

Super Air Meter

Operating Instructions

Version 3 – February, 2015



Warning

Safety glasses must be worn any time the Super Air Meter is in use.
Never use compressed air to pressurize the Super Air Meter
The seal between the lid and the bucket must be clean at all times.

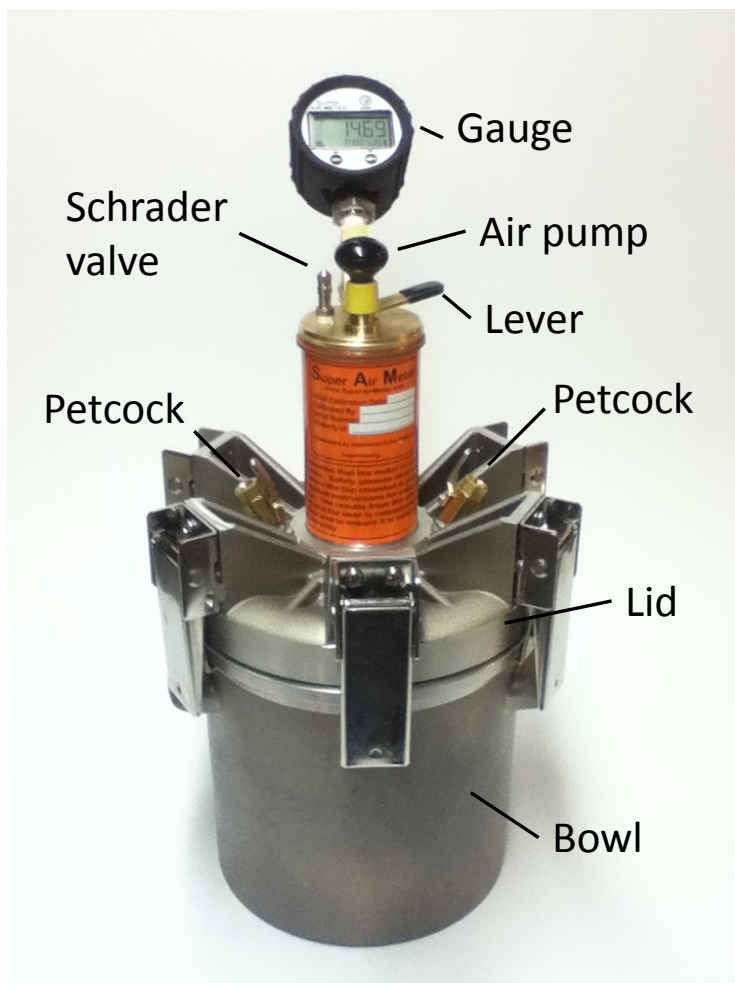
Contact Information

If you have questions please contact Jake LeFlore at superairmeter@gmail.com or 918-845-1397

Calibration

Calibrate the unit every three months using the CALIB program and the included calibration instructions.
This meter should be professionally calibrated and tested annually.
The clamp arms should be set as per the instructions in the manual and should not be adjusted.
Adjustment may make the results of the meter invalid and require recalibration.

Parts of the Super Air Meter



Button Presses

When pushing a button on a gage there are short and long presses. A short press lasts less than 0.5 seconds and a long press is greater than 0.5 seconds. A long press of the ENTER button is necessary to turn the meter off/on.

Super Air Meter Modes

The Super Air Meter (SAM) has five operating modes. The meter will start in the previous mode that it was in before it was turned off. The most common modes are SAM or TYPE B as they are the most used. To exit any mode just hold the menu button with a long press.

CALIB - This mode is used to calibrate the Super Air Meter. If this mode is selected the user can calibrate the device by selecting START or view the calibration constants by selecting VIEW. The device should come calibrated when you receive it.

LIGHT - This function allows the user to turn the backlight on or off. The default is that the backlight is off.

RESET – This resets the gauge to the factory settings and requires the user to calibrate the gauge.

TEST - This menu allows the user to select either the SAM or Type B test mode. The majority of the time the user will enter the **SAM** or **TYPE B** mode and then continue to use the meter in that mode until it has to be calibrated.

SAM – The SAM mode will report both the calculated air volume and the SAM number. The SAM number has been shown to correlate to the ASTM C 457 spacing factor. This is under the TEST menu.

TYPE B – The Type B mode allows the meter to be used as a traditional ASTM C 231 Type B pressure meter. This mode only reports the calculated air volume in the concrete. This is under the TEST menu.

Recommended SAM number

The SAM number has been shown to correlate with the ASTM C457 spacing factor. Based on over 300 concrete mixtures from the lab and the field it was found that a SAM number of 0.20 psi and lower best correlated with a spacing factor of 0.008 in. and lower. A spacing factor of 0.008 in. is recommended by ACI 201 to produce concrete with freeze thaw durability along with frost durable aggregate and a water to cement ratio below 0.45. Therefore, a SAM of 0.20 psi or below is recommended at this time as an indication of a satisfactory air void size distribution. This value may change based on further research, and does not ensure resistance to freezing and thawing in the tested concrete.

Clamp arm tension

The clamps arms tension must be uniform and at a constant value for all six clamps. This can be checked by measuring the distance from the bucket rim to the tip of the clamp lever before tightening the clamps. This is done by placing the lid on the bucket and resting the clamp tab under the beveled lip of the bucket but not pressing the clamp arms down. This is shown in the image below. The recommended distance from the edge of the bucket to the free end of the clamp arm is 3.5 +/- 0.2 in. If the clamp arm is further than 3.7 in. from the bucket then the clamp tab should be loosened by one turn. If the clamp arm is closer than 3.3 in. from the bucket we recommend tightening the clamp tab by one turn. The meter must be recalibrated if the clamp tabs are adjusted.



SAM test

(Air volume and SAM number)

1. The user and anyone near the instrument should wear safety glasses.
2. Turn on the gauge and pull the safety valve to release any pressure in the top chamber.
3. If the gauge is within 0 +/- .03 psi then continue. If not then use a long press of the MENU button and then hit the zero button.
4. Make sure the meter is in the SAM test. If the SAM test was used previously then the meter will return to that mode. If it was not in the SAM mode then hold the MENU button down for a long press and then enter the TEST and then SAM mode.
5. As per ASTM C231/AASHTO T 152, add concrete to the bottom chamber and **Ensure that the contact area between the bucket and the lid is clean.** Place the chamber on the bucket and tighten the clamps to provide a tight seal to the bucket. The clamps must be at the correct tension. Add water through the petcocks until the chamber is full as per ASTM C231/AASHTO T 152. Close the petcocks.
6. Use the pump on top of the meter to pressurize the top chamber to 14.5 +/- 0.05 psi. The pressure in the top chamber can be adjusted by removing the cap of the Schrader valve and pressing the stem down with a finger. After practice, a press with the thumb will reduce the pressure by 0.01 psi and touching it with a finger nail will reduce it by about 0.1 psi. One can also use the top lid of the Schrader valve for significant reductions in pressure. Be sure that the pressure in the top chamber is stable before pressing the **enter** button. **Close the petcocks.**
7. The gauge will check the pressure. If the pressure is too low, too high or not stable then an error message will be displayed. If the pressure is within the limit then it will read OK.
8. Hold the lever, strike the bottom chamber with a mallet, and press the **enter** button. Continue to hold the lever for ten seconds as the gauge counts down. Release the lever after the gauge displays "READ". If the pressure is not stable an error message will be displayed and the test will be aborted. This usually means that the lever was not held as per the instructions or there is a leak. If this occurs, press **enter** to exit and run the test again with a new sample of concrete.
9. Push the **enter** button to view the air content. Push **enter** again to continue the test or the **menu** button to abort.
10. Without releasing the petcocks or the pressure in the top chamber, repeat steps 6 – 8, pressurizing the top chamber to 30.0 +/- 0.05 psi.
11. Without releasing the petcocks or the pressure in the top chamber, repeat steps 6 – 8, pressurizing the top chamber to 45.0 +/- 0.05 psi.

12. Carefully open one of the petcock valves while covering it with your hand to slowly relieve the pressure in the bottom bucket. Be careful to point the valve you are opening away from people. Relieve the pressure in the top chamber using the safety valve adjacent to the gauge. The pressure in the top chamber does not need to be released to zero but should be at 14.5 psi or below.

13. While keeping the same concrete in the meter and without detaching the lid from the bucket, open both petcocks and fill with water as described in ASTM C231/AASHTO T 152.

14. Repeat steps 6 – 11 but skip step 9. Be sure to close the petcocks before applying the pressure to the bottom chamber.

15. The air volume and the SAM number will be shown. The SAM number has been shown to correlate with the ASTM C 457 spacing factor.

16. Carefully open one of the petcock valves while covering it with your hand to slowly relieve the pressure in the bottom bucket. Be careful to point the valve you are opening away from people. Relieve the pressure in the top chamber using the safety valve adjacent to the gauge.

* The air volume does not include the aggregate correction factor caused by air within the aggregates. The aggregate correction factor can be found with this meter for a given mixture by using ASTM C231/AASHTO T 152. Preliminary results suggest that the SAM number and therefore correlation to the spacing factor does not need an aggregate correction factor for most normal weight aggregates. A modification of the test may be needed for light weight aggregates. Please contact Super Air Meter LLC for more information.

Air Content by Pressure Method, Type B

(Air volume only)

1. The user and anyone near the instrument should wear safety glasses.
2. Turn on the gauge and pull the safety valve to release any pressure in the top chamber.
3. If the gauge is within 0 +/- .03 psi then continue. If not then use a long press of the MENU button and then hit the zero button.
4. Make sure the meter is in the TYPEB test. If the TYPEB test was used previously then the meter will return to that mode. If it was not in the TYPEB mode then hold the MENU button down for a long press and then enter the TEST and then TYPEB mode.
5. As per ASTM C231/AASHTO T 152, add concrete to the bottom chamber and **Ensure that the contact area between the bucket and the lid is clean.** Place the chamber on the bucket and tighten the clamps to provide a tight seal to the bucket. The clamps must be at the correct tension. Add water through the petcocks until the chamber is full as per ASTM C231/AASHTO T 152. Close the petcocks.
6. Use the pump on top of the meter to pressurize the top chamber to 14.5 +/- 0.05 psi. The pressure in the top chamber can be adjusted by removing the cap of the Schrader valve and pressing the stem down with a finger. After practice, a press with the thumb will reduce the pressure by 0.01 psi and touching it with a finger nail will reduce it by about 0.1 psi. One can also use the top lid of the Schrader valve for significant reductions in pressure. Be sure that the pressure in the top chamber is stable before pressing the **enter** button. **Close the petcocks.**
7. The gauge will check the pressure. If the pressure is too low, too high or not stable then an error message will be displayed. If the pressure is within the limit then it will read OK.
8. Hold the lever, strike the bottom chamber with a mallet, and press the **enter** button. Continue to hold the lever for ten seconds as the gauge counts down. Release the lever after the gauge displays "READ". If the pressure is not stable an error message will be displayed and the test will be aborted. This usually means that the lever was not held as per the instructions or there is a leak. If this occurs, press **enter** to exit and run the test again with a new sample of concrete.
9. Push the **enter** button to view the air content. Push **enter** again to repeat the test.
10. Carefully, open one of the petcock valves while covering it with your hand to slowly relieve the pressure in the bottom bucket. Be careful to point the valve you are opening away from people. Relieve the pressure in the top chamber using the safety valve adjacent to the gauge.

* The air volume does not include the aggregate correction factor caused by air within the aggregates. The aggregate correction factor can be found with this meter for a given mixture by using ASTM C231/AASHTO T 152.

Calibration

The meter should be calibrated every three months and professionally calibrated and serviced every year. Please contact Super Air Meter LLC for details.

1. The user and anyone near the instrument should wear safety glasses.
2. Turn on the gauge and pull the safety valve to release any pressure in the top chamber.
3. If the gauge is within 0 +/- .03 psi then continue. If not then use a long press of the MENU button and then hit the zero button.
4. Make sure the meter is in the CALIB mode. To get to this mode you likely have to use a long press of the menu button to exit the Test mode and then another long press. You then have to cycle to the CALIB mode by using a quick press of the menu button and then press enter.
5. **Ensure that the contact area between the bucket and the lid is clean.** Add water to the bottom bowl until it is full. Place the chamber on the bucket and tighten the clamps to provide a tight seal to the bucket. The clamps must be at the correct tension. Add water through the petcocks until the chamber is full as per ASTM C231/AASHTO T 152. Close the petcocks.
6. Use the pump on top of the meter to pressurize the top chamber to 14.5 +/- 0.05 psi. The pressure in the top chamber can be adjusted by removing the cap of the Schrader valve and pressing the stem down with your finger. After practice, a press with the thumb will reduce the pressure by 0.01 psi and touching it with your finger nail will reduce it by about 0.1 psi. One can also use the top lid of the Schrader valve for significant reductions in pressure. Be sure that the pressure in the top chamber is stable before pressing the **enter** button. **Close the petcocks.**
7. The gauge will check the pressure. If the pressure is too low, too high or not stable then an error message will be displayed. If the pressure is within the limit then it will read OK.
8. Hold the lever, strike the bottom chamber with a mallet, and press the **enter** button. Continue to hold the lever for ten seconds as the gauge counts down. Release the lever after the gauge displays "READ". If the pressure is not stable an error message will be displayed and the test will be aborted. This usually means that the lever was not held as per the instructions or there is a leak.
9. Without releasing the petcocks or the pressure in the top chamber, repeat steps 6 – 8 pressurizing the top chamber to 30.0 +/- 0.05 psi.
10. Without releasing the petcocks or the pressure in the top chamber, repeat steps 6 – 8 but pressurizing the top chamber to 45.0 +/- 0.05 psi.
11. Carefully, open one of the petcock valves while covering it with your hand to slowly relieve the pressure in the bottom bucket. Be careful to point the valve you are opening away from people. Relieve the pressure in the top chamber using the safety valve adjacent to the gauge.

12. Remove the lid and add the Pro Cali Can to the water in the bottom bucket. The Pro Cali Can should be vertical while it is lowered into the water. The inside of the Pro Cali Can must be full of air when inside the bottom chamber for the calibration to work correctly.

13. **Ensure that the contact area between the bucket and the lid is clean.** Add water to the bottom bowl until it is full. Place the chamber on the bucket and tighten the clamps to provide a tight seal to the bucket. The clamps must be at the correct tension. Add water through the petcocks until the chamber is full as per ASTM C231/AASHTO T 152. Close the petcocks.

14. Repeat steps 5-8.

15. Press **enter** to save in the gauge, or hold the **menu** button to abort and not save the calibration. The gauge will turn off automatically after saving the calibration.

16. Carefully, open one of the petcock valves while covering it with your hand to slowly relieve the pressure in the bottom bucket. Be careful to point the valve you are opening away from people. Relieve the pressure in the top chamber using the safety valve adjacent to the gauge.

17. After performing the calibration it is important to check the device to ensure it is calibrated correctly. Do this by turning the gauge on and performing a Type B test (directions above) with one Pro Cali Can in the bottom chamber. If calibrated correctly this test should give a result between 4.8 and 5.0% air content.

Troubleshooting

Q: Why does my meter turn off when I hit the **enter** button?

A: A long press of the **enter** button will turn the gauge off. Please try using a shorter press.

Q: Why does the gauge display “TOO HIGH” ?

A: This error means the top chamber has been pressurized by more than 0.05 psi over the target value. Fix this by reducing the pressure in the top chamber with the Schrader valve.

Q: Why does the gauge display “TOO LOW” ?

A: This error means the top chamber has been pressurized by more than 0.05 psi below the target value. Fix this by increasing the pressure in the top chamber with the pump.

Q: Why does the gauge display “NOT STABL”?

A: This error means the pressure of the meter was not stable when the measurement was taken. This can occur for two reasons. If the top chamber is being pressurized to the desired value then you can wait for the pressure to stabilize and then continue to run the test. If the error is given when the pressure is released to the bottom chamber then the test will be aborted and the test should be restarted with fresh concrete. This may be caused by a leak in the chamber.

Q: What if my meter does not hold pressure?

A: Spray a dilute soap and water mixture on the meter and look for signs of bubbles. This is an indication of leaking air. Adjust the connection that is leaking and continue to check for leaks. You may need to buy a new set of O rings for the chamber. These are available from Super Air Meter, LLC.

Q: What if my SAM number is too high?

A: Typically, the SAM number will decrease with an increase in the volume of entrained air in the mixture. This is usually achieved by increasing the dosage of air entraining agent. The rate will depend on the mixture and chemicals that you are using.

Q: What if my meter will not calibrate?

A: Try to run the calibration again. If you can still not get it to calibrate then be sure that the volume of the top chamber or bottom chamber has not changed, and the clamp arms are set to the correct tension. Contact Super Air Meter for more help.