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Operating Instructions

Connector Gage Kit
3.5mm/2.92mm (K)
Metrology Grade

Model A034E



A034-48C

Maury Microwave

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  - *2Y-050A Torque Wrenches*

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General Information

Description

The Maury model A034E connector gage kit is designed to measure 3.5mm and 2.92mm (K) connectors with either female or male interface.

CAUTION: *Use your A034E for 3.5mm and 2.92mm (K) connectors only. Do not use for SMA connectors.*

The Maury models A034E1 (female) and A034E2 (male) connector gage assemblies use a "thread-on" design that simulates actual mating conditions allowing high accuracy measurements and hands-free operation. The connector gage assemblies are initially set to zero using master setting gages, A034E3 (female) or A034E4 (male), permitting subsequent measurements to be read directly on the dial indicator. Centering sleeves are provided for measuring beadless air lines and 2-port standards. Flush setting sliding loads is easily accomplished using the A034E gages. The thread-on design of the A034E also allows more convenient and accurate measurements of network analyzer test ports.

All machined parts are made from non-magnetic stainless steel to assure long life and good stability. Gaging surfaces are lapped to ensure a high degree of accuracy. A parts list is shown in **Table 1**.

NOTE: *If you have experience with Maury push-on connector gages, you may want to go directly to the applications section on page 7 and get acquainted with the new features of the A034E kit.*

ITEM	DESCRIPTION	MAURY PART NUMBER	QUANTITY PER ASSEMBLY	NOTES
1	Indicator Assembly, Female	A034E1	1	
2	Indicator Assembly, Male	A034E2	1	
3	Master Gage Female	A034E3	1	
4	Master Gage Male	A034E4	1	
5	Sleeve Set (2), 3.5mm	A034S1	1	*
6	Sleeve Set (2), 2.92mm	A034S8	1	*

*** The centering sleeves are shipped in a small plastic container; small diameter sleeves are 2.92mm and large diameter sleeves are 3.5mm**

Table 1. Parts List

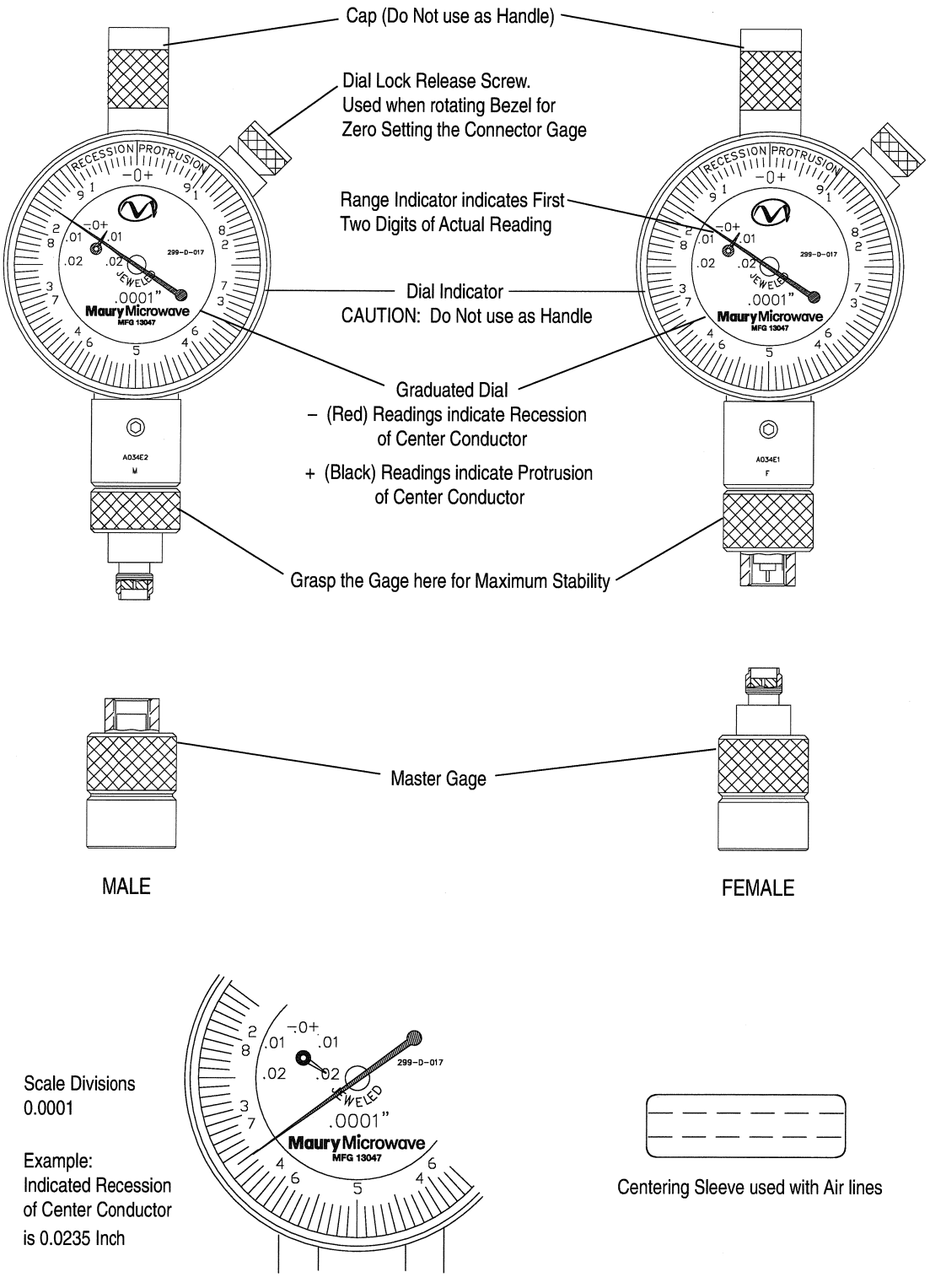


Figure 1. The A034E Connector Gage Kit

The specifications listed in **Table 2** are the performance standards based on factory measurements traceable to the U.S.A. National Institute of Standards and Technology (NIST).

To verify that your gage kit is performing to traceable specifications, periodically send the kit to Maury Microwave Corporation for calibration. The recommended calibration cycle is one year. The actual need may vary depending on usage.

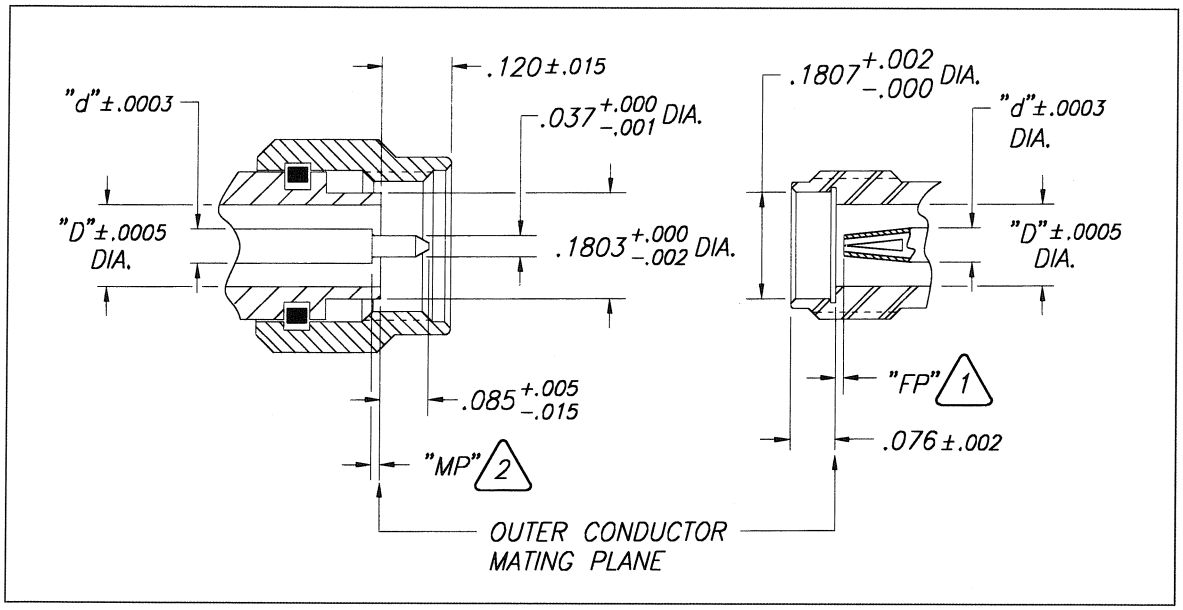
Connector Gage Specifications

CHARACTERISTICS	LIMITS	COMMENTS
Gage Resolution	± 0.000020	1/5 Least dial graduation [1]
Gage Calibration Accuracy [6]	± 0.000150	1 Least dial graduation [2] plus 0.000250 measurement guardband
Gage Repeatability [4]	± 0.000020	1/5 Least dial graduation [2]
Master Accuracy	± 0.000025	0.00005 Range [3]
Total Uncertainty [5, 6]		
RSS	± 0.000155	Root sum of the squares.
Worst Case	± 0.000215	Add resolution, repeatability, gage and master accuracy limits.

Table 2

NOTES:

1. Per ASME B89.1.10M-2001, C5.1.2.
2. Per ASME B89.1.10M-2001, Table 2.
3. Per manufacturer's specification.
4. Operator skill has a great impact on repeatability. You can easily determine the repeatability of the connector gages by multiple engagements of the master gages following the procedure outlined under ***Zero Setting*** on page 7.
5. Performance standards are in compliance with ANSI/NCSL Z540-1, MIL-STD-45662A and ISO 10012-1.
6. Applies over the operating range for connector gaging +0.006/-0.003" from master gage zero setting.



Connector Type	d	D	"FP" 3	"MP" 3	Comment
3.5mm	.0598	.1378	.000 +.003 -.000	.000 +.003 -.000	Rated to 34 GHz
2.92mm (K)	.0500	.1150	.000 +.003 -.000	.000 +.003 -.000	Rated to 40 GHz

NOTES:

1. Female contact pin location.
2. Male contact pin location.
3. Tighter tolerances can be used at user's discretion.
4. Plus (+) tolerances indicate a recessed condition from the outer conductor mating plane.
   Minus (-) tolerances indicate a protruding condition above the outer conductor mating plane.
5. Other dimensions shown in this figure are shown since they affect the mating of the Gage Assemblies' gaging mechanisms (bushing and pin). Deviation from these dimensions may cause measurement errors or improper fit between the gaging mechanisms and the connectors being measured. Consult our Customer Service Department on measuring connectors with interface dimensions other than specified above.

Figure 2. Critical Contact Pin Location Dimensions of 3.5mm and 2.92mm Precision Connectors

Applications

Your A034E is an easy to use connector gage kit featuring a "thread-on" design for hands-free operation to determine the critical contact location of 3.5mm and 2.92mm connectors. These dimensions must be maintained in order to provide the required electrical performance and mechanical mating of the connectors. Destructive interference may result if either the female or male contact protrudes beyond the outer conductor mating planes. Conversely, an excessive gap of the center contacts when mated produces high reflections and impaired overall system performance. See **Figure 2**.

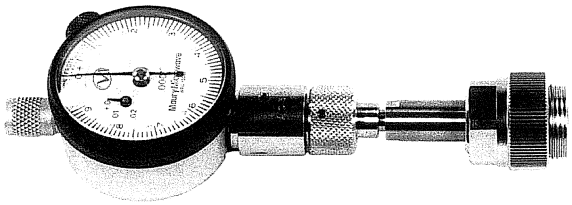


Figure 3

While primarily designed for metrology grade environment, the A034E can be used in production and for general laboratory testing of connector interfaces.

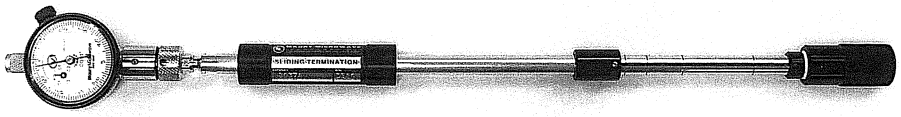


Figure 4

The A034E greatly simplifies setting the interface of sliding loads by freeing the user's hands to perform the necessary adjustments.



Figure 5

The A034E, along with the centering sleeves, is very useful for measuring the interface dimension of beadless 3.5mm and 2.92mm air lines.

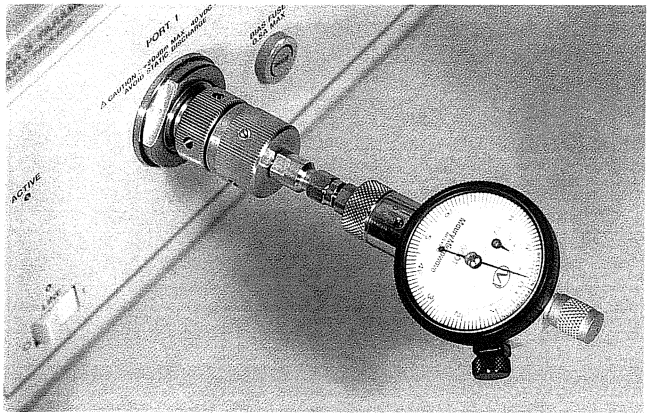


Figure 6

Figure 6 shows the A034E gaging a network analyzer test port connector.

Operation

Visual Inspection

Inspect all connectors carefully before each use. If a connector shows deep scratches, dents, uneven wear, or particles clinging to the mating plane surfaces, clean it and inspect again. Damaged connectors should be set aside for repair. Also, try to determine the cause of the damage before making further connections.

Cleaning

Use dry compressed air of a very low velocity first; then a solvent such as isopropyl alcohol. Clean the contacting surfaces, alignment parts and threads using a lint free swab. Then re-inspect the connector to make sure that no fibers have been left around the contact and mating surface.

CAUTION: *For optimum measurements and to prevent damage always hold the connector gage on the knurled part of the bushing when connecting (see* ***Figure 7****).* ***Never*** rotate parts against each other since this will yield faulty readings and could damage the mating surfaces.

Zero Setting

Before measuring a connector, refer to **Figure 2** for the correct contact pin location.

The following procedure applies to both connector gages. For the female connector gage A034E1, use the master setting gage A034E3, and for the male connector gage A034E2, use the A034E4 master setting gage, respectively.

Procedure: Refer to Figures 7, 8 and 9

1. Visually inspect the mating surfaces of your connector gage and master setting gage.
2. Clean both mating surfaces using the cleaning procedure above. Do not touch the surfaces after cleaning.
3. Align both the connector gage and master setting gage as shown in **Figures 7**, **8** and **9**. Then rotate the knurled nut of the connector gage or the master setting gage, allowing it to engage with the thread. Tighten using light finger pressure avoiding rotation of the mating planes at the same time. A torque wrench rated at 8 inch pounds is recommended (Maury model 8799A1).
4. Loosen the dial lock and rotate the Bezel (outside rim on indicator) to the zero position indicated by the hands on the indicator. Re-tighten the dial lock (see **Figures 1** and **9**).
5. Gently loosen the knurled nut and disengage the connector gage and master setting gage. The gage is now set for making measurements.

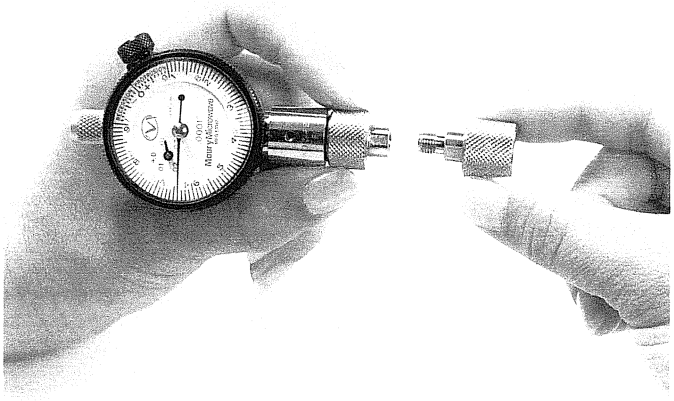


Figure 7. Zeroing the A034E1

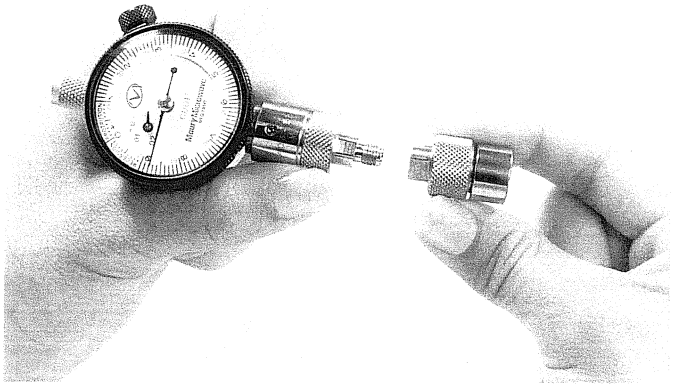
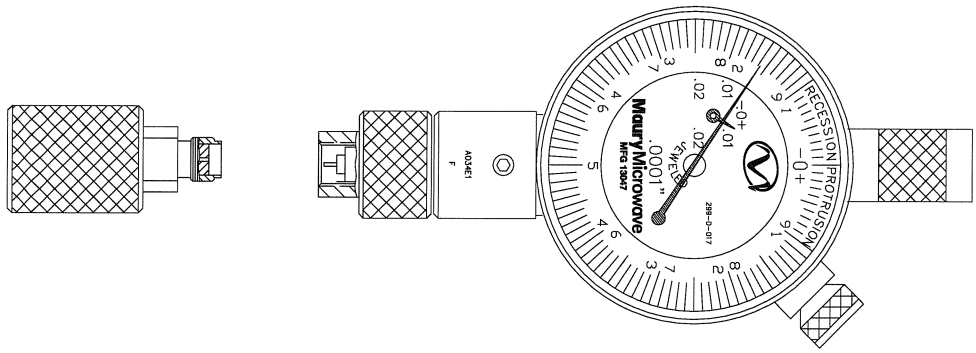
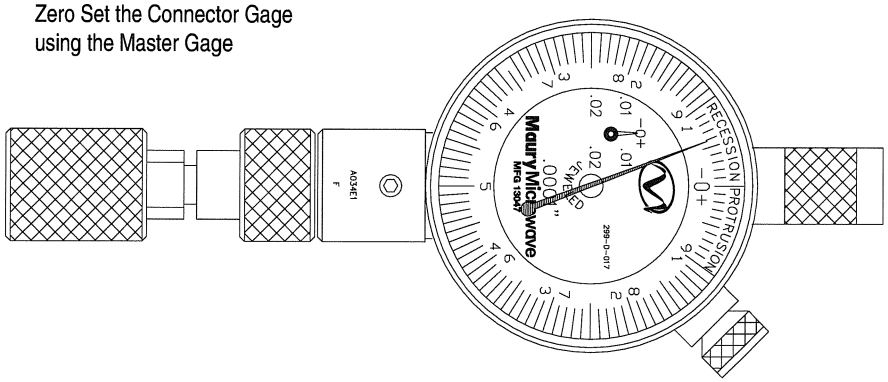


Figure 8. Zeroing the A034E2

Align your Connector Gage and the Connector



Zero Set the Connector Gage using the Master Gage



Adjust Outside Bezel for Proper Zero Reading.

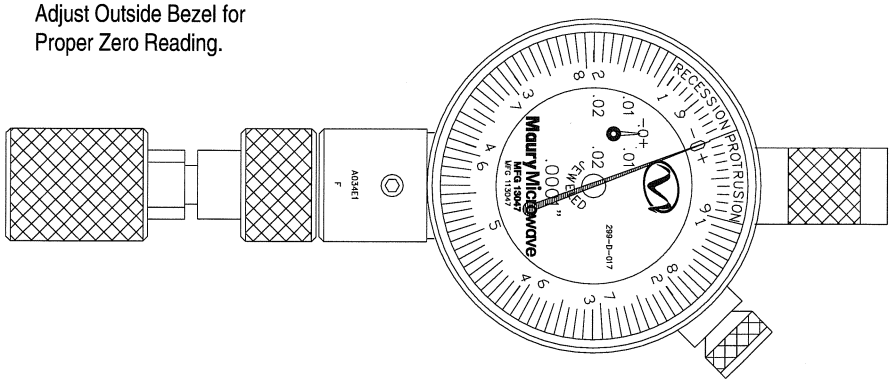


Figure 9. Zero Setting the Female Connector Gage (Applies Equally to the Male Connector Gage)

Gaging Precision Connectors (3.5mm and 2.92mm)

The critical mechanical specification in precision 3.5mm and 2.92mm (K) connectors is the recession (setback) of the center conductor relative to the outer conductor mating plane (**Figure 2**). No protrusion of the center conductor in front of the outer conductor mating plane is allowable.

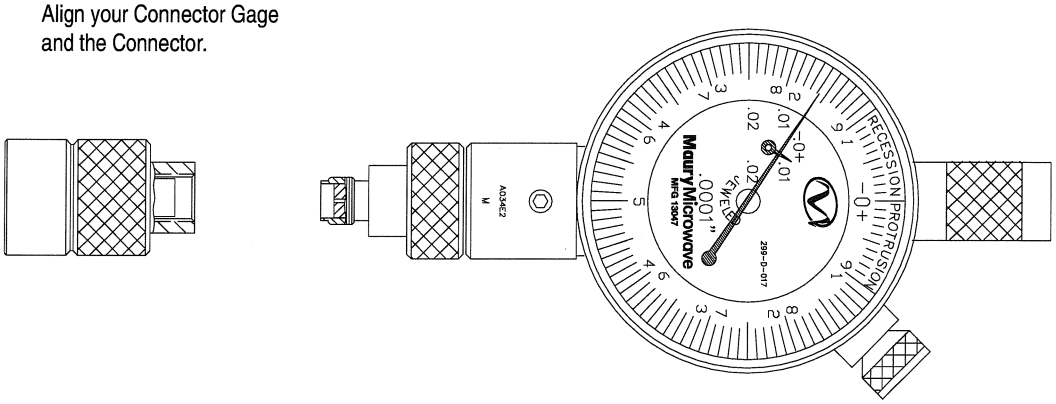
The following procedure applies to both connector gages. For the female connector gage A034E1, use the A034E3 master setting gage, and for the male connector gage A034E2, use the A034E4 master setting gage, respectively.

Procedure: Refer to Figure 10

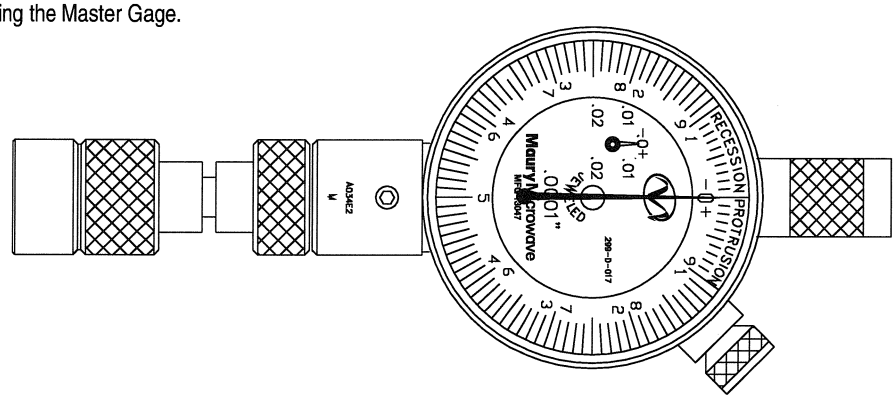
(Example for measuring a male connector.)

1. Visually inspect the mating surface of the connector to be gaged before making a connection.
2. Clean all mating surfaces: connector, master setting gage and connector gage using the procedure under cleaning on page 9.
4. Zero set your A034E2 by using mater setting gage A034E4.
5. Align both the connector and your A034E2; then rotate the nut of the connector allowing the threads to engage. Let the connector bottom freely against your A034E2. Tighten with light finger pressure avoiding rotation of the mating planes at the same time. When using a torque wrench, make sure it is rated at 8 inch pounds.

Align your Connector Gage and the Connector.



Zero Set the Connector Gage using the Master Gage.



Gently Connect the Device.

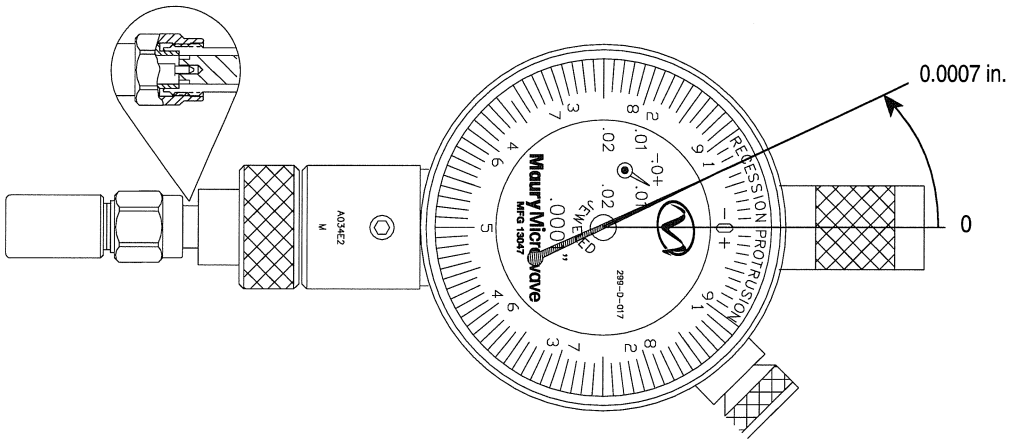


Figure 10. Gaging Precision 3.5mm or 2.92mm Connectors (Applies Equally to Female Connectors)

Sliding Loads & Air Lines

About Sliding Loads

Most sliding loads come equipped with a simple center conductor lock consisting of some form of clamping mechanism. The sliding load connector interface is usually set for a "zero gap" or "flush set" as described below.

NOTE: *Gaging the sliding load is not required for zero gap operation.*

To set a zero gap, loosen the locking mechanism and extend the center conductor and mate it completely with the center conductor on the mating connector. Then mate the outer conductors using a torque wrench for the final connection. The sliding load center conductor remains free in the outer conductor housing as mating of the outer conductors takes place. The locking mechanism is tightened only when all connections have been made.

For flush set operation, the sliding load center conductor is first set to the correct position using a connector gage. Then the center conductor is aligned axially and connected to the mating connector.

NOTE: *The nominal interface dimension is set using the A034E connector gage.*

For flush set measurements, use Maury sliding loads, models 8037A/B or 8777A1/B1, with flush set and pull back mechanisms. See **Figure 11**.



Figure 11

The flush set mechanism allows you to adjust the center conductor position very accurately, and the pullback feature provides an easy way to expose the center conductor for connection without sacrificing the proper interface condition preset with the flush set mechanism. For in-depth information, please refer to the operating instructions of your sliding load.

Gaging Sliding Loads

CAUTION: *This section may not have complete information for your particular sliding load. Please consult the manual for your sliding load* ***first****.*

The following procedure applies to both female and male sliding loads. For female sliding loads, use your A034E1 and A034E3 master gage. For male sliding loads, use the A034E2 and A034E4, respectively. For in-depth information on how to properly set the interface dimension, refer to the manual provided with your sliding load.

Procedure:

*(Example for measuring a female connector. Refer to **Figures 12** and **13**.)*

1. Visually inspect the mating surface of the connector to be gaged before making a connection.
2. Clean all mating surfaces: connector, master setting gage and connector gage.
3. Zero set your connector gage by using the respective master setting gage. Use your A034E1 with the A034E3, or the A034E2 with the A034E4. For this example use your A034E1 and A034E3.
4. Expose the center conductor of the sliding load to allow easy engagement of the gaging pin. In case of a male device, the center conductor pin will be guided inside the gaging pin. To assure concentricity while gaging female devices, the gaging pin of your connector gage features a contact pin that will be guided in the female center conductor. See **Figure 12**.

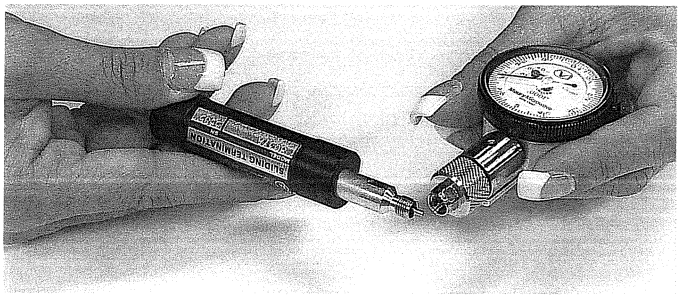
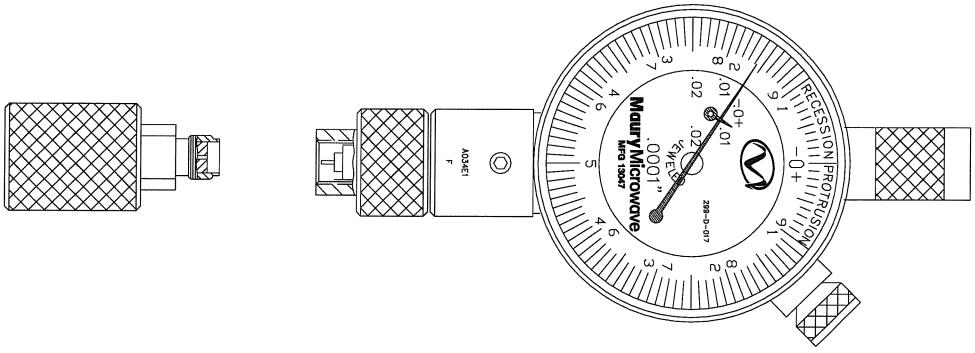


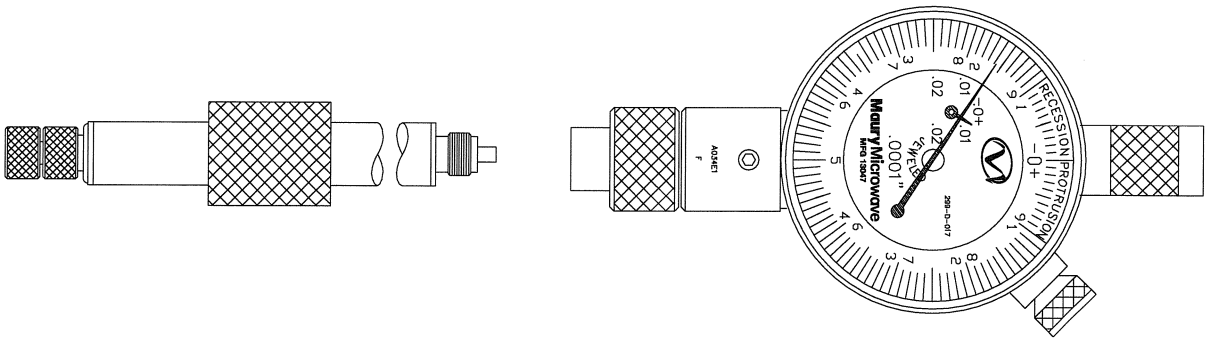
Figure 12

5. Make a gentle connection. Avoid rotation of the mating planes to prevent excessive wear. When using a torque wrench, make sure it is rated at 8 inch pounds. Allow the center conductor to gently push back during the mating process. Set the interface dimensions following the procedure outlined in the operating instructions of your sliding load.

Zero Gage using the Master Gage.



Expose the Free Floating Center Conductor
for Ease of Engagement.



Set Proper Interface
Dimensions

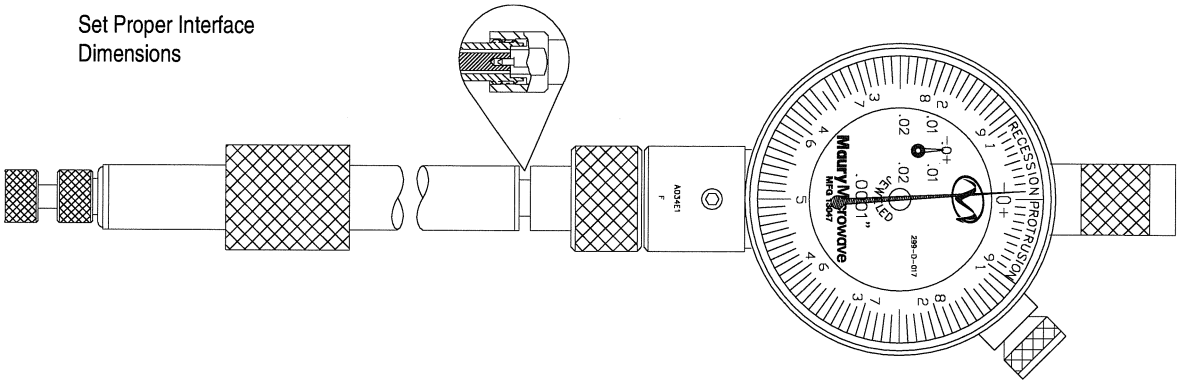


Figure 13. Gaging Precision Sliding Loads

Gaging 3.5mm and 2.92mm Air Lines

NOTE: *Use care when handling air line parts. Wear cotton gloves to prevent excessive thermal expansion.*

Maury beadless precision air lines come basically in two connector configurations; female to male, and male to male. To gage these air lines, a master gage is first connected to one end and the corresponding A034E indicator gage is connected to the opposite end.

Procedure: *See **Figures 14** and **15***

1. Visually inspect the mating surfaces on the air line to be gaged before making a connection, and clean all mating surfaces.
2. Zero set the connector gage using the respective master setting gage.
3. Slip the appropriate centering sleeve (3.5mm or 2.92mm) on one end of the center conductor and insert into the air line. Avoid scratching the outer conductor while inserting the center conductor. Make sure that the sex of the outer and center conductor comply.
4. Connect the corresponding master setting gage onto the same end of the air line where the sleeve was inserted.
5. Insert the second sleeve into the open end of the air line.
6. Align the air line and your A034E; then carefully connect the connector gage. Tighten finger tight avoiding rotation of the mating surfaces against one another. When using a torque wrench, make sure it is rated at 8 inch pounds.
7. The gage should read within the interface tolerances shown in **Figure 2**.

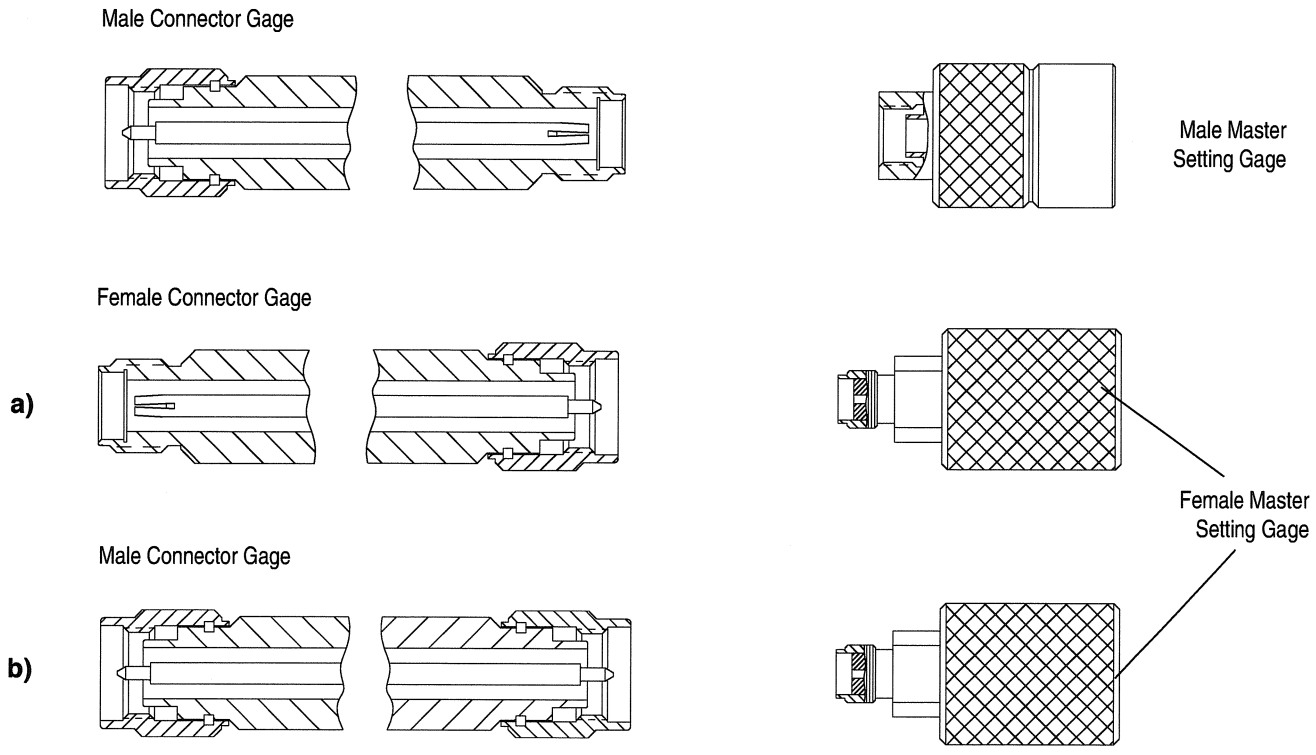


Figure 14. 3.5mm or 2.92mm Two Port Standards: a) With Different Interfaces b) Equal Interface (Shown without Centering Sleeves)

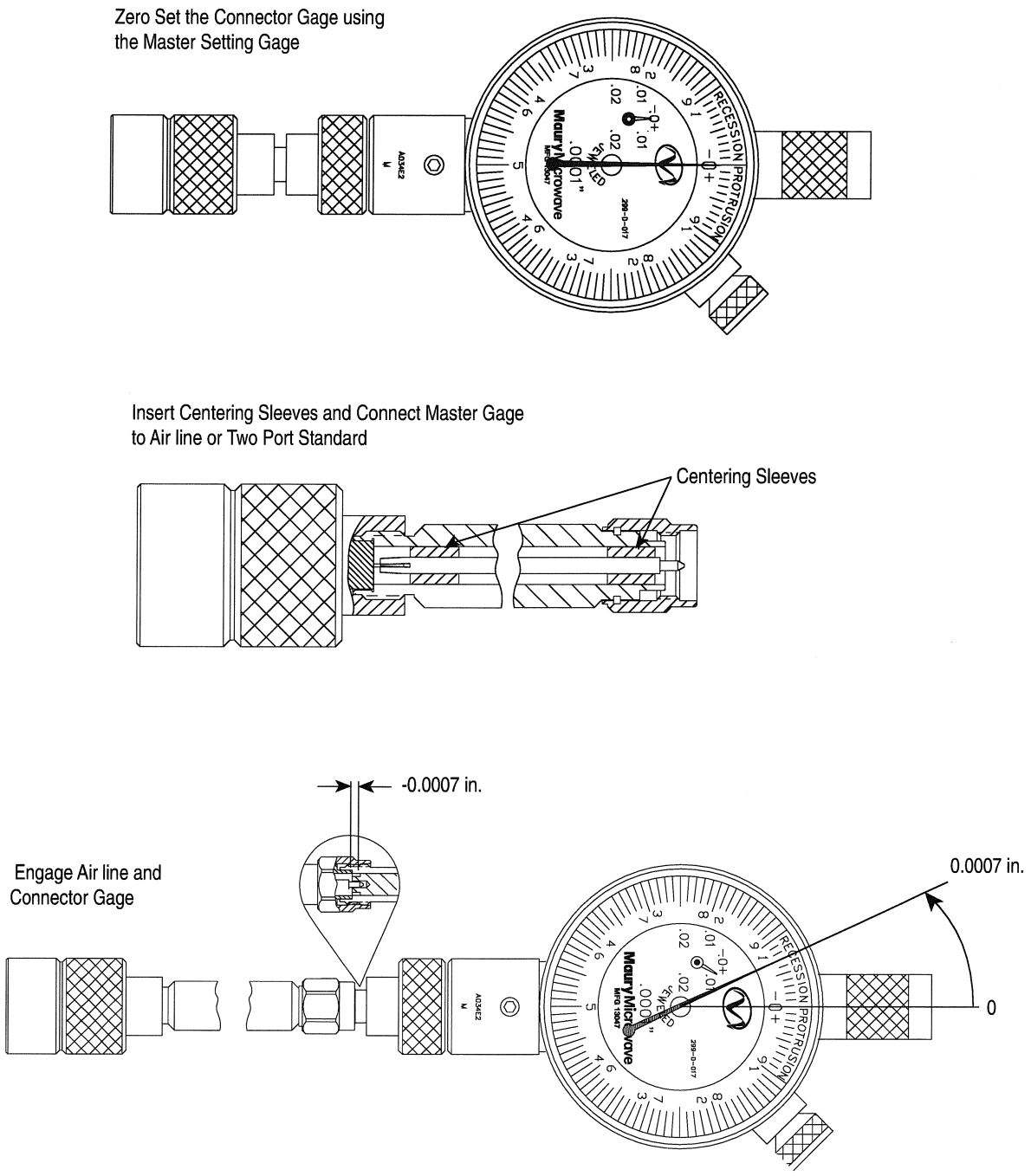


Figure 15. Gaging Beadless Precision Two Ports in 3.5mm or 2.92mm

Maintenance and Calibration

Maintenance

These connector gage kits are relatively maintenance free if the components are handled with the same care that is appropriate to all precision equipment. As with any precision component, proper care should be taken to assure clean mating surfaces, proper alignment, and proper torquing. Repair and calibration should be referred to our Customer Service Department.

Calibration

To verify that your calibration kit is performing to traceable specifications, periodically send the kit to Maury Microwave Corporation for calibration. The recommended calibration cycle is one year. The actual need may vary depending on usage.

Should additional information or service be required, address inquiries to:

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Ontario, California 91764-4804
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Phone: (909) 987-4715
Facsimile: (909) 987-1112
E-mail: maury@maurymw.com
Web site: http://www.maurymw.com

Please mention the model number and revision of the software and the date received in any correspondence.

Warranty

We warrant each instrument of our manufacture to be free from defects in material and workmanship. Our obligation under this warranty is limited to servicing or adjusting any instrument returned to our factory for that purpose, and to making good at our factory any part or parts thereof except fuses or batteries. This warranty period is limited to one year from date of shipment to the original purchaser, and to equipment which is returned to us with transportation charges prepaid and which, upon our examination, shall disclose to our satisfaction to have been defective. This warranty does not cover wear from normal usage nor subsequent damage after shipment.

We reserve the right to make changes in design at any time without incurring any obligation to install such changes on units previously sold by us.

This constitutes the only warranty extended by us, and is in lieu of any other obligations or liabilities on our part in connection with the sale of our equipment.

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