"Wire-to-Water is a ratio between the electrical energy input to the pumps and the kinetic energy achieved by this input. By optimizing this value for a pump package, operational costs can be reduced while maintaining load requirements."

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Wire-to-Water Efficiency

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Modular HVAC Systems

Wire-to-Water Efficiency

Wire-to-Water Efficiency

Systecon developed Wire-to-Water Efficiency in 1984 to determine pump selection and sequencing in order to optimize the performance of pumping systems. Wire-to-Water is a ratio between the electrical energy input to the pumps and the kinetic energy achieved by this input. By optimizing this value for a pump package, operational costs can be reduced while maintaining load requirements.

Wire-to-Water Efficiency is first modeled during pump and system selection, allowing the engineer and owner to select the option which best fits their needs. The Wire-to-Water Efficiency Report is then used during performance testing of the actual pump package to verify sequencing, as there may be slight differences between the theoretical report and the actual pumping system. Systecon has been developing Wire-to-Water for over 30 years, and our models have become extremely accurate. Once a system is up and running, Systecon's SCRIPT controls will continuously update the Wire-to-Water Efficiency Report to reflect real time data.

Achieving Higher Efficiencies

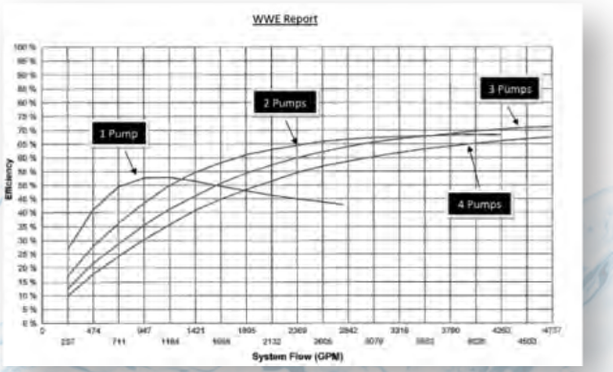
Operating pumps at their most efficient flow rates will result in optimized system performance. However, it is not always obvious which sequences will produce these results. Using Wire-to-Water in a multiple pump, variable speed system allows for the system to operate in the most efficient manner possible. Simpler systems may run one pump up to a pre-determined capacity, then bring addition pumps online as they become necessary.

Number Of Pumps Running = 1 Pump

System Flow	System Head	Water HP	Pump Flow	Ftg. Loss	Pump Head	Pump Speed	Pump Effy	System BHP	Mtr/Drv Effy	input KW	Wire To Water
947	27.9	6.7	947	5.4	33.3	782	86.9	9.2	72.4	9.5	52.7 **
1184	32.0	9.6	1184	8.4	40.4	892	84.7	14.3	78.8	13.5	52.8 **
1421	36.8	13.2	1421	12.2	49.0	1012	82.2	21.4	83.3	19.1	51.5
1658	42.4	17.7	1658	16.5	58.9	1139	79.9	30.9	86.2	26.7	49.6
...											
2605	71.6	47.1	2605	40.8	112.5	1674	74.2	99.7	92.7	80.3	43.8

Number Of Pumps Running = 2 Pumps

System Flow	System Head	Water HP	Pump Flow	Ftg. Loss	Pump Head	Pump Speed	Pump Effy	System BHP	Mtr/Drv Effy	input KW	Wire To Water
947	27.9	6.7	474	1.4	29.3	687	76.9	9.1	59.2	11.5	43.4
1184	32.0	9.6	592	2.1	34.1	746	80.6	12.7	66.1	14.3	50.0
1421	36.8	13.2	711	3.0	39.9	811	83.1	17.2	71.2	18.0	54.7 **
1658	42.4	17.7	829	4.1	46.5	882	84.8	23.0	75.3	22.7	58.2 **
...											
2605	71.6	47.1	1303	10.2	81.8	1193	87.1	61.8	86.5	53.3	65.9 **



This may be the easiest way to control the system, but not the most efficient. In the example below, a real application, we can see that running one pump to near full capacity will result in over 20% efficiency loss compared to two pumps maintaining the same flow conditions. The system is also less efficient with one pump running at 1421 GPM than with two pumps mainting this flow rate. Wire-to-Water efficiency allows us to determine the exact point when the system should change pump operation so that energy is not wasted.

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