

dropController. Stream Drops Custom

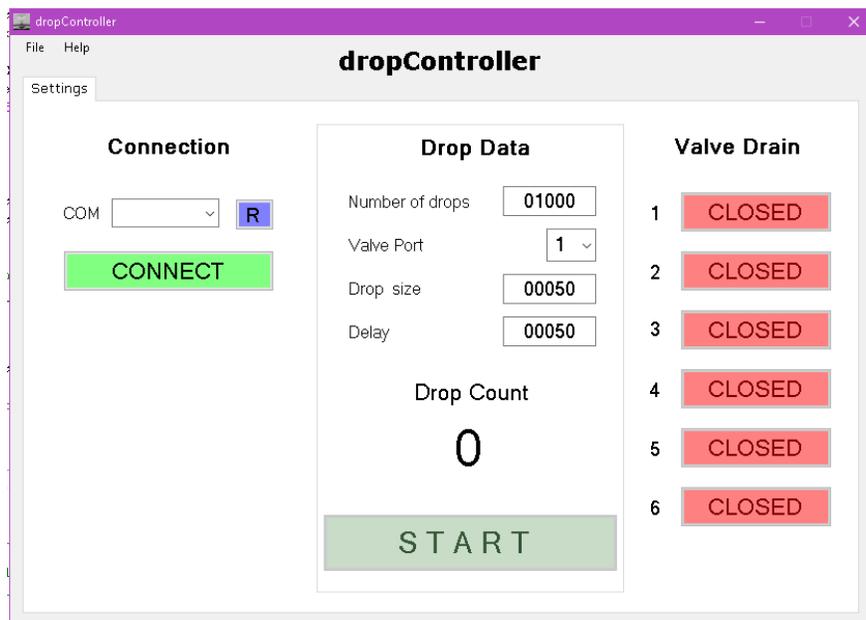
The custom Stream Drops firmware and the custom Drops App are experimental and no guarantees or warranties are made or offered.

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Windows Drop App User Guide

The Stream Drop App is developed for use with the custom Stream Drops firmware used on the dropControllerV3 device.



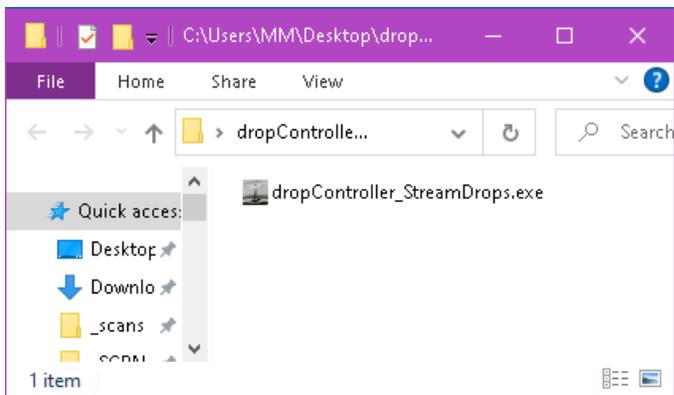
The app is designed to produce a sequence of drops (up to 99999 drops) from a single valve.

dropController

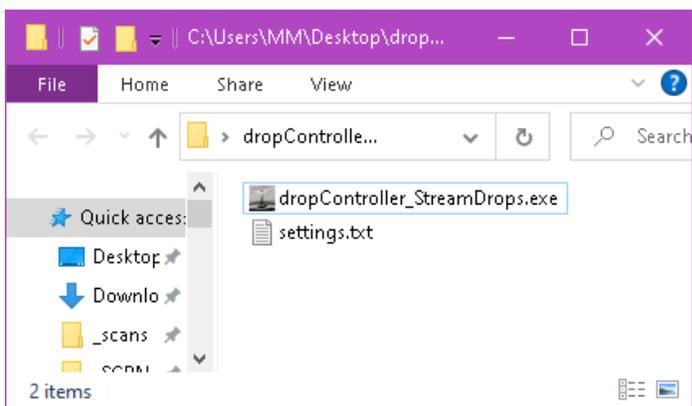
The App is Windows only and requires the .NET framework version 4 or greater.

The app does not require installation and can be run from a folder by double clicking the StreamDrops file.

Download the app. It will be a zip file. Unpack the zip file and copy the folder somewhere convenient.



Inside the folder is the app. Double click to run.



When the app first runs it creates a settings file.

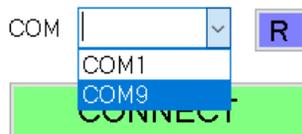
Connection

Before drops can be created the app has to be connected to the dropController.

Attach the controller to the computer by USB, wait for it to register with Windows (beep-bob sound) and for the yellow ready LED to come on on the controller.

If you are new to Arduino you may require a driver before you can connect to the dropController.

Connection

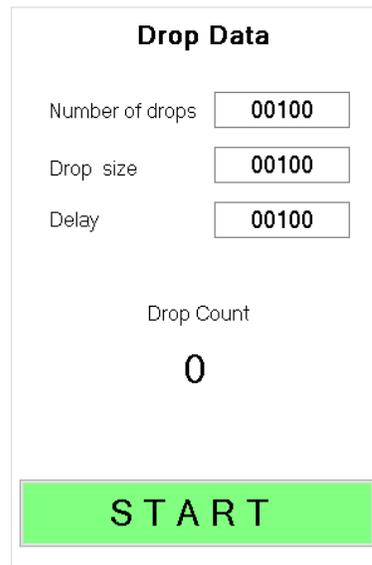
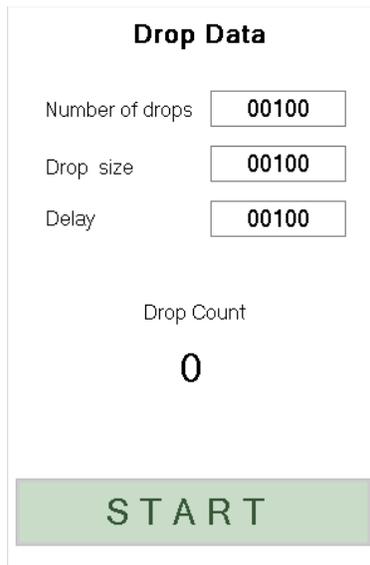


Select the COM port the controller has been assigned and click the CONNECT button.

Connection



If the controller successfully connects the CONNECT button will change to DIS-CONNECT and the large START button becomes active



When the controller successfully connects to the app the large START button becomes active

Note. On some systems, the very first connection attempt may fail. In this case retry.

Creating Drops

Enter the Number of Drops, the valve port, the Drop Size, the Delay, and click the START button.

Drop Data

Number of drops

Valve Port

Drop size

Delay

Drop Count

0

START

When the START button is clicked several things happen.

1. the drop data will be sent to the controller.
2. the START button changes to the ABORT button
3. the drop count starts to count the drops as they are made

Drop Data

Number of drops

Valve Port

Drop size

Delay

Drop Count

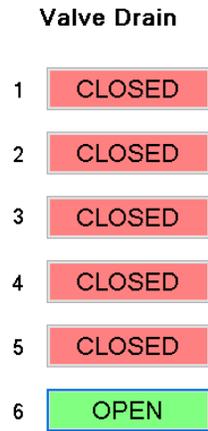
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ABORT

Clicking the ABORT button cancels the current sequence.

Valve Drain Buttons

The Valve Drain Buttons open and close the corresponding valve. The button value (1 to 6) is the valve port on the controller.



Click to OPEN, click again to CLOSE.

Note: The App does not know if a valve is connected to the controller or not. It simple sends the open and close command.

Controller Commands

The custom dropControllerV3 accepts drop data by a serial COM port, normally from the Windows Drop App, however, the controller can be used with direct serial communication using software such as the Arduino serial monitor or a serial terminal app such as putty.

A simple api could be implemented using any software or service that is able to send ascii data over a serial COM port.

Commands the dropControllerV3 Understands

Drop Data Commands

- [Nnnnnn] - the number of drops.
- [Pn] - the valve port
- [Snnnnn] - the drop size
- [Dnnnnn] - the delay between drops
- [E] - end of drop data. Start drops.

Other Commands

- [A] - abort the current drop sequence
- [Vna] - valve drain

All commands MUST be in ascii formatted text and the start character MUST be uppercase

All values are in milliseconds. There are 1000 milliseconds in one second. For example, 1000ms = 1 second.

Other Commands

Abort [A]

The abort command allows you to stop an active sequence.

Valve Drain

The valve drain command opens or closes a specific valve. The command format is [Vna]

- n = valve number, 1 to 6. This corresponds to the valve port on the controller.
- a = action. 1 for open. 0 for close.

For example

[V11] – open valve port 1

[V10] = close valve port 1

[V61] – open valve port 6
[V60] = close valve port 6

!Caution.

Solenoid valves can become hot when kept open for long periods of time. Take care not to leave them open too long.

Drop Data Commands

Number of drops

This is a 5 digit value from 0 to 99999. The command MUST include all 5 digits. 0 is used for non- values. For example:

[N00100] = 100 drops
[N00050] = 50 drops
[N10000] = 10,000 drops

Valve Port

This is a single digit number from 1 to 6

[P1] – valve port 1
[P2] – valve port 2

Drop Size

The drop size is the time (in milliseconds) the valve is open. It is a 5 digit value from 0 to 99999. The command MUST include all 5 digits. 0 is used for non-values. For example:

[S00100] = 100ms drop size
[S00050] = 50ms drop size
[S00025] = 25 ms drop size

This is the time (in milliseconds) the valve is open.

You will need to experiment to find a suitable drop size

Delay between drops

This is the time (in milliseconds) to wait between consecutive drops.

Solenoid valves do not open and close instantaneously and sufficient time should be allowed for them to open and the close again. You will need to experiment to find suitable times. If the delay is too short you will get a constant stream rather than drops or no drops at all.

Delay is a 5 digit value from 0 to 99999. The command MUST include all 5 digits. 0 is used for non-values. For example:

[D00100] = 100ms delay
[D00050] = 50ms delay

End of Data [E]

This is the end of data marker and is used to tell the dropController to start the drop sequence.

It should be the last command in the command sequence.

Default Values

Default values are set as:

Number of drops	= 0
Valve port	= 1
Drop size	= 35ms
Delay between drops	= 100ms

These are the values assigned to the drop properties when the controller is first started.

The default values are over written when new commands are received by the controller.

Note. The Windows app may have different default values.

Repeat Sequences

The controller remembers the valve port, the drop size, and the delay value. This means, after the first sequence, a new sequence can be started by sending the number of drops and the [E] end of data command only. New valve port, drop size, and delay values are not required.

When the controller is reset the values will reset to the defaults.

A typical command sequence may be

[N00050][P1][S00050][D00100][E]

500 drops. Drop size 50ms, delay between drops 100ms.

A subsequent drop sequence can be started using **[N00100][E]**

When the drop sequence is active, the green LED on the controller is illuminated.

Commands Sent By The dropControllerV3

There are 3 commands/markers that may be transmitted by the dropControllerV3 device

1. HELLO hand shake
2. drop count
3. end of sequence marker

HELLO hand shake

The Stream Drops App has a basic hand shake that is used to confirm the dropControllerV3 is connected and listening. The hand shake is performed when the CONNECT button is clicked. When the dropController replies, the START button activated.

When using direct serial communication such as an API, the hand shake is optional. To use the hand shake

- Send **[HELLO]**
- The dropController will reply with **[HELLO]**

Drop Count

When making drops, the dropController transmits the current drop. The command is formatted as **[C,currentDrop]**

The size of currentDrop is variable, for example, drop 1 is **[C,1]**, drop 10 is **[C,10]**, drop 100 is **[C,100]**, and so on.

End of Sequence Marker

When the dropController completes the drop sequence it sends an end of sequence marker **[#]**

The end of sequence marker can be used by an api to confirm the sequence has finished.

When building an api, it is suggested to include a time out in case the dropController fails to send the end of sequence marker.

The dropControllerV3 Device

Controller LEDs

When the controller is ready and waiting the yellow LED is on.

When there is an active sequence, the yellow LED goes out and the green LED illuminates.

When a blank or incomplete command is sent (0 drops) the yellow LED will blink twice. No further action takes place.

Changing the default vales in the Sketch

After you have found good a drop size and a good delay value you could update the controller firmware and make these the defaults. After this, you would no longer need to use the size and delay commands.

Change the following lines and then recompile and upload to the controller.

```
byte          valvePort          = 1;  
unsigned long delayBetweenDrops = 100;  
unsigned long dropSize           = 35;
```

Make sure you do not inadvertently delete the semi-colon at the end of the line.

dropController

Appendix A

Serial Port

The serial port uses standard 8 bit properties:

```
Baud Rate = 9600  
Data Bits = 8  
Parity = None  
Stop Bits = One  
Handshake = None
```

Appendix B

Windows App

The Windows StreamDrop app was created using VisualBasic.Net using Microsoft Visual Studio Community 2019.

Visual Studio Community 2019 is free for personal and limited commercial use.

Visit <https://visualstudio.microsoft.com/downloads/> . Scroll down to the Older Downloads link.

Note. The dropController Windows app may compile in later versions of Visual Studio Community but they have not been tested.