



WHERE THE PROFESSIONAL CONTRACTOR COMES FIRST™

# Guide to Lawn Sprinkler Installation

**A Practical Guide to the Methods of Installing an Underground Irrigation System. This is Not an Irrigation Design Manual. Other Resources are Available Regarding Irrigation System Design.**

## 11 LOCATIONS TO SERVE YOU

1120 Goffle Road  
Hawthorne NJ 07506  
973-423-0222

1000 Airport Road  
Lakewood, NJ 08701  
732-363-5034

314 West Basin Road  
New Castle DE 19720  
302-328-3326

8207B Rear Clover Leaf Drive  
Millersville MD 21108  
410-761-9455

4910 Quality Drive  
Fredericksburg VA 22408  
540-891-8100

64 S. Jefferson Road  
Whippany NJ 07981  
973-386-9076

852 E. Main Street  
Norristown PA 19401  
610-277-9764

223 Blackwood/Barnsboro Rd  
Sewell NJ 08080  
856-228-6070

4120 Pepsi Place  
Chantilly VA 20151  
703-263-1272

38373 Sussex Highway, Suite 1  
Delmar DE 19940  
302-846-3118

131 Lloyd Street  
Allentown, PA 18109  
610-231-2009

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2<sup>nd</sup> Edition March 2007.

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## **PREFACE**

The purpose of this manual is to assist our customers in the training of their employees and their company in the methods used in the proper installation of an underground irrigation system. This is not a system design manual but an irrigation installation guide. We prefer to introduce the components used and the methods of installation prior to the actual design of a system. This way the design process makes more sense and when design is being taught the audience is not lost in the confusion of what the items and descriptions are.

As this industry is our livelihood and your livelihood we strive for all of our relationships within the industry to uphold a high standard in their workmanship. If you have any questions please ask a sales associate or your employer for assistance and clarification so you are not confused and start off on the wrong foot. Your success is our and your companies' success and we sincerely value that relationship.

## **PART I** **PLUMBING TIE IN**

The first step to installing your irrigation system will be getting the water from the inside of the house to the outside. The plumbing portion of the installation process will be the most difficult part of the job. To do this it is recommended that you hire a plumber to do the tie in. He will be able to do a fast, neat job without any leaks the first time, hopefully. The plumber will also be able to obtain any permits required by the township for doing this work. Check with your town offices to find out what is required to do the work. You don't want any hassles from them.

Often you can hire a plumber for under \$400.00 to do a tie in if you will be in the position to give them steady work. If you desire to do the tie in and are comfortable with soldering copper pipe then you should have no problems. In many parts of our service areas PVC interior plumbing is becoming increasingly popular and reliable and easier for the novice plumber.

**NOTE:** A new product to our industry the CASH ACME "Shark Bite" Solder-less Copper, CPVC and PEX Pipe fittings is revolutionizing the plumbing trade allowing quality connections without the use of a torch.

## **WHERE DO YOU GET THE WATER FROM?**

During the design phase it was determined that the system would operate at a specified GPM at a certain amount of water pressure measured in pounds per square inch (P S I). The best place to achieve these numbers is by hooking up the pipe as close to the water meter as possible. The tie in must be done on your side of the water meter. Your side of the water meter is the side which attaches to the pipes feeding water into your house. If the water meter is located outside in the yard you will may want to tie in to it out there if possible. The main valve should be located in an area which is accessible so it will be easy to shut off the system if it needs service and to make winterization easy. Your plumber will help you with this decision.

## **WHAT ARE THE COMPONENTS IN THE PLUMBING?**

Aside from the pipe and the fittings, the parts of the tie in are; the main valve, the blowout valve, a second blowout valve (optional), the backflow preventer and the master valve (optional but recommended and an add on sales item). All of the pipe from the very first fitting continuing right up to the master valve should be copper pipe. It is the BEST method of installation and will last you the longest time. Once again PVC is a viable option if allowed in your service area.

## GETTING THE PIPE FROM THE INSIDE TO THE OUTSIDE.

Ideally you would like to have the pipe come out of the house below grade. This is the most professional manner and the cleanest looking. To do this you will, most likely, have to drill through the foundation of the house. The foundation is made of block or concrete and you will need a special drill to accomplish drilling through it. This drill is called a rotary hammer, your plumber will probably have one of these or it can be rented at a local rental center. Another method of getting the pipe outside is drilling through the sill. The sill is the area where the wooden part of the building meets the foundation. A regular drill with a wood bit and an extension on it will do the job fine. Before you drill you will want to dig a large hole at the location where the drill will exit the wall. This will be the area you mount the backflow preventer and master valve.

## WHAT SIZE HOLE DO YOU DRILL?

If you are mounting your controller near the main valve, which we recommend, and you have a 1" tie in, then a 1 1/2" hole through the foundation or the sill will be a sufficient size for running your copper pipe and the control wire for the zone valves. You will need to patch the hole in the wall after you are finished. You should use silicone or a hydraulic cement to do this. Hydraulic cement expands as it dries to make a water tight seal. If you went through the sill some silicone will be okay to patch that hole.

NOTE: DO NOT run the wire through the hole at the same time you run the copper pipe through the hole. While heating the pipe during the installation of the plumbing you have a chance of melting the jacket covering the wires. This will create a major headache for you. Heat travels quickly through copper pipe so be careful. The best method of getting the wire through the foundation is to pull it through the wall with a snake (or coat hanger) after the soldered joints have cooled. Also note that many people like to have their controller installed in their garage which means that a small trench would need to be dug to get the wires from the main line to the garage or the wires can often be run in an unfinished basement to the garage after having been run through the wall of the home as described above.

## HOW IS THE BACKFLOW PREVENTER INSTALLED?

During the design phase you chose a backflow preventer to protect your drinking water. If you are using a P V B (Pressure Vacuum Breaker) then it needs to be mounted 12" above the highest point on the sprinkler system. If you had some elevation differences on your property, then you probably designed in an R P A (Reduced Pressure Assembly) and it just needs to be mounted 12" above the grade. There are flow direction arrows on the backflow preventer (as well as all of the zone and master valves) be sure you note the flow arrow and DON'T install the devices backwards. NOTE: In your design, remember that a backflow preventer creates pressure loss. Be sure to include this in your calculations. Spec sheets are available for every backflow preventer.



## INSTALLING THE MASTER VALVE

If your system has the security of a master valve, it will be installed as the last part of the tie in process. A master valve is recommended as only when water is called for by an irrigation zone will the master valve open and pressurize the system. This means that if the main line is broken or another valve is malfunctioning the master valve will prevent any flooding when the system is not active (it will still allow leaking when the system is called to operate) Be sure you note the flow arrow on the valve and DON'T install it backwards. (Hint: the solenoid faces down stream). Screw your first plastic fitting into outlet side off the master valve before you install it onto the copper pipe. You can usually get a tighter fit with out bending down in the hole to turn it.



MASTER VALVE

## CHECKING THE PLUMBING FOR LEAKS?

Will it leak? Let's hope not. But just to make sure you should test it while the plumber is there. But first let us explain how a ball valve works. If the handle of the ball valve crosses the valve it is closed. If the handle runs parallel with the ball valve, the valve is open. To test the plumbing for leaks you need to shut off both ball valves on the backflow preventer and turn on the main valve slowly. You will hear water running for a short time and then stop running. Now go outside to the backflow preventer. Turn on the first ball valve on the backflow preventer, this time, turn it on quickly. You may hear a pop, which is the device inside the backflow preventer closing. Some water may spill out of the top of the backflow preventer at first. This is normal. You may also see water gushing out of two small ball valves on the side of the backflow preventer. Take a screw driver and shut them off it will only take a 1/4 turn to do this. These valves will be used for testing the device periodically. Now that all the water has stopped running, open up the second ball valve on the backflow preventer slowly, this will continue the water up to the master valve. Get a short piece of pipe and slide it onto the plastic fitting on the master valve. Make sure it is long enough to dump water away from the hole you are working in. Using your screw driver, open up the master valve manually by loosening the bleed screw on the back end of the valve or many valves have a quarter turn solenoid to manually bleed. Water will flow through the master valve and get all of the air out of the line. It won't take more than 10 - 15 seconds, maximum. Turn off the master valve and look for leaks. Good Luck!

Note: This is also a good time to verify or calculate the actual amount of water that is available for the operation of the sprinkler system (for city water only, wells need more specific attention). Attach a pressure gauge to the blow-out valve and open up the master valve and the pressure will probably drop way down and you are now making a mess in the back yard. Throttle back the last valve on the backflow preventer till the pressure on the gauge reads 45PSI. Now calculate how long it takes to fill a 5 gallon bucket and then you can extrapolate how many GPM Gallons Per minute you will have at 45 PSI. This means you will have the ability to loose 10 PSI in your piping grid and have 35 PSI at your sprinkler heads. Make sure you don't loose more then 10 PSI when you do your design!!!

### PLUMBING HINTS:

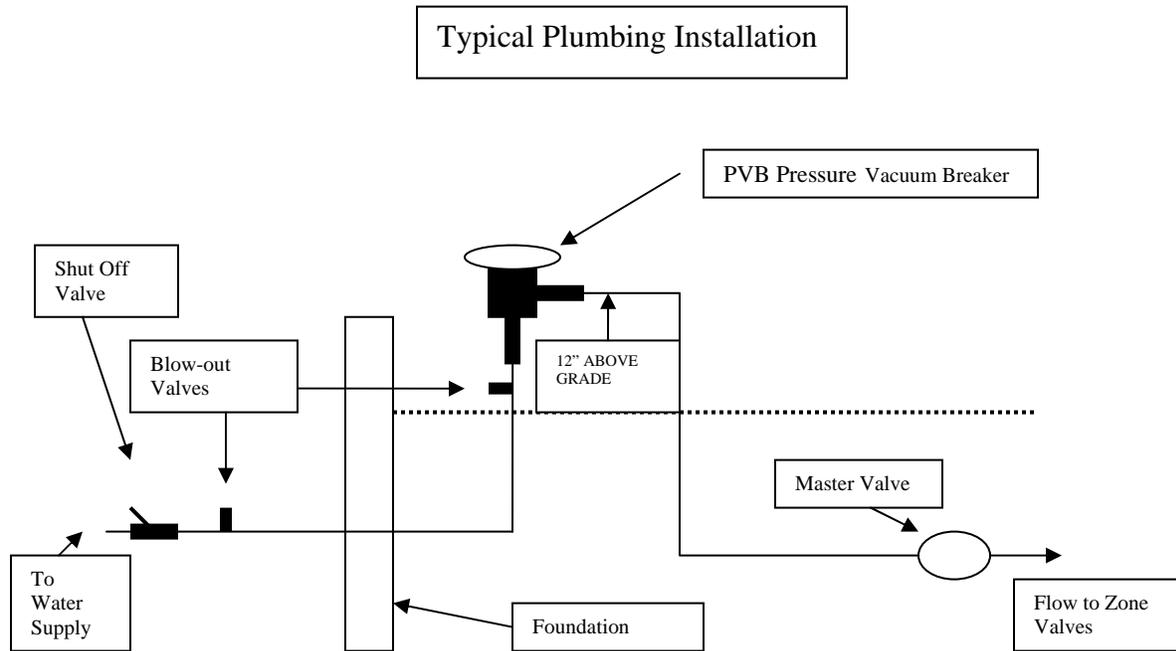
DO NOT put any heat near the backflow preventer or the master valve, you may damage them. Solder the fittings and the copper pipe together first then screw the fittings into the backflow preventer and the master valve



BALL VALVE



BLOW OUT VALVE



## **PART II** **THE PIPE AND WIRE**

There are three types of pipe which could be used during the installation of your lawn sprinkler system. They are polyethylene (POLY PIPE), poly vinyl chloride (PVC PIPE) and Funny pipe.

### **POLY PIPE**

Poly pipe is very good for tough soil conditions where there is a lot of rock in the ground or very hard digging conditions. It is ideal for pulling pipe underground and an easier method of installation when it comes to installing the fittings. There is one draw back when you use poly pipe, YOU MUST use a master valve on the main line. Poly pipe comes in 300' coils and the fittings insert into the pipe. Clamps are used to keep the fittings in the pipe.

### **PVC PIPE**

PVC pipe is a more rigid pipe than poly. Sometimes the fittings are harder to install when you use the pipe pulling method of installation you need two people to install the fittings. PVC pipe does not like tough digging or rocky soil conditions. It is a little easier to install when using the trenching method than it is when using the pipe pulling method of installation. This pipe comes in 20' lengths and the fittings must be solvent welded to the pipe with a primer solution first and then cement being put on the pipe and fittings prior to joining them together. PVC has better friction loss characteristics than poly pipe.

Often contractors may install a hybrid system where they use PVC as a pressurized main line without a master valve and poly pipe on the laterals after the zone valves.

### FUNNY PIPE

Funny pipe is a highly flexible pipe which will be used to attach the sprinkler heads to the zone lines. It is similar to poly pipe but has a tighter turning radius. Basically it doesn't kink as easy as poly pipe. This makes it easier to set the sprinkler heads to the correct grade. Funny pipe should be run in about two foot sections connecting a zone line and one sprinkler head. Even though funny pipe is similar to poly pipe clamping the fittings into the pipe is not necessary.

### THE WIRE

The type of wire used for irrigation systems is a single direct burial multi-conductor cable. It saves you from having to run many single wires. This 18 gauge wire is available in a cable with a various amount conductors all color coded for easy identification in the field. You can use this convenient cable unless your wire run is more than 1000 feet long. If it is talk to us at AQUARIUS

## PART III

### TRENCHING / PIPE PULLING

There are two methods of putting the pipe into the ground, trenching and pipe pulling. If this is your first irrigation system you may not have the availability of a pipe puller, thus trenching will be the method you have to use. It is more labor intensive than pipe pulling but the machines are more readily available. Often you can rent a pipe puller at Case/Aztec and Ditch Witch distributors in your area.

**BEFORE ANY DIGGING IS STARTED CALL THE UTILITY COMPANIES TO MARK THE GROUND WHERE THE UNDERGROUND WIRES AND GAS LINES ARE. YOU DON'T WANT TO HIT THEM. THIS IS THE LAW**

Before you start any trenching or pipe pulling, dig under any sidewalks you need to. It will make trenching or pipe pulling go smoother.

### HOW DEEP DO YOU HAVE TO GO?

Ideally you want to have the pipe 8" - 10" deep, 6" deep is okay, and 4" or less is undesirable. Your main concern is lawn aeration which will punch all kinds of holes in the pipes if they are too shallow. There are situations where bedrock and shale limit the depth of installation and it is clearly out of your hands. MAKE SURE YOU HAVE AN IDEA OF SOIL CONDITIONS BEFORE ANY ESTIMATES FOR WORK ARE GIVEN. The soil conditions can be the difference of 1 day to 4 days. When burying pipe you don't have to worry about getting below the frost line, we will discuss winterization later in the guide.

### TRENCHING

Once you have dug your trenches you will want to clean them out. This is the process of getting all of the foreign material out of the way of where you are going to put the pipe. Rocks, roots, and trash are some of the things that can get in your way. Leave a nice clean bed for the pipe to lie in. Control wires will also go into this trench. You may be able to use the trench for more than one pipe so look at your design carefully and see where you can utilize your trenches to get the

maximum benefit out of the work involved in digging them.

One more note about the trenching. Make sure that where ever the trenches meet that they meet at right angles. All of the fittings that turn, branch off at right angles. Digging the trenches this way will make installing the pipe and fittings easier when the time comes.



## PIPE PULLING

If you do have the availability of a pipe puller you will start installing you main line first, pulling the control wire at the same time as you pull the pipe. Don't make too long of a run or make too many turns as you may stretch the control wires or pipe and break them.

You will need two people to do the pipe pulling method of installation. One person will run the machine and the other person will feed the pipe and control wires into the ground.

PVC does not bend as easily as POLY so be careful and don't make too tight of a turn when pulling this type of pipe.

## SLEEVES

Whether you are trenching or pipe pulling, if you have to cross a driveway or a sidewalk you should install a sleeve. A sleeve is a bigger pipe than the one which carries the water. Think of it as a tunnel for the pipe and wires. If you ever need to repair the pipe under a driveway or a sidewalk, you will not have to dig up the driveway or sidewalk where the sleeve is located. You will be able to dig on either side of the pathway and pull the old pipe out, then slide the new pipe in. However, if the sidewalk or driveway is made of asphalt, then digging under it will move the dirt that supports the driveway or sidewalk. During the heat of the summer, asphalt can become soft and can settle very easily causing a cave in or a depression. Sleeves are the best option if the driveway is not installed yet or if only the binder coat has been installed without the top coat. If the driveway or sidewalk is made of concrete then you may dig under it and install your sleeve. Make sure you get as much of the hole backfilled as possible to restore as much support as possible to the pathway. Never use water to dig under a pathway. It creates a large hole under the pathway which will be difficult to backfill correctly and an even larger mess. Often many pipe pullers are equipped with a boring unit which will enable you to pull back a sleeve or your zone lines and wire without a sleeve. Consult with your local rental company.

One trick often used is to buy a piece of 1-1/2" galvanized pipe and put a reducer bushing from 1-1/2" to 1/2" with a 1/2" plug as a point and pound it under a walkway and then leave it in place and take the bushing off and leave the pipe in as a sleeve.



## **PART IV**

### **INSTALLING THE MAIN LINE**

The main line will be installed first, as far as the field piping goes; once this is done we will be able to install the rest of the system zone by zone. Whether you are trenching or pipe pulling you must lay out the path of the pipes before you start digging. A special marking chalk is available to do this. Following your design carefully mark out the main line making a larger mark on the ground when you reach a valve location. Once you have done this you can follow the lines with your machine without any problems.

### **TRENCHING METHOD**

After the trench is dug you must go to all the locations where the zone valves will be installed and dig out the valve holes you marked. Make the hole large enough to fit the zone valve and or valves, and the valve box. A true statement is "The bigger the hole, the easier it is to work in" and every word of it is true. So don't dig a small hole, it will cost you more time in the end. Now that you have dug out all your valve holes you are ready to run your pipe and control wire. Lay your control wire in the trench first leaving a loop of about 2' of control wire at each valve hole, a little more if you have more than one zone valve in the valve hole. Next put your pipe in the entire trench and cover it in a few spots to hold it down (Step on the pipe and kick in the dirt where your foot is). If you are putting more than one pipe in the trench put both in before you cover the pipe to hold it down.

### **PIPE PULLING METHOD**

After you have pulled the main line with the control wires dig out your valve holes at the locations you previously marked. Care should be taken to not to hit the pipe or score the control wires as you dig them up. Make sure you pull some extra control wire and loop it at each valve hole (start with the first valve with a very large loop and then work your way away from the spool of wire). Note: after pulling pipe the operator often drives over the slit to knock down any lumps. This will make pulling the wire loops impossible. **IMMEDIATELY DIG THE VALVE BOX HOLES AND PULL BACK SLACK IN WIRE BEFORE YOU PROCEED WITH ANY MORE PIPE PULLING.**

## **PART V**

### **INSTALLING THE FITTINGS**

Before we install the zone valves on the main line we need to learn how to install fittings into the pipe. As we have already mentioned there are two types of pipe and two types of fittings. Let's talk about them.

## POLY FITTINGS

These fittings are called insert fittings, because they insert into the poly pipe. They are held in the pipe by two types of clamps. Screw clamps are available and high quality but the industry primarily uses “Pinch” clamps. In order to get the insert fitting into the pipe you can use a rubber mallet to tap the insert into the pipe DON'T USE A REGULAR HAMMER! During the early spring and late fall when the temperatures are cool contractors often use “instant on” torches to heat up the pipe for an easy fit. The poly pipe slides over the insert fitting clearing all of the barbs on the insert fitting. The clamp is tightened over the barbed portion of the insert fitting. A crimper is needed to tighten the pinch clamps. Double clamps should be used on the main line fittings as these are under static pressure when the irrigation system is not operating.

## PVC FITTINGS

These fittings are called slip fittings because slip over the PVC pipe. The method of installation for the slip fittings is called a solvent weld. It is a two step process First you use a primer solution to clean the slip fitting and the PVC pipe and to soften the plastics preparing them for the next step. Once the outside of the PVC pipe and inside of the slip fitting are cleaned you can apply the liquid cement to the outside of the PVC pipe fairly generously, sparingly to the inside of the slip fitting. While sliding the two together a twisting motion should be used and the joint should be held together for a couple of seconds. Be sure not to twist the PVC pipe if you have already installed another slip fitting on the same line as you may misalign the other slip fittings on the PVC pipe. The solvent weld dries very fast so make sure everything is ready when you start to apply the liquid cement. After you have the PVC pipe and slip fitting together and before going to the next connection wipe the excess liquid cement off of the joint you just made.

REFER TO THE NEXT TWO PAGES FOR FITTING DESCRIPTIONS AND  
FITTING INSTALLATION

**LEARN YOUR FITTINGS AND HOW TO TALK THE TALK AND YOU  
WILL SAVE THOUSANDS OF DOLLARS IN MISTAKEN  
COMMUNICATION WHICH WILL LEAD TO LOST PRODUCTIVITY**

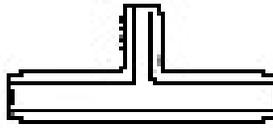
## FITTINGS

### HOW TO READ A FITTING

It will be important that you understand how to read a fitting properly. If you ask for a certain configuration you may not get what you were thinking about. A fitting is read just like everything else from left to right (then up if a tee) and the largest size is read first. Then you use poly fittings the barbed part is called insert. When you use PVC fittings the part that the pipe goes into is called slip. A fitting with threads on the out side of it is called a male fitting. A fitting with threads on the inside of it is called a female fitting. If a fitting has male threads on either side of it is called a nipple. In this sample the fitting is read in the order of 1, 2, and 3, from left to right, always reading the largest size which fits the pipe first, and then reading any threaded part of the fitting. The sample fitting is called a 1" insert by 1" insert by 3/4" insert tee.

3/4" INSERT (3<sup>RD</sup>)

1" INSERT (1<sup>ST</sup>)



1" INSERT (2<sup>ND</sup>)

Let's read this fitting:

It is a 1" insert by 1" insert by 1/2" female tee or a 1" insert by 1/2" female tee\*. It would be written like this. 1"x1/2" INS. X F TEE

\*Because the sizes on the run of the fitting are the same it is Not necessary to mention the same size twice.

1/2" FEMALE

1" INSERT

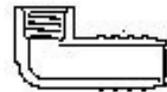


1" INSERT

Let's read this fitting:

It is a 1" insert by 3/4" female ell  
Written like this 1" X 3/4" INS. X F ELL

3/4" FEMALE

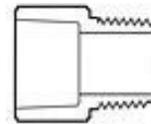


1" INSERT

Let's read this fitting:

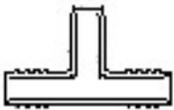
It is a 1" slip by 1" male adapter  
Written like this 1" S X M ADAPTER

1" SLIP



1" MALE

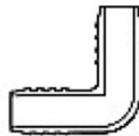
## INSERT FITTINGS (POLY)



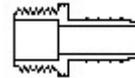
INSERT TEE



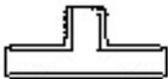
INSERT COUPLING



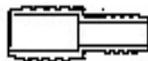
INSERT ELL



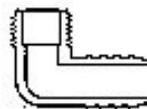
INSERT X MALE ADAPTER



INSERT X MALE TEE



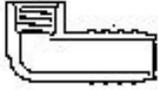
INSERT REDUCING COUPLING



INSERT X MALE ELL



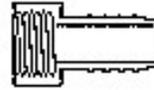
INSERT PLUG



**INSERT X FEMALE ELL**

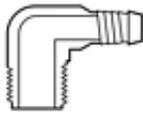


**INSERT X FEMALE TEE**



**INSERT X FEMALE ADAPTER**

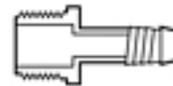
## **FUNNY PIPE FITTINGS**



**1/2" X FUNNY ELL**



**CUT -OFF RISER**



**FUNNY X MALE ADPAPTER**



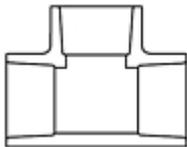
**PIPE CUTTER**



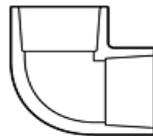
**PRE-FILLED WATERPROOF WIRE CONNECTORS**



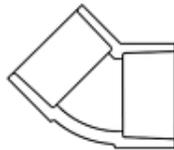
## **SLIP FITTINGS (PVC)**



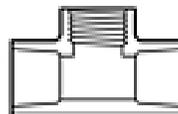
**SLIP TEE**



**SLIP ELL**



**SLIP 45 ELL**



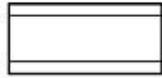
**SLIP X FEMALE TEE**



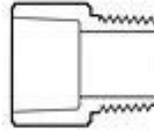
**SLIP CAP**



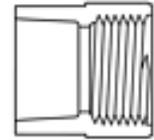
**THREADED CAP ADAPTER**



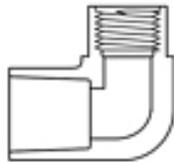
**SLIP COUPLING**



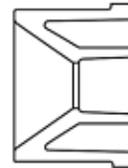
**SLIP X MALE ADAPTER**



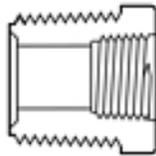
**SLIP X FEMALE**



**SLIP X FEMALE ELL**



**SLIP X SLIP REDUCER BUSHING**



**THREADED REDUCER BUSHING**



**THREADED PLUG**

## **PART VI**

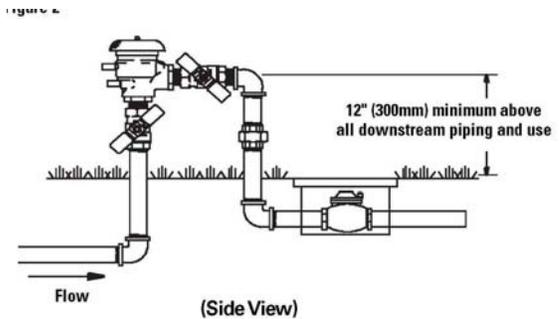
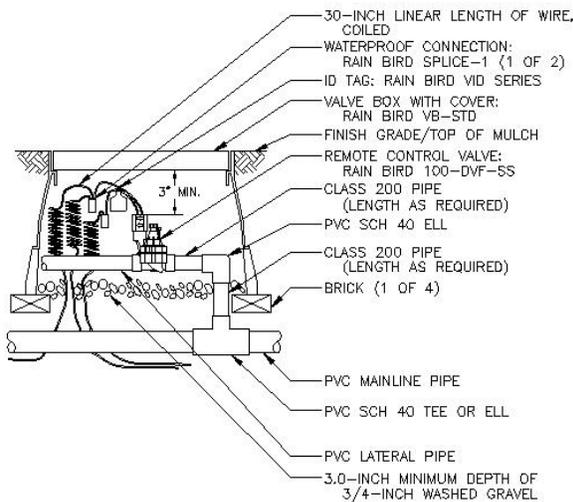
### **INSTALLING THE ZONE VALVES**

**REMEMBER THE FLOW ARROWS**

Now that we have run the main line and have learned how to put fittings together, we are ready to install the zone valves. First determine the direction of the water flow and look for the flow arrow on the zone valve. Next figure out what configuration of fittings you want to use on your zone valve. Be sure to use Teflon tape on all of your threaded valve connections so you won't have any leaks. Male fittings (threads on the outside), are used to hook up your zone valves. With the threaded part of the fitting facing you, Teflon tape is wrapped around all male fittings in a clockwise motion. If you are right handed hold the fitting in your left hand and apply the Teflon tape around the fitting by moving your hand away from you when starting to wrap. If you are a left handed person, vice versa. Assemble the male fittings and the zone valve before putting the fitting into the pipe; it is easier to turn the fittings above ground than it is underground. Tighten the fittings hand tight and then about 1 1/2 turns more into the zone valve. That should

give you a water tight seal. Don't over tighten the fitting; you might break the zone valve. Next cut the main line making sure you don't get any dirt in the pipe and put your fittings together. If you are using poly pipe don't forget to slide your clamps on first. Continue to the next zone valve. PIPE DOPE SHOULD NEVER BE USED ON ANY PLASTIC IRRIGATION FITTINGS, ONLY TEFLON TAPE.

If, during the installation of the main line, you did get dirt in the pipe, flush out the line before installing the last zone valve. Go back and turn on the master valve manually. Open the second ball valve on the backflow preventer slowly. Let the water run until the lines are clean. More about this in section XV on page 23.



**BACKFLOW WITH VALVES OPEN TO FLUSH**



**ZONE VALVE**

**VALVE INSTALLED IN VALVE BOX**

## **PART VII**

### **INSTALLING THE ZONE LINES AND SPRINKLER HEADS**

The zone lines or lateral lines will be a little less complicated than the main line was because there are no control wires and no flow arrows to worry about. Start your pipe pulling or trencher near the exit of each zone valve and in as straight as possible lay the pipe. Look at the design and make sure that the same sprinkler heads on the design are connected to the same sprinkler heads in the yard. Remember never to mix the spray heads and the rotary heads on the same zone. This was taught in the design phase of the project. (Always put duct tape on the end of the pipe when you have to leave it. Dirt in the pipe can cause more problems later on in the installation.) Put your head fitting on the pipe and then install your funny pipe fitting. No clamps are needed for funny pipe fittings. Just make sure you get the funny pipe over the fitting all the way to prevent any small leaks at the sprinkler head. Tighten the sprinkler head onto the funny pipe fitting hand tight. This will make the head easier to adjust when the time comes to turn them on and adjust them. Teflon tape is not necessarily needed on the funny pipe fittings to prevent leaks, a small

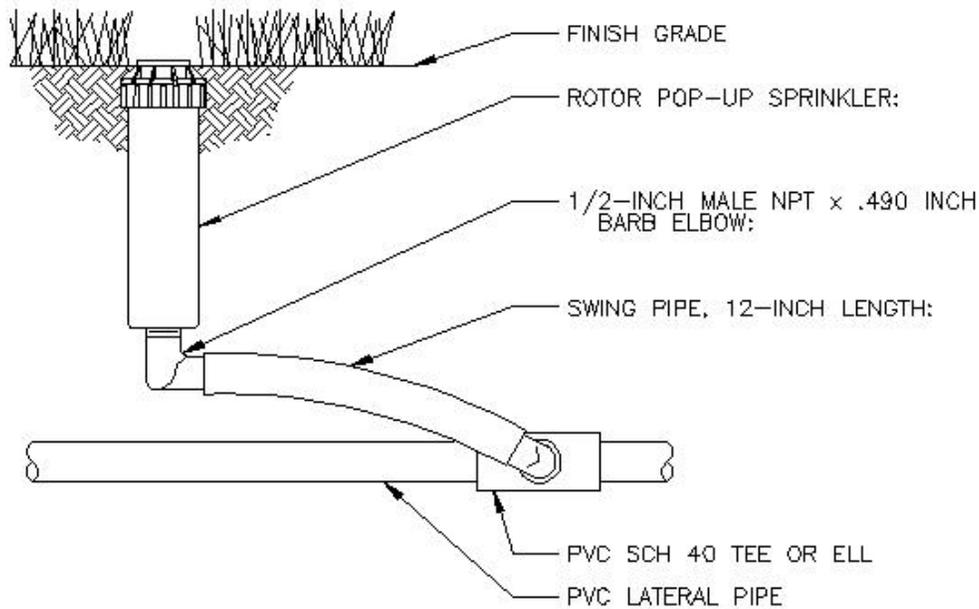
drip at the base of the sprinkler head is not a problem. Although, the Teflon tape installed on the funny pipe fittings will make adjusting the rotary heads and doing repairs simpler. Continue to all of the sprinkler heads on the zone.

Note: when pulling pipe and crossing another pipe all you need to do is expose the pipe you are going to cross and lift the blade and watch it clear the existing pipe and immediately dive the blade into the ground and you made a crossing. If it is a T location all you need to do is expose the pipe and dig a nice hole to make your splice and dive the blade in the hole and start the pull and come back later and make the splice.

## **PART VIII**

### **SETTING THE HEADS**

Burying the sprinkler heads to the right grade is very important. If the sprinkler head is too low it will not pop-up high enough and operate correctly, if it is too high it will be hit by a lawn mower. This can become a very expensive mistake. All sprinkler heads should be installed 1/4" below the finish grade of your yard. Get a 2 x 4 piece of wood and lay it across the top of the sprinkler head hole as a helper if need be. Set the sprinkler head 1/4" below the 2 x 4. Make sure the top of the sprinkler head is parallel to the ground and not crooked. If you are going to put down sod, set the sprinkler head 1/2" above the grade of the dirt. The thickness of the sod will allow the sprinkler head to be deep enough in the ground. Pack the dirt tight around the sprinkler head so when you turn it on, the water pressure at the sprinkler head does not move it out of position. If you do not have established a finish grade remember this helpful hint. It is always easier to raise a sprinkler head than it is to lower the sprinkler head. To raise a sprinkler head all you need to do is add on an extra fitting or two or when freshly installed a good pull usually works. This is where having at least a foot of funny will help. To lower the sprinkler head you have to dig it up and dig under the funny pipe to make a deeper hole. When you put the dirt back in the sprinkler head hole make sure that no rocks bigger than a golf ball are next to the sprinkler head. Big rocks make it hard to compact properly.



NOTE:

FOR FLOWS ABOVE 4 GPM USE A SWING JOINT INSTEAD OF SWING PIPE OR SWING ASSEMBLY.

SPRINKLER HEAD SET TO PROPER GRADE. 1/4" BELOW FINISH GRADE

## **PART IX** **WIRING THE VALVES**

Before you backfill the trenches you have to wire the zone valves. You have left a loop of wire at each valve hole. Score the outer jacket of the cable with a razor knife, not cutting too deep cutting into the colored wires. If you do cut too deep, splice them together with water tight connectors so they don't short out and cause electrical problems for you.

Each zone valve has two wires coming out of the solenoid on top of the valve. It does not matter which wire you use for the common wire or which wire you use for the hot wire. Just make sure that when you go into one solenoid wire with the common wire you come out of the same wire with the common wire. Always leave enough extra wire at the zone valve to allow for easy servicing of the zone valve in the future. Let's look at an example of wiring a valve by wiring the master valve. Cut open the outer jacket of the control wire. Use the white wire as the common wire. Cut the white wire and strip each end about 3/4". Join the two white wires back together by twisting them in a clockwise position. Next take one of the solenoid wires and twist it onto the stripped white wires. You may have to strip the solenoid wire a little more than it already is, just be careful not to pull it too hard, pulling the wire out of the solenoid itself. The common wire must enter and exit the same solenoid wire so it can continue to the next zone valve. Put the water tight wire connector on the twisted wires and screw it on in a clockwise motion. Now the next solenoid wire. Pick out one of the colored wires (called the hot wire) and cut it (Up Stream making the wire long) remembering to leave enough slack to reach the valve. Strip off about 3/4" on only the end of the hot wire which comes from the controller (down stream) and twist it together with the other solenoid wire. Put on the water tight connector. This hot wire does not have to continue to the next zone valve so do not make it a three wire splice as was with the

white common wire. Do yourself a favor and write down which colors on the hot wires are used for which zone valves. This will make wiring the controller easier. Continue to the next zone valve splicing into the common wire and then picking a different colored hot wire than was used for the previous valve. The only zone valve that will not have the common wire continuing on will be the last zone valve on the main line.

## **PART X**

### **BACKFILLING**

Filling in the trenches is not just pushing the dirt back and smoothing it out. During the trenching you disrupted the compaction of the ground and you must compact the trenches so they will not settle. Make sure that, as you fill in the trench the pipe is on the bottom of the trench. It is okay to step on the pipe as you backfill. As was with the sprinkler heads, you don't want any rocks larger than a golf ball or any sharp objects next to the pipe. The ground moves all the time, especially in the winter, due to frost. Sharp objects could wear on the pipe over time. This is especially true with PVC pipe because of its rigid nature. Fill up the trench partially and step on the dirt to compact it. Continue to fill up the trench and compact it as you go. If you used the pipe pulling method of installation, fill in all the holes the same way it was explained in the "setting the sprinkler heads" section of this guide. If you trenched the job you will find that the trencher has pulled the dirt to one end of the trench, you will have to carry it back up to the beginning of the trench where there is no dirt for backfilling. When backfilling the valve boxes set them to finish grade so they are not too high and get hit by the lawn mower.

You may end up with some dirt left over; most of it will be rocks which you pulled out of the trench. Save the extra dirt for a little while in case the trenches settle. You can use the extra dirt to fill in the low spots. On an average residential irrigation system the pipes and other components should not displace a lot of dirt. You should not have that much leftover.

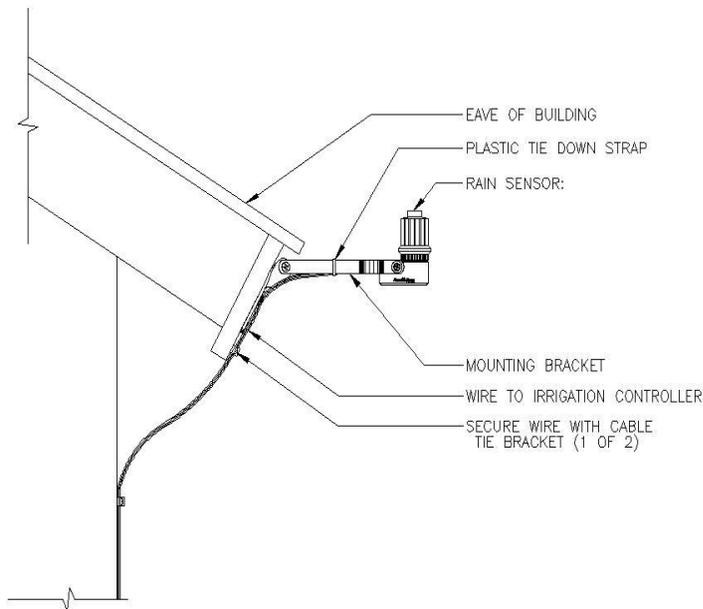
## **PART XI**

### **MOUNTING THE RAIN SENSOR**

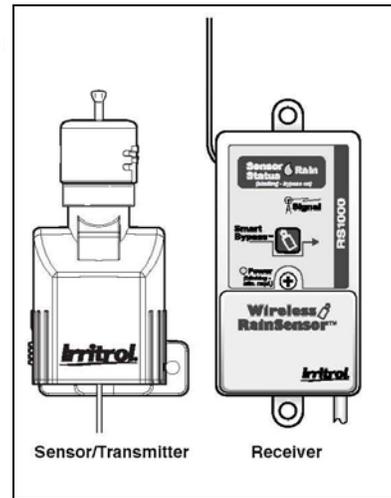
The rain sensor is mounted in an area where it will get wet. Usually this is up on the house on one of the gutters. The rain sensor wires will follow the control wire cable to the controller location. There is also a wireless rain sensor which simplifies installation by having no wires to hide on the way down the building. Almost all controllers have a built in wiring connection for wiring the rain sensor. They also have built in sensor bypasses which allow the system to be run when the sensor is wet for servicing and winterization.

### **HOW IT WORKS**

The rain sensor is wired at the controller. When it rains and the rain sensor gets wet it breaks the circuit of the common wire from the controller to the zone valves. When the rain sensor dries out it completes the common wire circuit to the zone valves, they get power when the controller calls them on and they operate.



**WIRED RAIN SENSOR**



**WIRELESS RAIN SENSOR**

## **PART XII**

### **MOUNTING THE CONTROLLER**

Refer to the installation instructions provided with your controller for specific details regarding the controller you are installing. You will first disassemble the controller so you only have the housing of the controller to work with. Put the housing up on the wall and mark the holes in the back of the housing on the wall. Depending where you mount the controller will depend on what type of wall anchors you use to do the job. If you are mounting it in a concrete wall or another type of stone you will have to use a masonry drill bit and put 1/4" plastic anchors in the wall, screwing screws through the housing into the plastic anchors. If you are mounting the controller on wall board you will need a different type of anchor will be used which you can pick up at AQUARIUS. If the controller will be mounted on a piece of wood then you won't need any anchors, regular screws usually supplied with the controller will be perfect. Once the housing is mounted put the controller back together and get ready to wire it up.

NOTE: You should mount the controller where it will be convenient to program and easy to reach with the control wires as well as the 110 volt power to plug in the controller. You can also mount weatherproof controller outside the building for easier access if needed.

## **PART XIII**

### **WIRING THE CONTROLLER**

IF YOU ARE UNSURE ABOUT WIRING THE 115 VOLTS PRIMARY SIDE OF THE CONTROLLER THEN YOU SHOULD HAVE SOMEONE KNOWLEDGEABLE DO IT. IF NOT DONE CORRECTLY DAMAGE TO THE CONTROLLER, FIRE OR ELECTROCUTION MAY OCCUR.

### **THE POWER SUPPLY (115 VOLT SIDE)**

Some controllers come with a plug in transformer follow the manufacturers installation guide to wire in the plug in transformer. Other controllers need to have a pigtail wired to it so it can be

plugged into an outlet. Follow the instructions provided with controller for wiring. Here is a brief run down on how the controller should be hooked up. Take off the protective cover which covers the built in transformer. The first wire you should splice together is the green wire on the controller. This wire **MUST** be wired to the green wire on the pigtail. If it is wired to one of the other wires it could blow out the controller and possibly start an electrical fire. **BE CAREFUL**. The green wire is the ground wire and is very important. The other two wires on the pigtail are spliced to each of the wires on the controller (White wire to white and black wire to black) and wire nuts are used to keep them secure. Replace the protective cover over the built in transformer. Do not plug in the controller until you have wired in all the field wiring.

### THE FIELD WIRING (24VOLT OUTPUT),

Referring to the notes you made when you wired the zone valves in the field splice into the cable and connect the wires to their respective spots on the terminal strip inside the controller. The white wire connecting to the post that reads COM. The master valve spot on the terminal strip is sometimes designated as PUMP. Hook up the master valve wire to this spot on the terminal strip.

All of the controller's owner's manuals have wiring instructions; refer to them if you have any questions about specific details on the particular controller you have chosen for your irrigation system.

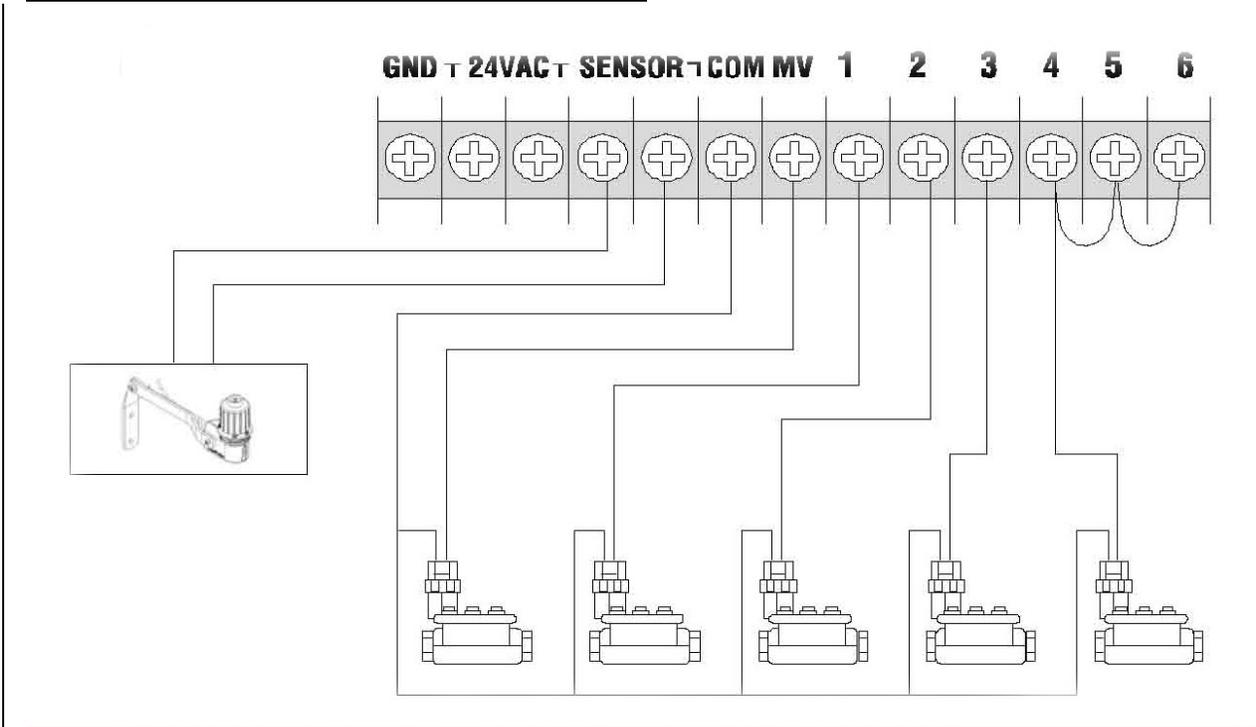
### WIRING THE RAIN SENSOR

If your lawn sprinkler system has a rain sensor you will need to wire it into the controller. The rain sensor breaks the common wire out to the valves. There are two wires from the rain sensor one of them will be spliced into the common wire and the other will be connected to the common wire post on the terminal strip on the controller. Caution should be used when using a rain sensor with a booster pump that operates off of a relay. Almost all newer controllers have rain sensor input terminals. The two wires from the rain sensor would be wired into these terminals. One wire to one terminal, the second wire to the other terminal. Controllers come with instructions and diagrams to help with this.

### RAIN SENSOR BY-PASS

By-passing the rain sensor is an important feature needed when using any rain sensing device. If the irrigation system needed to be serviced after a rain fall the rain sensor would prevent the irrigation system from operating if it was still in the off position. The by-pass will eliminate the need for you to disconnect the rain sensor at the controller in order to get the system running. Most new controllers have a built in by-pass switch. See the instruction manual for the location and operation of the by-pass.

## TERMINAL STRIP ON CONTROLLER



### **PART XIV**

#### **FILLING UP THE MAIN LINE**

Filling the mainline should be done slowly so the water does not rush through the empty pipe causing damage to the fittings and valves (Extreme water hammer as high as 600PSI). Be aware that the chances of that happening are very slim but why not be on the safe side? If your system has a master valve then filling the main line will be a little different than if the system does not have a master valve. Remember: when the handle crosses the ball valve the valve is closed. When it is parallel with the ball valve the valve is open

#### **FILLING THE MAIN LINE WITH A MASTER VALVE**

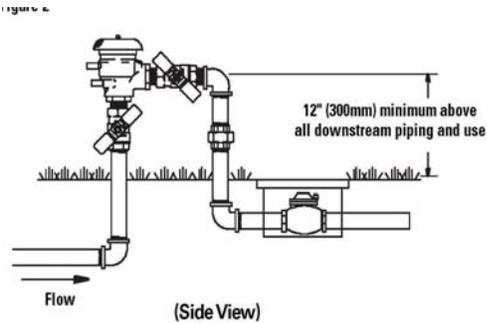
With the main valve open, the first ball valve on the backflow preventer open and the second ball valve on the backflow preventer closed, open up the master valve manually. Very slowly start to open up the second ball valve on the backflow preventer. The ball valve should only be opened half way (see below) and left alone until you hear the water stop running. Once the water has stopped running the second ball valve on the backflow preventer can be and should be opened up all the way. The main line is now full. Go back to the master valve and close the bleed screw and you can begin flushing the lines.

#### **FILLING THE MAIN LINE WITHOUT A MASTER VALVE**

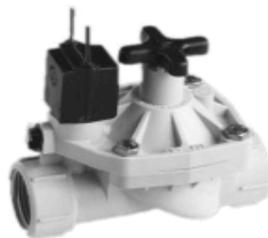
This is done the same way as if the system did have a master valve, you just do not have to worry about opening the master valve manually.



**PVB 2ND BALL VALVE  
CIRCLED**



**BACKFLOW WITH VALVES 1/2 OPEN**



**MASTER VALVE WITH MANUAL BLEED**

## **PART XV**

### **FLUSHING THE LINES**

Prior to starting up the system each of the zones should be flushed out. Go to the furthest sprinkler head on each zone and take the internal assembly of that sprinkler head out of its housing. Now go to the controller and turn on the furthest zone from the backflow preventer. This will get any air out of the main line and will flush the dirt out of the zone lines. Continue to flush each zone until they have been all flushed. Put the internal assemblies back into the sprinkler heads and you can now run through the system and adjust the sprinkler heads.

## **PART XVI**

### **ADJUSTING THE SPRINKLER HEADS**

#### **ADJUSTING ROTARY GEAR TYPE HEADS**

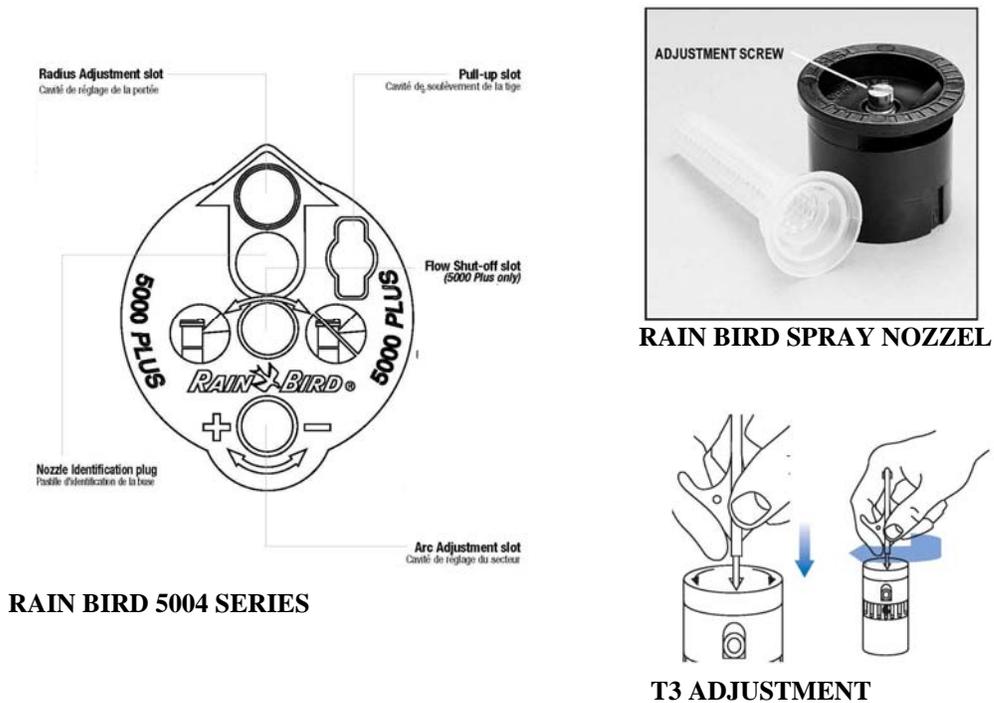
Most manufacturers have adjusting instructions which come with the sprinkler heads. The only tricky sprinkler heads to adjust will be the rotary sprinkler heads. Refer to those instructions supplied with the sprinkler heads you are using. Many rotary sprinkler heads do NOT have a ratcheting feature and if you attempt to ratchet them they will break and be worthless. Some rotary sprinkler heads do ratchet to aid in adjusting, refer to the adjusting instructions provided by the manufacturer prior to adjusting.

#### **ADJUSTING SPRAY HEADS**

The spray heads can only be adjusted as far as the distance they throw. The pattern is dictated by the nozzle type which was installed on the sprinkler head (Fixed Arch). The nozzle should be screwed on until it is tight and the stem of the sprinkler head can be ratcheted to where the spray covers the desired area.

NOTE: There is a relatively new item called an MP ROTATOR which is almost a hybrid

rotary/spray sprinkler that fits on conventional spray head bodies. This revolutionary technology is worth a serious look. Ask an AQUARIUS sales associate for details.



**PART XVII**  
**SCHEDULING THE IRRIGATION SYSTEM**

All irrigation controllers are different you will have to follow the instructions provided in the controllers owners manual in order to program the controller. All of the information provided in this part of the guide is approximate. Talk to a sales associate at AQUARIUS for more specific run times on each zone.

**ROTARY ZONE RUN TIME**

The rotary sprinkler heads will run for approximately 30 - 45 minutes per zone every other day, depending on your soil conditions and how much sun that portion of the yard gets during the day.

**SPRAY ZONE RUN TIME**

The spray sprinkler heads will run for approximately 10 - 15 minutes per zone every other day, depending on your soil conditions and how much sun that portion of the yard gets during the day. For planting beds you may run for a longer period of time less often to get some deep root penetration and then allow drying out to prevent root rot.

**DRIP IRRIGATION RUN TIME**

Drip is almost always used in planting beds. The drip irrigation portion of your lawn sprinkler system will run for approximately one hour per zone every 2 - 3 days. Depending on your soil conditions and how much sun that portion of the yard gets during the day. Because of the difference in the days that drip irrigation needs to operate a controller with more than one program needs to be used to allow for more the different schedules needed.

**WHAT IS A PROGRAM?**

Think of a program as a calendar. The best way to describe a program is give an example of how the controller would act with more than one program.

Let's say we have a six zone controller. Zones 1, 2 and 3 are zones which are dedicated to watering the lawn. Zones 4, 5 and 6 are used for drip irrigation. If we wanted to water the lawn zones everyday and the drip irrigation zones every third day we would need a controller that has at least two programs. On program A, we would set up the lawn zones (numbers 1, 2 and 3). Program A's calendar would be set up to water every day. On program B we would set up the drip irrigation zones (numbers 4, 5 and 6). Program B's calendar would be set up to water every third day. If we only had one program then we would probably have one calendar and we could not water the lawn zones and the drip irrigation zones as was described above.

**NOTE: In general the scheduling of the irrigation system is widely overlooked and us in the “clueless” water wasters of the North East could easily be accused and are guilty of wasting this precious resource water. Many systems get set to over water and never get adjusted weekly like they should. Same run times in September as July. New on the scene and revolutionizing our industry are ET (Evapo Transportation) controllers which automatically adjust run times based on real time weather condition reporting from the property or local weather services. These new items are the future and need to be taken seriously by us in the NE as our friends in the West are way ahead of us regarding water conservation. Please ask and AQUARIUS sales associate and they can give you the latest information regarding this great technology.**

## **PART XVIII**

### **DRIP IRRIGATION**

Drip irrigation is a very economical use of water, only delivering the water exactly where it is needed in very small amounts per minute. Drip irrigation uses so little water per minute it is rated in gallons per hour, (GPH). The most important thing you need to remember about drip irrigation is that the emitters that put out the water have very small holes and the water that flows through them needs to be extremely clean. There are two basic methods of drip irrigation, plugged in emitters and built in emitters.

### **WHAT'S THE DIFFERENCE BETWEEN THE TWO TYPES OF EMITTERS?**

The basic difference between the two types of emitters is that the built in emitters are spaced every so many inches in the drip tubing and the plugged in emitters are installed by you wherever you want them to be.

### **WHERE SHOULD YOU USE BUILT IN EMITTERS?**

Ideally you should use the built in emitters, better known as dripper line, in areas where the planting material is fairly close together or where you have a lot of ground cover. It is also set up in grid pattern. It is also the easiest to install.

### **WHERE SHOULD YOU USE PLUG IN EMITTERS?**

These emitters should be used in planting beds where the plant material is spaced further apart. By explaining the different components of drip irrigation one can better understand how it works. The drip irrigation zone is controlled by a regular zone valve. An air relief valve is installed next if the system is going to be installed underground, as is the way most of the dripper line, with built in emitters, is normally installed. This allows the drip tube to drain without

creating suction at the high points on the line and sucking dirt into the tube. The next part to be installed in the drip irrigation system is the filter. The most important part of all drip irrigation systems. Then a pressure regulator is installed. The pressure regulator lets the drip irrigation zone operate on a steady constant pressure usually less than 45 PSI. It is the only way to regulate the amount of water coming out of the emitters. Even though the emitters compensate for fluctuations in pressure below 45 PSI, a pressure regulator is still recommended. After the Pressure regulator is installed, the drip tubing is attached and laid out through the planting bed. All of the components just written about will be installed in one large valve box. The air relief must not be buried and the filter needs to be accessible for service. Depending on how dirty the water is the filter should be checked at least twice during the irrigation season and cleaned.

At the end of each long run of drip tube a flush valve should be installed. This valve flushes out about one gallon of water at the start of each cycle and then shuts down. Keeping the tubes clean is the only function of installing a flush valve.

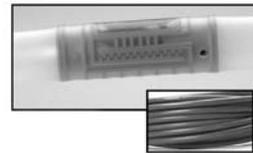
Drip irrigation does not have to be buried as deep as regular lawn irrigation. Raking away the mulch, laying out the drip tubing and covering it back up is sufficient, or you can bury it in the ground not more than 3" deep. While installing the drip tubing long landscape staples are used to hold the drip tubing in place. It is better to have it close to the surface where it can be repaired if it is cut rather than deep where it may be cut during plantings and ignored by the person planting the plants.



**FILTER**



**PRESSURE  
REGULATOR**



**DRIP LINE**



**PLUG IN EMITTER**



**SPRAY  
SPIKE**

## **PART XIX** **WINTERIZING THE SYSTEM**

Yes, if we don't get the water out of the sprinkler system it will freeze and be destroyed, and I

mean destroyed. There are two methods of getting the water out of the system, automatic drains and blowing out the system with compressed air.

### AUTOMATIC DRAINS

These devices installed in the zone and main line piping open up every time the water pressure is relieved from the zone. They need to be installed in a bed of rocks and the pipe needs to be pitched perfectly in order to drain correctly. They can also become clogged with dirt and not operate. This can happen if a leaks occurs somewhere in the system dirt get in the line and the lines before the automatic drain are not flushed out. **The problem with the automatic drain is if they don't work you don't know about it until the spring and by then it is generally too late. Aquarius Irrigation does not recommend the use of automatic drains. They are designed for warmer climates where freezing is a rare occurrence.**



AUTOMATIC DRAIN



BLOW OUT VALVE

### USING AN AIR COMPRESSOR

This is the best method of winterizing the irrigation system. You can see all of the water come out of the sprinkler heads and when all of the water is out, you're done. Renting an air compressor or purchasing one from Aquarius are a few ways to get this method accomplished. The larger the compressor the less time it takes to blow out the sprinkler system. You do not need a lot of pressure to blow out a sprinkler system; typically, 30-50 PSI is adequate. What is needed is more volume of air. If you have a large irrigation system you may need to have a tow along compressor to do the job correctly. A portable compressor can be used; it may just take a while.

### HOW IS THE SYSTEM WINTERIZED?

The main valve to the irrigation system is closed the air compressor is hooked up to the blow out valve and the controller is turned on. Each zone is turned on, just as if water was running through it, and left on until all of the water has been blown out. If you are using a portable air compressor you may have to open and close the valve on the compressor letting the compressor build up air and then release it into the irrigation system. **Too much air through a zone can destroy the heads by overheating the plastic gears running without the lubrication of water. 20-30 seconds of anatomized air/water coming out is sufficient to get the majority of the water out.**

## PART XX

### GLOSSARY OF TERMS

The description after each term is where that term is located in the irrigation system.

AIR RELIEF VALVE

Drip irrigation – used to break the suction created when installing drip irrigation underground.

BACKFILL	The act of filling in any holes or trenches you have dug.
BALL VALVE	Plumbing, backflow preventer – A manual quarter turn valve used to isolate one section from the other.
BLEED SCREW	Master Valve – When loosened master valve opens. When tight master valve is closed.
BLOW OUT VALVE	Plumbing – Used to hook up an air compressor to winterize the irrigation system. Mandatory item.
BUILT IN TRANSFORMER	Controller – Device used to step down the 100 volt to 24 volts. This is found inside the controller.
CLAMP	Poly Pipe – Used to hold pipe on fitting – see screw clamp or pinch clamp.
COM	Controller – Abbreviation for common post on the controller.
COMMON WIRE	Controller & valves – Runs to every valve to complete electrical circuit.
COMMON WIRE POST	Controller – The point on the controller where the common wire
CONTROL WIRE	Controller & valves – The wire which brings electricity from the controller to the valves.
CONTROLLER	The device which runs the irrigation system. Available in many different configurations.
COPPER PIPE	Plumbing – The pipe used to carry the water from the inside of the house to the outside of the house.
CRIMPER	Tool – Used to squeeze the pinch clamps tight.
DIRECT BURIAL	Does not need to be installed in conduit.
DRIP IRRIGATION	Planting Beds – A method of applying water in very small quantities over a long period of time, putting it only where it is needed.
DRIP TUBING	Drip Irrigation – Blank tubing used with plug in emitters.
DRIPPER LINE	Drip Irrigation – Built in emitters enable this to be run in areas which have dense planting material.
EMMITTERS	Drip Irrigation – A device which allows water to be delivered at a very slow rate in an isolated spot.
FINISH GRADE	Yard – The level of the ground when complete landscape is done.
FITTINGS	Anywhere pipe is used – these items join the pipe together.
FLOW ARROW	Valves & Backflow Preventer – Indication of which way the water must travel through the component.

FLUSH VALVE	Drip Irrigation – Used to flush out sediment in the drip irrigation lines.
FUNNY PIPE	Between zone lines and sprinkler head – used to set sprinkler head to finish grade.
FUNNY PIPE FITTING	Used to connect Funny Pipe to sprinkler head or zone line.
GPH	Gallons per hour.
GPM	Gallons per minute.
GRADE	See “Finish Grade”
HEAD FITTING	Zone line – The fitting which supplies water to the sprinkler.
HOT WIRE	Controller & Valves – The wire which attaches to the individual zone post on the controller and the wire at the valve other than the common. A colored wire other than white.
INSERT FITTING	Poly Pipe – Something used to connect the poly pipe. Also used to attach a sprinkler head or a valve to the pipe. Installed inside the pipe held in by a clamp.
LANDSCAPE STAPLES	Drip Irrigation – “U” shaped wire used to hold drip tube or dripper line in place.
LIQUID CEMENT	PVC Pipe – Used to keep fitting and pipe together.
MAIN LINE	The pipe line which feeds the zone valves.
MAIN VALVE	Plumbing – A Ball valve used to isolate the entire irrigation system. The first apperative in the plumbing.
MALE FITTING	Valves – A fitting with threads on the outside used to adapt the valves to whatever type of pipe is being used.
MASTER VALVE	Plumbing – An electrical valve used to keep a poly pipe main line from being kept under constant pressure.
PINCH CLAMP	Poly Pipe Zone Line – A stainless steel clamp which is used to keep the poly pipe on the insert fitting.
PIPE	Something which carries water from one point to another. Four types used in irrigation, pvc, poly copper and funny pipe.
PIPE PULLING	A method of installing pipe where no digging has to be done. Accomplished by a machine which drags the pipe underground.
PLUG IN TRANSFORMER	Controller – A device which steps down the 110 volt power supply to 24 volts to run the controller. This device will plug into any 110 volt receptacle.
POLY PIPE	Main and Zone lines – A flexible black plastic pipe used to carry water from the tie in to the valves then to the sprinkler heads.

	Rated at 100 PSI held together by screw clamps and pinch clamps.
PRESSURE REGULATOR	Drip Irrigation – A device which limits the amount of water pressure into the drip irrigation lines.
PRIMER	PVC Pipe and Fittings – A liquid solution used to clean and soften the pvc plastic preparing it for solvent welding.
PSI	Pounds per square inch.
PVB	Plumbing – A backflow preventer called a pressure vacuum breaker. Must be installed a minimum of 12” above the highest point on the sprinkler system, mounted outside.
PVC	Poly Vinyl Chloride – a type of pipe. See PVC pipe.
PVC Pipe	Main Line – A ridged pipe used to carry water from the tie into the zone valves. Rated at 200 PSI, held together by a solvent weld.
RAIN SENSOR	Side of house – A device which will shut down the irrigation system if the rain fall exceeds 1/8” minimum. Adjustable to 1¼” wired into the controller at the common wire post.
RAIN SENSOR BY-PASS	Controller – Used to override the rain sensor when the system needs to operate but the rain sensor is wet.
ROTARY SPRINKLER	Zone Line–A device which applies water to a specified area. Able to spray water from 15-40 feet depending on GMP and pressure available. Used primarily in larger portions of the yard.
RPA OR RPZ	Plumbing – A backflow preventer called a reduced pressure zone assembly. Must be mounted in an area where it can discharge water. Must be mounted 12” above the finish grade. Does not need to be mounted 12” above the highest point on the sprinkler system.
SCREW CLAMP	Poly Pipe – A stainless band which holds the poly pipe on the insert fitting.
SECOND BALL VALVE	Backflow preventer – The ball valve located downstream on the backflow preventer. PVB and RPA
SECOND BLOW OUT VALVE	Plumbing – A blow out valve located outside the house installed before the backflow preventer just after the copper pipe comes out through the foundation.
SLIP FITTING	PVC Pipe – Something used to connect the PVC pipe. Also used to attach a sprinkler head or a valve to the pipe installed over the pipe held on by a solvent weld.
SOLENOID	Zone Valve – Device located on the top of a zone valve turns on the zone valve electrically.
SOLENOID WIRES	Solenoid – The wire which comes off the solenoid. It does not

matter which is used for the common or the hot wire.

SOLVENT WELD	PVC Pipe and Fittings – A method of keeping the pipe and the fittings together. When the solvent weld is applied the two plastics melt a little and actually become one. Similar to metal welding but in liquid form for plastics.
SPRAY HEAD	Zone Line – A device which applies water to a specified area. Able to spray water from 6-15 feet depending on the GPM and pressure available. Used primarily in smaller portions of the yard.
SPRINKLER HEAD	Zone Line – Any device which applies water to a specified area at a specified rate of flow.
TEFLON TAPE	Male Fittings – A special tape that when wrapped around threads seals any small holes between the threads which may cause the joint to leak.
TERMINAL STRIP	Controller – The area on the controller where the control wires are attached.
TIE IN	Attaching the sprinkler system to the main pipes in the house.
TRENCHING	Digging lines in the ground for the main line pipes and zone line pipe to be installed in.
VALVE BOX	Zone Valve – A ground vault with a removable lid used for locating and servicing zone valves.
VALVE HOLE	A hole dug to install the zone valve and valve box.
WATER TIGHT CONNECTOR	Valves – This is a wire connector which will keep the electrical connections at the valve dry and corrosion free.
WATER METER	The device existing in the house separating the town from the home. It measures how much water is used. The size is usually stamped on the side of the housing.
WHITE WIRE	See common wire.
WINTERIZATION	The process of getting the water out of the irrigation system to prevent it from freezing over the winter.
ZONE	A group of the same type of sprinkler heads which operate at the same time.
ZONE LINE	The pipes which connect the valves to the sprinkler heads.
ZONE VALVE	An electrical device which separates different sections of the irrigation system. When activated it allows water to flow to the sprinkler heads which are attached to that valve.