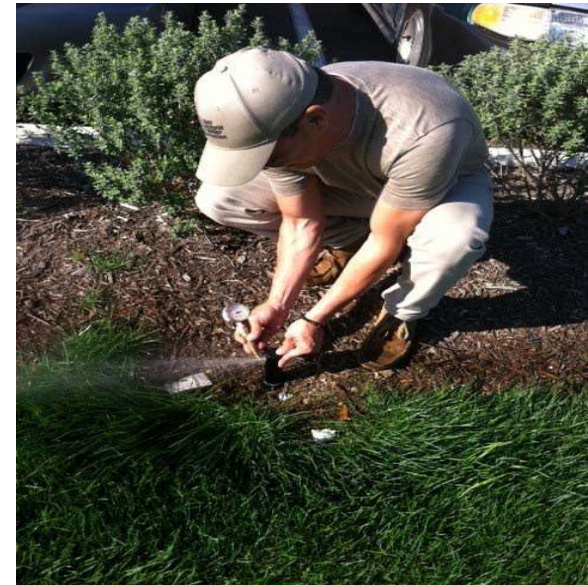


Representative Zones

Two Ways to Calculate Flow Rate in GPM's

1. Water Meter Method

**2. Pressure Readings and
Manufacturer Performance
Charts**



The Water Meter Method

Gallons or Cubic Feet?

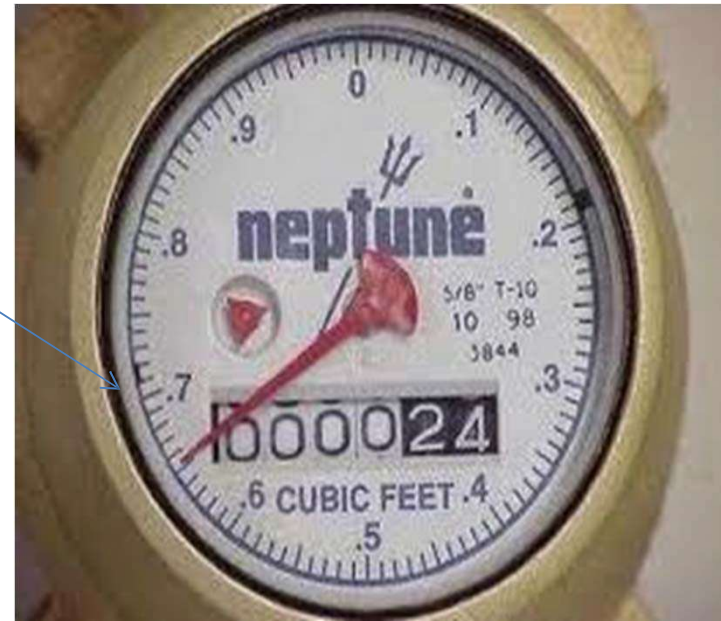
- Converting cubic feet to gallons
- 7.48 gallons in a cubic foot
- 1.5" or larger meters measure in 10 cubic feet
 - 74.8 gallons
 - Fixed zero on meter



1" or Less Meter

Meter Registers in Cubic Feet (7.48 gallons)

- Run zone for 3 minutes
- Start Read: 24.7
- Stop Read: 38.2
- $38.2 - 24.7 = 13.5$
- $13.5 \times 7.48 = 100.98$
gallons
- $101 / 3 \text{ mins} = 33.6$
gallons
- **GPM = 34 gallons**



1.5 “Meter Example





The 1.5” Meter Has a Fixed Zero (One Revolution of Meter is 74.8 Gallons)

- Run zone for 3 minutes
- Start Read: 4590.10
- Stop Read: 4591.80
- $4591.80 - 4590.10 = 1.7$
- $1.7 \times 74.8 = 127.16$
gallons
- $127.16 / 3 \text{ mins} = 42.3$
- **GPM = 42**



Pressure Readings and Manufacturer Performance Charts


Irrigation systems that are fed off a shared meter or a looped meter system will require the flow rate be calculated using the manufacturer specifications for flow rate based on head pressure.

I-25 NOZZLE PERFORMANCE DATA				VIEW NOZZLE	
Nozzle	Pressure	Radius	Flow	Precip in/hr	
	PSI	ft	GPM	■	▲
4  Yellow	40	40	3.8	0.46	0.53
	50	41	4.3	0.49	0.57
	60	42	4.7	0.51	0.59
	70	43	5.1	0.53	0.61
5  White	40	43	4.4	0.46	0.53
	50	44	4.8	0.48	0.55
	60	45	5.3	0.50	0.58
	70	46	5.6	0.51	0.59
7  Orange*	40	45	6.6	0.63	0.72
	50	47	7.0	0.61	0.70
	60	48	7.5	0.63	0.72
	70	49	7.9	0.63	0.73
8  Lt. Brown	40	47	7.7	0.67	0.77
	50	49	8.3	0.67	0.77
	60	50	9.2	0.71	0.82
	70	51	9.9	0.73	0.85

Product Information

UNDERHILL A-PHG-160K Head Checker Gauge

HeadChecker™ combines a solid brass Pitot tube and a liquid-filled 160 psi gauge to create a handy tool for measuring nozzle discharge pressure. Assuring correct pressures is essential to maintaining highly uniform irrigation systems. The 160 psi gauge can also be used separately to measure pipeline pressure.




Rotor Zones

Step 1: Take a pressure reading at rotor with pitot tube and gauge

Step 2: Determine approximate radius throw of the rotor nozzles in the zone

Step 3: Reference manufacturer performance chart for the make/model of rotor to find the GPM based on PSI and radius

Step 4: Multiply the GPM for individual rotor by the total # of rotors in the zone to determine the Total GPM for the Representative Zone

Example

Step 1: Zone Pressure reading at individual rotor is 40 PSI

Step 2: Rotors in zone have approximate 40' radius





Step 3: Reference manufacturer performance chart to identify GPM per rotor:

Yellow # 4 nozzle: 3.8 GPM

Step 4: Multiply individual rotor GPM x # of rotor heads in zone

10 rotors in zone x 3.8 GPM





Total GPM for Zone: 38 GPM

I-25 NOZZLE PERFORMANCE DATA				VIEW NOZZLE	
Nozzle	Pressure PSI	Radius ft	Flow GPM	Precip in/hr ■ ▲	
4  Yellow	40	40	3.8	0.46	0.53
	50	41	4.3	0.49	0.57
	60	42	4.7	0.51	0.59
	70	43	5.1	0.53	0.61
5  White	40	43	4.4	0.46	0.53
	50	44	4.8	0.48	0.55
	60	45	5.3	0.50	0.58
	70	46	5.6	0.51	0.59
7  Orange*	40	45	6.6	0.63	0.72
	50	47	7.0	0.61	0.70
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	70	49	7.9	0.63	0.73
8  Lt. Brown	40	47	7.7	0.67	0.77
	50	49	8.3	0.67	0.77
	60	50	9.2	0.71	0.82
	70	51	9.9	0.73	0.85

Spray Zones

10 Series VAN

10° Trajectory

Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
360° Arc 	15	7	1.93	3.80	4.39
	20	8	2.32	3.50	4.04
	25	9	2.52	3.00	3.46
	30	10	2.60	2.50	2.89
270° Arc 	15	7	1.45	3.80	4.39
	20	8	1.75	3.50	4.04
	25	9	1.89	3.00	3.46
	30	10	2.10	2.70	3.12
180° Arc 	15	7	0.97	3.80	4.39
	20	8	1.20	3.50	4.04
	25	9	1.26	3.00	3.46
	30	10	1.45	2.80	3.23
90° Arc 	15	7	0.48	3.80	4.39
	20	8	0.58	3.50	4.04
	25	9	0.63	3.00	3.46
	30	10	0.75	2.90	3.35



Spray Zones

Step 1: Take the pressure reading for the zone at individual spray head using spray head pressure gauge

Step 2: Identify type and quantity of spray heads in zone

Step 3: Reference the manufacturer performance chart for EACH ARC of each spray head type in the zone and find the GPM per each head type

Step 4: Add up the GPM for all the spray heads in the zone to determine the Total GPM for the Representative Spray Zone

Example

Step 1: pressure reading at furthest spray head is 30 PSI

Step 2: Identify ARC and quantity of spray heads in the zone

10 count of the 360 Arc nozzle

10 count of the 180 Arc nozzle

Step 3: Reference manufacturer performance chart to identify GPM per nozzle type:

360 Arc nozzle: 2.60 GPM





180 Arc nozzle: 1.45 GPM

Step 4: Sum the GPM for all heads in zone

2.60 GPM X 10 heads = 26 GPM

1.45 GPM X 10 heads = 14.5 GPM

Total GPM for the Representative Zone = 41 GPM

10 Series VAN					
10° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	Precip In/h	Precip In/h
	15	7	1.93	3.80	4.39
	20	8	2.32	3.50	4.04
	25	9	2.52	3.00	3.46
	30	10	2.60	2.50	2.89
	15	7	1.45	3.80	4.39
	20	8	1.75	3.50	4.04
	25	9	1.89	3.00	3.46
	30	10	2.10	2.70	3.12
	15	7	0.97	3.80	4.39
	20	8	1.20	3.50	4.04
	25	9	1.26	3.00	3.46
	30	10	1.45	2.80	3.23
	15	7	0.48	3.80	4.39
	20	8	0.58	3.50	4.04
	25	9	0.63	3.00	3.46
	30	10	0.75	2.90	3.35

Drip Zones

To calculate the flow rate for representative drip zone will require the following: the approximate total length of drip tubing, the emitter spacing and the emitter flow rate



Drip Zone

Example

Step 1: Determine the total length of the drip tubing in the zone:

Drip zone has 5 lateral lines of tubing.

Each lateral line is 75' in length.

$5 \times 75' = \mathbf{375' \text{ of drip tubing}}$

Step 2: Determine the total # of emitters in the zone:

The emitters are spaced 18" apart (1.5' feet)

$375' / 1.5' = \mathbf{250 \text{ emitters in the zone}}$

Step 3: Determine the total flow rate (GPM) for the zone:

Per manufacturer performance chart, the emitter rate is .9 GPH

$250 \text{ emitters} \times .9 \text{ GPH} = 225 \text{ GPH}$

$225 \text{ GPH} / 60 \text{ min} = 3.75 \text{ GPM}$

Total GPM for the Representative Zone = 4 GPM

Bubbler Zones

To calculate the GPM for bubbler zone, reference manufacturer performance chart. Assume 30 PSI for the Bubbler nozzle, and reference the corresponding nozzle.

Step 1: Locate the different nozzles present in the zone:

Full nozzle: Model # MSBN-10 F 1.0 GPM Half Nozzle
Model # MSBN-50 H has .5 GPM




Step 2: Determine the total # of emitters in the Zone:

10 Full nozzles: $\text{GPM } 1.0 \times 10 = 10 \text{ GPM}$

10 half nozzles: $\text{GPM } .5 \times 10 = 5 \text{ GPM}$

Total GPM for Representative Zone = 15 GPM

Multi-Stream Bubbler Performance Data

Arc	Model	Pressure	Flow	Radius
		PSI	GPM	ft.
	MSBN-25Q	30	0.25	1.0
	MSBN-50Q	30	0.50	1.5
	MSBN-50H	30	0.50	1.0
	MSBN-10H	30	1.00	1.5
	MSBN-10F	30	1.00	1.0
	MSBN-20F	30	2.00	1.5

Note: Typical spacing 2 to 4 ft.

