

# PARALLEL SENSORLESS PUMP CONTROLLER (PSPC) | FAQ

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- Q1** What does a remote differential pressure (DP) sensor control curve look like?
- A1** There is no remote DP sensor system control curve; only a virtual quadratic operating curve from the sensor setting on the ordinate/y-axis of a pump curve, to the design point, illustrating where a pump will operate in a DP sensor controlled system. For Design Envelope units with Sensorless control, the factory sets a quadratic control curve in the integrated controls to emulate the same operational tracking as the remote sensor controlled system.
- Q2** How does one know the Design Envelope Sensorless control is working without a remote reading to verify pressure?
- A2** The user can simply close off a main system valve, ensuring zero flow. The pump differential pressure (DP) reading at zero flow must be everywhere in a closed loop HVAC system, including the most remote pipe-leg. This will be identical to a remote sensor result at the same DP setting, and thus produce the same results. If the customer is having issues with comfort in remote areas a DP sensor may need re-setting or removing and being placed closer to the pump. With a Design Envelope pumping unit with Sensorless control, it's a simple task to change the minimum pressure setting ( $H_{min}$ ) locally at the integrated controller to increase for under-flow, or decrease for over-flow to produce higher or lower pressure respectively for any given system demand.
- Q3** Can a customer install a pressure gauge in a Design Envelope Sensorless controlled system, to read the remote pressure?
- A3** Gauges or similar equipment can be installed to check the DP at the remote leg if an operator chooses to do that; although it is not necessary for efficient operation and may be a wasted expense.
- Q4** Can you alternate from Sensorless to sensor control, should one fail (this is only for a customer who is not confident that Sensorless control works)?
- A4** The controller set-up would need to be changed from Sensorless control to remote sensor control manually at the controller keypad. These set-ups are in every Design Envelope shipped and it's not difficult; though a controls contractor or other authorized personnel should make the change. There is a third setup for BMS or control panel signal.
- Q5** How many zones will Sensorless technology handle specifically (assuring that none will be starved)?
- A5** A system with Sensorless control will be as effective as a system controlled by a remote sensor. Many multi-zone systems are controlled from a single sensor and Sensorless control will be as effective. Note that systems with several different zone load profiles and high diversity may have control issues with a single sensor. For those system types Sensorless control may also be insufficient. For complicated multi-zone systems with different zone load profiles and/or high diversity, multiple sensors and an IPS control panel may be required. Pumps with integrated controls will still hold high installation cost value in those systems.
- Q6** Does Design Envelope Sensorless control work in multi-pump system?
- A6** Multiple Design Envelope pumping units with Sensorless control can be controlled (up to four operating pumping units or three operating pumping units and one standby. Best efficiency staging is standard.
- Q7** If systems contain fluids such as Ethylene or Propylene glycol, CaCl<sub>2</sub> brine, ethanol, etc. Will this change the Sensorless pump data? Is fluid type a factor?
- A7** Armstrong factory tests all pump types, including Design Envelope Sensorless, with water. Other liquids will not affect the Sensorless control. Design conditions may be affected by fluid viscosity which is understood and adjusted automatically by Armstrong's (patent pending) pump selection software; though this is rare for HVAC systems. The motor power is affected by the liquid density. To ensure Sensorless control operates effectively, the power readings at the test-rigs are automatically adjusted according to the liquid properties stated on the order and/or in the selection software; thus the control curves from water testing will produce the correct results with other known liquids in the field.

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**Q8** Can I use a Design Envelope unit in a constant speed/constant flow HVAC system?

**A8** The pumps in most constant speed/constant flow systems are oversized, which has caused the system 'balancer' to reduce the system flow by a throttling valve in the mechanical room, to the original design flow. Typically, pump heads in North America are oversized 15% to 20%. If a constant speed system pump is replaced with a Design Envelope unit with integrated controls, the throttling valve may be opened wide, and the pump speed manually reduced to meet the original system design flow. The pump would operate continuously at the new reduced speed in the constant flow system. 15% to 20% energy is saved in this manner which should pay back the price of the pumping unit in two to five years.

**TORONTO**

+1 416 755 2291

**BUFFALO**

+1 716 693 8813

**BIRMINGHAM**

+44 (0) 8444 145 145

**MANCHESTER**

+44 (0) 8444 145 145

**BANGALORE**

+91 (0) 80 4906 3555

**SHANGHAI**

+86 21 3756 6696