



Bushel Plus
SmartPan System

1 Year Limited
Product
Warranty



OWNERS MANUAL

Bushel Plus Ltd. | B-44 Limestone Road, Brandon MB, CA , R7A 7L5 | www.BushelPlus.com

Owners Manual produced in August 2024

CONTACT INFORMATION

Please keep this manual for future reference.

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**Bushel Plus is THE Harvest Optimization Company,
setting the bar for helping farmers maximize their
investment in yield, quality, and time.**

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Thank you for choosing the Bushel Plus SmartPan System – the #1 complete grain loss management system. We know it will be a vital tool in reducing your combine losses for this harvest and many more in the future.

SAFETY INFORMATION

Before using your Bushel Plus SmartPan System

- Read and understand all labels, manuals, and safety instructions for the SmartPan System.
- Inspect the SmartPan System for damage. If you notice damage, do not use the SmartPan System, and contact your local dealer for further support.
- **WARNING!** Make sure all machinery (combine, threshing system, seed destructor, chaff deck, chopper, and chaff spreader) have stopped moving before attaching or removing SmartPan System.

Operating the Bushel Plus SmartPan System

- **WARNING!** Wear appropriate PPE: safety glasses and sturdy closed-toe shoes or boots. Refrain from wearing loose clothing and ensure long hair is confined.
- Beware of your surroundings and keep a safe distance away from moving machinery.
- Avoid driving over obstructions (straw/crop windrows, swaths, weeds, standing crops, etc.) with the carrier attached. As the carrier is held on the machine by magnets, hitting an obstruction could cause the carrier to detach.
- Remove carrier and drop pan before transporting equipment.

NOTE: Remove red pan before carrying the SmartPan System - it could come loose and fall out.

Caring for your Bushel Plus SmartPan System

- Keep the system clean. Avoid build-up of dust and dirt.
- Protect the SmartPan System from moisture, cold, dew, or extreme heat. Store under cover when not in use (even just overnight).
- Make sure the carrier and Air Separator are switched off after use.
- Batteries are sensitive to heat, cold and frost. Avoid these conditions when storing. Charge the device fully before storing and charge every 4-5 months while in storage. Unplug when charging is complete. Do not leave plugged in for extended periods.

Safety Labels SmartPan Carrier:



Safety Label Air Separator:



HOW THE BUSHEL PLUS SMARTPAN SYSTEM WORKS

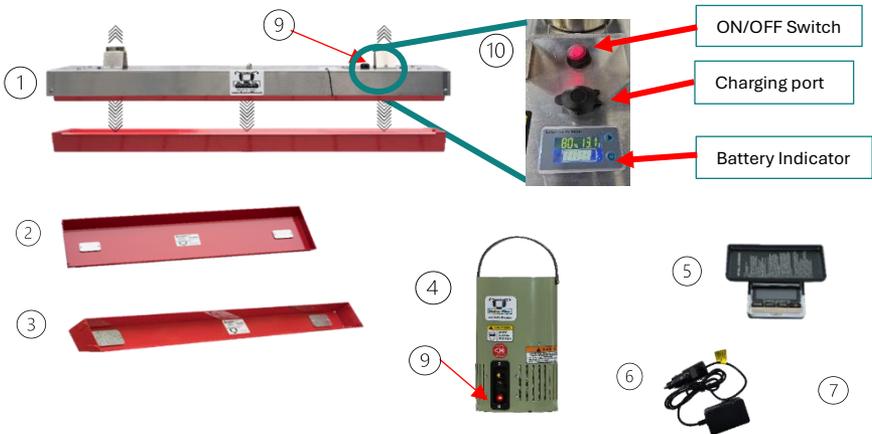
The Bushel Plus SmartPan System is precise, dependable, and **designed to measure grain loss easily with any combine**. With your safety in mind, all units are remote controlled and portable so that no wiring or bolts are needed to attach it to the combine. Our magnetic carrier and drop pan can quickly and easily move from one combine to the other – no tools needed!

Four fast and easy steps to measure your loss and put more grain in the bin!

1. Attach the magnetic carrier and drop pan to any combine in seconds.
2. Safely release the drop pan using the remote or the SmartDrop App.
3. Clean the sample with the Air Separator.
4. Check your results with the SmartDrop App.

PRODUCT OVERVIEW

1. Carrier (attaches to the combine)
2. Wide drop pan (canola/cereal pan)
3. Narrow drop pan (tall stubble, canola, etc). Not included in 20" system
4. Air Separator
5. Scale
6. Smart charger
7. Remote (with LED feedback function)
8. Owners manual (not shown)
9. Serial # label for registering the SmartDrop app and warranty purposes
10. ON/OFF Switch, charging port and battery indicator



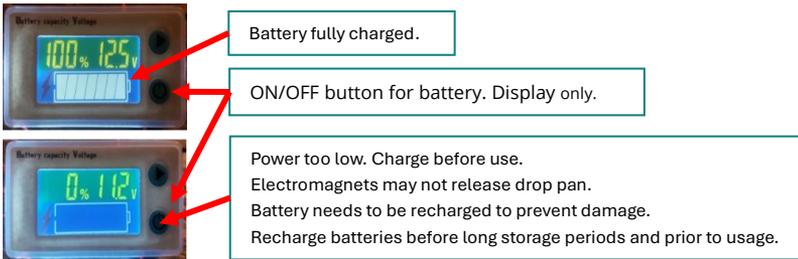
Which Drop Pan (Red) Should I Use?

All over the world, stubble conditions, seed row spacing, crop varieties, and many more variables can change from field to field. These varying conditions have great effect on how the drop pans fall from the carrier.

The **wide drop pan** works great in most stubble conditions. If your crop's stubble is very tall there is a possibility of the wider pan tipping over, or experience issues releasing from the carrier. In such conditions, the **narrow drop pan** is recommended as it has a better chance of dropping between the stubble due to its angled shape. Conditions may include straight cut canola, hemp, stripper header, etc.

NOTE: In tougher, longer cereal stubble, the narrow pan should fall more evenly into the stubble. For more tips on cutting high stubble, please refer to page 16 – Using the SmartPan System in the Field.

Battery Indicator on Carrier



Battery Indicator on Air Separator

- A low voltage alarm will sound for two seconds when ~5 min of continuous usage remains.
- If you turn the variable speed controller up too fast, you may also hear this alarm. Turn the speed down to complete the cleaning of your sample then charge your device.
- Ensure you recharge the battery after the low voltage alarm sounds.



PREPARING THE SMARTPAN SYSTEM FOR USE

Charging the SmartPan System

Your unit comes with a 12V Smart Charger (Part # BP-CHRG). You can purchase additional chargers and/or a vehicle charger (Part # BP-VEHCHRG-01) from your local dealer.

NOTE: Use only the charger provided with this unit or purchased from your local dealer.

1. Make sure unit is turned OFF. The on-off switch is located beneath the permanent magnet bracket. See Figure 1.



Figure 1: Location of ON/OFF Switch

2. If needed, insert the correct adapter for your country or region into the wall receptacle.
3. Plug the charger into the charging port on the unit first, then into the wall receptacle. See Figure 2.



Figure 2: Location of Charging Port

4. The LED on the charger will turn red when charging. See Figure 3. When the LED light turns green, charging is complete. **NOTE:** Check the battery indicator on the carrier.



Figure 3: SmartPan System Charger

5. When the unit is fully charged, unplug the charger from the wall receptacle first, then from the unit.

Downloading the SmartDrop App

For your convenience, we have developed the Bushel Plus SmartDrop App (available from Google Play, or the App Store).

After downloading the SmartDrop app for the first time, you must register the product with your name and serial number of the carrier as part of your warranty. (More details below).

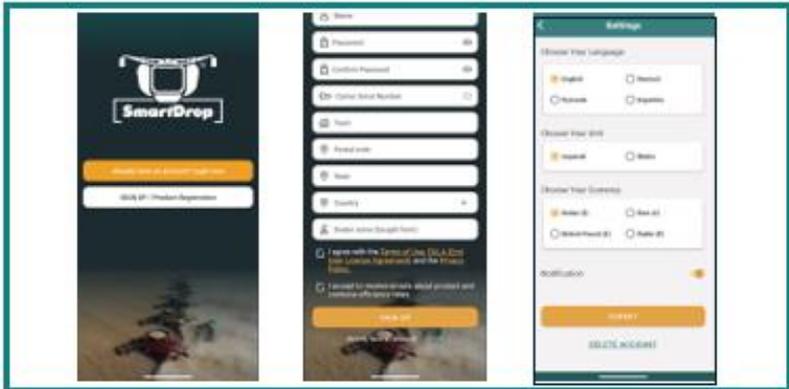
NOTE: All saved profiles and results are saved to your mobile device. If you lose/change your device or the app crashes, you may lose your saved data. Please back up your data by sharing the results to your email.

Some tabs or layouts may differ from the ones described in the following pages, but the most recent manual can always be found in the SmartDrop app under the Resources tab.

USING THE SMARTDROP APP

Registering/Creating an account

1. Download the SmartDrop app from Google Play or the App Store.
2. For first time users, hit **SIGN UP/Product Registration to use SmartDrop** app.
3. Create an account with your email address and a unique password. You will not need to re-enter the password every time you open the app, only if you log out of your account or switch devices.
4. Enter the Serial Number of your carrier and enter your contact details for warranty purposes. (See product overview on Page 5 for location of serial number) **Be sure to enter numbers, letters, and dashes exactly as shown on the serial number.**
5. After all required fields have been entered, hit the **Sign-up** button. (You can register up to 4 accounts with the same serial number.)
6. A confirmation email will be sent to your email address. Complete your registration by clicking on the link provided in the email. **If you do not see the email, check your spam, and junk folder.** If you still can't locate the email, try using a different email address or contact your email provider.
7. After confirming your email, you can login with your email address and password you just created and tap **Already have an account? Login Now.**
8. Choose your language, currency, and unit of measure. This can be changed later if needed.



*Design may be subject to change without notice

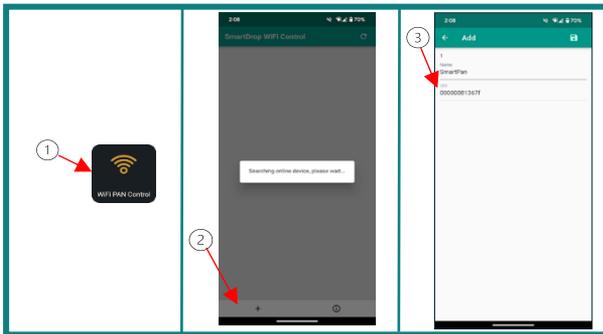
Pairing the SmartPan to the SmartDrop App

NOTE: All saved profiles and results are saved to your device. If you lose/change your device or the app crashes, you may lose your saved data. Please backup your data by sharing the results to your email.

Serial numbers that contain **WX**, are the newest version of the Bushel Plus SmartPan System. This carrier creates a unique Wi-Fi network which can be detected by your mobile device. Once connected the pan can either be released from the carrier with our app, or with the included remote.

1. Turn on the carrier. The on/off switch is located under the permanent magnet bracket.
2. Go to the **Wi-Fi** settings in your device and turn on Wi-Fi.
3. Find the Wi-Fi network of the carrier. It should read **SMARTCU_XXXXXX**. Enter the Wi-Fi password: **12345678**
4. You may be prompted with a window that shows **no internet access is available**. Hit **accept** or **connect anyways**.
5. Now open the **SmartDrop App** (from the App Store or Google Play) and navigate to the home screen.
 - a. Go to the Wi-Fi pan control page. **(1)**
 - i. Android Users will have to install a separate application (SmartDrop Wi-Fi Control from the Google Play Store)
 - b. Click **+** at the bottom of the screen and the app will auto search for carrier **(2)**
 - c. Change the name of the Wi-Fi carrier network and hit save. **(3)**

TIP: Name it with the last 4 digits of your serial number so it is easy to identify.
***a carrier network that has already been added to this device will not appear in the search results again.**



IMPORTANT: While your phone is connected to the carrier's Wi-Fi network, your phone **cannot** access the internet (5G or LTE) **When you are done using the SmartPan System, follow one of the 2 options below to access the internet again.**

- Turn the carrier off
- Disconnect your phone from the Wi-Fi carrier network **SMARTCU_XXXXXX**

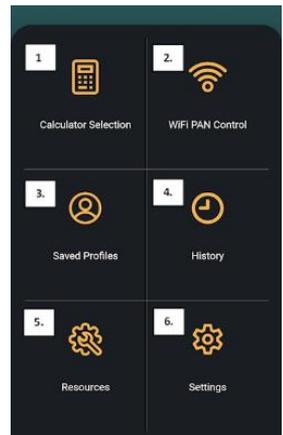
NOTE:

- You only have to complete the pairing process once. Complete this process prior to harvest to ensure smooth operation while in the field. In some cases, you may need to disable your mobile data or set the device to airplane mode to connect to the carrier's Wi-Fi network.
- Some devices like to automatically switch back to mobile data. Placing the device in airplane mode should stop this behavior.
- The remote controls do not need to be paired. They are pre-programmed out of the box.

SmartDrop App Overview and Terminology

Overview of the home page:

1. **Calculator Selection:** Click here to start the calculations for your loss sample. You will be guided to choose the pattern of your chaff spread (blue lines behind the icon) on your combine. When clicking on the question mark buttons in the app, a help window will open with more details and useful information.
2. **Wi-Fi Pan Control:** Choose this option to drop the pan from your smart device. Please find all details for this process described on page 16 of this manual.
3. **Saved Profiles:** You can save favorite app settings and calculator selections as a profile, that way you don't need to navigate through the calculator page (where your bu/ac results are shown). Some profiles may already be in the app by default.
4. **History:** Takes you to previous saved results to review, add more information or delete files.
5. **Resources:** Brings you to a menu where you can find tips and resources about the SmartPan System and optimizing your combine. For example: user manual, troubleshooting, combine tips, disclaimer, and more.



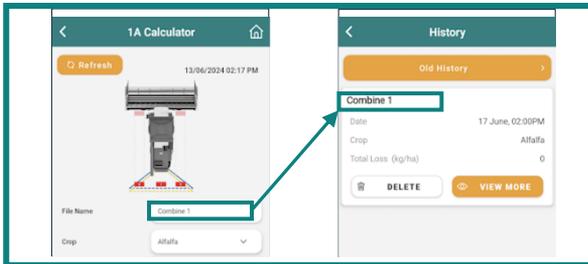
6. **Settings:** Change settings in the app for language, unit of measure, currency, etc. Android users can turn off the notification function: However, we recommend leaving this feature turned on to stay up to date for any product updates or new features from Bushel Plus.



Question Mark Icons: Throughout the SmartDrop app you will see numerous question mark icons in different areas. By clicking on the icon, a help window will pop up with more details and information regarding this section of the app.

Terminology on the calculator page:

- **File Name:** Give your individual tests a file name if you plan on saving them. It is best to use a reference in the name that allows you to easily identify it in the history list.
 - For example: driver initials (MF), crop type wheat (WH), humidity outside (RH90), or crop moisture (CM12). Find a format that makes sense for your operations. Remember to keep consistency in mind and have the most important information first (Example below: Combine 1) as this is your go to when searching the history list. This helps you get back to those low losses in similar conditions.



- **Crop:** Select the crop from the drop-down menu.
- **Density:** This number shows you the chosen crop's density in lbs/bushel when in the Imperial mode. You can change the bushel weight to adjust to your crop conditions and variety specifics. In Metric, all measurements are done by weight, therefore this field will be ignored/removed in its entirety.
- **Width of cut:** This is the width of the combine header or swathing header that was used. Please note, use the actual cutting width instead of the physical width of the header.

- **Width of spread pattern:** This will be the width of your straw/chaff spread that is coming out the back of the combine.
 - When spreading, try to be as accurate as possible when measuring your width.
 - When doing **normal windrowing/dropping the straw** in a windrow, it is recommended to use the actual width of the windrow (straw/chaff pattern on the ground). This will calculate the concentration factor automatically in the background of the app and account for the amount of loss occurring in the concentrated (smaller) windrowed area.
 - When performing **narrow chaff lining**, input the precise width of the chaff line observed on the ground. This action triggers automatic calculation of the concentration factor within the application's background processes. The app also accommodates variations in pan sizes and accurately addresses the extent of loss occurring in the concentrated, smaller windrowed area.
- **Pan size:** Select the drop pan size which you are using for your test.
- **Weight in grams:** Use the included scale to weigh your sample. This will provide your sample's weight in grams. Be sure to include decimals.

TIP: If you suspect your chopper is breaking you may need to double the weight of the broken kernels to account for the rest.

- **Calculate:** Hitting this button calculates your harvest loss based on your provided inputs.
- **Results:** Here you will see the loss results in bu/ac or kg/ha
- **Performance monitor:** This reveals a new section, providing further in-depth information and elaboration:
 - **Input Fields:**
 - Yield (bu/ac or t/ha)
 - Commodity price (\$/bu or \$/t)
 - Combine capacity in area per hour (ac/hr) or in volume per hour (bu/hr)
 - Total area to harvest (either entire farm or crop specific area)
 - **Results:**
 - Yield Loss (%)
 - Lost Product (\$) - Per (acres or hectare)
 - Lost Product (\$) - Per (hour)
 - Total money lost per farm/crop area

- **Save Data:** Hit this button to save your details on your phone. You can find the saved information under the history tab. On the history page, you have the following options:
 - **Add picture:** It is possible to add one picture either from the phone gallery or directly from your camera.
 - **Relative notes:** Anything you want to keep track of. Height or angle of the header; Did you find unthreshed grain with these settings; What details make the difference; etc. Feel free to add more notes to learn more about your machine as you go.
 - **Share:** Hit this button to share your results. You can send these results via email, text message, or other communications apps.

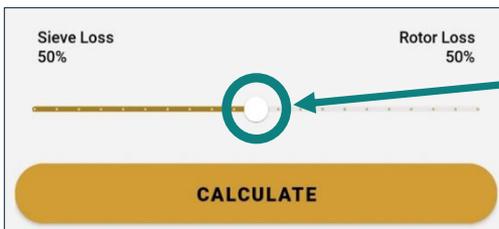
NOTE: In instances where the rotor and sieve losses are spread in different patterns, there is an option to estimate total loss with a single sample (named **One-Drop Estimate of Total Loss**).

The ratio of loss originating from the rotor vs. the sieve will affect the results of this calculation.

A slide bar (shown below) will appear when this option is selected. By default, the loss ratio is 50% from the sieves and 50% from the rotor. By using your experience in the field and the loss monitor data, the slide bar can be adjusted as needed.

For example, if the loss monitor shows that most of the loss is coming from the rotor, the slide bar can be adjusted to show 20% sieve loss and 80% rotor loss.

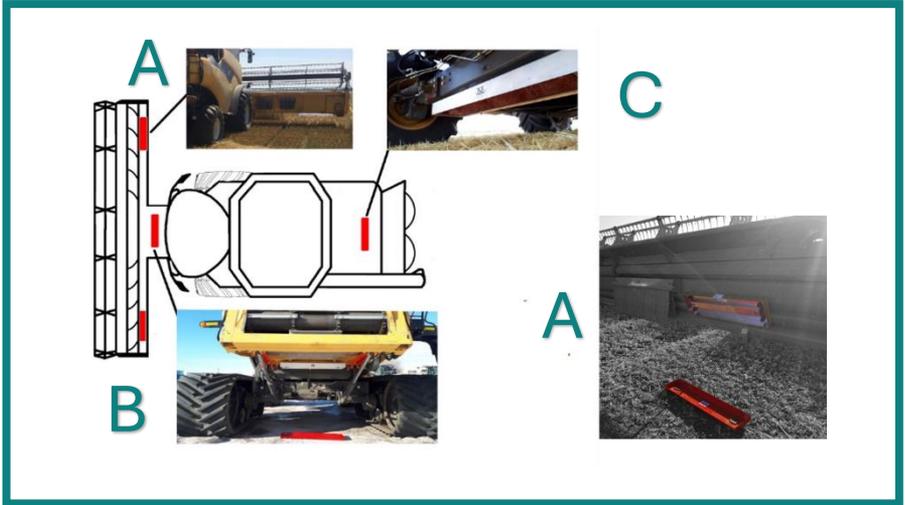
After moving the slider across, the new ratio needs to be confirmed by pushing the calculate button once again. This will update the calculation.



Move this slider further left or right and hit the **Calculate** button again. This allows to adjust for a different ratio of sieve vs. rotor loss in this specific spot of the drop pan.

USING THE SMARTPAN SYSTEM IN THE FIELD

Installing the SmartPan carrier



Depending on the combine, chaff spreader, chopper set up, etc.

- **Header:** Check the loss on the side of your machine by attaching the carrier to the header. This will sample the outside spread of your chaff spreader. You may have to implement a flat steel bracket to the header for the magnets to attach to if your header has round tubing. **To make attaching to the header easier, contact your local dealer to purchase Bushel Plus Header Brackets (Part #: BP-HEKIT-01). Header Brackets are available for 20" and 40" SmartPans.**

NOTE: All carriers can also be mounted in a vertical and angled position on the header. The drop pan will still release and fall out of the carrier.

- **Beneath the Feeder House:** When in long stubble conditions, we recommend you attach the carrier pan beneath the combine's feeder house (mostly for wide-body machines). This ensures protection from tall standing stubble stopping the carrier from being stripped off the machine (Canola, Sunflower, Corn etc.).

NOTE: This does not work with a 60" carrier.

- **Rear Axle or Crossbeam:**

You can also attach the carrier in the middle of the rear axle, or to any crossbeam. The header brackets can also be used to attach your carrier to the back side of the axle.

Header Loss:

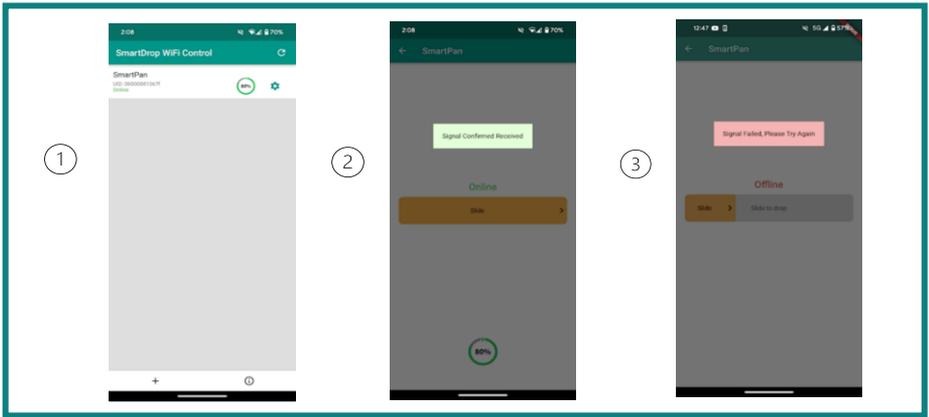
Header loss can be measured conveniently at the same time as machine loss. The ground area that was covered by the drop pan will contain kernels that were knocked to the ground by the header before the combine went over it. It will have no chaff or straw. Collecting these kernels and weighing them separately will show you your header loss. You can enter this value into your notes. Please note that these kernels could be the fault of mother nature as well. For the most accurate results, check the field for pre-harvest loss before using the SmartPan System.

Usage in the field – Dropping the pan with the SmartDrop app

1. Connect to the carrier
2. Turn the carrier ON
3. When the carrier network is in range, go to your device's W-Fi settings and select the carrier's network **SMARTCU_XXXXXX**

NOTE: If you are in range of multiple active carrier networks, your phone may automatically connect to the last carrier you used. (this will depend on your device and network settings)

4. Release the drop pan
 - a. Go to the **Wi-Fi pan control page** in the SmartDrop app and choose the carrier you want to control (usually only one unit will show unless you have purchased multiple systems) **(1)**
 - b. When you click on the carrier, the next page will open with an activation bar, swipe the bar to the right to drop the pan from the carrier.
 - c. If the signal reached the carrier successfully, the pan would drop from the carrier and a confirmation message will be shown. **(2)** If the signal failed to reach the carrier, an error message will be displayed. **(3)**



*Design subject to change without notice

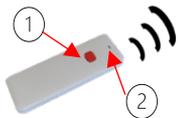
IMPORTANT Wi-Fi Auto-Connect: If your device doesn't automatically connect to the SmartPan when it's turned on, go to your device's Wi-Fi settings and connect to the **SMARTCU_XXXXXX** Wi-Fi Network. Optionally, you can enable Auto-Connect on the network by tapping the information or settings icon, then enable Auto-Connect.

Usage in the field – Dropping the Pan with the remote control

NOTE: All versions of the Bushel Plus SmartPan System from 2022 or later (Serial # WX) include one remote control.

The operating distance is around 50-100ft (15-30m) depending on conditions and equipment.

The remote is paired to the carrier from the factory. A maximum of two (2) remotes can be paired to a single carrier. One remote can be paired to three (3) carriers to drop three (3) pans at once.



1. While pressing the red activation button (1), a red LED (2) above the button will light up for 2 seconds. (The pan will drop after the button is released.)
2. If a signal was successfully received by the carrier, and therefore dropping the pan, the red LED (2) will blink again approximately 3-5 seconds after the button was pressed.

If the carrier did not receive the signal, the red LED will not light up a second time. In this case, please find a different position and try again. It can also help to hold up your arm and hand (if it is safe to do so) to increase the range of the remote (trees, metal or other obstacles can block the signal from traveling to the carrier).

Optionally, rotate the carrier around so that the remote-control antenna (Black colour) is on the opposite side of the carrier.

Process of collecting a SmartPan sample & Calibrating Loss

Monitor

1. Begin harvesting with the combine manufacturer's recommended settings. Choose and adjust your combine settings as you would have done in the past.
2. First, stop the combine, then disengage the threshing system and chopper/spreader.
3. Attach the SmartPan carrier to the combine, then attach the drop pan of your choice to the electromagnets (Figure 4). Switch the carrier's On/Off switch to ON.



Figure 4: Bottom of SmartPan

4. Resume harvesting. When you are ready to sample your current harvest loss, set your combine's **loss monitor sensitivity** to indicate your loss is within an acceptable range on the loss monitor display (for example, in the high green or 1/3 way up on the display). For details about setting your loss monitor sensitivity, please refer to your combine's operator manual.
5. Release the drop pan by pushing the red activation button on the remote, or by utilizing the SmartDrop app's Wi-Fi Pan Control. A successful drop can be confirmed by the red light flashing on the remote or a "Signal Received" prompt in the app. Signal Range depends on field conditions and where the carrier is mounted. This range varies from 50-100ft (15-30m).
6. Take note of your loss monitor level immediately upon releasing the pan. This level serves as a benchmark reference against the results calculated in the SmartDrop app.

7. As the combine moves over the released drop pan, it will catch straw, chaff, and any lost grain. Allow the combine to continue far enough away from the drop pan so that no further material is caught in the pan before stopping the combine or checking the pan. Failing to do so will skew your results.
8. Use the app to calculate the loss level based on what is captured in the drop pan. Check this against your benchmark noted in Step 6 to determine if you need to adjust sensitivity of the combine loss monitor.
9. Repeat this process several times a day.

NOTE: If you are using the remote control from inside the cab, please note that the communication between the remote control and the carrier works better the closer the carrier is to the cab. It can be beneficial to point the remote towards the rear of the combine or towards the mirrors when pushing the button on the remote. The ideal location for the carrier depends on the machine and harvesting conditions.

Cleaning your sample

WARNING! WEAR EYE PROTECTION. Material may be thrown from the Air Separator.

1. Place the Air Separator on a flat clean surface while operating. The tail gate of a pickup truck, and/or the surface of the red drop pan is recommended. This will ensure no dirt or debris gets into the unit.
2. Make sure the variable speed controller is off.
3. Remove the larger straw pieces from the drop pan by hand, making sure the kernels stay inside the pan.
4. Fill the Air Separator with the remaining contents of the pan. **NOTE:** the Air Separator can be filled right to the top.
5. Place one hand on top of the material and press slightly down while you turn the Air Separator ON.
6. **Slowly** increase the speed as needed. If the speed is increasing too rapidly, small seeds, such as alfalfa and flax, may be blown out of the Air Separator.
7. As the air starts to move, gently stir the sample with your free hand to allow the kernels to drop to the bottom of the Air Separator.
8. Once the chaff and straw have been blown out and the sample is clean, turn the Air Separator OFF and pour the remaining kernels onto the included scale to weigh it.

NOTE:

- If you are collecting your drop pan from a windrow or using the 60" drop pan, the large sample size may require separation in multiple batches.
- Moist straw and heavier crops may take more time to clean thoroughly. Heavier stalks might remain in the Air Separator; these can be removed by hand.
- The Air Separator has a low-voltage alarm that will sound when approximately five minutes of use remains. If the low-voltage alarm sounds, recharge the battery.
- Newer models of the Air Separator have both an ON/OFF switch and a speed dial. The ON/OFF switch must be set to ON before the speed dial will function. Be sure to turn the switch OFF when finished.

Weighing the sample

Using the scale:

- Prior to use, ensure batteries are installed.
- Scales come pre-calibrated from the factory. Ensure the scale is sitting on a flat surface and avoid windy environments as much as possible.

Calculating loss

1. Click on the Calculator on the home page of the SmartDrop app
2. Select your Chaff Spread Pattern
3. Choose your Straw Spread Pattern
4. If applicable, select your pan placement
5. Fill in your:
 - a. Crop type
 - b. Width of your cut
 - c. Width of your spread
 - d. The weight from the sample from the scale
 - e. Select your pan size
6. Hit Calculate.



NOTE: The Bushel Plus **Grain Shaker Box** helps you to check a sample of your grain for quality and cracked kernels within seconds. No matter where you are. This tool lets you check any size seed for cracks or quality. Contact your local dealer for pricing and availability. **Part #: BP-SHAKERBX-PL-02**

USING THE DIFFERENT MODES TO TEST LOSS

NOTE: Regardless of the loss result shown, you want to ensure a smaller amount of grain loss is present on your second measurement, and third, and so on. This means you are making improvements with your combine calibration after changing harvesting settings. Take multiple measurements throughout the day and from multiple mounting locations on the machine. Doing so will help you pinpoint areas with the greatest loss. Each time you calculate loss, adjust and measure again focusing more attention on the identified trouble spots. Following this method will help you learn how your machine performs in different harvesting conditions.

Suggested Start:

Prior to using the system, adjust your combine the way you usually do and follow the steps listed below to check your overall loss. Use the app and track those numbers, as this will be your starting point to compare future efficiencies.

- **Windrow mode (drop mode):**

We suggest doing the first few loss checks/calibrations while dropping the straw and chaff in a windrow (chopper disengaged). This will show if the machine is threshing and separating the kernels out of the crop heads or pods. If an unthreshed head or pod goes through the engaged chopper, it may be chopped up going through the blades, making it difficult to evaluate if the heads were properly threshed in the front of the machine. If you find unthreshed heads, you must re-adjust one or more of the following: your concave clearance, rotor/drum settings, and/or other settings which could be at fault.

NOTE: We realize it's not possible to drop the straw in the windrow with all machines. When using a Chaff Deck or certain chopper set ups, see details below for a guideline of measuring loss in spreading mode. Additionally, you can find detailed manuals for checking loss with the EMAR chaff deck and Chaff Lining in our app. Refer to the user manual of your combine, chopper, EMAR chaff deck, or seed destroyers for their manufacture's suggestions.

- **Spread Mode:**

Once you are happy with your harvest loss results and you are ready to start spreading your straw and chaff, we suggest measuring your harvest loss in multiple locations around the machine when spreading.

Going from dropping to spreading your straw may change back-end/wind dynamics in the back of the combine on certain machines which may influence the amount of loss coming out the back of the machine. Therefore, it is important to check your losses after switching to spreading. When in spreading mode, the user should measure the loss in the middle (behind the machine) and then on both sides of the machine and average the results as the total loss. This allows you to get a better sense of the machine's total loss.

TIP: If you are spreading the chaff from the sieves but are windrowing the straw from the rotor, take a separate loss test beside the machine and in the straw windrow. If the chaff spreader doesn't spread/drop kernels in the windrow, add each loss result together for total machine loss. If the chaff spreader drops kernels in the windrow as well, then you have captured the sieve loss and rotor loss in that windrow combined. To figure out your rotor loss by itself, you can then subtract the loss caught from only the chaff spreader (side of the combine) from the windrow loss. Similar methods apply if you are dropping your chaff and spreading your straw. Our app automates these functions for you and presents them visually in logical orders.

NOTE: It is important to find the average of the loss getting spread across the entire width of the spread, and not just in the middle. Some machines tend to "overload" material to one side, showing a higher loss on one side compared to the middle or opposite side. Also, some machines have chaff spreaders which spread the chaff and kernels primarily to the outside, with hardly anything right behind the machine.

You can:

- Attach the carrier in different places on the combine and header and take multiple measurements. (Reference page 14)
- You can purchase a second carrier unit to attach to the header and drop two pans at once.

You may find a certain area that always shows a higher amount of loss (hotspot). Once you are comfortable, this is the best spot to do your checks. You can utilize this spot as your "go to" location to reduce the overall machine loss within this point of reference. Be aware that if you only check a hotspot, you can only tell if your losses are greater or less from that location. You will not be able to calculate an exact loss average for the overall machine operations.

NOTE: If your combine manufacturer recommends power stops as part of your loss analysis, (to see where issues are coming from, or where material is building up inside the machine), then we welcome this as part of the process. Please ensure that you follow your user/operator manual and safety instructions of the specific machine.

Spreading Mode:



Windrow/Drop Mode:



Also refer to: Mounting options for SmartPan System on Page 14. Reference your machine's manual for instructions when changing between windrow and spread modes. Follow all manufacturer's recommendations.

CARING FOR YOUR SMARTPAN SYSTEM



If any of your SmartPan System safety labels become damaged, worn, or illegible, these labels can be replaced free of charge by contacting Bushel Plus.

Cleaning

- Clean the machine with a blower at the end of each day of use.
- Do not use any sharp objects to clean the SmartPan System.
- On a regular basis, check your SmartPan System to ensure no liquid has gotten into the carrier.
- Ensure magnets are free of debris before and after use.

Storage

- Do not leave the SmartPan System in the elements for long periods of time, including overnight. Do not expose to moisture, cold, dew, or extreme heat.
- To keep battery performance at optimum levels, be sure to charge your SmartPan system every 4-6 months when not in use.

Replacing Battery or Fuse

Inserting a new battery or fuse into your Air Separator, charge plug, or carrier can easily be done by opening the device. See Page 24.

NOTE: ENSURE ALL DEVICES ARE TURNED OFF BEFORE OPENING THEM

Battery Type	Pre 2020	2020 or later
Air Separator	12V/5A, SLA/AGM Sealed Gel Lead Acid Battery (approx. 4"x3.5"x2.75")	12V/1.6A LifePO4 battery
SmartPan	12V/1.3A SLA/AGM Sealed Gel Lead Acid Battery type 1213 (Approx. 3.75"x2"x1.63")	12V/1.6A, LifePO4 battery

NOTE: The year of manufacture is shown by the 2nd and 3rd digits of your unit's serial number.

New LifePO4 batteries can be used with earlier product versions through an update kit. Contact your local dealer for more information and pricing. (SmartPan Part # **DP-UPKIT-LPO** Air Separator Part # **AS-UPKIT-LPO**)

Opening Procedure: Air Separator

WARNING: Keep fingers away from the fan while the device is open and connected to the battery. Make sure ON/OFF button/switch is OFF. Take caution as the bottom plate may have sharp edges.



Figure 5: Bottom of Air Separator

To Replace Air Separator Battery

1. Turn the Air Separator Off.
2. Remove three screws (marked in red and closest to the edge) from the bottom plate. See Figure 5
3. Twist bottom plate counterclockwise and remove to give access to the components within.
4. Unplug the white plastic connector connected to the battery. (Turn the Air Separator onto its side to make the process easier.)
5. Release the battery clamp by removing two screws (marked in blue) from the bottom plate and remove battery.
6. Reverse the procedure to install the new battery.

NOTE: When closing the bottom plate, ensure the wiring harness is well clear of the fan blades. Use zip ties to properly secure the harness wires.

Opening Procedure: SmartPan Carrier

Carrier view from the bottom. (Red drop pan is removed.)



Figure 6: Bottom of SmartPan Carrier

If the red drop pan cannot be released/taken out with the remote/app, it can be removed by hand. Slide/push the pan to one direction to allow more room for your fingers to remove the pan.

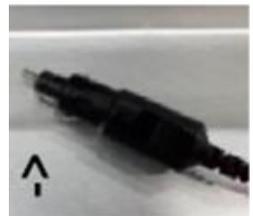
NOTE: Be aware of sharp edges and pinch points when removing the pan from the electromagnets.

- To change the **battery** in models built **after Jan 2020**: Loosen the battery latch screw (marked in red) and remove the cover. The battery is located inside the red/pink protective foam which keeps it in place. Remove the battery and carefully undo the cable connector. If your System was built **prior to 2020** (please see Page 29 on how to read your serial number), contact your local dealer to purchase a Battery Update Kit (Part # **DP-UPKIT-LPO**).
- To change the **receiver**: Carefully pry the receiver from its double-sided mounting tape. Unplug the square 4-pin connector from the receiver and the wiring. Unscrew the antennas from the receiver. Keep in mind their color arrangement. The white antenna is the Wi-Fi, and the black antenna is the 433 Mhz remote control antenna.
- To change the **fuse** in models built **after Jan 2020**: Loosen the battery latch screw (Figure 6: marked in red) and open the battery access cover. The fuse holder is built into the harness and will be nestled beside the receiver. An additional spare fuse is zip tied to the harness for your convenience.
- To replace the **fuse or receiver in units built prior to 2020**, the center U-channel needs to be completely removed. The **fuse holder** is built into the harness near the ON/OFF switch.
- To remove the centre U-channel, please remove:
 - 2 nuts on the 40" unit (4 on the 60" unit) located on the top side of the carrier. (Figure 5: marked in green)
 - 4 screws going into the plastic guide plates (marked in yellow) from the top side of the carrier.

You can now remove the U-channel. This will expose all the electrical wiring and internal components.

Fuse:

- The carrier and Air Separator operate with a 5A mini fuse, all units made after 2021 have an additional fuse tied to the fuse holder for your convenience.
- The chargers operate on a GMA 5A glass fuse, located inside the male plug that plugs into the devices.



WARNING: Fire and explosion hazard. Do not allow any electrical conductor (such as a wire or other metal object) to connect both battery terminals together. Doing so will short-circuit the battery causing it to discharge rapidly and overheat, which may cause a fire or explosion, ruining the battery. Avoid pinching wires when reassembling the unit.

When installing the new battery,

- Make sure to connect the positive and negative cables to the correct terminals.
- Secure the wiring harness so it is clear of moving parts, such as the fan, using zip ties if needed.
- Secure the new battery in place the same way as the original battery (double-sided tape, foam padding, or metal battery clamp).

TROUBLESHOOTING

Please find the most updated troubleshooting details in the SmartDrop app.

WARNING: ENSURE POWER IS TURNED OFF BEFORE OPENING ANY DEVICE

Symptom	Problem	Solutions
The drop pan will not disengage when activated by remote control or swipe function of the app.	The battery power of the remote control (transmitter) is too low. (The red light of the transmitter does not light up when the button is pushed).	Insert a new battery in the transmitter. (Transmitter opens best on the side of the lanyard hole).
	The battery power of the carrier is too low (check battery indicator).	Charge the battery with the Smart Charger. Only use the correct Smart Charger and make sure to plug into the device prior to connecting the charger to the wall/power outlet.
	SmartDrop app or Wi-Fi is not connected to the carrier.	Double check Wi-Fi connection to the carrier and re-connect.
	Carrier is turned OFF.	Turn the carrier ON. (On switch is located under the magnet bracket and is often

		confused with the on button on the display screen)
The battery of the carrier/ Air Separator will not charge. (Device does not function, even after 24h of charging). Check in this order:	1. Blown fuse in carrier or separator.	Replace the fuse (refer to section: opening devices)
	2. Blown fuse in the male plug of the charger: 	Open the male plug of the charger with screwdriver and change fuse.
	3. A defective battery.	Contact us for replacement battery & change the battery (see page 24).
Transmitter (remote) lost connection to receiver (remote control 3.0 and 3.W (WX) version)	Make sure all scenarios above are exhausted.	Open the channel on the bottom side of the carrier unit (refer to section: opening devices). 2018, 2019 & 2020 units: Open the cover of the grey receiver housing with a screwdriver. Push and hold the button "P1", inside the receiver and push the button "A" of the transmitter at the same time for a couple seconds. A blinking LED inside the receiver will indicate that the reconnection was successful. NOTE: the carrier needs to be turned on for this task because the receiver needs power.
Battery indicator display does not light up.	The display is most likely turned off.	Push the ON/OFF button on the battery indicator display to turn it back on (see page 6).

Narrow pan will not touch both electromagnets	Narrow pan does not fit properly.	If you need to use the pan immediately, you can gently put your knee into the center of the narrow pan to widen it slightly. This should allow the pan to fit over the original battery cover and continue testing. If needed, contact your local dealer to request a new battery cover for your unit. All units built in 2024 or later will already come with this new style cover.
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How to pair a remote to the dual WX-receiver

If you want to add an additional remote control, drop multiple pans with one remote, or if you've lost your remote and need to pair a new remote to the carrier, follow the steps below:

1. Refer to section on Opening procedure: SmartPan Carrier on page 24 to open the battery latch on the carrier.
2. In the opened channel, beside the red/pink foam pad holding the battery, you will see the black square receiver. Open the lid of the receiver with a small Philips screwdriver (4 screws) and take the lid off.
3. The **pair button** (marked with a red circle see Figure 7) manages the pairing for the remote. A single receiver can pair 2 remotes at once.
4. If you press and hold this button (**red circle**) for three seconds, all remote controls will be unpaired from the receiver. The green LED (**green circle**) will flash fast for a few seconds.
5. To pair a remote to this receiver, press the pair button once (**red circle**) for one second. The green LED (**green circle**) will start to flash slowly. Now press the red activation button on the remote control once for one second. Wait for a couple of seconds, then press the remote-control button again to test the connection. You will see a blue LED (**blue circle**) light up, and a clicking noise from the relay (**Blue Box**) can be heard.

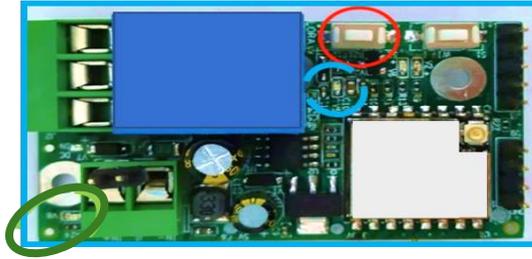


Figure 7: Inside of Receiver

HOW TO READ YOUR SERIAL NUMBER

Your serial number contains some important information regarding your SmartPan System.

- For both the Air Separator and SmartPan, the 2nd and 3rd digit of your serial number will tell you the year of manufacturing.
- If your SmartPan serial number contains the letters **WX**, this means your SmartPan has both Wi-Fi and remote capabilities.
- If your SmartPan serial number contains the letters **WI**, this means your SmartPan is a Wi-Fi only pan. If your SmartPan is Wi-Fi only, you may be able to upgrade your SmartPan to a Wi-Fi and remote by purchasing a **Dual Receiver Update Kit (BP-DUALRX-UPDATE KIT)** from your local dealer.

LIMITED PRODUCT WARRANTY

1) Software End-User License Agreement

Bushel Plus Products may include embedded software ("Embedded Software") and you may choose to download and use Bushel Plus Software ("Non-Embedded Software"), including the Bushel Plus App. By accepting and using Bushel Plus Products and/or by downloading and using Bushel Plus Software, your use of any Bushel Plus Software is subject to Bushel Plus's End User License Agreement, a copy of which may be found here: <https://www.bushelplus.ca/EULA>. The terms of the EULA form part of, and are incorporated into, this Agreement. In the event of any, conflict or inconsistency between the terms as set out in this Agreement and the EULA, the EULA shall prevail to the extent of such conflict or inconsistency. Bushel Plus Software is protected by applicable copyright laws and Bushel Plus reserves all rights thereto, including the right to revoke any licenses hereunder if you fail to comply with the terms of the EULA.

2) Personal Information

Bushel Plus values your privacy and trust. We are committed to protecting your personal information in accordance with applicable laws, as detailed more fully in our Privacy Policy (<https://www.bushelplus.ca/privacy>). This describes the terms by which your personal information is stored, used, and shared with others when using the Bushel Plus website, applications, products, and services. By accepting this Agreement, you agree that you have read and consent to the Bushel Plus Privacy Policy, the terms of which form part of, and are incorporated into, this Agreement. In the event of any, conflict or inconsistency between the terms as set out in this Agreement and the Privacy Policy, the Privacy Policy shall prevail to the extent of such conflict or inconsistency.

3) Representations and Warranties

- a) **Representations and Customer Obligations.** Customer acknowledges that the Products and Software, and the output thereof, are often complex, forward-looking projections, based on third party models and analysis relating, in part to combine harvesters, and are affected by unforeseen and unforeseeable conditions and events. While Bushel Plus takes commercially reasonable measures to ensure that the Products and Software shall meet industry acceptable standards, that third party information used in connection with the Services is correct and up to date, and that it presents complete and accurate analysis and recommendations, it is not possible to guarantee the achievement or avoidance of any outcomes, and accordingly, except as provided in this Section hereinbelow, Bushel Plus makes no representation or warranty in respect of the Products and Software, and the output thereof, or the accuracy of data or information provided to you, or to the third party data. Customer acknowledges the absence of any representation or warranty of any kind, and agrees to accept the Products and Software, and the output thereof, "as is/where is". Moreover, Customer is responsible for providing accurate information, for proper usage, application, and placement of Bushel Plus Products. You acknowledge and agree the Bushel Plus will not evaluate user submitted data for compliance or correctness, and it is the sole responsibility of the user to ensure that the information as provided is correct. All formula calculations are best practice and may have margins of error of up to +2%.
- b) **Limited Product Warranty.** The Bushel Plus SmartPan and/or Air Separator ("Equipment Set") is warranted to be free of all defects in workmanship or materials for a one (1) year period from the date when the Equipment Set is purchased by the original end user. This warranty does not apply to any Non-Embedded Software. The warranty of Bushel Plus is limited to repair or replacement at the sole option of BUSHEL PLUS of any defective workmanship or materials. Bushel Plus's liability is limited to the cost of parts and labour required to repair or replace the Equipment Set. Bushel Plus may, at its sole option, require the end user to return the Equipment Set to Bushel Plus or its authorized repair depot. Where the repair is covered by warranty, as determined by Bushel Plus in its sole discretion, Bushel Plus shall pay for the cost of repair provided the Equipment Set is returned to Bushel Plus or its authorized repair depot. In the event that, upon inspection Bushel Plus determines that the repair is not covered by this warranty, the end user shall be responsible for all costs associated with any servicing, including shipping costs, parts and labour. This Limited Product Warranty contains the following exclusions and limitations:
- i) Any warrant applicable hereunder is subject to Section 4 below (Limitation of Liability and Damages).
 - ii) This limited warranty is extended to the original end user only and is not transferable or assignable.
 - iii) This limited warranty does not cover damages to the Equipment Set caused by handling, shipping, transit, processing, or installation.
 - iv) Bushel Plus will not be liable for any damage or wear to the Equipment Set or abnormal operating.
 - v) Conditions, accidents, abuse, misuse, unauthorized alterations, or repair, failure by the end user to properly service and repair the Equipment Set, the improper alteration or repair of the equipment set, or failing to install or operate the equipment set in accordance with the Instruction Manual, and
 - vi) Any use, misuse, alteration, modification, repair, or maintenance of the Equipment Set which is contrary to, or not in accordance with the manufacturer's operating instructions or any service bulletins issued by Bushel Plus, from time to time, will void this warranty.
 - vii) Any claim of a defect in the equipment shall be deemed waived by the end user unless written notice thereof is given to Bushel Plus within thirty (30) days after discovery of the defect and within the applicable warranty period. The end user shall be required to provide proof of purchase in the event of making any warranty claim. Bushel Plus shall have a reasonable opportunity to investigate all warranty claims.
 - viii) The total liability of Bushel Plus is as set out herein, and Bushel Plus makes no implied warranties, including any implied warranty of merchantability of fitness for a particular purpose.
 - ix) Bushel Plus and their manufacturers reserve the right to modify this warranty statement at any time without prior notice.

4) Limitation on Liability and Damages

GENERAL. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR AMOUNTS REPRESENTING INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES, INCLUDING LOSS OF BUSINESS OR OPPORTUNITY, OF THE OTHER PARTY ARISING FROM THE PERFORMANCE OR BREACH OF ANY TERMS OF THESE TERMS AND CONDITIONS. NONE OF BUSHEL PLUS, ITS AFFILIATES, ITS SUPPLIERS, ITS LICENSORS, AND THE DIRECTORS, OFFICERS, EMPLOYEES, AND AGENTS OF ANY OF THEM (THE "PROTECTED PARTIES") WILL BE LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY AMOUNTS IN EXCESS OF THE PURCHASE PRICE OF THE SERVICES IN THE 12 MONTHS IMMEDIATELY PRECEDING THE DATE OF THE EARLIEST CLAIM HEREUNDER, WHETHER FOR A SINGLE CLAIM, ACT, OR OMISSION OR FOR A SERIES OF RELATED OR UNRELATED CLAIMS, ACTS, OR OMISSIONS.

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- a) **Assignment.** Customer will not assign any part or all of this Agreement without Bushel Plus's prior written consent. Any attempt to assign in violation of this section is void in each instance. Bushel Plus may assign this Agreement (or any of its rights and obligations under the Agreement or any Proposal) to any of its Affiliates or in connection with any merger, consolidation, reorganization, sale of all or substantially all of its assets or any similar transaction.
- b) **Governing Law/Venue.** This Agreement is governed by the laws of the Province of Manitoba and the federal laws of Canada applicable therein, excluding its conflicts of law rules. Customer irrevocably submits to venue and exclusive personal jurisdiction in the federal and provincial courts in Brandon, Manitoba, for any dispute arising out of this Agreement, and waives all objections to jurisdiction and venue of such courts. This Agreement and associated documentation have been written in the English language, and the Parties agree that the English version will govern. (For Canada : Les parties aux présentes confirment leur volonté que cette convention de même que tous les documents y compris tout avis qui s'y rattache, soient rédigés en langue anglaise. (Translation: The parties confirm that this Agreement and all related documentation is and will be in the English language).
- c) **Severability.** If any provision of this Agreement is determined by any court or governmental authority to be unenforceable, the parties intend that this Agreement be enforced as if the unenforceable provisions were not present, and that any partially valid and enforceable provisions be enforced to the extent that they are enforceable.
- d) **No Waiver.** A party does not waive any right under this Agreement by failing to insist on compliance with any of the terms of this Agreement or by failing to exercise any right hereunder. Any waivers granted hereunder are effective only if recorded in a writing signed by the party granting such waiver.

Remedies. Customer acknowledges that any material breach of Section 6 by Customer would cause Bushel Plus irreparable harm for which Bushel Plus has no adequate remedies at law and would not be compensable by monetary damages alone. Accordingly, Bushel Plus is entitled to specific performance or injunctive relief for any such breach without posting a bond or proving actual damages, and without prejudicing any other remedies available to Bushel Plus.

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- e) **Remedies.** Customer acknowledges that any material breach of Section 6 by Customer would cause Bushel Plus irreparable harm for which Bushel Plus has no adequate remedies at law and would not be compensable by monetary damages alone. Accordingly, Bushel Plus is entitled to specific performance or injunctive relief for any such breach without posting a bond or proving actual damages, and without prejudicing any other remedies available to Bushel Plus

Bushel Plus and their manufacturers reserve the right to modify this warranty statement at any time without prior notice.



FOR YOUR SAFETY AND THE CORRECT OPERATION OF YOUR SMARTPAN SYSTEM, USE ONLY ORIGINAL SPARE PARTS SUPPLIED BY BUSHEL PLUS LTD.

CONTACT INFORMATION

Please keep this manual for future reference.

If you have any questions or concerns, please contact:

Bushel Plus Ltd.

44 Limestone Road E

Unit B

Brandon, MB

R7A 7L5

1-833-DROP-PAN

1-833-376-7726

Contact form on our website: www.bushelplus.com

**Bushel Plus is THE Harvest Optimization Company,
setting the bar for helping farmers maximize their
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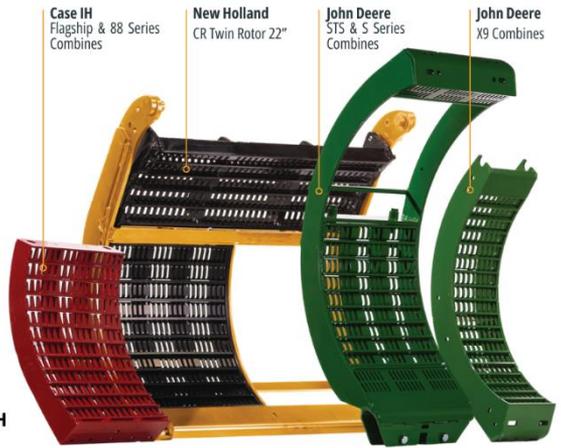
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- Built to last - Abrasion-resistant (AR-200) steel for extended wear.
- Reduce dockage and rotor loss.
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- Quick & easy-to-change split frame designs for John Deere STS/S Series, Case IH 88 Series, and New Holland CR Twin Rotor 22" combines.
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Quick, easy crop sample collection.



1 Portable, battery-powered and easy to use. Quickly collect a moisture sample from multiple spots in the field.



2 Built-in threshing drum and interchangeable concaves for use in multiple cereal and oil seed crops.



3 Accurate results without wasting time and fuel bringing a combine, header and truck to the field.