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https://reachmd.com/programs/cme/hi-lo-phaco-settings-and-details/33179/

Released: 02/20/2026
Valid until: 02/20/2027
Time needed to complete: 15 minutes

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Hi-Lo Phaco: Settings and Details

Dr. Scott:
Welcome to a description of the settings and details for Hi-Lo phaco. So we're going to be talking about Venturi and peristaltic settings and also all the other aspects of surgery which affect that anterior chamber stability and your ability to basically remove the cataract in the most safe and efficient way.

So currently, the phacoemulsification unit, the platform that I use, it can be in either peristaltic or Venturi mode. When using the peristaltic settings, there are some things I want to point out. Okay, aspiration flow is the flow that's coming to the tip all the time, once you're in the position of aspiration. And you see it's at 50. So that tip has to occlude before the vacuum can build. So these settings are high settings, high aspiration, highest vacuum, and again with the lowest power.

Regarding the power at 1%, on different units, you may find that you need more power than that. And on this unit, depending on the density of the lens, you may need more power than that. You can start at one and you can go up. I think that a fairly dense lens is usually, you can go up to 10% power and be fine. But really, I very rarely go above 20% with these settings.

The bottle height, again, is something that is at a moderate level. I mean, it can be raised to like 135, but bear in mind that the higher you raise it, the more flow, because the more pressure and the more fluid that's egressing either out the main incision or the paracentesis, which we're going to talk about later as far as how we create those and make those consistent.

Now, the pump ramp is something that is significant and a little counterintuitive for the peristaltic system. When we talk about pump ramp with Venturi, we're talking about how quickly the vacuum builds. But when we're talking about pump ramp with the peristaltic, we're talking about how quickly the aspiration decreases when the vacuum increases. So basically to avoid that post-occlusion surge, when the vacuum tip is occluded, you want that aspiration to drop quickly because the tip will become un-occluded and we don't want that aspiration present to avoid potentially having a complication.

So this pump ramp, it's 75%. That's a fairly quick release of the aspiration when the vacuum builds. And we're going to see an example of that in the next video.

Here's a fairly dense cataract with the peristaltic modes and variable white star settings, and you can see we're able to split it in half and get that back crack in place so that we can bring that lens forward. And the aspiration flow is facilitated by the second instrument bringing it forward. So you'll notice this aspiration and vacuum, the fact that they toggle back and forth, it means that you're not always maintaining the kind of vacuum that's optimal, maximal, and so it can take a little longer to remove the lens because of the really suboptimal vacuum. But it also is helping protect against that post-occlusion surge.

So this lens, of course, I mean, it is a denser lens, and it takes a little bit longer to do it. I try to actually go along the femto lines of the lens and remove it in that way when it's denser. Now, you'll see there's some epinuclear lens. The aspiration flow in this case is not

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enough, so that is one place where if you were in Venturi mode, you probably would just be able to lift that up.

Now, at the Hi-Lo phaco, we want to discuss the Venturi settings. Again, on the unit you can choose either, and this is what the screen looks like when you go to the Venturi settings. So because aspiration flows is not part of the choice, then you really have a limited number of choices. This vacuum is at the high level, the power is at the lowest possible level, and the vacuum ramp is actually at the highest level. So in this case, vacuum ramp, it means how quickly the vacuum will be at the tip when you enter that phase on the foot pedal. Again, the bottle height is really a moderate height. It could be raised if you felt like you needed more chamber stability, but also the higher the pressure, the more egress of fluid.

So varying the vacuum is really under the surgeon control, and preventing post-occlusion surge is really under your control in understanding and anticipating what's happening with the removal of the lens. We have other settings, other, really, details about why stability is dependent on these other factors, like the tip and the implosion sleeve and even the paracentesis and second instrument, which we're going to discuss later. But let's take a look at a video with these vacuum levels and surgeon control in mind. And let's watch this next one now.

Here we have another example of a Venturi case. So introducing the phaco tip, using the instrument, second instrument, to facilitate that. And note where the tip of the phaco tip goes. It goes to the center of the lens, but not beyond that, okay. That helps give you leverage at the thickest part of the lens and helps you split it. And you can use both instruments to rotate it and also to back crack it so that you really free up the hemi-lens and get that first segment up.

So watch the vacuum and also the power. And this is a harder lens, and at times, some of the vacuum will stop and you'll notice me taking my foot off the phaco pedal and it dropping to like zero, okay? Remember, in Venturi, it's going to be the surgeon controlling that, and we're going to rotate this piece and apply the vacuum again using the chop to lift it into position. But again, if you become familiar with this Venturi system, you'll find that going on and off the phaco pedal will allow you to more or less re-engage the nucleus in the tip.

So I included this video because there are a lot of little asteroid lens pieces flying around. Especially the harder the lens, sometimes you'll see more of that. And so when I'm going on and off the foot pedal, that does sometimes help bring in some of those. In this case, there is a little piece under the iris, okay? So you definitely want to make sure as you're doing it that you try to keep track of those, but also to be aware if you see anything at that edge that you need to pull that back in. And you can see this little lens mashing technique to get that fragment up and out with the INA.

So here are other specifics about exactly what I'm doing and what I'm using, because each detail actually does matter. So this is a 21-gauge phaco needle, 30 degree bevel tip. The inflow is a high-flow sleeve. It's an orange color. And that really is maximizing the inflow. So it's working in conjunction with your bottle height. The tubing matters. So this advanced infusion tubing is like stiffer internally, which improves the vacuum consistency. You could think of it as if you're sucking on a plastic straw that's not very strong and it just collapses, and that variation in the vacuum you're applying is changing, really, how much is flowing through. Whereas if you were using, say, a metal straw, it would be very consistent. You couldn't collapse it. And so by having that stiffer internal tubing, you are improving the vacuum consistency between the tip and that internal cassette. So I'm also using like an elliptical phaco tip motion, and this elliptical motion is improving the efficiency of the removal of the cataract.

Also, you want really consistent incisions. And for the studies I cited earlier, we actually did all blade incisions because we didn't want there to be any variance between the two groups. And at that time, we felt like that there was more variability with the femto incision. So the femto incision is also a little tighter because the nature of doing a femtosecond incision is that it's creating all the small little femto fractures, and then you're opening it up. So basically, to get an equivalent of a 2.4 blade incision, we use a 2.4 mm femto incision.

The paracentesis incision is made either with the laser or with the 25-gauge needle, and at approximately 1 mm for the second instrument.

One thing I developed with the chop instrument that I use is a constant shaft diameter. So it basically only starts tapering close to the end where it angles. And what I had noticed was just that movement of the second instrument in and out to position where you want was resulting in more outflow at various times and not in a really very predictable way because the shaft itself was tapered. So all these things I'm mentioning are really to try to keep the leakage to a minimum from both the main incision and from the paracentesis.

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So with particularly hard cataracts, approach it in the same way initially and crack it in half. So part of applying maximal vacuum is that at some point, you sometimes have to decide to either increase the power or to apply the vacuum in a different way. And what you'll notice, if you look at the lower right-hand corner and follow the vacuum, is that the vacuum is going up and down. And mostly, the vacuum's on all the time. It's still 1% power. So to speed things up, you could go to like 10% power. But in this case, I'm just going to be patient and bring this nucleus in.

But as I'm doing that, then it's, also, you'll see me starting to actually pulse the vacuum, okay? So that's when you're going to see, especially with this last part, me going up and down on the foot pedal quickly, like just coming up and going back down and repeatedly doing that. That pulsed vacuum is really another way of improving the efficiency.

Well, thank you for your kind attention, and as always, I mean, details, they really matter in ophthalmology, and I hope that these will be helpful in any adjustments you might be considering making.

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