



Design and Installation Manual



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Introduction

Driptech is an American company which manufactures and sells affordable drip irrigation systems designed specifically for small plot farmers of developing countries.

In contrast with traditional flood irrigation which applies large volumes of water to entire fields, drip irrigation delivers precise quantities of water to crop root zones. The benefits of drip irrigation relative to flood irrigation include:

1. Efficient use of scarce water supplies (30% - 70% savings)
2. Reduced labor costs by up to 75% savings
3. Increased crop yields by 20% - 90%
4. Fewer weeds between crop rows
5. Easy application of nutrient amendments (fertigation)

Drip irrigation is particularly suitable for row crops such as:

- Vegetables
- Cotton
- Sugarcane
- Spices

Driptech micro-irrigation systems achieve all the general benefits of drip irrigation plus the Driptech advantages of:

1. Affordable cost and quick return on investment
2. Low clogging
3. Easy installation and maintenance
4. Low pressure requirements, suitable for pumps or gravity tanks
5. Visibly uniform water deliver

Components of Dripteck Micro-Irrigation System

1. Water Source- It may be open well, bore well, canal, reservoir etc.
2. Pump- The water is carried from source to micro-irrigation system under certain pressure with the help of pump.
3. Screen Filter- It consists of a screen strainer which removes physical impurities and allows clean water to pass through to the drip system.
4. Venturi- This allows to give water soluble fertilizers through the system directly to the root zone of crop.
5. Valves – Different types of valves are used for drip system like by-pass valve used before the filter to control the water pressure, gate valve for Venturi to create differential pressure, ball valve at the inlet of sub-main to control flow of water and take-off cock valve installed at the inlet of each laterals to control pressure and flow through the laterals.
6. Main-line- This is a PVC pipe line used to carry water from water source to sub-main with a filter installed in between.
7. Sub-main- This is also a PVC pipe line which supplies water to laterals having flush valve at the end.
8. Lateral/Drip tape- These are made up with UV stabilized virgin plastic material which carries water from sub-main to the root zone of crop. There are two types of drip-tape: entry-level (125 micron) and long-life (200 micron).
9. Poly fittings- These are used for providing connection between laterals and sub - main and for inter-connecting the laterals. E.g. Grommet, joiner etc.

Driptech Materials:



Drip tape(Laterals)



Filter



Venturi



Grommet



Take-off



Hand drill

Additional PVC materials needed for installation:



Pipes



Ball Valve



Elbow



Tee



Reducer



Threaded End Cap



Female Threaded Adopter



Male Threaded Adopter



Solvent Cement

How to Design a system?

1. Survey the plot where system is to be installed.

- Measure the width and length of a plot.
- Note down row-to-row and plant-to-plant spacing, location of water source and direction of row
- Based on measurement, prepare a rough sketch.

2. Decide size of sub-main.

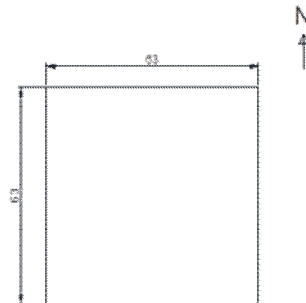
- Install the sub-main perpendicular to row.
- Based on below guideline for maximum sub-main length choose a sub - main of suitable length.

3. Laterals-

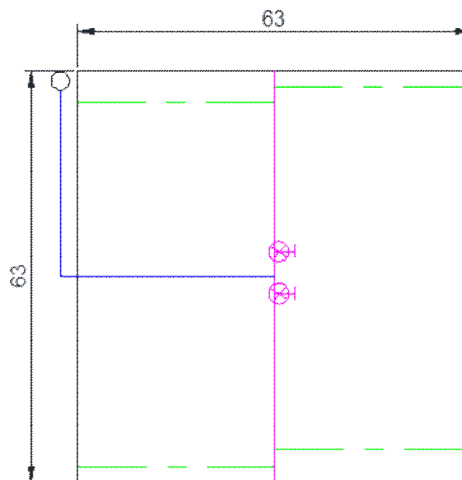
- Driptech is having two types of lateral with punch distance 30 cm and 45 cm; based on plant spacing decide a suitable type lateral.
- The maximum permissible length for lateral having 30 cm punch spacing is 105' either side of sub main.
- The maximum permissible length for lateral having 45 cm punch spacing is 125' either side of sub main.

Example- Take a plot of an approx. 1 acre (63mX63m) with 4'X1'i.e (1.22m X 0.3m) chilli crop.

- Here consider the row direction East West



- As row direction is E-W so we need to lay down sub-main North- South.
- As the plant-plant spacing is 1' we know that maximum running length of lateral is 105' i.e.32m
- Therefore we need to keep sub-main at the middle of plot so that lateral can cover the entire plot by keeping laterals on both side of sub-main.
- From above chart we can conclude that the maximum permissible running length for 2" sub-main having laterals on both side is 32m.
- Therefore we can divide the plot in two halves so that each sub-main length will be 32m.
- Thus we need two sub-mains for this plot.



- Pink Colour- Sub main
- Green Colour- Lateral
- Blue Colour- Main line

Guidelines for Installation and Commissioning of the System

System configuration and planning

1. Ensure the field is bare or has very early stage crops. Ideally, the drip system should be installed first so that the crops can be planted next to the lateral holes.
2. Ensure the field is level. This low-pressure system is designed for use on level fields. However, if the field has a slight slope (1 to 2 %) plan for the sub-main to run from top to bottom of the slope, and the laterals to run across the slope

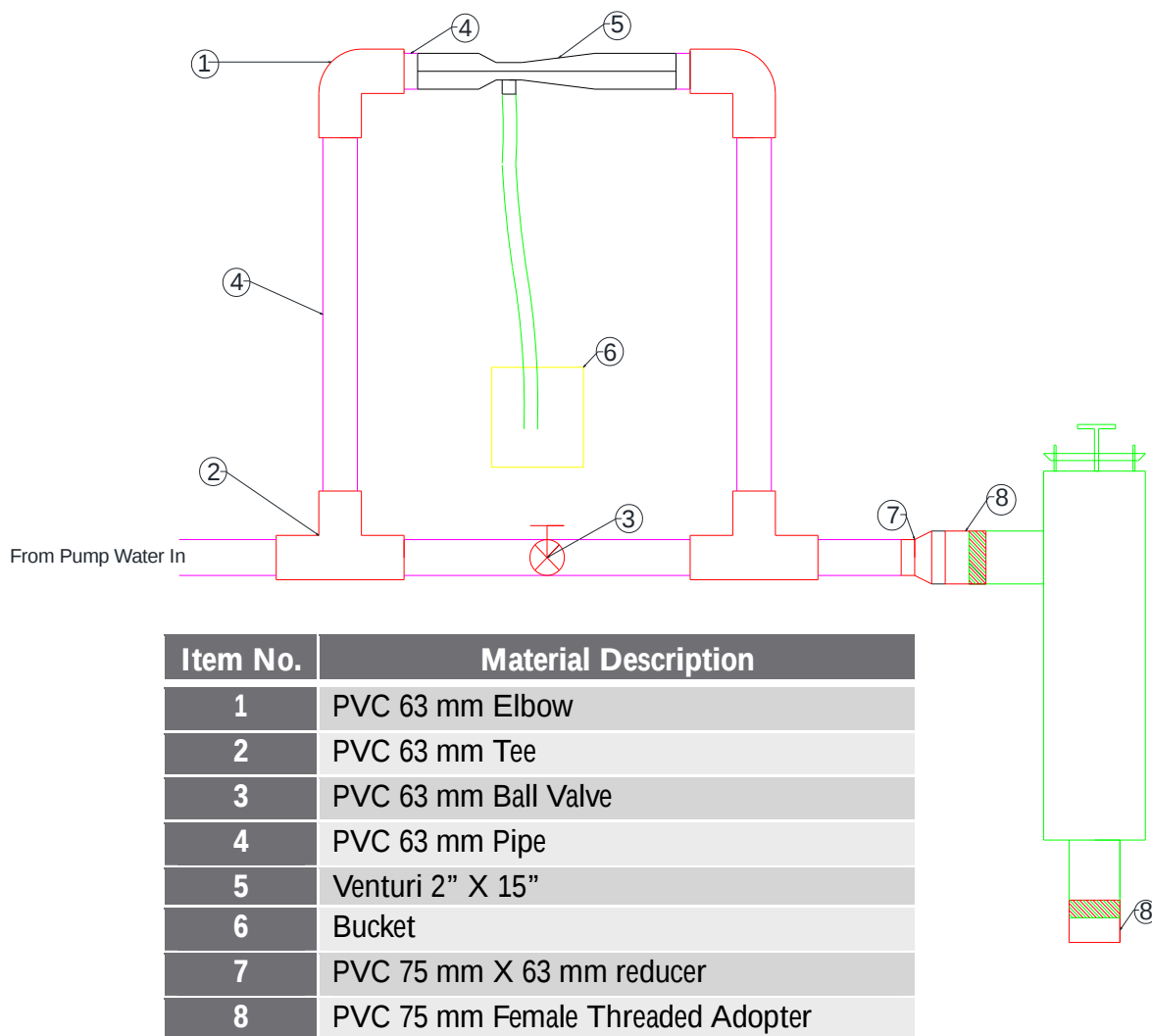
Installation of the Filter & Venturi

1. First filter fittings is done and the main line is connected starting from filter and followed by sub-main as per design sketch.
2. The filter connection will require FTAs (female threaded adapters). Any threaded fittings can be made snugger by wrapping the male part of the fitting in layers of Teflon tape.



3. If planning for the installation of Venturi then fix it before the filter i.e. in between pump and filter. (refer the sketch- installation of Venturi & filter)
4. If the water pressure and discharge from the pump is too high for the drip irrigation system, an alternate discharge should be connected with a tee joint and ball valve so that only a portion of the water being pumped goes into the drip system, with the remainder being returned to the water source.
5. A ball valve is provided as the inlet of sub-main.

6. Note and accommodate the differences in diameter along the mainline by using reducers to adjust (reduce or enlarge) the diameter appropriately to convey water from the source, through the ball valve, filter, fittings, and mainline to the sub-main.
7. A flush valve (if not available threaded end cap with male threaded adopter) facing slope of the sub-main is provided at the end of sub-main to facilitate sub-main flushing.



(Installation of Venturi & Filter)

Sub-main: Drilling PVC pipe holes, inserting grommets and takeoffs

1. Measure with the help of tape and mark an X where the holes will be drilled to insert the rubber grommet/ takeoff valve/drip lateral with the appropriate lateral-to-lateral spacing .Ensure that the marks are aligned length-wise along the pipe so that the takeoffs are inline and the drip laterals won't have kinks in them. An easy way to do this is to make the mark on the apex of the pipe and then turn the pipe 90 degrees after drilling the holes so that the holes point along the field.
2. While drilling, kindly note that the drill should be kept exactly perpendicular to the pipeline.
3. If the field configuration requires that laterals extend off both sides of the sub-main, measure and mark the holes so that those on one side are staggered by at least 5cm relative to those on the other side of the sub-main. This ensures adequate pressure through the system.



(Drill holes so that takeoffs are aligned length-wise on sub-main (L). Stagger the holes if using center sub-mains (R))

4. Note: never mark a hole to be drilled at a joint connecting PVC pipes, instead shift the hole to one side. Similarly, allow at least 10 cm between tee, elbow or ball valve fittings and drilled holes. Ensure the last hole is at least 20 cm from the end of the pipe and end cap.

5. Before drilling the holes, double check that the marks are aligned with each other on the same lengthwise plane
6. Squeeze a rubber grommet into each hole ensuring that the numbered side is facing up and non-numbered side is facing down inside the pipe
7. Insert the barbed end of a takeoff inside each grommet.



(The process for drilling holes, squeezing grommets into holes and pushing takeoffs into grommets)

Installation of laterals

1. Snip off the end of drip tape at the first hole on each roll.
2. All cuts should be made on a pre-punched hole so that hole placement between laterals is always aligned down the field.



3. Attach the open end of each lateral to a takeoff. Press the lateral open by squeezing the edges and slip it around the takeoff. Work the lateral as far as possible onto the neck of the takeoff until it is nearly flush with the valve. Pull the collar down over the lateral until two slight 'clicks' are heard and felt.



(L-R: The process of attaching a lateral to a takeoff and locking it in place)

4. The Driptech branded printing should be facing down and the pre-punched holes should be facing up for the initial run of the system in order to ensure proper discharge. It is advisable to turn the tape so that the pre-punched holes face down and deliver water directly to the soil.
5. Pull the lateral taut and straight on the field. The spacing between the tail ends of the laterals should be the same as the spacing between the takeoffs.
6. Close off one end of each lateral by snipping a 3-5 cm portion off the end, folding the drip lateral back on itself twice and slipping it through the cut portion. These can be adjusted on the field.



(L-R: The process of closing off the end of a lateral)

7. To prevent laterals from being blown by the wind, anchor the closed-off end of each lateral by placing it under a stone, fastening it to a stake (without piercing the lateral) or threading the closed off loop at the end of the lateral with a wire running the length of the field and anchored in the ground with pegs.

Commissioning the system

1. When all the connections have been made between the water source, mainline, sub-main, and laterals, it is time to flush the system.
2. Turn off all the takeoffs and turn on the ball valves in the system.
3. With sub-main end caps open, turn on the water and allow it to flow through the system flushing out debris. Ensure there is no leakage of the mainline or sub-main at fittings or connections.
4. Turn off the water and put end caps on the ends of the sub-mains.
5. Open all the takeoffs & ends of laterals; flush it and close the ends after removal of debris.
6. If pressure is very high on the system, ensure that water is being discharged back to the reservoir or tank from the pump so that only some water is being pumped through the drip irrigation system. Adjust the pressure to the desired level by slowly opening the main valve and adjusting by-pass valve.
7. If unevenness in the field or low water pressure causes non-uniform water discharge throughout the system, adjust the takeoffs accordingly. The takeoffs at low points on the field or near the water source can be only partially open while the takeoffs at high point on the field or farther from the water source can be fully open
8. Once uniform discharge has been observed with the drip laterals facing up (holes facing up), the drip laterals can each be flipped over to face down during regular operation of the system for more precise water application to the root zone.

Periodic Maintenance

General Maintenance:

1. Check the lateral functioning, leakages, wetting zone etc.
2. Check the placement of laterals in case the placement is disturbed.
3. Check the leakage through filter gasket in the lid, flush valve and fittings.
4. After harvesting; roll out laterals while doing farm operations.

Cleaning the screen of filter:

It is necessary to clean screen at regular interval. Procedure of cleaning is very simple, open the lid; remove the screen and clean it in flowing water by rubbing with cloth or soft brush.

Flushing the sub-main and the lateral:

Most of the foreign particles coming with water are removed by filter; still some silt passes towards sub-main and laterals. To remove these silts the sub-main should be flushed by opening their closed ends. The flushing can be stopped once the water coming out is clean. After flushing the sub-main repeat the procedure for laterals.
