



ARMSTRONG

DESIGN ENVELOPE

DESIGN ENVELOPE
IVS SERIES

WARNING
Always read the manual before use.
Failure to follow safety instructions
may result in injury or death.
Electrical danger possible after
power is cut. Lock out and tag out
before doing any work.

Intelligent Variable Speed pumps

SOLUTION OUTLINE

FILE NO: 100.11
DATE: AUGUST 2014

SUPERSEDES: 100.11
DATE: MAY 2013

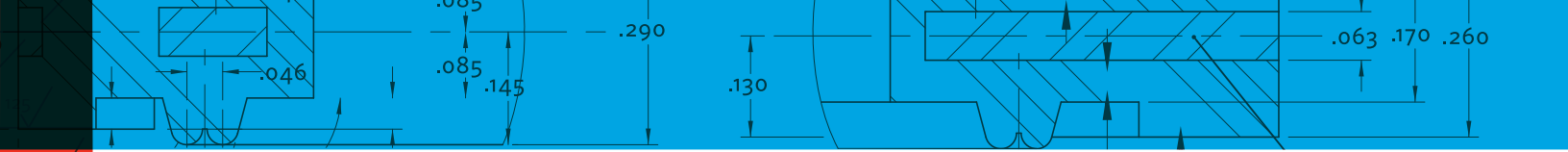
DESIGN ENVELOPE

OPTIMUM
PERFORMANCE
ANY GIVEN TIME

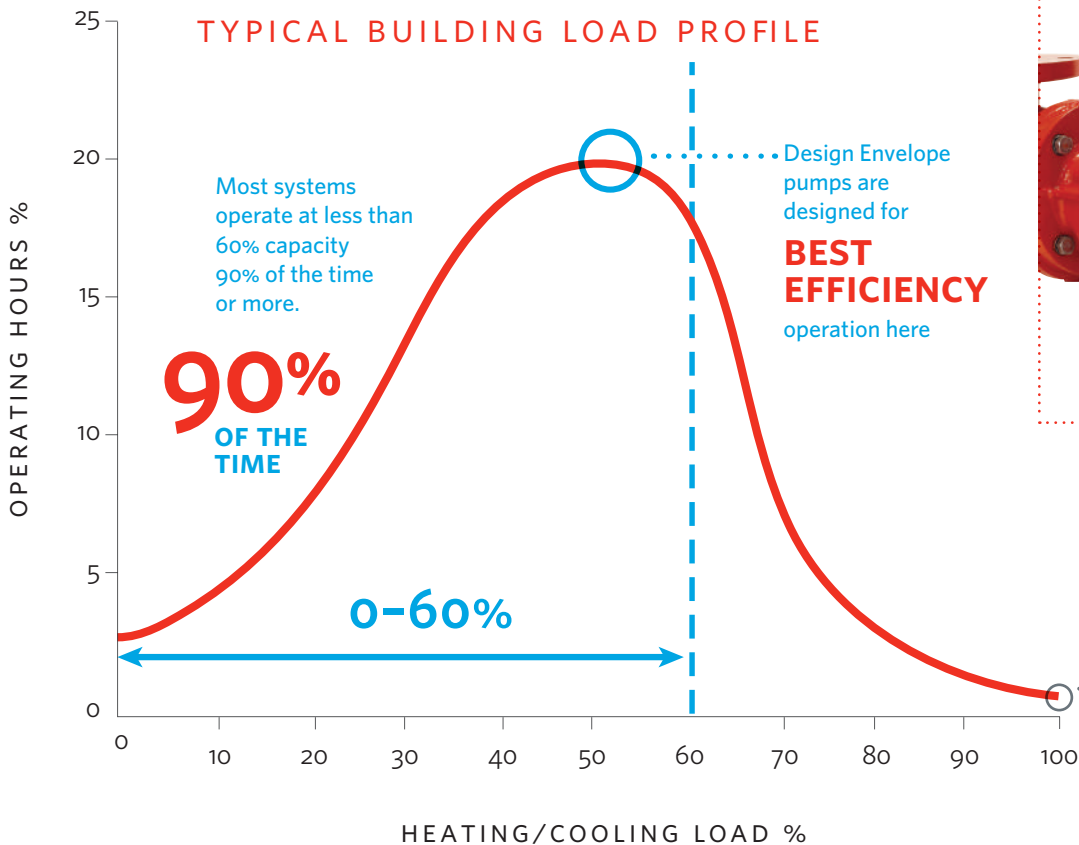
Armstrong's Design Envelope pumps are a complete solution for heating and cooling systems. The integration of a perfectly matched Vertical In-Line pump, motor, and Intelligent Variable Speed controller creates an innovative, high-value pumping solution.

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 control is available for Armstrong's Series 4300 and 4380 Vertical In-Line pumps, Series 4302 and 4382 dualARM pumps and Series 4312 and 4392 Twin pumps. These solutions are available with integrated controller or in a stand-alone configuration (controller mounted separately). Single phase available to 7.5hp / 5.5kW



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

Design Envelope pumps use a combination of optimized impeller size and speed control for energy efficient operation within a given performance en-

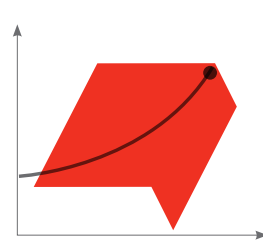
velope. The performance envelopes are mapped for the best pump efficiency at 50% of the design flow rate, where variable flow systems operate most often. This ensures a building's hydronic pumping system consumes as little energy as possible. It also ensures that the installation meets ASHRAE 90.1 guidelines requiring 70% energy savings at 50% of peak load.

SAVINGS

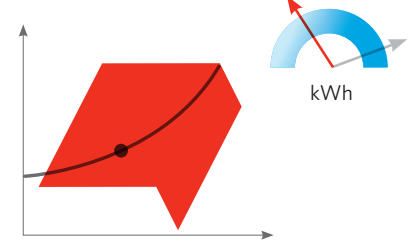
ENERGY SAVINGS

Armstrong Design Envelope variable speed technology fundamentally changes the operation of a pump within the larger HVAC system. The variable speed intelligence embedded in the Armstrong Design Envelope 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

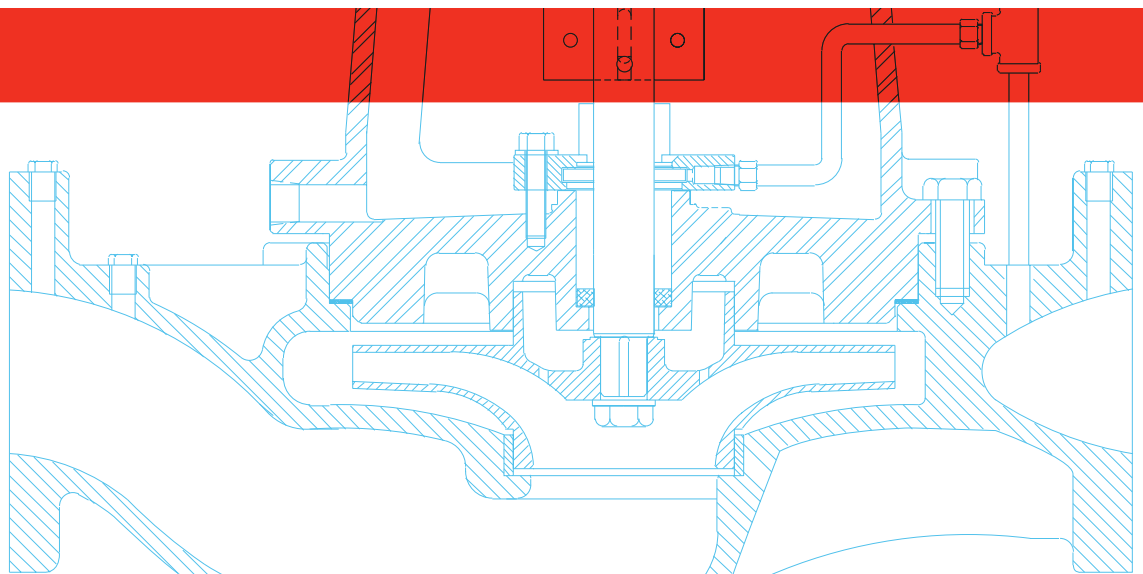


AT 100% DESIGN FLOW



AT 50% DESIGN FLOW

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



EVERYWHERE

INSTALLATION COST SAVINGS

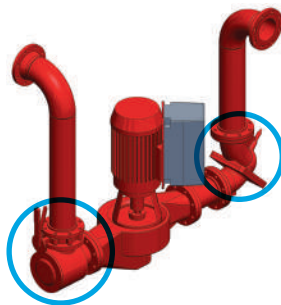
View your savings and ROI using real data from your installation.

Ask your Armstrong representative.

VERTICAL IN-LINE

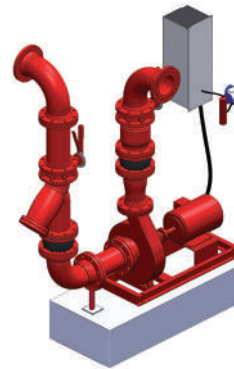
END SUCTION

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



DESIGN ENVELOPE 4300 (3×3×10 7.5hp)

VS.



4030 (3×2×10 7.5hp)

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

End suction base mounted installation with traditional piping.

IDENTICAL APPLICATION

1.00

INSTALLATION COST*

2.18

* Costs are normalized so no units are shown. For further detail, see Armstrong Value Proposition sheet (doc. #43.135).

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

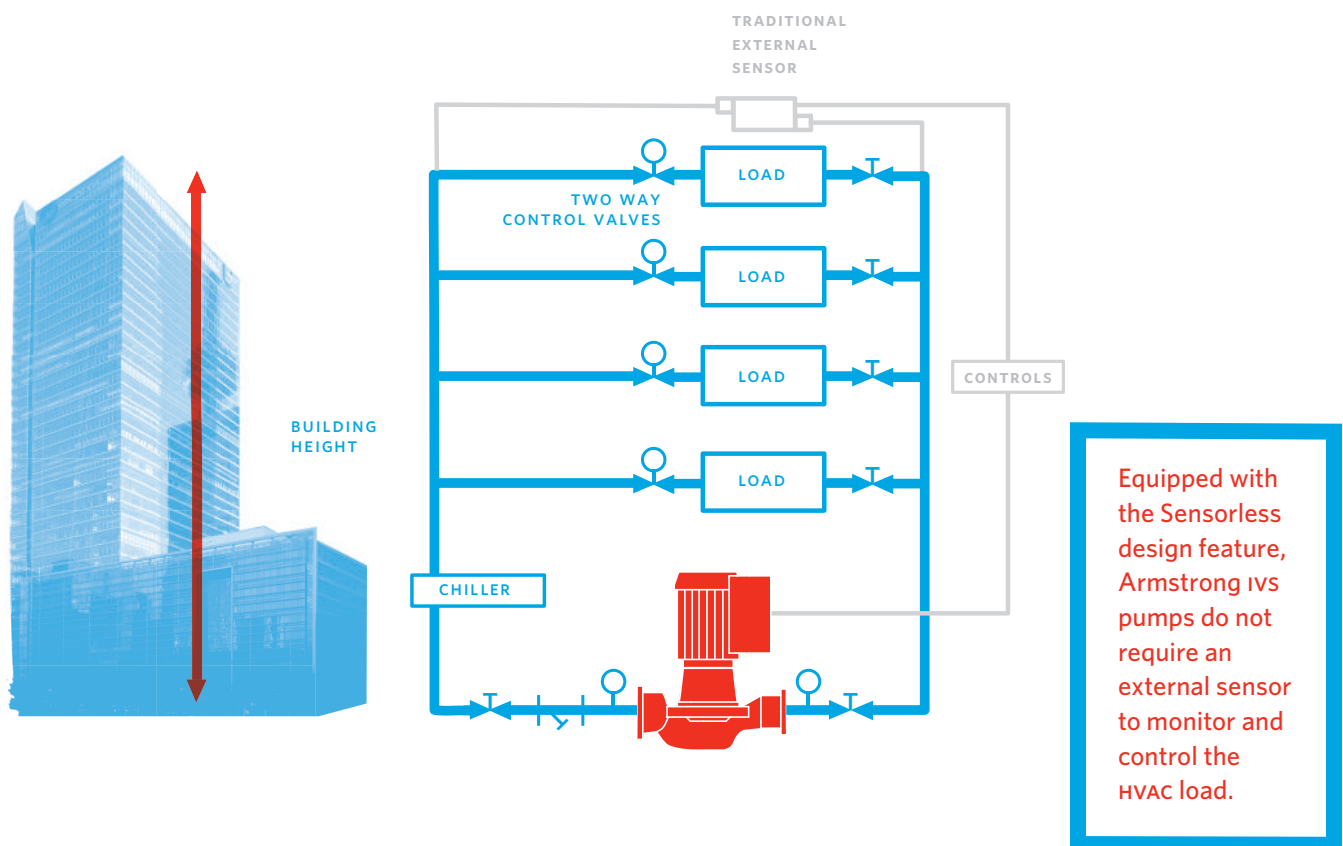
- Flex connectors
- Inertia base
- Remote sensor

Labour requirements

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

HOW IT

THE SENSOR WITHIN



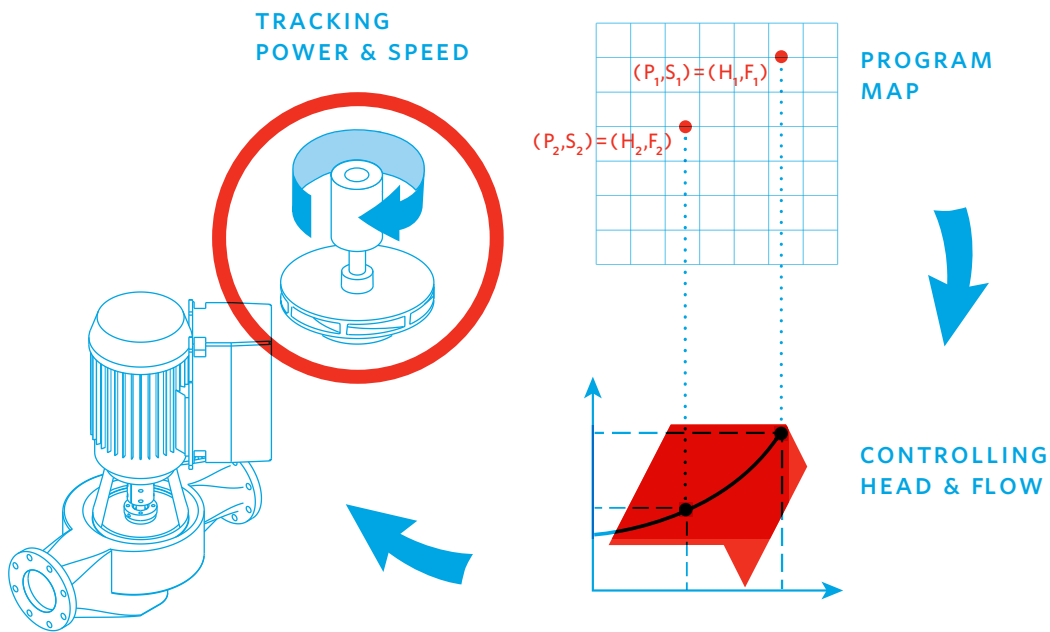
In a chilled water system, a building's temperature controls are connected to control valves that manage the flow rate to the cooling coils (load). As the control valves open for more cooling, the differential pressure across the valve decreases. The ivs controller

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 (power draw and RPM) and operating curve are pre-programmed into the controller. During operation, the controller monitors the power and speed of the pump and establishes the hydraulic performance and position

of the pump's head-flow condition relative to the system requirements. As the building's control valves open or close to regulate flow to the cooling coils and maintain building occupant comfort, the ivs Sensorless controller automatically adjusts the pump speed to match the required system pressure requirement at the current flow.

FUTURE

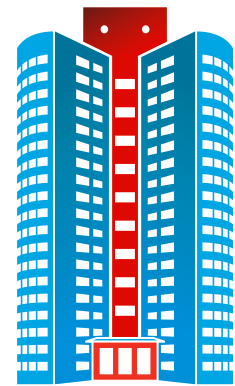
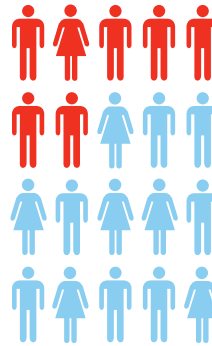
DESIGN FLEXIBILITY

Changes to building conditions

With Armstrong Design Envelope 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:

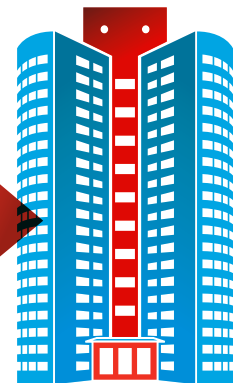
Changes to building occupancy



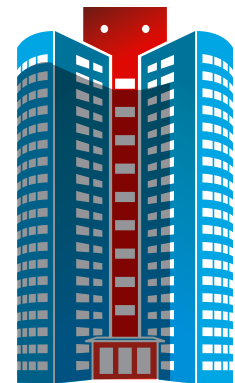
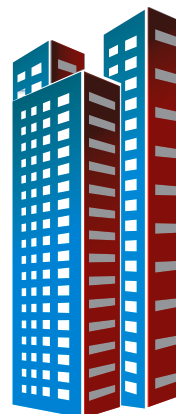
Changes to the building design



LOW-EMISSION GLASS

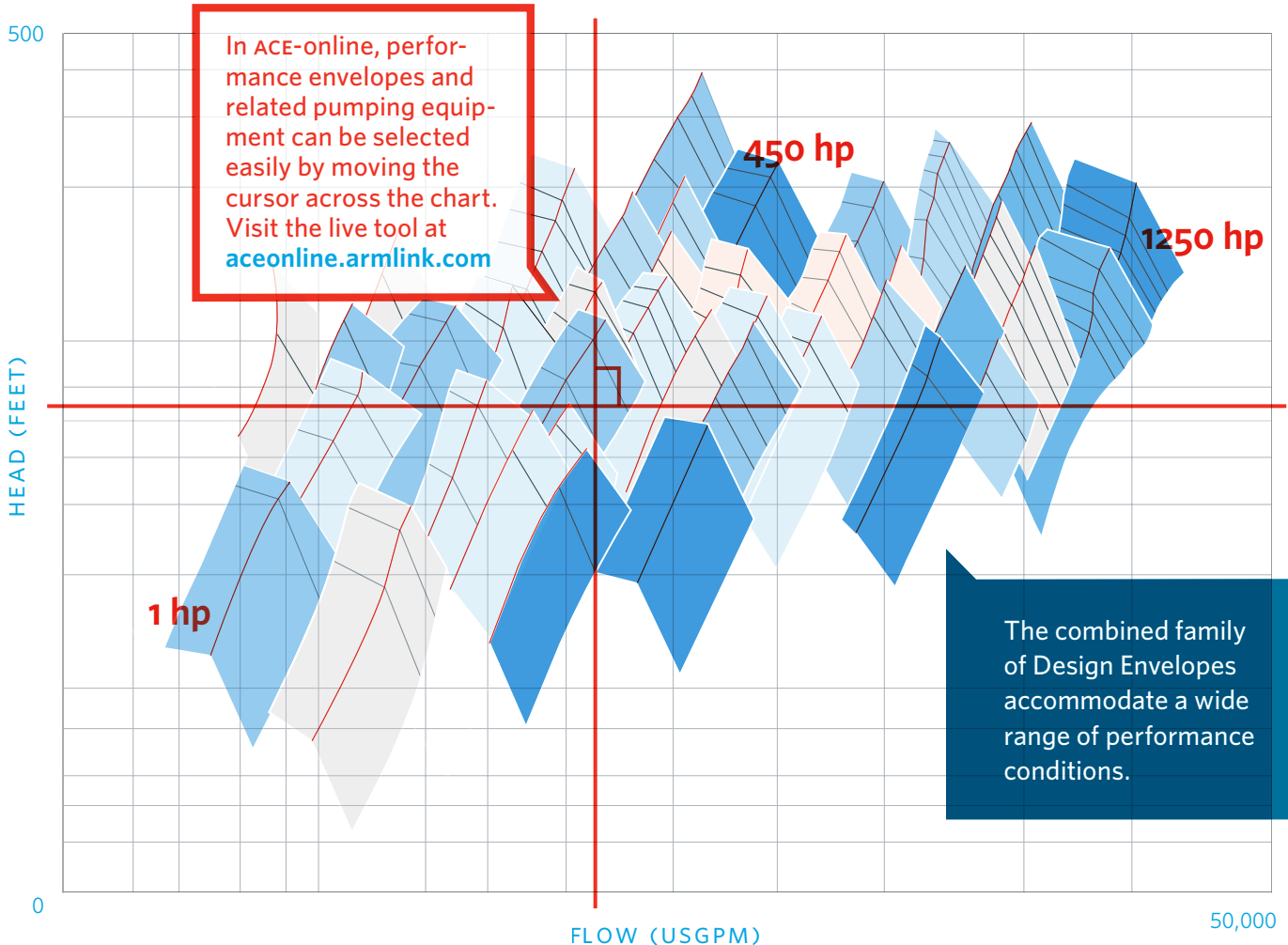
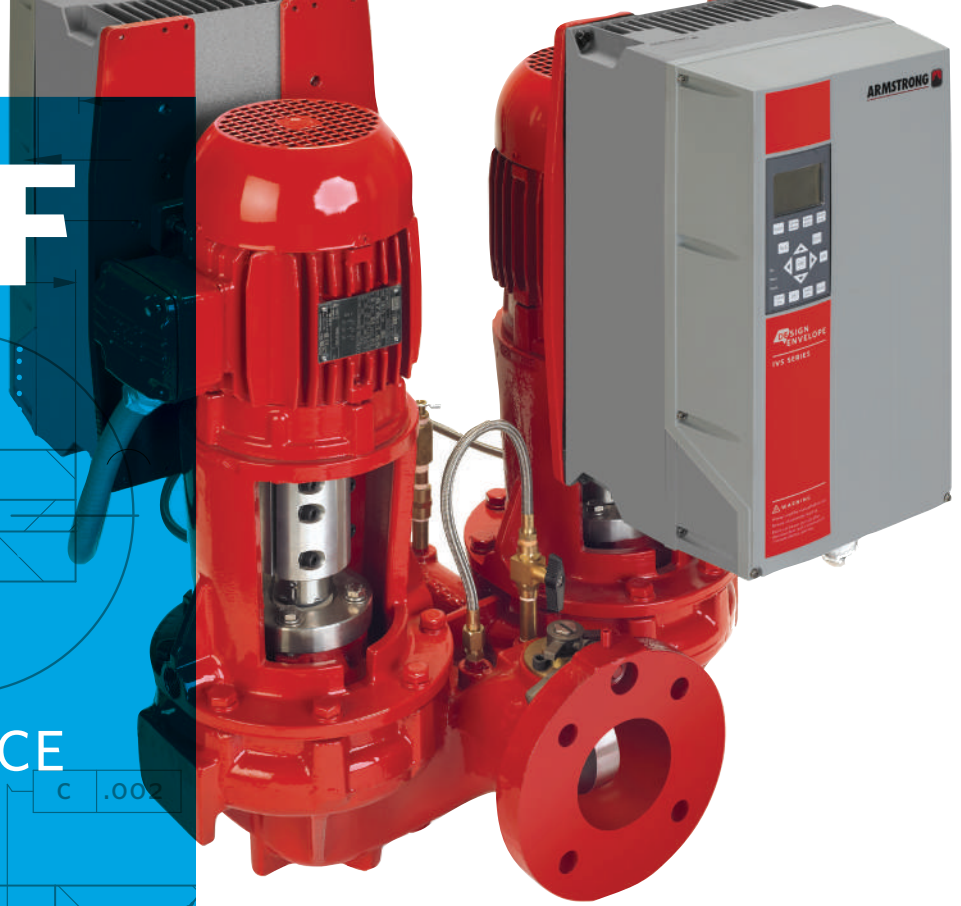


Changes to shade conditions caused by modifications to the building's surroundings



PROOF

EFFICIENCY-BASED PERFORMANCE SELECTION



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

DESIGN ENGINEERS

- 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

- 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 PUMP RANGE*

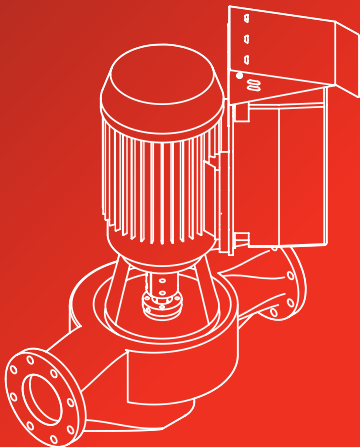
4300	INDOOR	OUTDOOR
	Integrated up to 450hp Standalone 450hp - 1250hp	Integrated to 125hp
4380	INDOOR	OUTDOOR
	Integrated to 7.5hp	Integrated to 7.5hp
4302	INDOOR	OUTDOOR
	Integrated to 100hp	Integrated to 100hp
4382	INDOOR	OUTDOOR
	Integrated to 7.5hp	Integrated to 7.5hp
4312	INDOOR	OUTDOOR
	Integrated to 40hp	Integrated to 40hp
4392	INDOOR	OUTDOOR
	Integrated to 7.5hp	Integrated to 7.5hp

* Single phase available to 7.5hp / 5.5kW

OUTDOOR SERIES

Armstrong Design Envelope pumps are available for outdoor applications in Series 4300, 4380, 4302, 4382, 4312 and 4392 up to a maximum of 125hp (90kW).

- Rated for UL Type 4X with TEFC motor standard.
- Epoxy coated electronics to protect against condensation within the controls.
- Stainless steel backplate prevents corrosion between the backplate and the heat sink.
- Equipped with stainless steel overhead weather shield — this protects the LCP keypad from UV rays, prevents the unit from overheating if exposed to the sun, and prevents accumulation of ice on sensitive areas.



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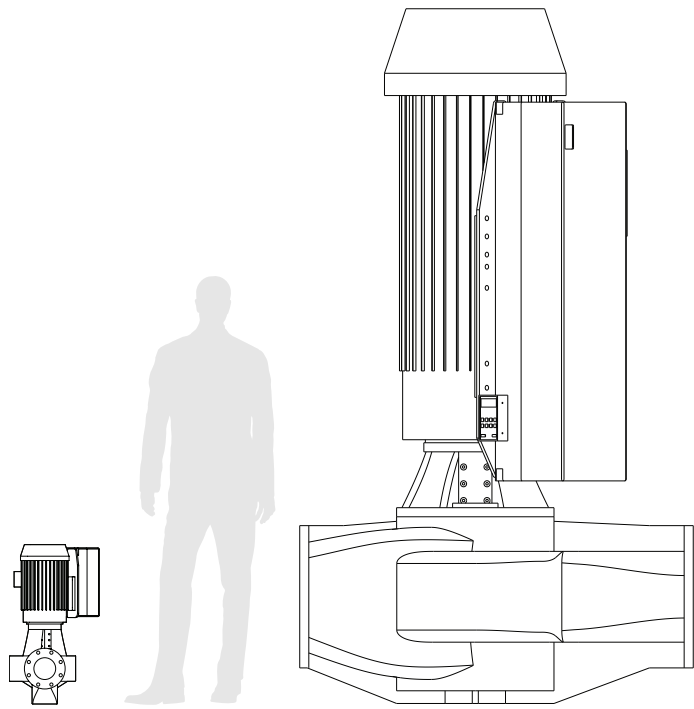
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