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# ELECTROPURE™ EXL EDI MODULE INSTALLATION CHECKLIST

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## 1. Safety

Please read and understand the Safety Section of the Electropure™ EDI OEM Technical Manual before installation. Please **train your colleagues** regarding the safe design and operation of EDI modules. Key safety topics are the use of electricity around water and the handling of the gases produced at the electrodes. Include a safety section in the customer site maintenance manual.

## 2. Handling the Module

**DO NOT LIFT BY THE PLUMBING OR ELECTRICAL CONNECTIONS.** There are 2 lifting rings and 4 mounting points on the frames for proper handling and securing of the module(s).

## 3. Mounting Options

The module can be mounted in different ways. The most popular way is to install flat brackets on the skid, which provide a secure track for module to sit on. The module must then be secured at the 4 mounting points with M8 x 20mm screws.

## 4. Module Orientation

Electropure™ EDI modules are designed to be installed in an upright, vertical position. In a horizontal position, gas can become trapped in the chambers and interfere with ion removal.

## 5. Pipe and Tubing Connections

The size and type of connection are specified when the order for the module is placed, this can be either US or metric connections. All connections fit all EXL models.

Standard Feed/Product connector for the standard EXL modules vary by model.

The recommended connectors for the EXL-550 and EXL-650 models are the d32/DN25 (1”/25mm) +GF+ Union fitting.

The recommended Feed/Product connectors for the EXL-750 and EXL 850 models are the d40DN32 (1-1/4”/32mm) +GF+ Union fitting

Another Feed/Product connector option is the DN-40/1-½” Sanitary Connector.

All Concentrate and Electrode stream ports are complete with push-to-connect style fittings.

US tube size for the Concentrate stream is ½" OD tubing and the Electrode stream is 5/16" OD tubing.

Metric tube size for the Concentrate stream is 12mm OD tubing and the Electrode stream is 8mm OD tubing.

**DO NOT USE PIPE THREAD SEALANT PASTE OR TEFLON TAPE FOR ANY EXL FITTINGS!**

**6. Power Connection & Wire Conventions**

The connection between the module and the power supply is a water-tight, gold-plated, three-connector fitting. The module is provided with a keyed male fitting on one face of the module. A 20-foot (6 meter) power cord, with female connector, is provided with each module. The GREEN (o), BLACK (-), and RED (+) wires at the end of the power cord should be connected to the appropriate terminals and ground of the regulated DC power supply.

The **(DC -) cathode** is always **BLACK**.
The **(DC +) anode** is **RED**.
The **Ground** is always **GREEN**.

**7. Module and Water Stream Grounding**

The module should be grounded in 3 distinct ways.

Primarily, the module is grounded through the green wire in the main DC electrical power connection. All conductive parts of the module are grounded together to the green wire of the connection. This green wire should be grounded to the bus or other suitable ground by a qualified electrician. The system frame(s) should share a common ground with the module(s).

The module(s) may also be physically grounded to the system frame via its mounting, provided the frame is properly connected to a grounding grid or grounding rod per local code. All paint/powder coating must be cleaned from the module(s) and the frame to ensure a good bond. DO NOT GROUND TO WATER OR SPRINKLER PIPE.

The water streams, with the exception of the Product/Dilute stream, are also conductive, current from the anode and cathode can flow through these water streams seeking a ground. It is good practice to install a "T" connection in these water streams. A conductive piece can be connected directly to ground (e.g., stainless steel rod with attached wire). Without grounding these streams, current in the water may cause metal instrumentation and/or sensors, remote from the EDI system to present a high voltage causing a safety concern and/or damage to instrumentation.

SnowPure recommends the following streams to be grounded:

1. EDI Feed stream between the module and any instrumentation or sensors in the RO permeate.
2. EDI Concentrate outlet. The Concentrate feed if separate from main feed line
3. EDI Electrode stream inlet and outlet. (These have the highest potential for transmitting voltage.)

NOTE: Do not ground the high resistivity EDI product stream. This stream is non-conductive, grounding is not necessary and by-products from electrochemistry may introduce undesirable trace iron or other metal ions into the product stream.

NOTE: Electrical measuring devices like conductivity, resistivity, and pH probes can give erroneous readings if their streams measure stray current/voltage or measure resistance to ground via the conductive piece.

**8. SnowPure EXL EDI Torque Specifications and Procedure**

The design of the EXL module, with internal urethane gaskets and EPDM o-rings, eliminates the requirement to re-torque the EXL module. The torque for the EXL module(s) is preset at 20 ft.-lbs (27 nm). If the EXL module requires re-torquing, contact SnowPure for the EXL torque procedure and settings.

**9. Module Startup Considerations**

Before connecting the EDI module(s) to the system plumbing:

- Perform system hydrostatic pressure check(s),
- Thoroughly flush system piping,

If the EDI is **NOT** connected directly to the RO permeate, installation of a 5 to10 micron filter on the EDI feed system is **strongly recommended** to prevent any debris from entering and fouling the EDI module(s).

Make all mechanical, plumbing, and electrical connections

The key to a proper EDI startup is to run as little water through the module(s) as possible during the plumbing checkout before applying power. The more water and ions that enter the module(s) the more time the initial regeneration will require.

Bleed all air out of plumbing system by first filling the manifold(s) slowly with water. If possible, bleed air out through sample valves. Then “pulse” feed water to all three streams to knock bubbles loose. The manifold(s) should be designed to have no dead legs that can trap air. Removing the air at start-up is important because airlocks in only some of the modules will prevent all modules from getting the same flow of water.

There may be bacteria in the module(s), after storage and shipments, which can be dislodged at this point. (Initial sanitization to come later.)

Check all plumbing connections for leaks, repair as required.

Have data sheets and startup notebook on hand. Record initial data and any observations. Call SnowPure Technical Support with any questions.

Apply DC power to the EDI system as soon as possible. If too much water (with ions) is sent through the module(s) before power is applies it will take the regeneration process a longer time to remove the excess ions.

Check to be sure all three streams for all modules are at the recommended design flows.

Check that the pressure drops of all three streams are approximately correct.

Check the module(s) for startup current. Initially, the amperage may be higher than normal during startup but should drop to a nominal level within 1 to 2 hours. This is dependent on how much water passed through the module(s) prior to the application of DC power. If more than one module is in the system, the current should be approximately the same in all modules. If they are not similar, this may mean that the different module(s) have different concentrate flows and therefore different concentrate conductivities. Verify flows and concentrate conductivity for each and every module.

Check that the ion concentration in the concentrate stream(s) is high. If the module(s) is operating at 90% recovery, the resulting concentrate conductivity should be approximately 11 times that of the feed conductivity. Perform a mass balance of the inlet and outlet ions to determine if the module(s) are regenerating (excess ions in the concentrate outlet) or underpowered (too few ions in the concentrate outlet).

Check all system permissions and interlocks. Check all flow and pressure sensors, and switches to ensure that the minimum flows are set properly and the correct signals are presented to the control system.

Product resistivity should rise to the design criteria within 1 to 2 hours of startup. If excess ions were introduced during the startup procedure, then regeneration may be required before quality is achieved. Consult the O&M Manual for the proper regeneration procedure.

Perform a sanitization, especially if the site is for USP Purified Water. Consult the O&M Manual for the proper sanitization procedure.

Leave a maintenance manual and maintenance log at the site with the customer.

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## *EDI Operating Feed Water Specifications:*

The following are requirements to operate within SnowPure's limited warranty. Optimum performance from Electropure™ EDI modules will result if values that are more stringent are set as design goals.

| Specification | Notes | Working Range | Optimum Performance |
|---|---|---|---|
| Feedwater Source | RO water, direct feed, or with intermediate break tank plus filter | | |
| EDI Feed Conductivity | Ionic load determines size of the working bed and polishing bed within the EDI | **1-20 µS/cm** | 1-6 µS/cm |
| Feedwater Conductivity Equivalent** | FCE = Conductivity + 2.79*$CO_2$+1.94*$SiO_2$ *see note below*** | **< 43 µS/cm** | < 9 µS/cm |
| pH | Low pH feedwater typically indicates the presence of $CO_2$ which will decrease quality. | **5.0-9.5** | 7.0-7.5 |
| Total $CO_2$ | Combined $CO_2$ and $HCO_3^-$ | **<5 mg/l as $CO_2$** | <2 mg/l |
| Operating Temperature | Standard XL-Models<br>XL-HTS Models | **5°C to 35°C**<br>**5°C to 45°C** | 20 to 30°C<br>20 to 30°C |
| Hardness | $Ca^{+2}$ and $Mg^{+2}$ as $CaCO_3$ | **<1.0 ppm at 90% recovery** | |
| Organics | TOC | **< 0.5 ppm** | Not Detectable |
| Metals | Fe, Mn, transition metals | **< 10 ppb** | Not Detectable |
| Silica, $SiO_2$ | Typically dissolved, reactive | **< 0.5 ppm** | < 0.2 ppm |
| Oxidizers | $Cl_2$ and $O_3$, typically | **Not Detectable** | Not Detectable |
| Particles | Recommended direct feed particle-free RO permeate, or 5-10 µm pre-filtration of feed from intermediate tank | | |
| Inlet Pressure | Depends on flow and temperature | **7 bar (100 psi) max** | 2-3 bar typical |
| Outlet Pressure | Concentrate and Electrode outlet pressures to be lower than the Product outlet pressure | | |

** FCE example:

*FCE = Conductivity + 2.79*($CO_2$) + 1.94*($SiO_2$), so if conductivity=5.0 µS/cm, $CO_2$=3.5 mg/l, $SiO_2$=0.5 mg/l, then FCE = 5.0 + 2.79*(3.5) + 1.94*(0.5) = 15.7 µS/cm.*