

MSR Rotator Control by Pine Potentiostats

A Brief Discussion on Compatibilities and Cable Options

The Pine MSR Rotator is a standalone instrument. It does not require a connection to a potentiostat to operate, but many users enjoy the integrated nature of controlling the rotation rate of the rotator through the same software that operates their potentiostat. This document describes the connection of a MSR Rotator to a compatible Pine WaveDriver and WaveNow Potentiostat.

1 Background

The MSR Rotator is a standalone instrument. It does not require any other instrument to operate, only an AC power connection supplied through the control unit. There is an inherent advantage to controlling the rotator rotation rate within the same software that controls the electrochemical experiment. Thus, Pine has integrated rotation rate controls into AfterMath Data Organizer enabling automated control of an MSR Rotator. AfterMath is the control program developed and maintained by Pine Research Instrumentation that controls the latest series of potentiostats manufactured by Pine. With the appropriate license file, "Rotator methods" appears in AfterMath as a submenu under the list of Experiments. The experiments in this submenu have input fields for rotation rates. A special cable connects the Pine WaveNow or WaveDriver potentiostats to the MSR Control Unit to allow automated control (software control) of the rotation rate.

2 Overview

The MSR Rotator consists of the motor assembly and the control unit. When the MSR Rotator is being used as a standalone instrument, the rotation rate can be set by turning the black knob on the front panel of the control unit under the LCD display (see: Figure 1). The rotation rate during standalone operation is displayed on the LCD in units of Rotations per Minute (RPM). The control unit outputs a specific voltage to the motor to achieve this rotation rate. For Pine MSR Rotators the rotation rate conversion factor is set at the factory to 1 mV/RPM . This rotation rate conversion factor may be different for rotators purchased from sources other than Pine.

Alternatively for software control of the rotation rate, an external analog voltage can be supplied to the control unit INPUT using the banana plugs on its front panel (see: Figure 1). Compatible WaveDriver and WaveNow potentiostats are configured to supply an analog voltage for controlling a rotator. Other potentiostats may support this feature; contact your potentiostat vendor to check compatibility and for any special cables or software requirements. Compatible Pine potentiostats under AfterMath control can be connected directly to the MSR Control Unit using a rotation rate control cable (AKCABLE4) (see: Figure 2). NOTE: Not all Pine potentiostats have an analog output feature (see: "Compatible Pine Potentiostats" section).



Figure 1. Front and Rear Views of the Pine MSR Control Unit



Figure 2. The Rotation Rate Control Cable (AKCABLE4) for Connecting a Pine Potentiostat to an MSR Rotator.

3 Compatible Pine Potentiostats

Any potentiostat that has an analog output feature can be integrated to the rotator control unit to control the rotation rate. The following Pine potentiostats are capable of controlling the rotator through AfterMath software:

- WaveNow Potentiostat/Galvanostat System (AFTP1)
- WaveNano Potentiostat/Galvanostat System (AFTP2)
- WaveNowXV Potentiostat/Galvanostat System (AFTP3)
- WaveDriver 10 Potentiostat/Galvanostat System (AFP1)
- WaveDriver 20 Bipotentiostat/Galvanostat System (AFP2)

Note, that while the CBP Bipotentiostat/Galvanostat System (AFCBP1) is capable of running on AfterMath software, it does not have an analog output feature. Therefore, the CBP is not compatible with MSR Rotator rotation rate control.

If “Rotator methods” is not available under the “Experiments” heading in the menu bar of AfterMath, a new AfterMath instrument license may be required to enable “Rotator methods”. If the rotator was purchased after the potentiostat was purchased, a “Rotator methods” capable license was likely not issued for the potentiostat at the time of purchase. Please contact Pine directly to update the AfterMath license.

4 Pine Potentiostat to MSR Rotator Connections

Compatible Pine potentiostats use the rotation rate control cable (AKCABLE4) to connect the analog output of the potentiostat to the analog input of the control unit; this cable can be purchased from Pine Research Instrumentation (see: Figure 2). It ships with any rotator/potentiostat bundle purchased from Pine and can be purchased separately at any time. The connections shown are only for use between compatible Pine potentiostats and MSR Rotators. To connect a potentiostat from a different manufacturer to the MSR Rotator, contact your representative at the potentiostat manufacturer for details and cable options.

In addition to controlling the rotation rate, a digital stop line connects the Pine potentiostats to the MSR Control Unit. When the knob on the front of the control unit is set to 0 RPM, residual power is still sent to the motor (so the rotation

rate may not be zero). It is important that the rotator be at zero RPM when not actively in use. Thus, when the rotator is inactive, the digital stop line disconnects the motor from its AC source, ensuring that the rotation rate is zero. When the digital line is inactive, the rotator turns at the defined rate.

To connect a compatible Pine potentiostat to the MSR Rotator follow these steps:

1. Connect the Rotation Rate Control Cable to the Front of the MSR Control Unit

One of the lines of the rotation rate control cable terminates in a BNC-to-Dual-Banana connector. This line carries an analog signal and a ground from the potentiostat to the control unit. Connect the dual banana jack into the "INPUT" signal port on the front of the control unit (see: Figure 3). Notice that the ground of the dual banana jack has a small black tab labeled with the letters "GND" on it. Make certain the jacks are installed with the correct orientation into the banana ports.



Figure 3. Connection of the Rotation Rate Control Cable to the MSR Control Unit.

2. Connect the Digital Stop Line to the Back of the MSR Control Unit

The digital stop line prevents residual rotation of the rotator motor when not actively engaged in an experiment. Connect the single banana plug (labeled with a blue label on the cable) to the blue jack on the back panel of the MSR Control Unit. The blue jack is labeled with "MOTOR STOP" (see: Figure 4).

It is important to note that while the MSR Rotator is compatible with any potentiostat that can provide an analog voltage output, only Pine Potentiostats have the digital stop line. It is unlikely that other potentiostat manufacturers have a digital output line from their potentiostats that can prevent residual rotation of the electrode when 0 RPM is requested. In this case, researchers are encouraged to turn "off" the control unit power switch while not actively rotating the rotator.



Figure 4. Rear Panel of the MSR Control Unit Showing Motor Stop Connection.

3. Connect the Green Block Connector to the Potentiostat

The rotation rate control cable terminates in a green three contact block connector. The three contacts, as previously discussed, are analog output, ground, and digital stop output. The green block connector plugs into the matching green colored block receptacle on the Pine potentiostat. Compatible Pine potentiostats are shipped with a blank three block connector installed into the block receptacle. First, remove the blank connector by sliding it out of its position on the WaveNow (see: Figure 5A) or the WaveDriver (see: Figure 5B) series potentiostats. Set aside the blank block connector; it will not be needed to connect the potentiostat to the MSR Rotator.

Next, insert the green three block connector of the rotation rate control cable into the receptacle on either the WaveNow (see: Figure 6A) or WaveDriver (see: Figure 6B) series potentiostats.

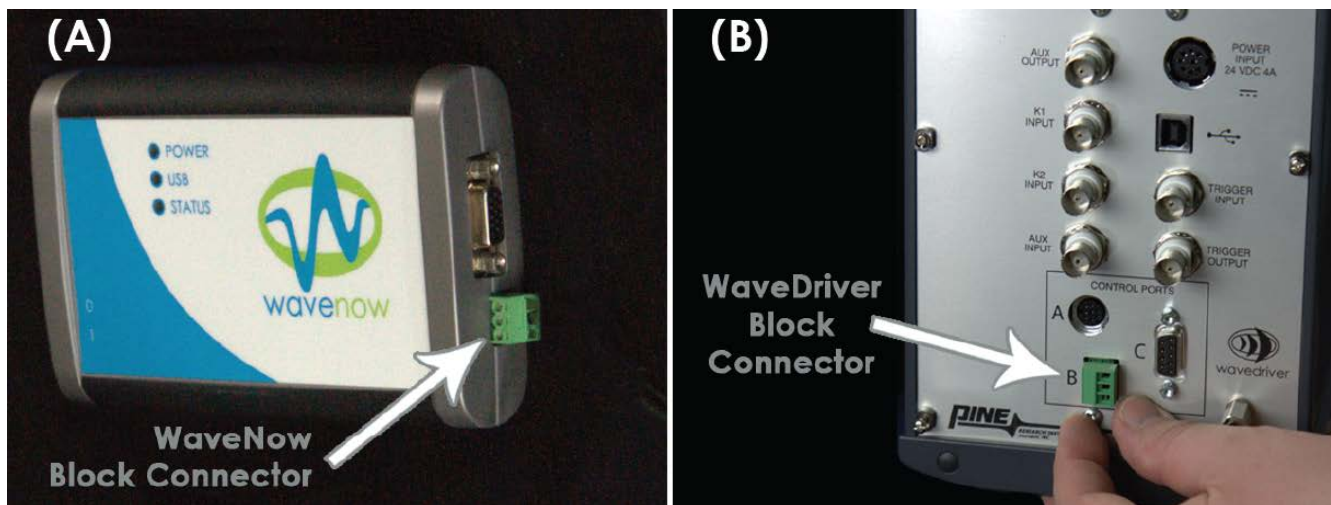


Figure 5. Green Block Connector on the WaveNow (A) and WaveDriver (B) Potentiostats.

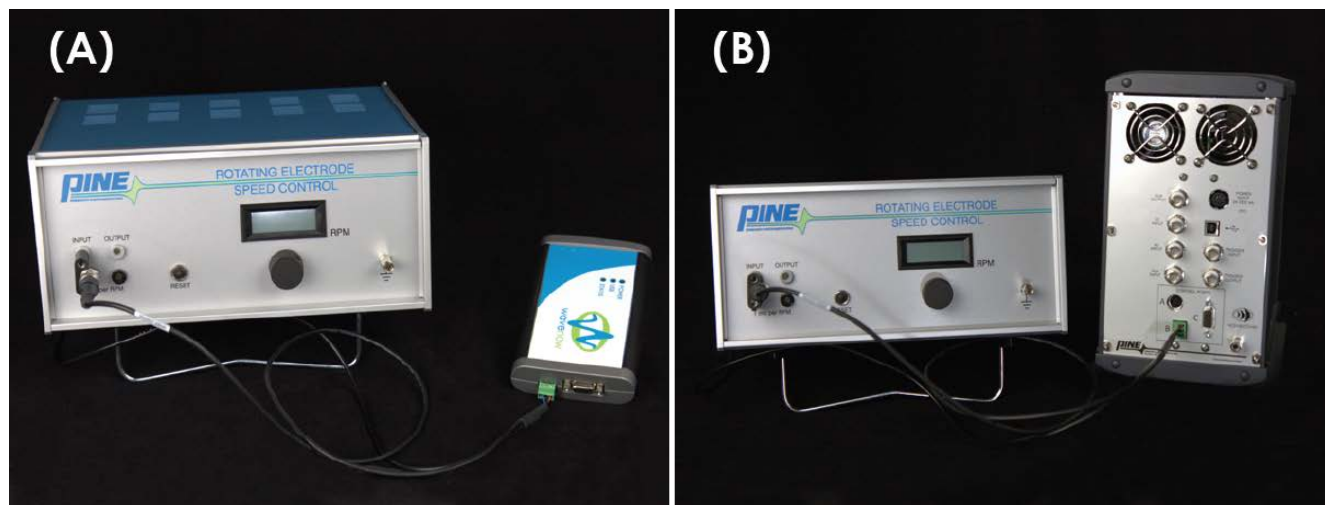


Figure 6. WaveNow (A) or WaveDriver (B) Potentiostats Connected to MSR Control Unit.

The compatible Pine potentiostat is now connected to the MSR rotator. The rotation settings under the “Rotator methods” of AfterMath should now control the rate of the rotator.

5 Rotation Rate Conversion Ratio

MSR Rotators and Pine potentiostats are set for a conversion ratio of 1 mV/RPM. Other rotator systems maybe set for a different conversion ratio, such as 2 mV/RPM or 4 mV/RPM. Consult with the rotators User Guide for a full description of conversion ratio. If you have obtained an MSR-like rotator from a third party, contact Pine or consult your User Guide with questions about conversion ratios.

6 Contact Us/Support

Please contact Pine with any of your needs: general and technical questions, pricing/quotes, selection assistance, etc. You will always get a live person at Pine – no calling tree. We are here to serve you.

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