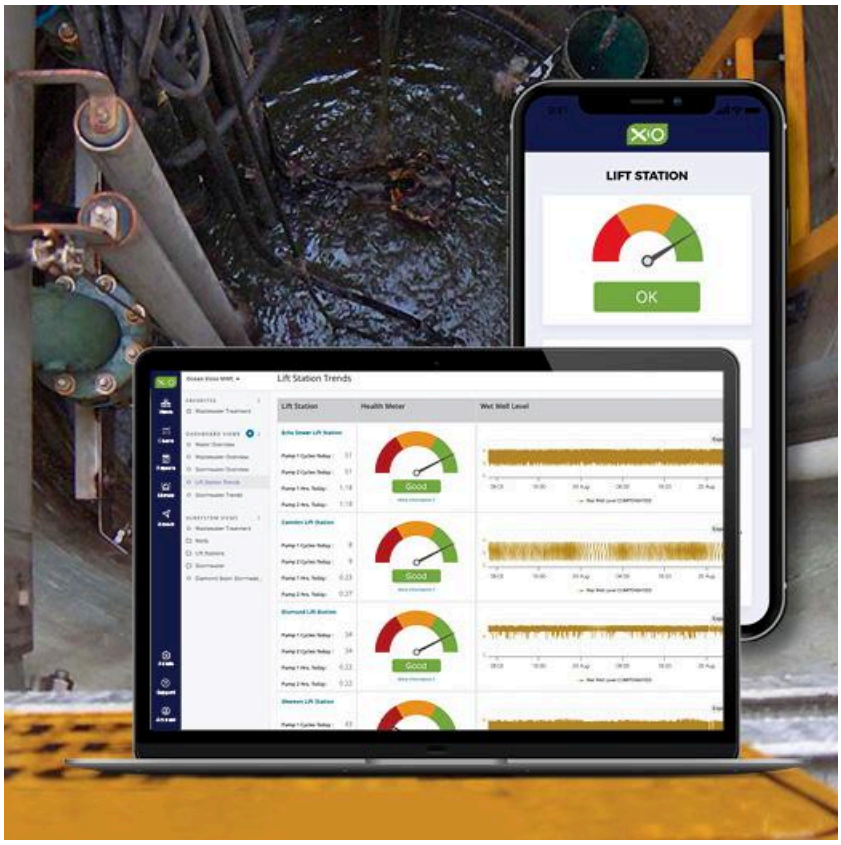

Lift Station Monitoring System
LS100/LS105
Installation Manual

To our partners, installers, and end-users,

Welcome. This manual is designed to guide partners and installers through the proper installation of the XiO Lift Station Monitoring System (LS100/LS105) offered through SensorPros.

We want your installation to go smoothly. It is important to understand the system involves BOTH the installation of physical equipment AND the corresponding setup of the system through the unique software login.

We recommend that you read through this document completely to ensure you have the required materials BEFORE beginning the installation process. The installation and online set up is often a TWO STAGE PROCESS.

Schedule an installation support call with XiO technical staff IN ADVANCE to correspond with your time at the installation site, in order to verify communication and calibrate values. Contact us at (415) 462-1300 ext. 2 or email support@xiowater.com. Please give us at least 1 week's notice before your intended setup day.

XiO offers a variety of information and training for our partners through our website and Knowledge Base. See the links at the end of this document.

XiO's Technical Support is available Monday thru Friday 8:00 AM to 5:00 PM Pacific Standard Time at (877) 946-0101 ext. 2 or support@xiowater.com. XiO offers after-hours emergency support by phone or email through service support plans.

Thank you,

The XiO Customer Success Team

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Before You Begin

Read and understand the following instructions before performing any procedure with this product. Failure to follow these instructions may result in death or serious injury.

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international, national, and local electrical code requirements with respect to the grounding of equipment.

BEFORE SERVICING

- Practice Lockout/Tagout procedures.
- Disconnect all power, including external control power.
- Place a “DO NOT TURN ON” label on all power disconnects.
- Lock all power disconnects in the open position.
- WAIT 15 MINUTES to allow any VFD capacitors to discharge.

UNINTENDED EQUIPMENT OPERATION

- No responsibility is assumed by XiO for any consequences arising out of the use of this product.
- Do not operate or install any equipment that appears damaged. Contact XiO to resolve any damage issues.

SAFETY WARNINGS

This is the safety alert symbol and is used to alert potential personal injury hazards. Please obey all safety messages with this symbol to avoid personal injury or death.

WARNING indicates an imminently hazardous situation, which if not avoided, can result in death, serious injury or equipment damage.

NOTE indicates an item that requires attention.

- Only licensed electrical contractors should attempt installation of XiO systems.
- Lifting tools and equipment are required during installation.
- A confined space entry plan and operational procedures may be required for lift station installations. Refer to OSHA’s website for more information: http://www.osha.gov or your relevant authority.

NOTE: XiO equipment will need to be recertified if not installed or left in a non operational state for one year. Contact XiO for details.

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System Overview

SYSTEM DESCRIPTION AT-A-GLANCE (LS100/LS105)

XiO's Lift Station System offers remote monitoring and visibility of lift stations. Each system includes field hardware and a private web-based user interface. This document provides information on hardware installation, as well as how to connect to the XiO Cloud Platform.

The XiO system works in conjunction with existing floats by measuring pump current and wet well level. **All I/O values are securely stored and displayed in the cloud.** XiO's cloud-based system is capable of integrating multiple data sources through APIs (such as sewer levels) and capable of advanced analytics to identify potential problems (pump performance) before they occur. **The system is also capable of control (available through an additional upgrade).**

System Options

SKU	Description
LS100	LS Monitoring
LS105	LS Monitoring with analytics

System Components (Included)

Component	Description	Image	SKU
FIU (Field Installable Unit)	NEMA enclosure, Soft I/O Module, ethernet port, power connections, terminal blocks		LS100, LS105
Modem	NEMA enclosure, modem		LS100, LS105

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Ethernet Cable	Ethernet Cable - cable length 6’		LS100, LS105
External Antenna (booster)	Wilson Electronics Wide band directional antenna		**Optional** (purchase through XiO)
Level Sensor	Versaline VL2113 (PMC) - cable length 50’		LS100, LS105
Sealed Reference Volume (level sensor vent tube bladder)	MP-11(PMC)		LS100, LS105
Current Transducers	Sentry 200 - cable length 10’		LS100, LS105
New Customer Packet	New Account Form Installation Manual Operations Manual Login Instructions		LS100, LS105
Cellular Modem Service	Verizon cellular network	verizon	LS100, LS105

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Recommended Tools and Materials (Not Included)

Mechanical Tools
• Drill • Step drill or saw • Hack or reciprocating saw • Metal cutting blades • Pliers • Nut driver • Phillips head screwdriver • Flat head screwdriver • Ladder or step stool

Electrical Tools
• Multimeter (Fluke #179 or equivalent) • Current clamp (Fluke #10005 or equivalent) • Cell phone or tablet with internet connection

Materials
• Conduit (flexible and rigid) • Wires • Sealant (silicone RTV) • Tape • Waterproof termination enclosure TE-11 (or junction box) for sealed reference volume (vent tube bladder) • Liquid tight cord connectors • Ethernet cable (FIU to Modem) • Earth ground rod and wire to ground FIU

FACILITIES REQUIREMENTS

The following requirements must be provided at the installation site:

Line power 120 VAC
Safety disconnect switch (not included)
Waterproof termination enclosure TE-11 for sealed reference volume (not included)
Electrical conduit (not included)
Verizon cellular service coverage (check/confirm coverage in advance of installation

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Workflow Sequence (Order of Operations)

For best results, use the following workflow sequence:

Step 1 - Log Into Online Account and Schedule "Live" Calibration Call

Step 2 - Survey Site and Design Layout

Step 3 - Mount Enclosures, Wire Inputs
- **Step 3.1 - Mount Enclosures (FIU and Modem)**
- **Step 3.2 - Connect Power to FIU**
- **Step 3.3 - Connect Power to Modem**
- **Step 3.4 - Install Sensor Hardware**
- **Step 3.5 - Connect/Terminate Sensor Inputs**

Step 4 - Test and Calibrate

Installation Step 1 - Log into Online Account and Schedule Live Calibration Call

SETTING UP YOUR XIO ACCOUNT

Prior to installation, new customers must:

- Complete the **New Account Form** so XiO can set up your web portal (if you are new to XiO).
- Complete the **FIU Installation Form** so XiO can set up the new unit(s) on your web portal.
- Email both forms to: support@xiowater.com

Access your web portal with the **login credentials** provided on the **New Account Form and via email**.

SCHEDULING XIO "GO LIVE" TECHNICAL SUPPORT CALL

Reach out **at least 1 week prior** to the day you plan to install and calibrate the system.

Call XiO at (877) 946-0101 ext. 2 or email support@xiowater.com to schedule an appointment.

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Installation Step 2 - Survey Site and Design Layout

Figure 1. System Schematic

The above schematic illustrates the links between existing infrastructure (wet wells and pumps), and XiO hardware (FIU and Modem). Before beginning installation, consider the following:

DETERMINE HARDWARE INSTALLATION LAYOUT

The XiO hardware (FIU and Modem) should be located next to each other utilizing a single source of power for both. Determine where to route sensors and transducers. *Note the standard cable lengths and whether extensions may be needed. Consider the proper size and type of conduit that may be needed.*

POWER SOURCE - Isolate a single power source or circuit for ALL XiO equipment that relies on its own breaker or fuse set.

NOTE: A dedicated circuit for XiO equipment makes troubleshooting easier, and reduces the chance of another circuit overload shutting down the XiO system

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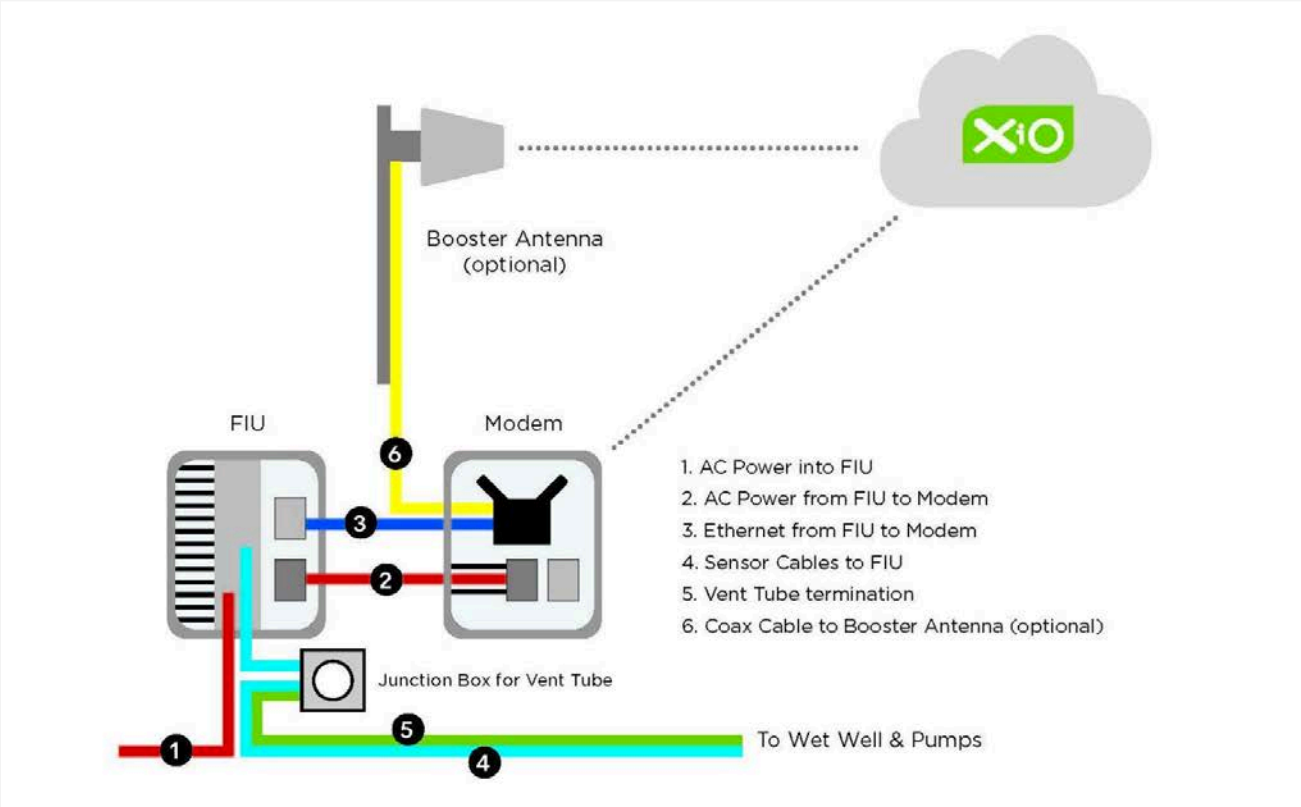

Figure 2. Key Installation Connections

As you plan the installation process, keep in mind there are multiple connections which must be made successfully. Understanding what is required at each connection point can help save time and reduce the need for troubleshooting.

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Installation Step 3 - Mount Enclosures, Wire Inputs

3.1. Mount Enclosures (FIU, Modem)

WARNING: Follow Lockout/Tagout Procedures during installation.

1. Determine WHERE to mount BOTH the FIU enclosure and the Modem enclosure.
    a. Units must be near the power source.
    b. Mount units CLOSE to each other, as they share a power source.
    c. CHECK clearances for door openings.
2. Prepare the mounting surface AND the enclosures.
3. Mount enclosures to the supports (wood, unistrut). See mounting feet on enclosures. (Figure 3)
4. Cut wiring holes in enclosures.
5. Configure the conduit and attach to the enclosures. Use sealant as needed.
6. See Enclosure Best Practices. (Figure 4)
7. Note Modem Installation Best Practices. (Figure 5)
8. Note Vent Tube Termination requirements. (Figure 10)
9. Confirm Verizon cellular service and signal strength.

Figure 3. FIU and Modem mounting example

ENCLOSURE BEST PRACTICES

Temperature - Equipment rated up to 140°F (60°C). Consider heat sources when mounting.

- Keep out of direct sunlight.
- Do not mount on a south-facing wall or panel.
- Consider a sun cover to provide shade.
- Avoid mounting on a surface that may become hot such as an outdoor metal panel.

Environment - NEMA-4X enclosures protect components from environmental conditions such as rain, solid objects, dust, and some corrosive agents.

- Avoid harsh environmental conditions if possible.
- Provide water-tight seals on enclosure penetrations.

Figure 4. Enclosure Best Practices (right)

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Modem Installation Best Practices

DO ✅✅✅✅	DON'T 🚫🚫🚫🚫🚫
Mount modem in a location that will receive a strong cellular signal	Don't place modem enclosure inside a steel enclosure without external antenna
If placing modem inside building or large structure, consider external booster antenna	Don't install modem underground without an external antenna.
Install in a location not obstructed by structure or electrical interference	Don't install enclosure in full sun without a shade structure.
Install in a shaded area to avoid overheating	
Keep communication wiring length between devices to a minimum - Install near the FIU/Network Switch if possible to utilize the same dedicated 120 volt AC power source (aids in troubleshooting)	
Use vandal-proof housing if installed outside of the building. Use lockable steel housing if an external antenna is added to the design. Antenna wire should be installed inside a rigid metallic conduit.	

Figure 5. Modem Installation Best Practices

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3.2. Connect 120 Volt AC Power TO The FIU

NOTE: The FIUs are designed to be powered with 120VAC, 50/60Hz.

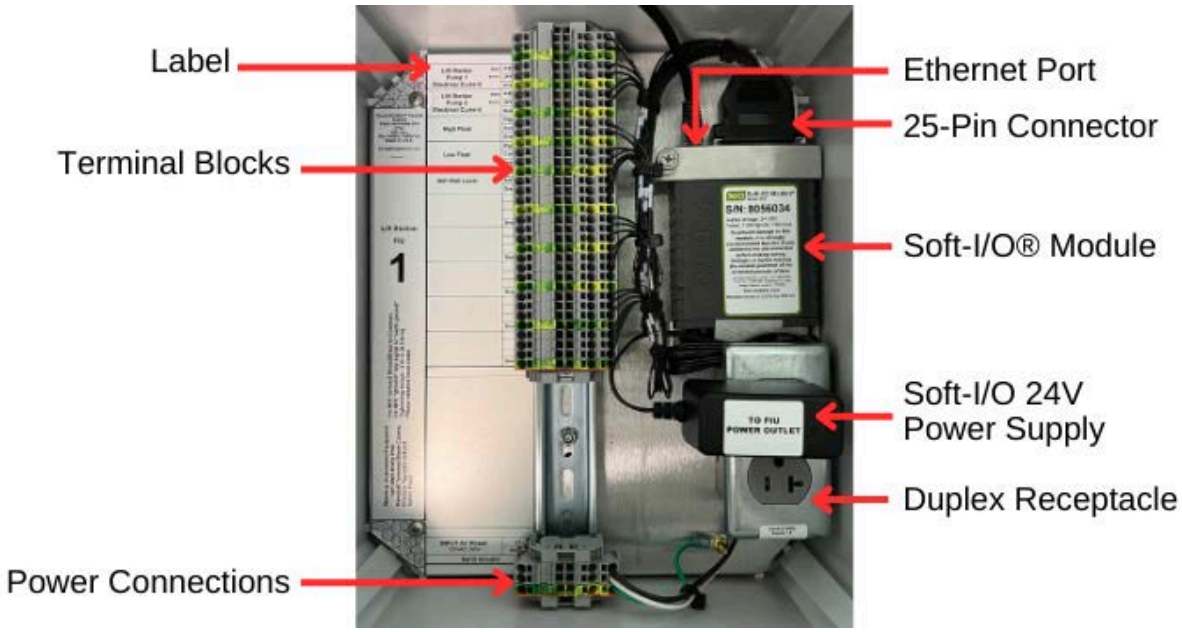

Figure 6. FIU Interior Components and Connections

Use phase-color identifiable and electrical code compliant wiring for primary power. Preferably #16 to #12 gauge insulated THHN copper wire.

- **Black for PRIMARY 120 volt power**
- **White for NEUTRAL/COMMON wire**
- **Green for GROUND wire**

1. Pull wires through conduit to the power connections terminal block.
2. Connect power (black) wire to **L1** on the FIU terminal block. (Figure 7)
3. Connect neutral (white) wire to **Neutral** on the FIU terminal block. (Figure 7)
4. Ground (green) wire to **Earth Ground** on the FIU terminal block. (Figure 7)
5. Note the **chassis ground lug** between the terminal blocks and the outlet. (Figure 8) **Connect the outside earth ground rod and wire to the chassis ground lug.**

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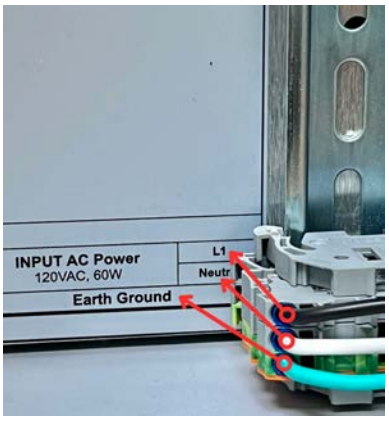

Figure 7. FIU Terminal Block AC Input

Black/Primary *wire terminates on* ***L1*** *on the FIU 120 volt input power terminal block.*

White/Neutral *wire terminates on* ***Neutral*** *on the FIU 120 volt input power terminal block.*

Green/Ground *wire terminates on* ***earth ground*** *on the FiU 120 volt input power terminal block.*

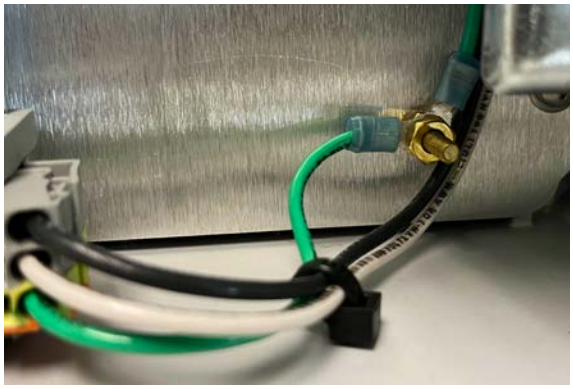

Figure 8. FIU Chassis Ground Lug

Chassis ground lug on FIU. *Connect to the exterior ground rod and wire.*

3.3. Connect 120 Volt AC Power FROM the FIU to the Modem

1. Drill holes in the FIU and Modem enclosures.
2. Install conduit between FIU and Modem enclosures.
3. Pull electrical wires and network cables through the conduit. *(Pull network cables first for best results).*
4. Connect power (black/primary) wire to the modem terminal block. (Figure 9)
5. Connect neutral (white) wire to Neutral on the FIU terminal block. (Figure 9)
6. Ground (green) wire to Earth Ground on the FIU terminal block. (Figure 9)

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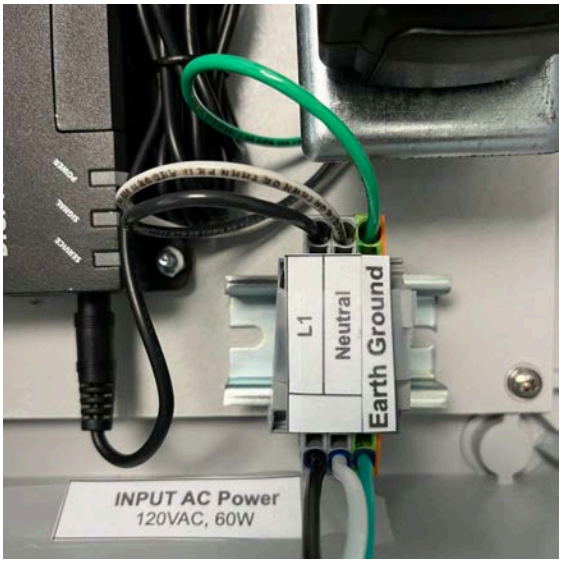

Figure 9. Modem Terminal Block AC Input

Connect Black/Primary, White/Neutral, and Green/Ground FROM the FIU to the terminal block inside the Modem enclosure.

3.4. Install Sensor Hardware

NOTE: Lift Station Operation

A lift station controlled using floats typically fills up with wastewater and is pumped down (pumps turn ON) when the level of the wet well triggers the HIGH float and stops pumping (pumps turn OFF) when the wet well level drops enough to trigger the LOW float. Depending on how the system is wired, both pumps may run at the same time or they may be set up so only one pump runs at a time and the pumps alternate after each run.

1. Locate and mount sensor hardware as indicated by the manufacturer specifications. Note cable lengths and determine if extensions are required.
2. Install (2) current transducers/sensors to measure electrical current from (2) lift pumps.
3. Install (1) level sensor to measure the level of fluid in the wet well. *(Note the level sensor requires both the MP-11 Sealed Reference Volume (included) AND the TE-11 Termination Enclosure (not included).*
4. Install the Termination Enclosure TE-11 (not included) (or junction box) for sealed reference volume Sealed Reference Volume. (Figure 10).

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5. Follow the diagram in Figure 10 for WIRING IN and WIRING OUT connections to the terminal blocks on the TE-11 Terminal Enclosure.
6. Install conduit to protect sensor wires.
7. Pull sensor wires through the conduit to connect at the terminal block on the FIU.

Sensor Hardware	Installation Location/Connection
Current Transducer (2)	One on EACH pump (on ONE leg of the AC power supply)
Level Sensor (1)	Submerged within the wet well

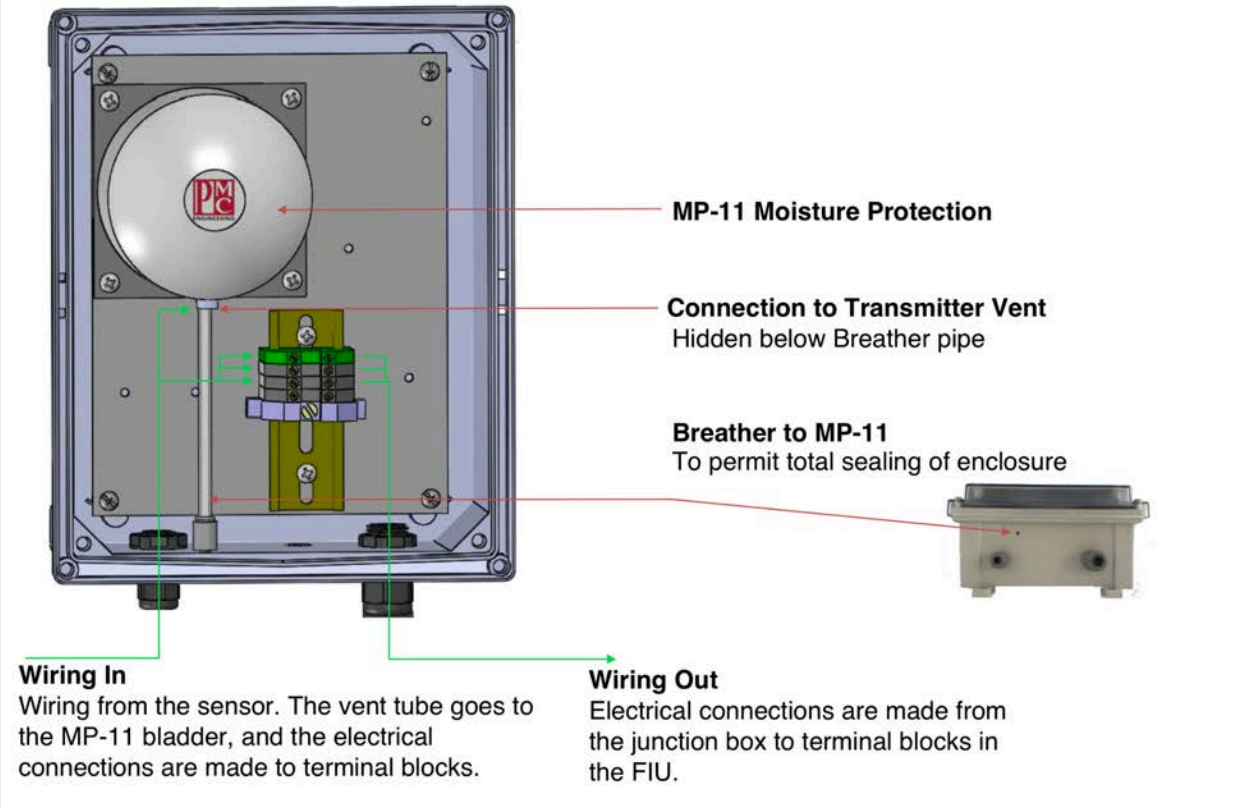

Figure 10. Sealed Reference Volume Termination Enclosure

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3.5. Connect/Terminate Sensor Inputs

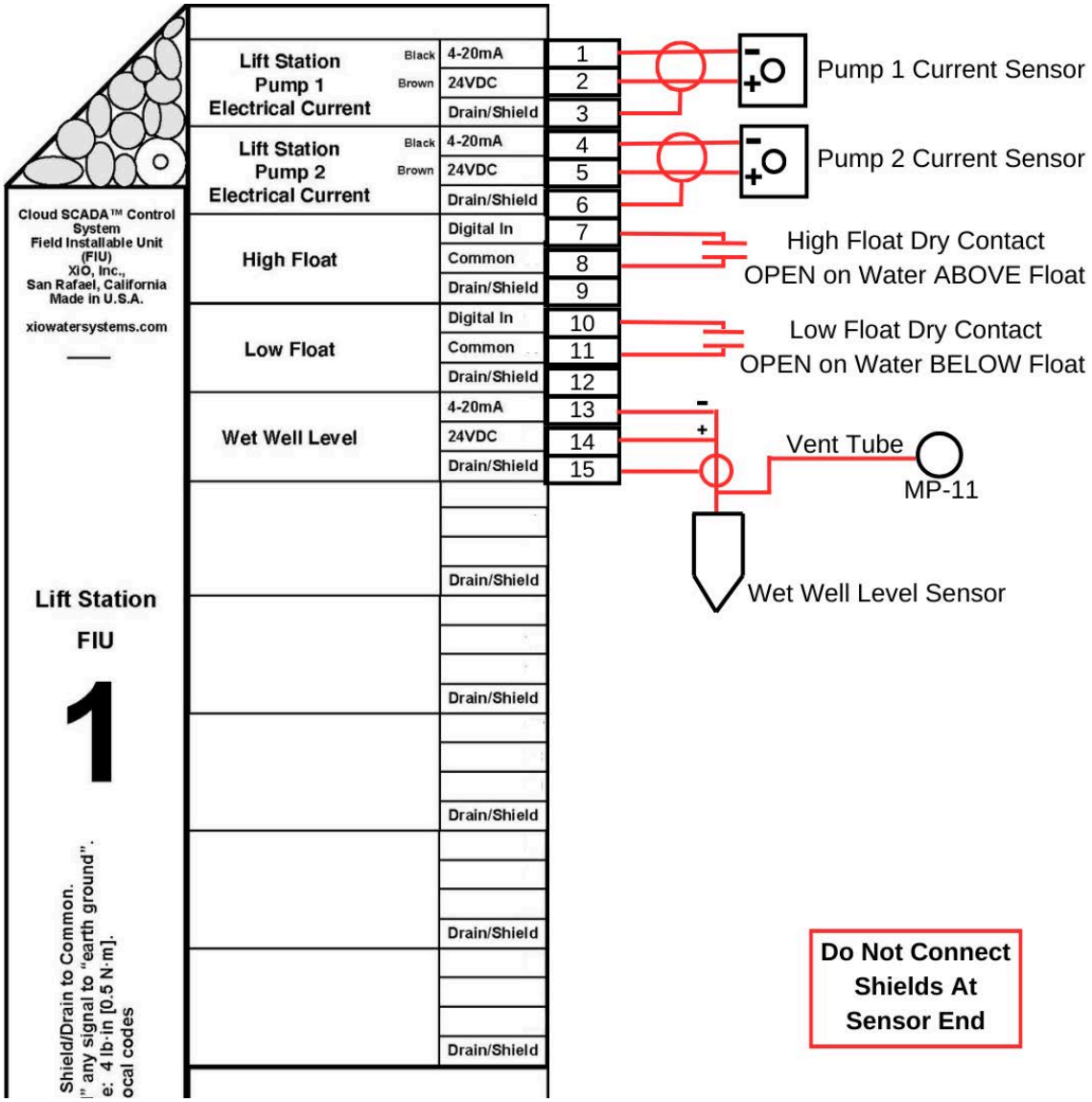

Figure 11. Sensor Terminations

1. Follow the diagram above to properly terminate the sensors to the FIU. (Figure 11)
2. See the Sensor Installation And Termination Best Practices notes below.
3. Locate the TWO EXISTING FLOATS. Connect (1) dry contact for the HIGH float and (1) dry contact for the LOW float. See notes below for polarity.

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Input Connections	Contacts Required
1 - Lift Station Pump 1 - electrical current	Analog In 4-20mA
2 - Lift Station Pump 2 - electrical current	Analog In 4-20mA
3 - High Float (open contact on water ABOVE float)	Digital In (dry contact - no voltage)
4 - Low Float (open contact on water BELOW float)	Digital In (dry contact - no voltage)
5 - Wet Well Level - level sensor	Analog In 4-20mA

Sensor Installation And Termination Best Practices

Current Transducers
The AC current transducers provide a 4-20mA current signal proportional to the monitored current of the lift pumps. The current sensor is packaged in a solid core case. One of the A/C power lines going into the pump is run through the 0.75" hole. Use a 12-22 AWG shielded twisted pair cable going from the screw terminals of the sensor to the FIU. **Do not connect the shield at the sensor end.**

NOTE: This package includes a sensor that is set with a range of 0-100A. If you have a lift station pump that draws more than 100A, **contact XiO Technical Support** to accommodate the larger current range. This will require adding a jumper to the sensor and reconfiguring the Soft-I/O® Module.

Level Sensor
Position the submersible level sensor so that it hangs close to the bottom of the wet well. The sensor ships with 50 ft. of cable. XiO recommends using the TE-11 as the Sealed Reference Volume Termination Enclosure to hold the MP11 Moisture Protection Reference Volume and terminal blocks to extend the electrical signals (Figure 10). Attach the vent tube within the sensor cable to the Reference Volume. Use silicone RTV or a similar sealant to seal the exposed end of the cable.

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NOTE: It is important to prevent moisture from entering the cable through the vent tube or into the cable between the conductors, since it can have an adverse effect on the reliability of the sensor. Protect the cable from the weather and exposure to moisture.

Read the Cable Terminations Application Notes for details.

Floats

This package is designed to connect to an existing lift station to read the high and low float states that control the pumps. When the wet well level rises and the high float triggers, the pumps turn on. When the wet well level drops enough so that the low float triggers, the pumps turn off.

NOTE: It is imperative that no voltage source is connected to the float inputs as it **will damage** the XiO Soft-I/O® Module. **When connecting the floats to the FIU, the FIU requires dry contacts to the digital inputs.** Use a spare pole on each of the float relays. The indication of the float state is determined by whether the dry contact is open or closed.

The high and low float states should be set up as follows:

High Float - float is down (contact closed) - float is up (contact open)

Low Float - float is up (contact closed) - float is down (contact open)

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Installation Step 4 - Test and Calibrate

Once the entire system has been installed, follow the test plan below to confirm proper operations. Use the table below to circle Passed (YES or NO), Date, Initial, and Comment.

In order to test and calibrate equipment, you must have logged in to your XiO online account in order to view sensor readings. The URL for the web interface is:
http:www.hub.xiowater.com/login

NOTE: Schedule your live appointment with XiO Technical Support **in advance**. See Installation Step 1 above.

WARNING: Follow Lockout/Tagout procedures.

Figure 12. Soft-I/O® Module (FIU)

Note light on top (network connection)
Note light on left side (power)

Figure 13. WR11XT (Modem)

Note lights on right side (service, signal, power)

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Soft-I/O® Module (FIU) Fault Codes	**WR11XT (Modem) Fault Codes**
OFF - Not powered **Amber Flashing** - Booting **Green Flashing** - Searching for network **Green ON** - Normal operations **Red** - Pin fault, reboot, call technical support	**Service:** **OFF** - No cellular service **Amber** - Busy setting up connection **Blink Green** - Communicating **Signal:** OFF - Poor or no signal Amber - Fair signal Green - Good signal **Power:** OFF - No power Green - Powered

Testing Cellular Coverage

1. Prior to system installation, check to confirm availability of Verizon cellular service.
2. Install the Modem hardware as described in Step 3 above.
3. Once the Modem is powered up, observe the three lights on the lower right side of the WR11XT Modem hardware.
4. If the following lights are present, contact XiO Technical Support for assistance.
    a. Service - OFF
    b. Signal - OFF, Amber
    c. Power - OFF
5. With assistance from Verizon, XiO Technical Support can provide guidance on placement and direction of a booster antenna (not included).

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Test 1 - Power

Prior to testing the FIU:

1. Ensure the area around the panel is safe for testing live electrical equipment. Follow Lockout/Tagout Procedures.
2. Coordinate with others on site to confirm FIU is ready to be safely energized and tested.

Test	Expected Result	Passed	Date/Init	Comment
Energize control power	Voltmeter confirms the panel is energized	__ YES __ NO		
Verify power to the FIU	Power lamp is GREEN on the Soft I/O® module	__ YES __ NO		
Verify power to the Modem	Power lamp is GREEN Signal lamp is GREEN or AMBER Service lamp is BLINKING GREEN	__ YES __ NO		

Test 2 - Communication

1. Ensure control power circuits are energized after power tests.

In order to test the system, log into the web interface **http:**www.hub.xiowater.com/login

2. Log in to the XiO web interface from a web-enabled tablet or laptop.

Test	Expected Result	Passed	Date/Init	Comment
Access XiO Web Interface	Web Interface is accessible	__ YES __ NO		
Verify the last update to FIU-1	Update to Last Unit Communication on the Overview Page on the Web Interface is within 5 min	__ YES __ NO		

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Test 3 - Lift Station Level Sensor

Test	Expected Result	Passed	Date/Init	Comment
Measure the Lift Station Level	Lift Station Level on the Monitoring page should display the level measured in ft	__ YES __ NO		

Test 4 - Lift Pump 1 Current

Test pump operation as follows:

Test	Expected Result	Passed	Date/Init	Comment
Place HOA switch to OFF	Ensure that the current meter displays 0A current draw	__ YES __ NO		
	Ensure that the Lift Pump1 RMS Electrical Current on the Monitoring page displays 0A current draw	__ YES __ NO		
Operate contactor in HAND using the HOA switch	Pump starts	__ YES __ NO		
Measure current drawn by the motor	Web Interface display matches current measured	__ YES __ NO		
Place HOA Switch to OFF	Pump stops	__ YES __ NO		

Test 5 - Lift Pump 2 Current

Test pump operation as follows:

Test	Expected Result	Passed	Date/Init	Comment
Place HOA switch to OFF	Ensure that the current meter displays 0A current draw	__ YES __ NO		
	Ensure that the Lift Pump2 RMS Electrical Current on the	__ YES __ NO		

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	Monitoring page displays 0A current draw.			
Operate contactor in HAND using the HOA switch	Pump starts.	__ YES __ NO		
Measure current drawn by the motor	Web Interface display matches current measured.	__ YES __ NO		
Place HOA Switch to OFF	Pump stops	__ YES __ NO		

Test 6 - Lift Station Float Control

Test float control (both pumps operate at once) and monitor state as follows:

Test	Expected Result	Passed	Date/Init	Comment
Place HOA for Lift Pump1 and Lift Pump2 in AUTO	Pumps are off	__ YES __ NO		
Raise the High Level Float	LP1 pump starter is energized. LP2 motor starter is energized	__ YES __ NO		
	Display shows correct state of float	__ YES __ NO		
Lower the High Level Float	LP1 and LP2 pump starters are still energized	__ YES __ NO		
	Display shows correct state of float	__ YES __ NO		
Raise the Low Level Float	Display shows correct state of float	__ YES __ NO		

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Lower the Low Level Float	LP1 and LP2 pump starters are de-energized	__ YES __ NO		
	Display shows correct state of float	__ YES __ NO		

If each of the expected results above are achieved PASS, then proceed to sensor calibration. If NOT, go back and troubleshoot the connections until a PASS is achieved.

4.1 Sensor Calibration

After it is determined that the system is reading reasonable values on the web interface, the sensors must be fine-tuned and calibrated.

An XiO Support Technician will be available by phone to assist with the calibrations of your Wet Well Level, Pump Current measurements, and Float States. This will require a strong network connection as the technician will need to access the Soft-IO Control module remotely.

The XiO technician will verify:

- Network connection strength
- Soft-I/O® Module reporting and remotely accessible
- Soft-I/O® Module displaying a value on each specified device input
- Each sensor's range and module configuration match the physical sensor specifications
- Reading of each pump's electrical current on site when running/not running and calibrating to match if necessary
- Measuring the distance of where the wet well level sensor is mounted from the bottom of the well and applying an offset and calibration to match the on-site reported level if necessary
- Confirming the float state outputs are dry contacts and confirming the correct state when the floats are tripped/un-tripped
- Saving and storing module configuration within the cloud after all calibrations are complete

Current Sensors - run the pumps and compare readings for each sensor to a known good measurement. Use a clamp current meter and view what the meter reads and what the

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measured reading (A) says. **Provide the date and time, as well as the meter reading to XiO Technical Support.** They can adjust the sensor scale and offset to get the reading to match the measured values.

Level Sensors - take a measurement of the height of the liquid in the wet well (in feet). **Provide the date and time, as well as the measured value (ft) to XiO Technical Support.** They can adjust the sensor scale and offset to get the reading to match the measured value.

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Appendix A - Terminology

FIU - Field Installable Unit, an enclosed system that includes the Soft-I/O® Module and I/O terminations.

Modem - Cellular modem to transmit data to XiO's cloud servers.

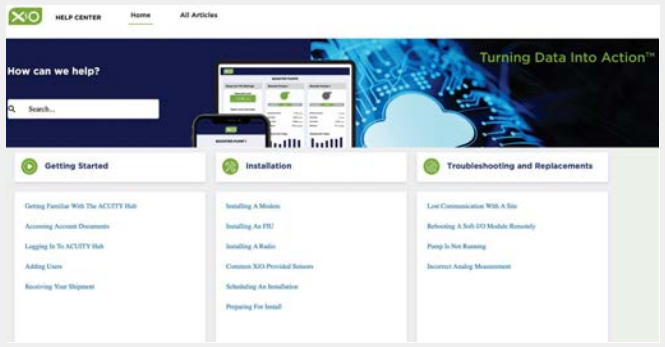
Soft-I/O® Module - XiO's I/O device.

ACUITY Hub - XiO's web interface for handling all monitoring and analytics for this lift station monitoring solution.

Appendix B - Support and Training Resources

XiO Technical Support available by phone (877) 946-0101 ext. 2 or by email support@xiowater.com.

Customers can access the XiO Knowledge Base online 24/7/365 for information and recorded training.



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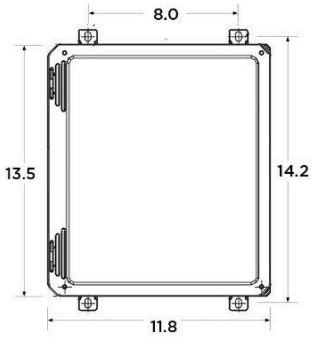
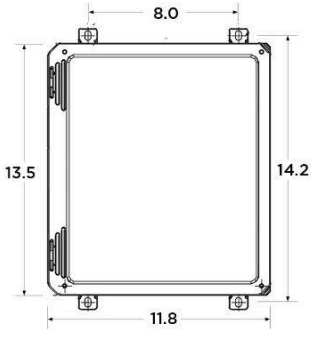
Appendix C - Lift Station Specifications

XiO Lift Station Monitoring System Specifications

FIELD INSTALLABLE UNIT (FIU)	
Dimensions Standard Enclosure (NEMA-4X)	11.97 in H x 9.42 in W x 6.5 in D
Temperature	0-60 °C ambient temperature
Humidity	5% to 95% non-condensing
Enclosure	Housed in NEMA-4X enclosure (optional)
Reporting Interval	1/min.
General Communication	RJ-45 (Ethernet), internet protocol
I/O Count	3 analog inputs and 2 digital inputs
Unit Supply Voltage	120 VAC
Analog Signals	4-20 mA @ 24 VDC
Digital Signals	Dry contact



MODEM	
Dimensions Standard Enclosure (NEMA-4X)	11.97 in H x 9.42 in W x 6.5 in D
Temperature	0-60 °C ambient temperature
Humidity	5% to 95% non-condensing
Enclosure	Housed in NEMA-4X enclosure (optional)
General Communication	RJ-45 (Ethernet), internet protocol
Unit Supply Voltage	120 VAC



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Appendix D - Component Data Sheets

Booster Antenna - Wilson Electronics	
Cellular Modem - Digi	
Current Transducer - Sentry 200	
Level Sensor - Versaline VL2113	
Sealed Reference Volume - MP-11 (level sensor bladder)	

Appendix E - Verizon Cellular Service Signal Strength

Prior to system installation, confirm availability of Verizon cellular service. A Cell Signal Meter is the best option but might not be available. If the cellular signal is weak, XiO Technical Support, working with Verizon directly, can provide guidance on the placement of a directional signal booster antenna (not included).

Appendix F - Upgrades (APIs and advanced analytics)

XiO's powerful hardware and software solutions offer multiple upgrade paths for customers seeking advanced analytics, remote equipment control, and integration of other data sources (sewer levels, rainfall) through application programming interfaces, or APIs.

XiO’s analytics upgrade measures the difference in pump runtime (lead/lag configuration) to determine if one pump is taking significantly longer to pump than the other. Repeated

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differences may indicate a pre-failure condition, pump wear, or an obstruction. **Ask your XiO salesperson for details.**

Appendix G - Wiring and Installation Best Practices

SUBMERSIBLE LEVEL SENSOR CABLE AND VENT TUBE TERMINATION - Consult the manufacturer's Application Note for details on cable termination.

Pay particular attention to sensors with vented cables. A separate enclosure such as the TE-11 (not included) may be required for installation of the MP-11 Sealed Reference Volume.

SURGE PROTECTION - Consider surge protectors for the XiO equipment or whole panel surge protection if the client doesn't already have in place.

EQUIPMENT GROUPING - Equipment is much easier to troubleshoot when it is centrally located and the power needs to be cycled or Status LEDs need to be monitored.

VANDAL PROOFING - When in doubt, lock it out! In areas that are outdoors or exposed to pedestrian traffic ALWAYS consider exterior housing to prevent the temptation of vandalism.

CORROSIVE PROOFING - In environments where corrosives such as chemicals are regularly present, or in environments where surfaces may need a regular wash-down due to close proximity to sewage, you will need to use PVC-coated conduits/fittings so the corrosive chemicals do not initiate corrosion of the conduit surfaces.

EXPLOSION PROOFING - In areas where exposure to volatile chemicals or gases may pose a hazard utilize "explosion proof" conduits/housings at every exposed or accessible entry point to voltage carrying conductors or wiring. *See National Electrical Contractors Association NECA code requirements per environment.

Utilize current local City, County, State and Federal Code requirements and listings on any and all projects when in question to protect yourself as the installer and the client/operator.

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Appendix H - Enclosure Mounting Example Photos



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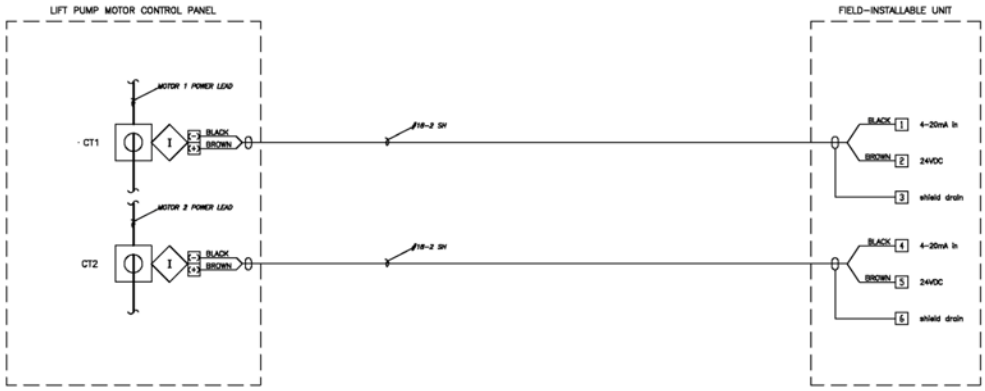
Appendix I - Wiring Diagrams

LIFT PUMP MOTOR CURRENT



TYPE: INDUCTIVE CURRENT TRANSDUCER
MAKE: N-K TECHNOLOGIES
MODEL: 200-05, 200-1
OUTPUT: 4-20 mA
RANGE: 0-2/0-5 A (200-05), 0-10/0-20/0-50 A (200-1), 0-100/0-150/0-200 A (200-2)
NOTE: THREAD ONE MOTOR POWER LEAD THROUGH APERTURE IN CURRENT TRANSDUCER. SELECT RANGE SO THAT STEADY-STATE MOTOR CURRENT LIES IN THE MIDDLE THIRD OF THAT RANGE.

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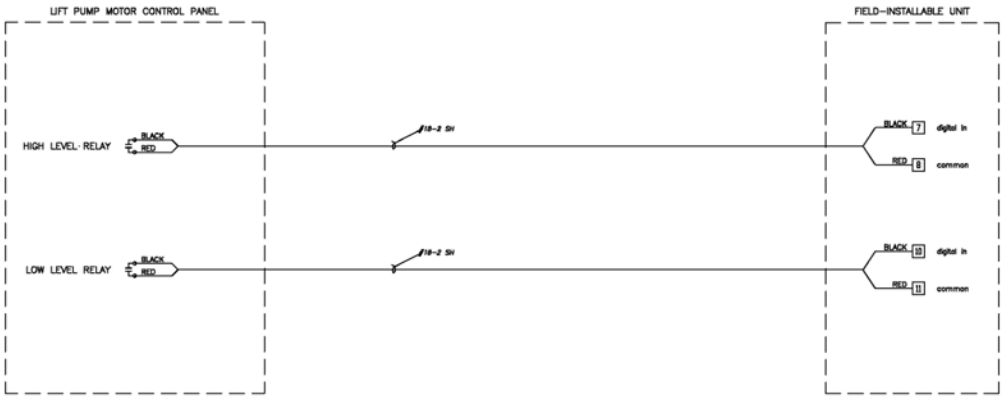
WET WELL FLOAT SWITCHES



TYPE: CONTROL RELAY
MAKE: (EXISTING)
MODEL: (EXISTING)
OUTPUT: DRY CONTACT SWITCHING
NOTE: USE LEVEL SWITCH CONTROL RELAYS IN CONJUNCTION WITH LEVEL SWITCHES TO PROVIDE DRY CONTACT INPUT FOR EACH LEVEL SWITCH TO THE FIU.

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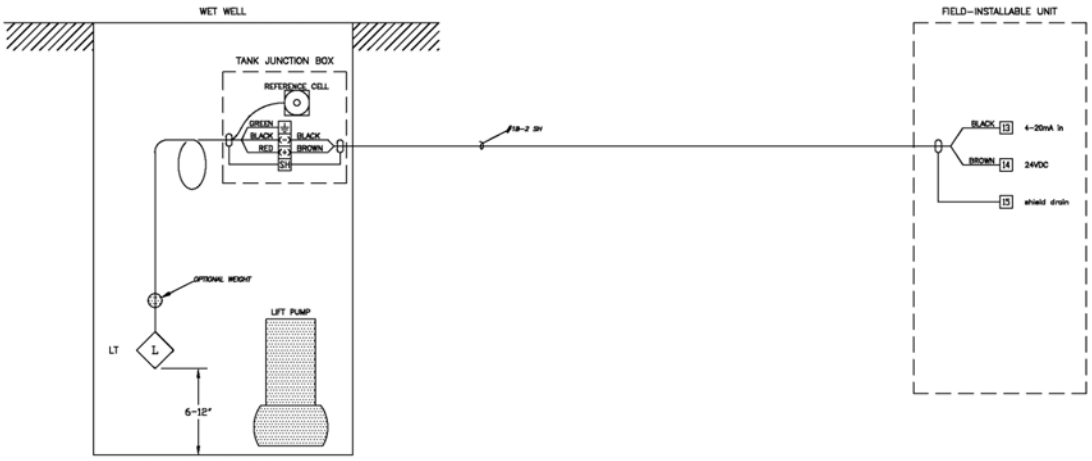
WET WELL LEVEL



TYPE: SUBMERSIBLE PRESSURE CAPSULE
MAKE: PMC ENGINEERING
MODEL: VL2113 INSTRUMENT AND MP-11 SEALED REFERENCE VOLUME
OUTPUT: 4-20 mA
RANGE: 0-15 PSIG
NOTE: DO NOT GROUND SHIELD DRAIN WIRE IN JUNCTION BOX.

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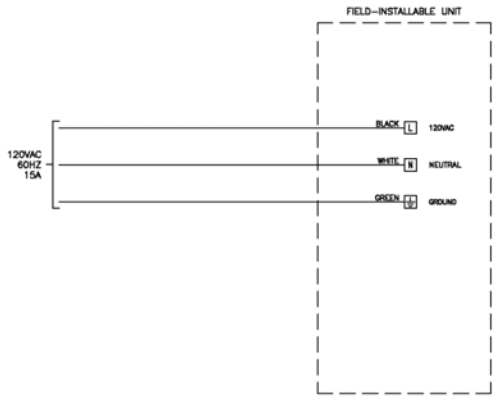
POWER



End of manual

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