

FAQ's for Electronic Interface (EI) Air Operated Diaphragm Pumps (AODP's) and Controllers in Hazardous Duty (HD) Environments

What is an EI air-operated diaphragm pump?

EI stands for Electronic Interface. It is an air-operated double diaphragm pump fitted with a solenoid and coil. Energizing and de-energizing the coil controls air flow to the major pilot valve, causing the pump to cycle. Additionally, these pumps can also be equipped with various sensors to monitor the number of strokes and detect the presence of internal leaks caused by diaphragm failures.

How can the electronic interface pump be controlled?

The pump can be controlled via an ARO® Dose Controller, customized PLC or a PC based control system.

What is meant by the closed loop system, used exclusively by ARO®?

ARO® integrates a proximity sensor into the pump, which provides positive feedback that the pump has completed each stroke. This ensures a complete cycle has been achieved and provides a higher degree of accuracy.

What is a hazardous environment?

A hazardous environment is one in which its atmosphere is considered to be potentially explosive due to local and operational conditions. An explosive atmosphere contains flammable substances in the form of gases, vapors, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

Potentially explosive atmospheres are sub-classified depending on its likelihood to become explosive. Equipment certified for use in hazardous environments is classified for use specifically in certain explosive atmospheres and by the level of protection it offers.

In which hazardous environments are ARO® EI pumps suitable for use?

- **United States (NEC):** Some EI pumps will be suitable for use in hazardous locations designated Class I&II, Division 1&2, Groups A-D. Conductive pump materials and NEC certified electronic components must be selected. See the operation parameters in the S-631 general information manual for additional detail.
- **Canada (CEC):** Some EI pumps will be suitable for use in hazardous locations designated Class I&II, Division 1&2, Groups A-D. Conductive pump materials and CEC certified electronic components must be selected. See the operation parameters in the S-631 general information manual for additional detail.
- **EU (ATEX Directive):** Some EI pumps will be certified and marked for use in ATEX hazardous locations designated Zones 1&2, 21&22. Conductive pump materials and ATEX certified electronic components must be selected in order for the pump to include the ATEX certification label. See the operation parameters in the S-631 general information manual for additional detail.

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Can any EI air-operated pump diaphragm pump be used in a hazardous duty environment?

No. The pump casing must be made of a conductive material (Ground-able) to meet ATEX, NEC or CEC compliance requirements. Additionally, only the certified versions of the electronic interface components may be selected and installed.

What coil options are available for EI AODP's? For HD (hazardous duty) environments?

- 12VDC, 24VDC, 120VAC, and 240VAC coils are available for non HD environments.
- 12VDC, 24VDC, and 120VAC coils are available with NEC/CEC certifications for hazardous environments in the USA and Canada.
- 12 VDC, 24VDC, and 240VAC coils are available with ATEX/IECex certifications for hazardous environments for the European Community and for countries that recognize the IEC standards.

Can the ARO® controller be used in a HD environment?

No, the controller is not certified for use in an HD environment but it may be placed within an enclosure rated for this environment or outside the hazardous area. In both cases the supplied barrier devices must be used and all applicable wiring codes must be followed. Reference the literature provided with the ARO® controller and the EI pumps for general installation guidelines.

Can any solenoid coil be used in conjunction with the ARO® controller?

No. The controller/pump interface can only be accomplished with a 24VDC coil. For hazardous environments, coils approved for NEC/CEC or ATEX/IECEx environments are available.

Can I use the prewired ARO® controller cables in HD environments?

No, the hazardous rated electronic components must be specifically wired to comply with all relevant HD codes and connected to the applicable barrier devices outside the hazardous environment. The ARO® cable and connectors are not rated for HD environments.

Why is installation and wiring the responsibility of the customer?

Wiring regulations required by law vary by location. Sometimes conduit or armored cable is required, as well special cable glands and/or enclosures. As a general rule, the supplied barriers must be installed. In all HD applications an appropriately licensed electrician must be responsible for the installation. Some general wiring recommendations and warnings are provided in the pump and controller literature, these notes are intended to be general information and do not provide the details required to meet applicable wiring codes.

Are any components necessary for final pump installation of the EI pump in a hazardous environment not provided with the pump itself?

Yes. Cables will be required as well as supporting materials such as conduit, cable glands and enclosures. Local regulations may require additional components.

What is the maximum distance I can wire the controller from the pump?

The applicable electrical codes will allow for a maximum cable length based on capacitance and maximum allowable energy. A certified electrician must ensure the installation meets these requirements. Distances of over 100 meters are not recommended to ensure reliable operation.

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✔ **What are the wire specifications for the HD environment?**

Consult your local regulations for accurate information regarding wiring, connectors, enclosures, cable glands and any other supporting materials.

✔ **Can I use the leak detection option in a HD environment?**

Yes. A leak detector is released and is certified for use in hazardous environments for both ATEX/IECEX and NEC/CEC locations. Refer to the EI literature for details regarding certification levels.

✔ **For batching applications, do I need to do the calibration for the EI pump and controller regularly? Is there a recommended frequency?**

If process conditions do not change, there is no need to re-calibrate the system. However, considering that process conditions may indeed vary, recalibration is not a bad idea. The frequency must be established by the final user, based on how much the process changes and how often.

✔ **Can I connect the controller to a PLC system?**

Yes. The PLC may be used to provide a 24v signal to start and stop the pump, and a 4-20mA signal may be used to control the pump speed. The PLC can also receive the analog pump rate output signal from the controller.

✔ **Can the leak detector be used with a corrosive chemical liquid?**

The body and prism of the leak detector is constructed of polysulfone material. Compatibility of the sensor must be established based on the specific characteristics of the liquid in question.

✔ **What is the maximum allowed fluid temperature that I can pump?**

For HD applications, the maximum allowable fluid temperature is 50°C. This limitation is specified in the general information manual S-631.

✔ **Will the solenoid be damaged if installed in an environment with acid gas in the air?**

The body of the solenoid coil is constructed of Nylon. Incompatible materials should not be allowed to come into contact with the coil.

✔ **What is the advantage of having a Solenoid in the Air valve instead of a Solenoid in the Airline?**

The solenoid actuation allows for accurate cycle rate control and provides a more consistent volume per stroke than is achieved with standard pumps.

✔ **What is the life of the solenoid (How many cycles will it last)?**

The solenoid coil and valve body are expected to last at least 20M cycles. The mechanical parts should normally wear out before the solenoid coil fails.

✔ **How can I determine whether my PD Pump can be upgraded to an EI pump.**

Starting in September 2017 all PD pumps will be equipped with plugged ports. These plugs may be removed such that the proximity sensor and leak detector found in PE pumps can be added to the pump. The PD pumps will not be able to be operated with a solenoid coil unless they are retrofitted with a valve body kit to enable solenoid operation. Once upgraded, these pumps will operate as a PE pump and, as such, will also be compatible for use with the ARO® controller.

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While ARO® has certified the manufacture, design and assembly of its hazardous duty capable PD pumps, it will not be in a position to certify pumps which are assembled outside of the direct control of ARO®. As such, pumps which are field-retrofitted with electronic interface equipment will not be certified for use in hazardous locations.

Since the nomenclature of the PD pumps will not change, end users requesting electronic interface will need to inspect the PD pumps for this added port to determine whether they can upgrade the pump's interface with electronic interface components. EXP pumps have an extra port that will be plugged for the end of stroke sensor (see image 1). Compact pumps will simply require the exchange of the muffler assembly.

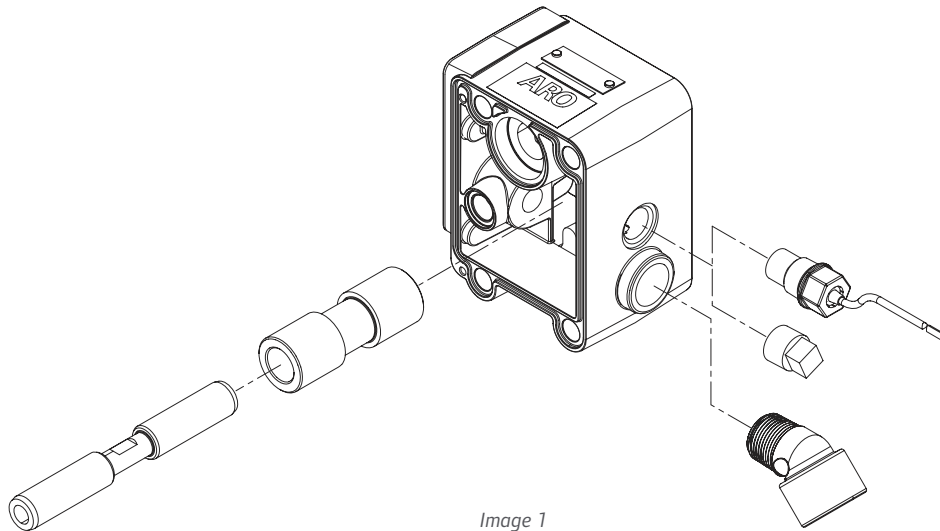


Image 1

Leak detection ports will be plugged for all pump sizes when not in use. (see image 2 for an example corresponding to a 1" pump)

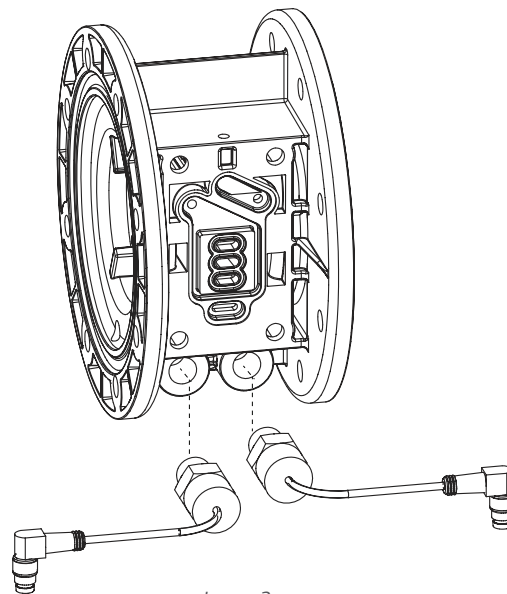


Image 2

Alternatively, customers may call ARO's customer service department and give the date code found within the serial number to determine if the pump can be upgraded.