



Using the A2RT with a Model 5050P-MS Tipping Bucket

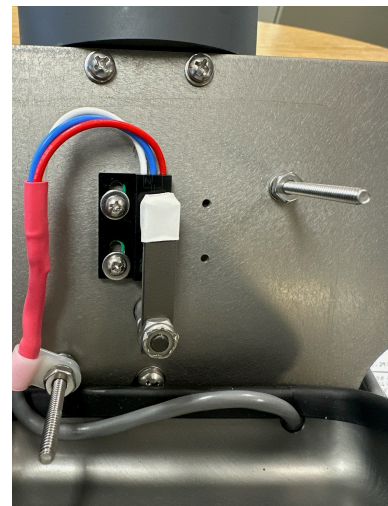
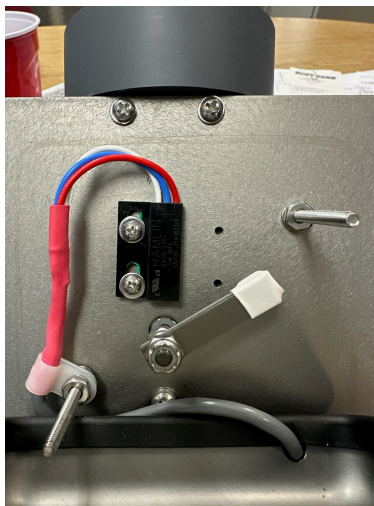
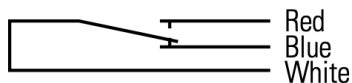
Overview

The Model 5050P-MS Tipping Bucket is a 3-wire tipping bucket, while the A2RT has only two connections for the tipping bucket circuit. This application note describes the different ways that the A2RT can be made to work with the 5050P-MS.

The A2RT supplies 3.3V through a 40K pull-up resistor on the PULSE+ terminal while concurrently monitoring the voltage on this terminal for a rising or falling edge. The PULSE- terminal is connected to ground.

In a traditional 2-wire tipping bucket, one side of the reed switch is connected to the PULSE+ terminal and the other side is connected to the PULSE- terminal. Normally, the switch is open and the voltage on the PULSE+ terminal is pulled up to 3.3V but when the arm of the tipping bucket closes the reed switch, the PULSE+ terminal is connected to the PULSE- terminal and is therefore pulled down to GND. The A2RT registers a pulse and increments the tip count. The pulse signal is debounced for a period of 250ms (meaning additional edges in the next 250ms will be ignored) to address multiple increments of the tip count due to noise, flutter, etc.. This also suppresses counting the rising edge when the switch opens again during a normal tip.

In the 3-wire tipping bucket, there is a SPDT switch, and the arm is configured such that the switch is open when the bucket is at rest on one side, and closed when on the other side, as shown in these images.



Approach 1: No Modifications

Starting with firmware version 1.2.0, the A2RT can be used with 5050P-MS with no modifications. Simply connect either the blue or red wire to PULSE+ and the white wire to PULSE-. The remaining wire should be taped and secured so that it remains floating and does not make electrical contact with other parts of the system.

The downside to this approach is that when the switch is held closed, there is a continuous power drain. However, because the resistance used in the detection circuit is high (40.1 kOhm), the associated power drain is relatively small (~80uAmp).

Approach 2: Arm Adjustment to Make a 2-Wire TB

By adjusting the position of the arm on the tipping bucket, the 3-wire design can be made to work like a 2-wire design. Loosen and rotate the arm such that the switch closes in the middle of the tip, but is open when the bucket is at rest on either side. Then, connect the red wire to PULSE+ and the white wire to PULSE-. The blue wire should be taped and secured so that it remains floating and does not make electrical contact with other parts of the system.

This requires some adjustment of the tipping bucket arm and some testing to make sure the arm is positioned properly. However, it does eliminate the power drain associated with approach #1.