

# Smartcart Controller Operators Manual

The Tecfarm Smartcart controller is designed for use with a compatible chaff cart to:

- **Control Door Opening in Manual mode:**
  - Open the rear door with (one button press) – to a pre-defined percentage of maximum opening.
  - Close the door (second button press).
- **Control Door Opening in Automatic mode:**
  - With a single button press - Open the main door to a pre-defined percentage, hold open for a pre-defined time, then close automatically.
- **Control a small floodlight** in the bin (no more than 30 Watts if replaced).
- **Monitor and alert when the cart is full** (audible and visual indication).
- **Monitor if the door is closed** (visual indication only).

## Control Panel Layout

The control panel has nine membrane switches and one 16x2 character liquid crystal display panel (LCD). At right is an image showing the layout of the controller faceplate with buttons and screen. Below is an explanation of the function performed by each button.



- **The three buttons on the right control the door.**
  - **LOCK** can be pressed at any time to stop/prevent the door from moving (double press to unlock). LOCK is also required to enter SETUP mode.
  - **CLOSE** will close the door at any time, if the sensor indicates that the door is not already closed.
  - **OPEN** will open the door in manual or automatic mode at any time. If the door is already open then the controller will confirm if you would like to open again.
- **AUTO** controls whether automatic door operation is enabled/disabled.
  - In manual mode the display will read “Manual Ready” (or “Cart Ready”).
  - In automatic mode the display will read “AUTO Ready”.
- **LIGHT** turns the bin floodlight on and off.
  - The symbol “\*” will appear in the bottom left of the LCD to indicate that the light is ON.
- **The four buttons on the left are used only for controller setup.**
  - **BACK** will exit SETUP or exit a value change.
  - **ENTER** will select a parameter to adjust or confirm changes in values.
  - **UP** will cycle through setup modes or increase a setup value.
  - **DOWN** will cycle through setup modes or decrease a setup value.

## Normal operation

The controller will allow normal operation provided it has acceptable values recorded in the setup modes. The door can be opened in either Manual or Auto modes; the following describes how to control Door Opening.


### Manual door open operation

The controller will display “Manual Ready” when in manual mode (or “Cart Ready”). When “OPEN” is pressed, the door will open to an amount determined by a combination of the “DOOR OPEN PERCENT” adjustment and the “DOORFULLY OPEN” time (see Setup modes 1 and 3). If the last button pressed was open, the controller will request “OPEN” be pressed again within 5 seconds. Otherwise the controller will assume that the door is already open, and will not try to open it again.

When “CLOSE” is pressed, the door close solenoid will activate until the door closed sensor reads, OR until a calculated time has elapsed (if sensor fails to register, a relief valve will prevent damage until calculated elapsed time).

### Automatic Door operation

The controller will display “AUTO READY” when in automatic mode. When “OPEN” is pressed the door will begin to open as per manual mode, however, there is no need to press “CLOSE”. After the door has opened to the predetermined amount, and remained open for the pre-determined ‘dwell time’, the door will automatically close.

 **BE AWARE** that the door will close automatically shortly after opening when “AUTO” mode is enabled. Ensure door area remains clear of persons and obstacles.

“CLOSE” can be pressed at any time in this cycle to override the automatic timers, and manually close the door.

 **“LOCK”** can be pressed at any time to stop the door moving regardless of mode of operation. This is an important safety feature of the Controller.

## Controller Setup and Calibration

To enter controller SETUP press “LOCK” followed by “ENTER”. The Smartcart controller has seven setup modes as described below. To cycle through these modes, press the Up or Down arrows located in the lower left of the controller. When the desired mode is displayed, press “ENTER” to select. Once selected, the parameter applicable to that mode may be adjusted by pressing the Up or Down arrows (press “BACK” to exit with no change). When the desired value has been set, press “ENTER” to confirm and return to the main setup menu to continue cycling through setup modes. To exit SETUP, press “BACK” followed by “LOCK” twice (within 4 seconds).

**Note:** The controller uses deciseconds for all time values (1 second = 10 deciseconds).

## **1 Door open percent**

This setting is applicable to both 'Manual' and 'Automatic' door operation modes and is used to adjust how far the door opens, from 0% to 100%, in 5% increments. The controller applies the "door open percent" to the "door fully open time" to calculate how long to activate the door open solenoid. For example if it takes 8 seconds to fully open the door (ie. 80 deciseconds is set as the 'door fully open' time), and the 'door open percent' is set to 50%, the hydraulic solenoid will be activated for 4 seconds, opening the door to around halfway.

## **2 Door dwell time**

This setting will only be applicable in AUTOMATIC door operation mode. When the controller is set to "AUTO Ready", and "OPEN" has been pressed, the door will open to the amount determined by "door open percent", then wait for the "door dwell time" value before automatically closing. This setting allows you to adjust 'door dwell time' (in deciseconds).

## **3 Door fully open time**

This allows you to set the time (in deciseconds) taken for the door to move from fully closed to fully opened. It is important that this is entered accurately (within 5 ds if possible). Setup mode 7 (below) may be used to assist with this calibration, otherwise door opening can be timed independently and the value adjusted using this setting alone.

## **4 Buzzer volume**

When the chaff cart is full of chaff an internal buzzer will sound. This setting controls how loud the buzzer will be, with 0 being muted and 10 being the loudest possible.

## **5 Controller software version**

This displays the current software version the controller is using. This can only be changed by a software update uploaded to the microcontroller over USB.

## **6 Reset ALL values to default**

This resets ALL changeable values to pre-defined conservative defaults.

## **7 Door time to fully open calibration**

It is important that the harvester hydraulic system is functioning at normal operating pressure and flow in order for this calibration to accurately reflect the 'time to fully open' in working conditions.



**This setup mode WILL OPEN THE DOOR when confirmed. Ensure area is clear before proceeding with calibration sequence.**

This mode is used to time accurately how long it takes the door to go from fully closed to fully open, however, as there is no door full open sensor, the operator is required to press "CLOSE" when the hydraulic rams reach maximum extension.

A second person may be required to alert the operator when the door is fully open in order for the operator to press CLOSE to end the calibration. If it is not pressed within 20 seconds the operation will automatically terminate.

After the calibration sequence, the value (in deciseconds) will be displayed to the operator and the operator asked to confirm if they want to save the new value as the "door fully open" value. The value can be altered if it is deemed inaccurate after calibration (as per mode 3 above).

**Note:** after the calibration sequence the door the door remains open and can only be closed by exiting setup mode ("BACK" then "LOCK" twice) and pressing "CLOSE".

## Setup mode overview

Mode	Units	Min	Max	Step	Default	Purpose
1. Door open percent	percent	0	100	5	100	Determines how far the door will open as a percent of the doors maximum time to fully open.
2. Door dwell time	Deci-seconds	0	200	5	30	Determines how long the door will hold open for in AUTOMATIC mode.
3. Door fully open time	Deci-seconds	0	120	5	60	Sets the system reference time for length of time taken for the door to go from fully closed to fully open.
4. Buzzer volume	Deci-seconds	0	10	1	10	Adjusts the bin full alarm volume.
5 Software Version	N/A	N/A	N/A	N/A	N/A	Displays current software version.
6. Reset to defaults	N/A	N/A	N/A	N/A	N/A	Resets all values to default.
7. Door fully open time calibration	N/A	N/A	N/A	N/A	N/A	Physically times the door opening to assist in setting the 'Door fully open time'.