

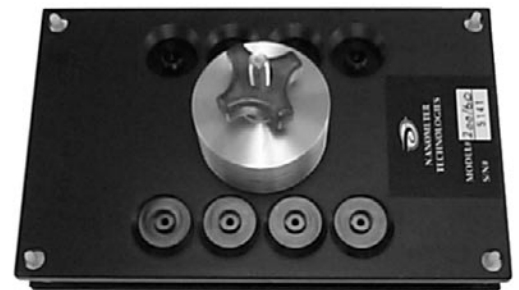
# MCP 12-60

## MASS CONNECTOR POLISHER

### INSTRUCTION MANUAL



UNI 12 Fixture Plate



FC/APC Fixture Plate



SC/APC Fixture Plate

Instructions for using and polishing with the:  
**UNI-12 & APC Fixture Plates**

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# **MCP 12**

**MASS CONNECTOR POLISHER**

**INSTRUCTION MANUAL - UNI & APC Fixture Plates**

Document Number RE:00B14-UNI/APC

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***October 27, 2008***

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Before using the MCP 12-60 please make sure that all of the following items (Shown in Table 0-1) are present.

Table 0-1 Standard Parts

<u>No.</u>	<u>Part</u>
1	Base Polisher
2	Cable Tree
3	Resilient Rubber Pad
4	Power Cord
5	Instruction Set
6	Base Plate
7	Polishing Plate SN

**CAUTION:**

**REMOVE THE SHIPPING STRAP PRIOR TO PLUGGING IN THE MCP12-60 POLISHER.**

Consumables are listed in Table 0-2

Table 0 – 2 Consumables

<b>Part</b>	<b>Part Code</b>	<b>Remarks</b>
Polishing Film 6uM	DS44060N-4.5	Change after every 15-20 uses
Polishing Film 3uM	DS44030N-4.5	Change after every 15-20 uses
Polishing Film 1uM	DS44010N-4.5	Change after every 10-15 uses
Final Film	863XW-4	Polish 12 ferrules at one time, (1 use only)

All consumables and connectors can be bought separately.

**Recommended Consumables:**

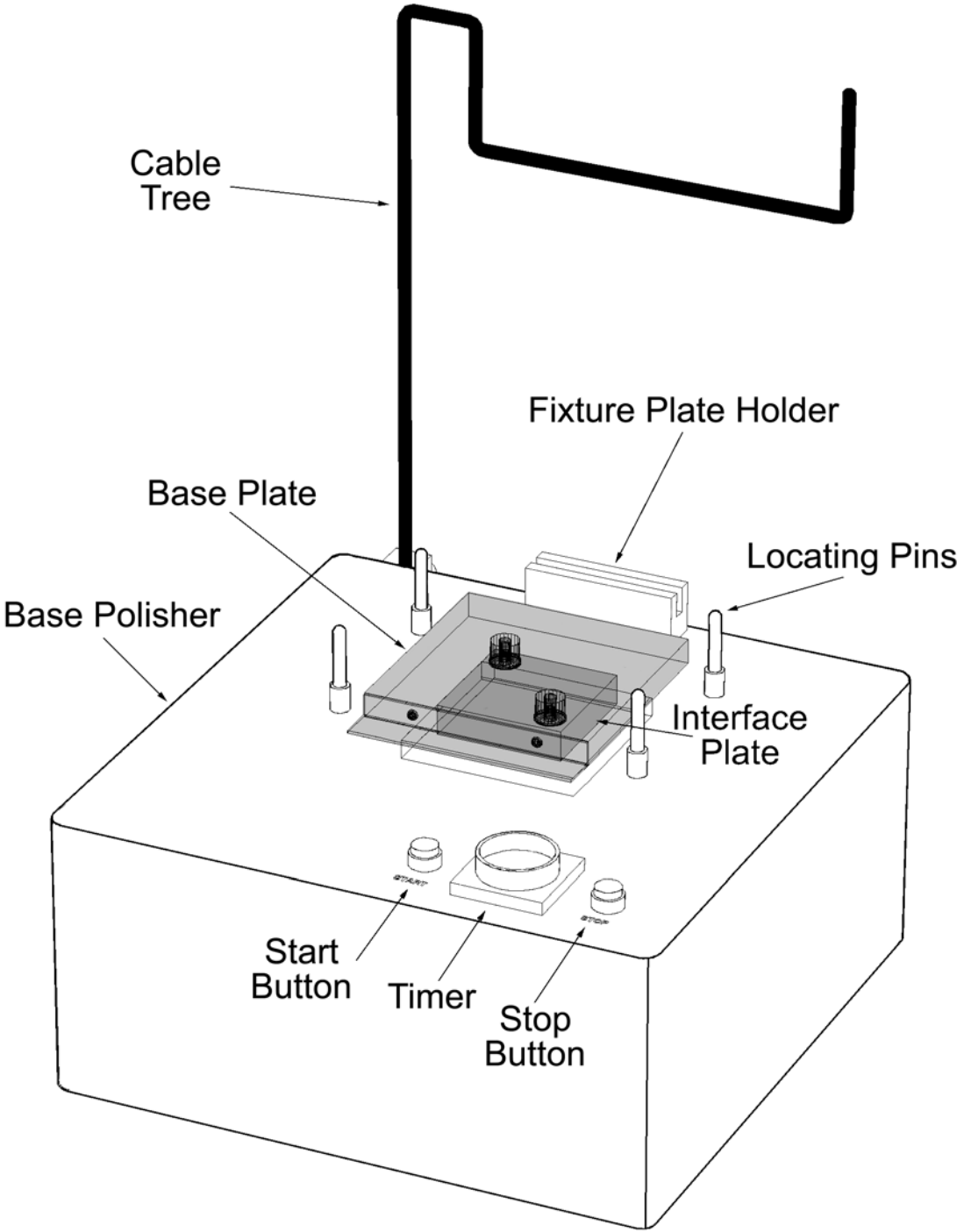
Epoxy: TRA-CON  
Connectors  
Films  
Final Polishing Film

BAF-123  
Nanometer Technologies  
DS Series Polishing Films  
Nanometer Technologies

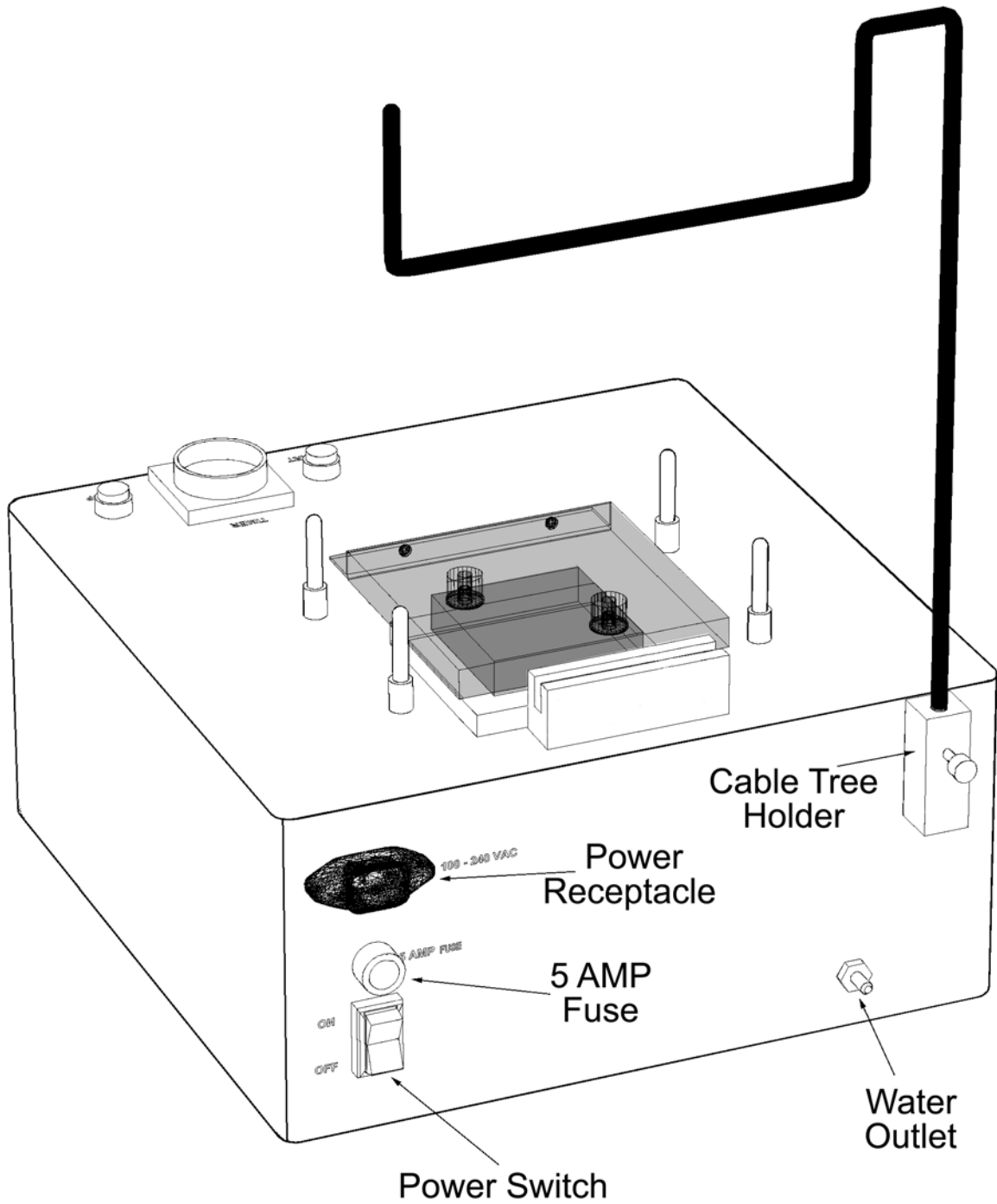
# MCP 12

## Mass Connector Polisher

*Front View*



# Back View



## **USER NOTES**

In this chapter, important notes for the user are given. Please read them carefully before using the MCP12.

### **PRECAUTIONS FOR USING THE MCP12**

To protect the MCP12 and use it correctly, please pay attention to the following notes:

- Do not leave the MCP12 outdoors, or where water might damage it.
- Do not subject the MCP12 to undue vibrations or drop it.
- Do not touch the operation panel or the switches with wet hands.
- The MCP12 is heavy (about 11.5 kg (25 lbs), so place it on a sturdy table.
- Do not touch the rotating parts during use.
- Do not reuse lint free wipes!
- Do not use alcohol to clean film or fixture plates.

### **PREPARATION**

In addition to the Mass Production Polisher and its accessories, please prepare the following items:

1. Lint Free Wipes
2. Distilled Water
3. Fine Mist Spray bottle



## **POLISHING PLATE**

### **Cleaning and Maintenance:**

- Polishing plate must be kept clean to eliminate cross contamination.
- Completely rinse plate with distilled water and non-abrasive pipe cleaners.
- **DO NOT DROP FIXTURE PLATE!**
- Blow-dry if compressed air is available.
- Wipe plate clean after each step in polishing procedure.

## **POLISHING TIPS FOR MCP12**

- Use very small amounts of distilled water for adhering rubber to base plate and polishing film to rubber..
- Always clean film, ferrules and rubber pad before and after each step (with lint free wipes and distilled water). This will help to eliminate cross contamination.
- Use enough distilled water to cover film for polishing. (Do not over apply)
- Always use fine mist spray bottles for applying distilled water.
- If you see more than a few small puddles in catch basin, then you are using too much polishing solution.

## **\*SPECIAL NOTE\***

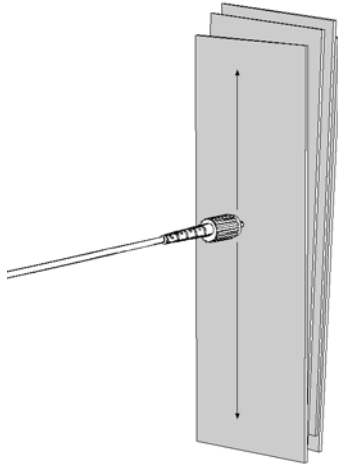
**The Shipping Box that the MCP 12 comes in contains Re-Packaging and Shipping Strap instructions. These instructions are important incase the MCP 12 has to be transported or shipped to another location. The instructions can be found on one of the upper inside box flaps.**

# Connector Preparation

This procedure is for “Tent” or Air Polishing your connectors. There are many ways to accomplish this task. If you already have a procedure for Tent Polishing your connectors that works good for you, we recommend staying with your original process.

## Step 1

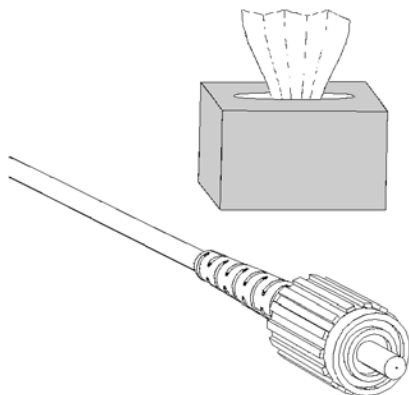
“Tent” or Air Polishing



1. After cleaving the ferrule, “Tent” or Air Polish the connector to remove the excess fiber stub. Take 3-5 pieces of 15 micron silicon carbide film layered together and polish the connectors by moving the film back and forth across the ferrule tip.

NOTE: If the connector has a small epoxy bead, continue this process until the epoxy bead has been removed.

## Step 3

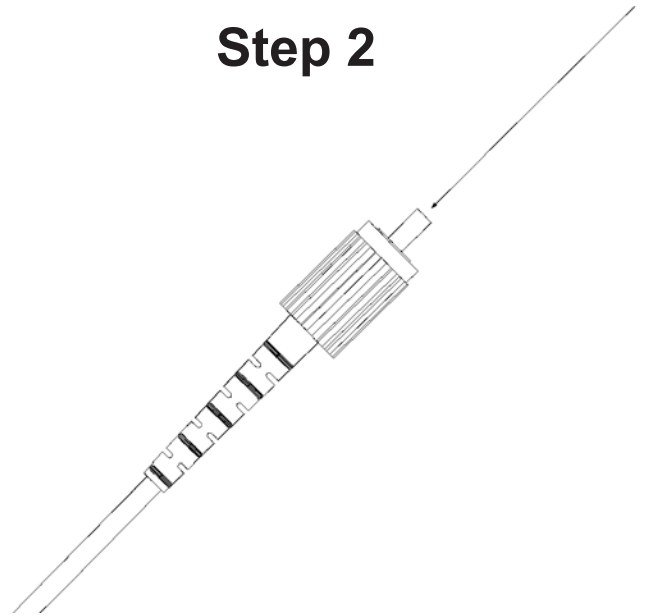


Clean the ferrule end face using a clean lint-free optical wipe.

Inspect the fiber end face to make sure that the fiber is not cracked into the ferrule face. Use an Inspection Scope or Interferometer to accomplish this task.

Cracks and breaks on the ferrule face are caused by bad cleaving.

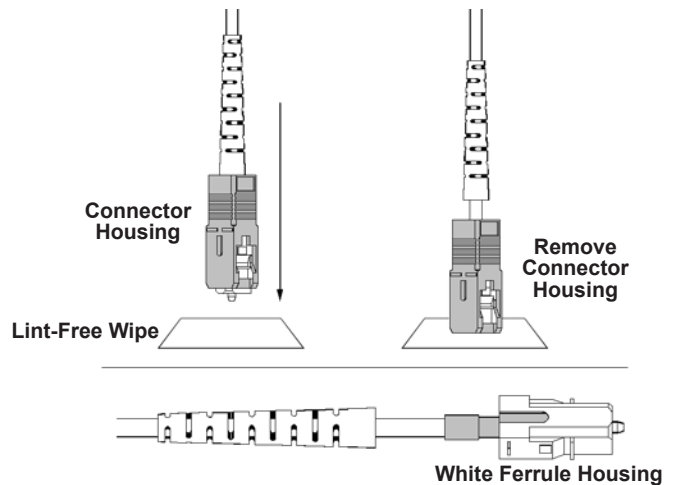
## Step 2



2. After “Tent” or Air Polishing, press on the ferrule tip to make sure the epoxy bead has not glued the ferrule tip to the connector housing.

## Important Note: SC Connectors

(This does not apply to SC/APC Connectors)



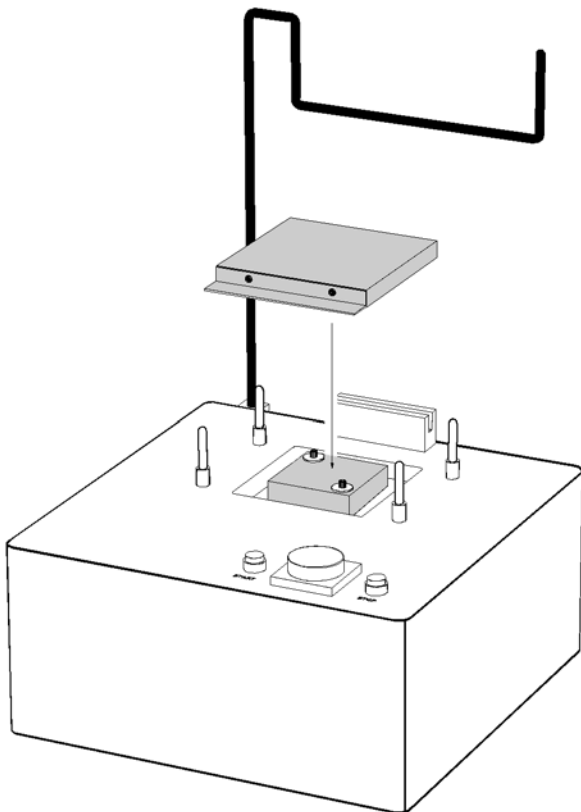
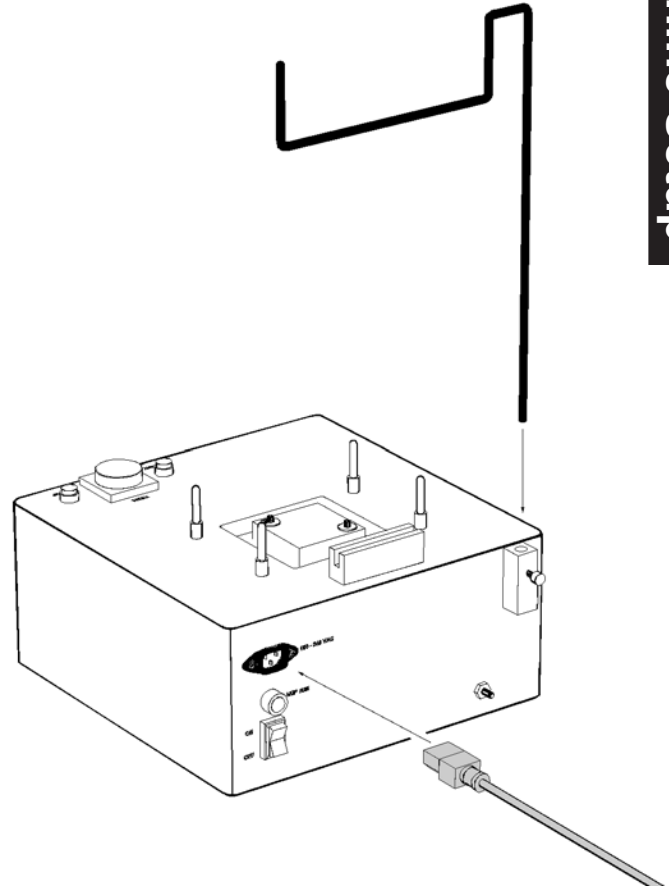
**It is important that the SC Connector is polished prior to assembly. Make sure the outer housing is off and boots are pulled back.**

If the connector is already put together, place a lint-free wipe on a hard clean surface. Grip the Connector Housing and push down on the hard surface. This will remove the Blue Outer Shell from the White Ferrule Housing. Pull back the Connector Boot to allow more of the Slider plate surface area to hold the connector in place.

# Machine Setup

## Step 1

1. Plug Power Cord into the back of the MCP 12-60. Attach the Cable Tree to the MCP12-60 as shown in the diagram.

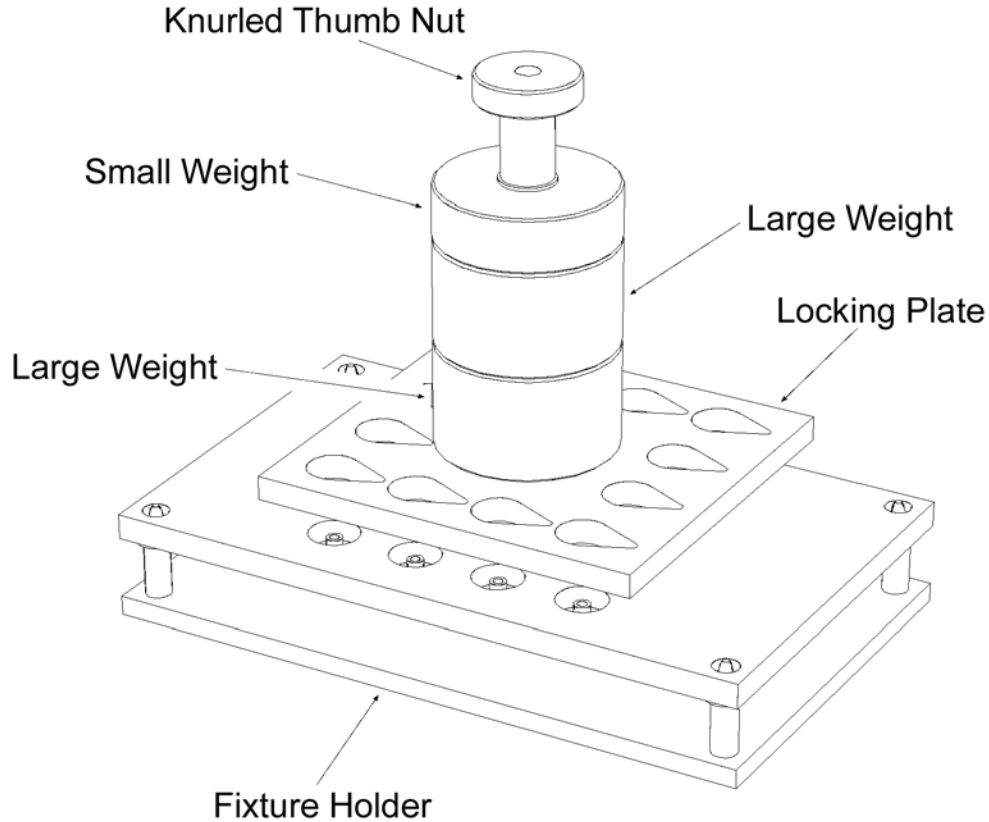


## Step 2

2. Set the Base Plate on the Interface Plate. Line up the guide holes on the Base Plate with the nose pins located on the Interface Plate.

# UNI-12 Fixture Plate

**UNI** Fixture Setup



## Weight VS Connector Quantity

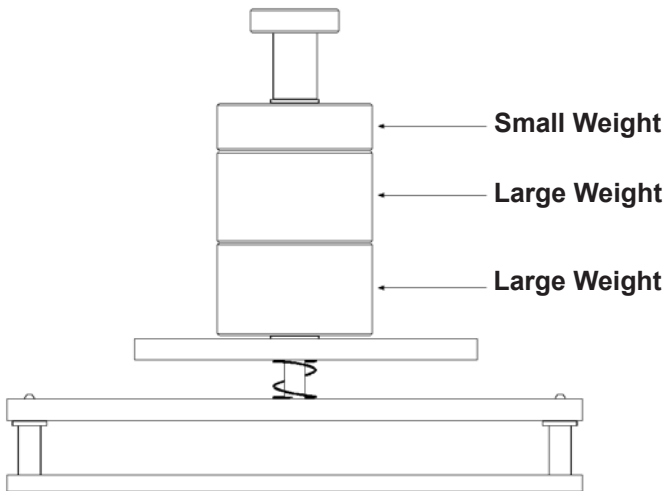
To change the number of weights, unscrew the Knurled Thumb Knob and add/remove weights as described below. Once completed, screw the Knurled Thumb Knob back onto the Fixture Plate and continue with the connector loading process.

- 3-4 connectors = 1 Small
- 6 connectors = 1 Large
- 8 connectors = 1 Large & 1 Small
- 10 connectors = 2 Large
- 12 connectors = 2 Large & 1 Small

### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

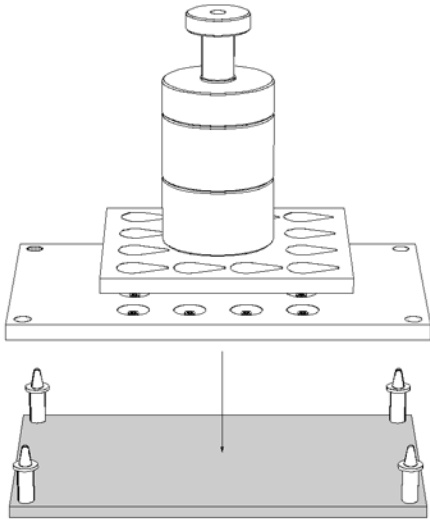
- More weight will produce a smaller radius.
- Less weight will produce a larger radius.



# Fixture Setup Instructions

## UNI-12 Fixture Plate

### Step 1

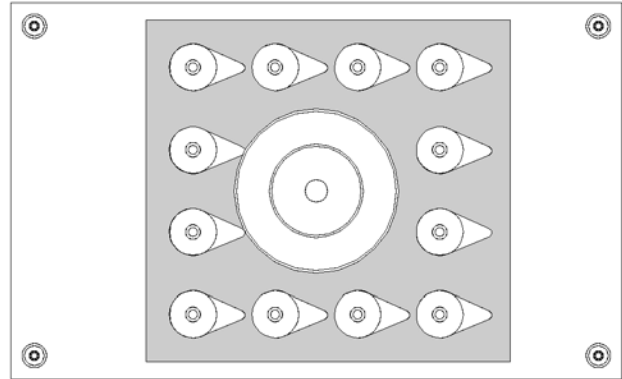


1. Make sure the Fixture Plate is free of particles and UPS-1 polishing solution.

Place the Polishing Fixture onto the Fixture Holder.

This will ensure a clean polish of your connectors and will avoid cross-contamination from previous polishings.

### Step 2



2. Loosen the Knurled Thumb Nut that holds down the weights & Locking Plate and slide it until the large end of the tear drop holes line up with the holes on the Polishing Fixture.

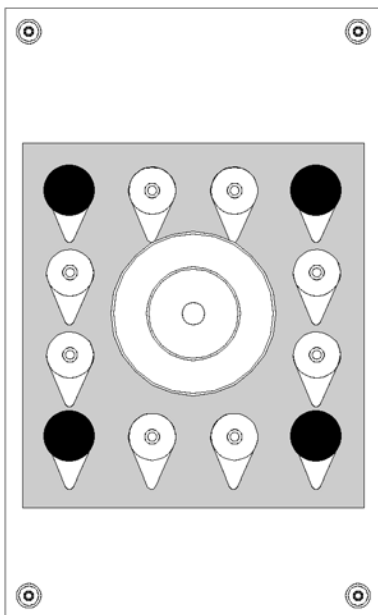
Tighten down the Locking Plate now, as this will make it easier to insert your connectors.

The Fixture Plate is now ready to be loaded with the connectors.

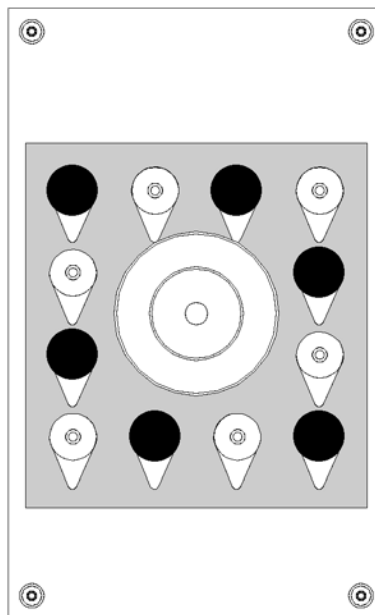
**UNI** Fixture Setup

**NOTE:** If the Polishing Fixture is being loaded with less than 12 connectors, it is important the connectors be placed in symmetrical pattern. This will keep the Polishing Fixture surface level over the base plate during the polishing procedure. Load outside holes first, spacing evenly.

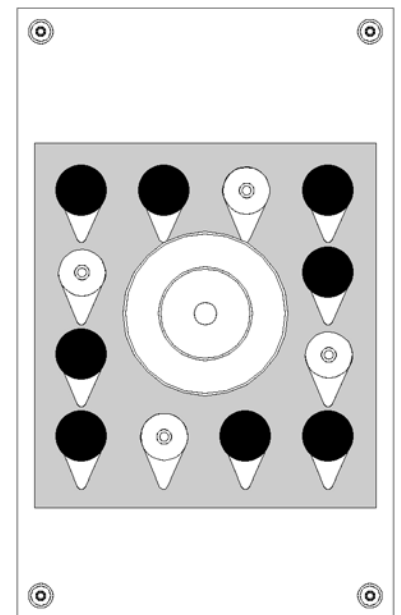
## Examples



4 Connectors



6 Connectors

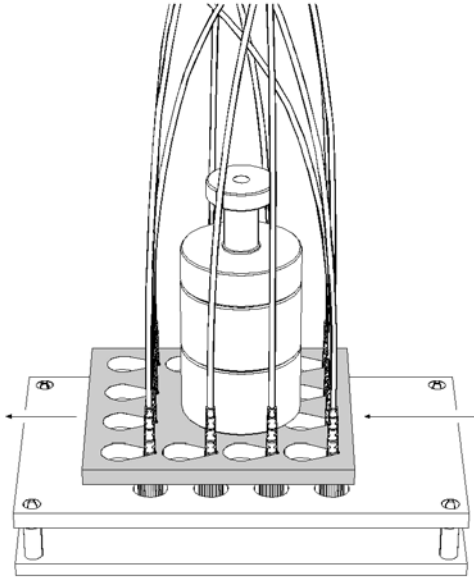


8 Connectors

# Fixture Setup Instructions

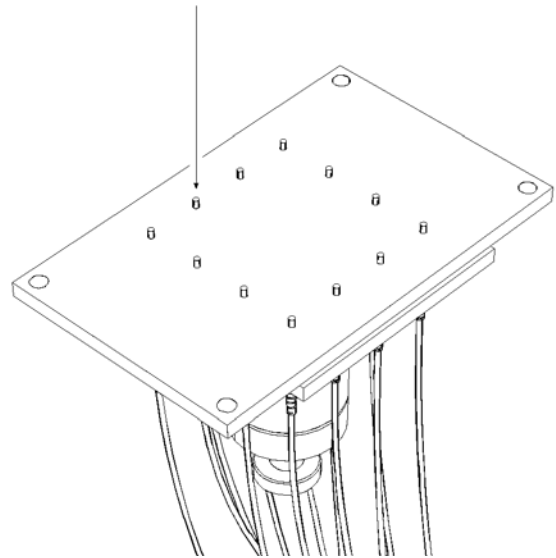
## UNI-12 Fixture Plate

### Step 3



3. Loosen the Knurled Thumb Nut and slide the Locking Plate over the connectors. Tighten the Knurled Thumb Nut, locking the connectors in place.

### Step 4



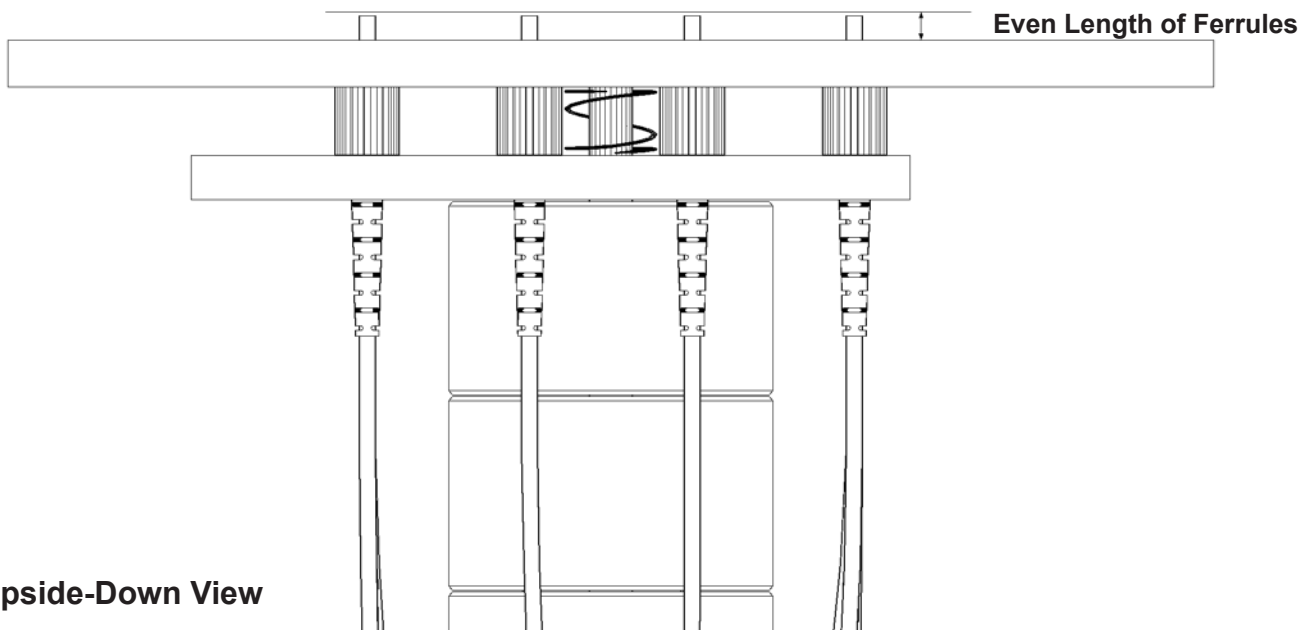
4. Lift up plate and press on the ferrules, checking to make sure the connectors have spring action and none are locked in place. Place the Fixture Plate back onto the Fixture Holder.

**UNI** Fixture Setup

## IMPORTANT

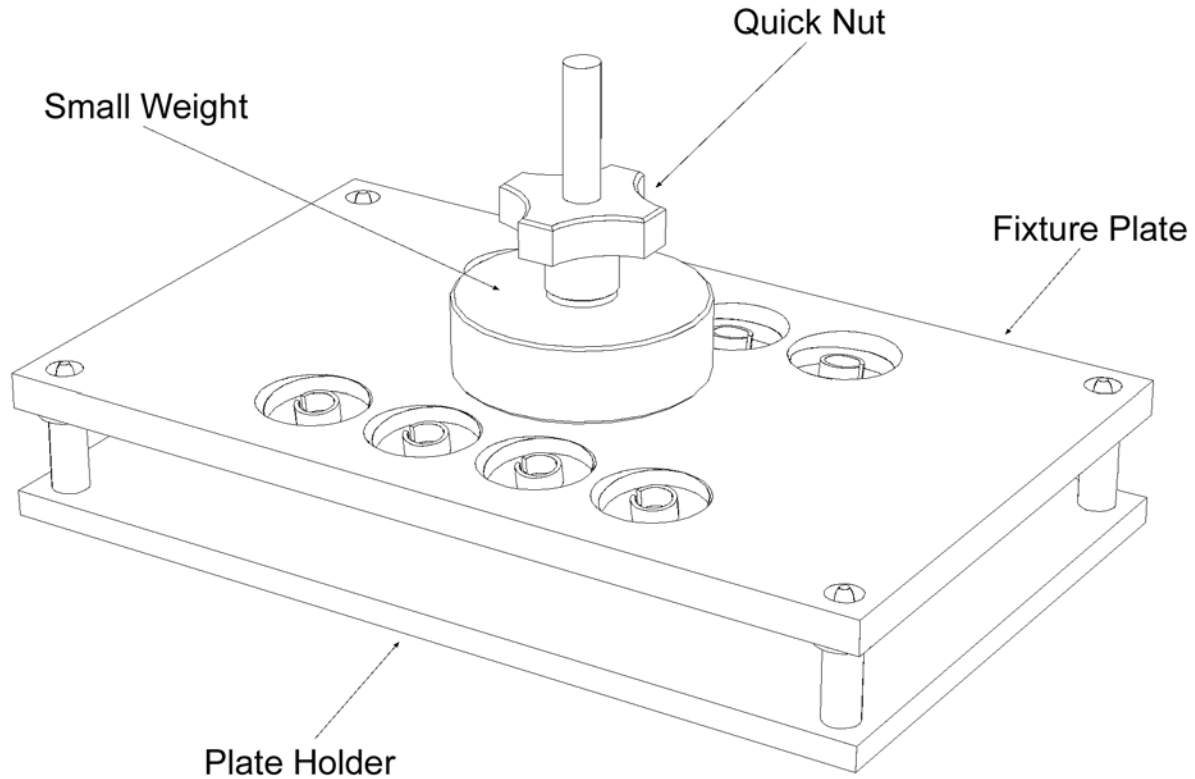
Make sure that all of the ferrules protrude from the bottom of the plate an equal length. Uneven ferrules will greatly affect the polishing performance. Sight down the profile of the plate referencing the ferrule tips to each other. Push on each ferrule face to check for ferrules sticking. Ferrules that stick are a sign of an unclean plate or epoxy on the side of ferrule.

Use high quality connectors and ferrules whenever possible. This will reduce the number of failures per polishing cycle.



Upside-Down View

# FC/APC Fixture Plate



**APC** Fixture Setup

## Weight VS Connector Quantity

Although it is possible to polish a small number of connectors, we recommend that you do not polish less than 4 connectors at a time.

To change the Small Weight, unscrew the Quick Nut and add/remove the weight as described below. Once completed, screw the Quick Nut back onto the Fixture Plate and continue with the connector loading process.

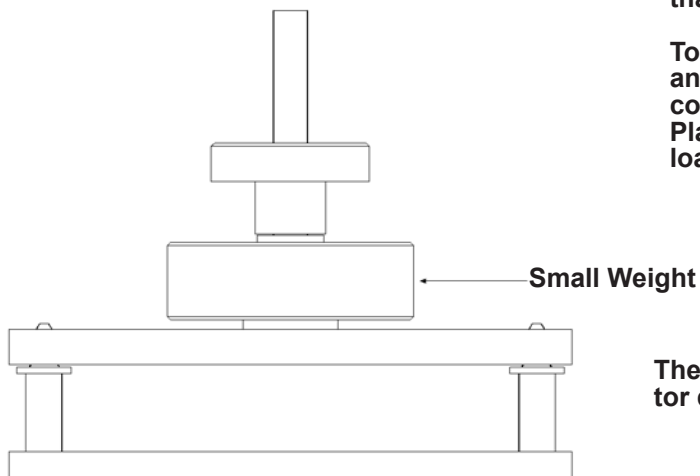
4 connectors = No Weight Needed  
6 - 8 connectors = 1 Small Weight

### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

More weight will produce a smaller radius.

Less weight will produce a larger radius.

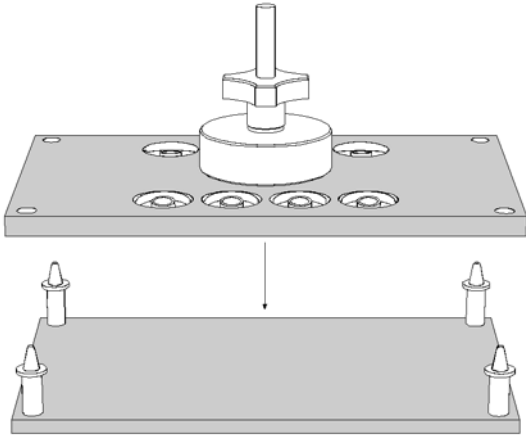


# Fixture Setup Instructions

## FC/APC Fixture Plate

**APC** Fixture Setup

### Step 1

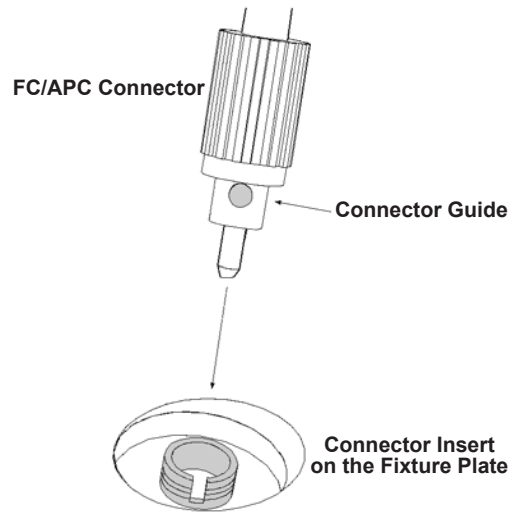


1. Make sure the Fixture Plate is free of particles and UPS-1 polishing solution.

Place the Polishing Fixture onto the Fixture Holder.

This will ensure a clean polish of your connectors and will avoid cross-contamination from previous polishings.

### Step 2

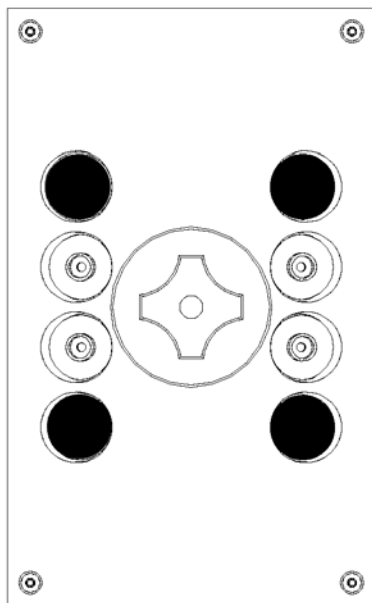


2. Insert the FC/APC Connectors into the Fixture Plate. Make sure the guide on the connector aligned with the slot on the Fixture Plate.

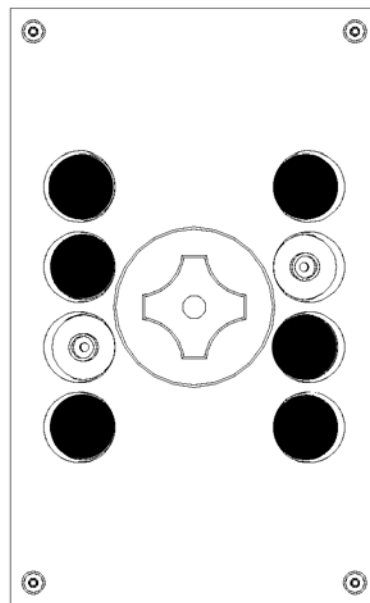
Screw and tighten the connectors to the Fixture Plate.

**NOTE:** If the Polishing Fixture is being loaded with less than 8 connectors, it is important the connectors be placed in symmetrical pattern. This will keep the Polishing Fixture surface level over the base plate during the polishing procedure. Load outside holes first, spacing evenly.

## Examples



**4 Connectors**



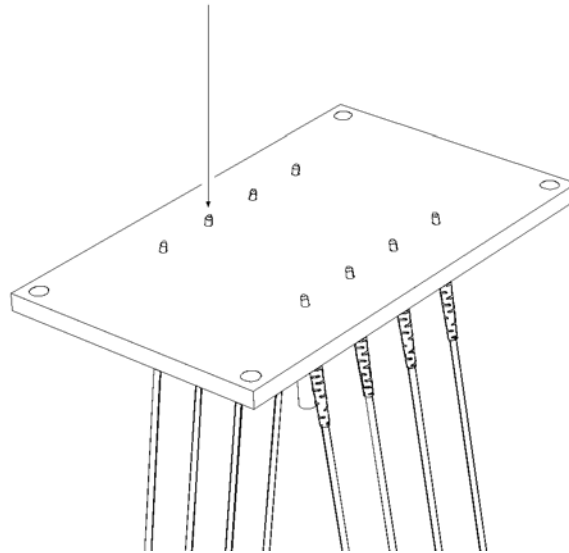
**6 Connectors**



# Fixture Setup Instructions

## FC/APC Fixture Plate

### Step 3



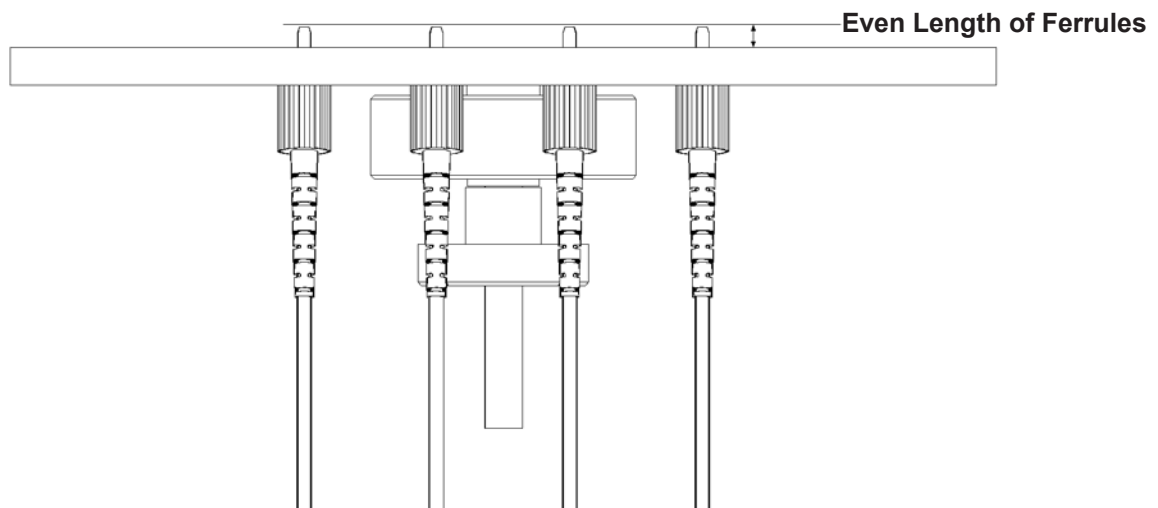
APC  
Fixture  
Setup

3. Lift up plate and press on the ferrules, checking to make sure the connectors have spring action and none are locked in place. Place the Fixture Plate back onto the Fixture Holder.

## IMPORTANT

Make sure that all of the ferrules protrude from the bottom of the plate an equal length. Uneven ferrules will greatly affect the polishing performance. Sight down the profile of the plate referencing the ferrule tips to each other. Push on each ferrule face to check for ferrules sticking. Ferrules that stick are a sign of an unclean plate or epoxy on the side of ferrule.

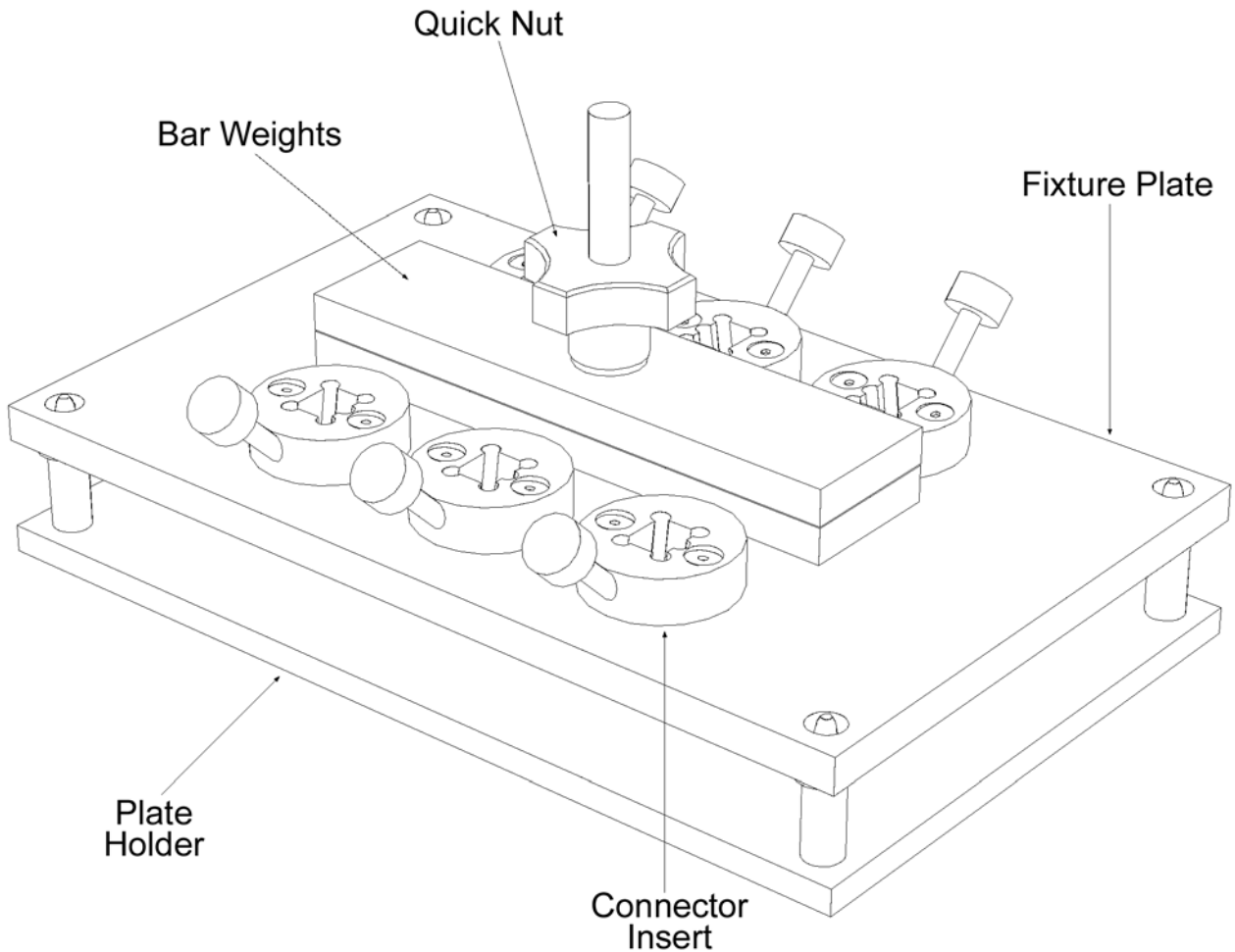
Use high quality connectors and ferrules whenever possible. This will reduce the number of failures per polishing cycle.



Upside-Down View

# SC/APC Fixture Plate

APC  
Fixture  
Setup



## Weight VS Connector Quantity

Although it is possible to polish a small number of connectors, we recommend that you do not polish less than 4 connectors at a time.

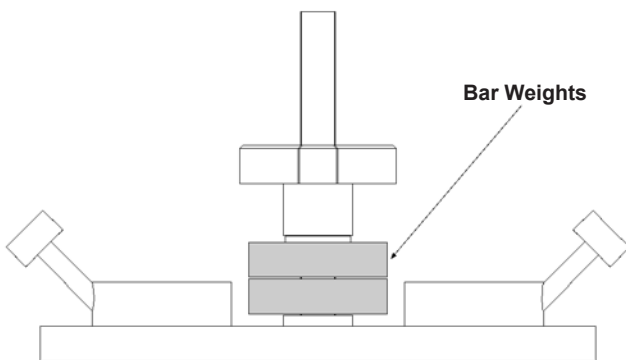
To change the Bar Weights, unscrew the Quick Nut and add/remove the weight as described below. Once completed, screw the Quick Nut back onto the Fixture Plate and continue with the connector loading process.

4 connectors = 1 Bar Weight  
5 - 6 connectors = 2 Bar Weights

### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

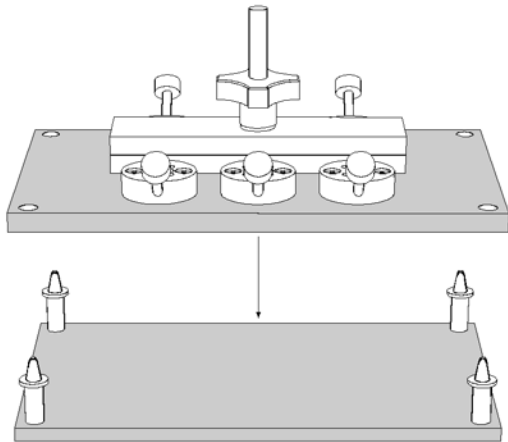
More weight will produce a smaller radius.  
Less weight will produce a larger radius.



# Fixture Setup Instructions

## SC/APC Fixture Plate

### Step 1

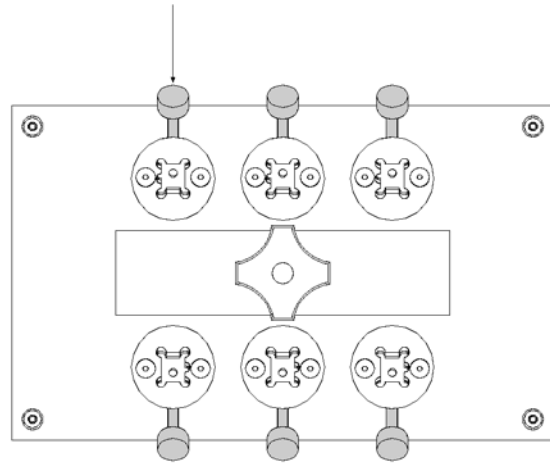


1. Make sure the Fixture Plate is free of particles and UPS-1 polishing solution.

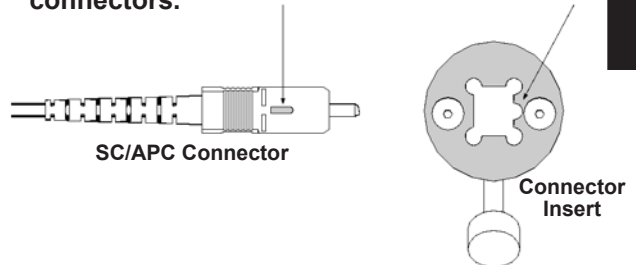
Place the Polishing Fixture onto the Fixture Holder.

This will ensure a clean polish of your connectors and will avoid cross-contamination from previous polishings.

### Step 2



2. Loosen the screws enough to insert the connectors.



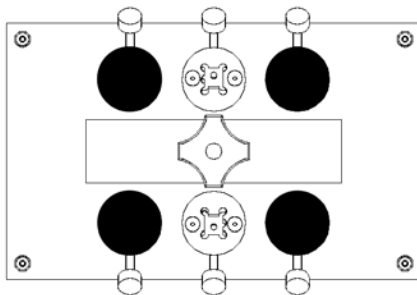
Insert the SC/APC connectors into the Fixture Plate. Note that the guide on the top of the connector slides into a slot located in the Connector Insert of the Fixture Plate. Make sure the connector has been pushed to the bottom of the Connector Insert.

Re-tighten the screws that will hold the connectors.

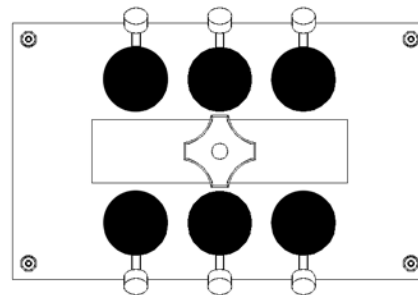
**APC** Fixture Setup

**NOTE:** If the Polishing Fixture is being loaded with less than 6 connectors, it is important the connectors be placed in symmetrical pattern. This will keep the Polishing Fixture surface level over the base plate during the polishing procedure. Load outside holes first, spacing evenly.

## Examples



**4 Connectors**



**6 Connectors**

# Fixture Setup Instructions

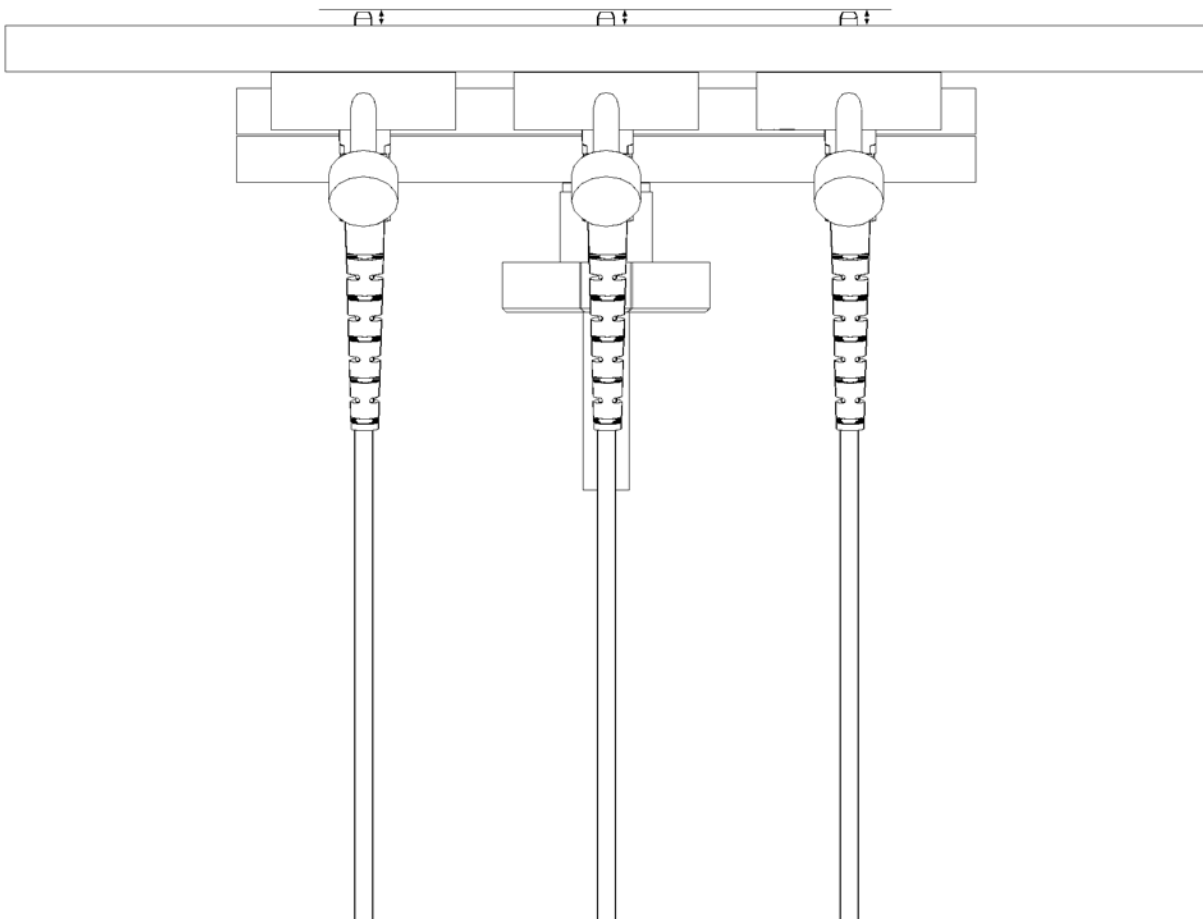
## SC/APC Fixture Plate

### IMPORTANT

Make sure that all of the ferrules protrude from the bottom of the plate an equal length. Uneven ferrules will greatly affect the polishing performance. Sight down the profile of the plate referencing the ferrule tips to each other. **DO NOT PRESS ON THE FERRULE TIPS!**

Use high quality connectors and ferrules whenever possible. This will reduce the number of failures per polishing cycle.

Even Length of Ferrules

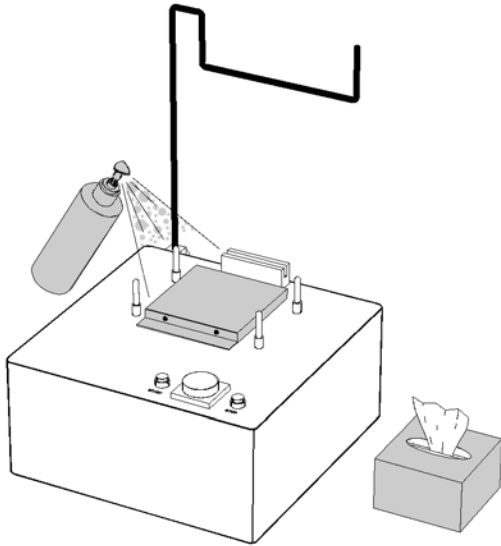


Upside-Down View

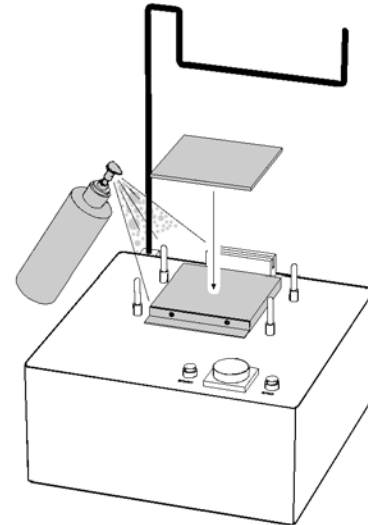
# Polishing Procedure

## UNI-12 & APC Fixture Plates

### Step 1 & 2



1. Make sure the surface of the Base Plate is clean. Spray a very small amount of distilled water onto the top of the Base Plate. Use a Lint-Free Optic Wipe to clean the surface.



2. Spray a very small amount of distilled water onto the surface of the Base Plate.

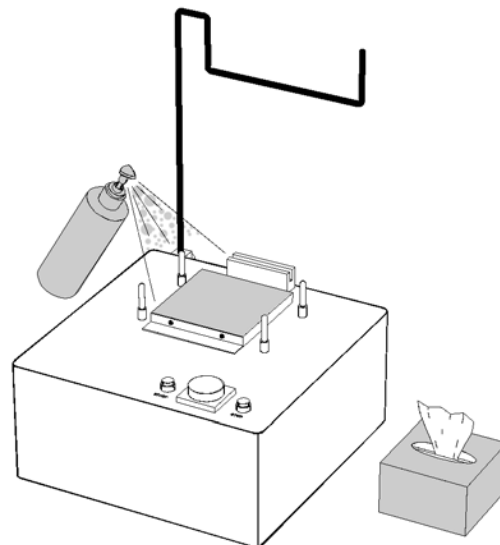
Place the Rubber Pad onto the Base Plate and slide the Rubber Pad around until it grips the surface.

Using too much water will cause the Rubber Pad to slide around on the Base Plate.

Polishing  
Procedure

### Step 3

3. Make sure the surface of the Rubber Pad is clean. Spray a small amount of distilled water onto the top of the Rubber Pad and use a Lint-Free Optic Wipe to clean the surface.



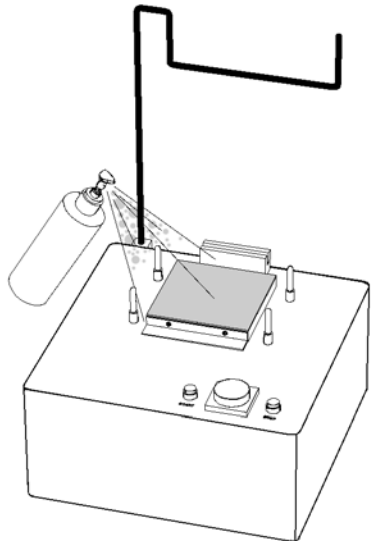
# Polishing Procedure

## UNI-12 & APC Fixture Plates

### Step 4

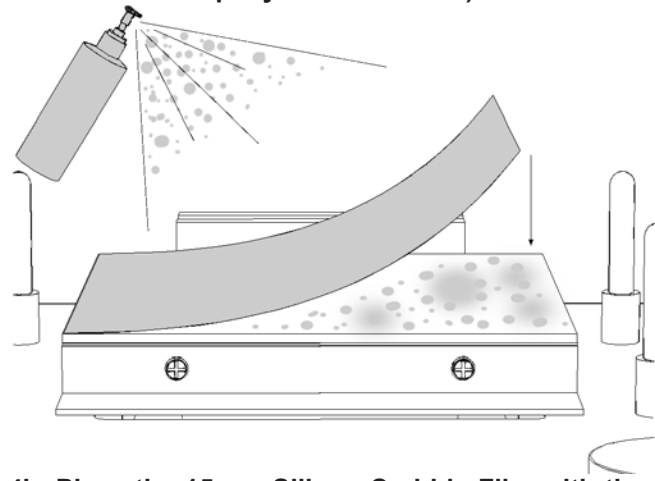
#### SINGLE AND MULTI-MODE EPOXY REMOVAL

(Use this procedure only if the connectors need the epoxy bead removed)



4a. Apply a very small amount of distilled water to the rubber surface using the spray bottle.

(NOTE: Using too much water will cause the film to slide around on the Rubber Pad.)

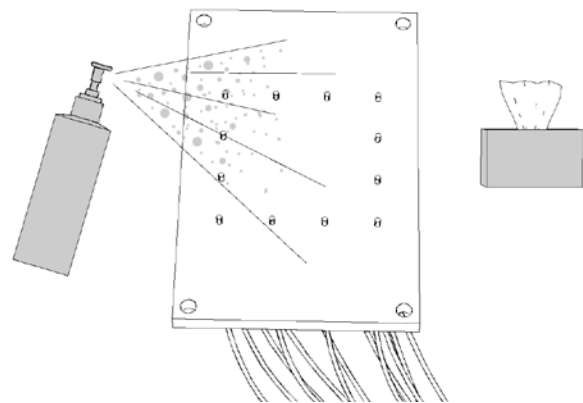


4b. Place the 15 um Silicon Carbide Film with the smooth shiny side down on the rubber pad.

Start by placing the edge of the film onto the edge of the Rubber Pad. Slowly roll the film across the Rubber Pad to avoid creating large air bubbles.

Spray distilled water onto the surface of the film. Use a clean lint-free wipe to press out any existing large air bubbles while cleaning the film at the same time.

Spray distilled water onto the surface of the film again. Make sure the surface of the film is completely covered with distilled water.



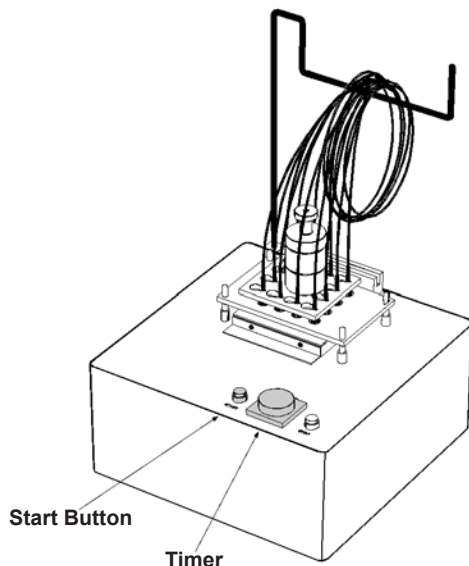
4d. After polishing has finished, remove the Fixture Plate and hold it away from the MCP 12-60.

Visually inspect ferrule tips for any remaining epoxy; polish for an additional 15 seconds if any epoxy is visible.

Thoroughly clean the bottom surface of the plate, the ferrules, and the surface of the polishing film with distilled water and clean lint free wipes after each use to avoid cross contamination. Throw away lint free wipes after each use.

Remove the film and place Fixture Plate into the Fixture Plate Holder located on the MCP 12-60.

Polishing Procedure



4c. Set the Fixture Plate onto the 4 locating pins making sure that it lies flat on the base plate.

Set the timer according to the Fixture Plate being used and press the Green Button. Time is determined by size of epoxy bead; additional time may be necessary due to size of epoxy bead itself.

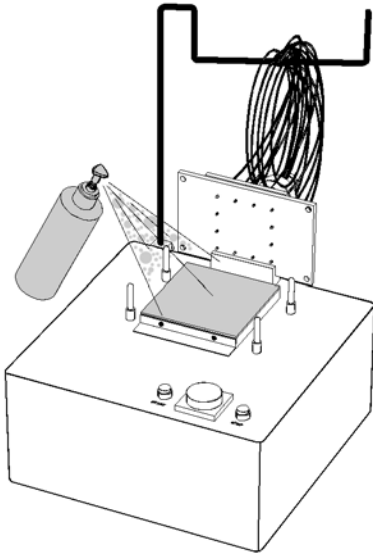
UNI-12	15-30 sec
APC	15-30 sec

# Polishing Procedure

## UNI-12 & APC Fixture Plates

### Step 5

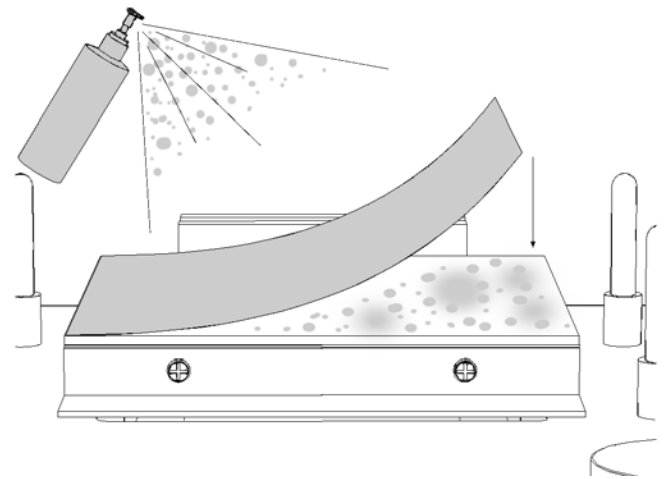
#### Coarse Lapping Film



(If you are continuing from step 4d, the Rubber Pad should still contain enough water on the surface to keep the film in place.)

5a. Apply a very small amount of distilled water to the rubber surface using the spray bottle.

(NOTE: Using too much water will cause the film to slide around on the Rubber Pad.)



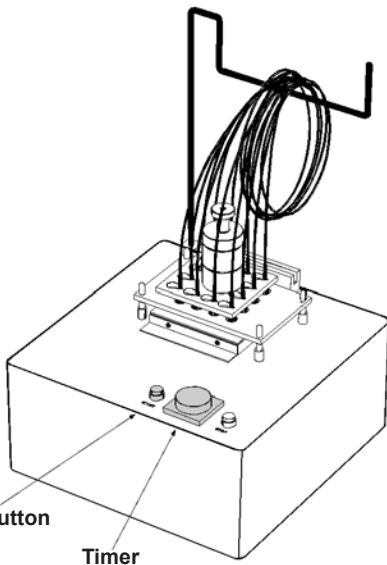
5b. Place the 6 um Diamond Film with the smooth shiny side down on the rubber pad.

Start by placing the edge of the film onto the edge of the Rubber Pad. Slowly roll the film across the Rubber Pad to avoid creating large air bubbles.

Spray distilled water onto the surface of the film. Use a clean lint-free wipe to press out any existing large air bubbles while cleaning the film at the same time.

Spray distilled water onto the surface of the film again. Make sure the surface of the film is completely covered with distilled water.

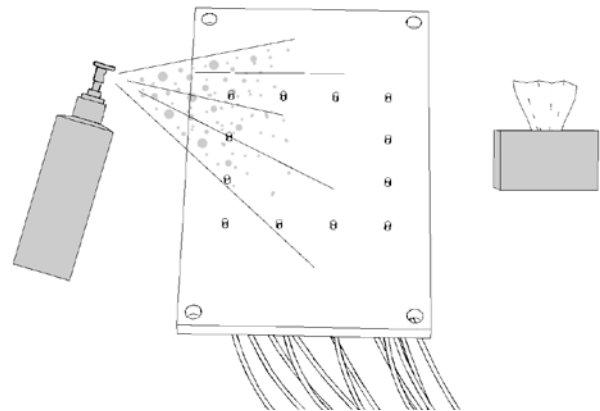
Polishing Procedure



5c. Set the Fixture Plate onto the 4 locating pins making sure that it lies flat on the base plate.

Set the timer according to the Fixture Plate being used and press the Green Button.

UNI-12	1 min
APC	2 min



5d. After polishing has finished, remove the Fixture Plate and hold it away from the MCP 12-60.

Thoroughly clean the bottom surface of the plate, the ferrules, and the surface of the polishing film with distilled water and clean lint free wipes after each use to avoid cross contamination. Throw away lint free wipes after each use.

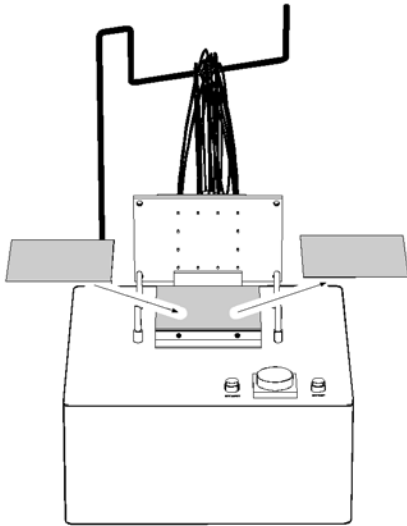
Once the cleaning process is complete, place the Fixture Plate into the Fixture Plate Holder located on the MCP 12-60.

# Polishing Procedure

## UNI-12 & APC Fixture Plates

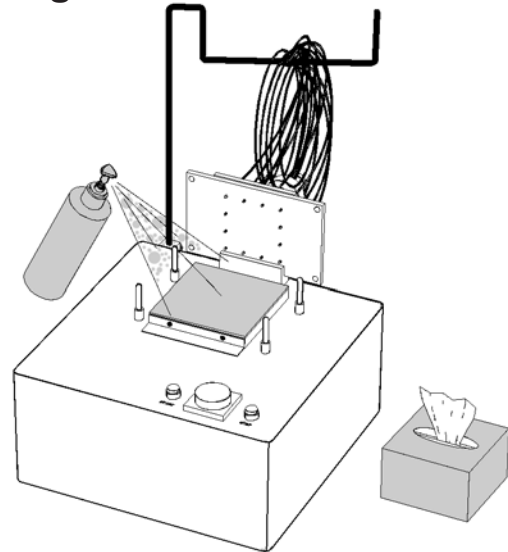
### Step 6

#### Medium Coarse Lapping Film



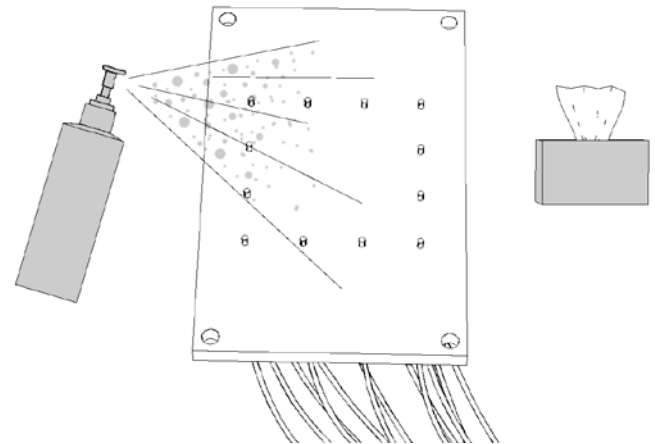
6a. Replace the 6 um Diamond Film with the 3 um Diamond Film.

The Rubber Pad should still have enough water on it to keep the film in place.



6b. Spray distilled water onto the surface of the film and wipe clean using lint-free wipes. This procedure will ensure a clean working surface and remove any large air bubbles.

Again spray distilled water on the film completely covering the surface.

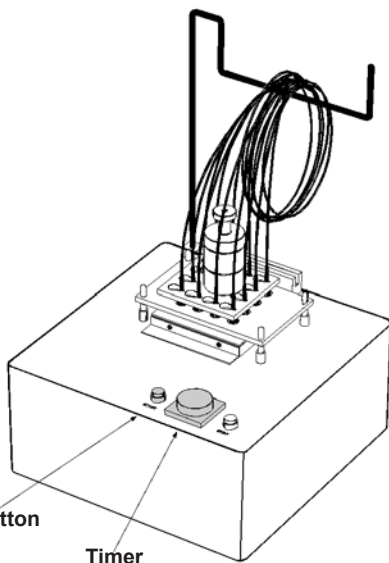


6d. After polishing has finished, remove the Fixture Plate and hold it away from the MCP 12-60.

Thoroughly clean the bottom surface of the plate, the ferrules, and the surface of the polishing film with distilled water and clean lint free wipes after each use to avoid cross contamination. Throw away lint free wipes after each use.

Once the cleaning process is complete, place the Fixture Plate into the Fixture Plate Holder located on the MCP 12-60.

Polishing Procedure



6c. Set the Fixture Plate onto the 4 locating pins making sure that it lies flat on the base plate.

Set the timer according to the Fixture Plate being used and press the Green Button.

UNI-12	30 sec
APC	1.5 min

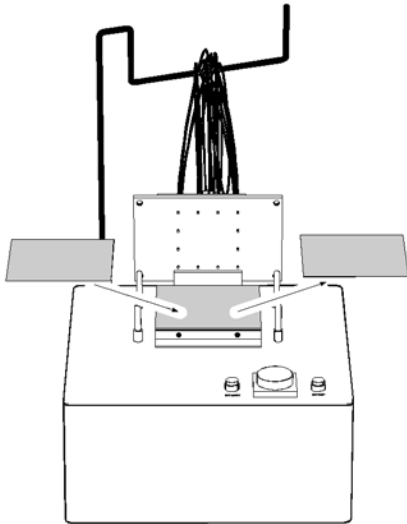


# Polishing Procedure

## UNI-12 & APC Fixture Plates

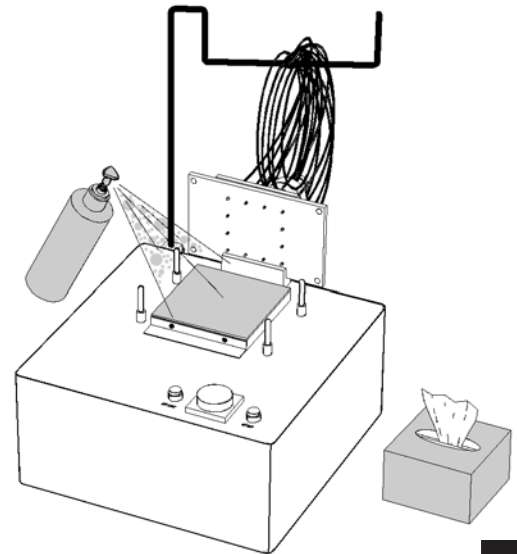
### Step 7

#### Fine Lapping Film



7a. Replace the 3 um Diamond Film with the 1 um Diamond Film.

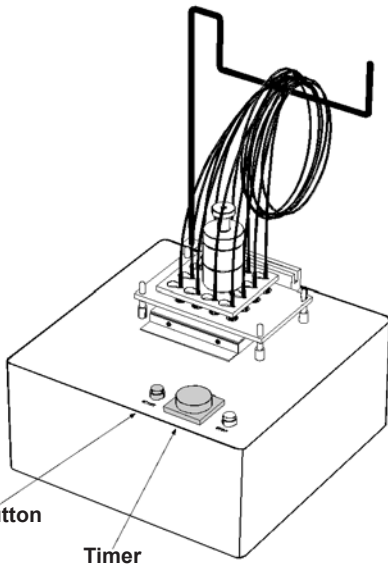
The Rubber Pad should still have enough water on it to keep the film in place.



7b. Spray distilled water onto the surface of the film and wipe clean using lint-free wipes. This procedure will ensure a clean working surface and remove any large air bubbles.

Again spray distilled water on the film completely covering the surface.

Polishing Procedure



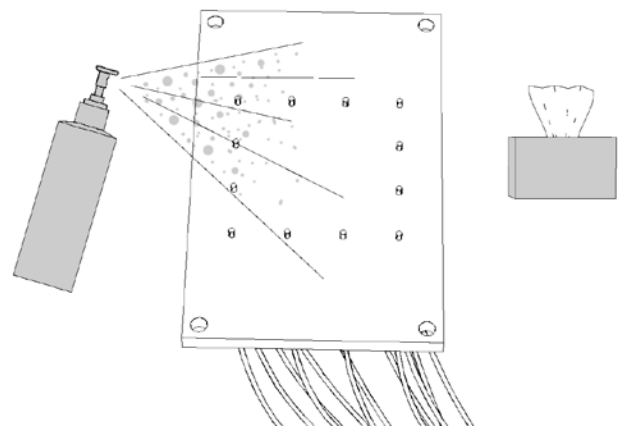
Start Button

Timer

7c. Set the Fixture Plate onto the 4 locating pins making sure that it lies flat on the base plate.

Set the timer according to the Fixture Plate being used and press the Green Button.

UNI-12	30 sec
APC	1 min



7d. After polishing has finished, remove the Fixture Plate and hold it away from the MCP 12-60.

Thoroughly clean the bottom surface of the plate, the ferrules, and the surface of the polishing film with distilled water and clean lint free wipes after each use to avoid cross contamination. Throw away lint free wipes after each use.

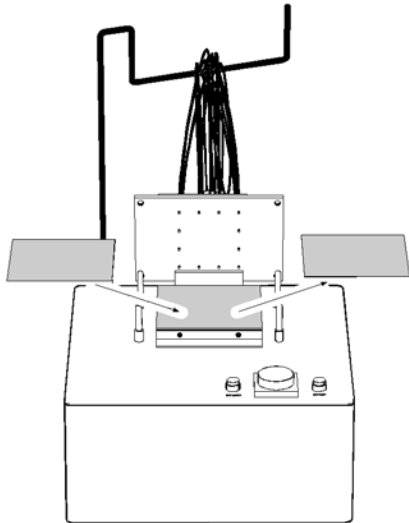
Once the cleaning process is complete, place the Fixture Plate into the Fixture Plate Holder located on the MCP 12-60.

# Polishing Procedure

## UNI-12 & APC Fixture Plates

### Step 8

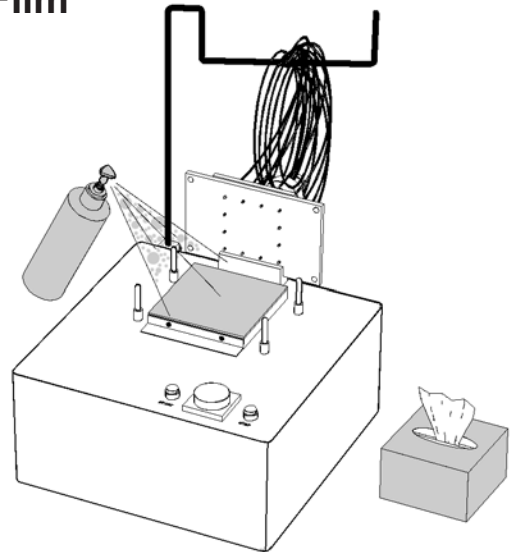
#### Final Polishing Film



8a. Replace the 1  $\mu$ m Diamond Film with the Final Polishing Film.

The Rubber Pad should still have enough water on it to keep the polishing pad in place.

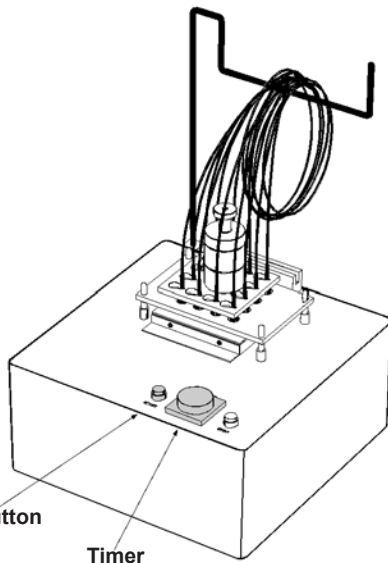
NOTE: Make sure the Final Film is placed on the Rubber Pad DULL side up, shiny side down.



8b. Spray distilled water onto the surface of the Final Film and wipe clean using lint-free wipes. This procedure will ensure a clean working surface and remove any large air bubbles.

Again spray distilled water on the film completely covering the surface.

Polishing Procedure



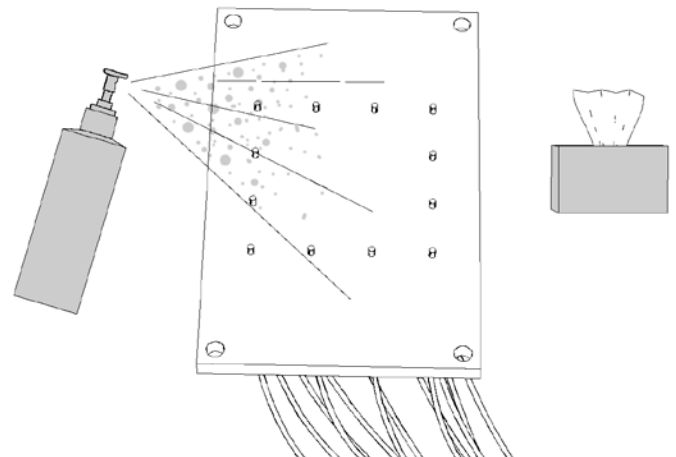
8c. Set the Fixture Plate onto the 4 locating pins making sure that it lies flat on the base plate.

Set the timer according to the Fixture Plate being used and press the Green Button.

UNI-12	1 min 45 sec
APC	1 min 45 sec

### Step 9

#### Fixture Plate Cleaning



9. Pick up and thoroughly clean the surface of the Fixture plate and Ferrules using distilled water, removing any particles.

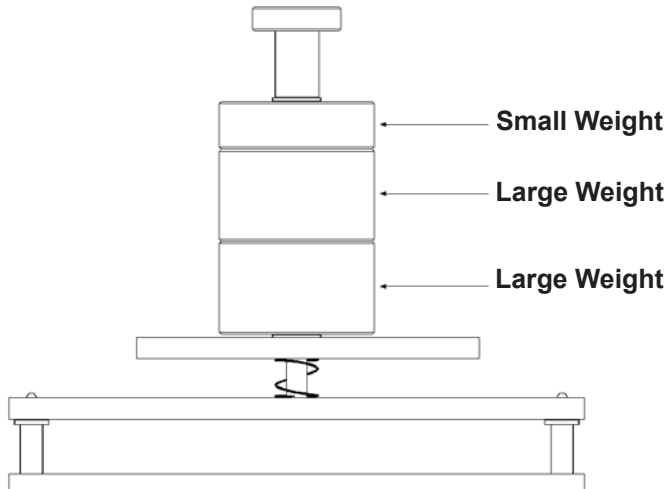
Once the cleaning is finished, place the Fixture Plate back onto the Fixture Holder. The connectors are ready to be removed and tested.

## PERSONAL NOTES:

# TABLES

## UNI-12 Fixture Plate

### Weight VS Connector Quantity



To change the number of weights, unscrew the Knurled Thumb Knob and add/remove weights as described below. Once completed, screw the Knurled Thumb Knob back on the Fixture Plate and continue with the connector loading process.

- 3-4 connectors = 1 Small
- 6 connectors = 1 Large
- 8 connectors = 1 Large & 1 Small
- 10 connectors = 2 Large
- 12 connectors = 2 Large & 1 Small

#### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

More weight will produce a smaller radius.

Less weight will produce a larger radius.

## UNI-FIXTURE POLISHING TIMES

Tables

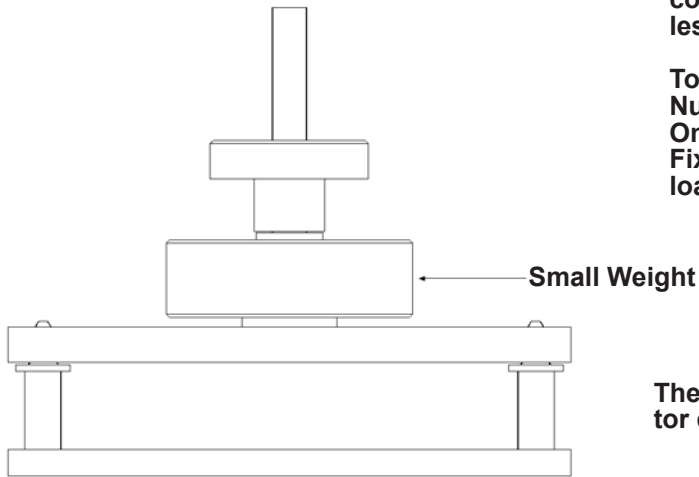
	PAPER	TIME	
STEP 1	15 Um Silicon Carbide	15-30 Sec	Epoxy Removal
STEP 2	6 Um Diamond	1 Min	Coarse Film
STEP 3	3 Um Diamond	30 Sec	Medium Coarse Film
STEP 4	1 Um Diamond	30 Sec	Fine Film
STEP 5	Final Film	1min 45sec	Final Polish

# FC/APC Fixture Plate

## Weight VS Connector Quantity

Although it is possible to polish a small number of connectors, we recommend that you do not polish less than 4 connectors at a time.

To change the Small Weight, unscrew the Quick Nut and add/remove the weight as described below. Once completed, screw the Quick Nut back onto the Fixture Plate and continue with the connector loading process.



4 connectors = No Weight Needed  
6 - 8 connectors = 1 Small Weight

### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

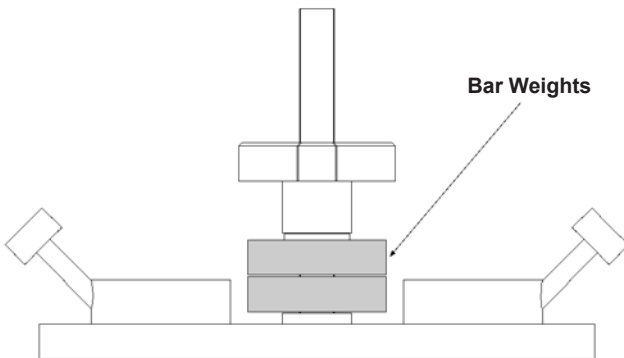
More weight will produce a smaller radius.  
Less weight will produce a larger radius.

# SC/APC Fixture Plate

## Weight VS Connector Quantity

Although it is possible to polish a small number of connectors, we recommend that you do not polish less than 4 connectors at a time.

To change the Bar Weights, unscrew the Quick Nut and add/remove the weight as described below. Once completed, screw the Quick Nut back onto the Fixture Plate and continue with the connector loading process.



4 connectors = 1 Bar Weight  
5 - 6 connectors = 2 Bar Weights

### NOTES:

The exact amount of weight is determined by connector quality, composition and desired final radius.

More weight will produce a smaller radius.

## APC-FIXTURE POLISHING TIMES

STEP 1	15 Um Silicon Carbide	15-30 Sec	Epoxy Removal
STEP 2	6 Um Diamond	2 min	Coarse Film
STEP 3	3 Um Diamond	1.5 min	Medium Coarse Film
STEP 4	1 Um Diamond	1 min	Fine Film
STEP 5	Final Film	1min 45sec	Final Polish

# TROUBLE SHOOTING

## MACHINE POLISHING OF FIBER OPTIC CONNECTORS

<u>SYMPTOM</u>	<u>CAUSE / SOLUTION</u>
<u>Pits in all Connectors</u>	Polish time too short on 3-1Um film
<u>Pits in 1-3 Connectors or Small and Large Radius</u>	Short Ferrules, protrusion tolerance bad. Tolerance +/- .001", 25 Um
<u>Excess Scratching</u>	Increase Final Polish (change FOS-1 film)
<u>Not Enough Undercut, Bad Back Reflection</u>	Increase Final Polish Time
<u>Too Much Undercut</u>	Decrease Final Polish Time, Repolish With 1 uM then back to Final
<u>Bad Back Reflection</u>	Test, Test Cable
<b><u>Bellcore Spec's</u></b>	
Radius of Curvature	7-30 mm [optimum 12-15mm]
Apex Offset	Less than 50Um
Undercut/Protrusion	+/- 50nm [objective-30-45nm]

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### **Maintenance for Mcp12, 24, 48 Polishers** **Recommended yearly service** **After warranty has expired.**

1. Check for wobble between interface and base plate; make sure no rust has accumulated between the bullet nose pin on the interface plate and the liner inserted into the base plate, clean of any debris on both parts and recheck.
2. Systems with air (Mcp24 & 48) need to be checked out with a soapy water test (small paint brush and a container of soapy water), all hose fitting internally and externally, (should have no air bubbles) clean pull down cylinder shaft once a month, also check to see if you hear any leaks from the cylinder.
3. Internal and external stages need to be checked for lubrication, we recommend water proof grease lightly applied to the rails on the stages, also check the stages to make sure they are not rocking from side to side. If they have a rocking motion they may need to be replaced.
4. Bearings in all pulleys and rods should be checked; they should have very little rocking motion and be smooth with no grinding.
5. Belt wear and tension, should not have more then 1/8" of play, and no threads coming out of belt. There should be very little or no belt dust, if there is re-alignment may be needed. Contact the factory.

## Limited Warranty

Nanometer Technologies products shall be free of defects in material and workmanship for a period of 1 year from the date of purchase.

Nanometer Technologies fixture plates shall be free of defects in material and workmanship for a period of 90 days from the date of purchase.

In the event of a defect in materials or workmanship, we will either replace or repair without charge (not including shipping costs) at our option any part which in our judgment shows evidence of such defect within 1 year (90 days for fixture plates) from the date of purchase. ***This warranty does not apply to misuse, abuse, tampered, altered items, overuse of water or UPS solution, dropping the fixture plate, or hitting the fixture plate while suspended from pneumatic arm.*** At the end of the warranty period Nanometer Technologies shall be under no further obligation expressed or implied. This warranty is in lieu of any other warranty, under no circumstances will Nanometer Technologies be liable for any loss, damage, expense or consequential damages of any kind arising in connection with the use or inability to use Nanometer Technologies products.

***Warranty will be voided if tamper seals are broken on any product or unit is opened by any person not authorized by Nanometer Technologies without prior permission.***

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