Ingenuity Precision Powder System

MARCH 21, **2026**

System Components

The system consists of a precision balance and an advanced powder metering system. The powder metering system has 7 main components as shown in the following pictures:

1. Powder Hopper
2. Powder Meter/Trickler
3. Thrower
4. Draft Shield
5. Controller
6. Bushing (one blue and one red)
7. Disk (Varies dependent on powder)

First, make sure your scales settings are as follows:

A&D Fx scale settings

Press and hold SAMPLE key to enter menu.
Press SAMPLE repeatedly until BASFnc 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 SAMPLE repeatedly until BASFnc is displayed.
Press PRINT to select the setting.
Press SAMPLE repeatedly until trc is displayed.
Press RE-ZERO repeatedly until 0 is displayed.
If using kernels larger than .04gr it can be set to 1.
Press PRINT to set the value.

Press Sample repeatedly until bASFnc 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 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 SAMPLE repeatedly until Sif is displayed.
Press PRINT to select the setting.
Press SAMPLE repeatedly until bps is displayed.
Press RE-ZERO repeatedly until 5 is displayed.
Press PRINT to set the value.

Press SAMPLE repeatedly until Sif is displayed.
Press PRINT to select the setting.
Press SAMPLE repeatedly until btPr is displayed.
Press RE-ZERO repeatedly until 2 is displayed.
Press PRINT to set the value.

Press SAMPLE repeatedly until Unit is displayed.
Press PRINT to select the setting.
Press SAMPLE repeatedly until GN is displayed.
Press RE-ZERO to set GN as the primary weight unit.
Press SAMPLE repeatedly until g is displayed.
Press RE-ZERO to set g as the secondary weight Unit.
Press PRINT to set the values.
Press CAL to exit.

Note: If scale was previously set up for Supertrickler you will also need to set
SiF=CrLF=0
SiF=tyPE=0

POWER OFF THE SCALE NOW.

Sartorious BCE EntrisII scale settings

Press the menu button on the top left of the screen. 

Scroll up or down  **until you see SETUP 1. Then select the confirm button.** 

Scroll up or down until you see BALANCE 1.1. Then select the confirm button. 

Scroll up or down until you see AMBIENT 1.1.1. Then select the confirm button. 

Scroll up or down until you see V.STABLE 1.1.1.1. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see APP.FILT 1.1.2. Then select the confirm button. 

Scroll up or down until you see FILLING 1.1.2.2. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see STAB.RNG 1.1.3. Then select the confirm button. 

Scroll up or down until you see V.FAST 1.1.3.5. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see WT.UNIT 1.1.7. Then select the confirm button. 

Scroll up or down until you see GRAINS 1.1.7.11. Then selcet the confirm button. 

Select the back button. 

Scroll up or down until you see DISP.DIG 1.1.8. Then select the confirm button. 

Scroll up or down until you see MINUS 1 1.1.8.7. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see CAL./ADJ. 1.1.9. Then select the confirm button. 

Scroll up or down until you see EXT.CAL 1.1.9.1. Then select the confirm button. 

Select the back button Three times. 

Scroll up or down until you see DEVICE 2. Then select the confirm button. 

Scroll up or down until you see RS232 2.1. Then select the confirm button. 

Scroll up or down until you see BAUD 2.1.2. Then select the confirm button. 

Scroll up or down until you see 19200 2.1.2.8. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see PARITY 2.1.3 .Then select the confirm button. 

Scroll up or down until you see NONE 2.1.3.5. Then select the confirm button. 

Select the back button. 

Scroll up or down until you see HANDSHK 2.1.5. Then select the confirm button. 

Scroll up or down until you see NONE 2.1.5.3. Then select the confirm button. 

Select the back button three times. 

Scroll up or down until you see DATA.OUT 3. Then select the confirm button. 

Scroll up or down until you see COM.SBI 3.1. Then select the confirm button. 

Scrolll up or down until you see COM.OUTP 3.1.1. Then select the confirm button. 

Scroll up or down until you see AUTO.W/O 3.1.1.4. Then select the confirm button.

Select the back button. 

Scroll up or down until you see FORMAT 3.1.4. Then select the confirm button. 

Scrolll up or down until you see 16CHARS 3.1.4.1. Then select the confirm button. 

POWER SCALE OFF NOW.

Finally, Let's get started!

Assembly videos can be found on the instructions page of the web site Ingenuityprecision.com Once the draft shield and system have been assembled on the scale, you can plug in the power adapter provided to the control box. The powder adapter provided only goes to the control box. **Do not plug it into scale!** The power cable has two plugs on the end of it. One goes into the control box and the other plugs into the back of the thrower body for grounding. Plug the grey cable into the back of the control box so that all the wires originate from the box. The motor cable with red heat shrink goes to the trickler motor and the black one goes to the thrower motor. The black wire plugs into the port on the back of the draft shield and the rs232 plug goes to the scale rs232 port.

Turn on the controller using the power button located on the right side and verify the controller turns on.

Controller Operation

The controller is used to run and configure the system. On power up the display will show the current firmware version and controller number for 5 seconds after which the screen will display the main run page with the following information:

- Target value in blue.
- Scale reading in white.
- State indicator
  - Off
  - Ready
  - Throwing
  - Filling
  - Final Fill
  - Done
- Thrower fine adjustment
- Trickler fine adjustment
- Profile name
- Bluetooth connection with App (Green when connected)

- The keypad is used to enter data and execute operations on the system. A new target value can be entered on the main page by typing in the value followed by the enter key

	Start/Stop auto operation Click to start, click again to stop
	Settings Click to display settings selection page then enter 1-5 to display the appropriate section. Click again to cycle through the settings on the page. Enter number keys followed by to change a value. Long press to go to the next section
	Calibration Click to display calibration options. Enter 1-6 to select the calibration option
	Profiles Click to read a profile, Click again to save a profile. Type the profile number (0-23) followed by
	Throw a manual charge
	Trickle a single kernel
	Cancel current operation
	Enter current value
	Backspace entry
	Number keys: 1&2 can be long pressed to +/- target 1/10gr 4&5 long press to +/- thrower time 7&8 long press to +/- trickler fine tune adjustment

Settings

The Settings page displays a list of options to select from

1. Base – Base system settings
2. Throw – Thrower settings
3. Trickle – Trickler settings
4. Reset – Reset settings to base set
5. Update – Update firmware – See firmware update section

1=Base

Scale Type: Set to your scale type now by entering 1-3 then press

1 = A&D, 2= Sartorious, 3= Creedmoor

Press to move the outline box to desired setting to change.

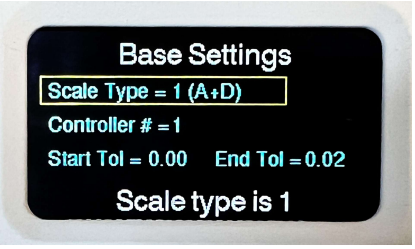
Controller # - Controller number 1-5

Tolerance type- 1 =+/- from charge weight, 2 = only + from charge weight

Start Tolerance – How far from scale zero you want to allow the system to start a charge. Usually, it is always zero.

End Tolerance – This is your +/- or only + allowance from your set target you will accept. +/-.02gr is normally preferred. This is highly dependent on which scale is used and the powder kernel size and consistency.

Hold the settings key down to forward to next page.



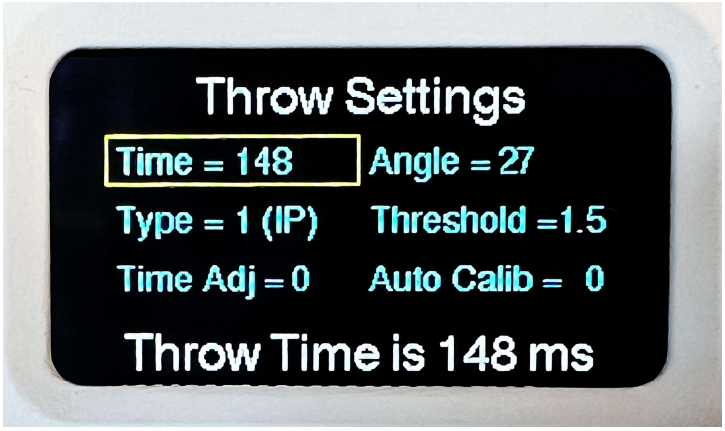
2=Thrower

1. Time – Throw time in milliseconds. Automatically set based on target weight after calibration. Can be manually overridden by typing a number here. If you are using type 2(v2/v3) set to 800-1500. This changes the pause at the top of the stroke for type 2 depending on how much powder is to be thrown. Default 1000.
2. Angle – Throw arm angle. Set to the number marked on the back of your particular thrower motor. Set to 5-15 if throwing extremely light loads under 10-15gr with some powders. For V2/V3 set to 173.
3. Type – Thrower type.
   1 = Ingenuity Precision 2=V2/V3 3=V4

Press  to move the outline box to desired setting to change.

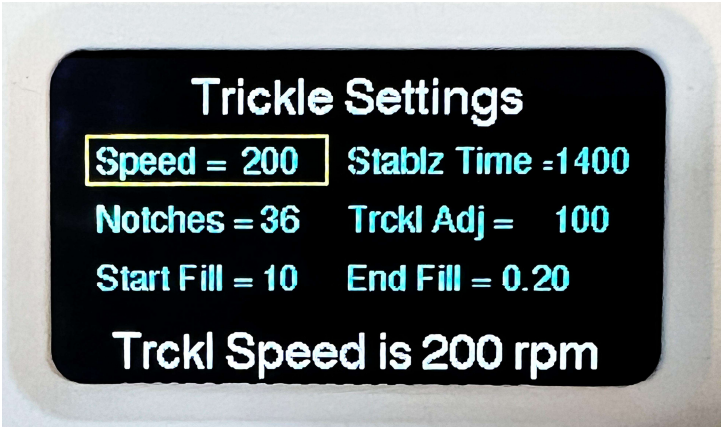
Set to your thrower type now by entering 1-3 then press 

4. Threshold – How far below target you wish to throw. Normally -1.5gr.
5. Time Adjustment – Throw time adjustment. Calculated by Auto Calibrate. Can be overridden here.
6. Auto Calibrate – Auto calibration factor 0-25. 0 =no auto calibration and 25 is max auto calibration. This is a real time auto throw adjustment feature that analyzes each throw weight according to the set threshold and will make small changes as you load if needed. The value set = how much the system is allowed to change the throw time as a percentage of previous throws.



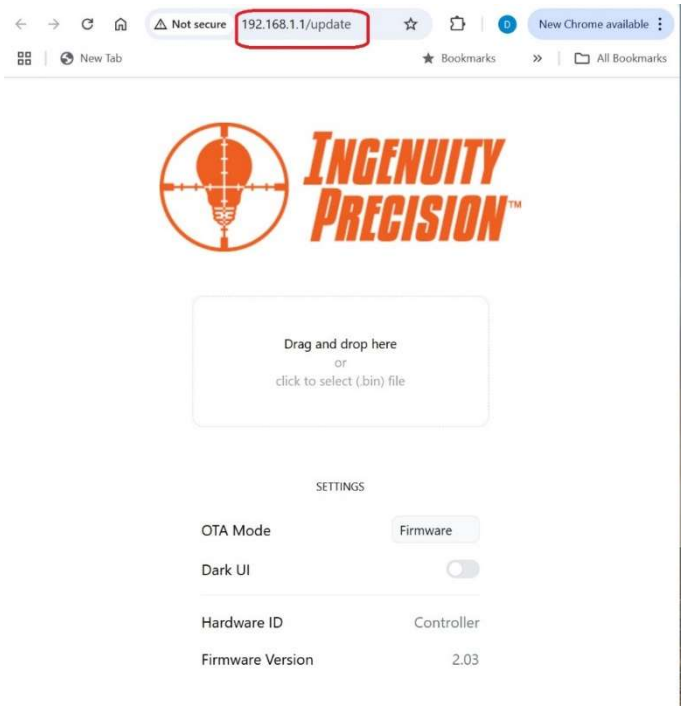
3=Trickler

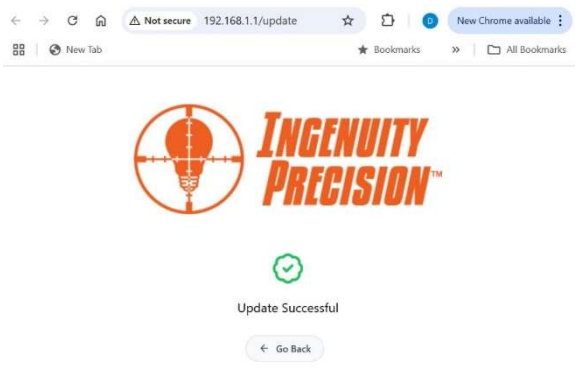
1. Speed – Trickler speed, normally operation set to 200.
2. Stabilization time – Balance stabilization time in milliseconds, normally 800 to 1200.
3. Notches – Number of notches on the trickler disk. Normally 36
4. Trickle Adjustment – Trickler adjustment factor. This adjusts the trickler calibration by a percentage to minimize overthrows if needed. 100% = no adjustment from calibration, 95% = 5% reduction from what was calibrated. Normal is 100-97.
5. Start fill threshold – how far below the target the powder trickler will start filling. Usually set to 10gr.
6. End fill threshold – The system makes two trickler moves after the bulk powder is dispensed into the cup. When the thrower drops the powder into the cup the system takes an instant reading of the scale weight and calculates how much the powder meter/trickler needs to move to get to this set value “End fill threshold”. Once there it will take a second instant reading of the weight and calculate how much remaining movement is needed to get to the desired target weight. This is usually always set to .2gr and does not need to be changed unless you are loading big kernel powders that are .06-.1gr each kernel, then it is desired to move it to .5gr.



5=Firmware Update

This option is used to update the firmware on the controller at any time new features are added. New systems are provided with the latest firmware and do not need updated upon receiving. Download the latest firmware from the email sent to you or the Ingenuity Precision web site and save it on your computer/phone. Select the Update option #5 from the settings page on the controller. This will create a Wi-Fi service on the controller to allow updates to the controller firmware. The Wi-Fi network name will be displayed on the controller (IP1 to IP5). Connect your computer or a phone to the network and enter the web address displayed on the controller in a browser (typically 192.168.x.x/update). A web page will be displayed where you can navigate to the new firmware file and load it onto the controller. Once the firmware has been loaded successfully the controller will restart.

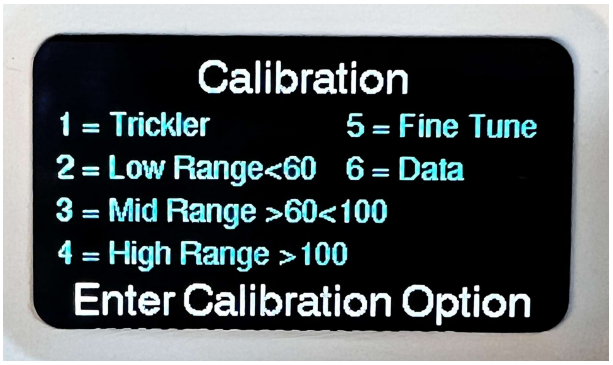




Calibration

The calibration page is used to calibrate the thrower and the trickler.

1. Trickler – Calibrate trickler to the powder your using.
2. Low Range < 60gr – Calibrate thrower with the blue bushing.
3. Mid-Range > 60gr < 100gr - Calibrate thrower with the red bushing.
4. High Range > 100gr - Calibrate thrower with the red bushing.
5. Fine Tune – This is a fast auto fine calibration for the thrower. Once a target weight is set after the initial calibration, it will drop 5 consecutive loads at the predicted throw time and adjust automatically if needed.
6. Data – Display calibration data for trouble shooting



Auto Operation

1.Turn on the scale after making sure you have configured the scale settings appropriately, adjusted its level and there is no powder cup on it.

2. Install the correct bushing in the thrower (Blue=<60gr, Red=>60gr). Make sure the powder hopper valve is shut, (arrow sideways) and that the powder cup is on the scale. Install the correct disk in the trickler and fill the powder hopper and trickler with powder. Do not exceed 150gr of powder in the trickler. Now with the cup installed you can open the hopper valve (arrow down). It is normal for 2-3 kernels to drop in the cup on initial opening of the hopper valve. Make sure the cup is empty and now tare/zero the cup weight from the scale.

3. Press the manual throw button  and verify it is throwing powder in the cup.

4. Press the manual trickle button  several times and verify the trickler is operating.

5. With the scale zeroed with an empty cup. Press the calibrate button  . Select the calibration range of your charge weight. 2=under 60gr charge, 3= 60gr-100gr charge, 4= over 100gr charge. The calibration will blink the draft shield lights 3 times and display a complete message on the controller when completed.

6.Calibrate the trickler by pressing 1. The calibration will blink the draft shield lights 3 times and display a complete message on the controller when completed if you have the Ingenuity draft shield.

7.Return to the home page by pressing the Cancel button 

Enter a powder charge on the keypad followed by the enter button  .

8.With an empty cup zeroed on the scale, start the charging operation by pressing the Start/Stop button 

.

9. A charge will be dropped into the cup followed by the trickler completing the charge. When complete the controller will display done and the LED's will be Green. If the charge is overweight, they will be red.

10.Remove the cup, dump the charge and replace the cup to repeat the operation.

11.After the second or third throw, if the trickler is going over charge weight one or two kernels, fine tune by reducing 100% by 1% at a time repeating throws each time until corrected. You should not have to go below 96 for most powders and if it still does not correct then this indicates a bad calibration and trickler calibration should be repeated.

12. The same principle is also applied to the thrower. If you pay attention to the amount the thrower is initially dropping for each charge and compare to your threshold value that was set in thrower settings you can fine tune by reducing or raising the throw time in 2ms increments by long pressing the 4 button for down and 5 button for up.

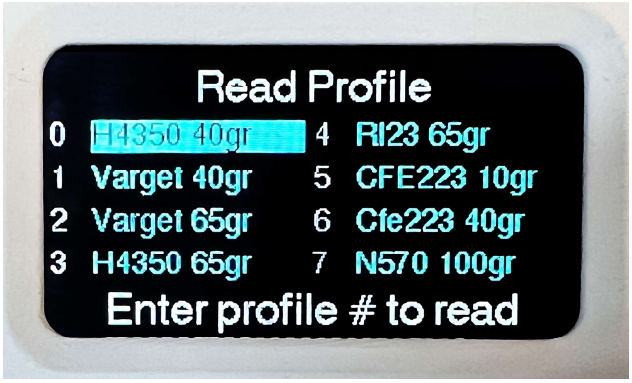
13. Once you are happy with everything, remember to save as a profile before powering off or all will be lost and all prior steps will need to be repeated the next power on session. Also make note that if you make any other changes after saving as a profile those new changes do not automatically update the profile and the profile will need to be saved again after said changes.

Profiles

Profiles are saved sets of calibrations and settings for a particular powder, disk and thrower bushing combination. These can be saved and re-loaded so a full calibration isn't required when a prior powder combination is loaded.

When a new powder is loaded follow these steps:

1. Install the correct bushing and disk for the powder
2. Load the Hopper and Trickler with powder
3. Calibrate the Thrower
4. Calibrate the Trickler
5. Run a few test charges
6. Adjust the settings and re-test if required
7. Save the profile



Changes made to settings or calibrations are not automatically saved to a profile to prevent a good profile from getting corrupted. After you are happy with the settings, save them to a profile. Profiles numbers range from 0 to 23 and can be named from the App. To save a profile push the Profile button until "Save Profile" is displayed on the screen. Type in the number to save and Enter ✅ You will need to keep your own record of profiles saved if you are only using the controller and not naming them using the app.

To read a profile push the Profile button until "Read Profile" is displayed on the screen. Type in the number to read and enter ✅. Make sure you have saved any changes to the current profile before reading another, so you do not lose any changes.

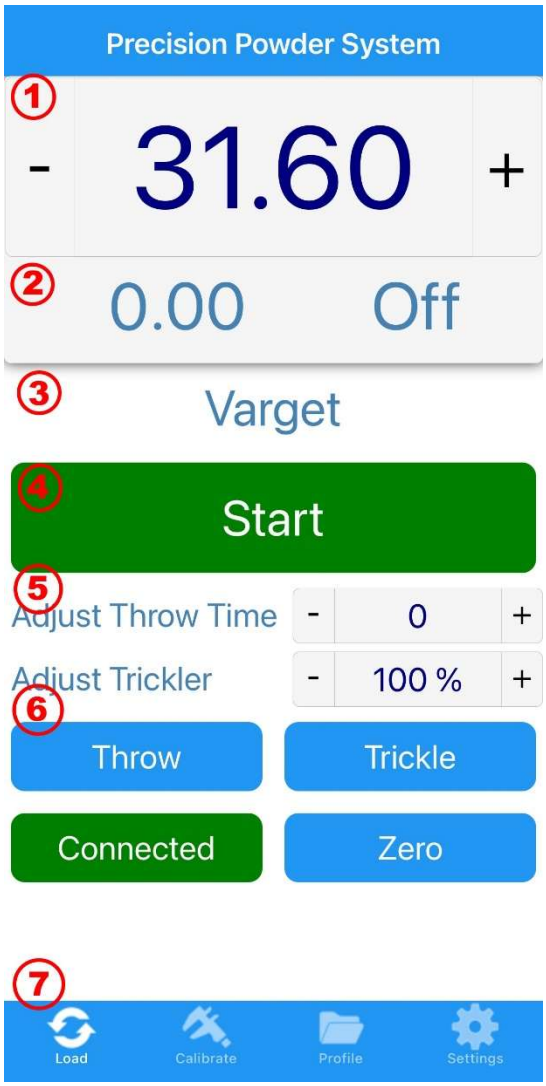
Phone App

The system can be controlled with an App as well as the controller. The App is available on both iOS and Android devices. The App uses Bluetooth Low Energy (BLE) to connect to the controller so do not Pair with the device. Android version can be downloaded on the bottom of the instructions page at Ingenuityprecision.com.

Main page

The Main Page is divided into several sections that display the current operation of the system and perform the most common actions such as changing the target value, start/stop, connect, etc.

1. Target Value – Tap and type a new value or -/+ 0.1 gr to the target value
2. Scale / State – Display the current scale reading and controller state
3. Profile – Display the current profile. Go to the Profile page to change it.
4. Start/Stop – Tap to start and press again to stop
5. Adjustments – Tap and type a new value to change the Throw Time and Trickler Adjustment or -/+ 1 to the value
6. Buttons
   Throw – Tap to throw a charge
   Trickle – Tap to trickle single kernel
   Connect – Tap to connect to controller
   Zero – Tap to Zero scale
7. Page Control
   Load – Go to the Main Page
   Calibrate - Go to the calibration page
   Profile – Go to the profiles page
   Settings – Go to the settings page



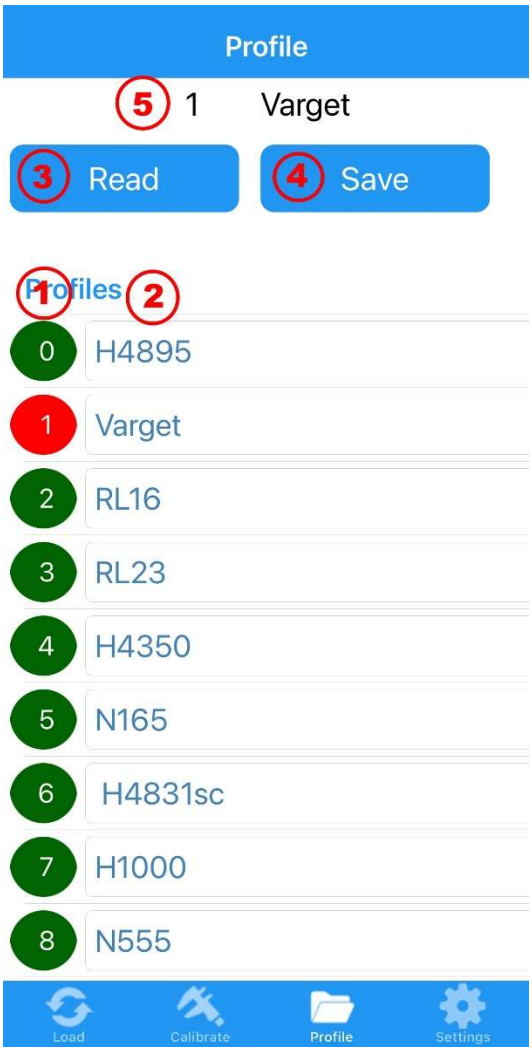
Calibration

The Calibration page functionality mimics the controller calibration

Profiles

The Profiles page functionality mimics the controller with some additional capabilities primarily naming the profiles.

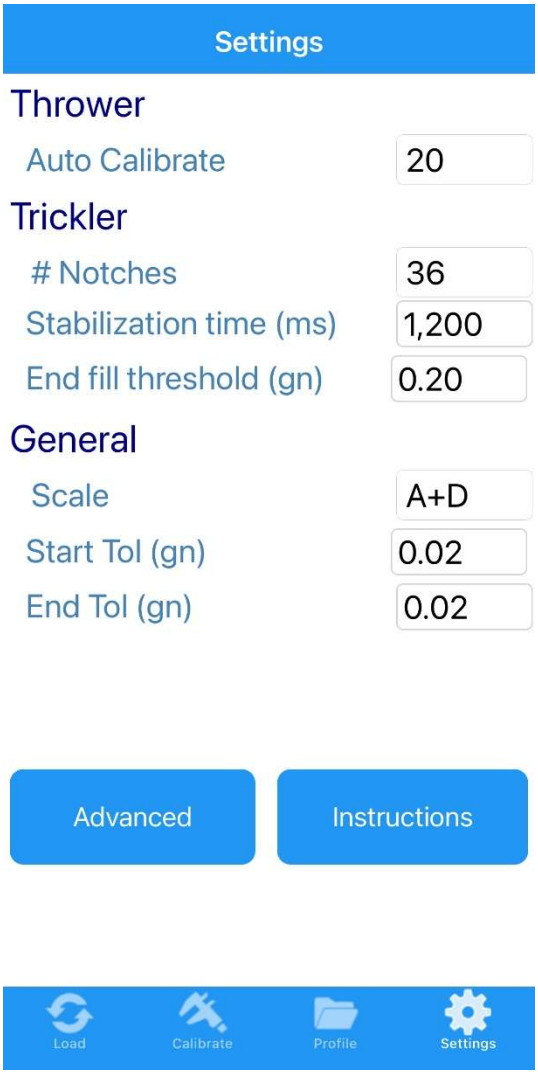
1. Profile Number – Tap to select the profile number. The circle will turn red, indicating the selected profile. Green indicates the profile is loaded on the App. Blue indicates it has not.
2. Profile Name – Tap and type the name followed by return/done to save the name.
3. Read Profile – Tap to Read the currently selected profile on the controller
4. Save Profile – Tap to Save the currently selected profile on the controller
5. Profile Number/Name – The profile currently loaded on the controller



Settings

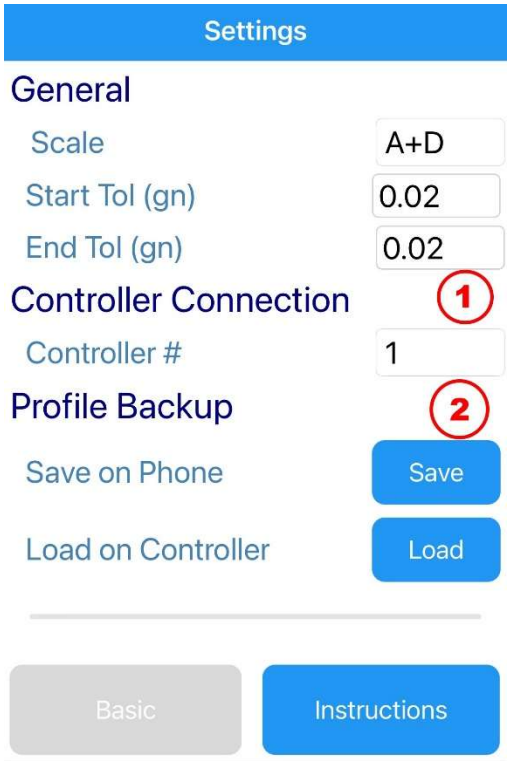
The Settings page functionality mimics the controller settings with some additional capabilities primarily dividing them into Basic and Advanced settings. The Basic settings may be changed occasionally primarily with big heavy powders or ball powders. The advanced settings would not normally be changed.

8. Tap the Advanced to show advanced options
9. Tap Instructions to go to the Ingenuity Precision Website



Advanced

The Advanced Settings page functionality mimics the controller settings with additional capability.



1. Controller Connection – Tap and select the controller to connect to (1-5)
2. Profile Backup - Backup profiles on your phone and load them onto a controller
   - Tap Save to save loaded profiles (green on Profiles page) to your phone.
   - Tap Load to load saved profiles on the controller

Profiles can be backed up on the App and loaded on the same or different controller. To move profiles from one controller to another:

1. Set the controllers to different numbers on their respective keypads.
2. Connect to source controller on the App Settings->Controller Connection
3. Read in profiles to be copied on the App Profiles page. Start at 0 through the desired profiles.
4. Save the profiles on the phone using the App Settings->Profile Backup->Save on Phone button
5. Connect to destination controller on the App Settings->Controller Connection
6. Set to profile 0 on the App Profiles page
7. Load the profiles on the phone using the App Settings->Profile Backup->Load on Controller button

INGENUITY PRECISION™

Metering Disk Compatibility List

HODGDON

H4895	7545
H4350	7545
Varget	7545
Benchmark	7545
Retumbo	7545
H1000	508
CFE 223	705
Superformance	705
H4831SC	7545 / 567
H50BMG	689
H4831	508
H322	567
US 869	705
H4227	705 wiper loose or removed
Accurate 2015	705 wiper loose or removed
Trail Boss	689 / 6115

WINCHESTER

StaBALL 6.5	705
StaBALL Match	705
StaBALL HD	705,no wiper

IMR LEGENDARY POWDERS

XBR 8208	7545
4451	508
8133	508
7977	7545
4166	508
4350	689/508
3031	508
4831	689
SR4759	567
7828 SSC	567
4064	689

SHOOTERS WORLD

LONGRIFLE	567

ALLIANT POWDER

Technically Superior by Design

RL-7	7545
RL-10X	567
RL-15	7545
RL-15.5	7545
RL-16	7545, 508
RL-17	7545
RL-19	508
RL-22	7545
RL-23	7545
RL-25	508
RL-26	7545,508
RL-33	689
VARMINT	705
AR COMP	7545/508

norma

N203B	7545
URP	7545
MRP	7545/508

VIHTAVUORI

N105	7545
N110	567
N133	705 wiper loose
.	set for notch disk
N135	567
N140	7545
N150	567
N160	567
N165	567
N540	7545
N555	567/508
N560	508
N565	567
N568	567
N570	6115
20N29	6115
20N41	6115