

Using SpotOn® Digital Meter for Boom Sprayer Calibration

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The SpotOn® Sprayer Calibrator is a digital flow meter produced by Innoquest Inc. as a tool for verifying nozzle output (desired flow rate is measured in gallons per minute; gpm) and calibrating a sprayer quickly and easily. The SpotOn® meter has three electrodes prepositioned inside the tube that sense the rising water level and provide a flow rate by measuring the time it takes to fill the meter's tube. The meter works only with fluids that conduct electricity, such as water, and is used for herbicide and insecticide applications.

There are three SpotOn Sprayer Calibrator models: 1. model SC-1 is designed for flow rates between 0.2 and 1.0 gpm; 2. model SC-2 is designed for flow rates below 2.25 gpm; 3. model SC-5 is designed for higher flow rates up to 5 gpm. Most farmers are familiar with the model SC-1. In addition to the features that model SC-1 has, the SC-2 can also measure true application rate by inputting your desired ground speed, nozzle spacing, and target application rate or spray volume. The Universal Flow Meter or model SC-5 is more similar to model SC-1, but requires an ongoing stream of water for a minimum of 10 s to receive an accurate reading.



Figure 1. The SC-1 model of the SpotOn® Sprayer Calibrator.

The three models can be calibrated in a similar way. The procedure outlined here is for using a SpotOn® meter (model SC-1; Figure 1) for calibrating a boom sprayer.

Calibration Procedure:

1	Determine the following parameters for your intended pesticide application: target application rate or spray volume (gallons per acre; gpa), nozzle spacing (inches), and ground speed (mph).
2	Using the tables provided in this publication, determine the desired flow rate (in gpm) required to attain the target application rate (in gpa) for the selected nozzle spacing and ground speed. For nozzle spacing (or application rate and speed) other than what is provided here, use the formula provided after the tables (Equation 1) to calculate the desired flow rate.
3	With the sprayer in a stationary position, adjust the spray pressure to the same setting that you intend to use during actual field application. This can be achieved by adjusting the throttle setting or engine rpm, or from an in-cab display if the sprayer is equipped with a rate controller.
4	Turn on the sprayer and perform a quick visual check on all the nozzles, looking for proper functioning and uniform application across the boom. Make sure that the sprayer can maintain the desired pressure when the boom is turned on.
5	To turn it on, press the START button on the SpotOn® meter. The LCD will flash “000” momentarily indicating it is working properly. Then the meter will show “- - -” on the LCD, indicating that it is ready to take a new measurement.
6	Place the SpotOn® meter under a nozzle so that all nozzle flow is transferred quickly from the nozzle to the meter. Note that the most accurate measurements are made with the meter held at a slight angle to the vertical. This keeps the water from flowing down the sides of the meter and accidentally triggering the sensors.
7	As the meter starts filling, the LCD will start flashing “- - -” indicating that a reading is in progress. When the water reaches the top sensor of the meter, a flow rate will be displayed on the LCD. Check the flow rate on multiple nozzles (preferably all) across the sprayer boom.
8	Compare the meter readings (gpm) to the target flow rate determined from the provided tables for your desired application rate.
9	If the meter readings differ from the target flow rate by more than $\pm 5\%$, check the individual nozzles and/or change the spray pressure to increase or decrease flow rate as needed.
10	After each adjustment, repeat steps 3 through 9 to verify the nozzle output and determine if actual nozzle output matches the target flow rate.
11	During measurement, if a reading needs to be restarted for some reason, simply empty the SpotOn® meter and re-press the START button to prepare it for a new reading.

Table 1. Nozzle flow rates (gpm) at different speeds (mph) and application rates (gpa) for 18-in. nozzle spacing.

Speed in mph	Target application rate in gallons per acre (gpa)								
	5	7.5	10	12.5	15	17.5	20	25	30
4.0	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.30	0.36
5.0	0.08	0.11	0.15	0.19	0.23	0.27	0.30	0.38	0.45
6.0	0.09	0.14	0.18	0.23	0.27	0.32	0.36	0.45	0.55
7.0	0.11	0.16	0.21	0.27	0.32	0.37	0.42	0.53	0.64
8.0	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.61	0.73
9.0	0.14	0.20	0.27	0.34	0.41	0.48	0.55	0.68	0.82
10.0	0.15	0.23	0.30	0.38	0.45	0.53	0.61	0.76	0.91
11.0	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.83	1.00
12.0	0.18	0.27	0.36	0.45	0.55	0.64	0.73	0.91	1.09
13.0	0.20	0.30	0.39	0.49	0.59	0.69	0.79	0.98	1.18
14.0	0.21	0.32	0.42	0.53	0.64	0.74	0.85	1.06	1.27
15.0	0.23	0.34	0.45	0.57	0.68	0.80	0.91	1.14	1.36
16.0	0.24	0.36	0.48	0.61	0.73	0.85	0.97	1.21	1.45
17.0	0.26	0.39	0.52	0.64	0.77	0.90	1.03	1.29	1.55
18.0	0.27	0.41	0.55	0.68	0.82	0.95	1.09	1.36	1.64
19.0	0.29	0.43	0.58	0.72	0.86	1.01	1.15	1.44	1.73
20.0	0.30	0.45	0.61	0.76	0.91	1.06	1.21	1.52	1.82

Table 2. Nozzle flow rates (gpm) at different speeds (mph) and application rates (gpa) for 20-in. nozzle spacing.

Speed in mph	Target application rate in gallons per acre (gpa)								
	5	7.5	10	12.5	15	17.5	20	25	30
4.0	0.07	0.10	0.13	0.17	0.20	0.24	0.27	0.34	0.40
5.0	0.08	0.13	0.17	0.21	0.25	0.29	0.34	0.42	0.51
6.0	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.51	0.61
7.0	0.12	0.18	0.24	0.29	0.35	0.41	0.47	0.59	0.71
8.0	0.13	0.20	0.27	0.34	0.40	0.47	0.54	0.67	0.81
9.0	0.15	0.23	0.30	0.38	0.45	0.53	0.61	0.76	0.91
10.0	0.17	0.25	0.34	0.42	0.51	0.59	0.67	0.84	1.01
11.0	0.19	0.28	0.37	0.46	0.56	0.65	0.74	0.93	1.11
12.0	0.20	0.30	0.40	0.51	0.61	0.71	0.81	1.01	1.21
13.0	0.22	0.33	0.44	0.55	0.66	0.77	0.88	1.09	1.31
14.0	0.24	0.35	0.47	0.59	0.71	0.82	0.94	1.18	1.41
15.0	0.25	0.38	0.51	0.63	0.76	0.88	1.01	1.26	1.52
16.0	0.27	0.40	0.54	0.67	0.81	0.94	1.08	1.35	1.62
17.0	0.29	0.43	0.57	0.72	0.86	1.00	1.14	1.43	1.72
18.0	0.30	0.45	0.61	0.76	0.91	1.06	1.21	1.52	1.82
19.0	0.32	0.48	0.64	0.80	0.96	1.12	1.28	1.60	1.92
20.0	0.34	0.51	0.67	0.84	1.01	1.18	1.35	1.68	2.02

Equation 1. Formula to calculate the desired flow rate for any given nozzle spacing, application rate, and ground speed.

$$\text{flow rate (gpm)} = \frac{\text{application rate (gpa)} \times \text{ground speed (mph)} \times \text{nozzle spacing (in.)}}{5940}$$

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