

⚠ WARNING

ARC FLASH AND
SHOCK HAZARD
SEE INSTRUCTIONS AND
WARNING LABELS
FOR ADDITIONAL INFORMATION



MAN STOP



ecosmart®
S T A T I O N
— AB —



The Future of
Pump Controls

ARC ARMOR



ECO SMART STATION® AB

Revolutionary in design, the new **ECO SMART STATION® AB** control system provides a safe, simple, energy efficient solution for optimum pump control in municipal lift station applications.

The **ECO SMART STATION® AB** uses the latest technology in VFD, microprocessor based controller, data storage and communication capabilities available.

This pre-engineered solution is available in 29 models, from 10HP to 100HP.

The **ECO SMART STATION® AB** is housed in the innovative, multiple compartment **ARC ARMOR® Enclosure**, reducing the risk of injury resulting from electric shock and exposure to arc flash. The control and power circuitry are isolated in separate compartments, preventing unnecessary operator exposure to high energy circuits and potential arc flash conditions.



Arc Flash

Arc Flash in an industrial control panel can occur when there is an ample voltage supply present in the panel. If a situation occurs to allow an accelerated fault to ground, an arc flash can occur.

With 5-10 arc flash incidents occurring per day, arc flash is a leading cause of death and burn accidents for maintenance staff when servicing electrical control panels in North America today. Onsite damages caused by an arc flash incident include: OSHA citations or fines, down time, loss of revenue and equipment damage. In worst case scenarios, arc flash may result in long term disability or even death thereby having a significant impact on the liability of the municipality.

Arc flash events can occur in less than 0.2 seconds:

- Intense heat
- Thermoacoustic shock wave
- Molten metal
- Hot shrapnel that can pierce a body
- Blinding light
- Toxic smoke
- Contact with energized components



Energy Efficiency

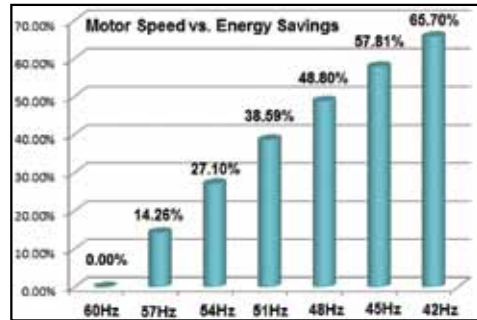
Energy and maintenance expenses for a typical pumping system can add up to be more than 65% of the total life cycle cost. Therefore, energy efficiency is a critical factor when investing in new equipment or simply retrofitting existing control systems. With the **ECO SMART STATION® AB** control system, up to 30% energy savings is achievable.

How Does the Energy Savings Work?

The Affinity Laws define the relationship between pump speed (n) and power (P), where $P_2 = P_1 (n_2 / n_1)^3$

Motor speed (n) in RPM can be controlled with the use of Variable Frequency Drives, where $n = (120 \times \text{Hz})/\text{Poles}$

The graph shown here illustrates how a small reduction in pump speed will result in considerable energy savings.



The controller uses an “Efficiency Auto-Tune” algorithm that searches for the pump speed (Hz) that will consume the least amount of energy per gallons of liquid pumped (W/GPM). The flow (GPM) is calculated from the level changes, tank dimensions, fill times and discharge times. A flow meter is not needed. The pump motor power (W) is monitored by the VFDs and transmitted to the controller. No power meters are required. The auto-tune program also takes into account the reduction in flow and head characteristics of the pump resulting from speed reductions to determine the Best Efficiency Frequency (BEF).

When the Best Efficiency Frequency (BEF) is found, the pumps will operate at that speed during every cycle. This mode of operation (ECO mode) is very efficient during low and normal in-flow to the station.



ECO (fx) Setup

Cycle Operation or Constant Level Operation?

During high in-flow operation (peak hours), it is more efficient to operate in a proportional-integral-derivative control mode (PID mode) other than cycling the pump ON and OFF. The controller recognizes high in-flow conditions and automatically switches the operation mode from ECO mode to PID mode. During PID operation the pump speed is controlled to match the incoming flow and maintain a constant wet well level. When the in-flow returns to normal, the operation returns to a cycle based mode (ECO mode) of operation automatically.

Cost Effective

The **ECO SMART STATION® AB** is designed to offer a superior solution at a competitive price. Rebate programs to promote energy efficient solutions such as the **ECO SMART STATION® AB** may be available in your area from your electric utility company. Rebates are in addition to the energy savings resulting directly from using an energy efficient solution such as the **ECO SMART STATION® AB** control panel.

Control Panel Overview

The **ECO SMART STATION® AB** is powered by the **Allen-Bradley POWERFLEX® 400** Variable Frequency Drives and controlled by the **MicroLogix™ 1400 PLC**. The **PanelView™ Plus 6 700** color display is designed for users to monitor and configure the pump station. The controller provides energy efficient level control, automatic pump alternation, flow monitoring, data logging, alarm logging, historical trending and comes equipped with an SD memory card for data storage and download. The controller can connect through multiple communication streams for remote monitoring and control.

Features:

- 6.5 inch color touch screen
- LCD backlit, sunlight readable
- Continuous level monitoring (Submersible pressure transducer provided)
- Sensorless flow monitoring
- Power monitoring
- Motor current monitoring
- Pump speed control
- Pump efficiency monitoring (W/GPM)
- Pump efficiency Auto-Tuning (lowest W/GPM)
- Automatically switches to PID mode during high in-flow
- Automatic alternation
- Multiple password protection
- Pump low efficiency alarm
- Pump over temperature and seal fail monitoring
- Pump dry run protection
- Data logging on SD memory card
- Battery back up controls

Simple Operation

The HMI display is very simple to use, intuitive and easy to read in various weather and light conditions, including direct sunlight. The **ECO SMART STATION® AB** is shipped pre-configured to reduce startup time.

Pre-Engineered

With the pre-engineered **ECO SMART STATION® AB** control panel, electrical schematics, mechanical drawings, bill of materials, component cut sheets, specifications, operation manuals and installation manuals are available from your sales representative.

Communication Options:

- Radio modem – DF1, Ethernet or DNP3 protocol
- GSM/GPRS cellular modem communication
- Dial up modem
- Auto dialer



Level Setup



Live Trends

Controller and VFD Overview

(PLC) MicroLogix™ 1400

- Ethernet port provides peer-to-peer messaging, web server and email capabilities
- Online editing for modifications to the ladder logic while the program is running
- Built-in LCD with backlight for viewing controller and I/O status, provides interface for messages, monitoring and manipulation
- Expand application abilities through support of up to 7 expansion I/O modules (1762 I/O) with 256 discrete I/O
- Supported by 2 Serial ports with DF1/DH485/Modbus RTU/DNP3/ASCII protocol



(HMI) PanelView™ Plus 6 700

- Display Size: 132 x 99 mm, 640 x 480 resolution
- Built-in Ethernet and RS-232 communications
- Display Type: Color Active Matrix (TFT 18-bit color)
- Internal Storage 512 MB, real-time clock, SD memory card slot
- Certifications: cUL certified; UL listed
- Operating Temperature 0 - 55°C (32 - 131°F)
- Ratings NEMA 12, 13, 4X, IP54, IP65

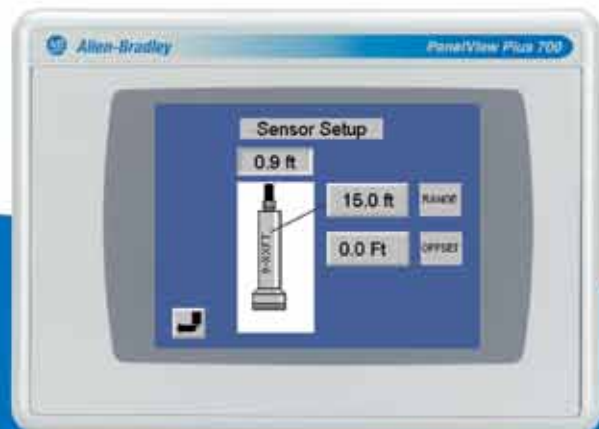


(VFD) POWERFLEX® 400

- 7 Digital Inputs (24V) - 3 Semi-Programmable, 4 Programmable
- 2 Analog Inputs – 1 Isolated and 1 Non-Isolated
- 2 Programmable Form C Relay Outputs
- 2 Analog Outputs (0 to 10V or 4 to 20mA)
- 1 Optocoupler Output
- Certifications: UL and cUL (CSA) Listed
- Input Specification 3-Phase Voltage: 200-240 / 380-480V +/-10%
- Output Specification Voltage: Adjustable from 0V to rated motor voltage
- Frequency Range: 0 to 320 Hz
- Overload Current: 110% for 60 seconds and 150% for 3 seconds



Flow Setup



Sensor Setup



The **ECO SMART STATION® AB** is housed in the innovative, multiple compartment **ARC ARMOR® Enclosure**, reducing the risk of injury resulting from electric shock and exposure to arc flash.

Zone 1 - Service Compartment

Danger Zone: This zone contains dangerous arc flash potential and the risk of electrical shock. Workers may require Personal Protective Equipment (PPE) when entering. "Lockout/Tagout" is supported.

Zone 2 - MCC Compartment

Danger Zone: When Zone 1 is energized, workers cannot gain access to Zone 2, thereby reducing accidental exposure to arc flash. "Tagout/Lockout" is also supported.

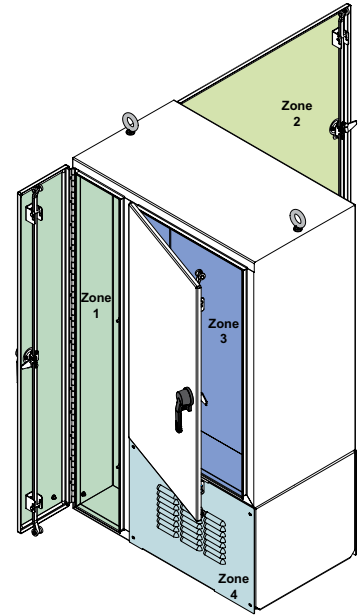
Zone 3 - Controls Compartment

Operator Safety Zone: Contains only low voltage circuits (120VAC or lower only), therefore minimal PPE is required.

Zone 4 - Skirt Compartment

Gas Isolation Zone: Provides gas isolation from wet well in wastewater lift station applications.

For more information on the **ARC ARMOR® Enclosure**, visit www.ArcArmorEnclosure.com.



Zone 3: Inner Door of Controls Compartment



Zone 1: Service Entrance Compartment



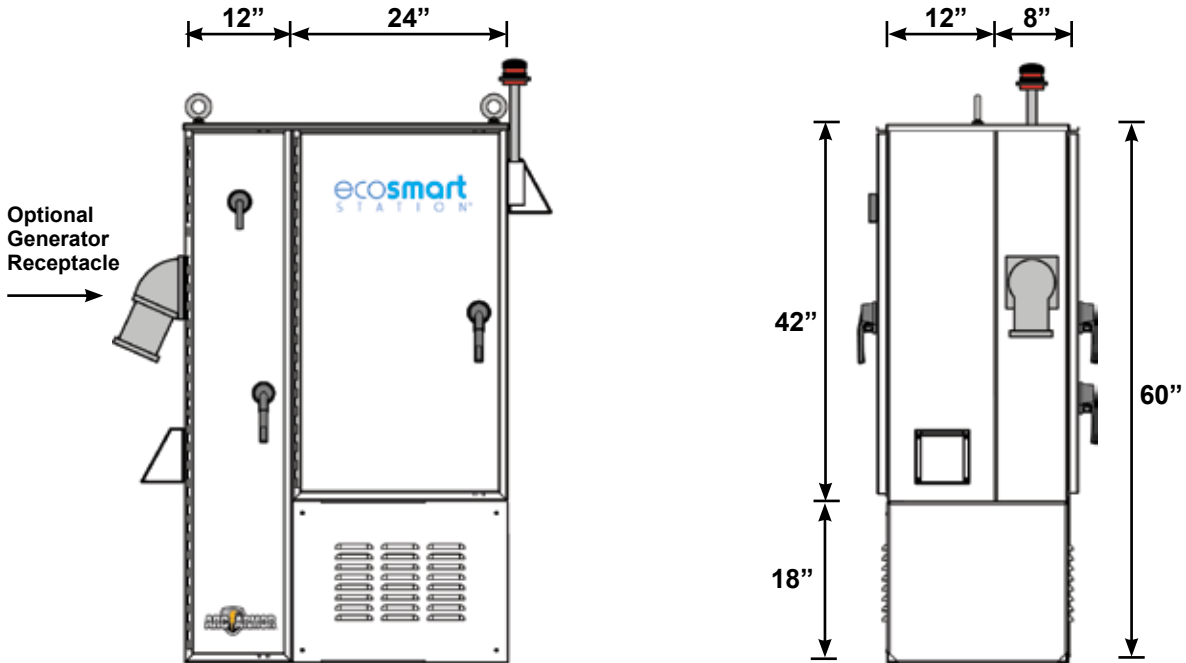
Zone 2: MCC Compartment



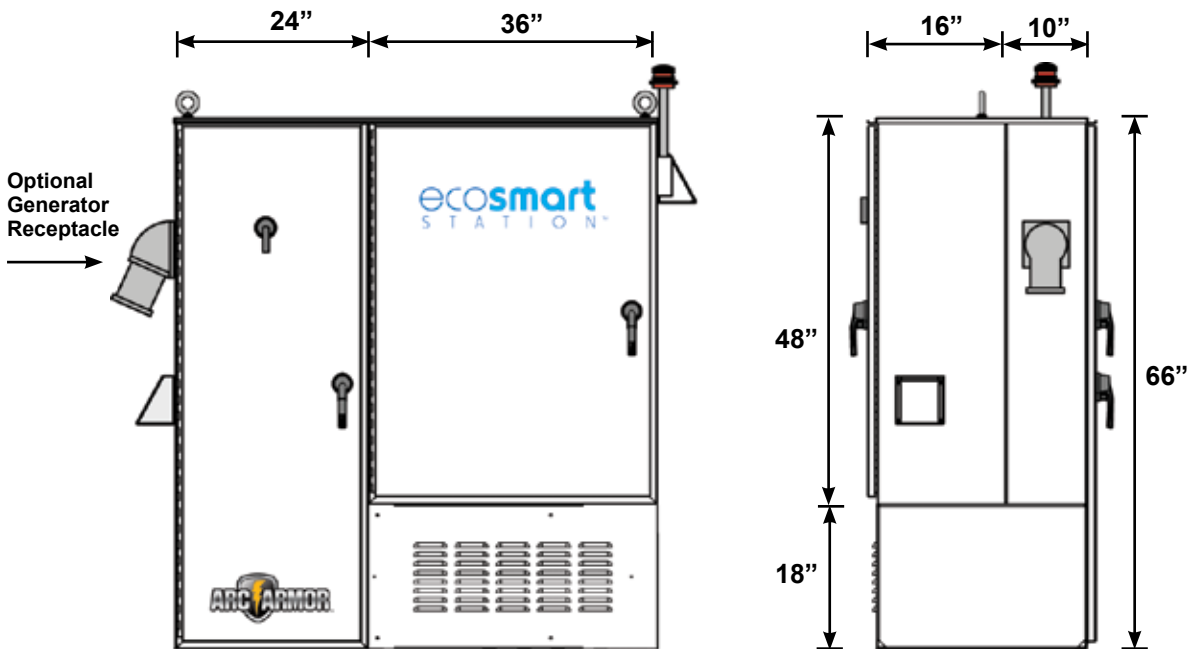
Zone 3: Controls Compartment

ECO SMART STATION® AB Enclosure Overview

Size 1 Overall Dimensions: 60"H x 36"W x 20"D



Size 2 Overall Dimensions: 66"H x 60"W x 26"D



WARNING

ARC FLASH AND SHOCK HAZARD
APPROPRIATE PPE REQUIRED



ecosmart[®]

S T A T I O N

AB

WARNING

DO NOT ATTEMPT TO REPAIR OR SERVICE THIS EQUIPMENT
UNLESS YOU ARE A QUALIFIED ELECTRICIAN
OR A QUALIFIED WATER TREATMENT OPERATOR.
FAILURE TO FOLLOW THESE INSTRUCTIONS
CAN CAUSE PERSONAL INJURY OR DEATH.



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