

SETUP INSTRUCTIONS v1.2 02/14/2020

Dear Customers:

Thank you for purchasing the SCK300P spin coater kit designed and produced by **Instras Scientific LLC**. This manual outlines the setup of a vacuum system suitable for use with the SCK-300P. We assume no responsibility generated by use of this design, including, but not limited to liabilities for damage of incidental losses or indirect losses. We make no guarantee, declaration or promise on whether the design is suitable for specific purposes of users.

I. Introduction

A vacuum chuck was one of the most requested features for spin coaters kits. Unfortunately, using commercial vacuum chuck components would be too costly ([\\$700+ just for motor](#)), while using hard drive motors ([hard drive spin coater](#)) would require a complete redesign, and it's not a very flexible approach. Faced with these options, we studied the fundamentals of how a vacuum chuck works, and were able to come up with an innovative design which integrates with the current SCK-300 units. Though not as convenient to use a commercial system, in which the vacuum hold is automatically controlled, it's an improvement over the use of double sided tape for certain applications. Moreover, double sided tape can still be used with the same chuck by just removing the o-ring. Overall, this design has been shown to work at speeds over 8,000 rpms with a 25mm x 75mm glass slide, using the inexpensive vacuum system outlined below.

II. Main Features of Vacuum System

- **Low Cost** - The component cost, including pump, is less than \$120
- **Compact Size** - The small footprint of the pump system allows it to be easily fit in a fume hood



III. Vacuum System Components

The following components were used to assemble a suitable vacuum system to use with the SCK-300P spin coater. All items were purchased from Amazon for a cost of less than \$120 US.

- A. [Zeny Single Stage 3.5CFM 5 Pa Rotary Vane Pump](#)
- B. [1/4" x 1/4" NPT male pipe](#)
- C. [Barstock Tee 1/4" x 1/4" x 1/4" NPT Female Pipe](#)
- D. [Economy Pressure Gauge 1/4" NPT Male](#)
- E. [90 Deg Brass Elbow 1/4" Male NPT x 1/4" Female NPT](#)
- F. [Brass Mini Ball Valve, 1/4" NPT Male x 1/4" NPT Female](#)
- G. [Brass Hose Adapter 1/4" Barb x 1/4" NPT Male](#)
- H. 1/4" I.D., 3/8" O.D. Vinyl Tubing
- I. 5/8" I.D., 3/4" O.D. Vinyl Tubing

IV. Setting up Vacuum System



The first step into setting the vacuum system is to remove the cover by removing the phillips head screws, so that the flare hose adapter which comes with the pump can be removed and replaced with the 1/4" NPT components. Removal of the hose adapter takes a bit of effort since it's held in place by thread lock glue. Once the factory hose adapter has been removed, assemble the components as shown in the picture above, making sure to use thread lock tape or glue. As far as the use of vinyl tubing, rather than thick vacuum tubing, testing has shown that the system cannot generate a strong enough vacuum to collapse the tube.

V. Using the Vacuum System with SCK-300P Spin Coater Kit

Warning: **NEVER START THE MOTOR/CHUCK WITHOUT THE SPIN CHAMBER COVER IN PLACE AND THE VACUUM PRESSURE HOLDING SUBSTRATE IS LESS THAN -15 inch Hg.**

The steps to use of the SCK-300P are the same only the additional step of turning on the vacuum pump and use the Brass Valve to turn on and off the vacuum at the chuck to hold or release the substrate.

Spin Coating Steps:

1. Place substrate in the center of the chuck and turn on vacuum source making sure to verify substrate is held in place.
2. Follow the instructions in the SCK-300P manual for coating the substrate.
3. After the desired time press pause/stop and, **WAIT FOR CHUCK TO STOP SPINNING BEFORE REMOVING THE SPIN CHAMBER COVER.**
4. Switch off the vacuum to the chuck then remove the coated substrate.

VI. Limitations

This is only one vacuum system that we have verified works with the SCK-300P vacuum chuck; however, any vacuum system that can be manually turned on and off and provided at least ~25 in Hg and move 3-4 L/min should work. Also, this pump seems to leak some oil, so placing it in a flat pan is recommended.

VIII. Handling Common Problems

| Problem | Solution(s) |
|---|---|
| When substrate is mounted the gauge doesn't read much off a vacuum. | Verify that the substrate fully covers the black o-ring on the chuck. |