

# Underhill®

## Flo-Pro™ Inline Applicator

### Installation & Operating Guide

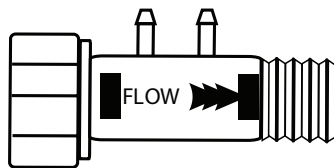
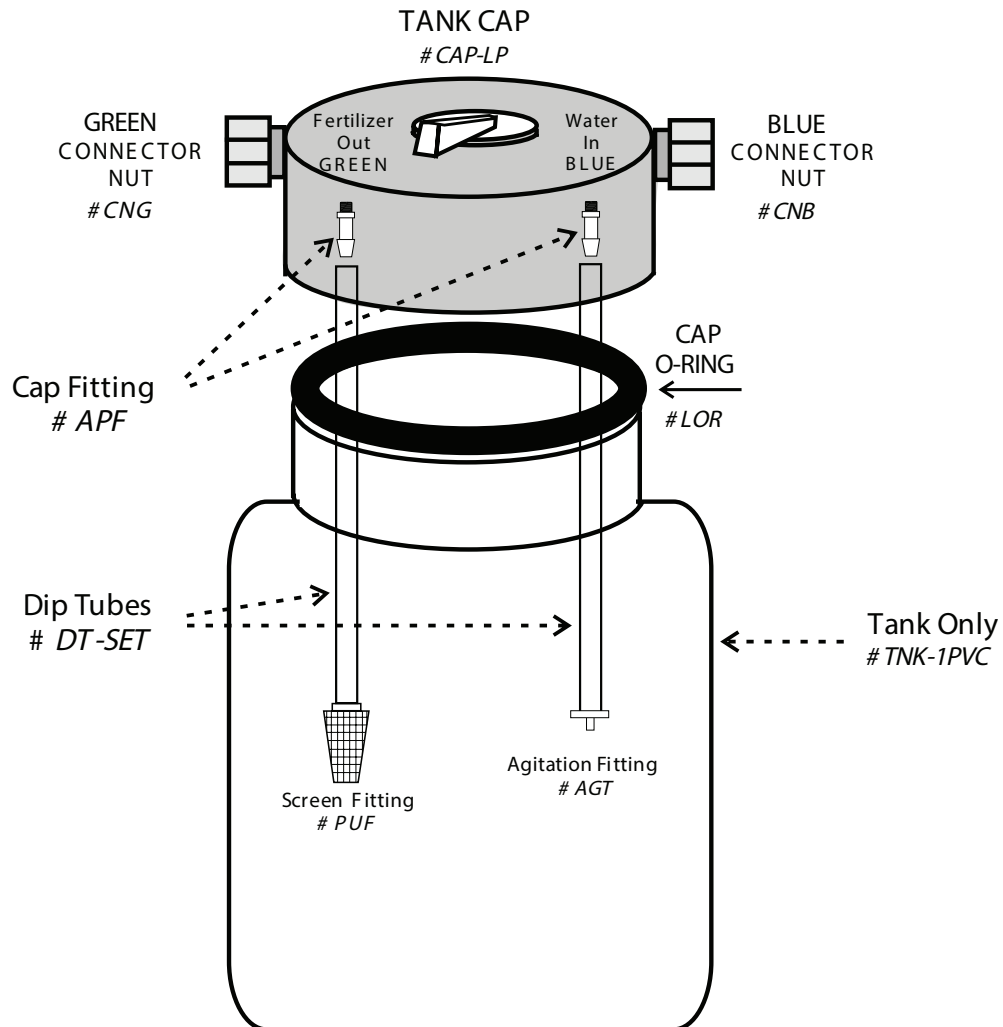


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## System Configuration

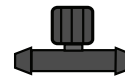


1 - Hose Bib Connector  
# 3060

5 - Feet 1/4" Clear Tubing  
# CT5



Hose Vacuum Breaker  
(Not Included)



2 - Tubing Valves  
# TVLV

*Tubing Valves normally drip when under pressure.*

5 - Feet 1/4" Black Tubing  
# BT5



Flo Disc Set  
# K-INSKFD  
RED Flo Disc  
BLACK Flo Disc  
WHITE Flo Disc

## Getting Started

Take a few moments and observe the components that represent the Underhill Flo-Pro™ Inline injector system. Verify all of the components are complete and undamaged before starting the installation.

Review the attached Installation Instructions so you are familiar with the product, its components and operation before starting to install.



**Note:** Installing your system improperly can cause risk of water contamination and pose health risks. Do not attach your injection feeder to a hose bib or sprinkler line does not have some form or backflow device (such as a atmospheric vacuum breaker, pressure vacuum breaker and/or pressure principle vacuum breaker). Backflow prevention is not included in with this system.



**Note:** Do not install system in an irrigation mainline before a zone valve. Do not use if delivery water pressure exceeds 100 Psi. Flush hose after each use to vent chemicals and pressure. To avoid potential damage to the portable injector tank, drain prior to freezing weather.

## Recommended Tools

The following table identifies recommended tools needed to complete the Underhill Flo-Pro Injector installation.

No.	Description
1	Pair of needle-nose pliers
2	Small flat-head screwdriver

## Application

The portable injection tank is suitable for use in light commercial, commercial, golf and /or nursery operations where a hose connection can be made to a quick coupler or hose bib.

Caution should be exercised to confirm backflow prevention for the water source exists prior to making any hose bib connections. Install an appropriate backflow device per local or state plumbing codes if none exists. This may or may not include backflow prevention for sites fed from wells.

## Locating the Portable Injection Tank

Select the location of where the portable injector tank is to be located. Selection criteria will depend on the application.

For golf applications, a quick coupler with a hose swivel is commonly the attachment point.



**Note:** Confirm all of the components are connected and in-place first before making connection to a quick coupler as it will pressurize the hose and other components once the coupler key is connected to the quick coupling valve.

## Installing the Injector Feeder

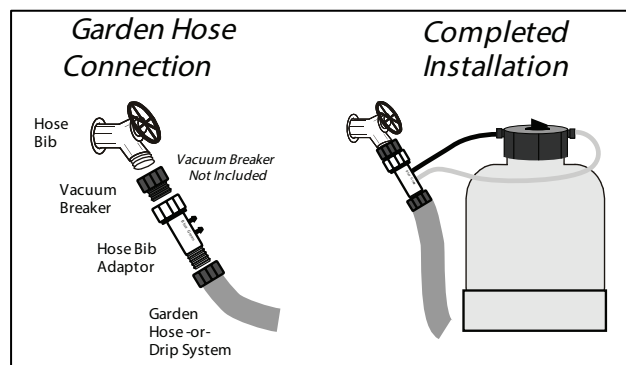
**Step 1** Connect the injector feeder to either a hose bib (with confirmed backflow prevention) or to a hose swivel as part of a quick coupler and hose swivel as shown below see Figures 5-1 and 5.2.



Quick Coupler Injector Connection  
Figure 5-1



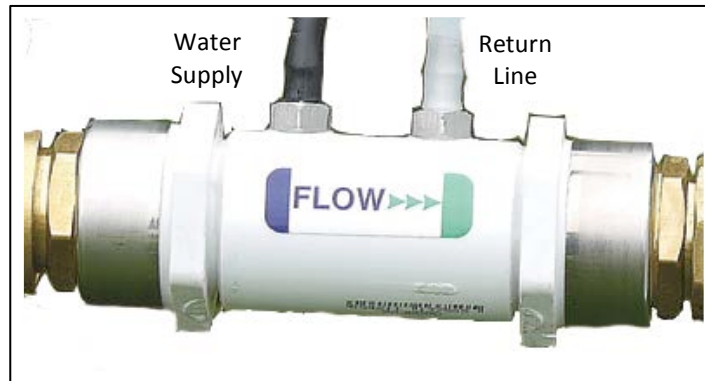
**Note:** The Flo-Pro Inline tank is capable of handling constant pressure



Hose Bib Injector Connection  
Figure 5-2

**Step 2** Attach tubing to the injector feeder. Wetting the ends of the tubing will make them slip over the barbed fittings easier. Slide the “Black” tubing over the barbed fitting next to the

blue mark that is the water supply. Slide the “Clear” tubing over the remaining barbed fitting which is the return line. See close-up of injector feeder in Figure 6-1



Close-up View of Injector Feeder  
Figure 6-1

**Step 3** Attach the opposite ends of the tubing to the green cap of the portable tank.



**Note:** Do not remove the blue and green cap connector nuts.

Slightly loosen each nut and insert the “Black” tubing through the center of the Blue nut until it stops. Once it stops, hand-tighten the Blue nut. Repeat the same process with the “Clear” tube and connecting to the Green nut.

When possible the hose bib adapter fitting should always be the last component installed in any configuration because it’s pressurized.

Shut-off valves are included for the “water supply” and “return line” tubing of the inline tank and can be installed in the “Clear” and “Black” tubing at any point. Tubing shut-off valves may drip under pressure and will not affect the operation of the injection system.

Each Flo-Pro Inline injection system includes a 5’ length of “Clear” and “Black” tubing that can be trimmed to length as needed.

## Common Application Techniques

Common usage of the in-line Flo-Pro Injector is as follows:

- Injectable material is placed in the in-line Flo-Pro tank along with some dye and/or anti-foaming agent (when applicable). This is to avoid any spillage of materials adjacent to a green or tee
- The balance of the unfilled tank is filled with water and cap is threaded to the tank
- The metering rate is set based on the material being applied and the desired application rate
- The in-line tank is set in close proximity to a quick coupler along the edge of a tee or green.

- A hose with a hose nozzle is attached to the “green” or “Water-Return Side of the Injector feeder.
- The ball valves on either side of the injector feeder to the tank are in the closed position
- A quick coupler key and hose swivel is connected to the “blue” or Water Supply side of the injector feeder. The supply line is then pressurized once the quick coupler key is set in place.
- The ball valves are open on the inlet and outlet side of the injector feeder lines to the tank.
- Injectable material can now be applied and is verified by seeing color-water being applied. Apply the material to the tee or green as needed.
- When the water is visually clear, the injected material has been exhausted and the tank with material needs to be refilled.

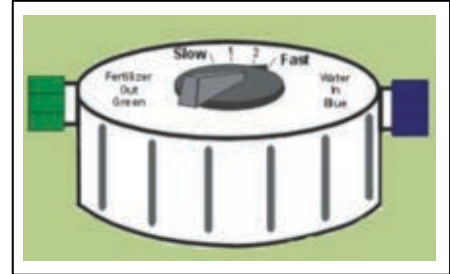
## Adding Product & Setting Metering Rate

**Step 1** Add the product to be applied into the portable tank.



**Note:** Refer to the product label of the manufacturer of the product to be applied.

**Step 2** Fill the remaining portion of the tank with water until all of the air is expelled. The system will mix the products automatically when the tank is pressurized with water.



**Adjustable Meter Setting**  
**Figure 7-1**

**Step 3** Screw the cap on the portable tank and connect the tubing to the cap from the hose bib or quick coupler connection. Connect the “Blue” to “Blue” and “Green” to “Green” colored connections.

**Step 4** Set the flow adjustment on the cap to “fast feed” for quick feeding and “slow feed” to feed slowly every time you water, see Figure 7-1. You can also feed at the rates shows in the table below:

Feed Rate	Ratio	Rate per Gallon of Water
Slow	1000:1	2/3 teaspoon per gallon
#1	500:1	1-1/3 teaspoon per gallon
#2	250:1	1 tablespoon per gallon
Fast	100:1	2 tablespoon per gallon

### ***Example of how to apply Underhill Tournament Ready™ Soil Surfactant***

Prior to setting the metering rate, the following information in the table below should be obtained or verified:

No.	Required Information	Description
1	Confirm	Determine how much Underhill Tournament Ready product is to be applied by reviewing the label on the container. (A recommended application rate is 8 ounces per 1000 sq. ft.)
2	Verify	Determine the flow rate in gallons per minute of the hose nozzle being used to apply this material. In this example, Underhill’s Precision™ “Cloudburst” nozzle applies water at 35 GPM.





3	Confirm	Determine how much wetting agent is needed. In this example, 4 greens totaling 30,000 sq. ft. will be applied with a wetting agent. The Tournament Ready™ application rate is 8 oz/ 1,000 sq ft., therefore 240 oz are needed for 30,000 sq ft. of greens. There are 128 oz. per gallon so you'll need to fill the tank twice with a little left over.
4	Select	Determine the feed rate. In this example the feed rate is set to "fast" to stay ahead of play. If the plan is to apply 100 gallons a minute (see table above), then it should take 2.85 or 3 minutes to apply material to this location. If there is more time and slower feed rate is desirable, and the goal is to apply 1000 gallons a minute then it should take 28.5 minutes to apply all of the material. This is verified when the water being applied is clear.

**To Refill** – Disconnect from a quick coupler or hose bib. Disconnect the small black and clear tubes into the tank. Unscrew the threaded cap and pour out any remaining water from the tank and repeat Steps 1-4 above.



**Note:** All feed rates are approximate and not guaranteed by Underhill due to the high amount of variables resulting from differences in irrigation system configurations, product quality, viscosity, specific gravity of the material being applied and hose nozzle flow rates. Feed rates and ratios are provided for convenience only. Underhill Flo-Pro Inline Injectors should be used for general application of liquid and water-soluble products only and are not marketed as a direct replacement for chemical siphon feeders.

For safe fertilizing practices, Underhill recommends that plants be fed at half or 50% of the manufacturer's recommended amount for the first application to prevent damage to the plants or landscape.

## Flow Requirements for Low Flow Hose or Drip Systems



**Note:** Drip systems that apply less than 120 gallon per hour (GPH) flow rates may require an Underhill Flo-Disc in order to inject solution at a proper rate. There are three Flo-Disc listed below.



**Note:** Products do not require dilution or pre-mixing unless using a Flo-Disc for drip applications or a lower injection rate per the manufacturer's recommendation is required.



**Important:** It is recommended to use colored fertilizer in the Inline portable tank or food dye to adjust the feed rate of the system. Let the system run for a few minutes to make sure the fertilizer is not flowing before installing or changing a Flo-Disc. If there is not color visible in the “Clear” injection tube, the system is not flowing and a more restrictive Flo-Disc is required for operation. The following table identifies the color and flow rate of each Flo-Disc.

No.	Color of Flo-Disc	Flow Ratio
1	White Flo-Disc	120-60 GPH
2	Black Flo-Disc	60-30 GPH
3	Red Flo-Disc	30-7.5 GPH



**Note:** When using a Flo-Disc, pre-dilute products 4 parts water with 1 part product (25% strength)

**Step 1** Estimate your water flow by multiplying the number of drip emitters in your system by their gallons per hour flow rate, (if you don’t know your water flow rate, you can use trial & error starting without a Flo-Disc. If no color is present in the “Clear” tube, insert a Flo-Disc starting with white model.

**Step 2** Remove the washer from the swivel nut on the hose bib adaptor. For easy removal use a pair of needle nose pliers to grab the “O-ring” tab. A small flat-head screw drive will also suffice.

**Step 3** Push the proper Flo-Disc until it seats firmly against the flow restrictor in the center of the hose bib adaptor. Water flow will hold the disc in place.

**Step 4** Replace the hose bib adaptor hose washer and follow Steps 2-4, “Installing the Flo-Pro Inline Injector” in these instructions.



**Note:** The Flo-Disc is not intended for pressure reduction and cannot be used for this purpose. The Flo-Disc will create additional bypass through the tank when necessary to speed up injection.

## Frequently Asked Questions

### 1. *What products can I use with this system?*

Any liquid or water-soluble powder may be used in the system. Water-soluble powders do not need to be dissolved to work in the system. The Flo-Pro process dissolves, mixes and measures for you. If your product is clear it is recommended to use food coloring or dyeing so the product will be visible in the “Clear” output tube.

### 2. *How do I know when the fertilizer is gone?*

When the system is operating (water flowing), the Clear tube will fill with color of your injected product. When the system is operating and the color inside the tube is clear, the system is out of the product being applied.

**3. *My fertilizer is gone but the tank is full of water.***

The Flo-Pro Inline System will always be full of fluid since it replaces the product being applied with fresh water utilizing a patented process to layer the incoming water over the heavier injected solution. This process is similar to oil on water or whipped cream on gelatin.

**4. *How do I know the system is working?***

When water is flowing through the hose or drip system, the color of the injected product will be visible through the “Clear” tube. The color depends on the product or dye color. The color in the tube may be lighter or darker depending on much product was placed in the portable tank and/or the injection setting selected on the cap. If you have a full tank of product and do not see color in the Clear tube, refer to the Installation and Flow Requirements section of these Installation Instructions.

**5. *My system is running but the line is clear.***

Verify the following tasks;

- Verify the system has water flowing and is not just under pressure. This will only show color when water is flowing.
- Verify the tank was filled with the proper amount of product to be injected and dye has been added for material that does not contain color. Verify all air was removed from the portable tank by topping off with water.
- Verify the Injector feeder tubes are installed according to the Installation section of these instructions. This may require re-arranging the filter, pressure regulator and/or in-line controller so the injector is the last component before the first valve.
- Verify the Flow Requirements section to determine if a Flo-Disc is needed or the correct Flo-Disc has been selected.
- If the injector feeder is installed in the irrigation mainline, adjust the ball valve connector (CBV) according to the instructions provided with the connector. If the system was installed in the irrigation mainline and a coupling ball valve (CBV) is not used, install one for proper function.

**6. *My system is feeding too fast.***

Verify the appropriate feed setting has been selected. If a Flo-Disc is being used, verify the proper disc has been selected. Any Flo-Disc will speed up the injection rate of the system.

If using a coupling ball valve connection, (CBV) for the irrigation pipe, verify the valve is properly calibrated. Opening the valve will slow the feed rate of your systems.



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