

Delta Automated Powder Measure (APM)

Operating Instructions

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Introduction

Welcome! And thank you for purchasing the Delta APM (Automated Powder Measure). This guide will help you get everything setup so you can begin using the Delta APM.

As of this writing, the Delta APM comes with everything needed to get up and running, with the exception of a scale. Along with the scale, you will need to provide a calibration weight.

The purpose of this machine is to an accurate powder charge using extruded smokeless powder that is within +/- a single kernel. Of course, speed is important as well. One of the features of the Delta APM is that it takes the kernel density into consideration when delivering individual kernels. This allows the system to feed a pre-calculated number of kernels without having to evaluate the total weight between delivering each kernel, which in turn speeds up the process.

Warnings

As with any electronic and mechanical device, please use caution when working around the moving parts. The motor that operates the volumetric dispenser is very powerful and interference with objects including body parts can result in severe injury.

This system is designed to be used with extruded smokeless gunpowder. Please do not use this system with black powder, or any other non-extruded forms of smokeless powder.

Do not use this system for any purpose other than its intended use.

Use caution and common sense when reloading. Using excessive charges and/or wrong powder type can result in severe injury or death. Please follow the manufacturers guidelines when loading for your specific cartridge and projectile.

Terminology / Getting familiar with the system

The following is a list of key words and phrases that will be used throughout the guide. Please become familiar with these to make setup and use an easier experience.

Volumetric Dispenser	The large dispenser that sits on top of the system and delivers the initial charge for your target charge weight
Plunger	The adjustment screw on the front of the volumetric dispenser used to set the initial powder charge. This should be in the down position and should not be manually moved after the system is powered on.
Powder chute	The initial charge flows down this tube into the pan on the scale
Kernel Feeder	Delivers individual kernels to the pan on the scale
Feeder wheel	The brass wheel inside the kernel feeder
Kernel tube	The copper tube that the individual kernel travels through to get to the pan
LCD Interface	The unit that is used to interface with the system. (control dispenser, set target weight etc.) see figure 1 below
Target weight	This is the desired target weight that will be used in your cartridge
Kernel Value	The calculated value for each individual kernel, based on the density
Processor housing	The black box that sits on top, near the back of the system.
Analytical Balance/Scale	The scale that is connected to the processor with the serial cable. The scale will sit inside the system underneath the powder chute and kernel tube.
Windscreen	Acrylic sheets on either side of the system to reduce draft on the scale.

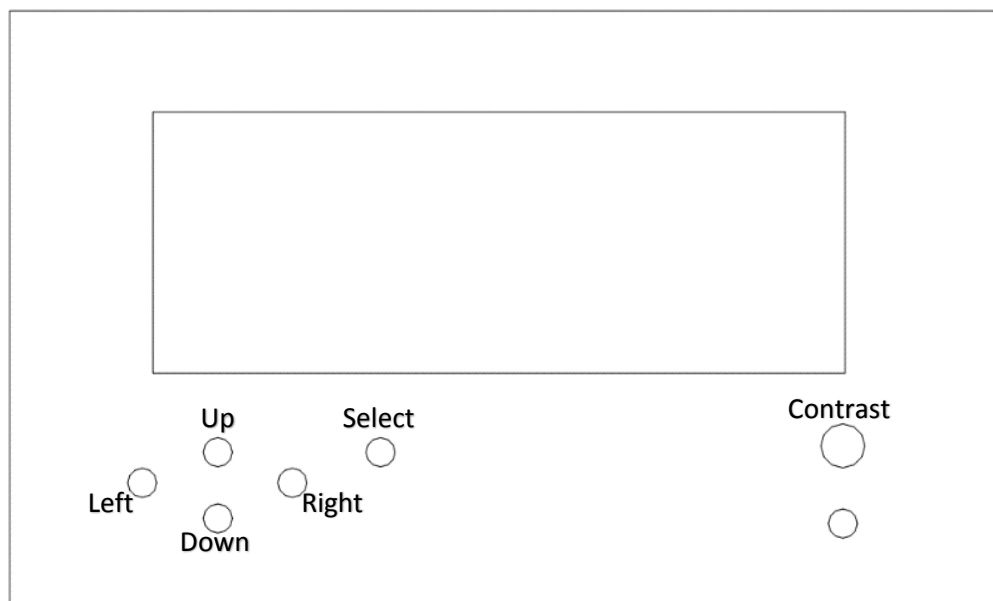


Figure 1 (LCD Interface)

Configuring the Scale

This system has been developed to work with A&D scales. In order for the system to communicate with the scale, certain parameters on the scale need to be changed. Use your scales manual as a reference to change the following values:

Class	Parameter	Value
bASFnc		
	Lond	0
	SPd	2
dout		
	Prb	3
SIF		
	bEPc	2
	bPS	4

Detailed instructions for configuring the scale are provided at the end of this document.

Calculating Kernel Value

This step can be done at any time before you start the system delivering powder charges.

1. Turn on your scale and calibrate it according to the manual
2. Place a pan on the scale and re-zero
3. Count out 30 individual kernels and place them in the pan
4. Take the measured weight and divide it by the number of kernels
 - a. Example: Measured weight = .84 with 30 kernels
 - i. $.84 / 30 = .28$
 - ii. To make the input easier, we take the result and multiple by 1000 to get a whole number of 28

Please keep in mid that these steps should be performed each time you use a different powder, or powder from a different LOT. Even though powders can look identical in shape and size, their densities can vary, and can cause the system to give inconsistent results.

With the variable, the user can adapt on-the-fly if the final charge weight is consistently high, or consistently low.

Using the Delta Powder Measure

Once the scale has been configured correctly, we can begin to use the system.

First, make sure the scale (via serial cable) and power is connected to the processor. Power on your scale first level and calibrate it using the instruction from the scale manual. Once the scale is on and ready, make sure the unity type is set to grains (GN). Also, be sure to have a pan on the scale ready to accept powder from the dispenser and that the scale is zeroed out by hitting the re-zero button on the scale.

Next, flip the power toggle to the processor to the ON position. If the scale is not on, or the unit type is not set to grains, you will see a RED error stating "Check Unit type or scale/cable". If you see this error, make sure both the Delta APM and the scale are powered on and double check the connection to the scale.

If both the APM and the scale are on and communicating, you should see is a YELLOW screen. If at any time the screen is YELLOW, it is asking for user input. In this case is it asking if you want to control the motor. Use this function to control the motor so you can set the Volumetric Dispenser initial charge weight.

*******Make sure that the plunger in the volumetric dispenser is completely in the DOWN position BEFORE powering on the system and operating the motor**

The System is unaware of the location of the plunger when the system starts, so it is extremely important that you start the system with the plunger in the down position.*****

On the motor control screen you will see "RUN | UP/DOWN >>". On this screen you can use the LEFT/RIGHT/UP/DOWN buttons to control the motors. This screen is useful for initial setup of the volumetric dispenser and changing powder. You can also control the kernel feeder to "prime" it to get ready for use. The table below shows you the action each button represents.

LEFT	Runs the plunger up, then back down (useful when setting up initial volume charge
UP	Runs the plunger to the UP position, then stops
DOWN	Runs the plunger to the down position, then stops
RIGHT	Runs the kernel feeder to index at each notch on the kernel feeder

Next, you will fill the volumetric dispenser with powder, and set it so that it is within .2-.3 grains short of your target weight. For example: if your target weight is 42.2 grains, you will want to set the volumetric dispenser so that it is consistently dumping around 42 grains.

Once the hopper has powder, you can use the LCD interface to run the motor that controls the volumetric dispenser. By pressing the LEFT button on the LCD interface, it will move the volumetric dispenser plunger to the UP position, then to the DOWN position. Read the measured weight, and adjust the volumetric dispenser accordingly. If the weight is too much, turn the plunger on the volumetric dispenser clockwise, if it is not enough, turn the plunger counter-clockwise. Repeat until you get to your target weight minus .2-.3 grains. The closer, the better, but if it is too close, it could result in

getting an occasional overcharge from the volumetric dispenser. Once the volumetric dispenser is set, press SELECT to move to the Kernel Value screen.

Note: If the unit is already in the down position and you press the DOWN button, the LCD interface will blink RED/YELLOW two times. This indicates that the plunger is already in the requested position, and that it will not move further. The is for the up position. If you push the UP button, and the plunger is already in the up position, the LCD interface will blink RED/YELLOW two times. If the plunger is in the UP position when the SELECT button is pressed, the system will move the plunger to the down position to continue to the Kernel Value screen.

The Kernel Value screen is where you enter the calculated kernel value from the steps above. If you have not performed these steps yet, please do so now.

To input the kernel value (and eventually the target weight) you use the four buttons in the diamond configuration on the LCD interface. In Figure 1 above, note the buttons labeled LEFT, UP, RIGHT, DOWN, and SELECT.

Each button will increase or decrease by a specified amount. See the table below:

LEFT	+10
UP	+ 1
RIGHT	+.1
DOWN	-1
SELECT	Accept value and continue

When the Kernel Value screen is present, use the buttons to enter the value calculated above. In the example used, the kernel value was determined to be 28. So, you would press LEFT until the display reads 20, then UP until the display reads 28.

Another option would be to press the LEFT button until the display reads 30, then the down button until the display reads 28.

You would then press select to accept that value.

Next is the Target Weight screen. Use the same method to enter the target weight.

LEFT	+10 GN
UP	+ 1 GN
RIGHT	+.1 GN
DOWN	-1 GN
SELECT	Accept value and continue

If my target weight is 42.2 I would press LEFT until the LCD displays 40, then UP until the display reads 42, then press RIGHT until the display reads 42.2

You would then press select to accept that value.

Once the you press SELECT to accept the Target Weight, the machine should start to deliver a charge if the right criteria are met. If the scale is STABLE (indicated by a small circle on the left side of the display on the scale, and the scale reads -0-, then the motor to run the volumetric motor will run. At this time, the LCD display will turn RED until the volumetric motor operation is complete.

If the system determines that additional kernels are needed, then the kernel feeder will run, and the LCD will turn VIOLET. Once this operation is finished, the LCD screen will return to a WHITE or BLUE/WHITE color. This indicates that the cycle is complete and is waiting for the pan to be removed (powder dumped into the cartridge case) then placed back on the scale. Once again, when the criteria are met (stable and -0-) it will run again.

As mentioned before, if your final charge weight is consistently low or consistent high, you can press the SELECT button when the LCD is not RED or VOILET to return to the Kernel Value screen to change the kernel value.

Symptom	Resolution
Final weigh consistently too high	Change kernel value to a higher value
Final weigh consistently too low	Change kernel value to a lower value

Once any changes are made to the kernel value, you can press select to accept the value and return to the target weight entry screen. If you are still satisfied with the target weight, then press select to continue with the charging process.

*****Be sure to monitor the powder levels of both volumetric dispenser and the kernel feeder and add powder as necessary*****

The feeder wheel

Due to the nature of the feeder wheel system, it is possible that a kernel may get missed during the kernel feeding process. If this happens the machine will end its cycle as usual, but the target weight may be short a kernel or two. If this is the case, it can be immediately corrected by pressing the UP button. This will cause the system to re-evaluate the measured weight against the target weight and add additional kernels as needed.

This feature can also be used if there is a small spill that caused powder to exit the pan. If the pan is place back on the scale, and the measured weight is missing .2-.3 grains (or more), you can press the UP button to re-evaluate to add the necessary kernel to the pan to achieve the target weight. It would be up to the user to decide if it would be faster to just dump the powder back in the hopper and run a full cycle, or wait for the kernel feeder to process the remaining charge.

Even though powder may look uniform in size and shape, there may be subtle differences that could cause a kernel to get stuck in the slots of the feeder wheel. Periodically check the feeder wheel to free stuck kernels if necessary.

If you are using a powder that is not uniform, and has highly irregular kernels, there will be several kernels that will not be able to be fed with the kernel feeder. After many cycles of the system, you may find that the kernel feeder has “filtered” out the smaller kernels. You will want to occasionally check the kernel feeder and dump those kernels into the volumetric dispenser, and refill the kernel feeder.

Important Notes

Be sure NOT to remove the pan during the cycle when the LCD screen is RED or VIOLET. Please wait for the LCD screen to turn WHITE or WHITE/BBLUE before removing the pan.

If at any time the system is in the charging cycle, and the pan is removed, please refrain from pressing the re-zero button on the scale as this may cause the volumetric dispenser to dump powder directly on the scale.

Scale Settings for use with the Delta APM

<p>bRSFnc -J Cond = 0</p> <p>Set the scale response time to FAST</p> <ul style="list-style-type: none"> - Press and hold SAMPLE to enter the menu. - Press SAMPLE repeatedly until bRSFnc is displayed. - Press PRINT to select the setting. - Press SAMPLE repeatedly until Cond is displayed. - Press RE-ZERO repeatedly until 0 is displayed. - Press PRINT to set the value. - Press CAL to exit the menu.
<p>bRSFnc -J SPd = 2</p> <p>Set the refresh rate to 20 times per second.</p> <ul style="list-style-type: none"> - Press and hold SAMPLE to enter the menu. - Press SAMPLE repeatedly until bRSFnc is displayed. - Press PRINT to select the setting. - Press SAMPLE repeatedly until SPd is displayed. - Press RE-ZERO repeatedly until 2 is displayed. - Press PRINT to set the value. - Press CAL to exit the menu.
<p>dout -J Prt = 3</p> <p>Set the scale for stream mode</p> <ul style="list-style-type: none"> - Press and hold SAMPLE to enter the menu. - Press SAMPLE repeatedly until dout is displayed. - Press PRINT to select the setting. - Press SAMPLE repeatedly until Prt is displayed. - Press RE-ZERO repeatedly until 3 is displayed. - Press PRINT to set the value. - Press CAL to exit the menu.
<p>S iF -J bPS = 4</p> <p>Set the scale for 9600bps</p> <ul style="list-style-type: none"> - Press and hold SAMPLE to enter the menu. - Press SAMPLE repeatedly until S iF is displayed. - Press PRINT to select the setting. - Press SAMPLE repeatedly until bps is displayed. - Press RE-ZERO repeatedly until 4 is displayed. - Press PRINT to set the value. - Press CAL to exit the menu.
<p>S iF -J bSPr = 2</p> <p>Set the serial port mode to 8N1.</p> <ul style="list-style-type: none"> - Press and hold SAMPLE to enter the menu. - Press SAMPLE repeatedly until S iF is displayed. - Press PRINT to select the setting. - Press SAMPLE repeatedly until bSPr is displayed. - Press RE-ZERO repeatedly until 2 is displayed. - Press PRINT to set the value. - Press CAL to exit the menu.