

## Defender and FlexCal Top Tips

### How do I ensure the piston is working properly?

1. With both ports free and open, flip the entire unit back and forth to move the piston.
  - a. If the piston moves smoothly from one end of the cell to the other, the piston is functioning properly.
  - b. If the piston becomes stuck or appears to have jerky movement, it requires factory service and cleaning.
  - c. Fixing the piston cannot be done by the customer. Attempting to fix the piston will void the manufacturer's warranty.



### I'm having trouble turning on my Defender/FlexCal.

1. Press the power button and let go as soon as there is any response from the unit (i.e., light, sound, screen backlight, etc.).
2. If you hold the power button too long, the unit will shut off before it is able to turn on.

### What should I know about my Defender/FlexCal battery?

1. A completely drained battery needs 8 to 12 hours to recharge.
2. The battery is a sealed, lead-acid battery. It should be stored fully charged. Batteries will discharge on their own over time.
3. To determine your battery voltage, follow this menu navigation:
  - a. Setup Menu > About
  - b. The last line in the "About" section shows the voltage. Ideally, the voltage should be at least 5 volts without the charger plugged in.
  - c. A low voltage reading tells you that the battery needs to be re-charged or replaced.
4. The charger is not a power supply and will not be able to operate the unit if the battery is dead.

### How do I know when the battery needs to be replaced?

1. Old batteries that cannot hold a charge or cannot charge above 85-90% need to be replaced.
2. A high voltage does not guarantee that the battery is good. If the battery drains quickly or does not fully charge after the 8-12 hour charging period, it may need to be replaced.
3. If the unit requires a new battery, do not attempt to replace it. It must be sent back to Mesa for proper replacement.

### How do I avoid getting my piston stuck?

1. The primary cause of a stuck piston is dirt in the cell.
2. Be sure to keep the ports covered when the unit is not in use. This prevents condensation and contamination from occurring within the cell.
3. Perform calibrations in a clean environment whenever possible.
4. Sending your unit in for annual maintenance will prevent the build-up of residue in the cell.
5. The gas source needs to be dry. If condensation forms in the tube, allow at least 30 minutes to equilibrate with the environment with the seal caps on to minimize the chance of condensation. If problems continue to occur, the unit may need factory cleaning.
6. If you require inlet filtration, we recommend using a 5 micron filtration device on the gas flow source.

## My unit is not measuring flow. What do I do?

1. This can occur for a number of reasons:
  - a. The gas flow might be lower than the specified range.
  - b. There could be a leak in the system.
  - c. The device under test could be connected to the wrong port.
2. To confirm that the issue is not with the Defender, perform a "Flip Test". Do this by following the steps below:
  - a. With both ports open, set the unit to measure continuously.
  - b. Hear the valve "clunk" and turn the unit upside down until the valve closes again (you'll hear a "click").
  - c. Return the unit upright and hear the valve "clunk".
  - d. If this creates a reading, the DryCal is operating correctly.
  - e. If the unit reads "Out of Range", you are flipping it too quickly (common with low-flow devices).

## My Defender/FlexCal is behaving abnormally. How do I reset the system?

1. To perform a system reset, begin by powering the unit on.
2. Use a paperclip to press the switch inside the small hole labelled "reset" on the back of the unit. You should feel a very slight click of the switch.
3. This will fully reset the unit.

## How do I perform a leak test?

1. Navigate through the menu to get to the leak test option:
  - a. Setup > Diagnostics
  - b. Follow the steps outlined in this menu:
    1. Invert unit
    2. Cap power port under test
    3. Press enter
    4. Return unit to upright

## My unit is not measuring accurately.

1. If you find that your DryCal unit is not measuring accurately when compared with other flow standards, below are several reasons this error could be happening:
  - a. For the Defender 530, FlexCal or DryCal 800, be sure the standardizing temperature is set correctly. The standardizing pressure is fixed, but setting the standard temperature incorrectly to between 0 °C and 21 °C will produce a 7% flow reading error.
  - b. The FlexCal or DryCal 800 sensor factor may not be set correctly. If not comparing flow to a MFM/MFC, the sensor factor should always be equal to 1.
  - c. A dirty cylinder may result in a low-flow reading.
  - d. Leaky tubing may also result in a low-flow reading.
  - e. If the flow reading is drastically off, the calibration constant may be corrupt in the firmware and the unit needs to be returned for service.



Mesa's Butler, N.J. manufacturing facility (pictured above) is our NVLAP accredited ISO 17025 laboratory.