



User Manual

FP180 Series Fiber Connector Polisher



Caution!

- Place the machine on a workbench with sufficient strength to support it.
- Keep the machine leveled and stable in order to prevent tipping over or falling off the workbench.
- Use only the power adapter rated for the machine (FP180e).
- Wipe the machine dry after each usage to prevent rusting. Do not store in high humidity environment.
- Keep water away from power switch (FP180e).
- Do not disassemble or make any modifications to the machine. Do not place foreign objects inside the machine.
- Transport the machine in the original factory-supplied case only.
- Use factory-supplied accessories only.
- Strong magnets are used in the Polishing disk holder and posts; keep all metal objects at a safe distance away.

To ensure safe and proper operation, read this entire user manual. Contact Princetel's technical support with any questions.

1. Introduction

Princetel's FP180 series fiber connector polishers are versatile polishing machines ideal for field, laboratory and small-scale production environments where 1- 2 connector polish is frequent. A car battery can be used as power source for field usage. The machines, with force adjustability, can be adapted to other polishing needs such as optical crystals and other micro-sized optics. Polishing time is controlled manually.

The unique reference plate precisely presets the ferrule protrusion. Lock and unlock connectors or ferrules by a simple movement of the release handle.

2. Specifications

Turntable speed	160 rpm
Planetary/spin speed ratio	1:50
Eccentric distance	5 mm
Force adjustment range	0-10 Newton
Fixture capacity	2 connectors or ferrules
Operating temperature	-20 to 65 C
Storage temperature	-40 to 85 C
Power adapter (FP180e)	110 VAC, 60 Hz, 6 W
DC Power Supply (FP180e)	12 VDC, 500 mA
Housing material	ABS/Stainless Steel
Weight (polisher)	2.4-2.5 kg
Weight (PDH w/polishing disk)	0.1 kg
Dimensions (LxWxH)	129.6x80x181.7 mm

3. Features

Flexible Fixture fits one or two connectors/ferrules.

Low center-of-gravity ensures machine stability.

Adjustable force provides consistent surface finishes and different ferrule sizes.

Quick-change mechanism allows speedy removal of polishing fixture.

Universal fixture fits most connectors and ferrules with the same diameter.

Precise ferrule protrusion, via the reference plate, reduces polish time.

Hand-operated crank (FP180 only) allows machine to be used in the field without power.

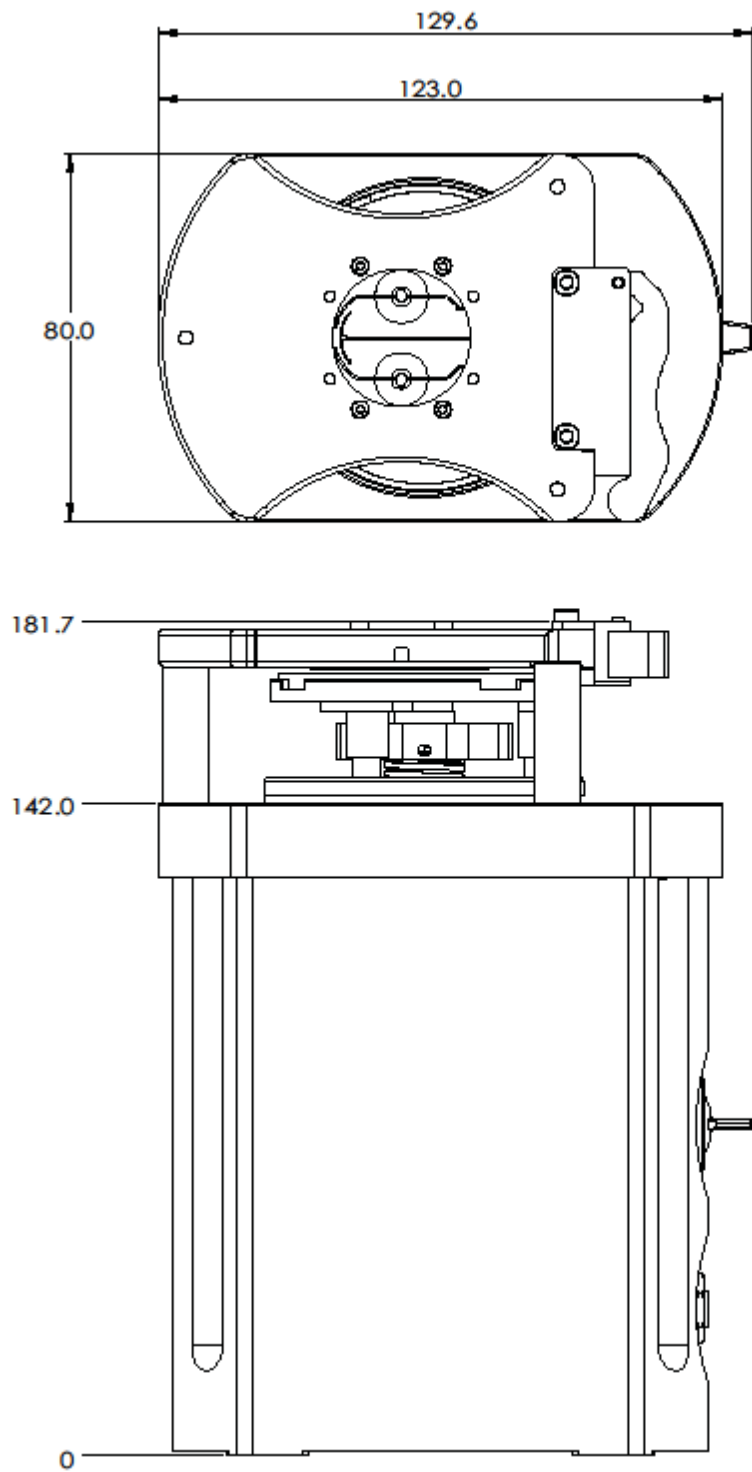
4. Package Contents

- 1 – FP180 Series Manual
- 1 – Polishing Machine
- 1 – Polishing Disk Holder (PDH)
- 4 – Blue 60A durometer Rubber Disks (RP160)
- 4 – Glass Disk (GD1)
- 1 – 2mm Allen Driver
- 1 – 1.5mm Allen Driver
- 1 – DC Wall Transformer (FP180e only)
- 1 – PDS250 Polishing Fixture

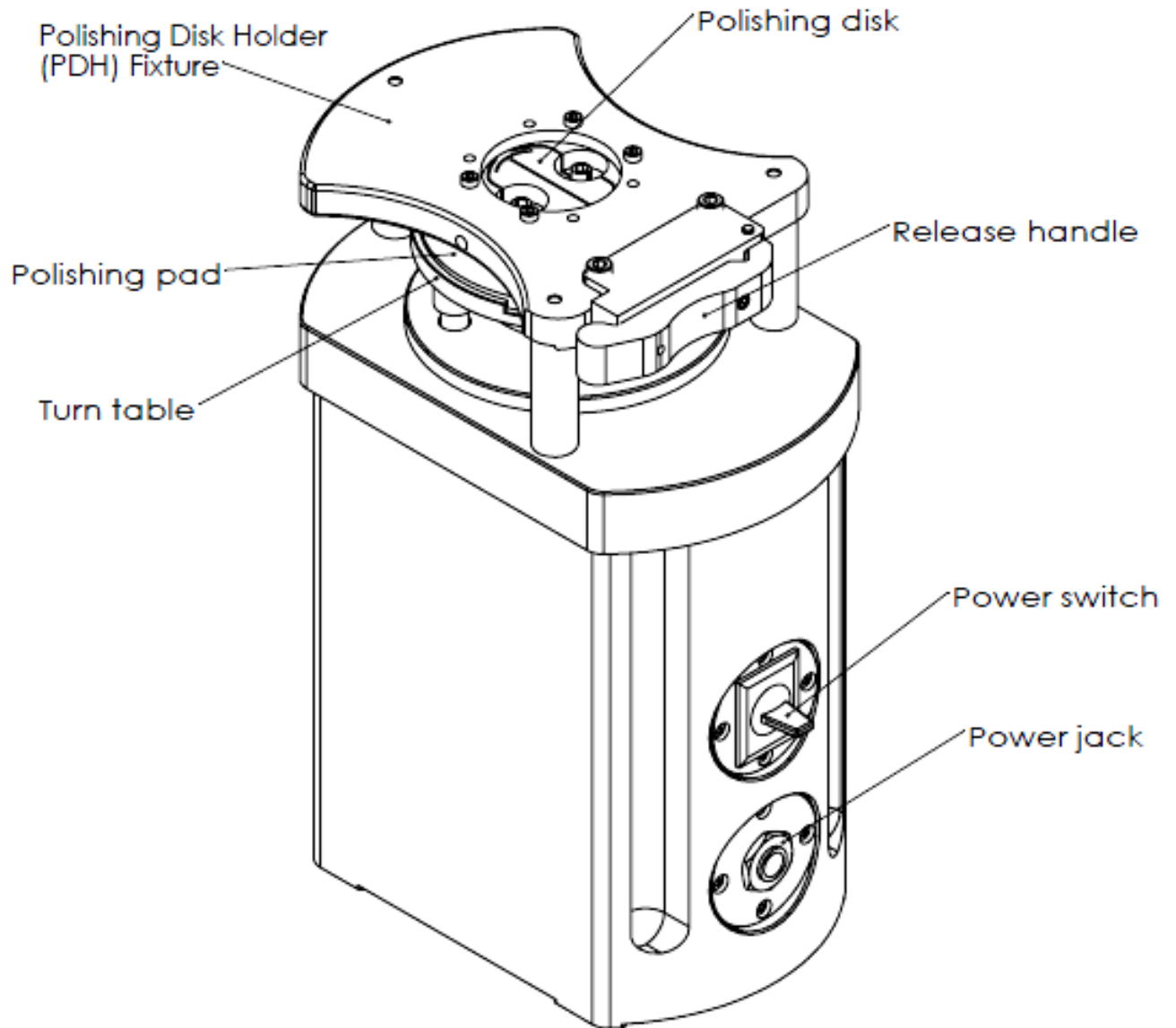
5. Accessories

Polishing Disk Holder	PDH
Polishing Disk for FC, SC, & ST	PDS250
Polishing Disk for FC/APC	PDS250FA
Polishing Disk for SC/APC	PDS250SA
Polishing Disk for LC	PDS125
Polishing Disk for LC/APC	PDS125A
Polishing Disk for SMA	PDS318
Polishing Disk for 8 Deg Angled SMA	PDS318A
Polishing Disk for 1.8mm Ferrules	PDS180
Polishing Disk for 8 Deg Angled 1.8mm	PDS180A
Polishing Disk for 2.0mm Ferrules	PDS200
Polishing Disk for 8 Deg Angled 2.0mm	PDS200A
Rubber Polishing Pad - 60A Blue	RP160
Rubber Polishing Pad - 70A Green	RP170
Rubber Polishing Pad - 80A Yellow	RP180
Rubber Polishing Pad - 90A Red	RP190
Glass Polishing Surface	GD1

6. Mechanical Profile (FP180e-Motorized Version)



7. Identifying the Parts



8. Operating Procedure

FERRULE PREPARATION

1. **Follow the connector manufacturer's instructions** to secure connector/ferrule onto the fiber end.

Note: Limit the epoxy bead on the ferrule end face to less than half the diameter and centered on the fiber, leaving the outer end face surface free of epoxy, to ensure correct ferrule protrusion from the reference fixture surface.

2. **Use a carbide blade to scribe the fiber** near the ferrule and break it off. (See Section 10 for a picture of a carbide scribe tool).
3. **Dispose of the fiber tip** in a safety container. (See Section 10 for a picture of a safety container).
4. **Gently rub each connector** in a figure-8 pattern against a rough lapping paper, such as a 15um grit lapping film, until the exposed fiber tip or "Hackle" is completely removed. The best procedure is to hold the lapping paper in your hand and press the connector against it while performing the figure-8 motion.

Note: Avoid any pressure against the exposed fiber tip as this may crush or crack the fiber below the surface of the ferrule. If this happens, try to polish, but if the cracked fiber is evident in the early stages of the polishing process, it is suggested to start over with a new ferrule.

FIXTURE PREPARATION

5. **Attach Reference Plate** to the Polishing Disk Holder (PDH) by aligning the wide side over the magnets and the radius step toward the polishing disk.



6. **Insert each connector** in the fixture until the ferrule end face contacts the reference plate (ferrule protrusion is ~1mm). For LC and SC connectors, do not use the reference plate at all and simply insert into fixture and lock. The ferrule does not protrude enough to contact the reference plate.



Note: If only polishing one connector, a dummy ferrule or connector must be used in the other hole. This dummy ferrule does not have to protrude through the bottom of the fixture; it is only needed to fill the space for the connector securing mechanism to function properly.

- 7. Lock both connectors** by closing the release handle. Ensure connectors are secured by pressing or pulling on the connector bodies to check for movement.



Note: The loaded PDH fixture can be placed on a flat surface without damaging the prepared ferrule end faces, since the release handle mechanism holds the ferrule tips off the table surface.

MACHINE OPERATION

- 8. Set fixture force** by rotating the knob under the turntable. The force setting should not be changed before completing the last film.



Note: There are two indicators on each knob. A full hash mark and a partial hash mark to indicate position when setting the spring force.

- 9. Place appropriate polishing surface pad** on turntable.



Note: Four pads are supplied so that each pad can be used for a different polishing film. To speed up your process times, place a different grit polishing film on each pad. This way when it is time to change the film for the next step, just place the pad with the appropriate film on the machine.

- 10. Place appropriate polishing film** on polishing pad. If you are using a pressure sensitive adhesive (PSA) backing to adhere to the pad surface, Peel away paper backing before use.

Note: To quickly remove any PSA residue left on the rubber or glass pad surface after removing a polishing film use standard office tape. Press the tape against the surface over the residue and rip the tape off. Be sure to leave enough extra tape to grip when ripping the tape off. The residue will stick to the tape. Repeat until all residue is removed.

- 11. Apply small amount of de-ionized (DI) water** (~1 ml) on the polishing film before each polish run.

Note: After each polish run, add a little DI water and wipe the film clean using lint-free tissues. Isopropyl Alcohol (IPA) may also be used to clean the polishing films after use.

- 12. Position the loaded PDH** over the two rear magnets, hold down the turntable and bring the fixture down over the front magnet.



- 13. Polish ferrules:** (See Section 10 for recommended polishing film schedule and polishing times for standard connectors.)

FP180e – Flip up power switch to turn the machine on. Turntable spins immediately.

FP180 – Rotate the handle at a slow speed to start and ramp up to a moderate and comfortable speed (~3 to 4 turns/sec).

- 14. Remove the PDH from machine** by pressing up on the single magnet side of the fixture with your thumb, then pivoting the fixture off the two rear magnets like a hinge.



- 15. Rinse the fixture** with de-ionized water to remove any polishing film material that may have built up on the fixture that could contaminate the next polishing film. Then blow it dry using air cans or wick the water away with clean lint-free tissues.
- 16. Repeat step 10-15** for the next polishing film until the process is complete.

Note: Make sure the polishing disk and all the ferrule end faces are thoroughly cleaned with de-ionized water and clean air before moving to the next step.

- 17. Wipe clean** the polishing film, the polishing pad, and the turntable collecting pan using DI water and clean lint-free tissues.
- 18. Store polisher machine and all polishing materials** in a clean and dry environment.

The following steps are recommended to install a polishing disk:

- 1.) Fit the polishing disk loosely under the Polishing Disk Holder (PDH) fixture, the “V” in the disk OD should face the cone tipped rod. Keep release handle open for steps 1 and 2 (pictured closed).



- 2.) While holding the polishing disk in place, secure the four mounting screws, but do not tighten, leaving the polishing disk free to rotate during the next step. Place two appropriately sized ferrules into the fixture to expand the flexure design.



- 3.) Close the release handle. The release handle should not be touching main the PDH fixture, if it is then adjust the set screw to move the release handle slightly off the fixture. To achieve the strongest magnetic attraction, the release handle should only be slightly separated from the fixture.



- 4.) Tighten the 4 screws to secure the polishing fixture in place, disengage the release handle, remove the inserted connectors, and now the fixture is ready to use.



9. Recommended Force Setting

Before setting any force settings, dial the knob under the turntable all the way to the top where it stops at the turntable. This is the zero setting position.

For 1.25mm diameter ferrules (LC) using blue 60A polishing pad – Turn knob ~2 full turns from zero setting.

For 2.5mm diameter ferrules (FC, ST, SC) using blue 60A polishing pad – Turn knob ~3 full turns from zero setting.

NOTES

- **The recommended settings should be used as a guide only.** The actual settings should be determined by the end user based on proper visual and end face inspection techniques.
- **Supplied rubber surfaces are Blue 60A durometer.**
- **The force setting** should not be changed before completing the last film.
- **For smaller radius of curvature** chose either larger force setting or softer polishing surface.
- **Force setting should be increased** if the edges of the ferrules are under-polished.
- **Force setting should be reduced** if the centers of the ferrules are under-polished.

10. Polishing Times, Materials, and Misc. Tools

POLISHING FILMS

Grit size	Material	Color	Rec. polish time (s)	Size (mm)
15 um	Diamond	Tan	Air Polish (Hackle Removal)*	φ50 (2")
6 um	Diamond	Brown	30-60**	φ50 (2")
1 um	Diamond	Purple	30-60***	φ50 (2")
0.05 um	A/O	White	4****	φ50 (2")

* Re-polish beginning at 15 um film if the fiber is pitted or scratched over 15 um. Start with this grit if connector does not have an existing pre-radius.

** Re-polish beginning at 6 um film if the scratches and digs on the fiber are 6 um or larger.

*** Re-polish beginning at 1 um film if there are scratches larger than 1 um in width.

**** Required for single mode fiber polishing. Not required for multimode fiber polishing.

- Ideal film diameter is 50 mm (2").
- Recommendation: Do not remove connector/connectors that have passed inspection before re-polish to ensure consistent pressure.

POLISHING SURFACES

Part number	Hardness	Where used	Comments
RP160	60A durometer	1.25-2.5 mm ferrule	PC finish
GD1	Solid	SMA & glass ferrules	Flat finish

DE-IONIZED WATER AND BOTTLE

Apply small amount of de-ionized water (~1 ml) on the polishing film before each polish run and wipe the film clean after each polish run using lint-free tissues such as Kimwipes.



CARBIDE SCRIBE AND SAFETY CONTAINER



CONNECTOR CLEANING

- **Film-based connector cleaners** are useful for polished connectors. However, they cannot offer much to clean the ferrule body, which is essential during the polishing process. They can also become expensive for production environment.
- **Cotton-tipped swabs** are low cost and versatile. One can use them to clean both ferrule surface and body. Make sure to select “no glue” type of swabs for ultimate cleanness.
- **Ultrasound-based connector cleaning machines** are the ultimate connector cleaning tools for production type environments. They are fast and effective.

INSPECTION MICROSCOPES

- **Hand-held inspection scopes** are low-cost solutions for non-critical applications. Those scopes typically come with 100-200x magnification. Some of them can go as high as 400x. Their optical clarity, however, is not the greatest.
- **Mono or stereo working microscopes** provide excellent optical clarity and are very versatile. However, it takes proper training for an operator to use them. The recommended magnification is >100x. Coaxial illumination is strongly recommended.
- **Microscopes with video monitors** are designed for production environments to prevent operator fatigue. The magnification is typically 200x and can go as high as 400x.
- **High-magnification microscopes with interferometers** are the ultimate inspection tools. They provide not only surface images for visual inspection but also surface smoothness and radii of curvature. They are also equipped with video monitors and data storage.

11. Certification

Princetel certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipment.

Upon receiving the device, check the packaging and parts for any possible damage that may have occurred in transit. If damage is apparent please get in touch with Princetel immediately.

12. Warranty

Princetel warrants all parts of this product against defects in material or workmanship for a period of one year from the date of delivery.

In the event of a defect during the warranty period, Princetel will repair or replace this product free of charge. It is the customer's responsibility though to understand the operating instructions and specifications prior to operation.

Any unauthorized modification, repair, or attempt to repair, will render the warranty void.

This warranty remains effective in the event of a change of ownership.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to Princetel or its representative in your area. Items authorized for return must be shipped in suitable containers.

We reserve the right to make changes to the design at any time without incurring any obligation to install changes on units previously purchased.

THERE ARE NO WARRANTIES, WHICH EXTEND BEYOND THE DESCRIPTION HEREIN. THIS WARRANTY IS IN LIEU OF, AND EXCLUDES ANY AND ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING MERCHANTABILITY AND FITNESS, AS WELL AS ANY AND ALL OTHER SPECIAL OR CONSEQUENTIAL DAMAGES. NO PERSON, FIRM OR CORPORATION IS AUTHORIZED TO ASSUME FOR PRINCETEL ANY ADDITIONAL OBLIGATION OR LIABILITY NOT EXPRESSLY PROVIDED FOR HEREIN EXCEPT IN WRITING DULY EXECUTED BY AN OFFICER OF PRINCETEL.

13. Return Authorization

Princetel will only accept returns for which Princetel has issued an approved Return Material Authorization (RMA). The user must first call Princetel at 609.588.8801 to discuss the return and request a RMA number.

The defective product should be shipped to Princetel freight prepaid and insured to Princetel at the address shown herein. International returns must mark air bill "US goods, returned for repair."

Princetel warrants to buyer that its services, labor, and parts will be free of defects in material and workmanship for ninety days from the date of shipment or performance of services.

14. Inspection Report

Characteristic	Test condition	Spec.	Test result
Visual inspection	External surfaces free of residues	Pass/Fail	
Switch/Crank operation	Turntable rotates freely	Pass/Fail	
Burn-in	FP180e - Run continuously for 10mins FP180 – Crank continuously for 1min	Pass/Fail	
End Face Geometry Check	Polish 2 connectors - measure Radius and Apex ^.	Pass/Fail	
SN			
Date		By	

^ - Radius and Apex inspected to IEC standard.

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