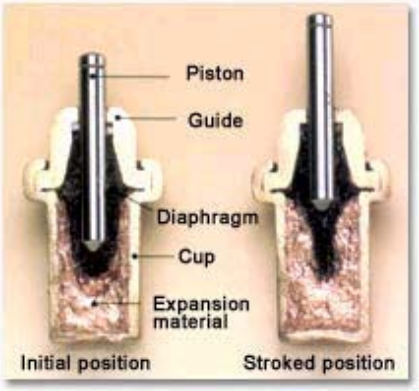
Paraffin Based Actuation

How it works

HydroGuard T/P e700 & HydroGuard e420 T/P shower valves incorporate paraffin-based sensor technology that operates on the principle of transforming calorific energy into mechanical energy using the expansion of paraffin from a solid to a liquid state. Copper, which conducts heat, is mixed with the paraffin to increase thermal conductivity.



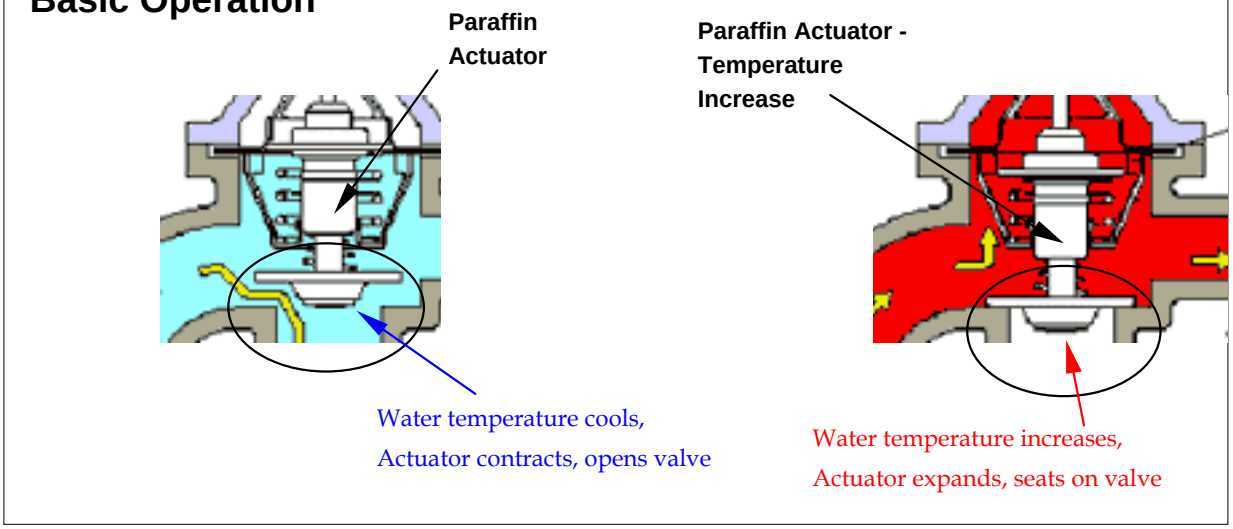
The sensor, while small in size, is powerful in force. As the water surrounding the sensor increases in temperature, the paraffin/copper charge increases in volume (solid to liquid) thus moving the piston in an upward direction. This movement, as a component of a valve's operating mechanism, restricts the flow of hot water while proportionally increasing the flow of cold. When the water enveloping the sensor cools, just the opposite affect takes place. An opposing spring contracts the sensor, moving to close the cold-water supply while opening the hot. The reaction of the sensor to changes in water temperature and supply pressure occurs within milliseconds.

While some valve manufacturers use paraffin-based technology to attain type "T" certification, only Powers has been successful certifying to the more stringent T/P performance criteria of ASSE 1016…. first with the HydroGuard T/P e420 series and now with the highly cost competitive HydroGuard T/P e700 series.

What's even more significant is Powers engineers accomplished T/P performance through the use of a **single** sensing element! Other manufacturers who comply with the T/P requirements incorporate <u>two</u> distinct compensating mechanisms within their valve, one to adjust for pressure changes and the other to amend for temperature fluctuations. The result is a far more costly valve.

T/P valves (also known as combination valves) are commonly priced as much as four to five times that of traditional pressure balancing valves, making them an early target of "value engineering". Not any longer! HydroGuard T/P provides optimum bather protection at the pricing levels of basic pressure balancing technology.

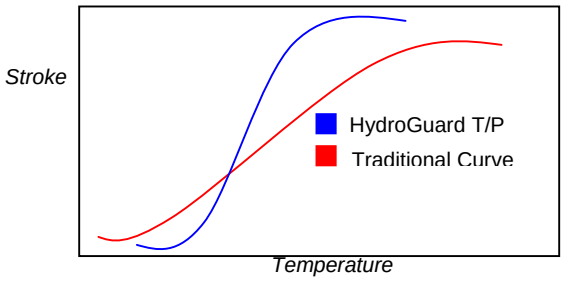
Basic Operation



How Does HydroGuard T/P Achieve Class-Leading Performance?

Both HydroGuard and HydroGuard T/P T/P's superior performance and response can be attributed to its' exclusive cartridge design, unique mixing chamber and supercharged paraffin sensor. Their paraffin sensors are specially designed to provide near instantaneous response to continually changing supply conditions. Performance optimization is accomplished through:

- Proprietary wax/copper mixture that responds aggressively to supply line changes within the desired bathing temperature range of 90 – 110^{o}F, i.e. a steep temperature/stroke curve.
- Maximizing the surface area (that comes in contact with mixed water temperature to insure aggressive movement.
- Utilization of Finite Element Analysis (FEA) to optimize critical components for greater overall piston movement (stroke).
- Exclusive mixing chamber design insures water is thoroughly mixed and envelopes sensor for maximum contact
- Testing to one million cycles to insure structural integrity and durability.



Finally, **Performance & Affordability!**

Combination valves and type T/P protection is not a new concept. But, Powers' method for achieving T/P performance is**.** Powers' single sensor solution is the first of its' kind, providing affordable temperature and pressure protection to the bather to ASSE 1016's most stringent safety criteria.

This added level of safety has historically equated to an added level of cost. Thermostatic (type T) and combination valves (type T/P) carry hefty list prices for the protection they offer, most in excess of $400. HydroGuard T/P is a category buster, providing optimum protection for pricing highly competitive with pressure balancing valves.