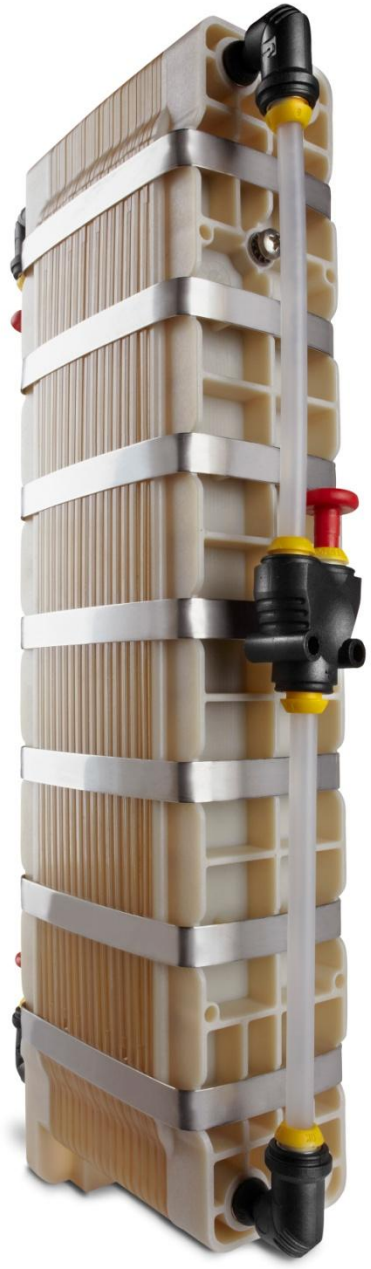

IONPURE®

LabXT CEDI Modules

Operation & Maintenance Manual

IP-MAN-LABXT
Rev 0
February 2014

Manual Covers Part #:

- **IP-LabXT 3**
- **IP-LabXT 5**
- **IP-LabXT 10**
- **IP-LabXT 15**

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MANUAL USER'S GUIDE

This manual describes the procedures necessary to install, operate, and maintain your IONPURE Continuous Electrodeionization modules. Please read this manual carefully before installing and operating your modules. The module warranty may be voided if installation or operation instructions are not followed correctly.

Notes, Warnings, Cautions are used to attract attention to essential or critical information in a manual. Warnings and Cautions will appear before the text associated with them, and notes can appear either before or after the associated text.

NOTE: *Notes are used to add information, state exceptions, and point out areas that may be of greater interest or importance.*

Cautions indicate a situation that may cause damage or destruction of equipment or may pose a long term health hazard.

Warnings indicate condition, practices, or procedures which must be observed to avoid personal injury or fatalities.

IONPURE continually strives to provide safe, efficient, trouble-free equipment using the optimum technology for your application. If problems should develop, IONPURE's worldwide network of technical support will be available to provide assistance. For service, sales, parts, or additional manual copies, please visit the website: www.ionpure.com.

OPERATING MANUAL REVISION HISTORY

EVENT	DATE	DESCRIPTION
Original	Feb, 2014	Original Publication – Operation and Maintenance Manual

1. INTRODUCTION

This section contains the following instructions:

- **LabXT module overview** - Brief introduction to components and models
- **Using this Manual** - How to use this Manual
- **Precautions** - Precautions to prevent personal injury or equipment damage during installation

1.1. LabXT module Overview

LabXT modules are designed to be installed in either single or multiple LabXT configurations. Their compact state-of-the-art design assures ease of installation, maintenance, and service. LabXT modules are available in the following size:

Table 1-1:

Part Number	Nominal Flow	Description
IP-LabXT 3	3 l/h	4 cell LabXT module
IP-LabXT 5	5 l/h	6 cell LabXT module
IP-LabXT 10	10 l/h	10 cell LabXT module
IP-LabXT 15	15 l/h	12 cell LabXT module

For more information on the LabXT module specifications and flow rates, see Section 2.6 and Appendix A of this Manual.

Figure 1-1: (From left to right) LabXT 3, LabXT 5, and LabXT 10 modules.
Note: LabXT 15 modules have the same tubing connections as the LabXT 5 and LabXT 10.

1.2. Using this manual

CAUTION **Service technicians should review this manual prior to going to the site. It lists tools and materials needed to install the modules. It also outlines the site information required to prepare for installation.**

NOTE: The warranty may be void if installation or operation instructions contained in this manual are not followed exactly.

This Manual describes the installation and operation of the LabXT modules. It also contains information on basic troubleshooting (See Section 6).

IONPURE strongly recommends all users read the entire contents of the manual. If the LabXT module is not operating properly after going through the basic troubleshooting exercises, contact your Local Service Provider.

1.3. Installation Precautions

CAUTION **DO NOT OPEN THE LABXT MODULE. OPENING THE MODULE WILL VOID THE WARRANTY AND CAUSE IRREVERSIBLE DAMAGE**

- During operation, the electrode wiring inside the module junction boxes are at high voltage and present a shock hazard. THEREFORE, BEFORE TOUCHING THE INSIDE OF THE JUNCTION BOX, CONFIRM THAT AC POWER TO THE DC POWER SUPPLY HAS FIRST BEEN DISCONNECTED AND LOCKED OUT ACCORDING TO STANDARD LOCKOUT/TAGOUT PROCEDURES.

WARNING

- **To eliminate the possibility of electric shock, confirm that all ground wires are properly connected. Thoroughly read all the information in this manual before operating the LabXT model modules.**

- The module must be operated according to the design specifications for temperature and humidity.
- Tube sections prepared for installation must be inspected, and be free of debris from storage or cutting tool particles. This must be done before installation.
- Because LabXT modules have narrow flow distribution channels, plugging by particles can cause permanent damage. Always install pressure gauges, sampling ports, sensors, etc. in tee fittings. Do not drill or tap into tubing.

CAUTION

- **After installing gauges, sampling ports, sensors, etc., ALWAYS FLUSH OUT THE TUBING TO REMOVE ANY DEBRIS BEFORE CONNECTING THE LABXT MODULE.**

- Installation of the LabXT module must be completed in accordance with the procedures outlined in this manual. If deviations from the prescribed procedures are deemed necessary to achieve the desired performance, consult your local Service Provider.

1.4. Operating Precautions

CAUTION

- **DO NOT APPLY POWER TO THE LABXT MODULE UNTIL PROPER FLOW AND PRESSURE HAVE FIRST BEEN CHECKED AND VERIFIED.**

- Allow for proper inlet and outlet connections. NEVER BLOCK OFF (DEAD-HEAD) ALL OF THE LABXT OUTLET TUBE CONNECTIONS. Dead-heading by blocking all outlets can result in over-pressurization, leading to permanent damage.

- Do not operate the module under conditions other than those stated in the module manual. The prescribed feed water, electrical requirements, and flow configurations, must be followed at all times. If the feed water quality or the product water requirements change, contact the *IONPURE* Technical Support Department for assistance.

Once every year:

- Make sure all wiring connections are tight.
- Test safety interlocks such as flow switches or connections to upstream components.

1.5. Shutdown Precautions

- Confirm that the pressure in the unit is relieved until all pressures inside the unit are atmospheric. (i.e., all pressure gauges should read zero).
- Drain standing water and plug all inlets and outlets.

2. PRE-INSTALLATION: PREPARATION & REQUIREMENTS

This section contains the following pre-installation information:

- **Tools and equipment** - Tools and equipment needed to install the module.
- **Module Inspection** - Inspecting the LabXT module for damage.
- **Operating conditions** - Temperature range, space requirements, electrical connections, feed water specifications, plumbing and drain requirements**.**

2.1. Tools and Equipment

The following items may be required to unpack, position, and install the LABXT module:

- Wire cutters/strippers
- Screwdriver (for securing the Lab XT)

2.2. Electrical and Plumbing Accessories

The amounts, sizes, and types of these supplies will vary based upon system size. Check before hand to determine the system needs.

- 6 mm Parker Quick disconnect Feed Water Harness is provided with the unit.
- Wire harness with a 2-pin electrical connection plug is provided with the unit. Wire harness length is 33 in (84 cm). The module harness should be connected to the DC power controller.

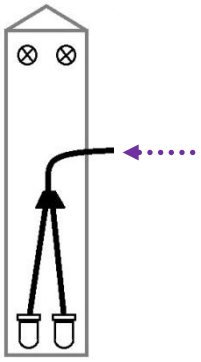
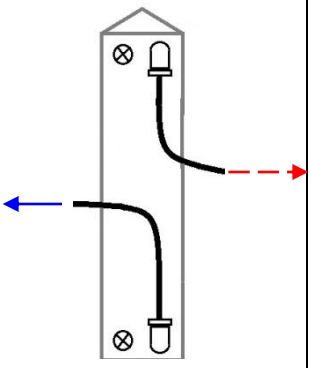
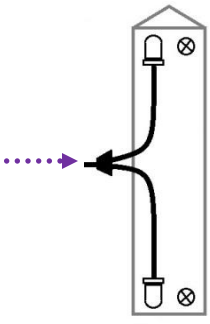
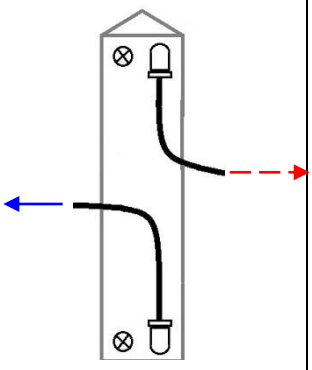
2.3. Inlet and Outlet Plumbing Connections

Ionpure LabXT modules have three (3) quick-connect fittings. Both the product inlet and the reject inlet are fed from the same connection (for more information see Connection Drawings in Appendix B). Letters marked by each port on the LabXT can be used for identification.

Table 2-1 Connection names and labels

Connection	Alternate Names	Port Identification Letter
Product & Reject Inlet	Dilute & Concentrate Feed	F
Product Outlet	Dilute	P
Reject Outlet	Concentrate (Waste)	W

Table 2-2 Module inlet/outlet port locations

Module Port Locations and Connection Types				
Module Model	**Connection type**	**Recommended Configuration**		**Inlet/outlet Configuration**
LabXT 3	**Tubing with quick connect fitting**	 **Anode (inlet) side**	 **Cathode (outlet) side**	**Inlet Connection** **Product Connection** **Reject Connection**
LabXT 5 **LabXT 10** **LabXT 15**	**Tubing with quick connect fitting**	 **Anode (inlet) side**	 **Cathode (outlet) side**	**Inlet Connection** **Product Connection** **Reject Connection**

Available Connection Types

Polyamide (w. nitrile rubber seal) – 6mm quick-connect fitting

2.4. Grounding of the Module Connection Tubing

To avoid the risk of electrical shock, some form of grounding must be used on any stream where the plumbing is stainless steel or if there are samples points or instrumentation in close proximity to the module.

2.5. Inspect the Module

- Do not uncrate the module prior to moving it into its final location. After uncrating it, inspect it for any signs of damage. If damage is apparent, immediately notify your Local Service Provider and the carrier.

2.6. Operating Requirements

In order to operate to specification, the LabXT module must have the following conditions present. If any of these conditions are unmet, do not attempt to install the LabXT module without specific instructions from your Local Service Provider's Technical Support.

- **Operating Environment**

  The LabXT module requires indoor installation out of direct sunlight. The maximum ambient room temperature should not exceed 113 °F (45° C). The module can tolerate humidity of up to 90%, as long as condensation does not occur.

- **Space Requirements**

  The physical dimensions of the LabXT Module are given in Appendix A.1. In addition to the size of the module itself, the arrangement of the tubing and the electrical connections will determine the amount of space the module needs to operate. This arrangement varies depending on the system integration requirements.

- **Module Orientation**

  The module can be oriented vertically or horizontally.

- **Electrical Requirements**

  All LabXT modules require a **120 VDC, 0.1 A** power source. For safety reasons, Ionpure recommends that the cathodes be at ground potential. Make sure this is compatible with the chosen DC power supply.

- **Feed Water Requirements – RO Permeate**

  - Feed water for the LabXT module must always meet the specifications outlined in Table 2-3. In most cases, pre-treating LabXT module feed water with reverse osmosis (RO) will bring it within these specifications. Depending on the conditions however, some configurations may require additional pretreatment.

  - Ensure that system design and feed water specifications are adequate to meet the module feed water requirements listed in Table 2-3 below.

Table 2-3. Feed Water Requirements for the LabXT Modules

Feed water source	RO permeate
Feed water conductivity equivalent including CO_2^*	< 60 µS/cm
Silica (SiO_2)	1.5 ppm
Total chlorine (as Cl_2)	< 0.02 ppm
Total Hardness (as $CaCO_3$)	2.5 ppm
Dissolved organics (TOC)	< 500 ppb
Operating range (pH)	4 – 11
Operating Range (Temperature)	41 - 95 °F (5 – 35 °C)
Inlet pressure	0.5 - 1.5 bar (7 - 22 psi)

- **Drain Requirements**

  Place the LabXT module near a drain that can accommodate at least 100% of the total feed flow.

2.7. Flow Rates and pressure drops

- See Appendix A

3. LABXT MODULE INSTALLATION AND OPERATION

This section contains the following installation information:

- **Moving and unpacking** - Moving the Module into place and unpacking it
- **Connecting the Module** - Connecting the plumbing and electrical.

3.1. Moving the LABXT Module into Place

Confirm that the pre-installation requirements outlined in Section 2 are met and the system is ready for LABXT Module installation.

⚠WARNING Remove any packaging materials and move the module to its operating location. (See section 2.1).

⚠CAUTION Remove the three (3) red tubing plugs from the inlet and outlet connections.

3.2. Water Connection Configuration and Fittings

⚠CAUTION **Pre-Flushing - Make sure all upstream pretreatment components and tubing have been thoroughly flushed with particle-free water before connecting them to the LabXT Module. Flushing removes any particles left in the tubing from cutting and assembly. If particles remain, they could plug the passages inside the LabXT Module.**

NOTE - Failure to properly flush the pretreatment components of installation debris to drain prior to flowing water to the CEDI can result in particulate fouling that may be irreversible.

Connections - Ionpure LabXT modules have inlet tubing connectors with quick-connect fittings. There are three (3) connection points:

- Product & Reject Inlet (Dilute & Concentrate Feed)
- Product Outlet (Product)
- Reject Outlet (Reject)

See Table 2-2 for module specific port locations or refer to the module layout drawings in Appendix B.

3.3. Electrical Connections

Wire Harness

LabXT modules have a wire harness for DC power connection.

- Connection type: 2-Pin
- Length: 33 in (84 cm)

Electrical Precautions

- Ensure that polarity of DC connections is correct before applying DC power. Operation with polarity reversed will permanently damage the cathode. It is critical that the positive (+) and negative (-) terminal blocks are correctly oriented during system design.

- **Do not run AC and DC wiring within the same conduit. This may cause interference and lead to malfunctions.**

- **Disconnect power before opening any enclosure and follow accepted Lockout/Tagout procedures when working on the system.**

- Power connections for the modules should be connected to a suitable power supply capable of meeting the DC power requirements of the module

4. DETERMINE OPERATING DC CURRENT PRIOR TO STARTUP

Startup current for all LabXT modules is 0.1A. Maximum voltage is 120V.

5. START-UP PROCEDURE

5.1. Test interlocks

- Test flow switches and other interlocks, including the RO interlock. (If applicable)
- Test pressure relief. (If applicable)
- Set alarm points. (If applicable)

5.2. Startup of LabXT modules

- Make sure that modules are correctly connected to the DC power source. (See section 3.3)
- Make sure that the LabXT product line is directed to drain.
- Turn on the feed water. Adjust valves to obtain the desired flows and pressures in the product and reject streams.
- Valves are adjusted so the product outlet pressure is about 0.5 - 2.5 psig higher than the reject outlet pressure at the desired flow rates.
- Set DC current to 0.1 A (120V max)
- Test all flow switches and interlocks to ensure LabXT DC power will shut off when flow is interrupted.
- Continue to direct the product water to drain until it reaches the desired quality.
- Once product reaches the desired quality, connect to process. Readjust pressures as required to maintain product outlet pressure 0.5 - 2.5 psi above the reject outlet pressure.
- Make sure the feed water parameters are within guidelines presented in Section 2 (Table 2-3)

- RO systems designed for start/stop operation should be configured to send RO permeate to drain for 3-5 minutes during the start-up sequence. This ensures that hardness, silica, and/or organics are flushed to drain if present on the downstream side of the RO membrane after low pressure conditions. Failure to meet these minimum flush cycles could result in scaling or fouling of the EDI module.

NOTE: LabXT modules operate at a recovery rate between 50% and 60%. Adjustments cannot be made to the recovery rate of the module.

6. TROUBLESHOOTING

The troubleshooting chart in this Section is a diagnostic guide**. If the LabXT system does not respond to the recommended solutions, do not attempt further repairs.** Call your Local Service Provider.

Before calling:

- Become thoroughly familiar with the module and all troubleshooting procedures.
- Prepare a list of all problems encountered while operating the equipment.
- Have your module's model and serial numbers at hand. This information can be found on the end plate on the plumbing side (Cathode).

Table 6-1: Troubleshooting Procedures for LABXT modules

PROBLEM	CAUSE	SOLUTION
Module leaks	Module has loosened during shipment, movement, or operation	Contact Ionpure Technical support
	Module is faulty	Contact your Local Service Provider
Plumbing leaks	Module adapters are loose	Tighten adapters, and tube fittings
Poor water quality with power ON to unit	Feedwater conductivity or CO_2 too high.	Measure feed conductivity and CO_2. Compare to feedwater specs. (Table 2-3)
	Incorrect module electrical connection polarity	Confirm correct DC+ and DC- connections Note: Incorrect polarity can cause permanent damage
Loss of flow and/or increase in feed pressure	Module is fouled, scaled, or oxidized	Contact Ionpure Technical Support
	Obstruction downstream	Check if a downstream valve is inadvertently closed.
	System is plugged with particulate matter or fouled	Contact Ionpure Technical Support
	Loss of feed flow	1. Check if an upstream valve is inadvertently closed. 2. Check for leaks or if an upstream bypass valve is inadvertently open. 3. Check feed source output (for example, a pump).

7. SHUTDOWN AND STORAGE

This section contains shutdown procedures for a LabXT module. Under certain circumstances, bacterial growth can occur quickly in water left stagnant within each module and the overall system.

7.1. SYSTEM SHUTDOWN

- Shut off feed water to LabXT module(s).
- Drain standing water out of LabXT module(s) for shutdown periods exceeding 7 days.
- Close isolation valves to prevent evaporation of water in membranes and resins.

7.2. STARTUP AFTER SHUTDOWN

- Divert product outlet to drain.
- Turn on feed water to LabXT module(s).
- Operate unit with DC power on, flushing through the module to drain.
- If desired, sanitize LabXT module(s).

7.3. DISPOSAL

- LabXT modules may be disposed of as normal (non-hazardous waste at the end of their life
- Typical module life is 3 years (based on recommended feedwater parameters

APPENDIX A: LABXT MODULE SPECIFICATIONS

A.1 Module Dimensions and Weight

DIMENSIONS / WEIGHT	IP-LabXT 3	IP-LabXT 5	IP-LabXT 10	IP-LabXT 15
Depth (includes elbows):	4.08 in (103.6 mm)	4.58 in (116.3 mm)	5.08 in (129.0 mm)	5.58 in (141.7)
Width	2.23 in (56.6 mm)	2.23 in (56.6 mm)	2.23 in (56.6 mm)	2.23 in (56.6 mm)
Length:	13.00 in (330.2 mm)	13.00 in (330.2 mm)	13.00 in (330.2 mm)	13.00 in (330.2 mm)
Weight (wet):	2.3 lb (1.04 kg)	2.8 lb (1.27 kg)	3.3 lb (1.50 kg)	3.8 lb (1.72 kg)

A.2 LabXT List of Wetted Components

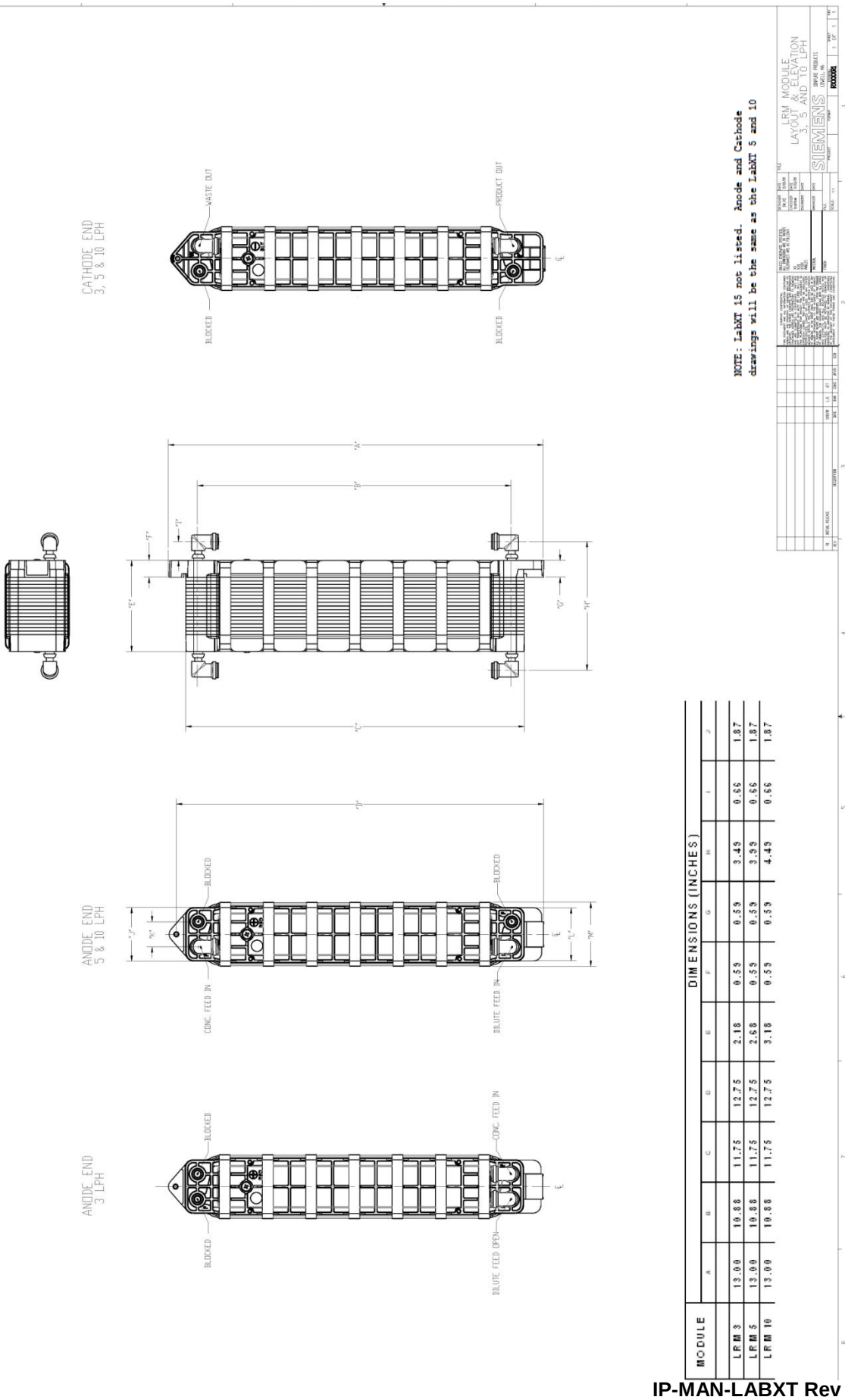
Wetted Component	**Material**
6 mm tubing	Polyethylene
6 mm elbow quick-connector (black)	Polyamide
6 mm Y quick-connector (black)	Polyamide
Tubing connector seals	Nitrile rubber
Dilute and Concentrate Spacers	Polysulfone
Endblock	Thermoplastic elastomer
Anion Exchange Resin	Styrene/divinylbenzene, strong base
Cation Exchange Resin	Styrene/divinylbenzene, strong acid
Anode	Platinized Titanium
Cathode	316 Stainless Steel

See Appendix B for Connection Drawings.

A.3 LabXT Module Flow Rates, Pressure Drops & Plumbing Connections

Module	**LabXT 3**	**LabXT 5**	**LabXT 10**	**LabXT 15**
Flow Rates**:** lph				
Dilute: minimum:	1.5	2.5	5	7.5
Dilute: nominal:	3	5	10	15
Dilute: maximum:	4.5	7.5	15	22.5
Concentrate: minimum	1	1.7	3.3	5
Pressure Drop psid (bar) Typical @ nominal flow and 25 ^{o}C	8-15 (0.55-1.03)	8-15 (0.55-1.03)	8-15 (0.55-1.03)	8-15 (0.55-1.03)
Feedwater Conductivity FCE (µS/cm)	< 60	< 60	< 60	< 60
Product Resistivity – RO feed (MΩ)	> 5 (10-15 typical)	> 5 (10-15 typical)	> 5 (10-15 typical)	> 5 (10-15 typical)
Temp range (^{o}C)	5 - 35	5 - 35	5 - 35	5 - 35
Recovery	50-60%	50-60%	50-60%	50-60%
Silica Removal	> 99.9%	> 99.9%	> 99.9%	> 99.9%

APPENDIX B: LABXT DIMENSIONAL / PIPING CONNECTION DRAWING



MODULE	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	I	J
LRM3	13.00	10.88	11.75	12.75	2.16	0.59	0.59	3.45	0.66	1.87
LRM5	13.00	10.88	11.75	12.75	2.60	0.59	0.59	3.59	0.66	1.87
LRM10	13.00	10.88	11.75	12.75	3.16	0.59	0.59	4.49	0.66	1.87