



# CBW<sup>®</sup> CONTINUOUS BATCH WASHERS



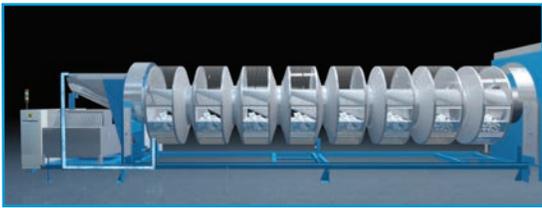
 **PulseFlow<sup>®</sup>**  
TECHNOLOGY

Revolutionizing Laundry Processing Technology. Again.

# SUPERIOR

## ON VERY RARE OCCASIONS, AN EVOLUTION TAKES PLACE THAT MAKES EVERYONE STOP AND NOTICE.

Pellerin Milnor Corporation has developed a revolutionary system—PulseFlow® Technology with several patented and patent-pending features—which has been successfully implemented in healthcare, hospitality, and linen supply applications worldwide. The superior soil removal and rinsing performance of PulseFlow Technology has been verified by independent testing laboratories and has earned a Hohenstein Certificate.



PulseFlow Technology in a new Milnor CBW® washer offers:

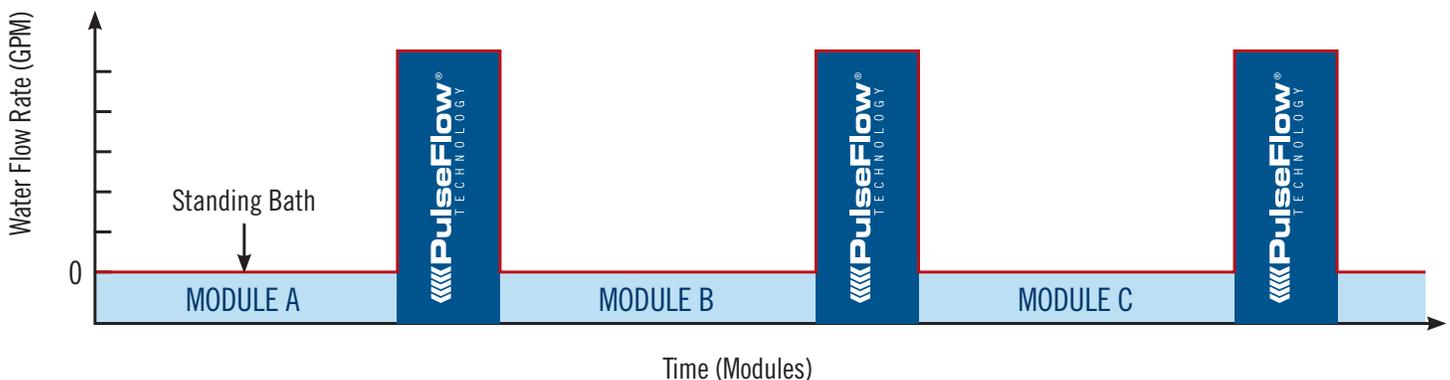
- Lowest Water Consumption
- Enhanced Chemical Performance
- Low Energy Usage
- Faster Washing

## THE NEXT GENERATION OF CBW WASHERS

Milnor's PulseFlow Technology CBW washer retains all the proven features that have made the Milnor CBW washer a market leader for over 40 years. The PulseFlow concept improves upon that technology with *increased* productivity, *more efficient use* of chemical energy, *reduced* utilities and the *lowest possible amount* of water without external filtration.

PulseFlow Technology combines traditional True Top Transfer with standing bath washing and controlled intermittent counterflow rinsing in every process module. For the greatest part of each cycle, processing without counterflow creates standing baths so chemicals in the wash liquor reach equilibrium faster and are allowed to do their job without being diluted. Then, for a very short portion of each cycle, high-velocity counterflow is applied, "PulseFlow," thus providing the first part of the required dilution effect. The second stage of dilution, True Top Transfer, ensures the goods move into far cleaner water every time. Dedicated rinse modules are not required, meaning more production from fewer modules.

**Milnor's PulseFlow Technology is a unique and simple solution for faster and more water-efficient washing in a Continuous Batch Washer.**



*Proven Milnor Top Transfer design leaves the dirty free water behind for immediate dilution upon each transfer.*

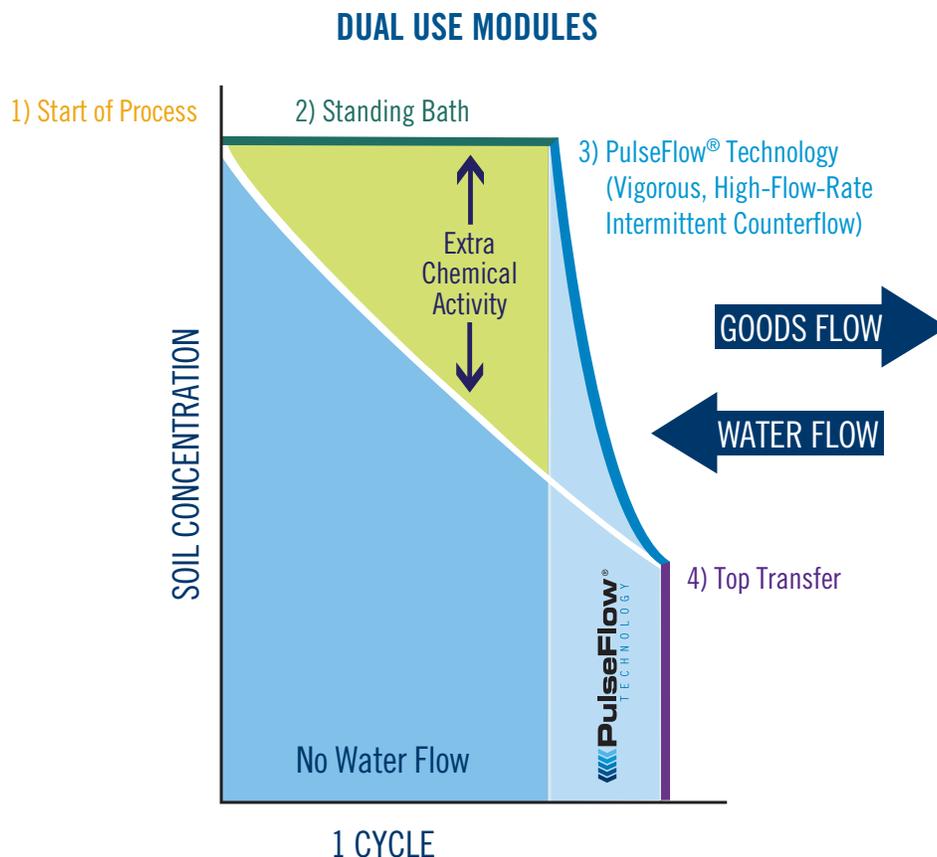
# DILUTION



With Milnor's PulseFlow Technology, we simply stop the counterflow completely for the first 65-75% of each transfer cycle and then pump the entire amount of counterflow water at a very fast rate in the final 25-35% of the time remaining. The pumps are high-volume, variable speed inverter-driven so that both flow rate and duration of the counter-flowing water can be fully controlled based on goods being processed. The high-velocity flow gives better rinsing action and uses far less water.

This chart represents the concentration of dirt and chemicals in successive modules.

- 1 At the start of processing in the first module, soil concentration is at its highest level.
- 2 With PulseFlow technology, the counterflow is delayed for approximately 70% of the cycle time, allowing for extra chemical time at full strength (green line).
- 3 Then for the remainder of the cycle time, the PulseFlow pumps are activated to provide a vigorous high-volume counterflow (blue line).
- 4 Next, transfer occurs using top transfer (purple line). The sequence is repeated in successive modules for the programmed process time.



## LOWEST WATER CONSUMPTION

Milnor PBW™ (PulseFlow Batch Washer) washers achieve very low fresh water consumption—less than any other tunnel washer. For light soil linen, the water consumption is as low as 0.3 gal/lb (2.5 L/kg) of linen processed. For most heavy soil linen, the expected water consumption is as low as 0.5 gal/lb (4 L/kg).

PulseFlow Technology saves water with these features:

- **Patented Interrupted Counterflow:** Water only flows for rinsing which is about the last 25–35% of each cycle.
- **Controlled Flow:** Water is delivered by high-volume inverter pumps with vigorous flow that removes suspended soil and used chemistry faster, with less water.
- **Patented Dual-Use Modules:** Each process module is used for both standing bath washing AND counterflow rinsing.
- **Full Water Availability:** Fresh water and water recovered from the extraction device are collected in a divided tank mounted within the washer frame (*under the load scoop*). No external tanks are required. The last water the goods contact is fresh water.
- **PulseRatio™ Feature:** When there is a high degree of load weight variation, the PulseRatio™ feature provides an additional level of refinement to maximize water consumption savings.

### LINT REMOVAL SCREEN



*The 430 micron wedgewire screen removes lint and other solids from the process water.*

## ENHANCED CHEMICAL PERFORMANCE

The PulseFlow system is able to achieve maximum chemical performance with standing bath washing and high-velocity counterflow rinsing.

- **Patented RecircONE® Pump Arrangement:** High-speed water recirculation within the first module allows fast sluicing and wet-down, causing the water and chemistry to instantly penetrate the soiled linen.
- **Standing Bath:** After the transfer of the goods, the counterflow is interrupted, creating a standing bath with no water flow—chemistry is not diluted and quickly reaches equilibrium.
- **Controlled Time:** Chemicals work at full concentration from the start of each bath. And, chemicals work faster because of the large cylinder volume and fast intermixing with the goods.
- **Better Rinsing:** Programmable high-volume PulseFlow system pumps create a vigorous flow to remove exhausted chemistry and suspended soil effectively. In the last module, goods finish with a fresh water immersion.
- **Solid Welded Partitions:** Fixed stainless steel partitions between each module prevent chemical mixing and leakage. No wearable seals required between modules.
- **ChemRatio™ Feature:** Depending upon the ratio of loaded clean, dry weight, and *programmed* clean dry weight, the ChemRatio feature adjusts the chemical injection.

### DIVIDED TANK



*The divided PulseFlow tank separately holds fresh water and recovered water from the extraction device. PulseFlow rinsing begins with reuse water followed by a programmable fresh water rinse.*

# EFITS



## LOW ENERGY USAGE

PulseFlow Technology reduces energy considerably, saving the user money and having a positive impact on the environment. These energy savings support our customers' environmental stewardship and sustainability programs, key values in today's marketplace.

- **Less Water to Heat:** Lower water usage (*and recycling water*) means less water to heat to wash temperatures. Energy to heat water is reduced significantly.
- **Lower Wash Temperatures:** New, low-temperature chemical formulations work very well in Milnor PulseFlow CBW washers, lowering energy use even more.
- **Steamless Washing:** Optional external systems can eliminate inherent losses in the boiler and steam distribution system, potentially saving in water heating costs.
- **Inverters on all Drive Motors and Volumetric Pumps:** Reduced in-rush current at start-up saves electricity use and demand charges.
- **Faster Washing:** With features of the Milnor CBW washer like high-rotational angles up to 270°, large cylinder volume in every module, 100% double drums and True Top Transfer with perforated scoops, the Milnor CBW system washes better in less time. PulseFlow technology can further reduce process times.

### INVERTERS ON PUMPS



*PulseFlow pumps are specially-engineered for precise process water volume and flow rates which are controlled by electronic flowmeters and inverters.*

## FASTER WASHING

For over 40 years, Milnor CBW batch washers with “True Top-Transfer” have washed about 30-40% faster than batch washers using “Bottom-Transfer” designs. Milnor CBW washers with PulseFlow Technology wash even faster—reducing the number of modules needed to process a given capacity, reducing capital investment costs AND saving floor space! This is all possible with:

- **Standing Baths:** Flow is paused at start of each cycle to create standing baths without dilution so chemicals work faster. Shorter process time means less wear on linen—and longer linen life.
- **PulseFlow Counterflow:** Counterflow water is pumped at high velocity for the very last portion of the cycle. Vigorous flow removes contaminants much more quickly, thus reducing overall time. Patented booster pump(s) maintain the counterflow through the modules. The last water seen by the goods is fresh water.
- **Dual-Use in Each Module:** All PulseFlow modules are used for two functions, standing bath and high-speed counterflow for faster, better rinsing. Dual-use means fewer modules.
- **No Separate Rinse Modules:** Rinsing occurs immediately after chemical action in each wash module. No separate rinse modules are required.
- **RecircONE® Pump Arrangement:** A patented feature recirculates water and chemistry at high-velocity within the first module. Goods are sluiced faster and more completely into the machine. Wet-down is almost instantaneous. Chemistry penetrates the linen instantly which is important for protein stains—Module One is now a working module.

### RecircONE® PUMP ARRANGEMENT



*This feature in the first module of each PBW washer is a patented pump arrangement which quickly wets down the goods. Additionally, this recirculated water adds a hydraulic effect which speeds up the cleaning action of the chemistry.*



# TOP TRANSFER

## CBW TECHNOLOGY

Tunnel washers were developed to save water, energy and labor, and to expedite the flow of goods through the laundry. Since they entered the market in the 1960s, they've all done this to some degree.

Early tunnel washers were bottom transfer machines. To move the goods from one stage of the washing process to the next, they transferred the goods and ALL the water along the bottom. Even the first successful batch tunnels did this—and the same is true today.

The Milnor CBW washer took tunnel washing a major step forward in the early 1980s with True Top Transfer technology. It lifts and drains the goods while transferring them into the next module. The result is much better rinsing and a higher level of wash quality. Everything from light hospitality to heavily-soiled industrial goods can be successfully laundered in a Milnor CBW washer.

There are other features that set a Milnor CBW washer apart from other tunnels, such as modular construction and double drum characteristics throughout.

Milnor CBW washers have always offered the highest level of quality and efficiency designed into a tunnel washer.

## WHY TOP TRANSFER IS IMPORTANT

A tunnel washer's transfer method is critical because it's the way the machine introduces each batch of goods into the next part of the process. Other tunnels transfer the goods and all dirty water forward to the next compartment so the goods are exposed to the same dirty water during each successive step of the process.

Milnor CBW washers lift each batch of goods out of the water, drain the free water, then slide the goods into the next compartment, where they are introduced into cleaner water. Only the water in the goods moves forward. Significant dilution occurs during transfer itself.

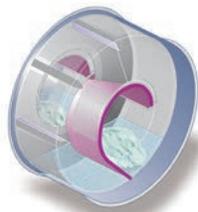
True Top Transfer effectively doubles the amount of dilution in each module—once from counterflow and then from transfer. This significantly reduces the number of modules needed to properly wash in a Milnor CBW washer versus other tunnels.

Milnor's top transfer feature assures bath integrity. Baths are truly independent, so the wash chemistry can work as planned.

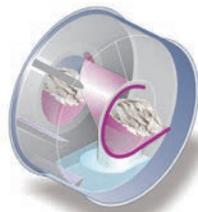
Because water is not pumped forward with each transfer, chemicals are better targeted to the proper baths. They don't migrate uncontrollably to subsequent baths. Titrations show that with a Milnor, it is far easier to control pH.



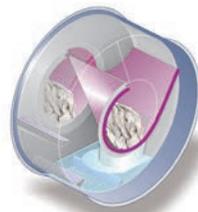
1 Washing



2 Transfer begins



3 Goods lifted out of dirty water



4 Dirty water left behind



5 Goods slide into next module

*Milnor CBW washers lift the goods out of the bath and leave the free dirty water behind. Other tunnels send dirty water into the next compartment along with the goods. (There's no dilution as the contents of the whole compartment move forward.)*

# CONSTRUCTION



## BATHS STAY SEPARATED

Better bath integrity lets chemicals work as intended because baths don't migrate between modules. Concentrations in a Milnor are controllable, predictable, and consistent because the baths remain completely independent during chemical activity.

## NO SEALS BELOW WATERLINE

There are no inter-module seals beneath the water line which could wear and leak, compromising wash quality. Without such seals, maintenance costs are reduced!

## STEAM INJECTION AND STEAMLESS WASHING

Steam is injected at the bottom of the shell through a venturi device, mixing it with water. This eliminates the exposure of goods to live steam and water is immediately heated as it enters. The location of steam injection also increases water turbulence.

Milnor's optional Steam Disinfect feature can provide programmed steam cycles for any or all modules and for PulseFlow tanks and extraction-device water reuse tanks, if desired.

Steamless washing is available through external systems.

## SOLID WELDED PARTITIONS

With a solid partition between each and every wash cylinder, Milnor keeps all baths independent. Water travels over weirs and via external piping from one module to the next so there is absolute water control.

Each module can be used for different baths.

The solid partition between modules is welded to the fixed outer drum giving complete bath separation without sliding seals.



## SUPERIOR CYLINDER DESIGN

All modules of a Milnor CBW washer are identical in size with a goods-to-cylinder volume ratio of approximately 1.4 lb/ft<sup>3</sup> (1 : 40).

Milnor's large cylinder volume allows water and chemicals to penetrate goods completely and quickly.

The use of equivalently large cylinders throughout creates constant high mechanical action during the washing process. 67% of the cylinder's area is perforated so water and chemicals can intermix fast and suspended soil flows easily out of the cylinder to the drain.

## THE DILUTION ADVANTAGE

Dilution with successive baths, each with cleaner water, is a Milnor CBW advantage. Time, temperature, chemicals, and mechanical action are the classic, essential elements of the washing process. These four things loosen soil from the goods and dissolve/suspend soil in the water—but these catalysts can only remove soil if water washes it away with dilution. With the unique combination of True Top Transfer and counterflow, Milnor CBW washers dilute better and faster than any others.



# MECHANICAL ACTION

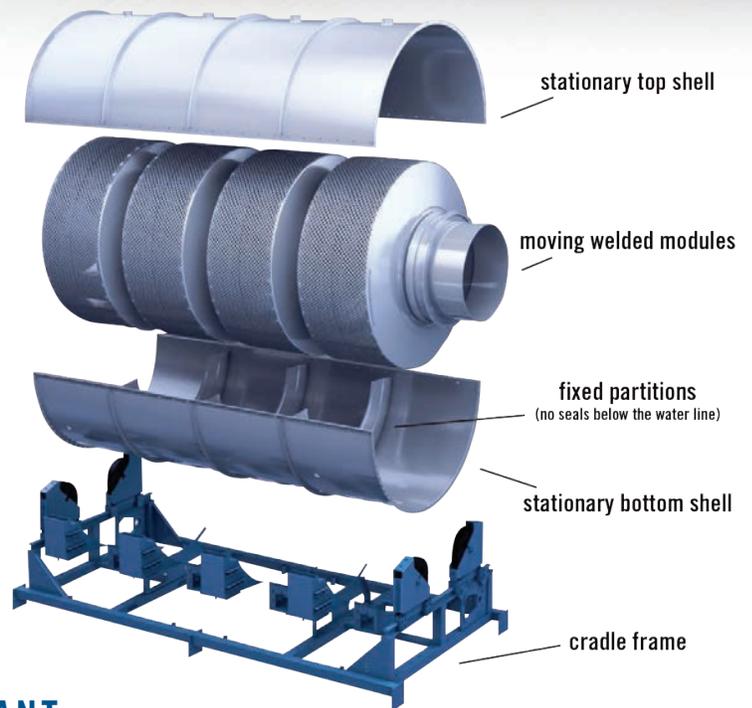
## DOUBLE DRUM THROUGHOUT

Milnor's double-drum design delivers high washing quality. Each module has a stationary shell to hold the wash bath and a rotating perforated inner cylinder. Baths are kept separate (*due to top transfer*) so chemical injection is more controllable.

The stationary outer shell simplifies injection of water, supplies, and steam—plus draining and temperature maintenance.

Sectional CBW Washer - Models 76028 & 76039 are comprised of sections consisting of three, four, or five modules, allowing for easy move in.

Modular CBW Washer - Model 92048 consists of individual modules each with their own individual drive and support elements.



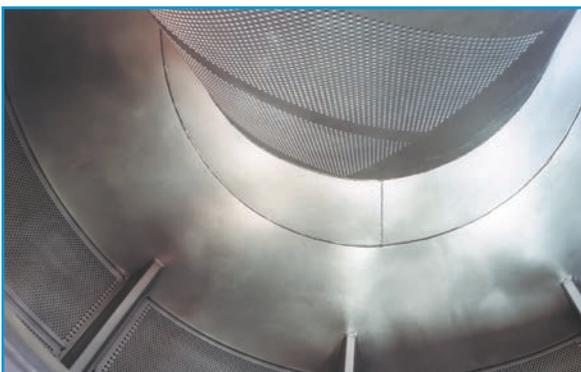
## WHY MECHANICAL ACTION IS IMPORTANT

Mechanical action accelerates dilution. Water and chemicals penetrate the load faster and soil is removed more quickly. With no mechanical action at all, some soil gradually exits the goods. That's because with water present, some dilution occurs.

Add mechanical action, and soil can exit much more quickly. The lift-and-drop mechanical action of the cylinder ribs on the goods squeezes out the water and chemicals inside them. When the goods relax at the bottom of the cylinder, they open up and absorb more wash liquor.

The significance of this: Once goods transfer to a new bath, they must be penetrated by that new bath as quickly as possible. High mechanical action simply aids dilution better than low mechanical action. (*And because goods spend less time in the washer, there is less wear.*)

Because goods are not packed tightly, the Milnor CBW washer provides the kind of washing action you'd only expect in an industrial washer-extractor—a fact that has been documented by internationally recognized testing companies.



## HIGH MECHANICAL ACTION

Milnor's high mechanical action effectively loosens and removes dirt from fibers. Perforations all around the rotating cylinder allow counterflow water to move through the large open area and better penetrate the goods.

Other factors which contribute to excellent wash action inside the cylinder: More space, high ribs that are strategically positioned, and a rotational speed that uses these features to the best advantage.

Tall ribs in each module are strategically placed for multiple drops and high mechanical action.



# CONTROL SYSTEMS & SYSTEM EQUIPMENT



## MENTOR® CONTROL

The Mentor controller enables you to capitalize on the Milnor CBW washer's vast capabilities. With intuitive graphic displays and mouse-click operation, it saves time in programming and maintenance. Different password levels ensure security and familiar Windows® based format makes all operations more familiar. This saves training time. Another advantage is one-stop data backup and restoration using standard media.



*The operational display gives key information for each batch in the loading system, washer and post-washing devices.*

*Windows® is a registered trademark of Microsoft Corporation.*

## MILDATA® COMPUTER NETWORK

The Miltdata software/hardware package is designed to interface a personal computer with Milnor machines to simplify programming and to provide central storage for machine configuration, formulas, and production data. Standard and customizable reports help managers monitor performance and control processing costs.



*MilMetrix® display allows you to see, at a glance, if you're keeping up with expected performance throughout your laundry or on a machine by machine basis.*

## EXTRACTION OPTIONS

A variety of extraction devices are available depending upon goods processed, production quantities, and drying/finishing requirements.



*Various capacity sizes and extraction pressures and speeds are available in the Single Stage Press and Centrifugal Extractor. Other options are available for tight spaces.*

## DRYER OPTIONS

Milnor dryers are pass-through machines that load at one side and discharge at the other. They form an integral part of an automated batch laundry processing system.



*A wide range of capacities and fuel choices are available in the dryers. A unique air path means a Milnor dryer gets the most efficient use of hot air.*

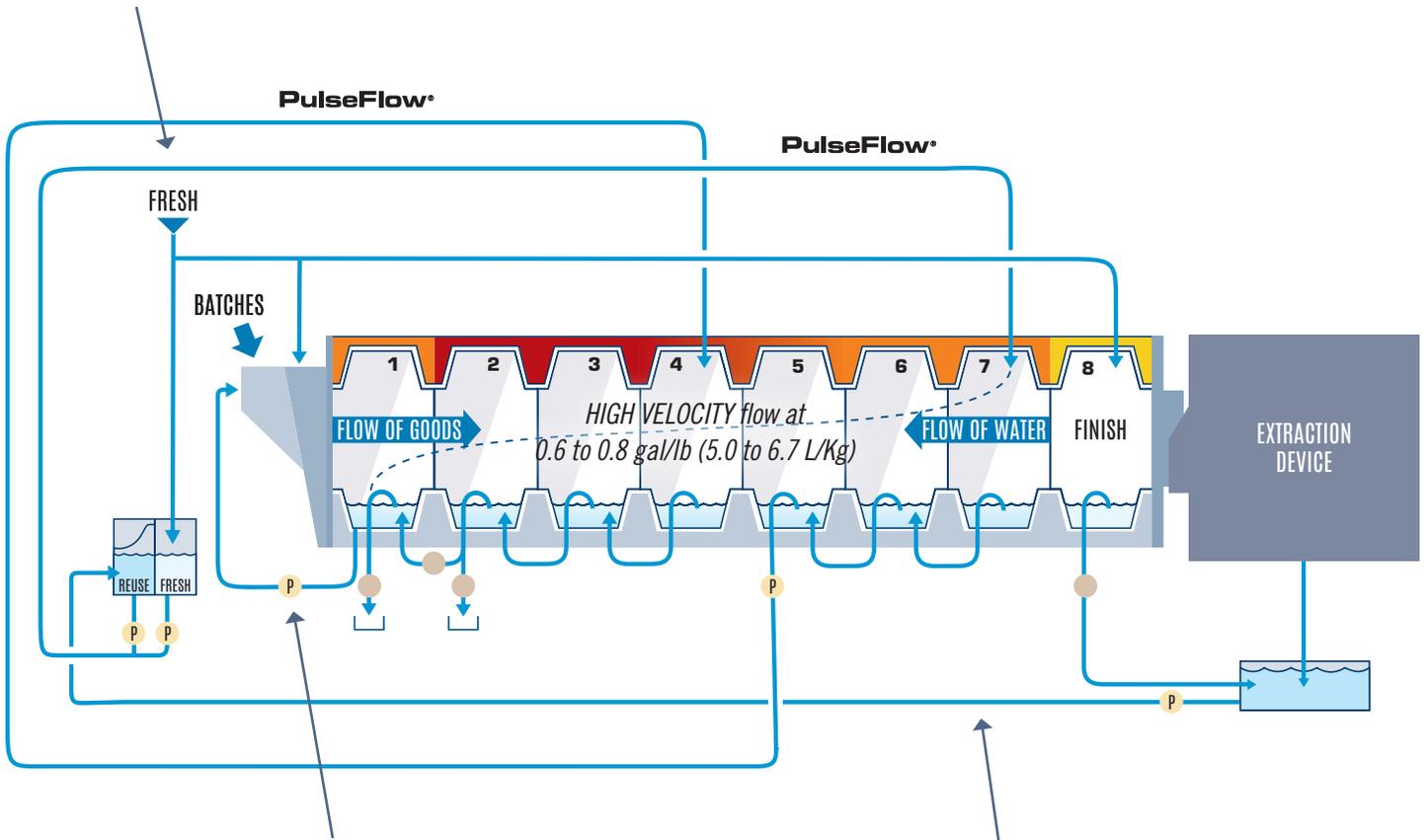
# PULSEFLOW TECHNOLOGY

PulseFlow Technology CBW washers need fewer modules because the PulseFlow design offers faster rinsing with high velocity counterflow, more throughput with dual-use modules, and less water usage by recycling water.

Counterflow with PulseFlow technology is comprised of two steps:

Step one is counterflow using extraction-device reuse water. Step two is a programmable quantity of a fresh water finish.

*Fresh water used in step two of the PulseFlow rinsing sequence is isolated in the fresh side of the PulseFlow tank. Replenishes at 0.30 to 0.65 gal/lb (2.5 to 5.4 L/kg).*



*With RecircONE, a separate wetdown module is not needed.*

*Water extracted from clean goods is stored in the reuse side of the tank for use in step one of PulseFlow rinsing.*



## SPECIFICATIONS

PulseFlow	SECTIONAL				MODULAR	
	76028		76039		92048	
<b>Washing Cylinder</b>						
Rated capacity	110 lbs.	50 kg	150 lbs.	68 kg	Up to 260 lbs.	Up to 120 kg
Diameter	76"	1930mm	76"	1930mm	92"	2337mm
Depth	28"	711mm	39"	990mm	48"	1219mm
<b>Approx. Dimensions</b>						
Width	7'7"	2311	7'7"	2311	8'5"	2572
Height	9'0"	2755	9'0"	2755	10'9"	3290
<b>Length of modules</b>						
3	17'10"	5440	20'3"	6160	24'8"	7530
4	20'5"	6220	23'7"	7180	29'11"	9110
5	23'0"	7000	—	—	35'1"	10680
6	27'4"	8340	32'1"	9770	40'3"	12260
7	29'11"	9120	35'5"	10790	45'5"	13840
8	32'6"	9900	38'10"	11820	50'7"	15420
9	35'1"	10680	43'11"	13380	55'9"	16990
10	37'7"	11460	47'3"	14400	60'11"	18570
11	42'0"	12800	50'7"	15420	66'1"	20150
12	44'7"	13580	53'11"	16440	71'3"	21720
<b>Connections</b>						
Water manifold inlet(s)	3"/2"	76/50	3"/2"	76/50	3"/2"	76/50
Quick drain valve	8"	203.2	8"	203.2	8"	203.2
Steam	2"	50.8	2"	50.8	3"	76
Air	1/2"	12.7	1/2"	12.7	1/2"	12.7
<b>Water</b>						
Approx. consumption++	.3 gal/lb	2.5 L/kg	.3 gal/lb	2.5 L/kg	.3 gal/lb	2.5 L/kg
As low as						

Specifications and appearance subject to change without notice.

\*Depends on several factors including type of goods, soil content, etc.

+Additional 3" for linen supply.

++Depending on wash program.

Check with factory for availability on non-PulseFlow CBW washers.

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