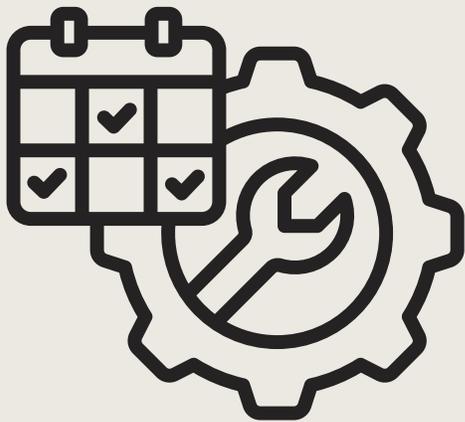


# Nanobubble **water conditioning** for Reverse Osmosis Machines.



**CRS**  
CHEMICAL REDUCTION SOLUTIONS

Drier Cars. Cleaner RO Water. Less Maintenance.



## RO Feed Water Is Working Against You

Mineral scaling, particulate fouling, and unstable water behavior limit RO performance, reduce spot-free capacity, and accelerate membrane fouling.

The result is shorter membrane life, lower permeate output, inconsistent rinse quality, increased chemical cleaning, and unplanned maintenance, all of which cap throughput and increase operating costs.



## CRS Solution

CRS installs a patent-pending, passive nanobubble generator inline on key car wash water lines. Using hydrodynamic cavitation and electro-ionization, the system continuously conditions water before it reaches RO machines and rinse stages.

## Key Benefits



- Improved pretreatment and filtration efficiency
- Higher quality spot-free rinse
- Reduced scale and fouling in RO membranes and plumbing
- Improved RO reliability and uptime
- Extended membrane and equipment life
- Less algae growth in bays
- No electricity or consumables

Connect with  
**CRS**

[www.chemicalreduction.com](http://www.chemicalreduction.com)

BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.



# CRS

CHEMICAL REDUCTION SOLUTIONS

## WHAT IS A NANOBUBBLE?



### Tiny. Stable. Game Changing.

2500 times smaller than a grain of sand, nanobubbles are so small that they have a lower bouyancy and will remain suspended in water for a long time

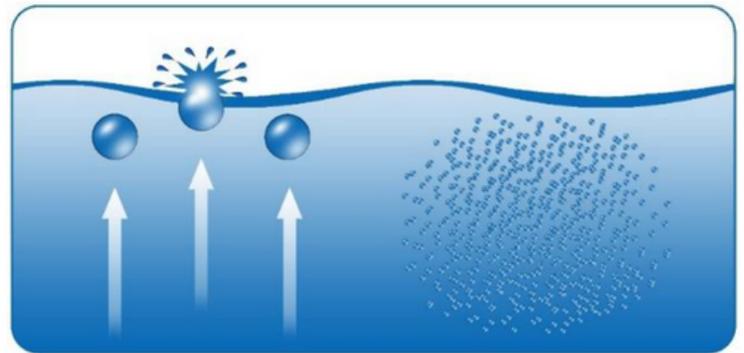


### Industrially Useful

Nanobubbles are useful in removing and preventing scale and biofilm growth, improving heat transfer, inhibiting rust, reducing surface tension and improving filtration efficacy

## We are the **future** of your business

CRS is on a mission to use their economical and simple nanobubble generator, The Shaft, to improve profitability and reliability of water systems



nanobubbles remain suspended in water

# 575+

CRS SHAFTS  
DEPLOYED IN 2025

MORE THAN  
**15 years**

OF EXPERIENCE

# 500+ million

GALLONS OF WATER  
TREATED BY THE SHAFT PER  
MONTH



## Connect with CRS

[www.chemicalreduction.com](http://www.chemicalreduction.com)

BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.



**CRS**  
CHEMICAL REDUCTION SOLUTIONS

HOW ARE NANO BUBBLES FORMED?



**Hydrodynamic Cavitation**

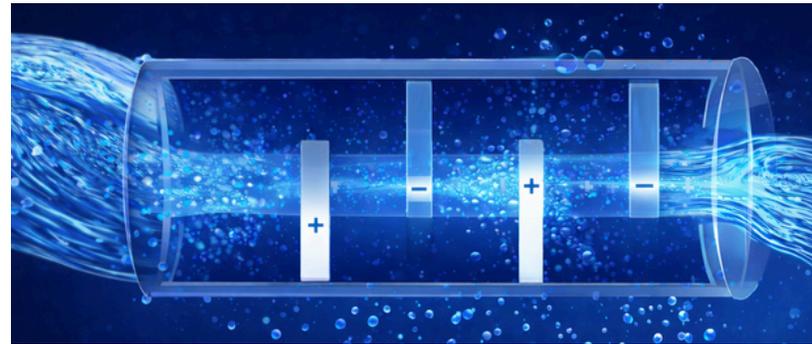
As water flows through The Shaft, the internal geometry creates localized pressure differentials and high shear zones. Under appropriate flow conditions, these effects induce controlled hydrodynamic cavitation



**Ionization of Entrained Gas**

Nanobubbles are formed under more lenient flow conditions when the gasses that are entrained in water are ionized or charged by The Shaft's proprietary metal alloy baffles

**Hydrodynamic cavitation plus entrained gas ionization**



Hydrodynamic cavitation is a well-documented physical phenomenon in which microscopic vapor- or gas-filled cavities form and collapse due to transient pressure reductions in a moving liquid. In The Shaft, this process also results in the formation of stable micro- and nanobubbles.

**575+**

CRS SHAFTS DEPLOYED IN 2025

MORE THAN  
**15 years**

OF EXPERIENCE

**500+ million**

GALLONS OF WATER TREATED BY THE SHAFT PER MONTH



Connect with  
**CRS**

[www.chemicalreduction.com](http://www.chemicalreduction.com)

BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.

# SHAFT® NANOBUBBLE GENERATOR

## Spot Free Rinse Installation Instructions

### APPLICATIONS

- Suitable for all reverse osmosis machines
- Designed for municipal or treated water
- No power, no programming, no maintenance required
- Installs before the pre-filter
- Can flow in either direction

### IMPORTANT INSTALL LOCATION

The SHAFT® MUST be installed BEFORE the water filter  
Why? Nanobubbles cause suspended minerals and impurities to coagulate, which:

- Extends filter life
- Improves filtration effectiveness
- Reduces scale and biofilm inside the RO machine



### THREAD SEALANT REQUIREMENT

- Use Loctite 55 cord
- Apply to all NPT threads
- Do not use excessive sealant

### TWO INSTALLATION STRATEGIES (SIMPLE & PERFORMANCE BOOSTING)

**Single Pass:** Place the Shaft upstream of your earliest pre-filter to protect your RO system, improve pre-filtration, lower scale buildup and infuse both RO permeate and reject water with nanobubbles

**Multi-Pass Recirculation (Premium Drying Performance):** Create a recirculation loop inside the RO permeate tank using a submersible pump. With each pass through the SHAFT, ORP and drying performance improves



**CRS**  
CHEMICAL REDUCTION SOLUTIONS



### INSTALLATION STEPS

01

**Shut Off Water Supply**  
and relieve pressure by opening a downstream fitting

02

**Disconnect the water line immediately before the filter**

03

**Install CRS SHAFT® inline**  
Using appropriate thread sealant and fittings

04

**Restore Water Supply**

05

**Check for Leaks**

06

**Flush and Return to Service**  
If machine is badly scaled a good flush should be done before re-using

### TECH NOTES (FOR SERVICE MANAGERS)

- No pressure drop impact on RO machines
- Compatible with carbon, sediment, and other pre-filters
- Passive device – cannot fail electrically



BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.

# SHAFT® NANOBUBBLE GENERATOR

## Spot Free Rinse Unit Model Selection

### INSTALL TIPS

- Use the lowest flow SHAFT® that will NOT trigger a low pressure fault on the RO machine
- After initial installation and after running the SHAFT® for several days, change RO pre-filters to maximize effect
- The SHAFT® cannot repair RO membranes with channels and holes, but can improve lifespan



**CRS**  
CHEMICAL REDUCTION SOLUTIONS



### SHAFT® MODEL SIZING

01

#### Measure the Total RO Flow

Permeate Flow + Reject Flow = Total Flow

02

#### Choose the Right SHAFT®

**TOTAL RO FLOW**  
(Permeate + Reject)

**SHAFT® UNIT**

1 - 2 GPM

CRS79

3 - 4 GPM

CRS190

5 - 7 GPM

CRS285

8 - 13 GPM

CRS538

14 - 20 GPM

CRS887

### SONNY'S MODEL NUMBERS

SONNY'S RO Machine	SHAFT® UNIT
VROF-2	CRS285
VROF-4	CRS538
VROF-6	CRS887
VROF-8	CRS887
VROF-12	CRS1585



BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.