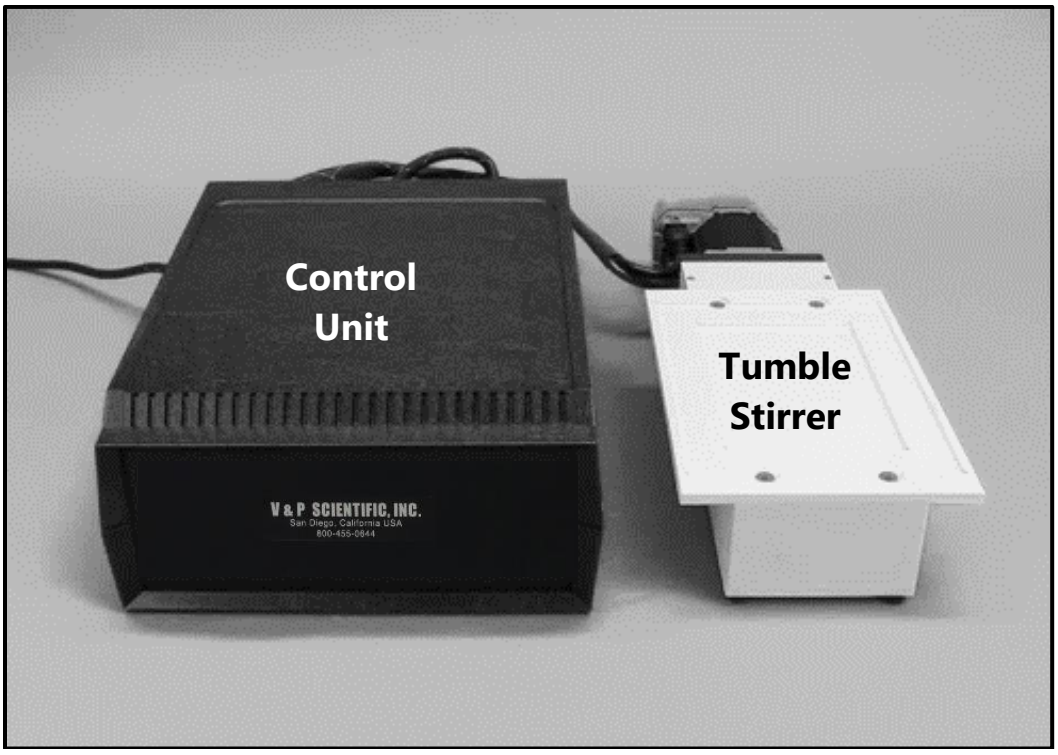
OPERATION MANUAL FOR VP 710C5-7A SERIES ALLIGATOR TUMBLE STIRRERS WITH COMPUTER CONTROL *US Patent # 6,176,609



WARNING!!!!!

- **Be advised that the Magnetic Tumble Stirrer has very strong magnetic fields coming from a 48 MGO Neodymium Iron Boron drive magnet.**
- **People with pacemakers should not get closer than 24 inches.**
- **Remove all magnetic influenced tools and objects from the immediate area to prevent them from being pulled onto the magnet or from striking anyone as the objects are pulled towards the magnet.**
- **Keep credit cards, watches, and other magnetic sensitive items at least 24 inches from the Magnetic Tumble Stirrer's magnetic fields.**
- **Do not operate the Magnetic Tumble Stirrer in the close proximity (3-4 inches) to large pieces of aluminum or ferromagnetic material. For more information see TUMBLE STIRRER INSTALLATION section.**

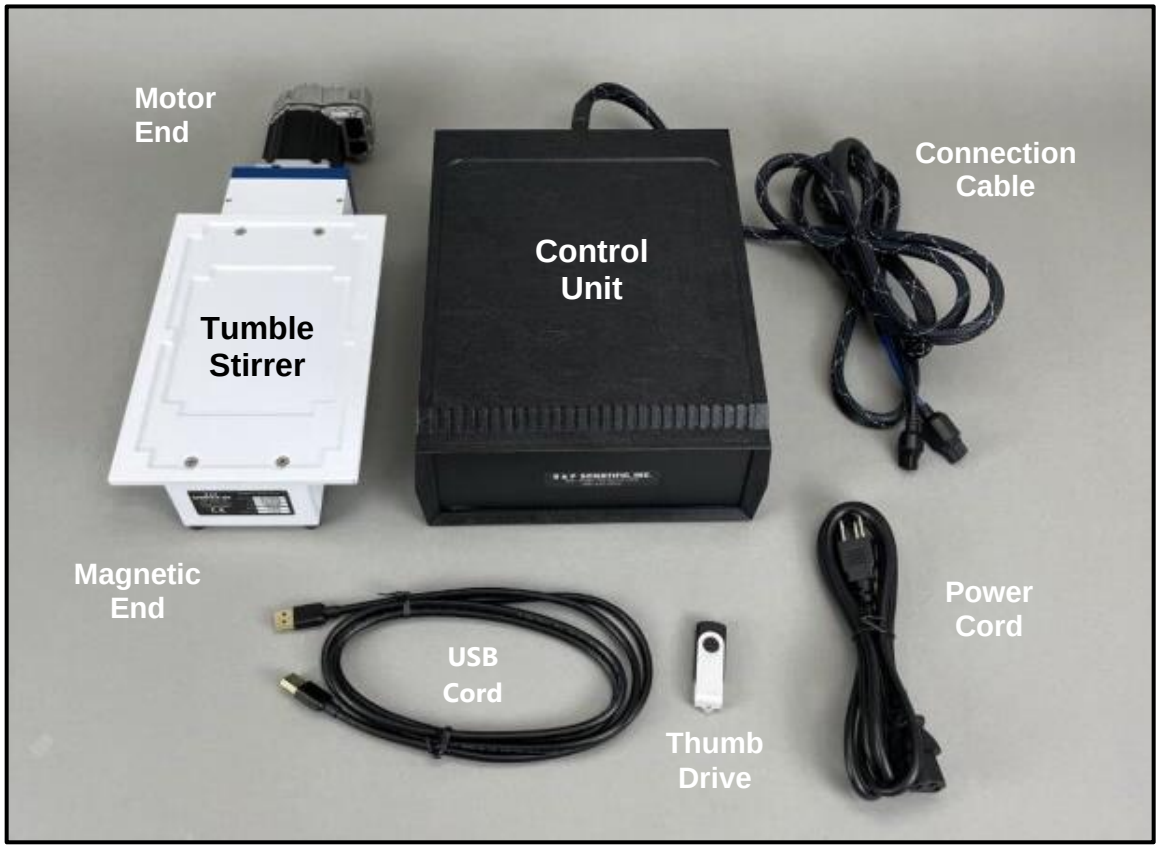
TUMBLE STIRRER INSTALLATION

Caution: Operating the Tumble Stirrer in close proximity of ferromagnetic, aluminum materials, or both, is not recommended.

We recommend that the Magnetic Tumble Stirrer be installed as far away from ferromagnetic material as possible. The closer and larger the magnetic material is to the Magnetic Tumble Stirrer and the faster the magnetic cylinder is spinning, the greater the torque that is required.

Also, large/thick aluminum structures should be avoided. Although aluminum is not magnetic it will cause a drag on the magnetic field due to eddy currents being formed when magnetic flux lines pass through it. The eddy current effect will also cause the aluminum block to heat up. A large mass of aluminum will cause a significant drag and result in greater strain on the motor. This strain can shorten the motor life. This is not covered under V&P Scientific, Inc.'s warranty for this product.

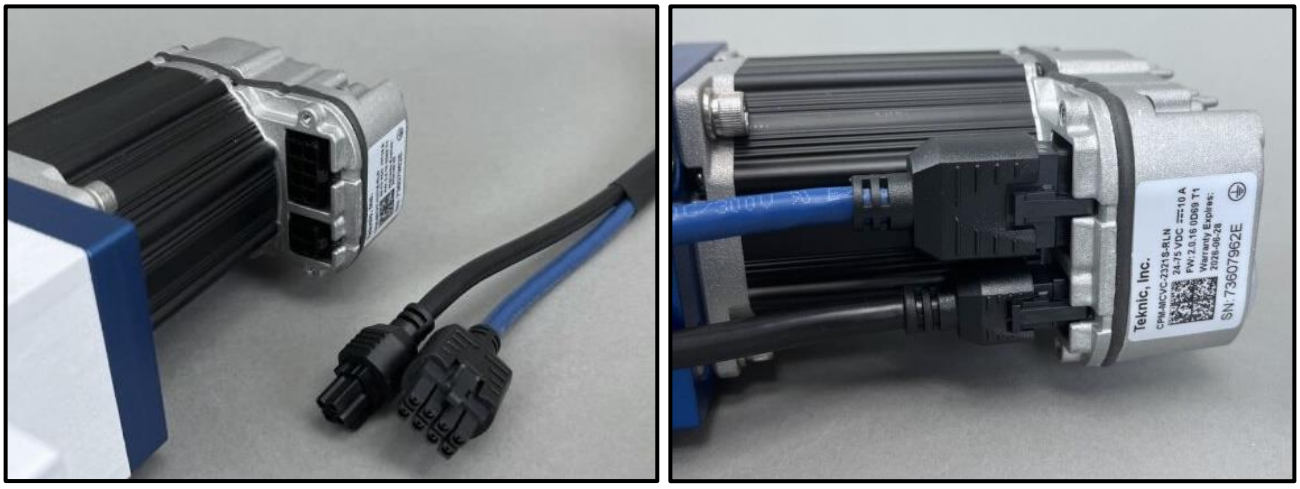
If installing away from these materials is unavoidable, test run parameters before operating instrument without supervision for long periods. The Tumble Stirrer will turn itself off when temperature of the motor exceeds its safety limit of 135°C. If this happens, turn off power supply and allow motor to cool before re-starting. Modify operating speed parameters to prevent over-heating. Repeated over-heating could reduce product longevity.



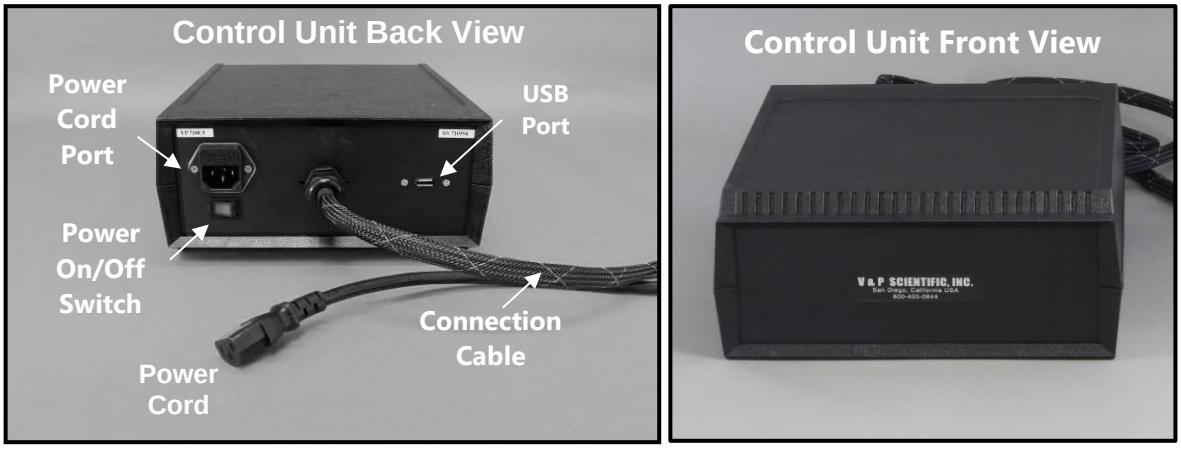
Parts of the VP 710C5-7A-CC Tumble Stirrer

Connecting the Control Unit to the Tumble Stirrer and Computer:

Attach the connection cable (two plugs, one blue and one black) that transfers power and provides communication between the Tumble Stirrer and the Control Unit into the connection ports on the motor end of the Tumble Stirrer. Attach the power cord to the Control Unit, then plug into appropriate power outlet. Plug USB cord into port on Control Unit and other end to computer.



Plug connection cable to the connection ports on motor end of Tumble Stirrer.



Plug power cord to the power port and USB cord to USB port (left). Computer-Control Control Unit does not have manual speed control knobs (right).

TUMBLE STIRRER OPERATION

The Control Unit for the stirrer has an ON/OFF power switch and a port for connecting to a computer via a USB cord. The maximum speed is set at the factory to 1500 RPM with no load. The RPM displayed on the computer is a true RPM reading. Adding a load (magnetic resistance), such as aluminum around the magnetic end of the Tumble Stirrer, will directly affect speed. The controller is programmed to compensate by adding more power to maintain the same RPM that is set. If there is substantial magnetic resistance, such as aluminum, keep the stirrer speed at no more than 750 RPM.

The optimal operating speed of the Tumble Stirrer is dependent upon the particular application to be used and needs to be empirically determined.

Factors to consider in determining optimal stir speed are the application, fragility of the objects (such as cells or beads) being stirred, size, shape, composition of the test tube, vial, bottle or microplate well (glass, polypropylene or polystyrene), depth of the liquid in the container, volume and viscosity of the liquid, and the type of magnetic stir element (bar, disc, custom shape) used.

In general, stirring microbial cultures works best at low speeds. Stirring to resolubilize extracts, or to stir in deep well microplates, requires high speed. The Tumble Stirrer is well suited for either of these types of applications since it can function at minimum and high RPM. Again, the speed of stirring needs to be determined empirically for the application. Most tumble stirring applications require a stir speed between 300 – 500 RPM. The VP 710C5 series is capable of a maximum stir speed of 1500 RPM.

TUMBLE STIRRER COMPUTER CONTROL

The Tumble Stirrer Models with "-CC" in part number can be controlled using a computer (not included). In these models, the Control Unit does not have a manual control knob or an RPM meter display. The control unit for the Tumble Stirrer is connected by a USB communication cable to the computer. And through this connection, the Control Unit accepts simple ASCII commands to control the speed of the stirrer, in the range of 0-1,500 RPM.

Technical details:

1. The Tumble Stirrer Control uses an internal CH340G USB to Serial Converter (set to 9600,8,N,1) which will require driver software (see set-up step 3 below).

2. The basic command language for this computer to the stirrer communication is ASCII.

3. Commands can be sent from the computer using a standard terminal program like HyperTerminal or Realterm. Or, if needed, download from the provided USB flash drive the Serial Terminal program to the computer to be used to control the stirrer.

4. Alternatively, the ASCII commands can be sent by an automated liquid handler's software to control the stirrer. Since there are many different automated liquid handlers available, please contact a technical representative from the company that makes the liquid handler.

Set-up:

1. Connect the stirrer to the Control Unit as described in the TUMBLE STIRRER INSTALLATION section on page 2.
2. Connect the Tumble Stirrer Control Unit to a computer using the provided USB cable.

3. USB driver software
    a. Windows may already have installed the needed USB driver software.
    b. Or download from the provided USB flash drive the "CH340 USB DRIVER" and run "CH341SER.exe" and install (Windows typically auto-installs once downloaded)

4. The Tumble Stirrer will be recognized automatically by the driver once installed.

5. Using a Windows-based terminal software (see technical details above) send ASCII commands from the connected computer to the Tumble Stirrer as described below.

Send ASCII commands to the Tumble Stirrer:

1. Select the com port of the Stirrer (listed under Ports in Device Manager as "USB-SERIAL CH340 (COMx)" where x is the COM number)

2. The command starts with a lowercase "s" (ASCII 115) and a numeric value such as 0 - 1500 which is the RPM to be requested.
    EXAMPLE:
    send: "s200"
    response: "Speed: 200"

3. The Stirrer will either respond with " Speed: Value" or "Out of Range"

4. The "Out of Range" response is if the input value is greater than allowable RPM of the Stirrer (1500RPM limit).

PRODUCT MAINTENANCE

General Product Care:

- When not in use, turn the power switch off.
- Motor can handle ambient humidity of 0-95%; non-condensing. Motor will tolerate ambient temperature of 0-70°C.
- The deck of the Tumble Stirrer is made of ABS. To clean the deck use a mild detergent followed by wiping dry. Do not submerge any part of the Tumble Stirrer into liquids.
- The motor of the VP 710C5 series Tumble Stirrers is a powerful servo motor designed for high torque and long-term stirring applications.

Additional Tumble Stirrer Specifications:

Equipment Rating - 115/230V~, 1.6A, 60/50 Hz Not to be used with power above this rating

SAFETY PRECAUTIONS

The use of Magnetic Tumble Stirrer, like that of all utilization of concentrated power, is potentially hazardous. The degree of hazard can be greatly reduced by proper design, selection, installation, and use, but all hazards cannot be completely eliminated.

V&P Scientific assumes no liability for the customer's failure to comply with safety requirements and practices.

TECHNICAL ASSISTANCE

If technical assistance is required, contact V&P Scientific, Inc. at 858-455-0643 or sales@vp-sci.com.

WARRANTY

V&P Scientific, Inc. warrants this product to be free from defects in material and workmanship when used under normal laboratory conditions for one year. This warranty begins from the date of delivery by V&P Scientific.

In the event this product fails under normal laboratory conditions within the specified period of time because of a defect in material or workmanship, V&P Scientific will, at its option, repair or replace the product. Damage to the product caused by user negligence is not covered.

This warranty is made in lieu of other warranties expressed or implied including the warranties of merchantability and fitness for a particular purpose. V&P Scientific shall not be liable for loss or damages arising from the use of these products nor for consequential damages of any kind.

Please keep the special shipping carton in case the unit needs to be shipped back to V&P Scientific. Contact V&P Scientific for return authorization and shipping instructions or for any other assistance at 858-455-0643 or sales@vp-sci.com.