Water System

This operations manual is intended for assembly, operating, maintenance, inspection, safety warnings and cleaning procedures.

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1.   Getting Started

1.1.   Specifications

|	
Operating Voltage:	11 - 15 VDC or 120 - 240 VAC 50/60 Hz (Power supply included)
Operating Temperature:	-20 to 50 $^{\circ}$C (-4 to 120 $^{\circ}$F)
Power Consumption	10 watts idle, up to 240 watts when closing gate up to 900 watts when heating
Dimensions:	Customizable to fit any animal or feed requirement Bin capacity: 0.5 ~ 1.2 cubic meters Larger bin sizes can be made to user specifications
Data Communications:	Standard: WiFi (802.11b/n/g) Optional: 4G/LTE Cellular Web-based online interface Data processing: cloud-based server
Sensors:	RFID Tag Reader - (ISO 11784/5 134KHz HDX/FDX) Quad Load Cells - Bin weight Load Cell Resolution: 10 grams
Control:	Search "Control Feed" in your App Store
Water Tank Capacity:	30 gal / 113 L of water, (4 ft^3 / 0.1 m^3)

1.2.   SmartFeed Pro Layout
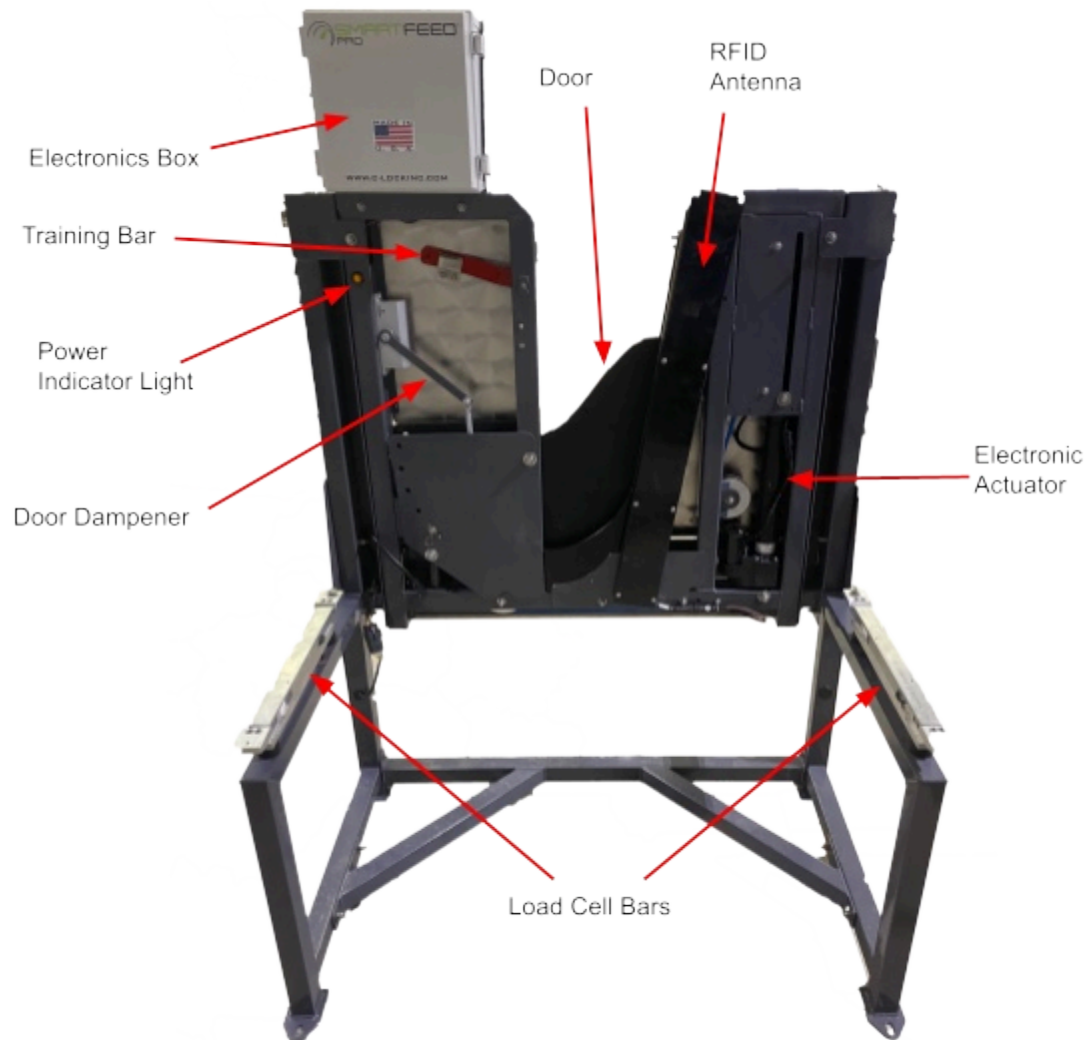
Figure 1) Reflects the back of the SmartFeed Pro Waterer with the Bin Removed

1.3.   Installation

Choosing a Location

ⓘ Note: SmartFeed is very sensitive to weight fluctuations. To get as accurate of a weight reading as possible, please follow these rules:

1. Choose a location where no grass or plants will grown under the bin
2. Ensure the bin is completely suspended by its load cell bars.
3. In windy environments, use solid obstructions, such as plywood, sheet metal, or other types of shelter to block as much wind as possible.
4. Ensure nothing is leaning against the bin. This includes wires, plants, farm tools, or other equipment.
5. Check regularly to ensure that nothing is below the bin and is piling up.
6. The system must have access to a water line. Ensure your water line has a regular pressure of 30 ~ 80 psi, and is appropriately protected/heated for the environmental conditions.

Anchoring the Frame to the Ground

ⓘ **Caution! SmartFeed is front-heavy and can tip over easily if not anchored appropriately. Please use caution when moving or installing the system to prevent from injury or damage. ALWAYS ANCHOR ALL FOUR CORNERS OF SMARTFEED FIRMLY TO THE GROUND.**

1. Select a location that will not allow the animals to access the feed bin from behind. Alternatively, place a fence around the SmartFeed to prevent access from behind.
2. Make sure the unit is on a level surface by placing it on flat pieces of metal, wood, or concrete.
3. Use rebar or ground anchors to secure the frame to the ground. See Figure 2 for reference.

Figure 2) SmartFeed Orientation and Mounting Reference

Connecting a Water Line

ⓘ The SmartFeed Pro Water System has two options for connecting water. The first is exposed on the side of the base. The second option is to have conduit running up and into the base. See these two locations in Figures 3 and 4.

Figure 3) Water Side Inlet

Figure 4) Water Bottom Inlet

Accessing and Setting Up the Watering Components

ℹ The plumbing, heating, and valve controls of the watering system are all confined inside the bottom base of the SmartFeed system. To access the water plumbing:
1) Identify the two handles on the base of the system
2) Turn both handles 90 degrees inward
3) Pull the entire panel off
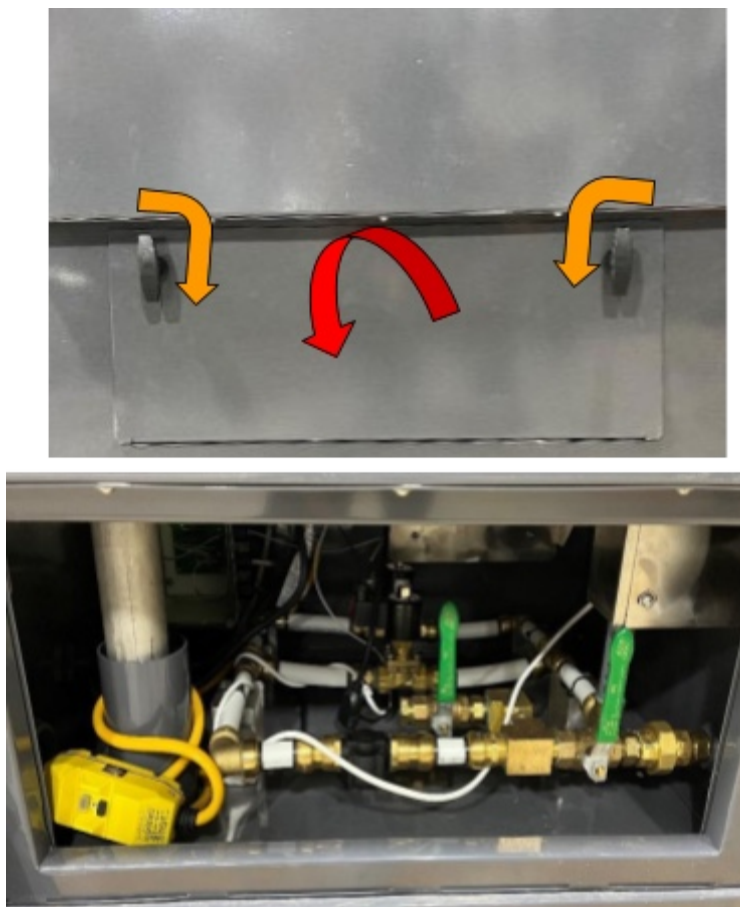
Figure 5) Removing the Water Plumbing Front Panel

The components for the water plumbing are shown below in various angles in Figure 6

Figure 6) Plumbing Layout in the Base of the Watering System

1) Side Inlet Main Cutoff Valve
2) Bottom Inlet Main Cutoff Valve
3) GFCI Electrical Safety Box
4) Drain Spout
5) Bottom Inlet Opening
6) Primary Water Valve
7) Fail-Safe (Power Loss) Water Valve
8) Water Flow Meter
9) AC Power Electrical Box
10) Main 500W Heater
11) Electronics Control
12) 40W Water Pipe Heater

Once the water inlet has been connected, the appropriate cutoff valve must be opened. If water is connected to the side inlet, turn on the Side Inlet Main Valve (#1). If water is connected to the bottom inlet, turn on the Bottom Inlet Main Valve (#2). Only one valve should be opened during operation.

In temperatures below 40 degrees Fahrenheit (5 degrees Celsius), the main heater (#10) and the water pipe heater must be plugged in and functioning. It is important to periodically ensure that both heaters are functioning and warming their respective locations.

ⓘ **Caution! The main heater will get extremely hot, do not touch it while it is plugged in. Allow at least 30 minutes to cool down after unplugging it before touching it.**

To adjust the main heater's power, adjust the knob located on the base of the heater. Turn it clockwise to increase the temperature. Turn it counterclockwise (anti-clockwise) to decrease the temperature.
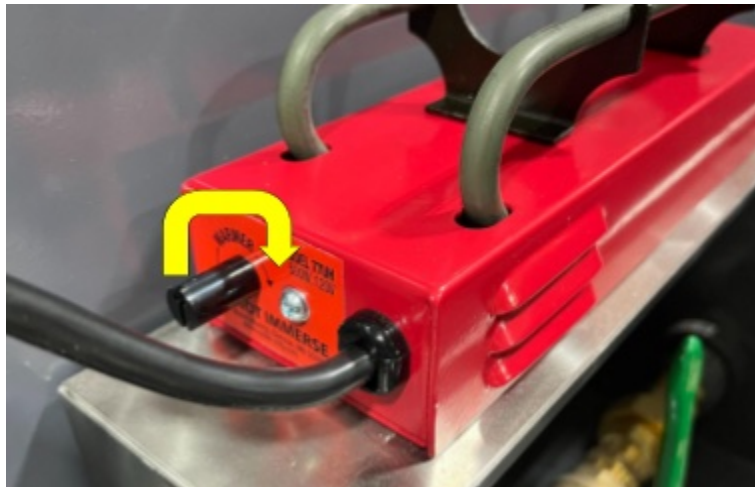
Figure 7) Main Heater Adjustment

For safety, the heating system includes an inline GFCI breaker. This breaker will disable power as soon as an electrical short is detected, to prevent harm to people, animals, or electronics. The GFCI breaker automatically turns off when a power loss is detected. As a result, it must be enabled each and every time the system is plugged in. To turn on the power to the breaker, press the translucent *RESET* button on the breaker box, shown in Figure 8.

Figure 8) Turning on the GFCI Breaker

The water fill device is located in the top water tank. To access it, remove the top four bolts and lift the cover off.

Figure 9) Removing the Water Tank Cover

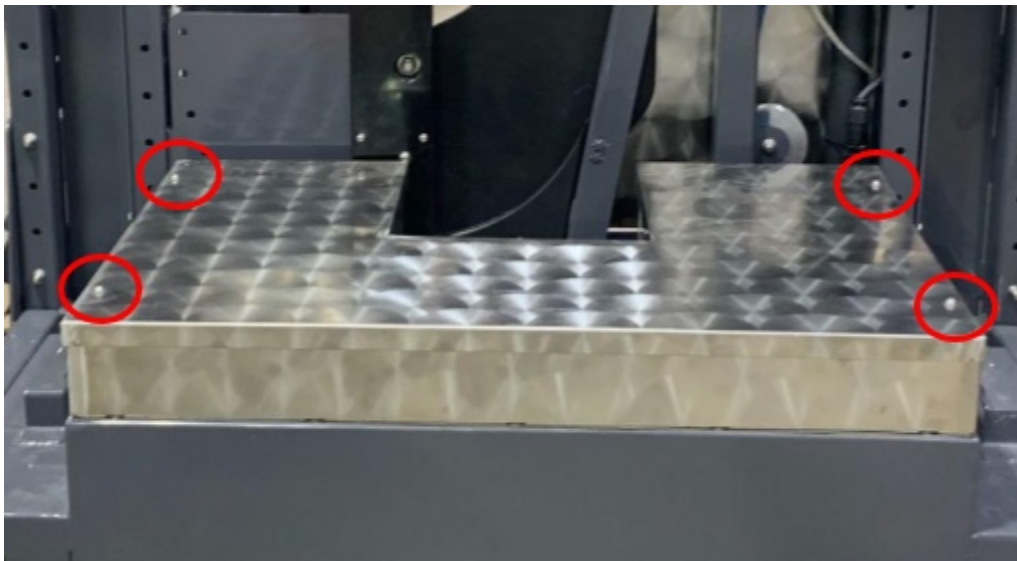Figure 10 shows the components inside the top water tank. These parts must be removed or adjusted before lifting the top tank off the base of the system.
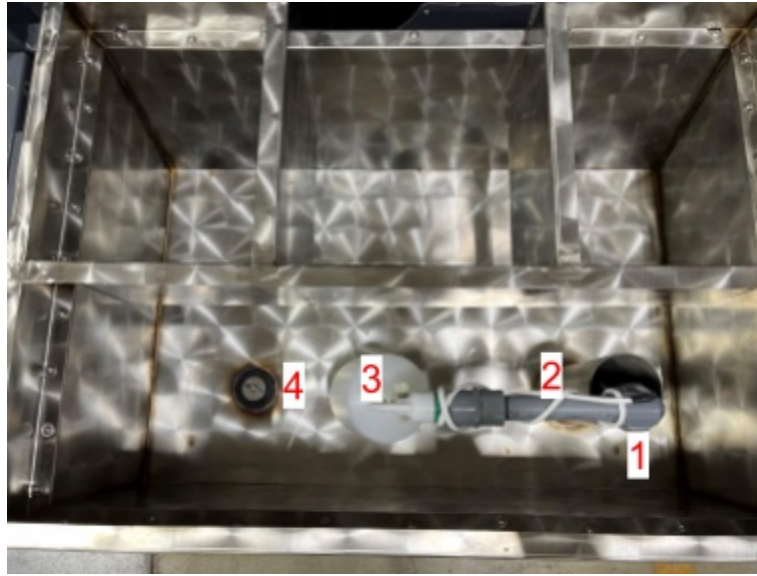

Figure 10) Water Tank Component Layout

1)   Spigot Disconnect   3)   Ball Float
2)   Heater Rope   4)   Drain Plug

The spigot disconnect is used to remove the faucet from the system. This is required before removing the bin from the frame of the system. Removing the spigot is also required to blow out the water from the water line, when storing the system. (See Section 1.4 for powering off the system for storage).

The heater rope must be wrapped around the spigot to prevent the main outlet from freezing. Ensure the rope is uniformly wrapped around the plastic conduit, and ensure that the rope is warm to the touch.

The ball float is used as a mechanical fail-safe to prevent water from overflowing in the water tank. This is preset during system assembly and should not be adjusted unless the water level seems too high or low.

The drain plug is used to completely drain the water out of the tank for easy cleanout and for storing the system after use. Water will drain out the bottom of the system, so

ensure that there is nothing below the SmartFeed system before pulling the drain plug.

1.4.   Powering SmartFeed Pro Water On and Off

SmartFeed only requires a 12 volt DC power source to operate. This low voltage is relatively harmless. However, an external AC to DC power converter is used to power the SmartFeed, the AC power going into the converter can be hazardous. Please protect the AC power cord and exercise caution when using AC power.

Before you power on SmartFeed:

1. Connect the provided power cable to the SmartFeed power plug. The plug is located next to the main power supply. Also ensure the water addon communication line is connected. See Figure 11 for reference.
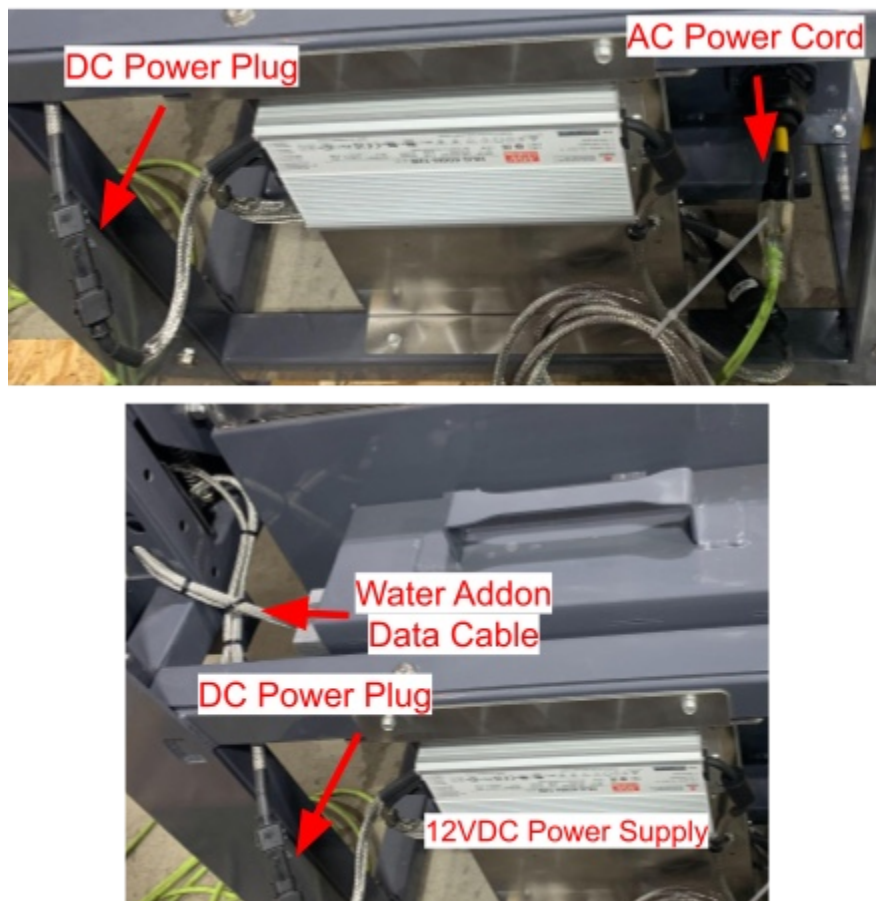
Figure 11) SmartFeed Power and Water Communication

2. Ensure all power cables are protected from animals and other possible sources of damage, such as vehicle or foot traffic.
3. Ensure the power cord is not a tripping hazard.
4. Contact C-Lock if the power cord is worn or wires are exposed.

To power on SmartFeed:

1. Depending on your SmartFeed setup, you may have a different method of applying power to the unit, either a power switch or a power connector. Ensure the power source is connected to your SmartFeed unit, and if applicable, turn the power switch to ON.
2. The power indicator light on SmartFeed will illuminate, to signify that it has power.
3. Once power is applied to the system, the water valve solenoids will both close to prevent water from flowing. You may now open the inlet water valve - either item #1 or #2 in Figure 12 (#1 if your water source is coming from the side, #2 if your water source is coming from the bottom). This will allow the system to start controlling the flow of water automatically.

Figure 12) Open the Inlet Water Valve

4. Please allow ~1 minute for the system to initialize.
5. Use the mobile Control Feed application to scan for your system to ensure it is fully powered on and ready.
6. Once it is fully initialized, you will be able to push the door open and let it shut. When this is done, the system will detect the water level and fill appropriately.

To power off SmartFeed for Storage:

1. When the system is not powered, the water bypass valve will be opened and water will flow as it would in a regular unpowered water system. To prevent this, close both main water inlet valves. Turn both valves to the up position as shown in Figure 13 below.

Figure 13) Turning Off Both Water Inlet Valves

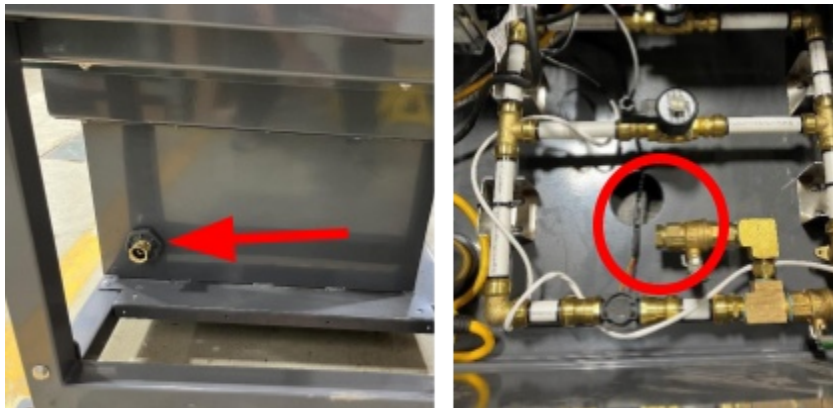2. Shut off the main water source and disconnect the water inlet from the system.

Figure 14) Disconnecting the Water Source

3. Open the main water valve to let any internal water drain out of the internal plumbing.
4. Drain the water from the tank by removing the lid and unplugging the drain plug shown in Figure 15. Note that the water will drain out the bottom of the system. Ensure there is nothing below the base of SmartFeed.

Figure 15) Drain Plug Location

5. If storing the system in cold conditions, use an airline to blow out the excess water from the line. To do this, the spigot must be unscrewed from the disconnection point and compressed air should be used to ensure all water is cleared from the plumbing. This will need to be done twice: Once with SmartFeed powered on, and once with SmartFeed powered off. This will ensure the fail-safe water solenoid is flushed out as well.

6. If your system is powered by an AC power source, unplug the power cord from the side of the system. See Figure 16. Once the system is powered off, repeat step 5 again to clear the water out of the fail-safe solenoid..

Figure 16) Disconnecting the AC Power Cable

1.5.   Installing the Control Feed Mobile Application

Controlling and monitoring the SmartFeed system is made possible using the Control Feed mobile application. To install Control Feed on your mobile device, search for "Control Feed" by C-Lock Inc. in the Google Play Store or Apple App Store, or scan the QR code below.

Control Feed
Utilities

Apple App Store   **Google Play Store**

https://apps.apple.com/us/app/control-feed/id1524038899

https://play.google.com/store/apps/details?id=com.controlfeed

For instructions on using Control Feed, see **Section 3**.

2. Setup

2.1. Adjusting the Closed Door Height

The closed-gate height can be adjusted to provide access to smaller or larger animals. Perform the following to adjust the door height:
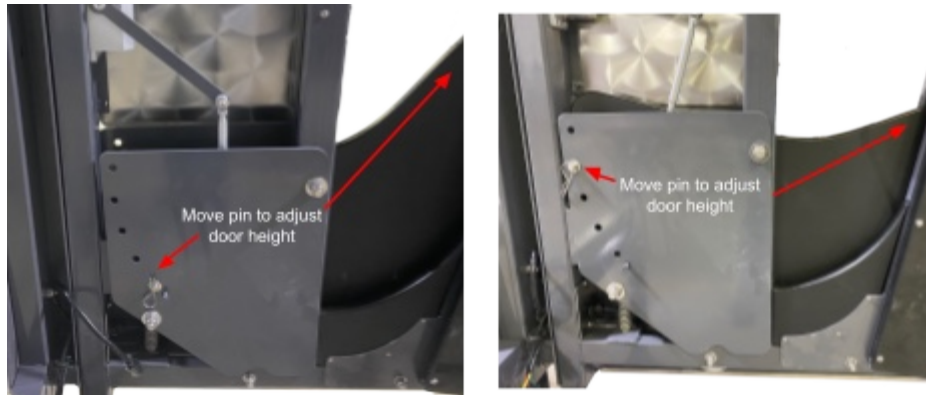
Figure 17) Gate Adjustment for Smaller or Larger Animals

1. Tap the "Unlock Door" button on the Control Feed app.
2. Open the gate far enough to be held open by the training latch.
3. Remove the gate-height adjustment pin and re-insert into the desired hole.
4. For smaller animals, place the pin in the highest hole. For larger animals, place the pin in the lowest hole.
5. Remove the training latch and allow the gate to close.
6. Ensure that the gate successfully latches onto the pin, the Control Feed app status should show "Door State: Closed".

2.2. Manually Opening the Door

🛈 **Caution! Unlatching the door manually using the latch release switch will cause SmartFeed to automatically close the door with extreme force, which could result in injury. The Control Feed App "Unlock Door" button *must* be used to unlock the door if SmartFeed is powered on. (See Section 4 for instructions on using the Mobile app.) The latch release switch should only be used if SmartFeed is <u>powered off</u>.**

To open the door manually:

🛈 Please note: While in Water mode (measuring water intake, rather than feed intake), the SmartFeed latch will not lock. This is done to ensure that if a power loss occurs, animals can still drink. While the water add-on is attached, the door should never need to be unlocked. But in the rare event that troubleshooting must be done, the door can be unlocked using these steps:

1. Locate the latch release switch. This switch can be found hidden between the door and the back wall plate under the training bar.

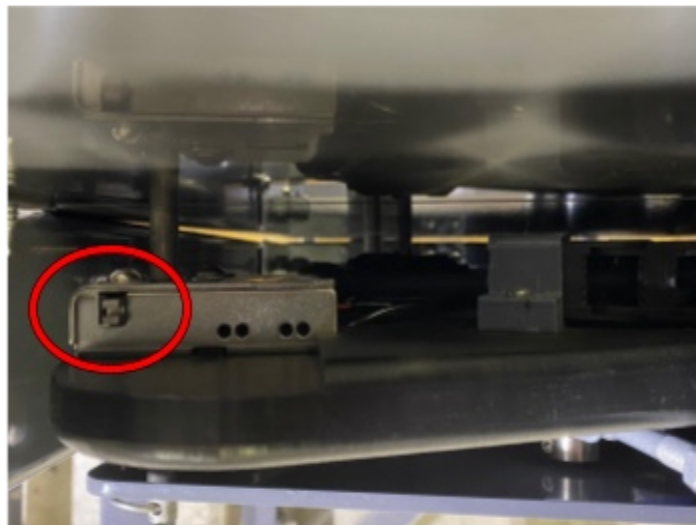

Figure 18) Location of the Manual Door Unlock Switch

2. Place your hand between the gate and the front of the feeder. You will feel a small lever sticking out the top of the latch housing. Push the lever towards the outside of the machine.

2.3. Engaging the Training Latch

The training latch is meant to hold the door open so that animals can learn there is feed in the bin. When the training latch is engaged, animals can eat as much and as often as they want. The orange bar located beneath the electronics box allows you to place SmartFeed in training mode.

🛈 **Note: If you engage the training latch on the SmartFeed machine, you must also switch SmartFeed into training mode** online**. See Section 5.2 for instructions.**

To engage the training latch:
1. Tap the "Unlock Door" in Control Feed. If SmartFeed is powered off, you will have to manually unlock the latch (see **Section 2.2**)
2. Push the gate as far open as it will go.
3. Remove the orange training latch from its holder and lower it down into position so that the "fork" of the latch closes onto the orange pin.
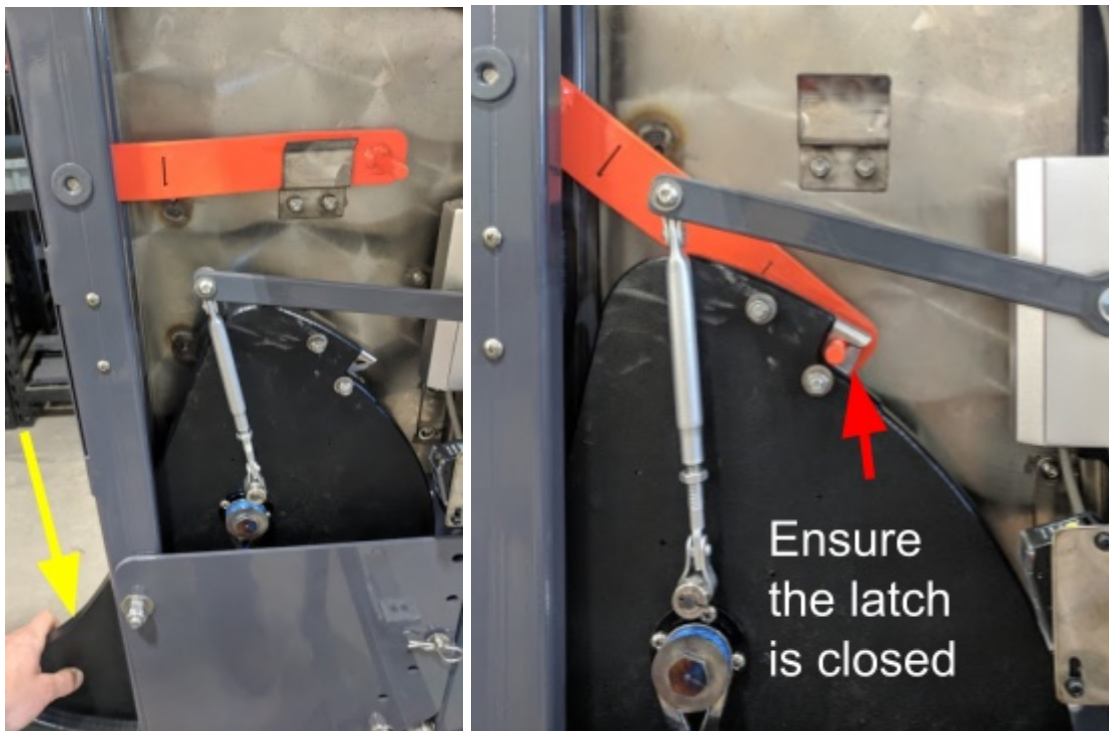4. Push the door latch into the training bar pin until it locks shut.

Figure 19) Engaging the Training Latch.

To return the SmartFeed Pro to regular operating mode:

ⓘ **Note: If you disengage the training latch on the SmartFeed machine, you must also switch SmartFeed into normal operating mode** <u>online.</u>

1. Tap "Unlock Door" in Control Feed. If SmartFeed is powered off, you will have to manually unlock the latch (see **Section 2.2**)
2. Push the gate as far open as it will go.
3. Return the orange training latch to its holder.
4. Allow the gate to close until the latch engages the gate-height adjustment pin.

2.4.   Adjusting the SmartFeed Height

2.4.1 - SmartFeed can be adjusted to accommodate a wide range of animal sizes. Adjusting the height requires at least two people. To adjust the full height of the front follow these steps:

Figure 20) Loosen four bolts to raise/lower the front of SmartFeed

ⓘ **Caution: At least two people are required to adjust the height of the gate system. The only equipment that is holding the gate at its height are the four bolts shown in Figure 20. Once these bolts are removed, the whole gate *will* fall (and is heavy), so be sure to have support and/or multiple people to hold it in place.**

1. Remove the bolts and washers from these four spots.
2. Raise or lower the bin supports to the desired height and place the four bolts back in place.
3. Adjust the door height to accommodate the new front height. See **Section 2.1**

2.5.   Connecting to a Network

SmartFeed must have at least one of the following types of connection:

- WiFi - requires configuration when connecting to a new WiFi network.

- Ethernet - requires additional equipment and an ethernet cable run to SmartFeed.

- Cellular - requires a cellular modem (available at additional cost). A monthly cellular data plan charge may apply, depending on the cellular provider.

In order for multiple SmartFeed Pro systems to synchronize their feed intake records with each other, they must communicate over an internet connection.

Failure to synchronize may result in animals being allowed more feed than the user specifies. For SmartFeed systems that are within 100 feet of each other, it is recommended to connect them to the same network (usually WiFi). This will ensure synchronized feed intake records. Please contact C-Lock Inc. for assistance in configuring your network.

2.5.1.   WiFi

SmartFeed can be configured to connect to any WiFi network. Please see **Section 3** for instruction on using Control Feed to configure SmartFeed to use a new WiFi network.

2.5.2.   Ethernet

Additional equipment must be installed into SmartFeed to allow for an Ethernet connection. To use an ethernet connection, please contact C-Lock.

2.5.3.   Cellular

If your SmartFeed(s) came with a cellular modem, they will already be configured to connect to the modem. For US customers, the modem will also include a pre-installed SIM card. No additional work is required.

For international customers, an activated 2FF "Mini SIM" card will be required. Please ensure that the SIM card has a data plan allowance of at least 1GB per month of data.

For instructions on installing the SIM card, see Appendix B.

2.6.   Calibrating and Checking the Scale

- ⓘ It is recommended to recalibrate the scale any time the feed bin is removed or the system is moved or repositioned.
- ⓘ It is recommended to check the scale for accuracy every time the bin is empty - or on a weekly or monthly basis. This will ensure accurate readings.
- ⓘ SmartFeed operates on the principle of bin weight changes. If at any time, the operator must change the amount of feed in the bin, it is important to mark that event so that it's not interpreted as unknown intake. To mark an event as an empty or fill event, please see **Section 3, part 6g**.

To check for accurate weight measurement:

1. Make note of the current weight in the feed bin using the Control Feed app.
2. Place the calibration weight in the feed bin. Every C-Lock provided calibration weight will have the exact weight marked on it.
3. Ensure the SmartFeed bin weight increases by the correct amount.
4. If the weight increase is incorrect - check that the feed bin is fully suspended only by the load cell bars. If it is suspended correctly, please calibrate the scale.

To calibrate the scale:

1. Remove all feed and debris from the feed bin. If needed, open the cleaning door to remove the last bits of feed.
2. From the Control Feed app, tap Zero
3. When prompted to zero, ensure nothing is touching the bin. Then tap Yes.
4. Tap Set Span and Calibrate
5. Type in the mass of your calibration weight, ensuring to select the appropriate units of weight (lb or kg).
6. Tap "Calibrate"
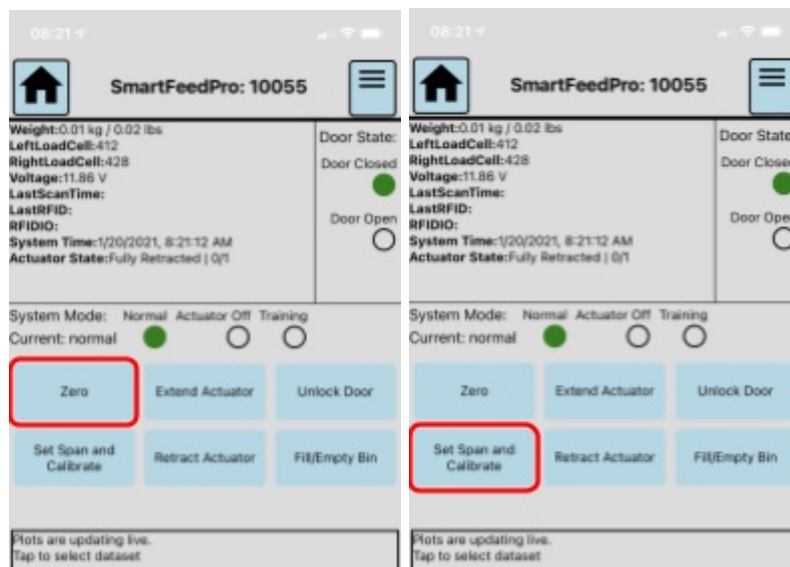7. The correct weight should now be displayed on Control Feed.

Figure 21) Zeroing (Taring) and Calibrating SmartFeed

2.7. Checking your EID (RFID) Tags

To check if the RFID reader is working for your EID tags:

1. You will need a spare ear tag.
2. Open the electronics box by unlatching the 2 fasteners (Figure 12).
3. Hold the ear tag next to the RFID antenna (Figure 1).
4. Watch for the green "READ" light to blink on the RFID circuit board in the electronics box. When you see the green "READ" light blink, this means it has detected an RFID tag.
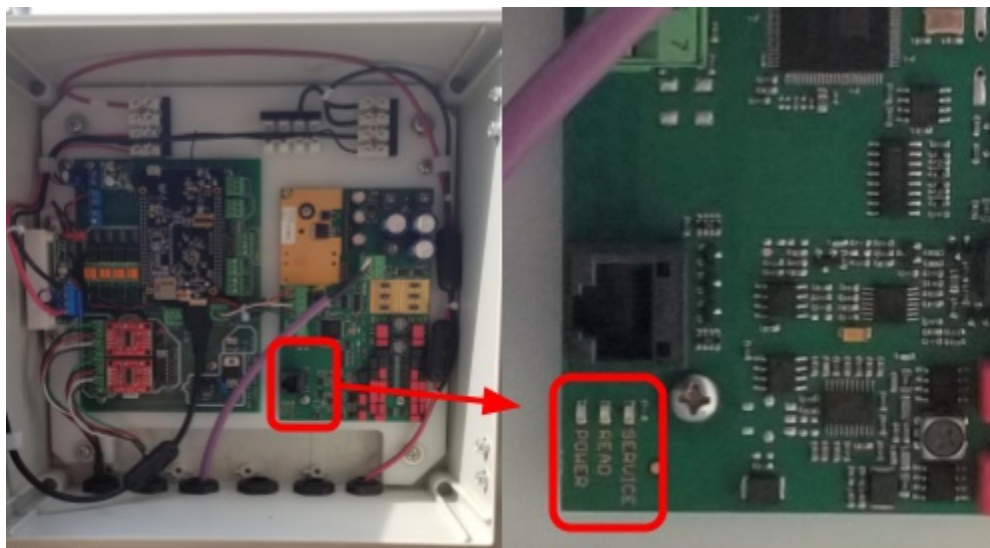

Figure 22) Checking the RFID Reader

3. Control Feed Mobile App

Although SmartFeed is an online measurement system, most common tasks can be performed from the feeder itself using the Control Feed mobile app.

To install Control Feed on your mobile device, search for "Control Feed" by C-Lock Inc. in the Google Play Store or Apple App Store.

Initial Operation of Control Feed

1. Begin by tapping "Start Scanning for Systems".
2. A list of nearby devices (within 50ft / 15m) will appear. See Figure 23.
3. Tap the System you wish to control.
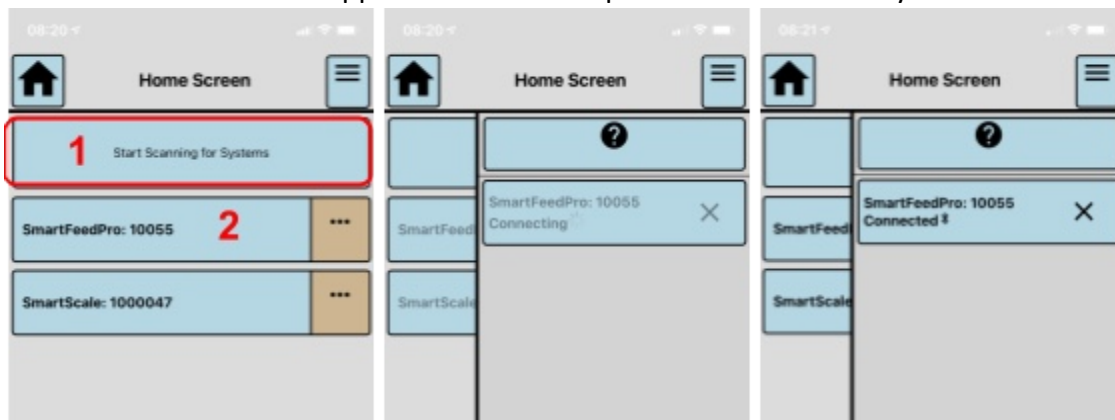4. A side-box will appear while it attempts to connect to the system.

Figure 23) Scanning and Connecting to a SmartFeed System

5. Once connected, tap the button on the side to launch the control interface.

6. From this interface, you can:
    a. see the current state of each sensor on the system.
    b. Configure the system for training mode or regular mode *
    c. Zero/Tare the bin
    d. Recalibrate the bin
    e. Manually move the high-power kick-out actuator
    f. Manually unlock the door
    g. Indicate that the bin is about to be emptied or filled
    h. View a real-time plot of data
    i. Change WiFi network credentials for the feeder
    j. Return to the list of all scanned feeders
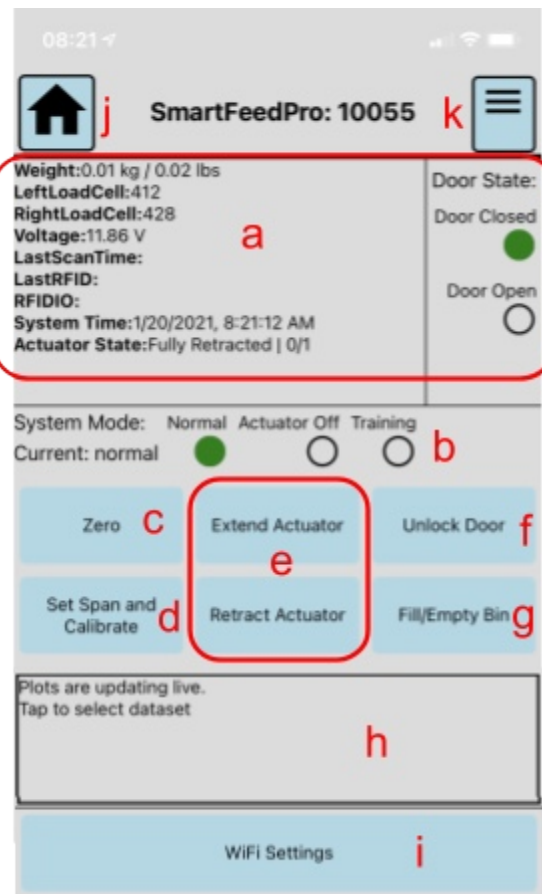   k. See which feeders are currently connected

Figure 24) Control Feed Main Interface Controls

ⓘ * Note: The System Mode has three settings: Training, Actuator Off, and Normal. The differences between these three are listed below:

- **Training mode** will keep the door unlocked and will never push animals out. This mode is helpful to teach the animals that they need to push the door down in order to get feed. This is meant as the second step to teaching animals to eat from the system. (See **Section 2.3** for the first step in training).

- **Actuator Off mode** will allow SmartFeed to the door, to keep animals out, but will not enable the actuator to push animals out. This means that once the door does unlock for an animal, they will be able to eat as much as they want until they lift their heads up - similar to a Calan gate operation. This is a useful "intermediate" step between fully training animals and using the system in normal mode.

- **Normal mode** will configure the system to lock the door and push out animals once they have eaten their feed allotment.

Please note that if using any one of these three settings, you must also configure the system to "Normal" mode from the online interface.

Configuring the WiFi Network Credentials

To change the WiFi network that SmartFeed connects to:

1. Tap "WiFi Settings"
2. Tap the button with the WiFi network you wish SmartFeed to use
3. In the box that appears, select WPA2
    - If the network is an open network (no password), select None
4. Enter the password for the network under "Password" (if applicable).
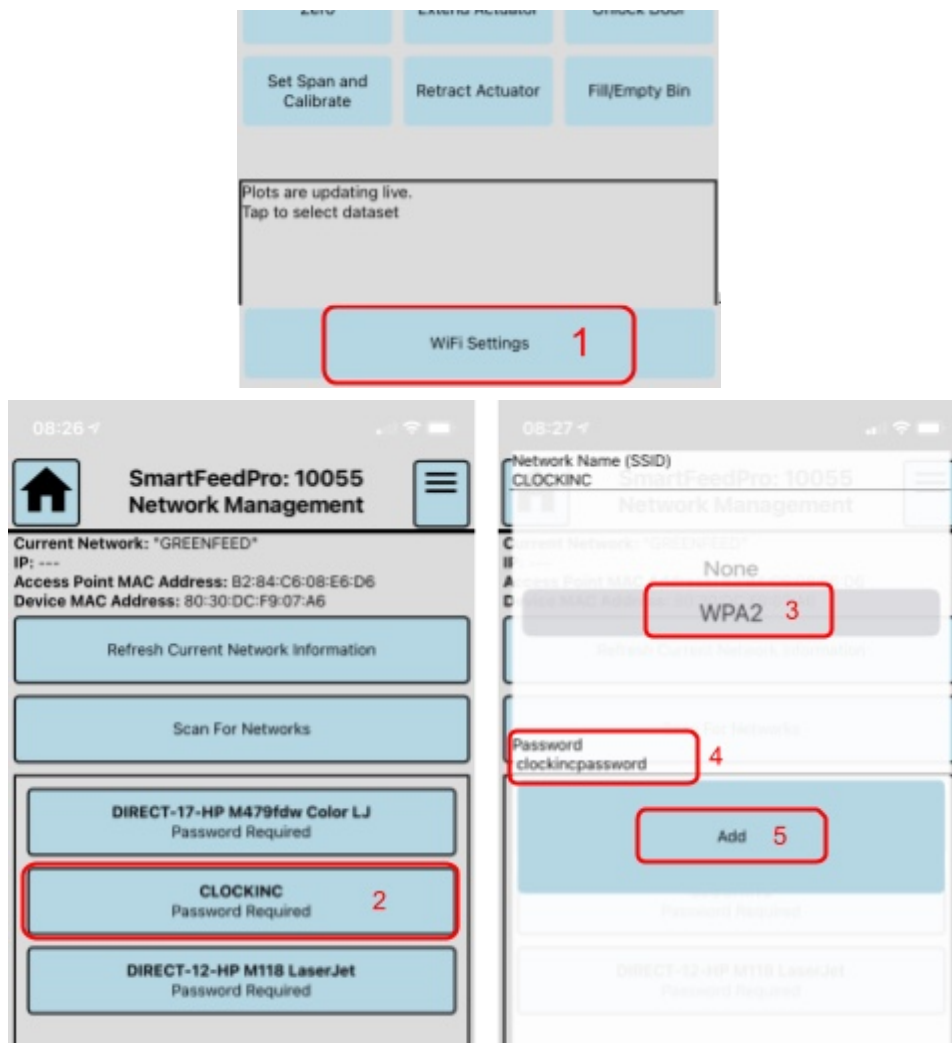5. Tap Add. The system will immediately reboot and connect to the new network.

Figure 25) Control Feed WiFi Configuration

4. Training Animals

- SmartFeed requires all animals to have an RFID tag. SmartFeed is compatible with the following RFID standards: ISO 11784 or ISO 11785 (HDX and FDX tags). To purchase these tags, please contact C-Lock.

- SmartFeed has a built-in RFID Reader. This reader will scan the tags automatically.

- When introducing the animal to the SmartFeed for the first time, it is important to make sure the animal associates the SmartFeed with water.

- It is recommended to set the door height to 100% open (**Section 2.1**), or use the training latch (**Section 2.3**). This will allow the animals to see and understand that there is water in the bin.

- Once the animal becomes familiar with the feed in the bin, close the door 50% open (**Section 2.1**) and continue feeding the animal.

- Over the course of 5 to 7 days, the animals should understand and be cooperative with SmartFeed. At this time, the door can be set to fully closed (**Section 2.1**).

5. Maintenance

- To clean the inside of the water tank, turn off the main source of water and lift the lid off the tank. Remove the drain plug to drain all the water out of the tank. Clean the inside as needed, then reinstall the drain plug and turn the water source back on.

- To ensure accurate weight, clean underneath the bin. Make sure there is no food or debris touching the bottom of the system.

- Check the bin calibration (**Section 2.6**) once per week and recalibrate as necessary.

Appendix A - Configuring the Cellular Modem

If your SmartFeed system includes a cellular modem, the modem will be pre-configured. The only thing that must be done is inserting an activated Mini-SIM (type 2FF) card and checking for an Internet connection. To do this, follow these steps:

1) Locate the modem. It will be in the SmartFeed battery box, or in a separate box by itself.

2) Disconnect power from the modem to turn it off.
3) Insert the 2FF SIM card into the slot.

4) Apply power and ensure the modem lights turn on.
5) Wait three minutes.

6) Use a laptop, tablet, or smartphone to check for a WiFi connection. The name of the WiFi network will vary depending on the SmartFeed configuration, but the network should start with "SMARTFEED".

7) Join this network, when prompted for the password, enter: smartfeed

8) On the laptop, tablet, or smartphone, go to http://www.c-lockinc.com/ip You should be presented with the following message: **Your IP address is xx.xx.xx.xx**

9) If you see this message, it means your modem is configured and ready.

10) If you do not see this message, please contact C-Lock for assistance.