec pulse width; 0.5 % duty cycle).

CONNECTOR: SMA female connector per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connector.

SHAFT ROTATION: counter clockwise for increasing attenuation

STEP ANGLE: 32.7 $^{\circ}$

DRUM CONFIGURATIONS:

Single Drum: 3003, 3006, 3007, 3053
 Dual Drum: 3010, 3014, 3054

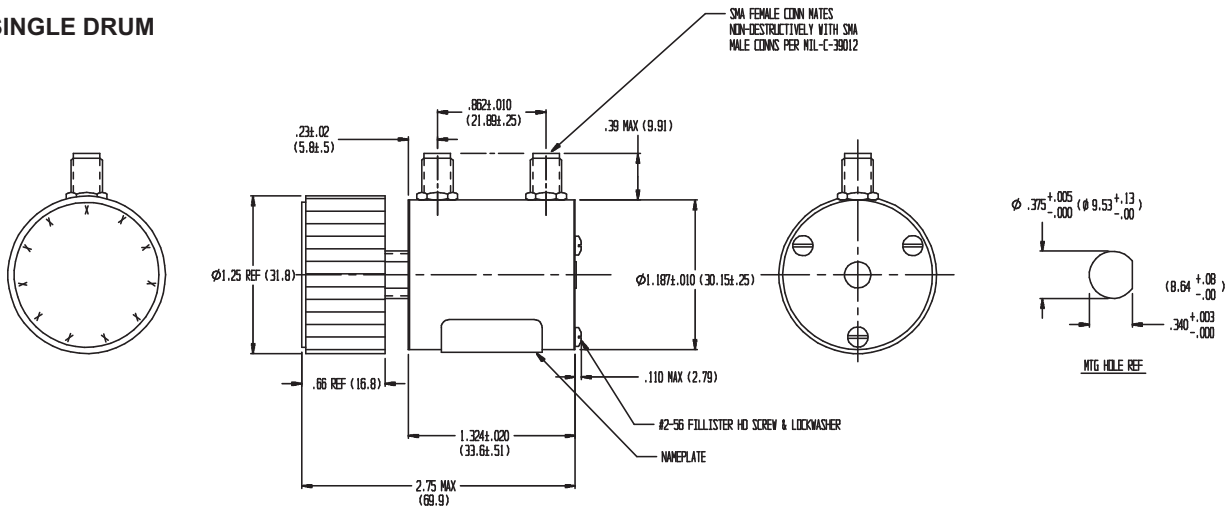
MAXIMUM SWR & ZERO INSERTION LOSS:

| Model | Frequency (GHz) | SWR | Loss (dB) |
|-------|-----------------|------|-----------|
| 3053 | dc - 3.0 | 1.30 | < 0.3 |
| | 3.0 - 6.0 | 1.40 | < 0.7 |
| 3054 | dc - 3.0 | 1.30 | < 0.8 |
| | 3.0 - 6.0 | 1.55 | < 1.3 |

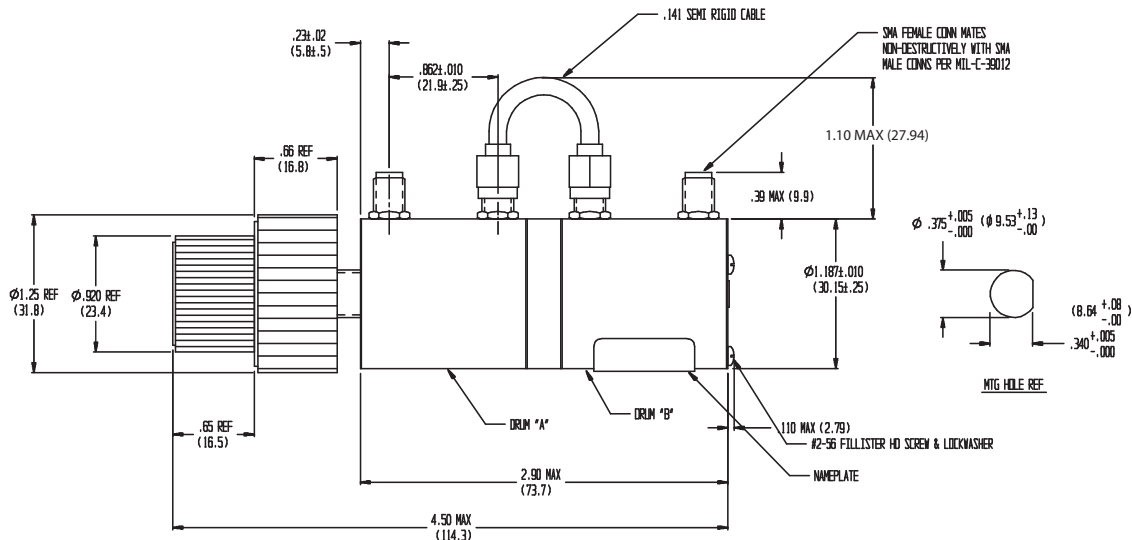
SWITCHING LIFE: 1,000,000 steps
REPEATABILITY: ± 0.1 dB over frequency range and rated life
ROTATION STOPS: Supplied on 10 dB step drums (not supplied on 1 dB drums).
INCREMENTAL PHASE SHIFT: $\sim 0.25^\circ$ per dB \times f(GHz)
CONSTRUCTION: Shafting and external hardware and connector shells: CRES Type 303, per ASTM-A582 passivated per QQ-P-35. Housing: AL ALLOY Gold Flash. Knob is included with each unit.
TEST DATA: Test data is available at additional cost.
WEIGHT: Single drum: Net 125 g (4.4 oz)
Dual drum: Net 201 g (9.9 oz)

PHYSICAL DIMENSIONS:

SINGLE DRUM



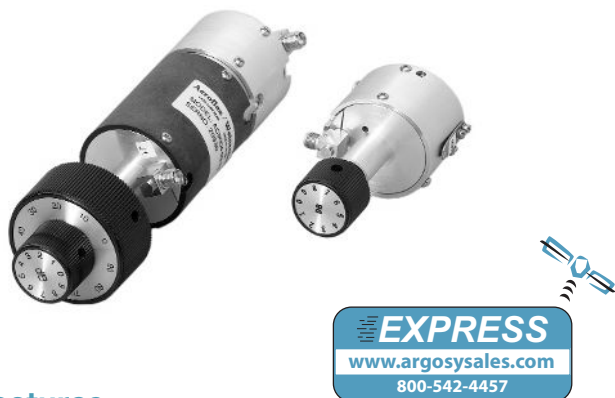
DUAL DRUM



Variable Attenuators



Models 9003, 9004, 9009, 9010 & 9011 dc to 18.0 GHz Manual Step, Ruggedized SMA Connectors 2 Watt



Features

- /// **Broadband** - Available in a choice of frequency ranges: dc to 4, dc to 8, dc to 12.4 and dc to 18 GHz.
- /// **Available Express Models:** AC-9003-69-31
AF-9003-9-12
AF-9003-69-31

Other models may be available for Express delivery.

- /// **Wide Choice of Attenuation Ranges** - A choice of five standard attenuation ranges is available: 0 to 9.0, 0 to 69 and 0 to 99 dB in 1 dB steps, and 0 to 60 and 0 to 90 dB in 10 dB steps.
- /// **Environmental** - Designed to meet most environmental requirements of MIL-A-24215 (Vibration, Shock, Relative Humidity to 95% and Altitude).
- /// **In-line Configuration** - Passivated stainless steel SMA connector are set parallel with control shaft (except units with right angle connector) to reduce volume for applications where space is critical. All models are bidirectional.
- /// **Precise Incremental Attenuation Accuracy** - Model 9000 series has flat frequency response and small deviation from nominal attenuation at all settings (e.g., deviation is only ± 2.5 dB at 99 dB setting at 18 GHz).
- /// **Excellent Repeatability and Long Switch Life.**
- /// **Custom Configurations Available Upon Request.**
- /// **Highly Accurate Detent Stepping** - Direct drive of attenuator drums eliminates gears and provides for excellent repeatability.
- /// **Safety Mechanical Stop** - A mechanical stop between maximum and 0 attenuation positions on all models except 0-9 dB unit is provided to prevent large power changes at attenuator output from damaging sensitive equipment.

Description

The Model 9000 series Step Attenuators are broadband miniature step attenuators that provide excellent performance characteristics suitable for use in high reliability 50 ohm systems and applications requiring extra-small components for the precision control of signal levels. The Model 9000 series can be used either as input or output attenuators in signal sources, receivers, field strength meters, spectrum analyzers, etc.

The SMA connector furnished on all models are available in either standard or right-angle configuration. The sex of front and rear connector is optional (refer to connector specification for specific combinations available). A knob(s), marked appropriately, is supplied with each unit.

Specifications

NOMINAL IMPEDANCE: 50 Ω

FREQUENCY RANGE (add Model No. Prefix to Designate Range):

All Models: dc to 4.0 GHz (AC)
dc to 18.0 GHz (AF)

Standard Incremental Attenuation Range:

Model 9009: 0 to 9 dB in 1 dB steps
Model 9003: 0 to 69 dB in 1 dB steps
Model 9004: 0 to 99 dB in 1 dB steps
Model 9010: 0 to 60 dB in 10 dB steps
Model 9011: 0 to 90 dB in 10 dB steps

MAXIMUM SWR:

| Frequency Range (GHz) | 9009, 9010 9011 | 9003 9004 |
|-----------------------|--------------------|--------------|
| dc - 4 | 1.25 | 1.35 |
| dc - 18 | 1.60 | 1.75 |

POWER RATING: 2 watts **average** to 25°C ambient temperature, derated linearly to 1 watt @ 54°C. 200 watts **peak** (5 μ sec pulse width; 0.5% duty cycle)

POWER COEFFICIENT: < 0.005dB/dB/watt

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB/°C

TEMPERATURE RANGE:

Operating: 0°C to +54°C
Nonoperating: -54°C to +54°C

Specifications--con't

TEST DATA: Insertion Loss data is supplied as follows. Other test data can be supplied at additional cost.

dc to 4 GHz: At 50 MHz and 4 GHz
 dc to 18 GHz: At 50 MHz, 4, 8, 12 and 18 GHz

INCREMENTAL PHASE SHIFT: ~0.5° per dB per GHz

REPEATABILITY: Better than 0.05 dB across frequency band for switch life

SWITCH LIFE: Over 1,000,000 steps

SHAFT ROTATION: Clockwise for increasing attenuation.

CONSTRUCTION:

Drum Assembly: Aluminum alloy
 Housing: Phenolic or aluminum
 Control Shaft: Stainless steel
 Connector: Stainless steel
 Knob: Supplied with control knob

INDEXING: 36°

DRUM CONFIGURATIONS:

Single Drum: 9009, 9010, 9011
 Dual Drum: 9003, 9004

MAXIMUM INSERTION LOSS (dB):

| Frequency Range (GHz) | Model No. | | | | |
|-----------------------|-----------|------|------|------|------|
| | 9009 | 9003 | 9004 | 9010 | 9011 |
| dc - 4 | 0.3 | 0.6 | 0.6 | 0.4 | 0.5 |
| dc - 18 | 1.0 | 1.5 | 1.5 | 1.0 | 1.0 |

CONNECTOR: SMA connector per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connector. Front and rear SMA connector available in either standard or right-angle configuration, connector sex is optional as follows:

| Connector Options | Type/Description |
|-------------------|--------------------------|
| 1 | SMA, Female |
| 2 | SMA, Male* |
| 3 | SMA, Female, right-angle |
| 4 | SMA, Male, right-angle |

*Standard male SMA connector not available as J1 connector.

WEIGHT:

| | |
|------|-----------------|
| 9009 | 680 g (2.4 oz) |
| 9010 | 160 g (5.7 oz) |
| 9011 | 200 g (7.1 oz) |
| 9003 | 260 g (9.0 oz) |
| 9004 | 290 g (10.4 oz) |

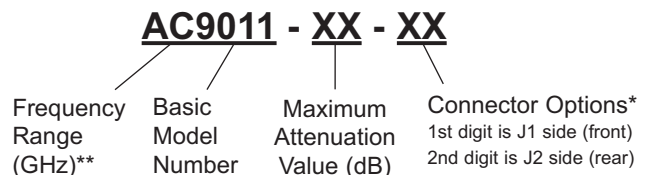
INCREMENTAL INSERTION LOSS (±dB):

| Model Number | dB Range | Frequency Range (GHz) | |
|--------------|----------|-----------------------|-------|
| | | dc-4 | dc-18 |
| 9009 | 1-9 | 0.3 | 0.5 |
| 9003 | 1-9 | 0.3 | 0.5 |
| | 10-19 | 0.7 | 1.0 |
| | 20-29 | 0.9 | 1.2 |
| | 30-39 | 1.0 | 1.4 |
| | 40-49 | 1.1 | 1.5 |
| | 50-59 | 1.2 | 1.7 |
| 9004 | 60-69 | 1.3 | 1.9 |
| | 1-9 | 0.3 | 0.5 |
| | 10-19 | 0.7 | 1.0 |
| | 20-29 | 0.9 | 1.2 |
| | 30-39 | 1.0 | 1.4 |
| | 40-49 | 1.1 | 1.5 |
| 9010 | 50-59 | 1.2 | 1.7 |
| | 60-69 | 1.3 | 1.9 |
| | 70-79 | 1.4 | 2.1 |
| | 80-89 | 1.5 | 2.3 |
| | 90-99 | 1.6 | 2.5 |
| | 9011 | 10 | 0.3 |
| 20 | | 0.3 | 1.0 |
| 30 | | 0.4 | 1.0 |
| 40 | | 0.5 | 1.2 |
| 50 | | 0.7 | 1.5 |
| 60 | | 0.8 | 1.8 |
| 9011 | 70 | 0.9 | 2.1 |
| | 80 | 1.0 | 2.3 |
| | 90 | 1.2 | 2.5 |

NA=Model no longer available.

MODEL NUMBER DESCRIPTION:

Example:



** Frequency Range

dc-4.0 GHz (AC)
 dc-8.0 GHz (AD)
 dc-12.4 GHz (AE)
 dc-18.0 GHz (AF)

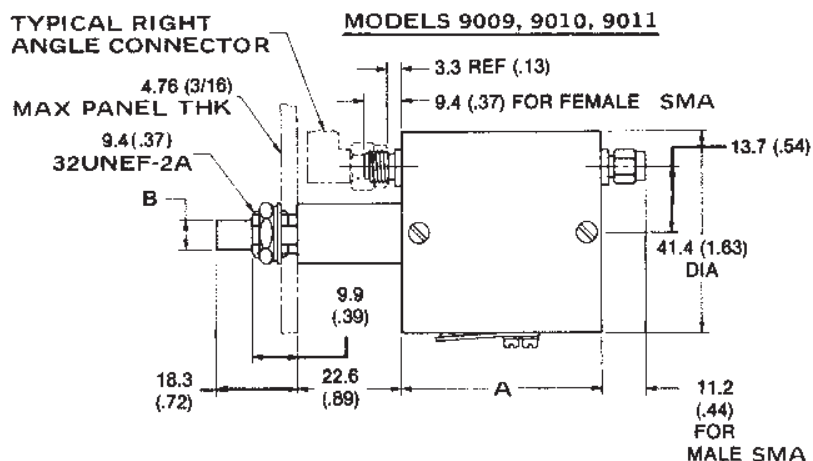
Available Models

AC9003, AC9004, AC9009, AC9010, AC9011
 No longer available, order AF as replacement
 No longer available, order AF as replacement
 AF9003, AF9004, AF9009, AF9010, AF9011

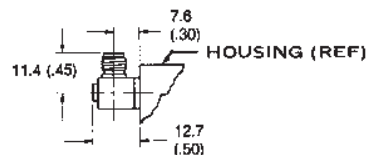
Variable Attenuators



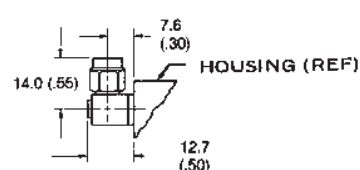
PHYSICAL DIMENSIONS:



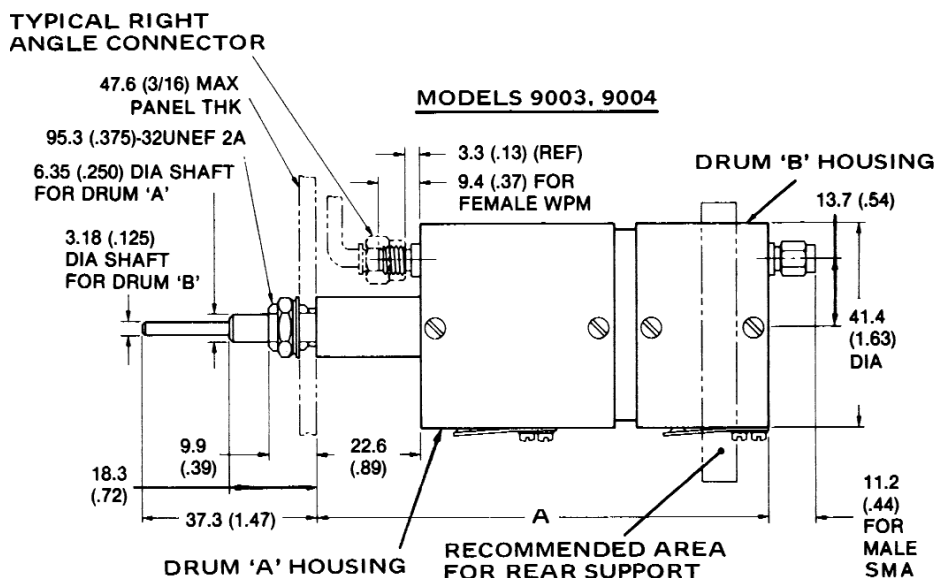
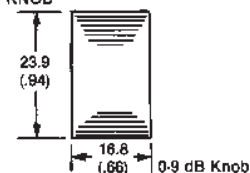
RIGHT ANGLE FEMALE SMA



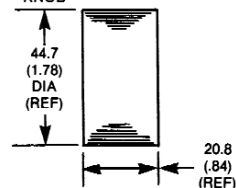
RIGHT ANGLE MALE SMA



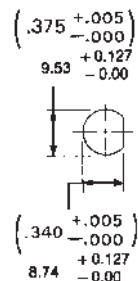
KNOB



KNOB



MOUNTING HOLE



| Model No. | DIM A | DIM B |
|-----------|--------------|--------------|
| 9003 | 96.3 (3.79) | --- |
| 9004 | 106.4 (4.19) | --- |
| 9009 | 28.7 (1.13) | 3.25 (0.125) |
| 9010 | 41.4 (1.63) | 6.35 (0.250) |
| 9011 | 51.6 (2.03) | 6.35 (0.250) |

NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise specified.

Models 115A thru 119A Manual Step Attenuators

dc to 18.0 GHz
2 Watt

Choice of Type N or SMA Connectors



Features

- /// **Safety Mechanical Stop** - A mechanical stop between maximum and 0 attenuation positions on all models prevents damage to the mechanical drive as well as preventing large power changes that could cause damage to sensitive equipment.
- /// **Choice of Attenuation Ranges** - Five standard attenuation ranges are available: 0-9 dB, 0-69 dB, and 0-99 dB in 1 dB steps, and 0-60 dB and 0-90 dB in 10 dB steps.
- /// **Broadband** - All models are available in a choice of 2 frequency ranges: dc-4 and dc-18 GHz.
- /// **Right-Angle Drive** - The center conductor of the connector is perpendicular to the control shaft, offering greater flexibility of applications: panel mounting or bench setup. All models are bidirectional.
- /// **Custom Configurations Available Upon Request.**
- /// **Low Deviation from Nominal Value** - These Mini Step Attenuators have flat frequency response over specified bands and excellent attenuation accuracy. Deviation from nominal value is low at all settings.
- /// **Excellent Repeatability and Long Life Switch** - Repeatability is better than 0.05 dB to 18.0 GHz for over 1,000,000 switchings of the drum.

Description

The Aeroflex / Weinschel Models 115A through 119A are a series of broadband, step attenuators in a right-angle drive configuration, where the center conductor of the connector is perpendicular to the control shaft. They feature excellent performance characteristics suitable for use in high reliability 50 ohm systems and applications requiring extra-small components for the precision control of power in discrete steps. They can be used either as input or output attenuators in signal sources, receivers, field strength meters, spectrum analyzers, etc.

Specifications

NOMINAL IMPEDANCE: 50 Ω

FREQUENCY RANGE (add Model No. Prefix to Designate Range):

All Models: dc to 4.0 GHz (AC)
dc to 18.0 GHz (AF)

STANDARD INCREMENTAL ATTENUATION RANGE:

Model 115A: 0 to 9 dB in 1 dB steps
Model 116A: 0 to 60 dB in 10 dB steps
Model 117A: 0 to 69 dB in 1 dB steps
Model 118A: 0 to 90 dB in 10 dB steps
Model 119A: 0 to 99 dB in 1 dB steps

MAXIMUM SWR (Models 117A & 119A):

| Frequency Range (GHz) | 117A & 119A | 115A, 116A & 118A |
|-----------------------|-------------|-------------------|
| dc - 4 | 1.35 | 1.25 |
| 4 - 12.4 | 1.50 | 1.60 |
| 12.4 - 18.0 | 1.70 | 1.60 |

POWER RATING: 2 watts **average** to 25°C ambient temperature, derated linearly to 1 watt @ 54°C. 200 watts **peak** (5 μ sec pulse width; 0.5% duty cycle)

POWER COEFFICIENT: < 0.005/dB/dB/watt

TEMPERATURE COEFFICIENT: < 0.0004/dB/dB/°C

TEMPERATURE RANGE: Operating: 0°C to +54°C
Nonoperating: -54°C to +54°C

INCREMENTAL PHASE SHIFT: ~0.5° per dB x f(GHz)

REPEATABILITY: Better than 0.05 dB across frequency band for switch life.

SWITCH LIFE: Over 1,000,000 steps

INDEXING: 36°

MAXIMUM INSERTION LOSS (dB):

| Model Number | CONN Type | Frequency Range (GHz) | |
|--------------|-----------|-----------------------|-------|
| | | dc-4 | dc-18 |
| 115A | N | 0.3 | 0.7 |
| | SMA | 0.3 | 1.0 |
| 116A | N | 0.3 | 0.7 |
| | SMA | 0.4 | 1.0 |
| 117A | N | 0.5 | 1.2 |
| | SMA | 0.6 | 1.5 |
| 118A | N | 0.4 | 0.8 |
| | SMA | 0.5 | 1.0 |
| 119A | N | 0.5 | 1.2 |
| | SMA | 0.6 | 1.5 |

Variable Attenuators



Specifications (Con't):

TEST DATA: Insertion Loss data is supplied as follows.
 Other test data can be supplied at additional cost.
 dc to 4 GHz: At 50 MHz and 4 GHz
 dc to 18 GHz: At 50 MHz, 4, 8, 12 and 18 GHz

RELATIVE HUMIDITY: 95%

ALTITUDE: to 10,000 ft.

SHOCK (non-operating): 8 g's, 100 ms, 1/2 sine

DRUM CONFIGURATIONS:

Single Drum: 115A, 116A, 118A

Dual Drum: 117A, 119A

VIBRATION (non-operating):

5 to 8 cps, 0.20 inch double amplitude

8 to 15 cps, 0.10 inch double amplitude

15 to 55 cps, 0.36 inch double amplitude

Supported rigidly front and back

SHAFT ROTATION: Clockwise for increasing attenuation

CONSTRUCTION:

Materials: Housing: aluminum alloy, clear irridite,
 MIL-C-5541.

Dust Cover: Painted aluminum alloy

Drum: Aluminum alloy

Shaft: Passivated stainless steel

Connector: Stainless steel and beryllium
 copper contacts.

CONNECTOR: SMA and Type N connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connector. Connector sex is optional as follows:

| Connector Options | Type/Description |
|-------------------|------------------|
| 1 | SMA, Female |
| 2 | SMA, Male |
| 3 | Type N, Female |
| 4 | Type N, Male |

WEIGHT:

| | |
|------|---------------|
| 115A | 340 g (12 oz) |
| 116A | 340 g (12 oz) |
| 117A | 760 g (27 oz) |
| 118A | 450 g (16 oz) |
| 119A | 880 g (31 oz) |

INCREMENTAL INSERTION LOSS (±dB):

| Model Number | dB Range | Frequency Range (GHz) | |
|--------------|----------|-----------------------|-------|
| | | dc-4 | dc-18 |
| 115A | 1-9 | 0.3 | 0.5 |
| 117A | 1-9 | 0.3 | 0.5 |
| | 10-19 | 0.7 | 1.0 |
| | 20-29 | 0.9 | 1.2 |
| | 30-39 | 1.0 | 1.4 |
| | 40-49 | 1.1 | 1.5 |
| | 50-59 | 1.2 | 1.7 |
| 119A | 60-69 | 1.3 | 1.9 |
| | 1-9 | 0.3 | 0.5 |
| | 10-19 | 0.7 | 1.0 |
| | 20-29 | 0.9 | 1.2 |
| | 30-39 | 1.0 | 1.4 |
| | 40-49 | 1.1 | 1.5 |
| | 50-59 | 1.2 | 1.7 |
| | 60-69 | 1.3 | 1.9 |
| | 70-79 | 1.4 | 2.1 |
| | 80-89 | 1.5 | 2.3 |
| 90-99 | 1.6 | 2.5 | |
| 116A | 10 | 0.3 | 1.0 |
| | 20 | 0.3 | 1.0 |
| | 30 | 0.4 | 1.0 |
| | 40 | 0.5 | 1.2 |
| | 50 | 0.7 | 1.5 |
| | 60 | 0.8 | 1.8 |
| 118A | 10 | 0.3 | 1.0 |
| | 20 | 0.3 | 1.0 |
| | 30 | 0.4 | 1.0 |
| | 40 | 0.5 | 1.2 |
| | 50 | 0.7 | 1.5 |
| | 60 | 0.8 | 1.8 |
| | 70 | 0.9 | 2.1 |
| 80 | 1.0 | 2.3 | |
| 90 | 1.2 | 2.5 | |

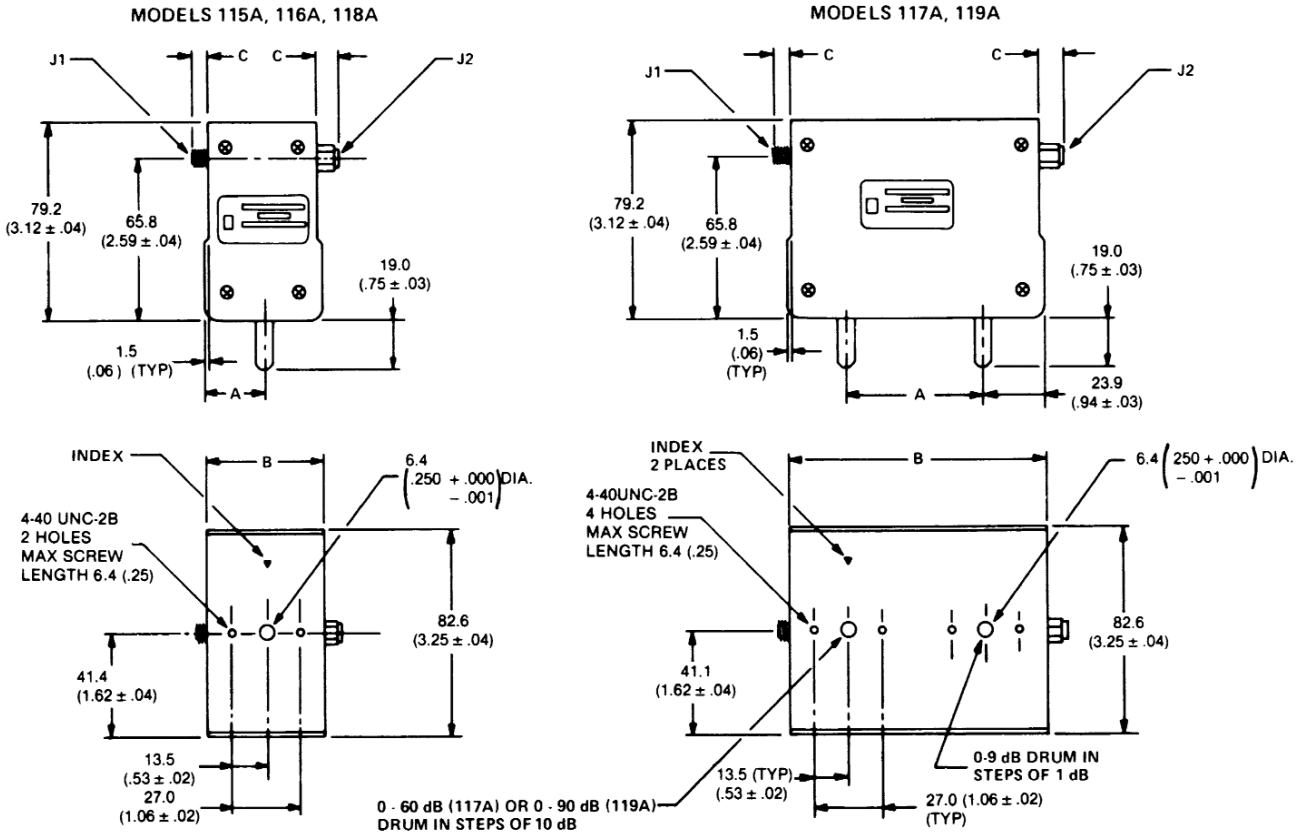
MODEL NUMBER DESCRIPTION:

Example:

AC116A - XX - XX

| | | | |
|-----------------------|--------------------|--------------------------------|---|
| Frequency Range (GHz) | Basic Model Number | Maximum Attenuation Value (dB) | Connector Options* 1st digit is J1 side (left) 2nd digit is J2 side (right) |
| | | | |

PHYSICAL DIMENSIONS:



| Model No. | DIM A | DIM B |
|-----------|-------------|--------------|
| 119A | 58.7 (2.31) | 111.3 (4.38) |
| 118A | 29.0 (1.14) | 57.7 (2.27) |
| 117A | 54.0 (2.11) | 101.1 (3.98) |
| 116A | 23.9 (0.94) | 47.5 (1.87) |
| 115A | 23.9 (0.94) | 47.5 (1.87) |

| CONN Type | DIM C |
|----------------|-------------|
| Type N, Male | 20.6 (0.81) |
| Type N, Female | 18.3 (0.72) |
| SMA, Male | 9.4 (0.37) |
| SMA, Female | 7.9 (0.31) |

NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise specified.

Variable Attenuators



Model 9012 Manual Step, SMK Connectors

dc to 26.5 GHz
2 Watts



Features

- /// Choice of Attenuation Ranges and Step Sizes.
- /// Excellent Repeatability.
- /// Custom Configurations Available Upon Request.
- /// Highly Accurate Detent Stepping
- /// Ruggedized Connector - Injection molded to provide consistent interface dimensions.

Specifications

NOMINAL IMPEDANCE: 50 Ω

FREQUENCY RANGE: dc to 26.5 GHz

INCREMENTAL ATTENUATION RANGE/STEPS:

Model 9012-9: 0-9 dB in 1 dB steps

Model 9012-70: 0-70 dB in 10 dB steps

INCREMENTAL ATTENUATION ACCURACY:

| Model No. | Accuracy |
|-----------|----------------|
| 9012-9 | ± 0.5 dB |
| 9012-70 | ± 1.0 dB or 2% |

MAXIMUM SWR:

| Frequency Range (GHz) | 9012 |
|-----------------------|------|
| dc - 18 | 1.40 |
| 18 - 26.5 | 1.50 |

MAXIMUM ZERO INSERTION LOSS (±dB):

| Frequency Range (GHz) | 9012 |
|-----------------------|------|
| dc - 18 | 1.00 |
| 18 - 26.5 | 1.50 |

POWER RATING: 2 watts **average** to 25°C ambient temperature, derated linearly to 1 watt @ 54°C. 200 watts **peak** (5 μsec pulse width; 0.5% duty cycle)

POWER COEFFICIENT: < 0.005 dB/dB/watt

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB/°C

TEMPERATURE RANGE:

Operating: 0°C to + 54°C

Nonoperating: -54°C to + 54°C

REPEATABILITY: ±0.5 dB to 60 dB

TEST DATA: Insertion loss and SWR data supplied at selected frequencies between 50 MHz and 26.5/40 GHz. Other test data can be provided at additional cost.

CONNECTOR: 2.92mm female connector - mate nondestructively with SMA connector per MIL-C-39012, SMK, 3.5mm, and other 2.92mm connector.

CONSTRUCTION: Stainless steel connector; gold plated beryllium copper contacts. Knob is included with each unit.

WEIGHT: Net 270 g (9.6 oz)

