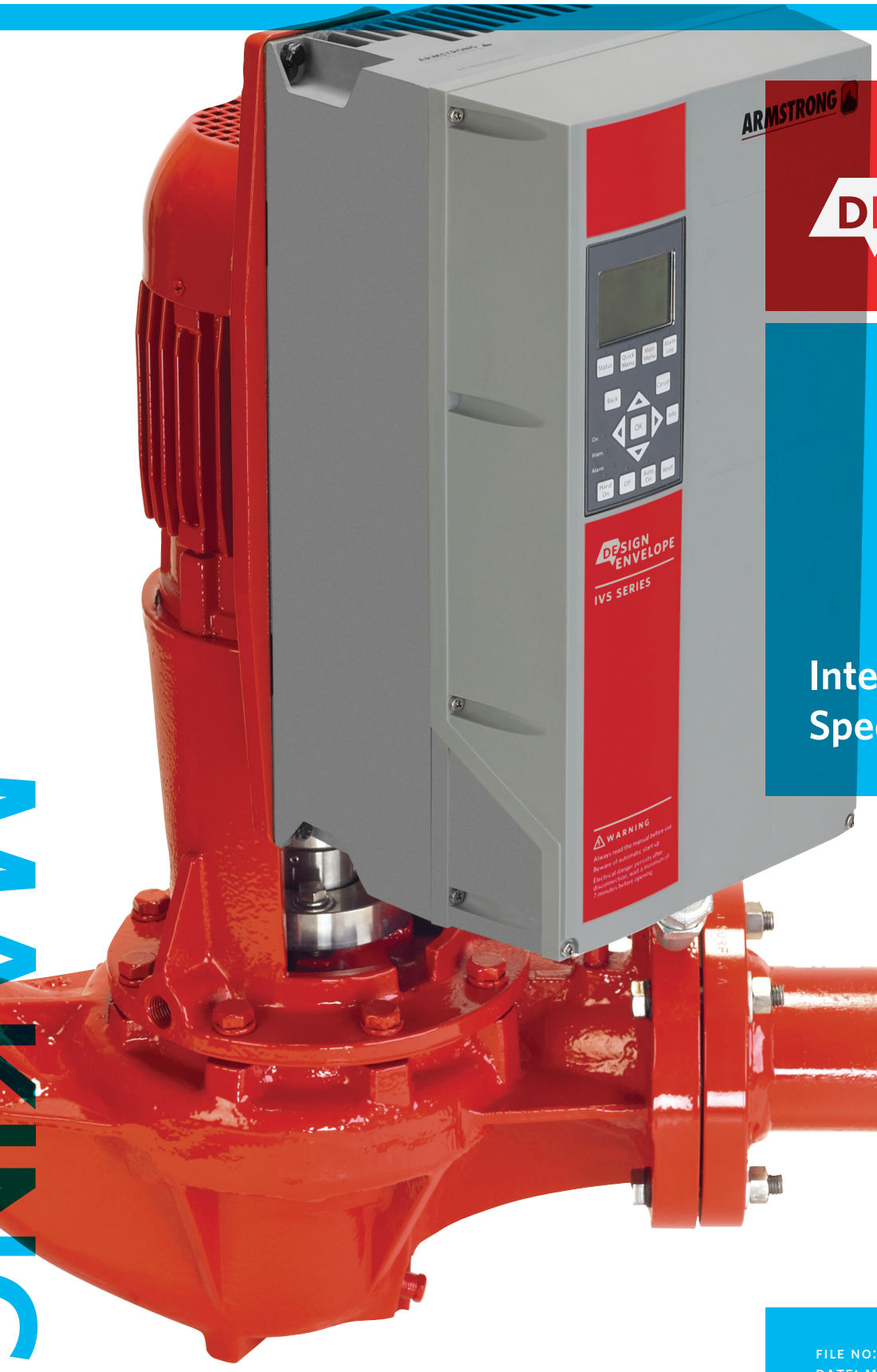
ARMSTRONG



DESIGN ENVELOPE

Intelligent Variable Speed pumps

FILE NO: 100.11 IN
DATE: MARCH 2013

SUPERSEDES: NEW
DATE: NEW

DESIGN ENVELOPE

OPTIMUM EFFICIENCY AT PART LOAD

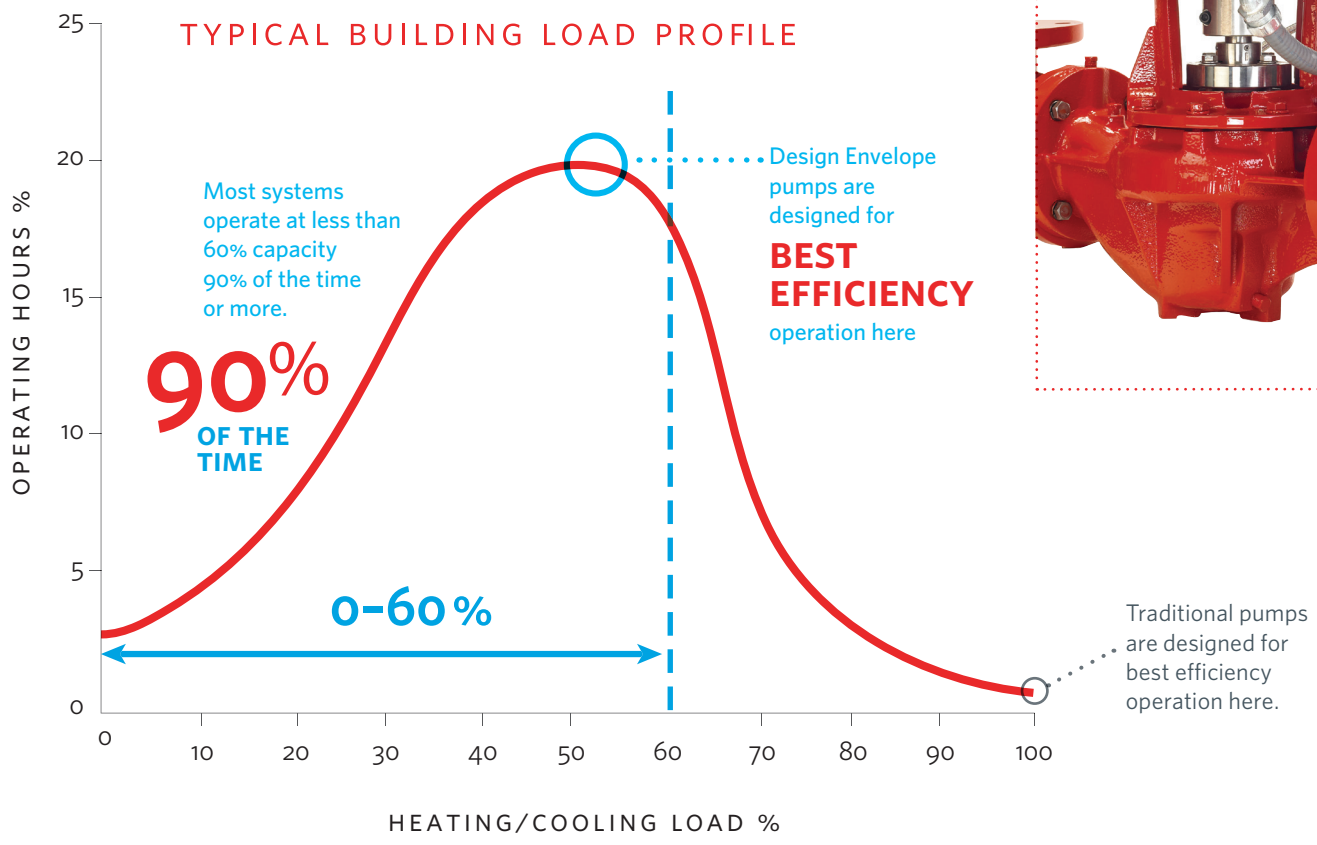


Armstrong's Design Envelope IVS pumps are a complete solution for heating and cooling systems. The integration of a perfectly matched Vertical In-Line pump, motor, and Intelligent Variable Speed controller creates an innovative, high-value pumping solution.

Rising energy costs and sustainability governance are driving the development of new technologies to improve the performance of buildings. Armstrong answers the challenge with unparalleled pumping efficiency and performance.

The Design Envelope IVS control is available for Armstrong's Series 4300 and 4380 Vertical In-Line pumps as well as Series 4302 and 4382 dualARM pumps, and 4392 and 4312 twin head pumps. These solutions are available with integrated controller or in a stand-alone configuration (controller mounted separately).





Design Envelope IVS pumps reduce pumping costs through variable speed, demand-based operation — consuming only the energy required, based on current system demand.

Design Envelope IVS pumps use a combination of optimised impeller size and speed control for energy efficient operation within a given performance envelope. The performance envelopes are mapped for the best pump efficiency at 50% of the design flow rate, where variable flow systems operate most often. This ensures a building's hydronic pumping system consumes as little energy as possible. It also ensures that the installation meets ASHRAE 90.1 guidelines requiring 70% energy savings at 50% of peak load.

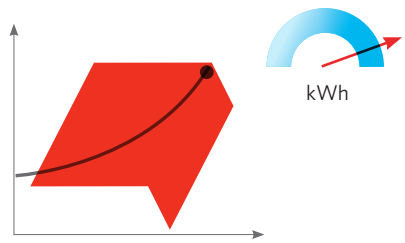
SAVINGS



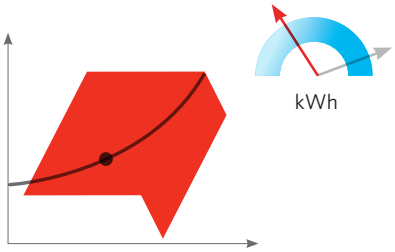
ENERGY SAVINGS

Armstrong Design Envelope variable speed technology automatically optimses the speed control of a circulating pump serving a two port valve controlled HVAC system. The variable speed intelligence embedded in the Armstrong Design Envelope IVS controller adjusts the speed of the pump to meet the immediate load on the HVAC system. This results in the pump responding instantaneously to the system load and drawing only the power required to meet that load.

UP TO 70% ENERGY SAVINGS

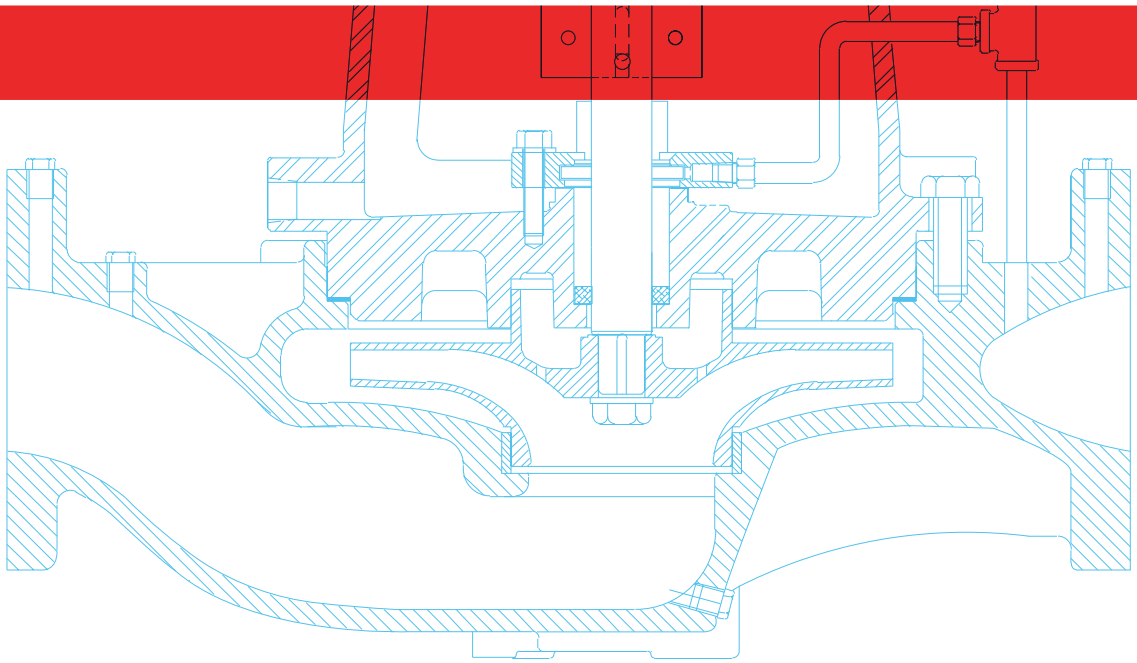


AT 100% DESIGN FLOW



AT 50% DESIGN FLOW

The reduction in power draw and the resulting savings in energy costs can be dramatic.



EVERYWHERE

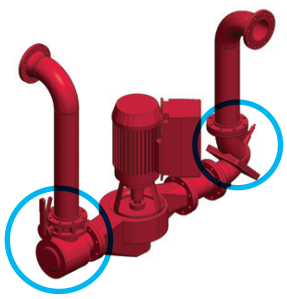
INSTALLATION COST SAVINGS

View your savings and ROI using real data from your installation. Ask the Armstrong Team.

VERTICAL IN-LINE

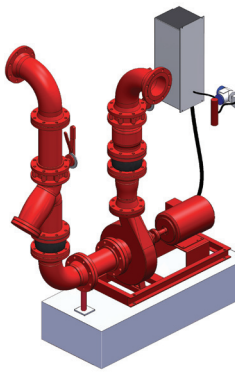
END SUCTION

Suction Guides and Flo-Trex valves cut your costs by reducing the requirement for pipe and fittings.



4300 IVS (80-250 5.5kW)

VS.



4030 (50-250 5.5kW)

IDENTICAL APPLICATION

Design Envelope Sensorless split-coupled VIL IVS installation with Suction Guide and Flo-Trex valve.

End suction base mounted installation with traditional piping.

1.00 INSTALLATION COST* 2.18

*Costs are normalised so no units are shown. For further detail, see Armstrong Value Proposition sheet.

Everything included

- Elegant space-saving design
- All-in-one pump and VFD solution
- Perfectly matched pump-motor-control combination
- No mounting of VFD to wall
- No re-alignment of shaft and coupling
- No flexible piping connectors
- No inertia base or grouting

Contents required

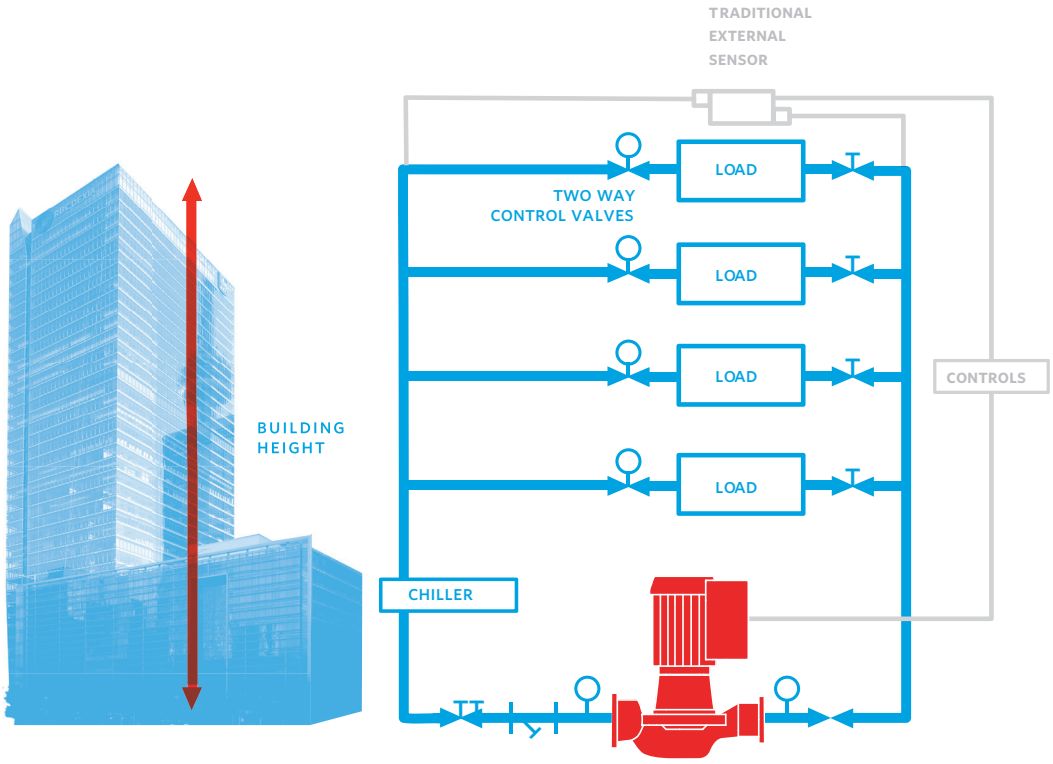
- Flex connectors
- Inertia base
- Remote sensor

Labour requirements

- Grouting
- Shaft realignment
- Wiring to VFD
- Mounting and wiring of remote sensor

HOW IT

THE VIRTUAL SENSOR



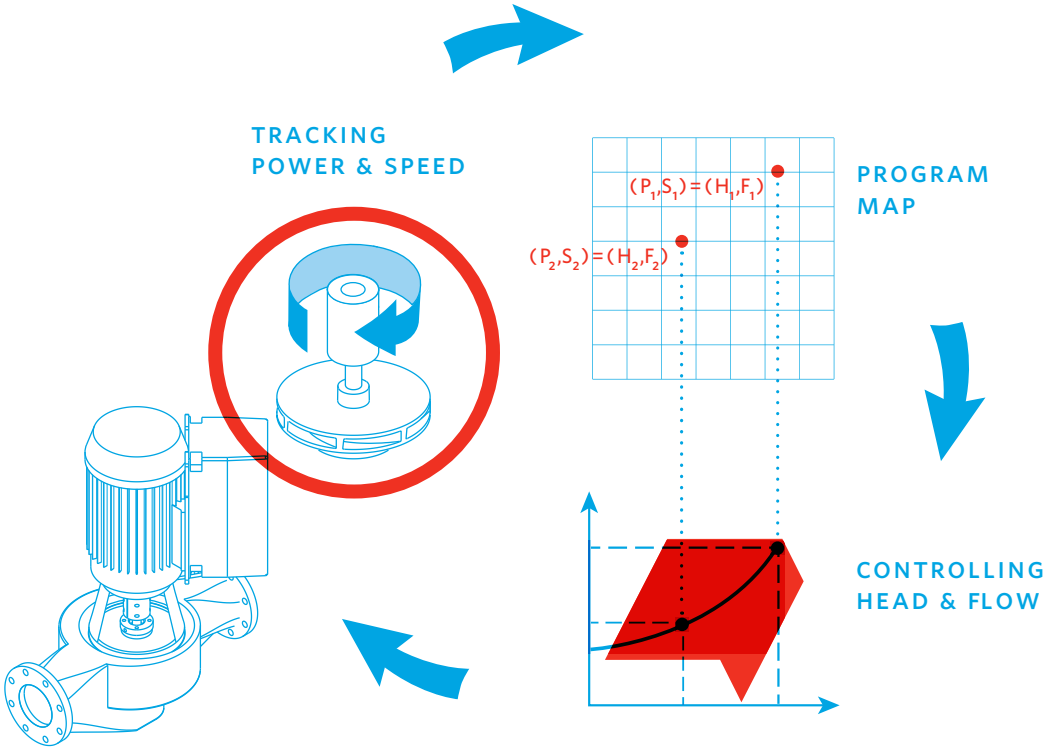
Equipped with the Sensorless design feature, Armstrong IVS pumps do not require an external sensor to monitor and control the HVAC load.

In a chilled water system, a building's temperature controls are connected to control valves that manage the flow rate to the cooling coils (load). As the control valves open for more cooling, the differential pressure across the valve decreases. The IVS controller reacts to this change by increasing the pump speed to maintain the pressure setpoint. If the control valves close to reduce the cooling output, the differential pressure across the valve increases, and the IVS controller reduces the pump speed to maintain the pressure setpoint.

WORKS

MONITOR POWER & SPEED

CONTROL HEAD & FLOW



Equipped with the IVS Sensorless feature, a pump's performance characteristic curve is programmed into the memory of the pump controls. A control curve is also programmed into the pump controls, with a minimum required system head at zero flow pre-set. During operation, the sensorless controller monitors the power draw and speed of the pump, establishes the flow requirement of the system and controls the pump so that the operating point sits on the control curve. As two port control valves open and shut, the controller automatically adjusts the pump speed so that it matches the system demand while keeping the pump operating at minimum speed on the control curve. This guarantees the lowest life cycle cost.

FUTURE.

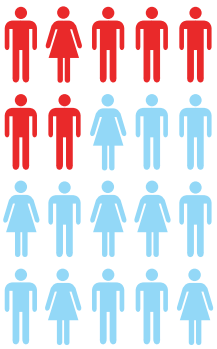
DESIGN FLEXIBILITY

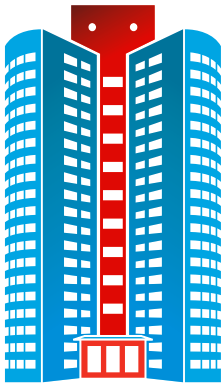
Changes to building conditions

With Armstrong Design Envelope variable speed technology the increased range of operating performance also reduces the risk of underperformance in the HVAC system. As occupant load or building surroundings change, the building load will change as well. A Design Envelope pump will still operate at high efficiency levels and will provide the exact pumping performance that supports the HVAC system and keeps costs at a minimum.

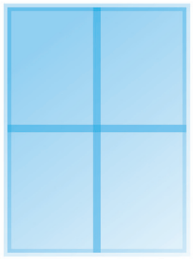
Armstrong Design Envelope provides building owners with the necessary adaptability to changes that can occur during a building's operating life. Typically, a building's load can shift because:

Changes to building occupancy

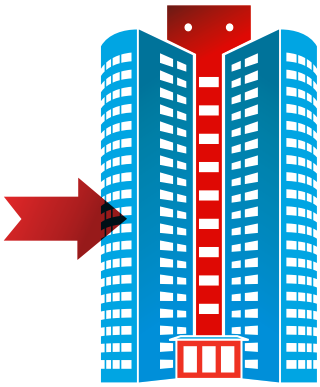




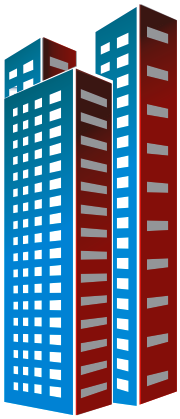
Changes to the building design

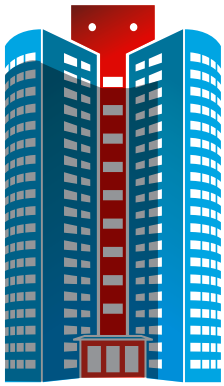


LOW-EMISSION GLASS



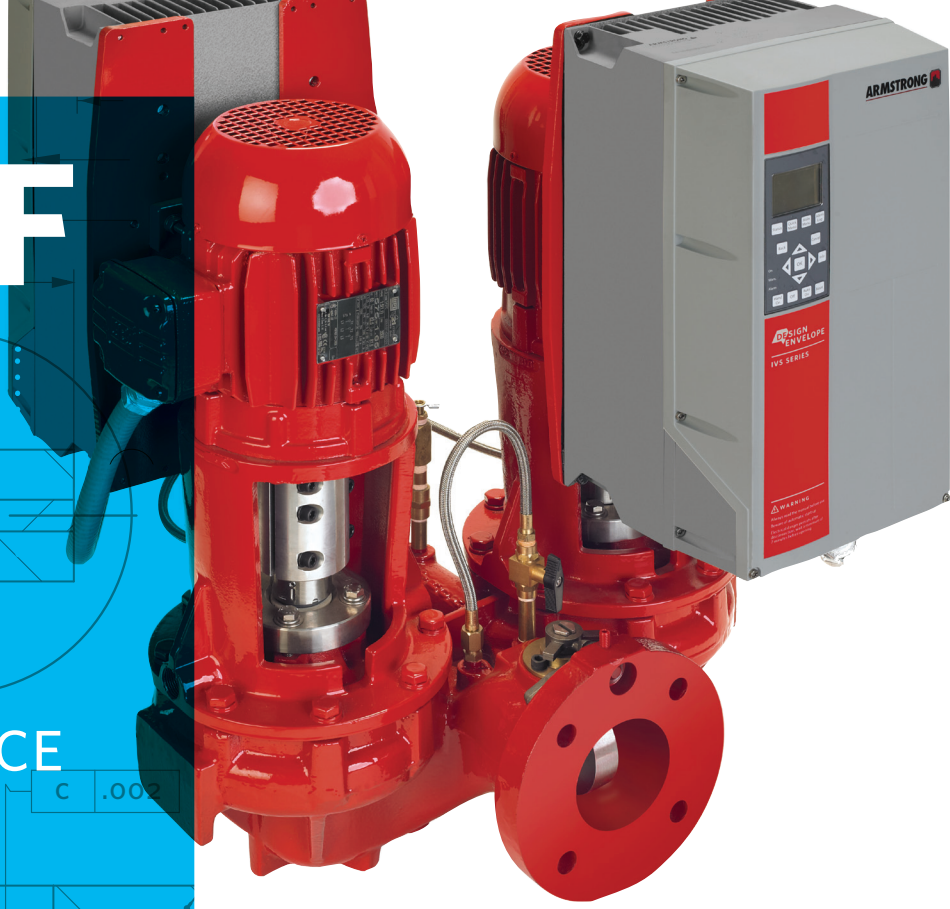
Changes to shade conditions caused by modifications to the building's surroundings

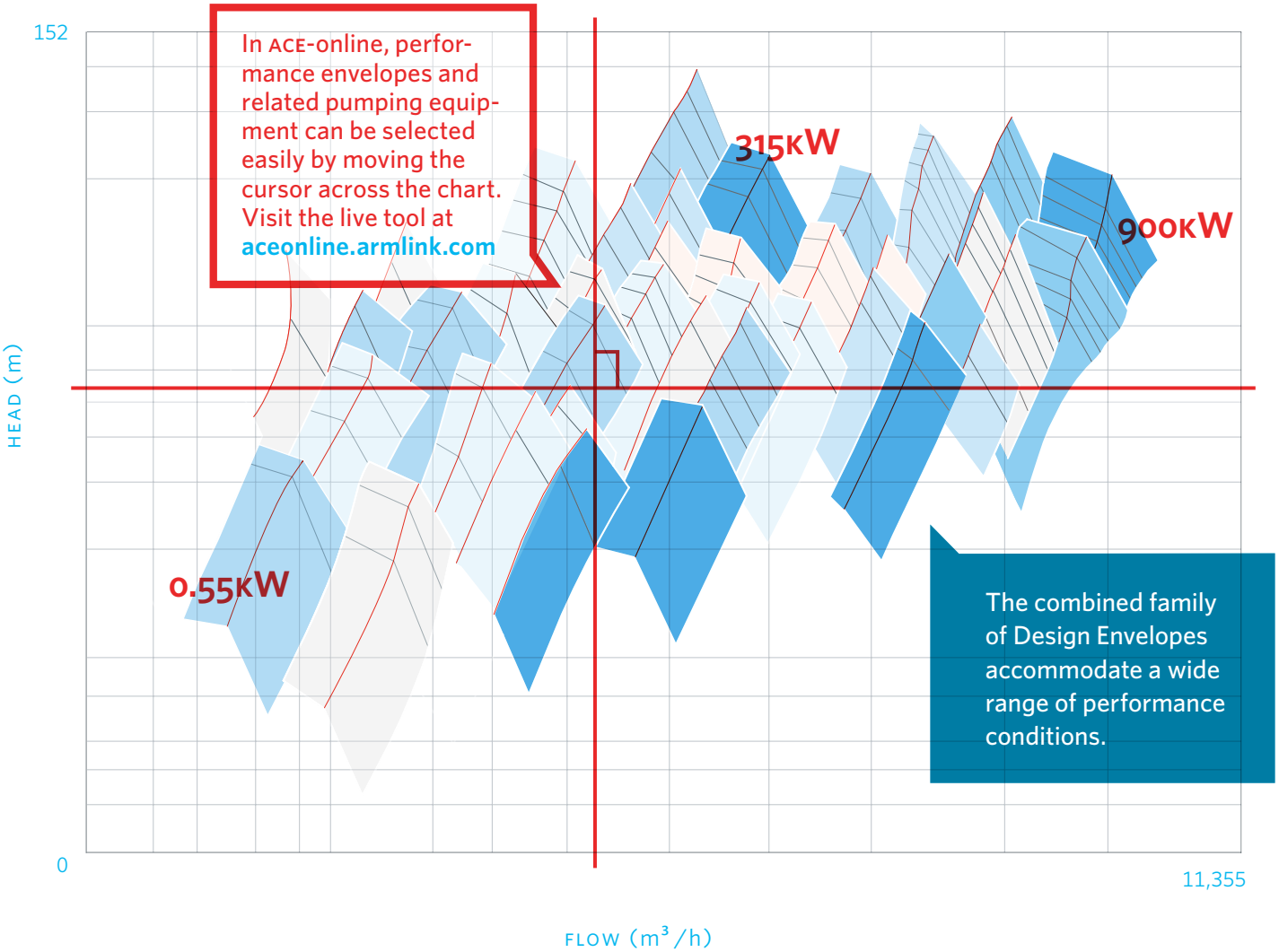




PROOF

EFFICIENCY-BASED PERFORMANCE SELECTION

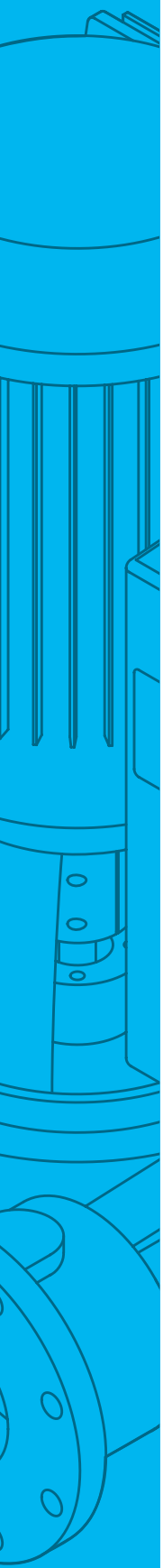




In ACE-online, performance envelopes and related pumping equipment can be selected easily by moving the cursor across the chart. Visit the live tool at **aceonline.armlink.com**

The combined family of Design Envelopes accommodate a wide range of performance conditions.

BENEFITS



Reduced energy consumption leads to substantial operating savings

BUILDING OWNERS

- Lowest lifecycle costs
- Reduced energy consumption leads to substantial operating savings
- Green building incentives and rebates available in most regions
- Demand-based variable speed leads to improved occupant comfort
- Selection methodology provides future proofing against changing building loads
- Selection methodology prevents over-sizing of equipment

Broad range of performance leads to reduced iterations of pump selection

CONSULTANTS

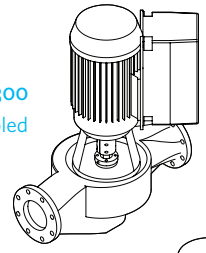
- Broad range of performance leads to reduced iterations of pump selection
- Energy-saving solution reduces HVAC operating costs
- Contributes to LEED certification
- Improved pumping efficiency and control leads to reduced carbon footprint
- Fewer components and reduced wiring means simpler HVAC system drawings
- IVS Sensorless technology means fewer components to select

Faster installation & start up

CONTRACTORS

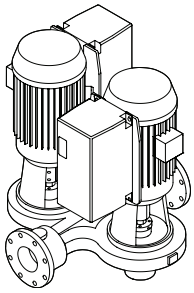
- Reduced controls installations and set up fees
- Less floor space required
- Fewer peripheral components
- Reduced costs for pipe and pipe installation
- No requirement for concrete pad
- Fewer components to install
- Faster installation and commissioning

DESIGN ENVELOPE IVS PUMP RANGE



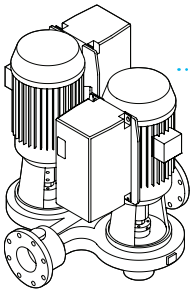
4300
Single/split coupled

INDOORS	OUTDOORS
Integrated to 315kW	Integrated to 90kW
Standalone 315kW – 900kW	



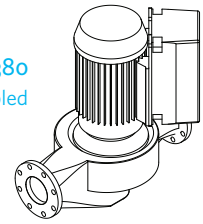
4302
Dual arm/split coupled

INDOORS	OUTDOORS
Integrated to 55kW	Integrated to 55kW



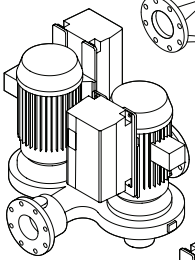
4312
Twin/split coupled

INDOORS	OUTDOORS
Integrated to 30kW	Integrated to 30kW



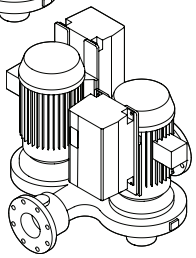
4380
Single/close coupled

INDOORS	OUTDOORS
Integrated to 7.5kW	Integrated to 7.5kW



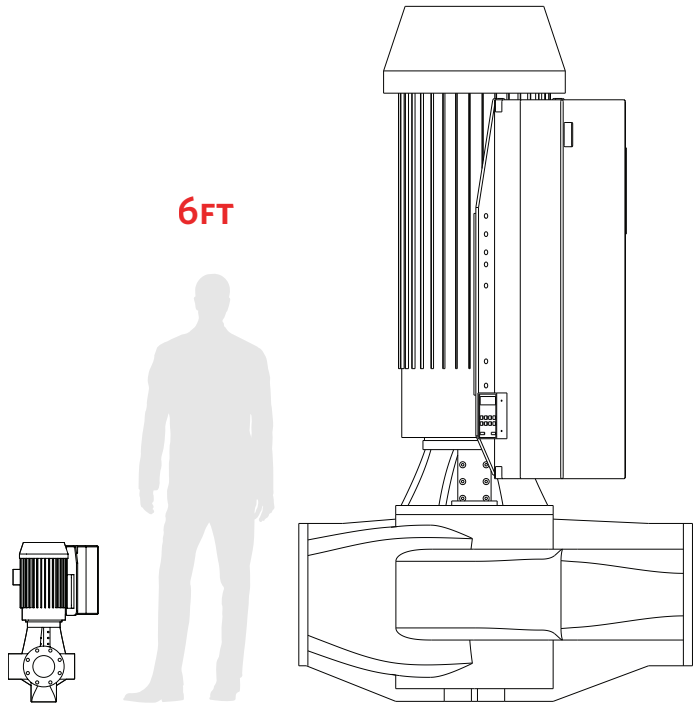
4382
Dual Arm/close coupled

INDOORS	OUTDOORS
Integrated to 7.5kW	Integrated to 7.5kW



4392
Twin/close coupled

INDOORS	OUTDOORS
Integrated to 7.5kW	Integrated to 7.5kW



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View your savings and ROI using real data from your installation. Ask your Armstrong Team.

