

Tabco

OPTICAL INC.

THE TOTAL RIMLESS SOLUTION

***** Please Read Before Using the Smart Drill II *****

The drill is shipped in two parts:

1. The drill motor and press are in the largest inside box. Please follow the instructions for assembly, mounting and height adjustment you will find in the box.
2. The Smart Drill II base unit is fully assembled and has been aligned for axis before packaging.

You will need to view the Instructional Videos and read the Operating Procedures. The video can be viewed on the internet at www.tabcooptical.com/rimless.htm

If you are using a blocking system other than the Weco star/speed or posi-block type, the adapters are fitting on the lock-down arms. Please check to see if the adapters are aligned to allow insertion of your lenses with the tops toward the back of the Smart Drill II. If not, simply pry them off and replace in the right direction.

**** Please Note ****

If you are using an edging system that de-centers in the edging cycle, please block on passive mode. This is necessary as the Smart Drilling System assumes:

1. The block is in the geometric center of the lens
2. Depending on the PD the block could be positioned inward toward nasal and interfere with nasal drilling.

If you have any questions regarding the use of the Smart Drill please call us at 800-394-9285 or 760-723-5283 outside of the USA.

**** Smart Drill II - Motor & Drill Press Assembly****

Some simple assembly and final height adjustments are needed before using the Drill Press and Motor.

1. Enclosed is the Drill Press and Motor. Wrapped in bubble wrap, you will find a bag holding the two mounting screws for the back rod.. The Drill Press & Rod mount on the back side of the Smart Drill, behind the raised, black, center section.
2. Mount the Motor Assembly Rob on the back of the Smart Drill using the two screws in the bag.
3. To raise or lower the Drill Press Assembly, unloosen the two set screws on the top, left side of the Drill Press and slide the Drill Press & Motor to your desired height,.
4. The correct height for the Drill Press and Motor allows about $\frac{3}{4}$ to 1 inch clearance between the end of an inserted drill bit and the top of the lock-down arms with lenses in position. To determine that height, you will need to:
 - a. Insert and lock down a blocked lens.
 - b. Insert any drill bit.
 - c. Loosening the two set screws on the back rod, move the Drill Press Assembly down until you have about $\frac{3}{4}$ to 1 inch clearance between the end of the Drill Bit and the top of the Lock-Down Arms.

Please view the Instructional CD and read the Operating Procedures, you are now ready to practice drilling with you Smart Drill II.

Smart Drill II Operating Procedures

1. After edging do not de-block lenses. The finishing blocks are used by the Smart Drill to hold the lenses.
2. Insert each lens into the Lens Holding Arm with nasal sides together. The orientation of the lenses will have the right lens on the left side of the drill. * **NOTE if the eye size is below 45mm you might have to mount the lenses upside down to clear holding arm when drilling. If this is the case, move up into the Minus (-) side of the Vertical Scale for drill hole placement above the 180 line***
3. Lock the lenses down by the Lens Locking Knob in the back of the Lock-Down Arms, do not over-tighten
4. Position each lens to the correct (Perpendicular to the Front Surface of the lens) drilling angle by holding either lens assembly and rotating outward, the nasal side moves upward. This will cause the front surface of the nasal side to be perpendicular to the drill bit. Base curve angle indicator is located just below and in front of the lens. Lock into position by tightening the Black Locking Handles Down. This procedure will always be done unless noted on the Formula Charts that the drill holes need to be positioned parallel to the lens edge. (After you have completed drilling nasal holes then you will setup for temple angle.)
5. Now that you have the lenses positioned for nasal drilling look to your Formula Chart for the drilling formula. Step #1 will always be positioning the vertical height of the first nasal drill hole or notch.
6. Turn the Vertical Height Knob on the front of the Smart Drill to position the Vertical Scale Pointer on the Vertical Scale to the correct plus or minus number. The Plus side of the scale moves the lenses toward you and results in a hole above the 180 line.
7. You are now ready to position the Lens Table in place on the Base Slide. The Lens Table maintains position by a combination of spring loading and surface tension, you will find it easy to move with minimal hand pressure. With your left hand sliding the Lens Table, take the Drill Handle in your right hand and pull the drill bit down to just above the nasal lens surface. Moving the Lens Table with your left hand, position the **top edge of the nasal side** so the drill bit just touches the edge. Lock the Lens Table in place. (Make sure you are touching just the front side edge. Depending on base curve, the side of the lens will be at an angle to the drill bit because of the angle of the lenses. Do not position to the middle or bottom of the lens side, as this will result in drill holes too close to the lens edge.)

Smart Drill II Operating Procedures (continued)

8. The drill bit is now positioned at the correct height for the first nasal hole or notch and also at the edge of the front surface of the lens. Formula Chart Step #2 gives you the horizontal offset from the edge of the lens front surface to the first hole or notch. Turn the Base Slide Knob to position the pointer on the Horizontal Scale to the correct number. Drill the first hole or notch. ***Note, refer to the Formula Charts for the correct size drill bit.**
9. ***NOTE * Always set drill speed at about 14,500 RPM's. This is for both holes and notches and applies to all lenses materials.**
10. In the case of a 6-step formula, look to the Formula Charts for Step #3 for second hole offset. Turn the Base Slide Knob to position the pointer on the Horizontal Scale to the number that is the result of steps #2 and #3. [Example: if step #2 is 3mm and step #3 is 4mm, then you will move the horizontal pointer to 7mm]. If the second hole is at the same height as the first hole, you can now drill the second hole.
11. In the case of a height difference between the first hole and or notch to the second hole an 8-step formula will be used. Look to step #4 and you will now turn the Vertical Height Knob to the result of step #1 and step #4 [Example: if #1 is 3.5mm and #4 is 4mm, then you will move the vertical pointer to 7.5mm.] Now you are positioned for the second hole drilling.
12. The first lens nasal side is now drilled. Repeat the procedures #7 through #11 for the other nasal side.
13. You have now drilled the nasal holes and/or notches and are now ready to drill the temples. Just repeat the above listed procedures #4 through #12 except you will now use Steps #3 and #4 for a 4-step formula, #4 to #6 for a 6-step formula and #5 to #8 for an 8-step formula.

** We suggest using some rejected lenses and drilling them to get used to this new method of drilling before you run regular jobs.**

Smart Drill II Axis Alignment Procedures

Proper Axis Alignment is critical for accurate hole placement. When using the Smart Drilling System, your will be drilling lenses that have already been edged. The Smart Drill has been adjusted to a "70" mm On-Axis Alignment and starts with the assumption that the lenses are "On-Axis" when you lock the lenses on the Smart Drill. The following instructions are designed to make sure that your Blocker & Edger are aligned correctly. Please run the following tests to determine that alignment.

Blocker and Edger Alignment:

The Axis Alignment Bar can be used to check both your Blocker and Edger axis.

Blocker:

Mark or Scribe a straight line on a lens and block to that line. You can also use a progressive lens and block either 1 or 2 mm above or below the line. Once blocked place the lens on the Alignment Bar and observe if the line matches the straight line of the Axis Alignment Bar. My experience is that very few blockers are off axis, but it is always good to double check. If the line does not match the line of the bar then follow the manufactures procedures for axis alignment.

Edger:

Block a pair of Thin junk lenses and edge using a lens shape, about 54 "A", with very sharp corners at the nasal. Place the edged lenses on the Alignment Bar and check axis by moving the lenses so that the sharp points are touching.

Note, if your bar has blocking adapters they will probably be separated too far for your edged lenses to position touching against one another. You can move the adapters inward to allow easily inspection of the sharp edges of the lenses.

Using this method you can tell even a 1 degree axis tilt. Use the manufactures procedures to align the edger.

Final Checking of Lenses BEFORE Drilling:

Once you are certain that your edger is on axis, the next item to check is for twisting. There is the ongoing problem of lenses twisting during edging. Before drilling use the Axis Alignment Bar to check for twisted lenses by the same procedure as listed above for Edger Alignment. If you find that your lenses have twisted and your blocks are attached by a 3M Leap Pad system, then while the lenses are still on the bar, gently twist the lenses back on axis. Do this very slowly as the leap pad will allow some twisting without detaching, slightly over-twist and set aside for a short time and then double check again. Repeat twist if still slightly off axis, once your nasals match exactly then proceed with drilling.

Axis Alignment Procedures – with Axis Aligning Bar

This procedure has already been accomplished on your Smart Drill. The following procedures are for your information in case of a problem in the future!

1. Using a pair of uncut 70 mm lenses, place your blocks about 1 to 2 mm above the center of the lenses.
2. Lock the lenses into the Smart Drill and position the vertical scale at -1. Using the smallest drill bit you have, drill one hole on the outside edge of both sides of each lens.
3. Place the drilled lenses on a flat surface and insert the Axis Aligning Bar into the star-blocks. If you are using another type of finishing block the adapters from the Smart Drill or separate adapters can be applied onto the Axis Bar. Just align the adapters over the blocked lenses and push into place.
4. Determine the positions of the four drilled holes using the Axis Aligning Bar as a reference. If any of the holes are not in exact alignment, please follow the instructions below:

Holes off Axis:

Look to either side of the lens locking arms and you will see two bars held in place by setscrews. The bars hold the rod that inserts directly into the Star block or block adapter. By unloosing the two screws and then moving the bar forward or backwards you can correct any axis or vertical height problems. The following procedures are how to accomplish those adjustments.

1. First determine the hole that is off axis. All adjustments should be made back to the majority of the holes that are on axis.
2. You will need to move the bar in the same direction of the error. **For example** if the temple hole of one lens is below the other holes, then move that side bar toward the front of the drill. This will move the lens down and result in a slightly higher hole.
3. Please remember that even small movements at the block will result in larger movements at the edge of a 70 mm lens.
4. Continue small adjustments to one bar at a time to align back onto axis. After each small adjustment re-tighten setscrews and re-drill holes just inside of last drilling for a further reference.

Hints and Suggestions:

1. Continue to check your drill hole placement by re-drilling both lenses at the same time.
2. Do a final check at the outside edge of the lenses. Using a 70 mm lens will magnify any error to make certain that the usual 50 to 48 eye size lenses are completely on axis. For this I usually just drill either above or below the holes already drilled.
3. Make only one change to each lens and then check by drilling both lenses again. If you try to make too many changes at the same time

Axis Alignment Procedures – with Axis Aligning Bar (continued)

it usually results in over correction and necessitates restarting the whole process over again.

4. You could find that additional movements in one direction are not possible (usually upward movements), if this occurs than moving the other side of the lens will be necessary.
5. One additional problem that could occur is that the rod that fits into the block or block adapter is tilted vertically. To check this, angle the entire Smart Drill back and double-check that both rods look straight and not tilted up or down vertically. If either rod is angled you are inducing an additional third axis movement and this makes axis alignment very hard to impossible. When this has occurred, I would suggest unloosening all eight set screws and moving the bars completely back so that there is no gap and starting over.

Smart Drill II Procedure Questions & Drilling Tips

1. **Drill Bit Placement:** One of the most important alignments that you make is positioning against the lens edge. This sets up all future moves. Position the drill bit just above the lens and move the Lens Table in small steps to just below the inside edge of the drill bit. Pull the drill bit down and check to make sure there is just a slight deflection of the bit as it passes the front surface edge. If the bit moves freely past the front surface edge you are not yet moved in enough. The major problem you would experience if the drill bit is not positioned correctly would be with compression mounted frames being too loose when mounted.
2. **Compression Mounted Frames are loose:** This can be corrected by using a slightly larger drill bit and opening the drill hole only toward the center of the lens, and then use a inserting washer to fill the gap. The result will move the screw away from the lens edge and tighten the mounting. To correct in all future drillings see the above #1 Tip for proper alignment to lens edge.
3. **Drill Hole too Large:** This occurred because of a slight “run-out” of the drill bit when drilling. If this only occurs infrequently, than you have to make sure the drill bit shank is clean when inserting drill bit. If it appears to be consistent, then try using the next smaller drill bit included in your 10-piece bit set. This has occurred to a small percentage of users and the change of bit size has completely corrected the problem.
4. **Drill Bit Hits Lock-Down Arms:** On some small eye size lenses and top bar mounts you will find that the arms that clamp down on the lenses will interfere with the drill bit movement. In this case (Some Formula Charts will direct you to this step) insert the lenses up side down instead of the regular method. To visualize how this works, on a piece of paper, place a pair of lenses in front of you with the nasal together and the top of the lenses away from you (this is the normal set-up into the drill). Now just rotate the paper 180 degrees, this will result in the top of the lenses toward you, but still nasals together. Inserting the lenses into the drill in this manner will move the top of the lenses below the clamp down arms and the drill bit will move freely into the lens. ****Note** when using this method make sure you move into the (-) minus side of the vertical scale to position above the 180 line.**

Drill Bit Sizes

#63 Pink Ring	0.93 mm	#51 Pink Ring	1.72 mm
1.00 Green Ring	1.00 mm	#50 Brown Ring	1.78 mm
#58 Grey Ring	1.06 mm	#48 Yellow Ring	1.93 mm
1.10 Pink Ring	1.10 mm	#47 Pink Ring	1.99 mm
1.15 Red Ring	1.15 mm	2.00 Red Ring	2.00 mm
1.20 Green Ring	1.20 mm	#46 Orange Ring	2.06 mm
1.25 Lime Green Ring	1.25 mm	2.15 Purple Ring	2.15 mm
#55 Yellow Ring	1.34 mm	#44 Yellow Ring	2.17 mm
#54 Blue Ring	1.39 mm	2.20 Gray Ring	2.20 mm
1.50 Tan Ring	1.50 mm	1.50 Tan Ring	1.50 mm
#52 Yellow Ring	1.62 mm	2.50 Blue Ring	2.50 mm

To order replacement Drill Bits, please contact Tabco Optical at 800-394-9285