



MP ROTATOR[®]



**A WATER CONSERVATION
DEVICE FOR TURF &
LANDSCAPE IRRIGATION**

THE CLAIM:

The MP Rotator is a water-conserving sprinkler

At Nelson Irrigation Corporation and Walla Walla Sprinkler Company, we take the claims that we make seriously and we think it is important to substantiate this claim.

THE GOAL: TO SAVE WATER!

A water-conserving sprinkler must have the following characteristics:

- Low precipitation rate to reduce runoff
- Effective arc and radius adjustment to reduce overspray
- Matched precipitation rate after arc and radius adjustment
- High uniformity of water application
- Resistance to the negative effects of wind
- Functional reliability

The “smart” controllers and moisture sensors now available can determine the theoretical amount and timing of water required to match soil, plant and climatic conditions. Even with these scheduling tools, an efficient irrigation system requires sprinklers that have the above characteristics.

THE SOLUTION: MP ROTATOR®

The MP Rotator employs unique, multi-stream, multi-trajectory rotating stream technology to achieve water-conserving results. The MP Rotator is a breakthrough solution enabling levels of conservation that are increasingly necessary and even mandated.

Since the MP Rotator is targeted for sprinkler spacings in the 8' to 30' (2.5-9 m) range, this paper will compare the water conservation characteristics of the MP Rotator to both traditional spray heads and short range rotors that cover that same spacing range.

THE PROBLEM:

Runoff caused by high precipitation rate spray heads

The concept is very basic; if water is applied faster than the soil can absorb the water, wasteful runoff is inevitable.

Spray heads are well known to have precipitation rates that are significantly higher than the intake rate of most soil conditions.

Soils in urban landscape environments are typically compacted, non-homogeneous, and often feature sloped areas. These areas are especially prone to runoff — even with short, frequent irrigation cycles.

For the last five to six decades, the only option for sprinkler irrigation of smaller turf and landscape areas was traditional fixed-arc spray heads. Despite being recognized as a low-efficiency product, spray heads have been widely accepted because no alternative technology has been available, until now.

THE ADVANTAGE: MP ROTATOR®

A low precipitation rate sprinkler

The MP Rotator applies water at approximately 1/3 the rate of spray heads, allowing for a much greater opportunity for water to infiltrate the soil without runoff. For the first time in over 50 years, the industry has a low precipitation rate product to efficiently irrigate smaller turf and landscape areas.

THE PROBLEM:

Increased runoff after reducing the radius of a spray head

Reducing the radius of a spray head increases the precipitation rate to even higher levels, compounding the runoff problem.

While spray head manufacturers claim the radius can be reduced by up to 25%, they don't tell you that the precipitation rate actually increases by as much as 30% to levels that inevitably produce irrigation runoff ... even with the shortest of irrigation cycles.

THE ADVANTAGE: MP ROTATOR®

Adjustable radius with matched precipitation

The radius of the MP Rotator can also be reduced by 25%. As the radius is reduced, the flow is reduced proportionately.

This allows the sprinkler to maintain matched precipitation, applying the same depth of water to all of the irrigated area.

THE PROBLEM:

Obsolete fixed arc spray head technology

The most under developed aspect of spray head technology is the inability to provide for arc adjustment*. Fixed arc spray heads are difficult to fit into typical landscape designs without causing overspray and uniformity problems, both of which contribute to runoff.

*While it is acknowledged that variable arc spray nozzles are available, they are not considered in this discussion about water conservation because they have even higher precipitation rates and poorer uniformity than fixed arc spray nozzles which dominate the professional landscape market.

THE ADVANTAGE: MP ROTATOR®

Adjustable arc with matched precipitation

The MP Rotator not only features a fully adjustable arc, but as the arc is changed, the flow adjusts proportionately to maintain matched precipitation.

It maintains its low precipitation and high uniformity while being adjusted for radius and arc to provide a perfect fit to the landscape area.

These unique capabilities warrant the claim that no other sprinkler manufacturer in the world can make about their sprinkler:

“Matched precipitation ...any arc ...any radius.”

THE PROBLEM:

Increased water use due to poor spray head uniformity

It is commonly understood in the industry that spray heads provide relatively poor uniformity. What is often misunderstood is how the concept of uniformity relates to irrigation efficiency, and just how important uniformity is.

We can all relate to uniformity problems when brown spots start to show up in the turf during the heat of the season.

The usual solution is to increase the run time on our irrigation timers. In reality, compensating for inadequate uniformity by increasing the watering time wastes even more water.

THE STUDY: MP ROTATOR®

The most informative source on the subject of uniformity is a technical paper authored by Joseph Kissinger and Dr. Kenneth H. Solomon, summarizing their research on the water conservation potential of multi-stream, multi-trajectory rotating sprinklers like the MP Rotator.

This is the first research paper that quantifies the water-savings potential and provides a solid technical basis to substantiate our claims.

In this study, several spray head systems were audited by independent auditors. The systems were converted to the MP Rotator and re-audited to measure the difference in the uniformity of water application. The amount of water saved depended upon the irrigation scheduling technique of the irrigation manager both before and after the audits:

- If pre-conversion irrigation scheduling followed the Irrigation Association's recommendation based upon DU_{LH} , the dry areas were eliminated and the water savings averaged 22%.
- If pre-conversion scheduling was simply to eliminate the dry areas by increasing the watering time (equivalent to scheduling based upon DU_{L30}), the water savings averaged 41%.

This paper is posted at www.mprotator.com or available in hard copy upon request.

THE PROBLEM:

Rotors also have a problem with high precipitation rates

High precipitation rate problems with rotors occur when either an arc adjustment is made, or the radius is reduced. Rotors do not have the capability to change the flow when the arc and/or radius are adjusted.

When the radius of a rotor is reduced, and the nozzle is not changed, the flow remains constant and that same flow is applied to a smaller area. This increases the precipitation rate dramatically. For example, a 30' (9 m) rotor with a radius reduced by 25% to 22.5' (6.8 m) increases the precipitation rate by a staggering 78%.

When the arc of a rotor is reduced, the flow remains constant, and the same water flow is again applied to a smaller area, increasing the precipitation rate. For example, if a rotor is set at 180° and then closed down by 30°, the precipitation rate will increase by 20%.

The “Nozzle Tree” ... too little, too late.

Most manufacturers provide a nozzle tree with each rotor. The installer must attempt to choose the correct nozzle for the arc or radius setting, install it in the field and then discard the other nozzles.

Changing a rotor nozzle to maintain matched precipitation in response to an arc or radius adjustment is an impractical approach, as it is technically impossible to select a nozzle that will provide matched precipitation at all possible arc or radius settings.

THE SOLUTION: MP ROTATOR®

Matched precipitation ... any arc ... any radius

The flow of the MP Rotator changes proportionately to the area being covered when the arc and/or the radius are changed. This maintains the original precipitation rate.

Matched precipitation ... any arc ... any radius — a claim that no other rotor manufacturer in the world can make.

THE PROBLEM:

High instantaneous precipitation rates of rotors

The instantaneous precipitation rate is what the soil actually sees during the instant when the stream passes over it.

The instantaneous precipitation rate of rotors is several times greater than their average precipitation rate. The intensity of the stream impacting the soil is a major contributor to runoff.

Radius adjustment on conventional rotors further compounds these problems because the same amount of water is being applied to a smaller area, dramatically increasing the instantaneous precipitation rate.

Decades of nozzle research, but no real solution!

Rotor manufacturers have struggled with nozzle design for decades. The task is very demanding, as a lot is required of a nozzle — throw water as far as possible ... produce good uniformity of coverage ... fight the wind ... produce gentle droplets to minimize soil surface damage and provide good in-close water for acceptable coverage. Many of these requirements contradict each other so that the nozzle design becomes a series of compromises.

Two very important innovations!

Eliminate the Nozzle

Our engineers decided not to fight a losing battle — they eliminated the nozzle altogether! They developed an adjustable orifice and internal throttle that increases and decreases the flow as the arc or radius is changed to maintain matched precipitation at any arc or radius.

Multiple Streams and Multiple Trajectories

Another signature innovation of the MP Rotator is the use of multiple streams with multiple trajectories. Water emitting from the adjustable orifice is divided into multiple streams as it impinges on the grooved rotor plate. Each groove has been crafted to produce a series of high performance streams, each with a specific purpose — some to maximize the radius of throw and to fight the wind ... some to provide intermediate and in-close uniformity ... and yet others to provide strong rotating torque to overcome the resistance of the viscous brake ... and all to present gentle droplets to the soil.

All of the streams are designed for high performance over a wide range of pressures to minimize water loss due to wind drift and evaporation, as well as to produce good uniformity.

Multiple rotating streams dramatically reduce the high instantaneous application rate and treat the soil very gently because the water is spread out over the entire pattern during operation.

FUNCTIONAL RELIABILITY

Quantifying the loss or gain in irrigation efficiency due to the functional reliability of a sprinkler is a difficult task. However, it is very easy to envision that most all sprinkler failures or malfunctions result in inefficient system performance and waste of water.

The MP Rotator brings a new level of reliability to the Turf and Landscape Irrigation Industry. With more than two decades of operation in the demanding conditions of agricultural irrigation throughout the world, Rotator® technology has set a new standard for reliability, longevity and performance.

Summary

We believe our claim that the MP Rotator is a water conserving sprinkler is well founded and legitimate. While it is not possible to quantify the exact water-savings potential of the MP Rotator, the “feature by feature” comparison in this paper brings the conserving potential into perspective. The water savings potential is real ... it is big ... and it is the future.

U.S. Patents:

5,058,806

5,288,022

6,244,521

6,499,672

6,651,905

6,688,539

6,736,332

7,032,836

Licensed U.S. Patents:

4,842,201

4,867,379

4,898,332

4,967,961

Numerous corresponding foreign patents.

Other patents pending.



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