W. P. LAW, INCORPORATED
GREENHOUSE IRRIGATION GUIDE

Introduction

Since 1970, W. P. Law, Inc. has helped meet the needs of growers by offering **profesional products and services**. This guide has been developed to help take the guesswork out of greenhouse irrigation.

Properly irrigating a greenhouse can seem overwhleming. With so many options and products available, it's easy to get confused. This guide is designed to meet the needs of the majority of greenhouse applications to **ensure proper watering of your crop.** W. P. Law, Inc. is committed to helping greenhouse growers by offering different options to meet specific irrigation needs in greenhouses.

Sprinkler and Mister Location and Supports

Two options for overhead watering are **hanging sprinkler/mister assemblies** or **sprinkler/mister assemblies mounted on ridged pipe risers**, The same sprinklers or misters can be installed either **upright** or **upside down**. Single or multi outlet dripper assemblies are available for potted plants to **reduce disease and fungus** by sending water **directly to the roots** of the plant.

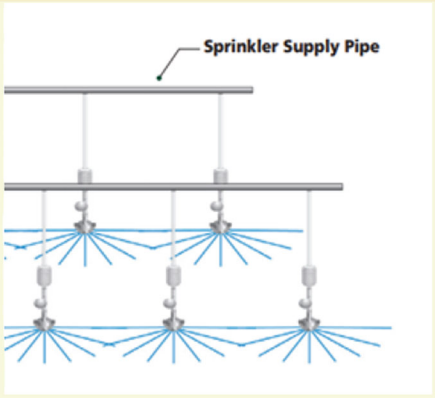
Growers looking to cut back on **time and labor** while irrigating hanging baskets can also install **hanging dripper assemblies to reduce cost**. All options can be used with **electronic controllers** to simplify the growing experience.

Overhead Application

Sprinkler and mister locations depend on the **size** and **spacing** of the table or area to be watered. Sprinklers and misters hanging from above will be spaced differently depending on the **length and width** of the area being watered.

Overhead sprinklers and misters come standard with **leak prevention devices**. This device **prevents water droplets from causing erosion damage** to the soil media below. It will also allow each sprinkler or mister to turn **simultaneously** at start up since the overhead lines remain full. This is especially important in propagation where frequent irrigation cycles are necessary. **LPDs are not needed when used on risers being supplied from the floor or bench.**

GREENHOUSE SPRINKLERS AND MISTERS				
Sprinkler / Mister	Flow Rate (GPH)	Bench Width (FT)	Sprinkler Spacing (FT)	Height Above Crop (FT)
GHVNBL	9.2	3-4	3	3
GHVNGN	11.7	5-6	3	3
GHFOG	8.1	5-8	3	2



Filtration

Greenhouse micro irrigation supplies **require at least 120 mesh (125 micron) filtration** to reduce the likeliness of emitters and micro sprinklers being clogged. **W. P. Law, Inc. offers a full line of filters needed to to clean water in small, medium, and large greenhouses.** A basic line of Amiad filters are in stock with **flows ranging from 10 to 220 gallons per minute.** A full line of sand media filters, screen filters, and disc filters can also be supplied through W. P. Law, Inc. These are also available in self-cleaning models.

Amiad 120 Mesh Filters		
Size	GPM	GPH
3/4"	10	600
1"	18	1080
1 1/2"	66	3960
2"	110	6600
3"	220	13200

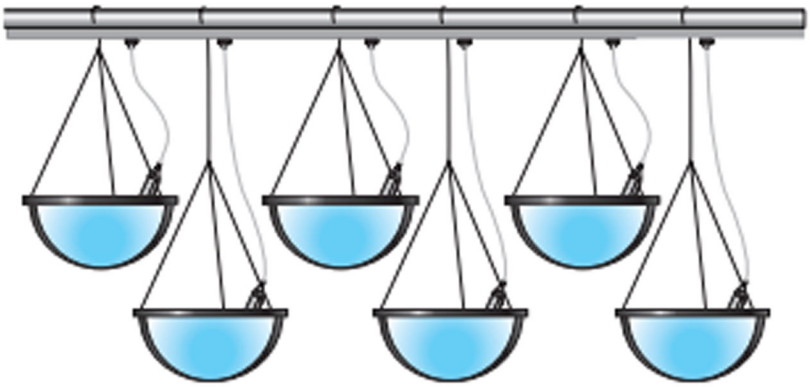
Pressure Regulators

Pressure Regulators are used in **greenhouse settings** to keep a **consistent pressure throughout the entire greenhouse** to ensure even water distribution through overhead and drip irrigation assemblies. **W. P. Law, Inc. offers a full line of pressure regulators for all flow rates.**

Pressure Regulator Flows		
Regulator Model	Size	Flow Range (gpm)
Low Flow Regulator	3/4"	.2 - 8
Medium Flow	1"	2-20
Medium Flow	1.5"	11 - 35
Medium Flow	2"	22 - 70
High Flow	2"	33 - 105
High Flow	3"	35 - 175

Hanging Basket Drip Assembly

Much like the bench-mounted dripper assemblies, the **hanging basket drippers apply water directly to the root zone.** This helps **keep plants dry** to **lower chances of disease** on plant foliage. The Drippers feature **pressure compensation** and **built-in check valves** that result in **94% uniformity** during watering **even when watering different levels of baskets as shown below**. With emiters providing a low flow of 0.5 gph, it is less likely to have overflowing baskets and water draining on the floor.



Zone Flow *(GPM)*

Number of Hanging Baskets	200	400	600	800	1000	1200	1400	1600	1800	2000
GPM	2	3	5	7	8	10	12	13	15	17

WPCJ Dripper Supply Pipe Sizing

Length of Pipe (feet)	Dripper Spacing 6"	12"	18"	24"	36"
50	16mm poly	16mm poly	16mm poly	16mm poly	16mm poly
100	½"				
150	¾" poly	½" poly			
200		¾" poly	½" poly		
250	1" poly			½" poly	
300			¾" poly		
350				¾" poly	½" poly
400		1" poly			

Control Options

Automated controls and valves are available for **any sized greenhouse**. If 120VAC is not available at the greenhouse, **a battery powered hose faucet timer can be used**. These timers are limited to 5 gpm maximum flow rate and can be used for general watering, but **not for propagation.**

For medium sized greenhouses, a controller like the **Toro Evolution Ag** can be used to provide **optimal water use efficiency for the greenhouse.** This controller will handle **up to 16 stations** and can be used for **propagation and general watering.** Additional options available for this controller include smart logic compatibility so that it can be **controlled from anywhere in the world via internet.** Additional options such as soil moisture sensors and hand held remotes are compatible with this controller. **Optional Fertilizer Injection Pumps can also be used with this controller.**

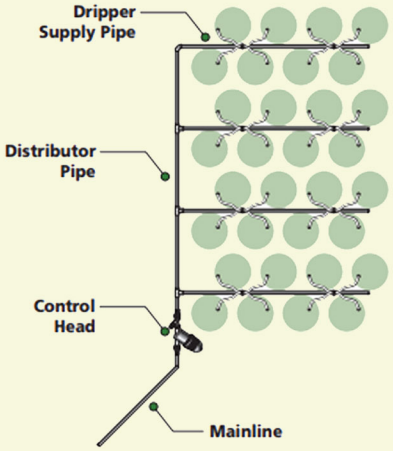
W. P. Law, Inc. is also a dealer of **high end controllers** that are used in **commercial greenhouse operations**. Controllers can be used with a variety of soil moisture probes, fertilizer injectors, and water meters to deliver real time data to a **computer or cell phone around the world.**

Bench Mounted Dripper Assemblies

Single and Multi-outlet dripper assemblies are available for potted plants. These **pressure compensating emitters and drippers result in highly uniform water outputs** to provide the same great coverage whether using **double, 4-way, or 8-way dripper assemblies**. This is a great way to **slow disease and fungus in a greenhouse setting** by keeping **plant foliage dry** and sending the water directly to the **root system**, Each assembly has a 2 gph pressure compensating dripper to ensure even coverage and flow throughout the greenhouse.

Zone Flow Chart *(GPM) Assumes use of a 2.0 GPH dripper.*

Number of Plants	200	400	600	800	1000	1200	1400	1600	1800	2000
GPM 4-Way MOD	2	3	5	7	8	10	12	13	15	17
GPM 8-Way MOD	1	2	3	3	4	5	6	7	8	8



4-Way MOD Dripper Supply Pipe Sizing

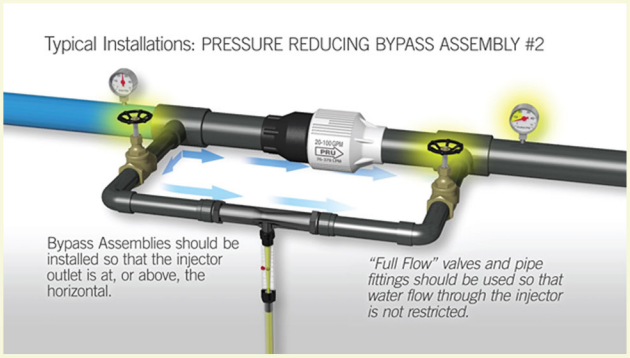
Length of Pipe (feet)	Dripper Spacing (inches) 6"	12"	18"	24"	36"
50	16mm poly	16mm poly	16mm poly	16mm poly	16mm poly
100	1/2"				
150	3/4" poly	1/2" poly			
200	1" poly	3/4" poly	1/2" poly		
250			3/4" poly	1/2" poly	
300				3/4" poly	1/2" poly
350		1" poly			
400					

Assumes 35 psi inlet pressure, 10 psi at last dripper and no slope.

Fertilizer Injection

Fertigation is a vital part of greenhouse and nursery production. Since the introduction of fertilizer injection, it has provided a **labor saving and simple** way to provide **fertilizer and pesticide treatments to crops**. A full line of fertilizer injectors can be supplied from **venturi injectors to fertilizer pumps** depending on flow rate and accuracy of injection needed. Mazzei injectors are venturi injectors that rely on **pressure differential from one side to the other** to inject fertilizer as seen below.

W. P. Law, Inc. also offers **Shurflo fertilizer injection pumps** for small to medium sized greenhouses. For larger greenhouses, **Agri-inject and Netafim Fertilizer pump**s can be provided.



Pipe and Tubing Size

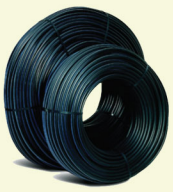
Charts shown are used to **correctly size** pipe and tubing flow rates.

Tubing		
Size	GPM	Max Pressure
16 mm (5/8")	4	60 psi
20 mm (3/4")	7	50 psi
26 mm (1")	13	45 psi

Distributor and Mainline Pipe Sizing

Pipe Size	Maximum GPM*
1/2"	6
3/4"	10
1"	17
1 1/4"	28
1 1/2"	37
2"	58

**Assumes class 160 PVC and 5 fps water velocity.*



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