

CONVERSION TABLE FOR U.S. AND METRIC SYSTEM

METRIC TO U.S.			U.S. TO METRIC		
MULTIPLY		TO OBTAIN	MULTIPLY		TO OBTAIN
millimeter (mm)	x .03937	= inches	inches (in)	x 25.4	= millimeters
centimeters (cm)	x .3937	= inches	inches (in)	x 2.54	= centimeters
meters (m)	x 39.37	= inches	inches (in)	x .254	= meters
meters (m)	x 3.281	= feet	feet (ft)	x .3048	= meters
meters (m)	x 1.094	= yards	yards (yds)	x .9144	= meters
kilometers (km)	x .6214	= miles	miles (mi)	x 1.6093	= kilometers
kilometers (km)	x 1093.62	= yards	yards (yds)	x .0001943	= kilometers
kilometers (km)	x 3280.87	= feet	feet (ft)	x .0003048	= kilometers
liters (l)	x 1.0567	= quarts	quarts (qts)	x .945	= liters
liters (l)	x .2642	= gallons	gallons (gals)	x 3.78	= liters
liters (l)	x .455	= pounds	pounds (lbs)	x 2.2	= liters
temperature in °C	(°C x 1.80) + 32°	= temp. in °F	temperature in °F	(°F - 32) x .5556	= temp. in °C
kilograms/cubic centimeter (kg/cm ³)	x 14.223	= lb/sq in (PSI)			
cubic feet (cu ft)	x 28.316	= liters			

MISCELLANEOUS CONVERSION FACTORS

MULTIPLY TO OBTAIN			MULTIPLY TO OBTAIN		
AREA			LENGTH		
acres (ac)	x 43560	= square feet	feet (ft)	x 12	= inches
acres (ac)	x 4046.8	= square meters	kilometers (km)	x .6214	= miles
square meters (sq m)	x 10.764	= square feet	miles (mi)	x 5280	= feet
square feet (sq ft)	x 144	= square inches	miles (mi)	x 1609.34	= meters
square inches (sq in)	x 6.452	= square centimeters	millimeters (mm)	x .03937	= inches
hectares (ha)	x 10000	= square meters	PRESSURE		
hectares (ha)	x 2.471	= acres	PSI	x 6.89476	= kilopascals
POWER			PSI	x .068948	= bars
kilowatts (kW)	x 1.341	= horsepower	bars	x 100	= kilopascals
FLOW			PSI	x 2.31	= feet of head
VOLUME			VOLUME		
cubic feet/minute (cu ft/min)	x .0004719	= cubic meters/second	cubic feet (cu ft)	x 7.48	= gallons
cubic feet/second (cu ft/sec)	x .02832	= cubic meters/second	cubic feet (cu ft)	x 28.32	= liters
cubic yards/minute (cu yd/min)	x .01274	= cubic meters/second	cubic meters (cu m)	x 35.31	= cubic feet
gallons/minute (gal/min)	x .22716	= cubic meters/hour	cubic meters (cu m)	x 1.3087	= cubic yards
gallons/minute (gal/min)	x 3.7854	= liters/minute	cubic yards (cu yd)	x 27	= cubic feet
gallons/minute (gal/min)	x .06309	= liters/second	cubic yards (cu yd)	x 202	= gallons
cubic meters/hour (cu m/hr)	x 16.645	= liters/minute	acres/feet (ac/ft)	x 43,560	= cubic feet
cubic meters/hour (cu m/hr)	x .2774	= liters/second	gallons (gal)	x .003785	= cubic meters
liters/minute (l/min)	x 60	= liters/second	gallons (gal)	x 3.785	= liters
VELOCITY			imperial gallons (ig)	x 1.833	= gallons
feet/second (ft/sec)	x .3048	= meters/second			

SURGE PRESSURE

$$P = \left(\frac{VL}{T} \right)$$

WHERE:

P = Pressure rise (PSI) above the static pressure

V = Velocity of flow (ft/sec)

L = Length of pipe (ft) on the pressure side of the valve

T = Closing time of valve (sec)

WATER PRESSURE

Water pressure varies by .433 PSI for each foot of elevation change, or about 1 PSI for every 2.3 ft. gained or lost.

DEFINITIONS

Static Pressure - Water pressure without movement

Dynamic Pressure - Water pressure with movement

Precipitation Rate - How fast water is applied to the soil

Transpiration Rate - Amount of water plants require to live

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Pressure drop calculations can be made for valves and strainers for different fluids, flow rates and sizes using the CV values and the following equation:

$$P = \frac{(G)^2 \text{ (specific gravity liquid)}}{(CV \text{ Factor})^2}$$

WHERE:

P = Pressure drop in PSI; feet of water = $\frac{PSI}{.4332}$

G = Gallons per minute

CV = Gallons per minute per 1 PSI pressure drop

TYPICAL SOLENOID OHM READINGS

Irritrol	24
Hunter	24
Rain Bird PGA	36
Rain Bird DV	40
Weathermatic	30
Toro 252	29
Toro 1"	53

FRICITION LOSS THROUGH FITTINGS

Friction loss through fittings is expressed in equivalent feet of the same pipe size and schedule for the system flow rate.

Schedule 40 head loss per 100-foot values are usually used for other wall thicknesses and standard iron pipe size outside diameters.

ITEM	1/2"	3/4"	1"	1-3/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Tee Run	1.0	1.4	1.7	2.3	2.7	4.0	4.9	6.1	7.9	12.3	14.0	17.5	20.0	25.0	27.0	32.0	35.0	42.0
Tee Branch	3.8	4.9	6.0	7.3	8.4	12.0	14.7	16.4	22.0	32.7	49.0	57.0	67.0	78.0	88.0	107.0	118.0	137.0
90 Ell	1.5	2.0	2.5	3.8	4.0	5.7	6.9	7.9	11.4	16.7	21.0	26.0	32.0	37.0	43.0	53.0	58.0	67.0
45 Ell	.8	1.1	1.4	1.8	2.1	2.6	3.1	4.0	5.1	8.0	10.6	13.5	15.5	18.0	20.0	23.0	25.0	30.0

LIGHTING WIRE GAUGE CHART

FEET	WATTS														
	20	40	60	80	100	120	140	160	180	200	220	240	260	280	
20	12	12	12	12	12	12	12	12	12	10	10	10	8	8	
40	12	12	12	12	12	12	12	12	10	10	10	10	8	8	
60	12	12	12	12	12	12	12	10	10	10	10	10	8	8	
80	12	12	12	12	12	12	10	10	10	10	8	8	8	8	
100	12	12	12	12	12	10	10	10	10	8	8	8	8		
120	12	12	12	10	10	10	10	8	8	8	8				
140	12	12	10	10	10	10	8	8	8						
160	12	10	10	10	10	8	8	8							
180	12	10	10	10	8	8	8								
200	10	10	10	10	8	8									
220	10	10	10	8	8										
240	10	10	10	8	8										
260	10	10	8	8	8										
280	10	10	8	8	8										
300	10	10	8	8	8										

DISTRIBUTION UNIFORMITY

Formula for finding low quarter distribution uniformity

$$DU_{lq} = \frac{LQ_{avg}}{V_{avg}}$$

WHERE

DU_{lq} = Low Quarter Distribution Uniformity

LQ_{avg} = Average Catch in Lower Quarter

V_{avg} = Average Catch Overall

DRIP IRRIGATION

Three Simple Steps to Getting Started

Step 1: Determine the water needs of plant. Consult the experts from which you purchased your plant materials, or locate the evapotranspiration (ET) data online.

Step 2: Calculate the drip application rate.

$$\text{Application Rate (in/hr)} = \frac{\text{GPH} \times 1.604}{\text{irrigated area (in square feet)}}$$

Step 3: Adjust the run times.

$$\text{Run Time (in minutes)} = \frac{\text{in. of water required}}{\text{application rate}} \times 60$$

CONVERSION FORMULAS

$$V=W/A \quad A=W/V \quad V \times A=W$$

V = Voltage

A = Amperage

W = Watts

HARDSCAPE

Sand Setting Bed and Compacted Aggregate Base Material Calculation Chart

SQUARE FEET	TONS		YDS ³		TONS		YDS ³	
	100	YDS ³	150	YDS ³	200	YDS ³		
1" Sand Setting Bed	0.45	0.3	0.75	0.5	0.9	0.6		
4" Compacted Aggregate Base	2.3	1.3	3.5	2.0	4.6	2.6		
6" Compacted Aggregate Base	3.6	2.0	5.4	3.0	7.2	4.0		
12" Compacted Aggregate Base	7.2	4.0	10.8	6.0	14.4	8.0		

Calculations are approximate. Quantities may vary depending upon material density and moisture content.

FORMULAS

Area of a rectangle	length x width
Area of a triangle	1/2 (base x height)
Area of a circle	3.14 (radius x radius)
Cubic feet	length x width x height (27 cubic feet = 1 yard)

VOLTAGE DROP

Cable Constant Voltage Drop Formulas
(run length in feet)

8 GAUGE

$$\frac{\text{watts} \times \text{run length} \times 2}{18,960} = \text{Voltage Drop}$$

10 GAUGE

$$\frac{\text{watts} \times \text{run length} \times 2}{11,920} = \text{Voltage Drop}$$

12 GAUGE

$$\frac{\text{watts} \times \text{run length} \times 2}{7,500} = \text{Voltage Drop}$$

16 GAUGE

$$\frac{\text{watts} \times \text{run length} \times 2}{2,200} = \text{Voltage Drop}$$



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