V&P SCIENTIFIC, INC.

Innovators in Immuno and Genetic Assays

CE

OPERATION AND CARE MANUAL
FOR
V&P SCIENTIFIC'S ALLIGATOR TUMBLE STIRRER WITH SMART SWITCH AND NANO CONTROL*

05/17/2005
US Patent # 6,176,609

CAUTION!!!!!

Be advised that the Alligator Tumble Stirrer has very strong magnetic fields. People with pacemakers should not get closer than 6 inches. Remove all magnetic influenced tools and objects from the immediate area to prevent them from being pulled onto the magnets or from striking people as they are pulled onto the magnets. Keep credit cards, watches and other magnetic sensitive items at least 1 foot from the Tumble Stirrer's magnetic fields.

OPERATION

ASSEMBLY

Place the flexible drive head into the tumble stirrer receptacle bracket and slip over magnetic cylinder drive shaft. Spin the drive shaft until the 3/32" set screw aligns with the hole in the top of the mounting bracket. Stretch the flexible drive out straight. Place the other end of the flexible drive through the bracket and into the motor compartment. Slip the flexible drive shaft over the motor shaft. Spin the flexible drive shaft until the 3/32" set screw is aligned with the hole in the top of the mounting bracket. Tighten the set screw. Tighten the two 3/32" set screws in the motor bracket to the drive shaft sleeve. Place the Tumble Stirrer and the motor into working positions then tighten the two 3/32" set screws that couple the drive shaft sleeve to the Tumble Stirrer bracket.*
We recommend that you install the Tumble Stirrer as far away from magnetic material as possible as the closer and larger the magnetic material is to the Tumble Stirrer the more torque that is required and slower the maximum speed will be.

Operating the Control

The PACESETTER™ "NANO" inverter control is factory set for operation using the VP 700 Smart Switch and a computer.

1. First load the Smart Switch CD into your computer. Follow the prompts on screen to install the program.
2. Connect the Smart Switch to your computer via the RS232 Cable (provided).
3. Connect the Smart Switch power cord into a 120 Volt wall socket.
4. Plug the 120 Volt power outlet (provided) from the VP 710F into the Smart Switch port # 3 (Remote Outlet) and plug the VP 710F remote switch cable (provided – see cable label) into the Smart Switch port #1 (Remote Switch). *****Important***** Note that Smart Switch port #1 is not a power outlet but a remote switch that can be controlled by the computer software. **Do not plug 120 Volt power source into this outlet.** Also note that Smart Switch port #2 no longer functions as a power outlet.
5. Start the Smart Switch program. The switch will be detected by the program automatically. If there are any problems, check your connections and enter the comp port number under File-Setup.
6. To control stirrer operation manually go to "Direct Mode" on the Menu, then select "Change State of Outlets", click on "Outlet 1". This will change the status of the stirrer, turning it

either on or off.

7. Be certain to read the Smart Switch documentation included with this technote and on the control disc for detailed instructions on using the scheduling feature.

Remote Smart Switch Operation

1. To turn on the VP 710F motor, first turn on Smart Switch #3 (remote power) with the computer program and then turn on Smart Switch #1 (remote switch) to start the motor.
2. Press the Nano display button labeled "▲" to increase the output frequency. The motor will accelerate until the "▲" button is released. Note that the output frequency changes at a progressively faster rate the longer you hold the button down.
3. Press the "▼" button to decrease the output frequency.
4. Use the computer program to stop the motor by turning off Smart Switch #1.
5. Use the computer program to turn off the Nano Pacesetter Control by turning off Smart Switch #3.

Manual Key Pad Operation

If you want to operate the Nano Pacesetter Control manually with the push button keypad you will have to change Function Setting F10 in the Nano display from 001 to 000. See pages 14 and 15 in Pacesetter Instruction manual for the procedure to do this.

When the Pacesetter Nano Control is set for manual key board push button operation. Use the following procedure to start the motor and adjust speed.

1. Turn the AC power ON. The LED display will illuminate and show the current setting for output frequency. The power light just to the left of the LED display will also illuminate.
2. Press the button labeled "RUN/STOP." The display will change to show actual output frequency, which will start at "000" and ramp up to the set frequency. Simultaneously, the motor will start and accelerate.
3. Press the button labeled "▲" to increase the output frequency. The motor will accelerate until the "▲" button is released. Note that the output frequency changes at a progressively faster rate the longer you hold the button down. Press the "▼" button to decrease the output frequency.
4. Press the button labeled "RUN/STOP" again to stop the motor.
5. If the motor does not start promptly and run smoothly, refer to "TROUBLESHOOTING." in Appendix A.

Operating the Tumble Stirrer

The operating speed of the Tumble Stirrers is dependent upon your particular application and needs

to be empirically determined for your application You can determine the optimal speed for your application quite simply. The Bodine AC Inverter Motor is controlled by changing the Hertz frequency. The higher the Hertz frequency the faster the speed. The attached table converts the Hertz frequency in the digital read out to speed in RPM.

Factors to consider in determining optimal stir speed are the fragility of the objects being stirred, size, shape, composition of the well or Bubble Paddle reservoir (polypropylene PTFE or polystyrene), depth of the microwells, volume and viscosity of the liquid, and the type of Paddle, stir disc or bar used.

In general, stirring microbial cultures works best at low speeds. Stirring to re-solubilize extracts or to stir in deep well microplates, or to re-suspend beads with the Bubble Paddle Reservoirs requires high speeds. Again the speed of stirring needs to be determined empirically for your particular application.

The motor is set at the factory to deliver a top speed of 1000 RPM which corresponds to a frequency setting on the control of 164. The correlation between frequency and RPM is 1 to 6.097 so just multiply your frequency on the control by 6.097 to determine the RPM. Although it is possible to set the Hertz frequency higher, neither V&P nor Bodine recommends operating at the higher settings for long periods of time or under heavy loads. Also note that at low Hertz frequency settings the stirrer may not operate, you must first set the frequency high enough to overcome inertia.

CARE

When not in use, turn the power switch off. Do not place the control unit in chambers with temperatures above 40C. The Tumble Stirrer motor is an AC Inverter motor and requires no maintenance.

We have provided extra fuses in the rare event that they blow. We have also provided a 3/32" Allen wrench to use for the flexible drive set screws. **The flexible drive shaft can be damaged if it is coiled too tight. It should not be coiled tighter than an 8 inch radius.**

* When you reverse this process to remove the flexible drive from the Tumble Stirrer, do not unscrew the set screw too far. If you do, the raised set screw will prevent you from removing the flexible drive from the Tumble Stirrer Bracket.

Speed/ HZ conversion Table

VP 710F

RPM	Hz
0	0.0
10	1.6
20	3.3
30	4.9
40	6.6
50	8.2
60	9.8
70	11.5
80	13.1
90	14.8
100	16.4
150	24.6
200	32.8
250	41.0
300	49.2
350	57.4
400	65.6
450	73.8
500	82.0
550	90.2
600	98.4
650	107
700	115
750	123
800	131
850	139
900	148
950	156
1000	164
1050	172
1100	180
1150	189
1200	197

If technical assistance is required, contact:

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WARRANTY

There is a one-year warranty against defective parts. We will replace or repair the defective part and not charge a Labor fee. Damage to the machine caused by user negligence is not covered. We ask that you keep the special shipping carton in case you need to send the unit back to us.

SPECIFICATIONS AND CAUTIONS

The VP 710series Alligator Tumble Stirrers are driven by a heavy duty three phase, inverter duty, non-synchronous, parallel shaft, 1/6 horsepower, induction gearmotor, manufactured by Bodine Electric Company. This motor was selected primarily because of its ruggedness and reliability. The control for this motor is a Bodine adjustable speed drive - PACESETTER™ "NANO". It is a PWM type inverter that accepts single-phase AC input voltage and converts it to an adjustable frequency three phase AC output voltage. Since the speed of AC induction motors is proportional to the line frequency, adjusting the output frequency of the inverter enables adjustable speed operation of the motor. At output frequencies below the motor's rating, the PACESETTER™ "NANO" series inverter simultaneously adjusts applied voltage to the motor so that it is proportional to the applied frequency. This prevents stator saturation and the resultant overheating. At output frequencies above the motor rating, the applied voltage is held constant, so torque output from the motor is proportionately lower at higher frequencies. If the equipment is used in a manner not specified by V&P SCIENTIFIC, INC., the protection provided by the equipment may be impaired.

NANO Inverter Specifications

Input Voltage:	110 to 120 VAC +10%/-15%, 50/60 Hz +/-5%, Single Phase
Maximum Output Voltage:	200 to 240 VAC +10%/-15%, Three Phase
Output Frequency:	0 to 120 Hz
Ambient Operating Temperature:	-10°C to 40°C
Humidity:	0 to 95% Noncondensing
Vibration:	<1G (9.8 m/s^2
Enclosure rating:	IP 20
Safety Approval:	UL Listed
Dimensions, Width X Height X Depth:	2.83" x 5.20" x 4.64" (72mm x 132mm x 118mm)
Weight:	
Model 2701:	1.7 lb

Additional Tumble Stirrer Specifications

Equipment Rating	230V~, 1.6A, 50/60 Hz
Ambient Environment: Indoor use, Altitude up to 2000 m, supply voltage not to exceed ∀ 10% of nominal, Installation Category II and Pollution Degree 2.	
Safety Approval:	UL Listed

The use of motor controls, 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.

The following safety precautions must be observed during all phases of installation, operation, service, and repair of this motor control product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the products. V&P Scientific assumes no liability for the customer's failure to comply with safety requirements and practices.

Throughout this manual, and the NANO Operators Users Manual, (Appendix A) a WARNING will highlight a procedure, which presents potential danger to people, and a CAUTION will highlight a possible danger to equipment. Both types of instructions must always be followed.

WARNING

- Do not touch the PCB or components on the PCB right after turning off the power. Wait until the power indicator turns off or at least seven minutes.
- Do not attempt to wire circuitry while power is on. Do not attempt to examine the components and signals on the PCB with the inverter operating.
- Do not attempt to disassemble or modify internal circuitry, wiring, or components of the inverter.
- The grounding terminal of the inverter must be grounded properly with 200V class type III standard.

CAUTION

- Do not attempt a dielectric strength test to internal components of the inverter. They are sensitive semiconductor-devices vulnerable to high voltages.
- Do not connect the output terminals T1(U), T2(V), and T3(W) to an AC power outlet.
- The CMOS IC on the primary PCB of the inverter is vulnerable to static electrical charges. Avoid contact with the primary PCB of the inverter.

WARNING
Do not remove the cover of the inverter when the power is ON to avoid personnel injury caused by electrical shock.

CAUTION
Do not disconnect motor during operation. Otherwise, inverter overcurrent breakdown may result.

FOOTNOTE

The above operating instructions apply to operating the Alligator Tumble Stirrer unit in the "Basic" mode. For information on connecting the NANO control to external devices or on changing the programmable functions of the NANO, refer to "Advanced Installation & Operation" in Appendix A

APPENDIX

A. Instructions for Installation and Operation of PACESTTTER Adjustable Speed Drive