What are smart circulators?

Smart circulators use controls to limit pump operation to only when hot water is required. Building owners and facilities managers can consult with installers about a recommended control strategy. As a best practice, the strategy chosen should conserve the most energy, cause the least amount of wear and tear on the piping system, and deliver water effectively and efficiently to building occupants. Here are some of the different control types that can be selected for smart circulators:

Circulator Control Type	Control Description	Run Hours per Year
No controls	Runs at all times	8,760
On demand	Occupants push a button to call for hot water; occupancy sensor	60
Temperature	Sensor on pipe calls for pump to run below a specified temperature	3,900
Timer	Runs during pre-set intervals	4,380
Learning	Computer learns occupant's habits, similar to a smart thermostat's learning capabilities	4,380

Smart circulators in plumbing and HVAC systems

In plumbing systems, smart circulators are most often used to boost water pressure and efficiently recirculate hot water. Building occupants don't need hot water available at the tap constantly, but standard circulators run non-stop, which wastes energy. Additionally, continuous pumping can harm the plumbing system, cause leaks, or void pipe warranties. To save energy in the motor and at the water heater, use automatic controls to deliver hot water only when needed and dramatically lower the pump's run time. Field studies demonstrated controls can reduce that time to less than 1% of an uncontrolled system.[2]

HVAC systems—such as boilers, air handler units, and hydronic heating loops—typically use hydraulic circulators within a closed, pressurized system, and distributes heated or chilled water through the building's piping to condition the space.

- **The power of electronically commutated motor (ECM) technology.** In recent years, ECM technology has made circulators for hydronic systems more energy efficient. The ECMs on smart circulators require less power, saving roughly 20% compared to traditional motors. Not only is the motor more efficient, but intelligent speed control embedded in smart circulators can also significantly reduce energy use without sacrificing performance.
- **Speed control.** HVAC systems are designed for peak load days but rarely require use at full capacity. Smart circulators automatically determine the lowest possible operating point to meet the system's demand, which is important since most circulator pumps are oversized. Advanced controls match the circulator's speed to the load, significantly reducing the motor's power consumption. A 25% reduction in rotating speed reduces power draw by more than 50%.

Federal standards for circulator pumps

In 2024, the U.S. Department of Energy released the first-ever federal standards for residential and commercial circulator pumps.

As of May 22, 2028, manufacturers will need to modernize their entire circulator product lines with ECMs or equivalent performance to comply with the standard.

Read the Federal Standards article on BetterBricks>

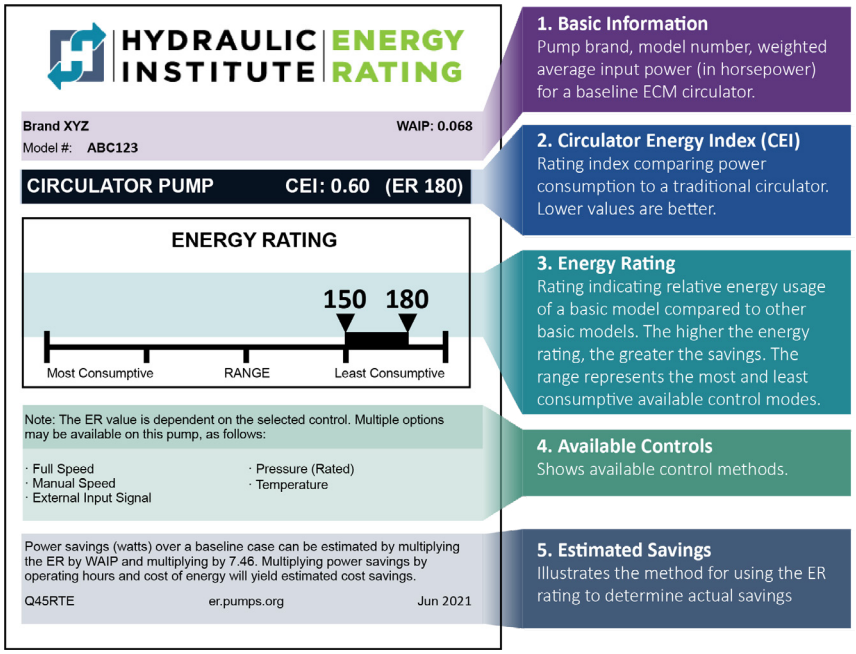
Lifecycle cost calculator

The Hydraulic Institute has a tool for calculating the savings of a smart circulation pump. The calculator goes beyond the upfront costs, highlighting other data points—including total cost of ownership, payback time, and lower operating costs—and is useful during the decision-making process.

View the Pump Savings Calculator >

Circulator Energy Rating Label

The Hydraulic Institute's Circulator Energy Rating Label, located on the pump's packaging, helps buyers make apples-to-apples comparisons between the desired pump and other pumps on the market. The label also displays the range of energy consumption: the higher the pump's rating, the greatest energy savings and least amount of energy use can be expected.



Utility incentives

Many Northwest utilities offer incentives and rebates for energy-efficient circulators in common applications. Ask your utility about available incentives for qualifying circulators that meet your project needs.

[1]Contact your pipe manufacturer's representative for warranty information.
[2]NEEA. Extended Motor Products Savings Validation Research on Clean Water Pumps. https://neea.org/extended-motor-products-savings-validation-research-on-clean-water-pumps-and-circulators