ProGauge

Configuration

ProGauge MagLink LX 4®, LX Plus® and LX Ultimate®

M2051
Rev. 11 April 2026

ProGauge MagLink LX 4®, LX Plus® and LX Ultimate®

DFS *Worldwide* Brands

DOVER FUELING SOLUTIONS

Wayne · OPW · ClearView · AvaLAN · Bulloch · Tokheim · ProGauge · fairbanks · LIQAL

ProGauge is a part of Dover Fueling Solutions.

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Copyright Information

Security Best Practices

To prevent unauthorized access or unwanted intrusions into your system, DFS Information Technology strongly recommends that you obey the Security Best Practices that follow:

- Change the default password **immediately** to enhance security. Default passwords are often easy to guess or widely known, making devices vulnerable to unauthorized access.
- Limit access to the system. Access should only be granted on a need-to-know basis.
- Secure all control systems by minimizing their exposure and ensuring that they are not accessible from the Internet. This is important to prevent unauthorized access.
- Identify the control system network and relocate devices behind firewalls.
- Isolate the system from the business network to enhance security measures.
- Maximize isolation of the different networks (segmentation) by firewalls, routers, and VPN solutions to largely exclude attack paths to the Industrial Control System network.
- When remote access is required, use secure methods, such as Virtual Private Networks (VPNs) or known secure remote access management tools. Use the latest version of the tools and implement the updates as recommended.

Notices

IMPORTANT: *Before you use this manual, make sure you have the most recent revision. Look at the revision of this document to make sure it agrees with the most current revision found in the FMS Technical Library. Download the latest revision if necessary.*

IMPORTANT: *If you have an installation in an area that has possible Internet connectivity issues, it is recommended to either print or download these manuals to a mobile device (mobile phone or tablet) before you go to the installation site.*

READ CAREFULLY: *Dover Fueling Solutions cannot be held responsible for installations, configurations or use of its products that does not comply with the most recent documentation available.*

NOTE: *It will be necessary to have Single Sign-On (SSO) credentials to get access to manuals, instructions, software updates and other important assets. Speak with your FMS sales representative or contact FMS Customer Service at 1-888-679-3835 (1-888-OPW-FUEL) for information. Once you have been approved for SSO credentials go to the FMS Technical Library to find the most recent revisions of all manuals and instructions.*

NOTE: *All references to other manuals and instructions in this manual can be found in the FMS Technical Library. Make sure you have the most recent revision.*

Related Manuals

M2050 LX 4 Installation Manual

M2050-PLUS LX Plus Installation Manual

M2051 LX 4-LX Plus-LX Ultimate ConfigurationManual

M2052 LX 4-LX Plus-LX Ultimate User Manual

M2054-QS LX Consoles Quick Start

FMM2058-PLS LX Plus Wiring Diagram

FMM2058-PG LX Plus Wiring With ProGauge

FMM2060 LX Ultimate Installation Manual

Configuration

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Table of Contents

1 Preface

Dover Fueling Solutions Italia S.r.l. has made every effort possible to see that this document is complete, accurate and updated. With every revision of the console, the related information is added to the document. Dover Fueling Solutions Italia S.r.l. reserves the right to make unannounced improvements and/or changes in the product and/or associated programs. Dover Fueling Solutions Italia S.r.l. is not liable for damages of any kind, including those resulting in the document, including typographical errors.

2 General Warnings

Carefully read the instructions in this manual before you do the installation procedures.

Only approved persons are permitted to install this equipment and configure the console.

The manufacturer is not responsible for operations that are not included in this manual.

The manufacturer is not liable in regard to competent bodies for changes to the equipment and software that are not approved.

In case of failure or defect, refer directly to an authorized service provider or manufacturer.

The manufacturer is not liable for injury and/or damage to persons and/or property and/or pets caused by the failure to obey safety instructions.

All approved personnel must know all safety requirements in this manual, the configuration manual and the user manual.

Refer directly to an approved service provider or manufacturer for questions about the operation of the equipment.

IMPORTANT: *You must read and obey all safety instructions in this manual before you use this equipment.*

 **WARNING!**
Incorrect use of this equipment that does not agree with the instructions in this manual can cause a risk to safety.

 **WARNING!**
 A minimum insulation thickness of 0.25 mm is necessary for all internal wiring of different intrinsically safe circuits. A grounding conductor must be connected between the I.S. ground terminals of the Intrinsic safety barrier in the console and the power distribution panel. This connection must have a cross-sectional area of at least 4 mm2 for the added earth connection.

 **WARNING!**	**AVERTISSEMENT !**
Substitution of components can decrease intrinsic safety.	La substitution des composants peut compromettre la sécurité intrinsèque

READ CAREFULLY: *The control drawing shown in ILL. 14 shall be provided with all devices.*

IMPORTANT: *If a replacement power supply cable is necessary, use an applicable, approved ELBZ/7 type power cord. Do not use another type of power cable.*

3 Introduction

This manual was prepared in accordance with IEC 82079-1 standards. “Preparation of instructions for use - Structuring, content and presentation - Part 1: General principles and detailed requirements and according to the ATEX Directive 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres.”

This manual gives all necessary information about the configuration of the MagLink LX consoles.

This manual must be used together with the related product manuals:

- M2050 LX 4 / M2050-PLS LX Plus Installation Manual / M2060 LX Ultimate Installation Manual
- M2052 LX4/Plus/Ultimate Operator manual

You must install the console as shown in the M2050 LX 4 / M2050-PLS LX Plus / M2060 LX Ultimate Installation Manual, configure the console as instructed in this manual and use the console in the field as shown in the M2052 LX 4/Plus/Ultimate Operator Manual.

WARNING!

This device must not be discarded with household waste. This device is labeled in accordance with European Directive 2012/19/UE concerning used electrical and electronic appliances (waste electrical and electronic equipment – WEEE).
This guideline gives the methods for the return and recycling of used electronic devices as applicable throughout the EU. To return your used device, use the return and collection systems available to you.
The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above 50°C or incinerate.

The table that follows lists reference data of the manufacturer:

Data	Description
Name	Dover Fueling Solutions Italia S.r.l.
Address	Via Natta 6 20823 Lentate Sul Seveso, (MB) Italy
Telephone	+39 0362 1581465
Fax	+39 0362 1581464
Website	www.startitaliana.com
e-Mail	support@startitaliana.it

INFORMATION: *The units of measurement contained in this manual refer to a specified selection by the user. Refer to* *System (p. 25)* *for more information on how to set units of measure.*

3.1 Safety Warnings

This manual contains many important Safety Alerts. there can be a risk of injury or damage to property if you do not obey these alerts. the panels below show the types of safety warnings that can be seen and how each is specified. Danger, Warning and Caution panels can also show ISO warning symbol icons that show specified hazards that are given in the panel text.

DANGER!

Indicates an immediately hazardous condition, if not prevented, will result in death or serious injury.

WARNING!

Indicates a possibly hazardous condition, if not prevented, could result in death or serious injury.

CAUTION!

Indicates a possibly hazardous situation, if not prevented, could result in minor or moderate injury.

NOTICE!

Indicates important information not related to hazards. A condition that, if not prevented, can result in property damage.

SAFETY INSTRUCTIONS

Indicates instructions and procedures related to safety or gives the location of safety equipment.

3.2 Information Panels

NOTE: *This panel gives more information about an instruction or procedure.*

IMPORTANT: *This panel contains special information that is important and must be read and obeyed.*

REMINDER: *This panel shows information that has been given before in the manual that is important to show again.*

TIP: *A step or procedure that is recommended to make another step or procedure easier.*

INFORMATION: *This panel shows references to more information in other sources.*

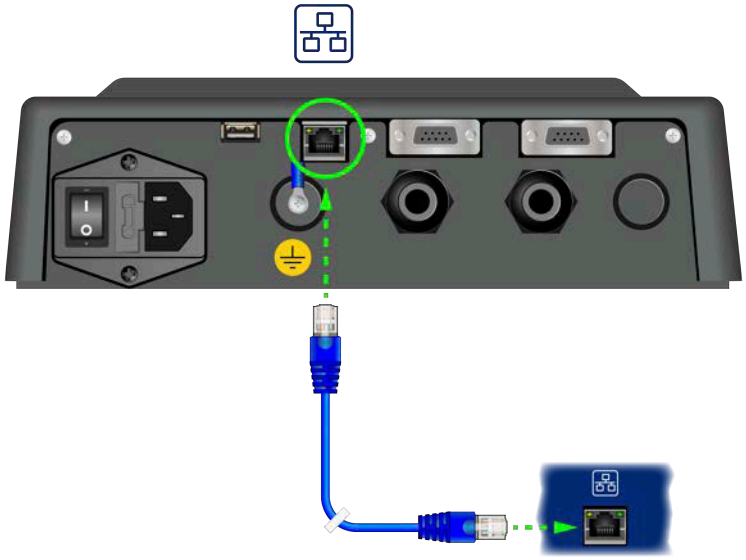
READ CAREFULLY: *This panel points to information that must be fully read and understood before doing the procedure(s) that comes after.*

DEPENDENCY: *For User Interface configurations, this panel shows the relationship between an action taken on one screen and the effect it will cause to another screen.*

4 Direct Connection

This section covers how to connect directly to the console using a standard RJ45 cable.

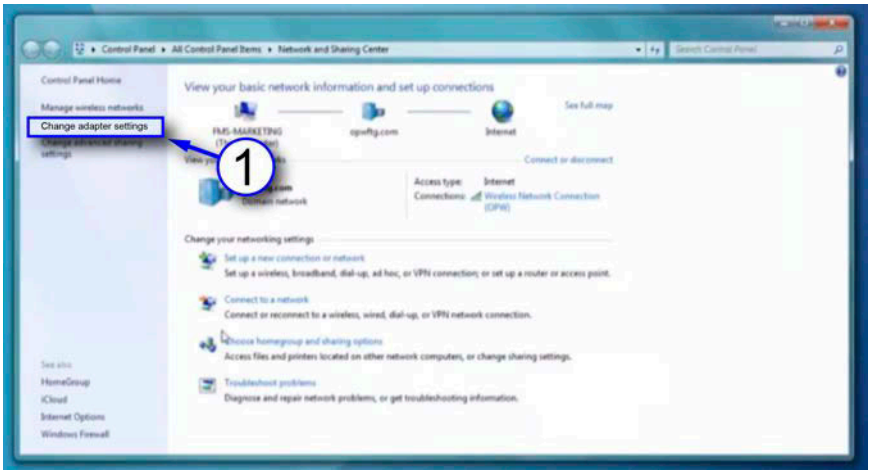
NOTE: *If you have a connection problem with a standard RJ45, as an option, try an* ***RJ45 Crossover cable****.*



Connect an RJ45 cable from your laptop Ethernet port to the Ethernet port on the bottom panel of the console.

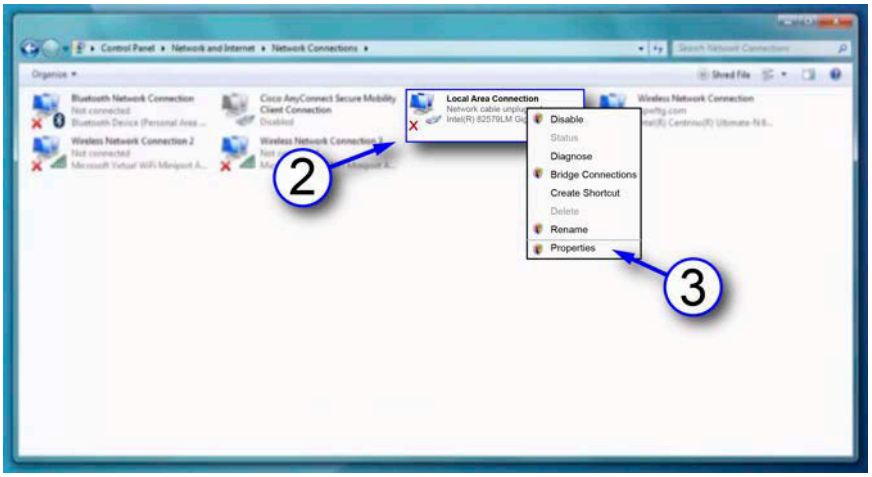
Navigate to *Control Panel* > *All Control Panel Items* > *Network and Sharing Center* on your laptop.

1. Click **Change adapter settings** in the left-side panel.

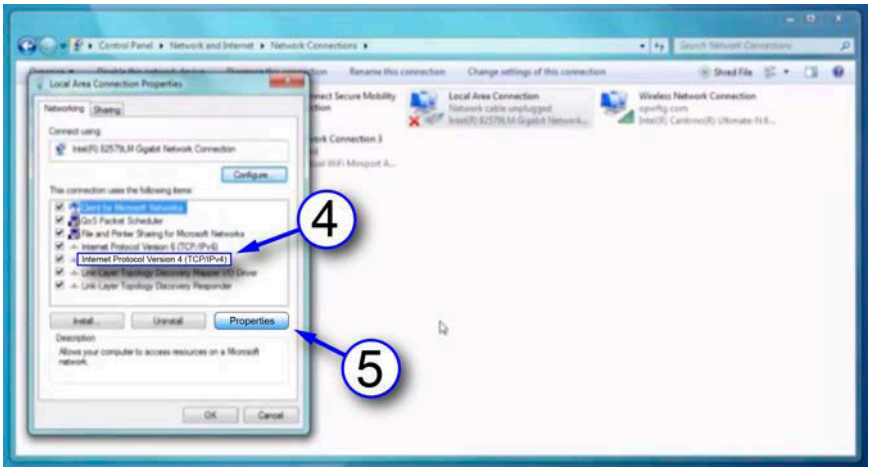


2. Right-click **Local Area Connections**.

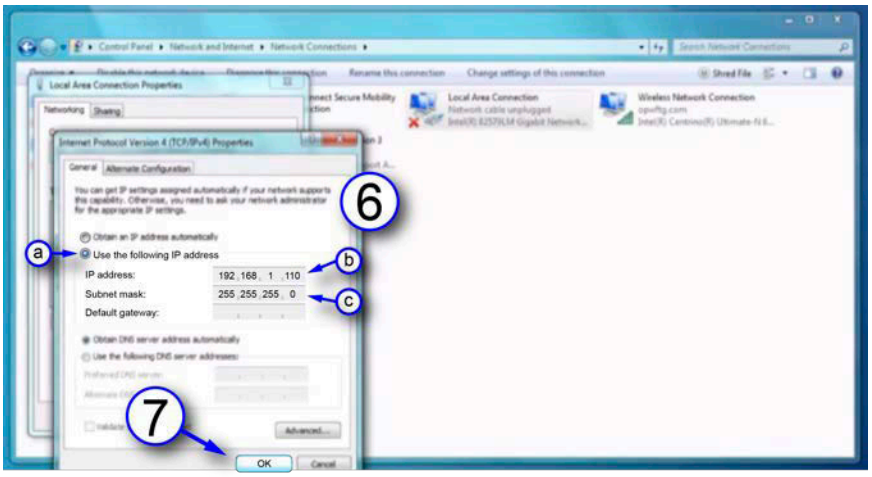
3. Select **Properties** from the menu.



4. Select to highlight **Internet Protocol version 4 (IPv4)** on the list in the pop-up.
5. Click **Properties**.



6. Set the **IP address**. The unit comes shipped from the factory with the IP address 10.90.10.92. Your laptop must be set one number higher or one number lower to connect to the console. The connection must be made on port 3000.
   a. Click the button next to **Use the following IP address**.
   b. Enter the IP address: **10.90.10.91**.
   c. Enter the Subnet mask: **255.255.255.0**.



7. Click **OK**.

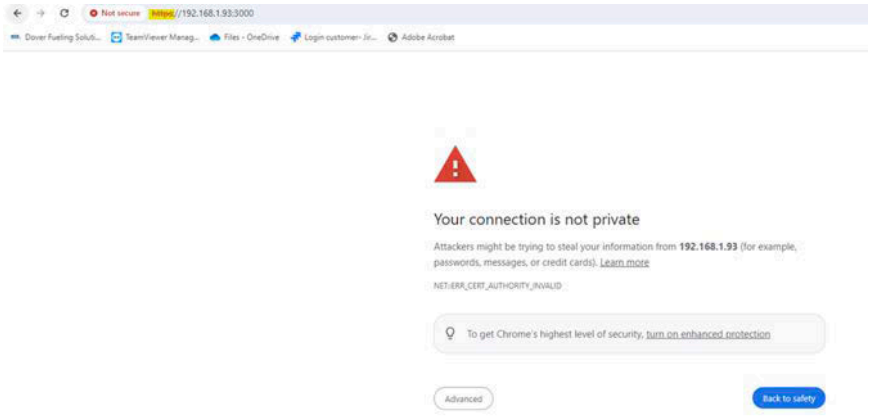
Your laptop is now set up to communicate directly with your MagLink LX4 console. Enter the IP address into your browser to connect (e.g. e.g https://10.90.10.92:3000).

NOTE: *The software versions 4.19.9 or higher support the https protocol which includes a self-signed certificate for enhanced web browser security.*

To establish connection with the console, on the web browser url bar you must type **https://10.90.10.92:3000**.

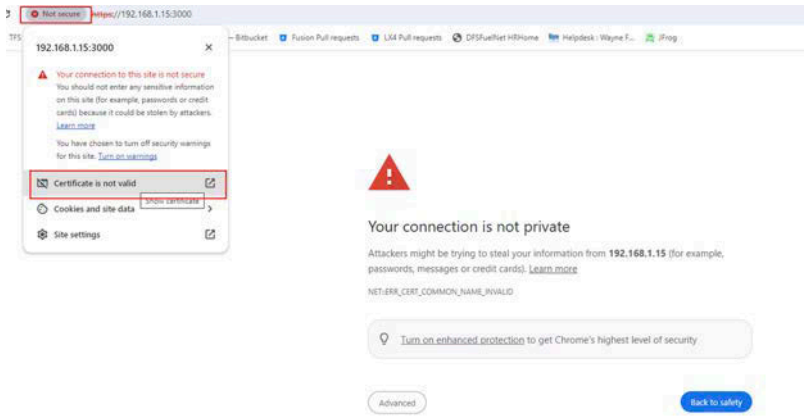
IMPORTANT: *If you attempt to use the older http, it will result in an error and the connection will not be established.*

Once you establish connection, the web browser will show an alert that indicates the connection is not secure. See the example below on Google Chrome web browser. Similar screens will appear on other web browsers.

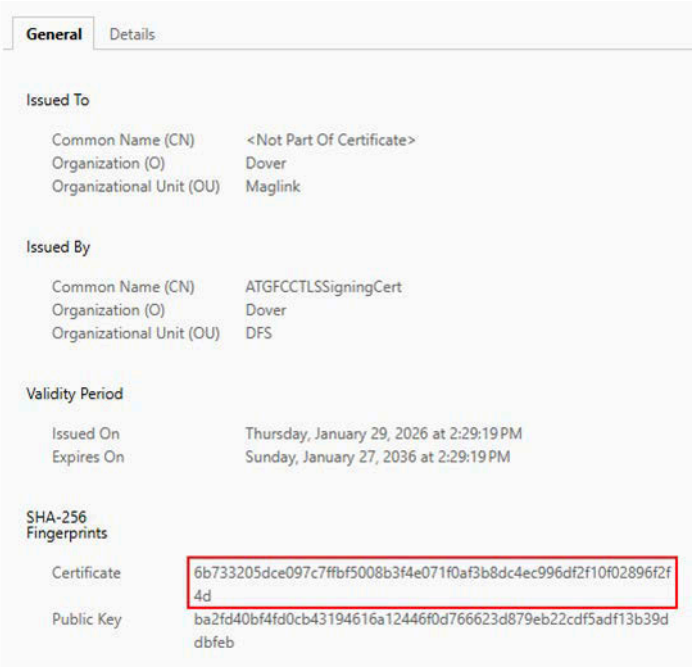


This is normal and expected since the console is not always connected to the Internet and a certificate from an appropriate authority cannot be provided.

Verify that the fingerprint of the certificate is correct (see image below). Click on “Not secure” in the address bar, then click “Certificate is not valid”.

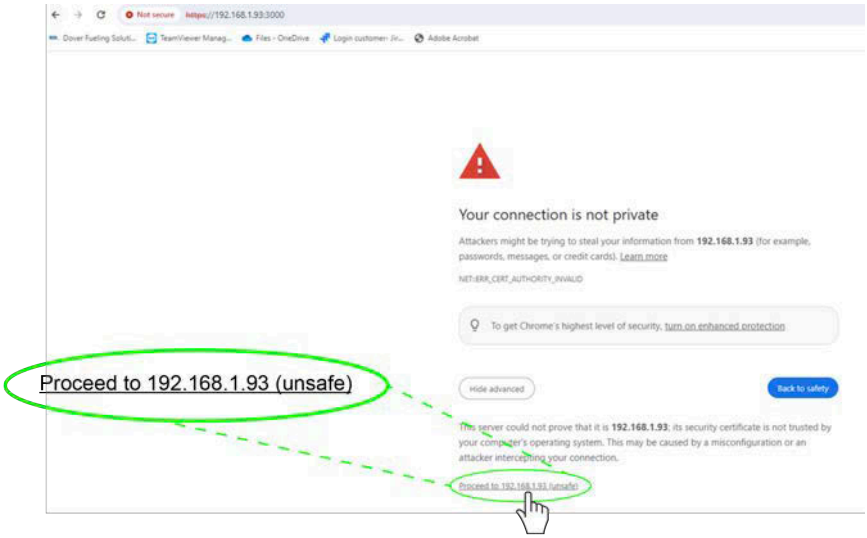


Verify the highlighted fingerprint in your browser matches the Certificate number shown below.



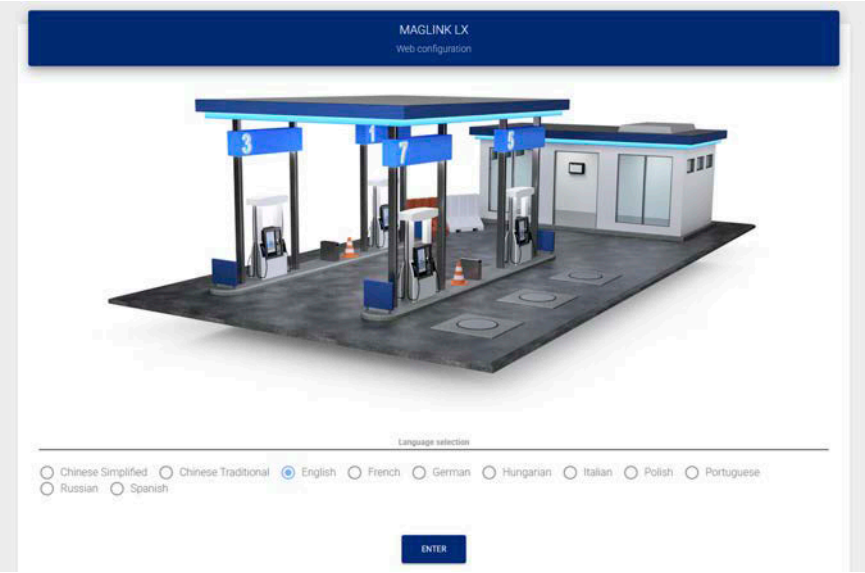
<u>If the certificates match, then the connection is safe and you can proceed.</u>

To continue, click the **Advanced** button in the lower left of the screen. The screen shown below will come into view.



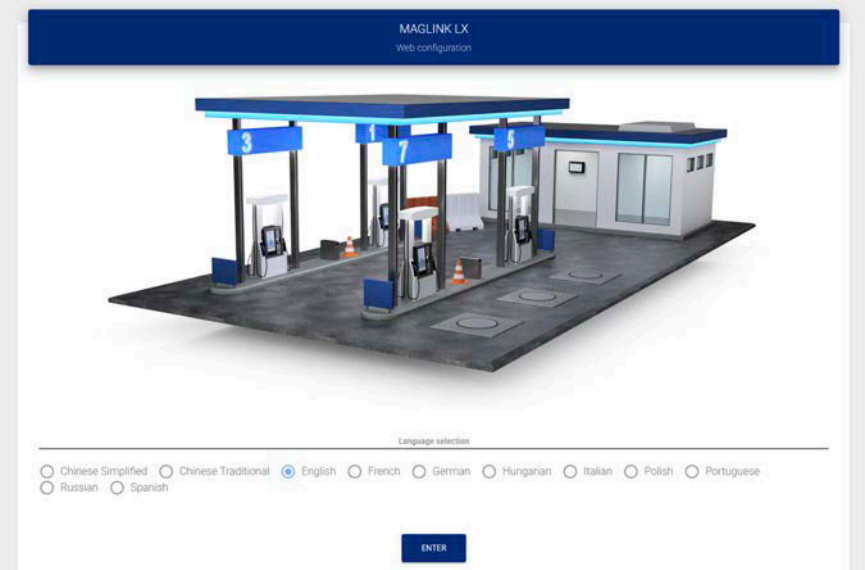
Click **<u>Proceed to 192.168.1.93 (unsafe)</u>**.

The "Login" screen will come up (see the image below).



5 Login Procedure

The Home Screen shown below will come into view after you enter the IP Address into your browser.

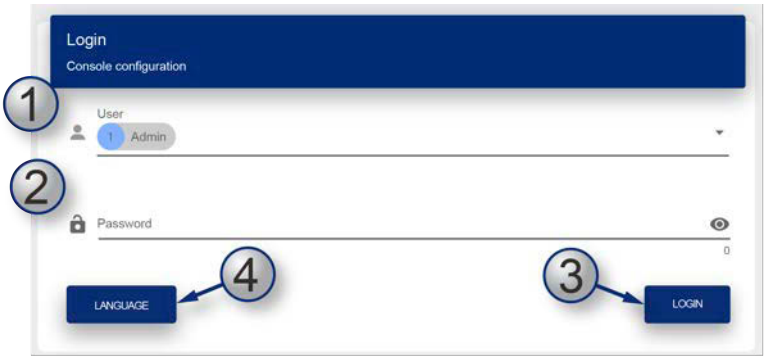


Under **Language selection**, select the radio button adjacent to the language that will be used for the configuration.

The table that follows shows the languages that can be selected:

Console Language Selections		
Chinese Simplified	Chinese Traditional	English
French	German	Italian
Polish	Portuguese	Russian
Spanish	Hungarian (Magyar)	

Push the **Enter** button. The Login page will come into view.



1. Select a **User** type from the drop-down. There are three (3) types of Users:
   - **Guest**: Can only see Tank Status, Sensor Status and Reports (measures, deliveries, leakages, sudden loss). A Guest User cannot make changes to the configuration. The Guest Password is **GUEST-LX4**.
   - **Admin**: Has the same rights as Guest and can also make changes to the configuration. The Admin Password is **ADMIN-LX4**.
   - **Technician**: The Technician account can see the configuration but cannot make changes. The Technician account has access to advanced CSLD reports (Daily, Diagnostics, Segments). The Technician password is **TECHNICIAN-LX4**.
   - **SuperAdmin**: This is for internal use only.
2. Enter the **Password**.

NOTE: *The initial password for a Guest user and Admin User can be found on the M2054-QS Quick Start instruction that is in the box that came with your console. These passwords are case-sensitive. Only an Admin user can change passwords.*

IMPORTANT: *The administrator must change the password as soon as possible to prevent access by personnel that are not approved. See* *Change Password (p. 98)* *for information.*

TIP: *As you type your password only neutral "bullet" characters will show (e.g. • • • • • •). Select the "eye" icon to show the password characters as you type.*

3. Push the LOGIN button to log in to the console with the selected user type.
4. If you did not select the applicable language in the Home screen you can push the LANGUAGE button to go back to the Home screen.

The table that follows shows the types of data that can be seen by the two User types:

Data Type	Guest	Admin
Inventory	X	X
Historical Data Table	X	X
Alarm status	X	X
Delivery/Leakage	X	X
Login	X	X
Logout	X	X
Association of alarm to relays (per tank)		X
Managing internal and external sensors		X
Automatic print features		X
Managing strapping tables		X
Configuring email address book		X
Configuration of all dispensers		X
TCP/IP address configuration, DNS		X
Utility operations (Backup/restore, Clean historical data: Historical readings, alarms, reconciliation, shift reports, Touch screen calibration of the console; Restarting the console, Restarting the operating system of the console)		X
Reconciliation (if enabled)		X
Shift report with scheduling		X
Sensors current status	X	X
Autocalibration Analysis		X
Tanks, sensors, Line leak setup		X

6 Admin Account

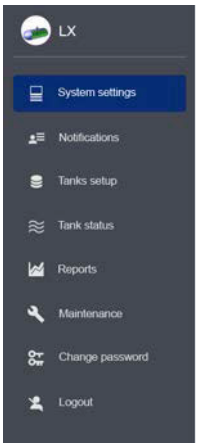
1. When an Admin User is logged in, the screen will show a *Main Menu* on the right side of the display.
2. When a **menu item** is selected, its related *tabs* will come into view along the top of the display (the selected menu item will be highlighted by a blue background).
3. When a **Tab** is selected in the *Tabs Bar* it is highlighted by a yellow line.
4. When an entry in a tab has a *character limit* it is shown as “number of characters entered / character limit” to the right of its entry line.
5. Each tab has a **SAVE** button that is used to save that tab's configuration data after it is entered.

IMPORTANT: *Make sure you save the configuration data that you entered before you continue to another tab.*

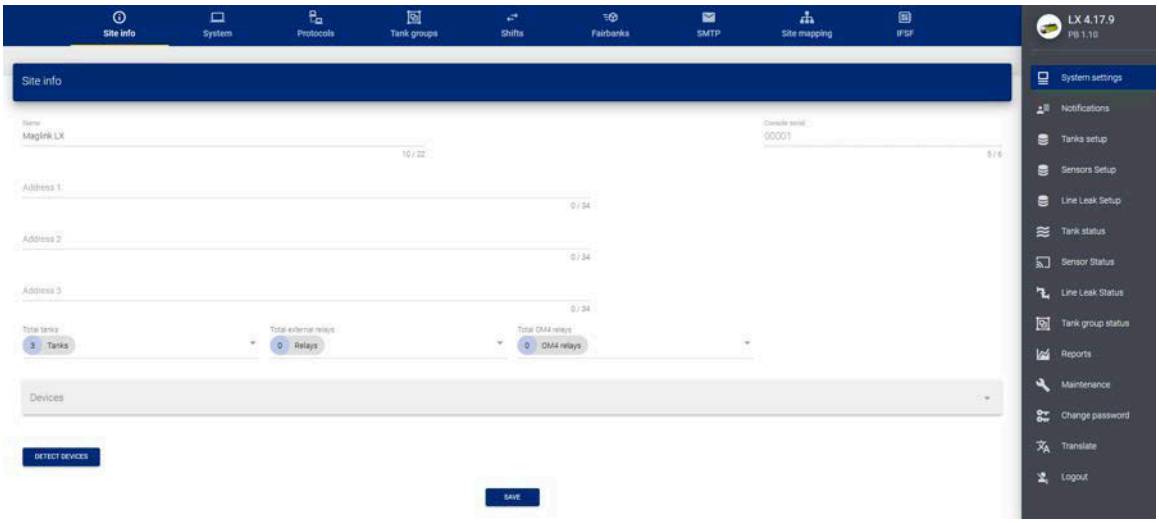
6. When all applicable tabs have been configured you can click the **APPLY SETTINGS TO CONSOLE** button to save all of the configuration data to the console.

TIP: *It is recommended to start from the Site Info tab and complete all applicable fields. Then, continue to the next tab to the right and complete all applicable fields. Continue this procedure until you have completed all tabs.*

6.1 System Settings



6.1.1 Site Info



Enter the applicable information into the fields and make the correct selections as shown in the table that follows:

Field	Description
Name	The name of your site or station.*
Console serial	Enter your console's serial number. This field is read-only. Only a superuser can change it.
Total Tanks	This field shows the number of probes connected to the console. Enter 1-32*
Total external relays	This field shows the number of external output relays connected to the console. Enter 1-32*
Total dispensers	This *read-only* field shows the number of pumps configured for reconciliation/autocalibration.

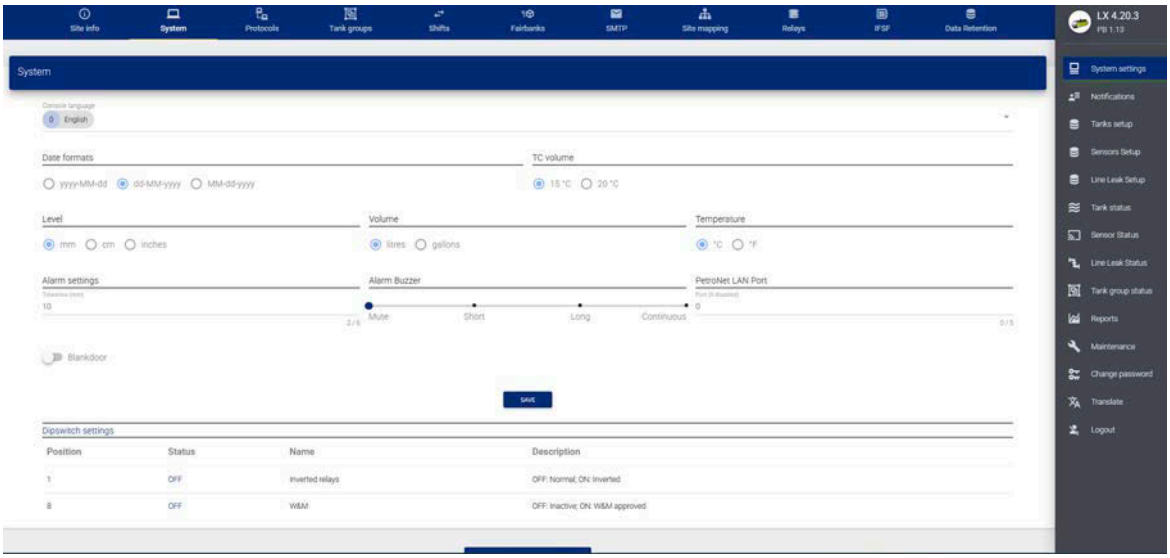
Field	Description
Total sensors	This field shows the number of environmental sensors configured in the console.
Detect Button	**For model LX Plus and LX Ultimate only**. This will start an auto-detect for 924B probes, DMP 1-wire probes and Smart Sensors with the iSIM module. Devices found during auto-detection will show in the drop-down list.
Total OM4 Relays	**For model LX Plus and LX Ultimate only**. If OM4 module(s) are connected to the console, select the total number of relays. Each OM4 module has four (4) relays. Example: If only one OM4 is connected, select 4. If two OM4 modules are connected, select 8.

*Fields marked with an asterisk are mandatory.

Click **Save**. A confirmation message will come into view.

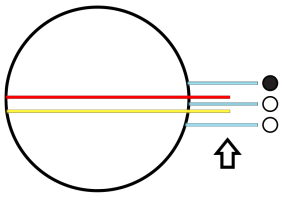
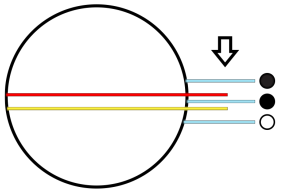
Select **CLOSE**.

6.1.2 System



NOTE: *All fields have selections (but not Alarm settings/Tolerance & Leak threshold) with default values. Changes to level and/or volume unit and number of decimals can automatically change with the selection.*

NOTE: *Blankdoor Slider Button: This control removes the visual display. This is used when the user wants to set the console to a blank screen. In blankdoor mode, the alarms can only be acknowledged through the Web User Interface.*

Field	Description
Console language	Select the language for the graphical user interface .
Date formats	Date format used in the console
TC vol (°C)	Select the temperature used for the temperature compensated volume calculations
Level	Measurement units of the product and water height
Volume	Measurement units of the product and water volume
Alarm Settings	The alarm hysteresis text box is used ONLY in when there is NO alarm. This is used when there is turbulence in the tank. This is important for relay management. In the examples below, Hysteresis is the value interval between the yellow and red lines. Recommended setting: 10 mm  STARTING FROM **NO** ALARM STATUS Relay 1 is linked to H_2O Alarm • $H_2O \leq H_2O$ Alarm Threshold - Hysteresis Value → Alarm OFF ○ • $H_2O \leq H_2O$ Alarm Threshold → Alarm OFF ○ • $H_2O > H_2O$ Alarm Threshold → Alarm ON ●  STARTING **FROM** ALARM STATUS Relay 1 is linked to H_2O Alarm • $H_2O > H_2O$ Alarm Threshold → Alarm ON ● • $H_2O > H_2O$ Alarm Threshold - Hysterisis Value AND $H_2O < H_2O$ Alarm Threshold → Alarm ON ● • $H_2O < H_2O$ Alarm Threshold - Hysterisis Value → Alarm OFF ○
Temperature	Measurement units of the temperature of the product.
Petronet LAN Port	For LX Plus / LX Ultimate models only. Set the LAN port to 3200 to communicate with a VSmart module via TCP/IP. See *Appendix D OPW VSmart Module Connection to MagLink LX Plus / LX Ultimate via TCP/IP* (p. 132) for more detailed instructions.
Alarm Buzzer	**Continuous**: The buzzer will operate continuously and will stop when the alarm is cleared or acknowledged. **Long**: The buzzer will operate for 3 minutes. It will stop automatically. **Short**: The buzzer will operate for 30 seconds. It will stop automatically. **Mute**: The buzzer will not operate.

The Dip-switch Settings field shows the function of the dip-switches.

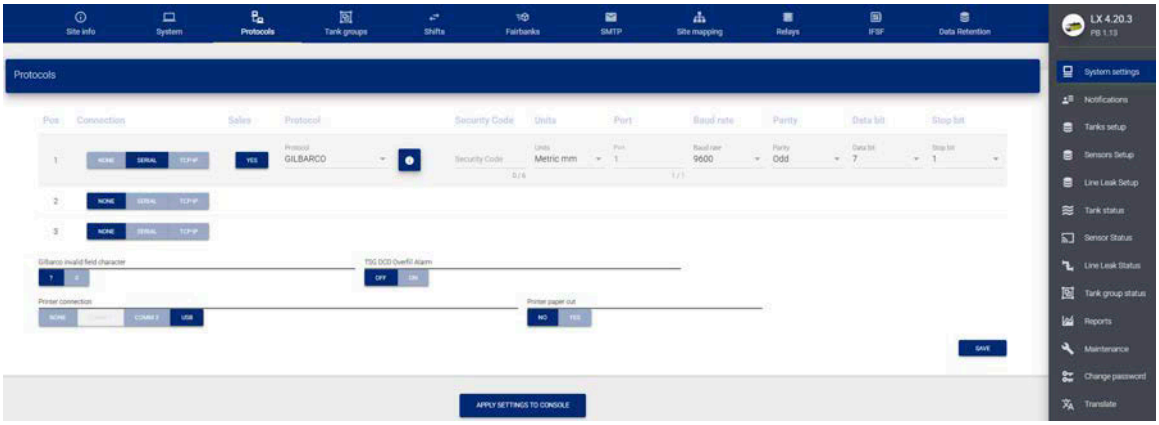
NOTE: *The STATUS field is for future use and can be ignored at this time.*

NOTE: *Position 2 is only shown in the LX4 and is not shown in the LX Plus/Ultimate consoles (LX Plus/Ultimate does not support internal inputs).*

Click **Save** when you complete the *System* tab configuration.

The system will also show the status of the Dip-switches 1 & 2.

6.1.3 Protocols



This section specifies the protocol to use to communicate with a POS (point of sale) system or a FCC (forecourt controller) system.

Field	Description
Connection	Select the type of connection: • **None**: If no device communicates with the console. • **Serial**: If a serial RS232 connection is made between the POS/FCC and the console. • **TCP/IP**: If a TCP-IP connection is made between the POS/FCC and the console.
Sales	Click **YES** if the POS/FCC will transmit the dispenser sales transactions to the console. The Gilbarco BCD protocol is supported for this function. Note that only one connection at a time can support the sales transactions.
Security code	Used in cases where the POS/FCC is requesting a password for authentication.
Protocol	Select one of the following: • **Gilbarco**: To permit the GVR TLS350 protocol commands. If the “i” button that comes into view is selected when a Gilbarco POS connection has been mapped, the supported Veeder-Root commands will be shown. • **TLS250:** To permit the Veeder-Root TLS250 protocol commands. • **DOMS OPC**: To permit the DOMS OPC protocol commands. • **TLS Passport:** To permit a combination of Veeder-Root TLS250 & TLS350 commands. • **PV4**: To permit the OPW PV4 protocol commands. • **Probe Emulation**: Emulation of the "M" command of the Progauge probe (the console responds to the M command). This protocol can be used by forecourt controllers that support the Progauge probe M command and need to get information on the product height, water height and product temperature only.

Field	Description
Port	• If serial communication was selected above, select which serial port will be used (COM1 or COM2). • If TCP-IP communication was selected above, configure the TCP-IP port that to be used. Do not use ports 3000 and 3001 as these are reserved for web browser communications only.
Baud rate / Parity / Data bits / Stop bits	Theses fields are in operation if serial communication has been selected. Configure the settings for the serial ports.
TSG DCD Overfill Alarm	If this control is enabled, when a High High Product alarm is caused, the console will send an Overfill alarm in the POS communication.
Modbus RTU	Support for the Modbus RTU communication protocol used in BMS (Building Management Systems), available in the LX Ultimate only. The physical connection is done via the RS-485 X800 connector on the main board; see *Appendix C Modbus Protocol Support* (p. 119) for further details. To enable the Modbus support, enable the “SERIAL” button, set the “Device Id” (typically 1) and then set the “Units”, the “Baud rate”, the “Parity” and the “Stop bits” as per the BMS configuration.
Printer Connection	Select: • **None**: If no printer is connected • **USB**: If a printer is connected through the USB port. • **COM1/COM2**: If a printer is connected to the serial port (baud rate for the printer should be set to 9600 bps). Note that this is necessary for the fields to become available if the serial ports have not been configured for POS/FCC communication.
Gilbarco Invalid Field Character	Select the symbol (“?” or “0”) to use in the VeederRoot protocol commands for invalid fields. The default is “?”.
Printer paper cut	For ticket printers with automatic cut function, select Yes.

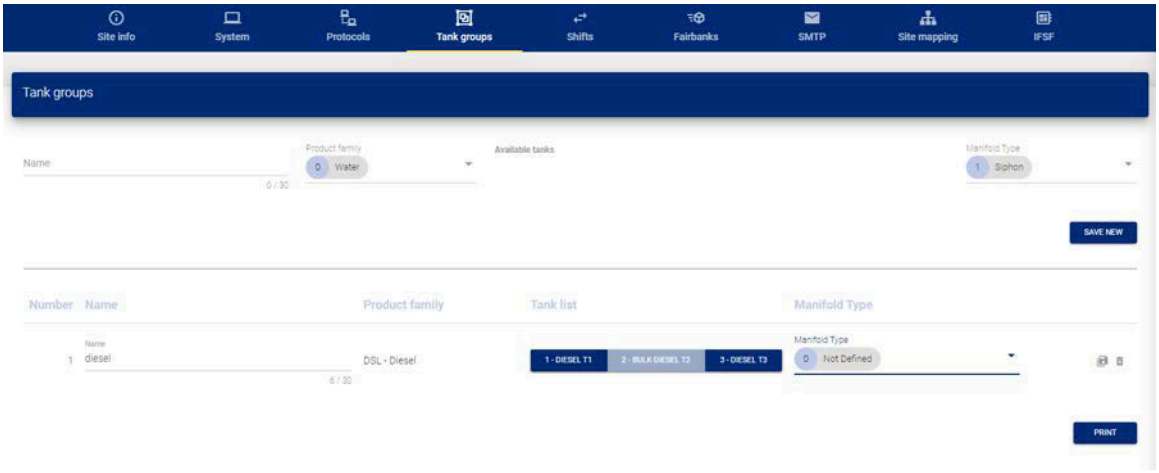
Click **Save** and **Apply settings to console** when you complete the *Protocols* tab configuration.

6.1.4 Tank Group

NOTE: *The number of tanks are configured in the Site Info tab. Tank parameters are configured in Tanks setup from the Main Menu.*

This tab is used to make Siphon (Manifold) groups.

IMPORTANT: *Tanks in a Siphon (Manifold) group must contain the same product.*

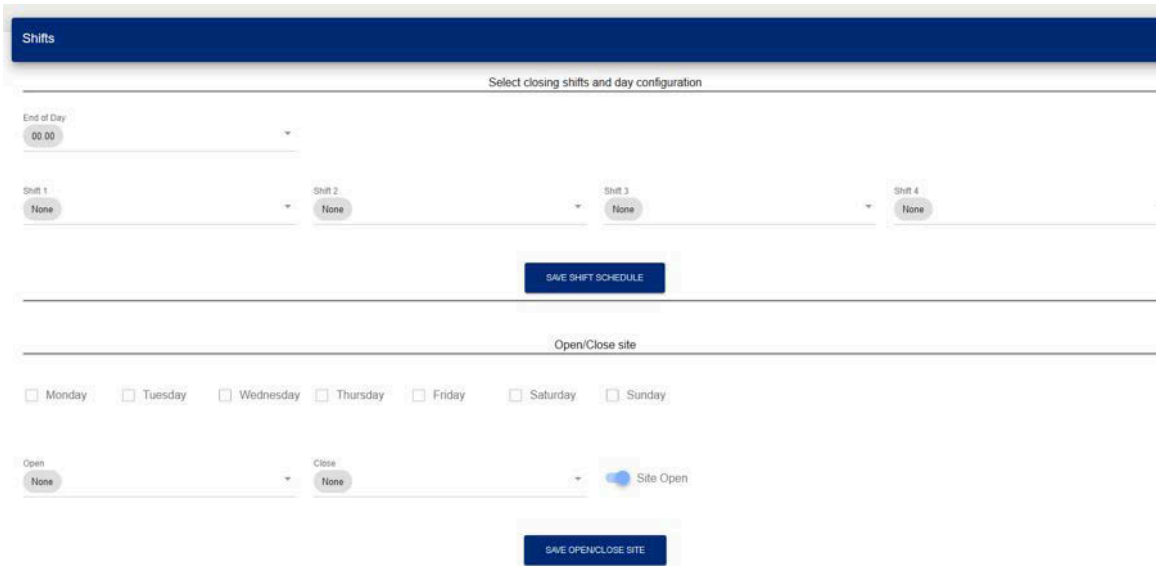


There are two (2) panels to configure in the "Tank Group" screen.

- In the top panel:
  - Enter a **Name** for the Tank Group.
  - Select a **Product Family** from the drop-down for this Tank Group. The tanks that contain the selected product family will automatically come into view under *Available Tanks*.
  - Click the **Save New** button.
- In the bottom panel:
  - Add the applicable tanks to the Tank Group
  - Set the Manifold type: Select the **Siphon** option. The other options are not active at this time.
  - Click the **Save** icon on the right side of the panel.
  - Click **Apply settings to console** to complete the procedure.

To delete a group, click the **Delete** icon on the right side of the panel.

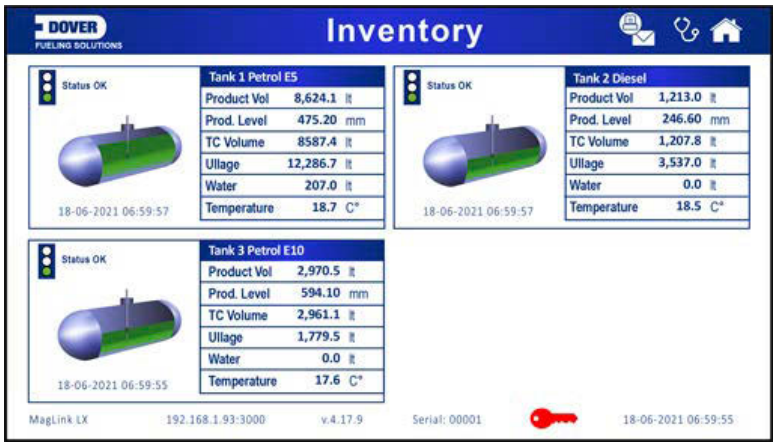
6.1.5 Shifts



The “Shifts” screen is used to configure shift reports. A shift report shows the tank contents at the beginning and end of the shift. The shift report is made in another menu.

Configure the **Closing Time** for up to four shifts (use the drop-down lists).

End of Day: Used for the reconciliation report (when the day ends from a reconciliation perspective).

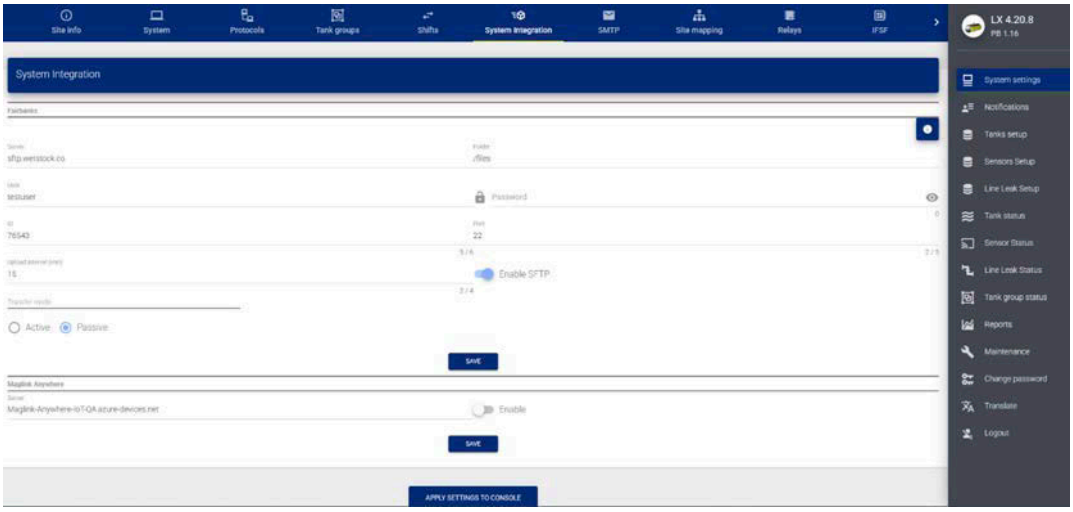


When the site is Closed, a red key icon will show at the bottom of the Graphical User Interface (see the illustration above).

When complete, click the **Save Shift Schedule** button. Click **Apply Settings to Console** to complete the procedure.

Open/Close site: This will be applicable to future releases. This functionality has not been implemented at this time. This will be used to enter specified site open and close times. After the site close time, the tank can be monitored for a theft (sudden loss) event. This is applicable to tanks in Standard mode only.

6.1.6 System Integration



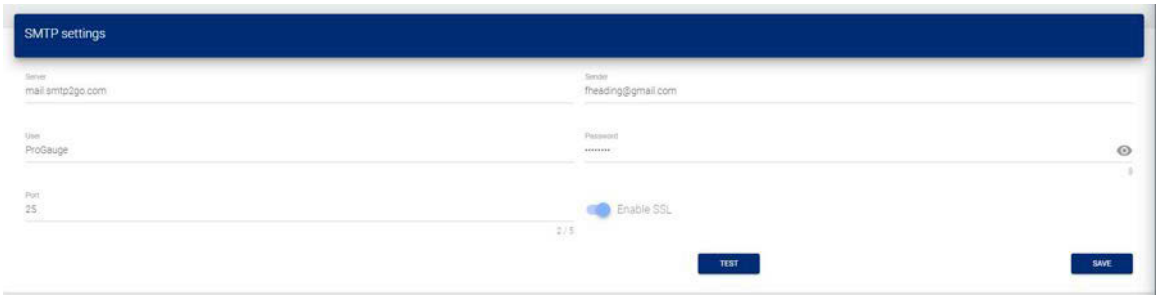
The console can send information to a server through FTP/SFTP if applicable. This includes:

- Inventory stock levels
- Deliveries
- Alarms
- Pump transactions (if connected to a POS/FCC that uses the Gilbarco BCD protocol).

Field	Description
Server	The IP address of the server that will receive the files (given by the server administrator).
Folder	The folder in the server where the files are to be sent, provided by the server administrator (optional, can be left blank)
User	User name provided by the server administrator
Password	Password provided by the server administrator
ID	Console identifier. If set to 0, the FTP transfer gets disabled.
Port	FTP or SFTP port, provided by the server administrator
Interval	How often the console will attempt to establish connection to the server in order to send the files
Transfer mode	Active or Passive, info provided by the server administrator.
Enable SFTP	For SFTP connections
MagLink Anywhere	The MagLink Anywhere mobile application allows secure pairing and information exchange with the MagLink LX console using a smartphone device. See *Appendix G MagLink Anywhere Mobile Application Setup* (p. 145) for more detailed instructions .

Click **Save** when you complete the *System Integration* tab configuration.

6.1.7 SMTP



The console can send email notifications related to tank information, tank events and console events.

Configure the SMTP connection parameters in this page. Notifications and email recipients are configured under *Notifications Menu* (p. 38).

Field	Description
Server	The email server that handles the email functionality
Sender	Email of the sender
User	Username provided by the mail Server
Password	Password provided by the mail Server
Port	SMTP port, provided by the mail Server
Enable SSL	Activate it for SSL connections.

Use the TEST button to send a test email to a specified recipient.

REMINDER: *The recipient must first be configured under Contacts (p. 38).*

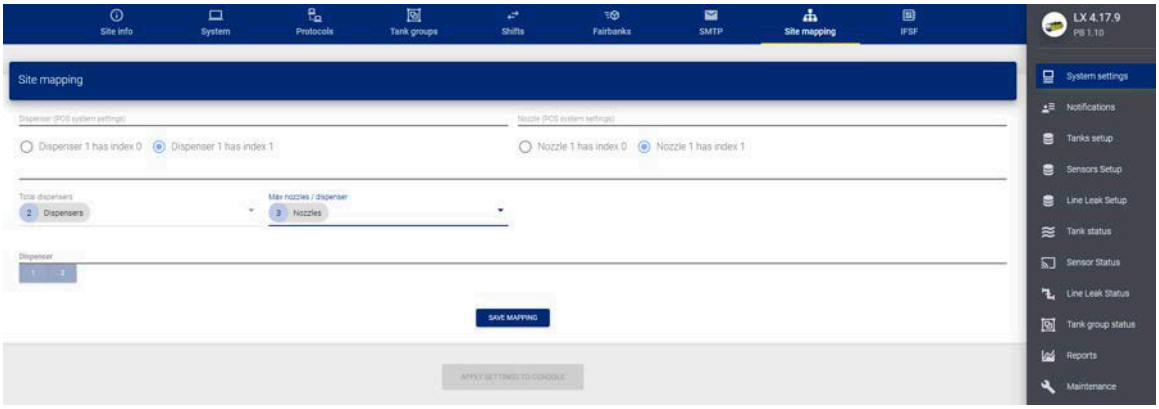
Click **Save** when you complete the *SMTP* tab configuration.

NOTE: *The SMTP server that is used for email sent from the MagLink console can be configured with the applicable server address / user account / password. Selected one of the available options:*

- Port 587, ssl enabled -This is used worldwide by SMTP providers as the default and is the best option (email transfer is encrypted).
- Port 25, ssl enabled - Not every SMTP provider supports this option, (email transfer is encrypted).
- Port 25, ssl disabled - This is used by many SMTP providers as a legacy compatible option but it is less secure (email transfer is unencrypted). Use this option only if no other option is available.
- Port 465 - Do not use this port. It is not supported by the MagLink console.

It is recommended to use Port 587 as your first selection. If it is not supported by the SMTP provider then use port 25.

6.1.8 Site Mapping (for Reconciliation/Autocalibration mode only)



A POS/FCC that uses the Gilbarco BCD Dispenser Interface Protocol must be used to communicate pump sales. Configure the tank-to-nozzle mapping on this tab.

Field	Description
Dispenser (POS system settings)	This field identifies the index of the first pump (refer to the Gilbarco BCD Dispenser Interface Protocol). • Select Index 0 if the first pump in the POS/FCC is identified as Pump 0. • Select Index 1 if the first pump in the POS/FCC is identified as Pump 1. The word “Pump” refers to the Fueling Position as shown in the Gilbarco BCD Dispenser Interface Protocol.
Nozzle (POS system settings)	This field identifies the index of the first nozzle of the pump (refer to the Gilbarco BCD Dispenser Interface Protocol). • Select Index 0 if the first nozzle in the POS/FCC is identified as Nozzle 0. • Select Index 1 if the first nozzle in the POS/FCC is identified as Nozzle 1. The word “Nozzle” refers to the Meter Identifier as shown in the Gilbarco BCD Dispenser Interface Protocol.
Total dispensers	Identifies the total number of pumps (Fueling Positions) that are connected to the tanks monitored by the console
Max nozzles	Identifies the maximum number of nozzles for each pump.

Click **Save** when you complete the top section of the *Site mapping* tab configuration.

Map Dispensers and Nozzles to Tanks

1. Select a **Dispenser**.
2. Map each **Nozzle** to a Tank.
3. The offset is the “meter drift” value of the dispenser (the meter drift is set during a pump calibration). The offset should be calculated as follows:

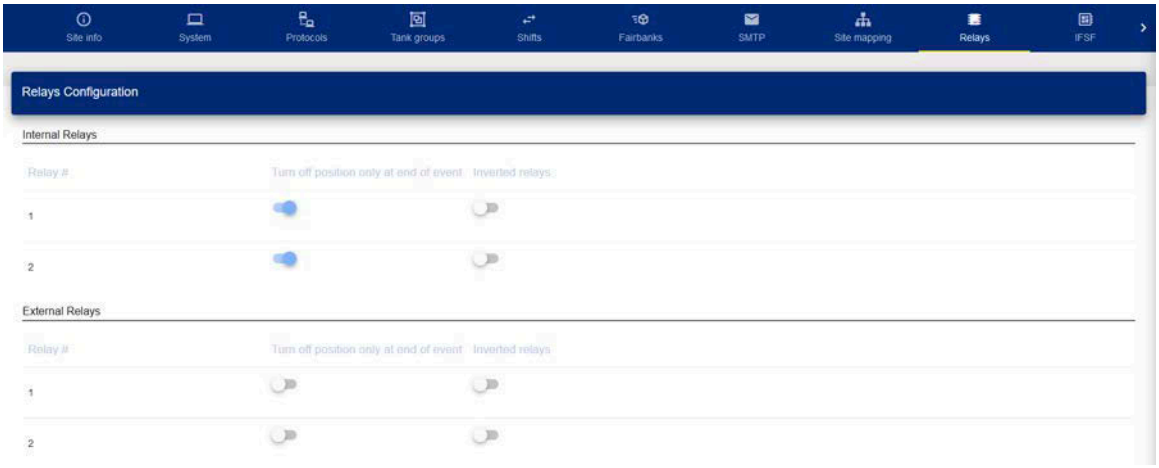
   If the dispenser dispensed 19.9 liters (measured during the meter calibration) but it registered 20 liters on the display, then the offset should be entered as (20/19.9) - 1 = 0.005
4. Use the slider button to Enable the Nozzle to Tank mapping.

IMPORTANT: *Nozzle-to-tank mapping must be done correctly or the console will communicate incorrect sales data for the tanks and the autocalibration / reconciliation function will not operate correctly.*

NOTE: *When manifolded tanks are in use, the first tank in the Manifold Group should be mapped to the related nozzles. The reconciliation reports and the delivery reports for the full manifold Group will be shown under the 1st tank. Autocalibration cannot be performed in a tank that is part of a Manifold Group.*

Click the **Save Mapping** button at the bottom of the panel to save the configuration.

6.1.9 Relay Settings



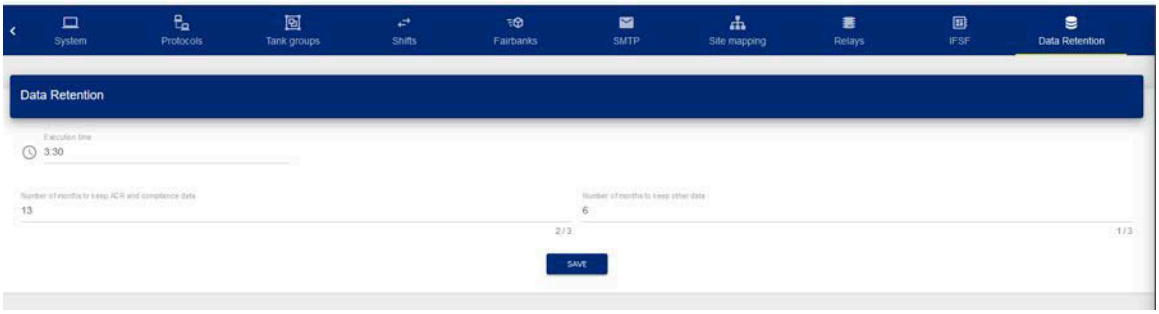
Turn off position only at the end of the event: When this slider button is active, the relay will deactivate only when the alarm has been cleared (the event that caused the relay to activate has ended). If this control is not active, the relay will deactivate when the alarm has been acknowledged.

Inverted relays: When this slider button is active, it energizes the relay under normal conditions and keeps the NC contact open whilst the NO contact is closed. In an alarm condition, or in the event of a power loss, the NC contact of the relay closes to activate the circuit and the NO contact opens.

6.1.10 IFSF

This is not in use at this time. Ignore this section. For IFSF connections, the external ProGauge part number 17-IFSF Module must be used.

6.1.11 Data Retention



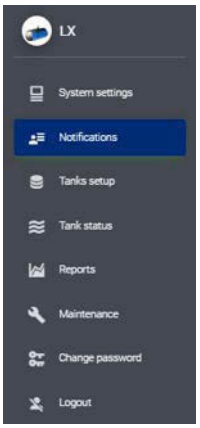
Execution time: Set the time when the console will automatically do a check each day to update old data. If set to 0, the functionality is disabled.

In the other two fields, the user can configure how long the console stores ACR, Compliance and other data.

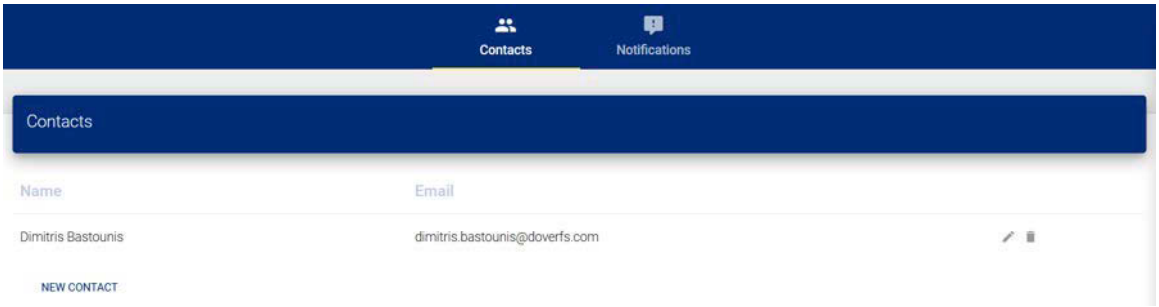
ACR/Compliance data: Daily reconciliation, hourly reconciliation, tank leaks, line leaks, LLD alarms, sensor alarms, tank alarms, straptables.

Others: deliveries, measurements, sales, shifts, CSLD diagnostics, spoolers.

6.2 Notifications Menu



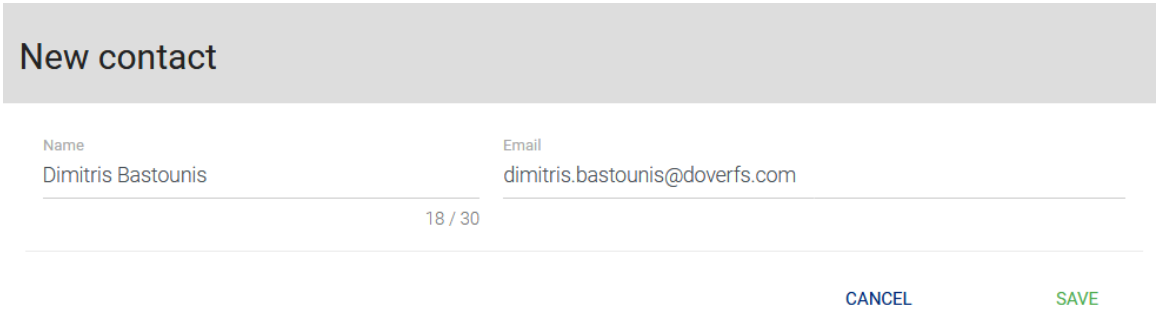
6.2.1 Contacts



When the contacts tab is selected, all contacts that have been entered can be seen.

Click the **Edit** icon to change information for a contact. Click the **Delete** icon to remove a contact.

Click **NEW CONTACT** to configure notification information for a new contact name. The New Contact window will come into view.

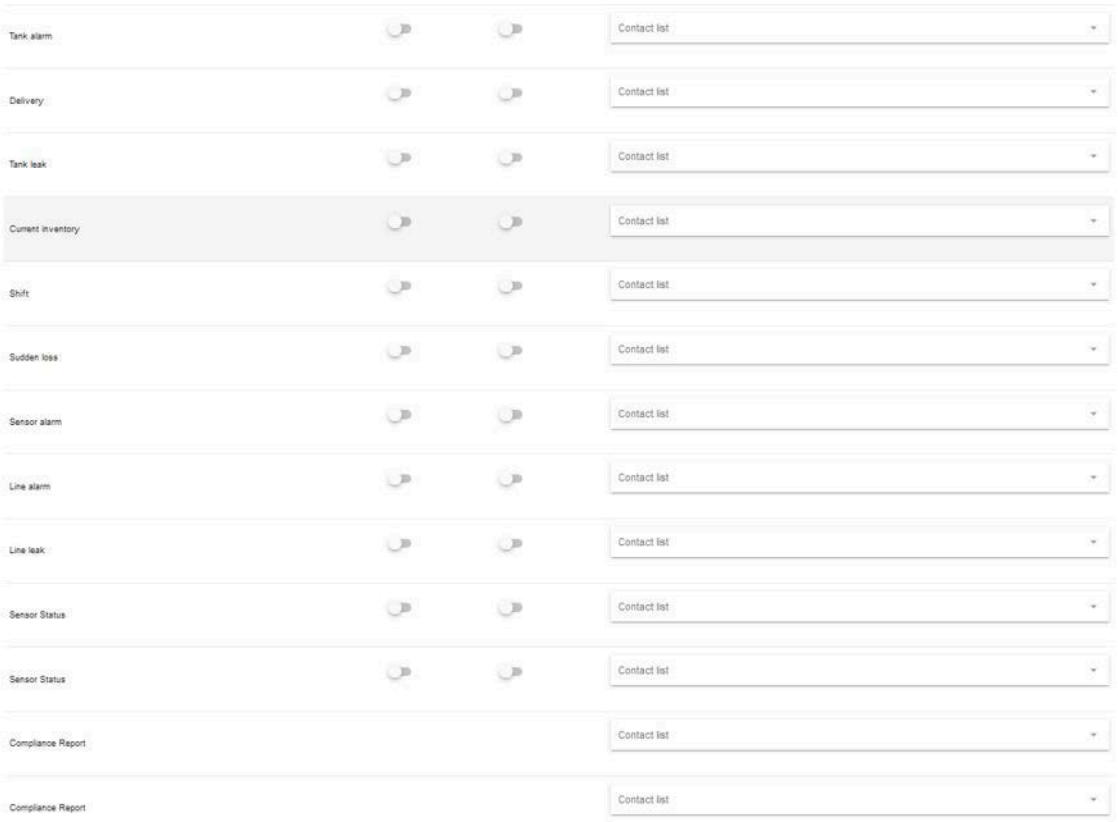


Complete the fields:

- Name
- Email: To receive notifications by email

Click **Save** when you complete the *New Contact* configuration.

6.2.2 Notifications



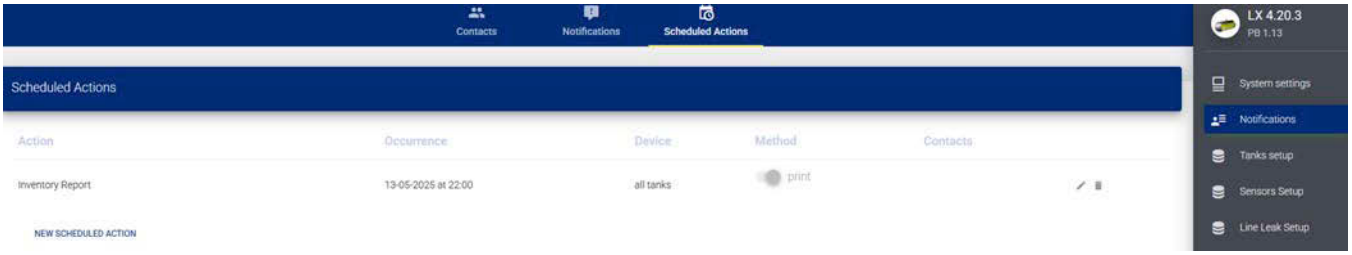
Set up the contact name(s) and notification type for each of the Notification Events.

Field	Alarm Description
Tank alarm	High-high product, High product, Low product, Low-low product, Water
Delivery	End of delivery report
Tank Leak	Leak detected in the tank
Current Inventory	A current inventory report can be started from the Graphical User Interface (GUI) to be printed or to be emailed. For the report to be emailed, select the recipients here.
Shift	Shift report
Sudden Loss	Sudden loss alarm. The volume has dropped over the configured threshold when the site is closed. NOTE: This requires the site to be closed.
Sensor	Sensor Alarm
Line Alarm	Alarms related to the operation of the PLLD: plld sensor no link, no STP link (no link with LIM), plld sensor open (no reading), plld sensor short (wrong polarity), STP controller (STP contactor fused or damaged), Line leak, No leak test, No annual leak test, Pressure low.
Line Leak	An alarm related to a PLLD test that failed.

Field	Alarm Description
Sensor Status	A report that shows the current status of all sensors
Compliance Report	A report with tank leak tests, line leak tests and sensor activation history that is started and emailed from the display. Select the email recipients here.

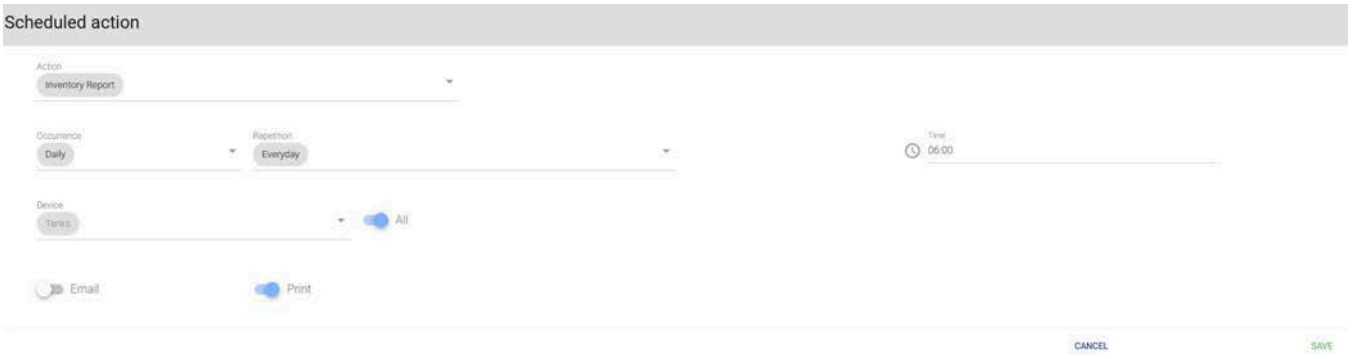
Click **Save** when you complete the *Notifications* tab configuration.

6.2.3 Scheduled Actions



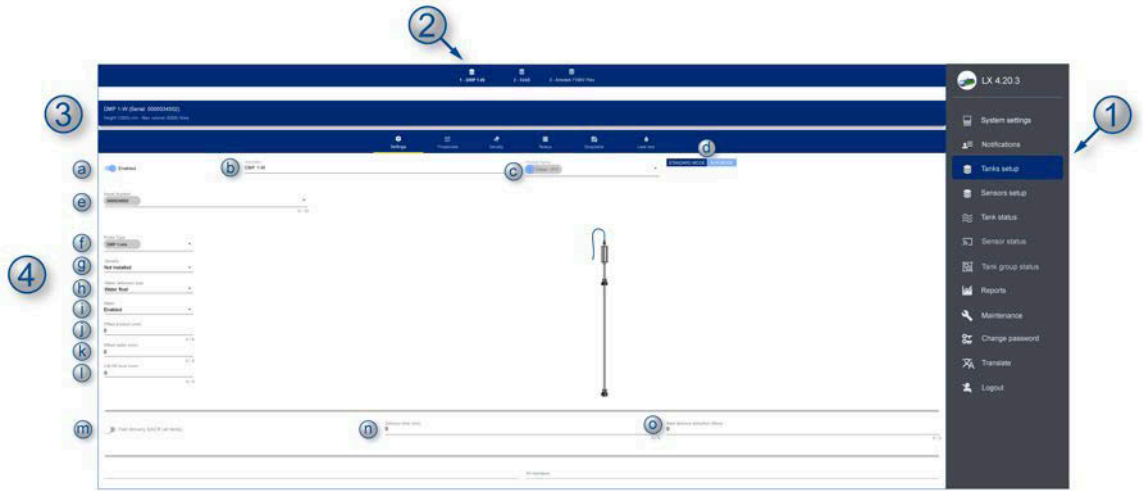
Here the user can configure certain actions that can be scheduled to occur at a specific time. Available actions to schedule include Inventory Report, Sensor Status Report, Compliance Report and Leak Test Status Report.

Select “New Scheduled Action” and fill in the required fields. Select **Save** when done.



6.3 Tank Setup Menu

6.3.1 Settings



1. Select **Tank setup** from the Main Menu. The number of Tanks configured in *Site Info* (p. 24) will show in the Tabs bar.
2. Select a Tank to configure.
3. An information bar below the tabs bar will show the **Height** and **Max Volume** of the selected tank. This is read-only data from the last line of the tank strapping table *Straptable* (p. 44).

   NOTE: *If the tank does not do autocalibration / reconciliation, then select the Standard mode button and configure as below.*

4. The bar below the information bar shows the configuration parameter selections. **Settings** is the first selection.
   a. Move the **Enabled** slider button to ON to let the application query the installed probe during the read cycle. A probe query does not occur if this button is OFF.
   b. **Description**: Enter a description of the tank.
   c. Select the **product type** from the *Product family* drop-down.
   d. Select a button for **Standard** or **ACR** Mode (to turn on the ACR function).

e. **Serial Number**: 924B and DMP 1-Wire probes that are connected through the ISB (LX Plus and Ultimate models only) are automatically recognized once they have been detected.

- If the console is an LX Plus or LX Ultimate model, the probes that were connected to the ISB and detected in the System Settings/Info menu will show here.
- If the console is an LX4 model, the probe serial number must be entered manually.

NOTE: *When a serial number is entered manually, a "QUERY" button will come into view. When the "QUERY" button is selected, the console will try to communicate with the probe to get information on the probe type (e.g 924B, DMP-IS 1-Wire, DMP-IS RS485, XMT-SI-485 etc) and the number of floats that are detected on the probe.*

f. **Probe type**: If the console can successfully communicate with the probe to get its configuration, this field will populate automatically.

- DMP-485: DMP-IS probe connected through RS485.

NOTE: *With this selection the console thinks that the probe has 5 temperature sensors and the applicable tank leak detection settings are automatically detected.*

- DMP 1-WIRE: DMP-IS probe with 1-wire protocol connected on the ISB.

NOTE: *With this selection the console thinks that the probe has 5 temperature sensors and the applicable tank leak detection settings are automatically detected.*

- DMP FLEX: DMP flexible probe connected via RS485.
- DMP FLEX 1-wire: DMP flexible probe with 1-wire protocol connected on the ISB.
- XMT-SI-485: XMT-SI-485 probe connected through RS485.
- XMT-SI-RF: XMT-SI wireless probe connected through an RS485 RF Receiver.
- XMT-EXd: XMT explosion proof probe connected through RS485.
- OPW 924B: OPW 924B with 5 temperature sensors.
- OPW 924A: Previous generation OPW 924A probe with 5 temperature sensors.
- VSmart analog: For OPW 7100V flexible probes that connect through the VSmart module.
- Radar LR120: For Siemens Radar transmitter LR120 (see Appendix in this manual for the setup).

g. **Density**: Select *Densimeter* if a density measurement float is installed on the probe (applicable to DMP probes only).

NOTE: *For DMP 1-wire probes (LX Plus/Ultimate models only): For console software versions earlier than 4.17.9 in combination with DMP probes with firmware version older than v08, the probe needs to be configured firstly via RS485 (with the dedicated DMP Probe Config Manager) in order to use the densimeter. For console software version 4.17.9 and later in combination with DMP firmware version v08 and later, there is no need for the above requirement and the console can push the configuration to the probe.*

NOTE: *For DMP RS485 probes: The density configuration for DMP 485 probes can be pushed to the probe by the console.*

h. Select the **Water detection type** from the drop-down:
- **Not installed**: Water float is not installed on the probe
- **Water float**: Water float is installed on the probe
- **AEF**: Aqueous Ethanol Float installed in the place of the standard water float.

i. Select the status of **Water** detection from the drop-down:
- **Enabled**: The water float is present and measurements will be available and taken into processes (this setting will send the “two floats” information to DMP Probe)
- **Ignored**: The water float is installed but no measurements are processed,, Water values are shown as “0”.
- **Ignored during delivery**: The water float is present and measurements will be available and taken into processes. However, when the delivery is detected, the last measurements will be locked and shown to not cause false alarms during delivery. Once the delivery has completed, the water measurements will be unlocked.

j. **Offset product**: This value is used to calibrate the position of the product float. Possible value range: ±5000 mm (197 in).

k. **Offset water**: This value is used to calibrate the water float Possible value range: ±5000 mm (197 in).

l. **Lift-off level:** Represents the amount of water required to lift off the water float. Recommended to set to 20 mm. The lift-off value is added to the water reading when the water reading is higher than 5 mm or when the difference between the old water reading and the lift-off value is greater than 2 mm.

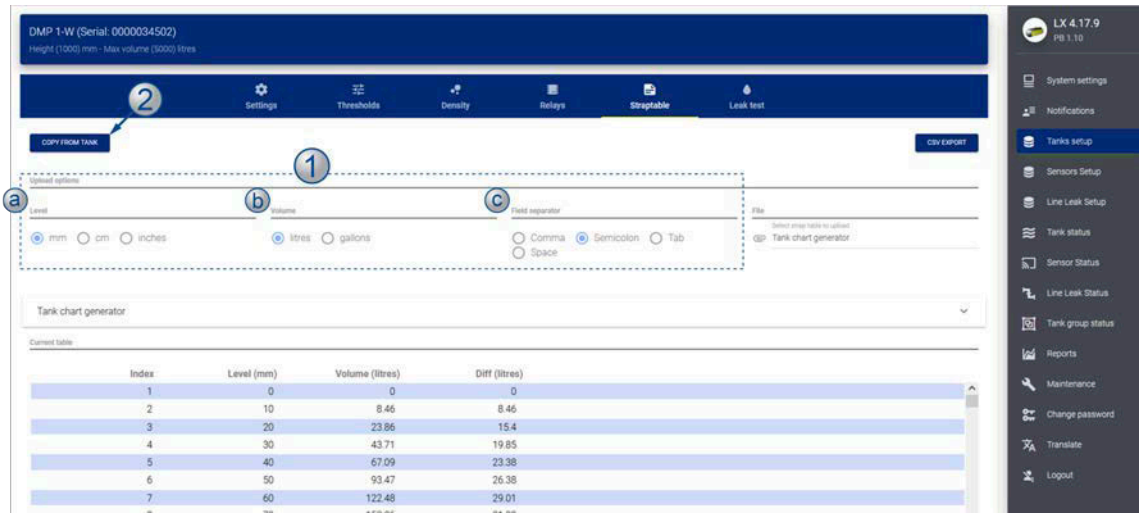
m. Move the **Fast delivery QACR** slider button to the right (to the enabled position) to let the application use the QACR algorithm for the delivery detection. Set the delivery time (in minutes). The QACR algorithm is the delivery algorithm that is usually used when the tank is in ACR mode. For some situations where a tank is in Standard mode and the site would like to have the delivery report as quickly as possible, the QACR algorithm can be used.

n. Enter the **Delivery time** in minutes: Set the delivery time to tell the console how much time to wait from the moment the delivery detection has ended before the final delivery report is printed. This delivery time is used to permit time for the turbulence within the tank to settle and to have a stable level.

o. Enter the amount (in liters) to **Start delivery detection**: Set the Delivery start threshold to tell the console when to know when a delivery has started (for example if set at 300 liters, this means that as soon as there is a 300 liter volume increase, then this is a delivery start point).

Click **Save** when you complete the *Settings* configuration.

6.3.2 Straptable



The Strapping table shows the related mm / litre value of the Tank Volume.

You can enter a Strapping table in one of the methods that follow:

1. You can import a table from a csv or txt file. You must configure the import parameters:
   a. Level units
   b. Volume units
   c. The Field separator

IMPORTANT: *The Field separator for a tank table/strapping chart from a 3D Laser MUST be set as a semicolon (;).*

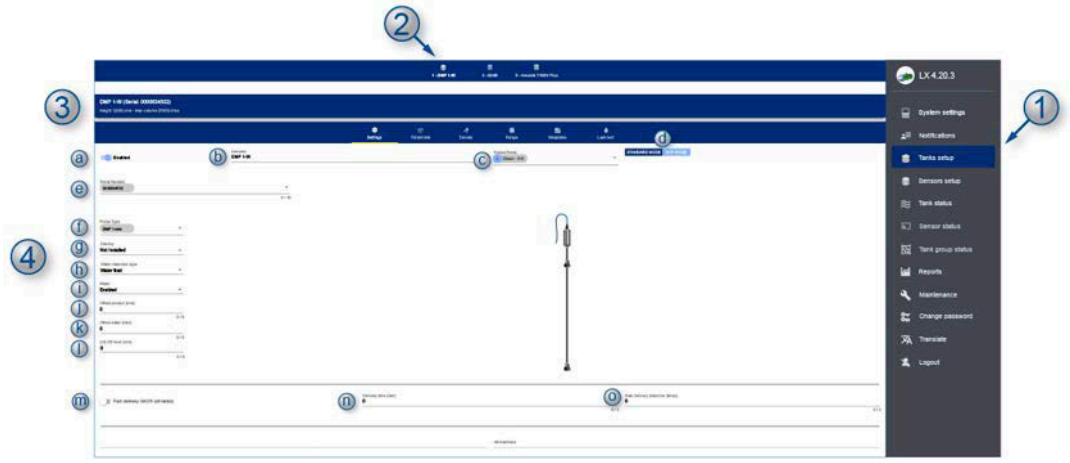
Select a file from the attachment list.

2. You can copy a strapping table from a different tank. Click the **Copy from tank** button and select an available strapping table from the list that comes into view.

   When a strapping table upload is complete, the strapping points (Index) can be seen in the table at the bottom of the screen. Use the scroll bar to see more points

   *A selected strapping table can be exported to a csv format that can be saved in a spread-sheet or text editor. Click the **CSV Export** button to continue.*

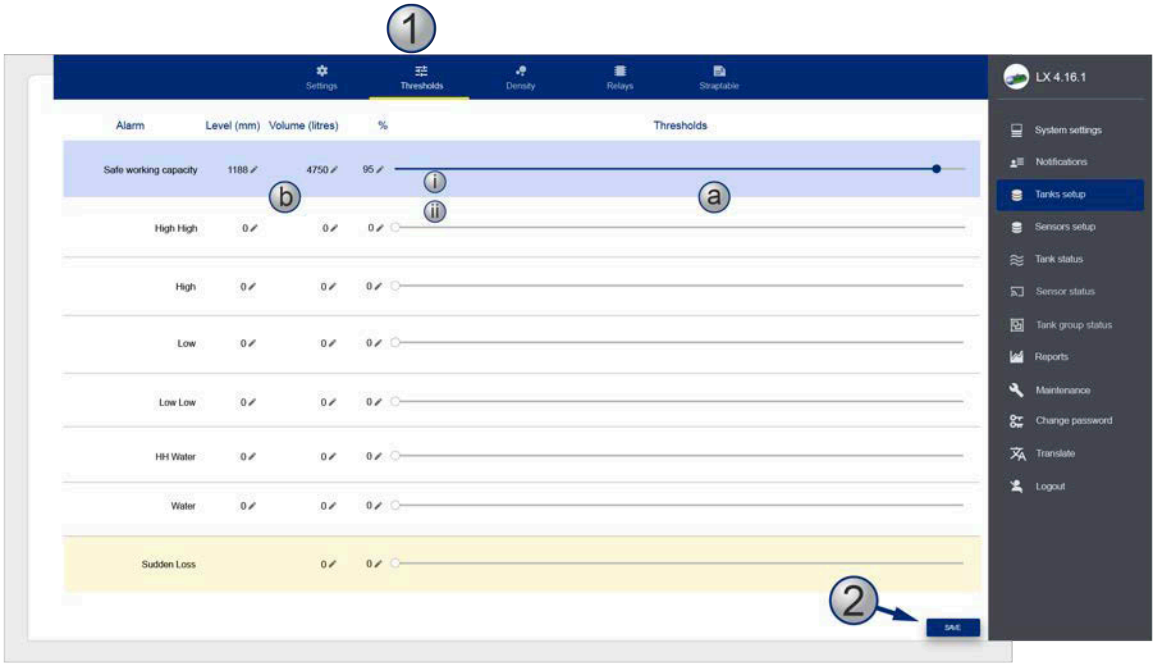
3. You can use the *tank generator* function of the console.



   a. Select the tank shape from the drop-down list (Vertical, Flat ended, Cylindrical, Dished-Ellipsoidal).
   b. Enter the tank **Height** (in mm).
   c. Enter the tank **Capacity** (in litres).
   d. Enter the number of **Steps** for the chart to be divided into.
   e. Select the **Generate** button.

The bottom of the screen shows the volume to height graph and the volume distribution (liters per unit of height). See the screenshots below:

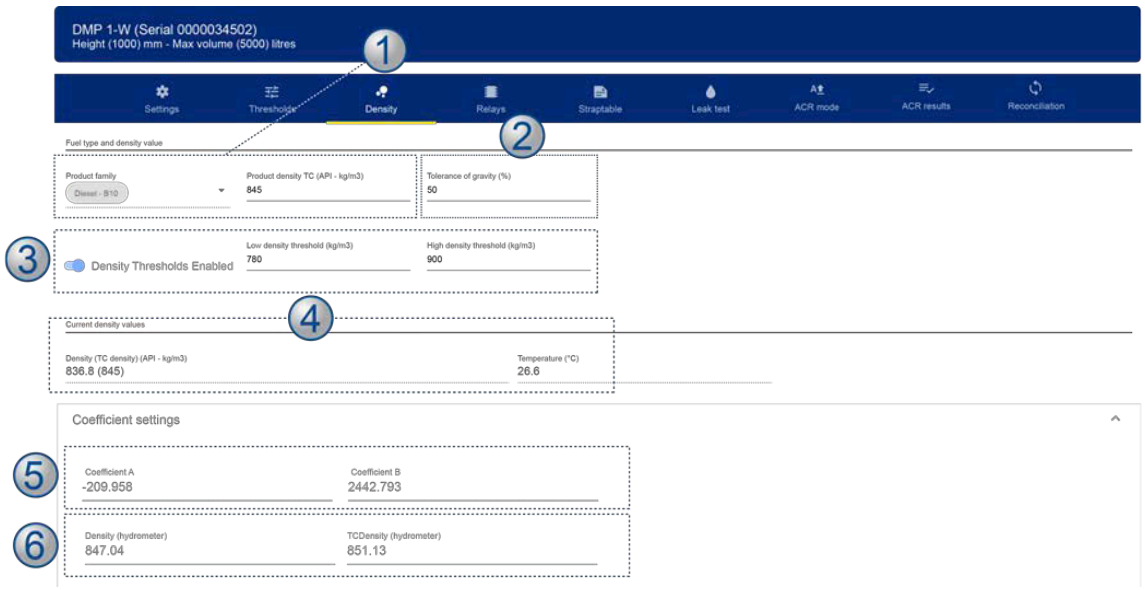
6.3.3 Thresholds



1. Select **Thresholds** from the configurations parameters. Use one of two methods to adjust each of the parameter values:
   a. Move the slider until you get the correct values.
      i. The slider for **Safe working capacity** adjusts by **%**. The Level and Volume values will adjust automatically.
      ii. The slider for all other parameters adjusts by **Level**. The Volume and % values will adjust automatically.
   b. Click the **Edit** icon (✎) for one of the values. Enter the correct value in the pop-up. Click **OK** to save the value. The other values for that parameter will adjust automatically.
2. Click **Save** when you complete the *Thresholds* configuration.

NOTE: *From the top Threshold down, each of the Threshold value sets (Level, Volume and %) must be lower than the one above it. For example, the Low Threshold must have lower values than the High Threshold. If the values are not set correctly, the SAVE button will not be on.*

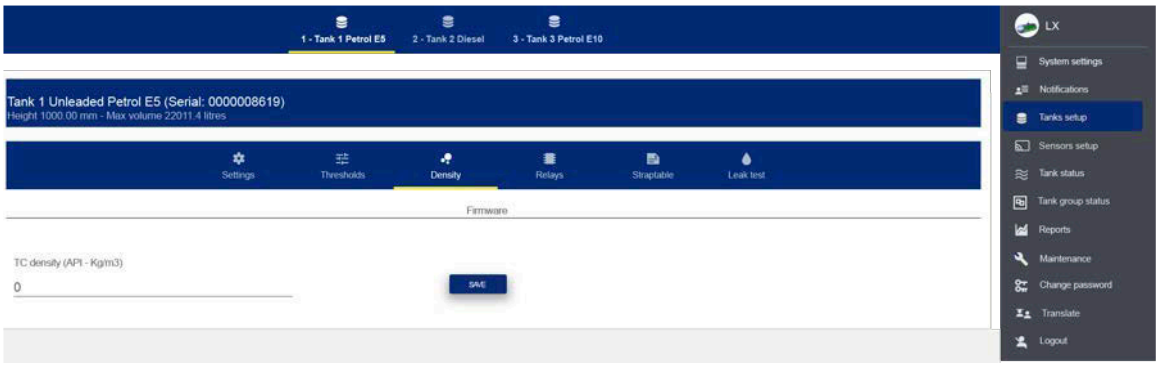
6.3.4 Density



Configure a probe with an installed density float in this screen. The parameters that show in the illustration above are only available when the **DMP Density** Probe type is selected in *Tank Setup Menu* (p. 41) > *Settings* (p. 41).

1. Select **Density** from the configurations parameters. The **Product family** and the **Product density TC** are shown.
2. Enter the **Tolerance**. Accepted values are between 1-100. This is used to set the accepted tolerance of measured density. Whenever the measurement is outside of this tolerance, the system will use the default Product density TC value for all calculations. The default value is 20%.
3. **Density Thresholds Enabled**: When this slider button is in the active position, thresholds for density alarms are enabled.
4. **Current Density Values**: The density values as read by the sensor.
   - **Density**: This is the density value at ambient temperature
   - **TC density**: This is the density value compensated at reference temperature.
   - **Temperature**: This is the current temperature of the product
5. The **Coefficients settings** are values that are given with the density sensor.
   a. Enter the Coefficient A (negative) and Coefficient B (positive) values in the fields.
   b. Click **Save** after you enter the values.

6. **Density (hydrometer) / TC Density (hydrometer)**: If the density of the product can be measured with a 3rd party instrument such as a hydrometer, then the density value as measured by the instrument can be used to calibrate the density sensor. Use either of the two values to calibrate the density sensor (the system will automatically change the B value to adapt to the manually entered hydrometer density.



For all other probes types, enter the product density at the reference temperature. Values are permitted in API format or in Kg/m3 format.

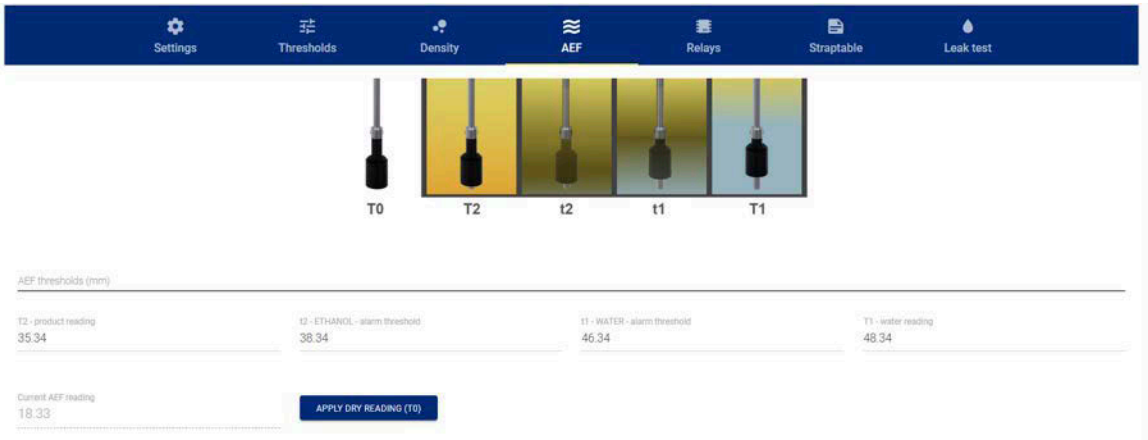
6.3.5 AEF (Aqueous Ethanol Float) Thresholds

When an AEF is selected in the Water detection type, the AEF thresholds screen will show as a separate tab.

NOTE: *The water height will not be shown if the Delivery status is "In progress". During a delivery, the AEF reading is discarded and alarms will not occur to avoid incorrect measurements.*

For Progauge Probes with AEF

The AEF in a Progauge probe measures very precise water levels at the bottom of the tank. The setup screen is shown in the image below:

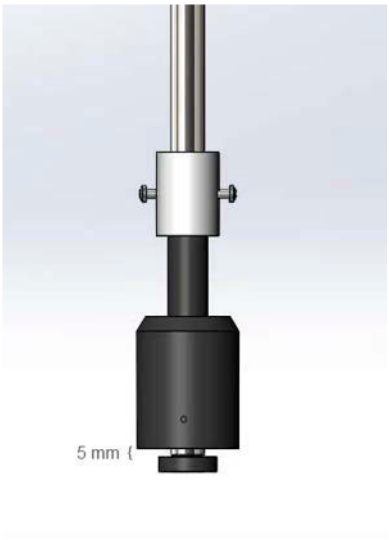


Four (4) thresholds will show that will must be calculated. The current AEF reading value is used by the console to automatically make these calculations.

- T2: AEF position in normal product
- t2: AEF position when lift begins in ethanol (phase separation has started)
- t1: AEF position when lift begins in water (water starts to collect)
- T1: AEF position in water (water has collected)

Do the steps that follow to let the console calculate the thresholds:

1. Install the AEF on the probe and put the probe in a vertical position. Attach the AEF so that the moving element hangs down at approximately 5 mm above the black retaining ring at the bottom of the probe (see the illustration below).



2. With the AEF in this position, push the **Apply Dry Reading (T0)** button. This will automatically calculate all thresholds.

The alarms will be set as follows:

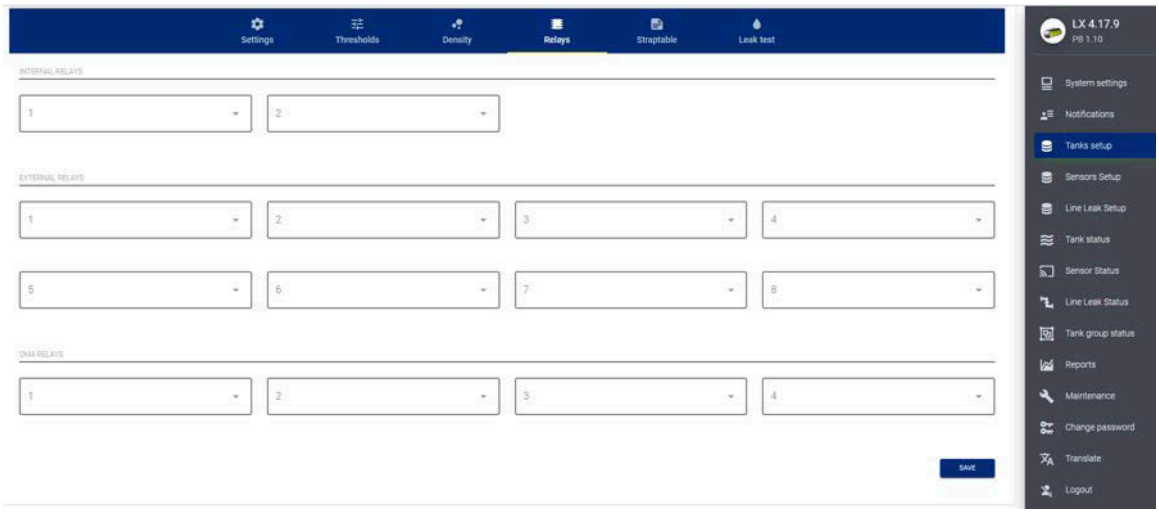
- When the water level measured by the AEF is between the t2 and t1 threshold, an ETHANOL alarm is caused.
- When the water level measured by the AEF is greater than the t1 threshold, then a WATER alarm is caused.

For OPW 924B Probes with AEF

The OPW-FMS AEF on a 924B probe measures the density at the bottom of the tank. The setup screen is shown in the image below:

1. The coefficients A, B must be configured. These coefficients are engraved on the float body and can also be found on a label that is included the packaging of the AEF. Enter the **A & B Coefficients** into the fields.
2. Two alarm thresholds are used:
   - t2 Ethanol alarm threshold and t1 Water alarm threshold.
   - The system recommends default values for these thresholds however, the user can overwrite them.
3. Click **Save** when you complete the configuration.

6.3.6 Relays



The screenshot above shows the menu for an LX Plus/Ultimate that has eight (8) external relays and four (4) OM4 relays configured at the System Settings/Site Info menu.

NOTE: *The same menu in a LX4 console would show only the four (4) Internal Relays as it does not support the external OM4.*

The relays of the console can be configured in this screen.

NOTE: *The External Relays and OM4 relays (LX Plus and LX Ultimate models only) that show must first be set up in* *Site Info (p. 24).*

The available alarms/actions that can be linked to a relay:

- Disabled
- No Link
- Probe Error
- High/High Water
- Low
- Low/Low
- Leak
- High/High
- Ethanol
- No Leak Test
- Water
- High
- Sudden Loss

Click **Save** when you complete the *Relays* configuration.

6.3.7 Leak Test

The console can run a leak test in two primary modes:

- Static test: In this mode, the tank must be stopped during the full test. No dispensing and no pump sales can be done during the test. The type of probe installed will make the decision if the static test will run at a leak rate of 0.1 gph, 0.2 gph or higher.

  There are three (3) procedures for static leak tests:

  – Automatic test: In this mode, the user can program the test frequency and the console will automatically try to run a test at the specified frequency.
  – Scheduled test: The user can program the test to start at a specified date and time.
  – On demand: The user can select to start the test immediately.

  On a web browser, the user can configure the automatic and scheduled leak test. The On-demand test can be started through the web browser Tank Status menu or through the Graphical User Interface.

  The console will start the test if the applicable parameters are correct (i.e a stable level in the tank and 8 hrs after the last fuel delivery). Activity in the tank such as a pump sale or a fuel delivery will automatically stop the test.

  The algorithm compares the temperature compensated volume between the start and end of the test period. External causes can affect the test results (such as ground vibration, extreme winds that cause excessive evaporation, probe failure or a sticky float, incorrect tank charts).

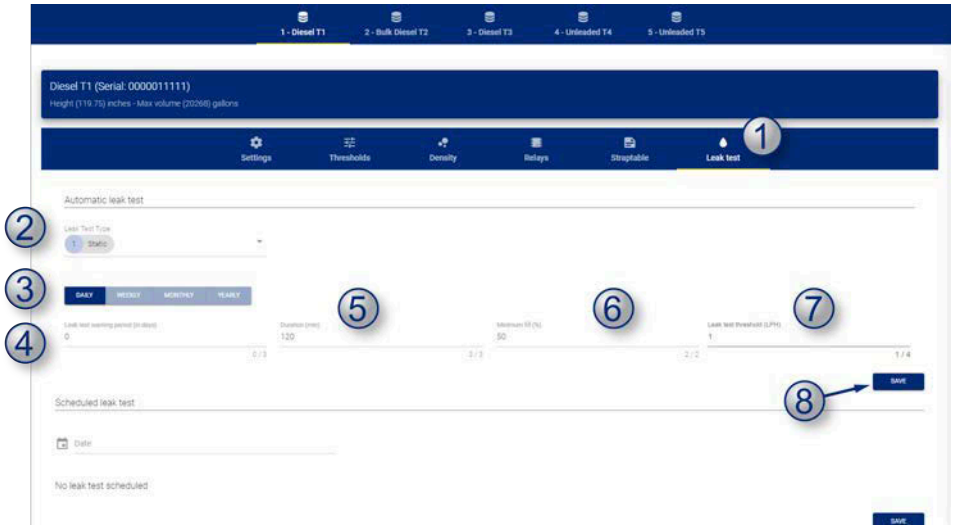
  NOTE: *OPW 924B probes and ProGauge DMP LD probes (with 5 temperature sensors) can run 0.1 gph and 0.2 gph static leak tests. ProGauge DMP probes with 1 temperature sensor can run 1 gph tests as a minimum leak rate. 2” floats are required for leak testing.*

- Continuous Statistical Leak Detection (CSLD) test: In this mode, the system monitors the tank during multiple short, quiet periods. It is necessary for this test to have given periods of quiet time where there are no deliveries to the tank and no withdrawals from the tank (for example, pump activity). All quiet periods are collected together and run through an advanced statistical analysis to calculate the leakage status for the tank. The results are recorded after a sufficient number of days. The CSLD test is a monthly test. The CSLD test can run at a leak rate of 0.2 gph.

  NOTE: *OPW 924B probes and ProGauge DMP LD probes (with 5 temperature sensors) can run 0.2 gph CSLD tests. 2” floats are required for leak testing.*

  NOTE: *Continuous Statistical Leak Detection (CSLD) is only available on the LX Plus and LX Ultimate consoles.*

Static Leak Test Setup



On the Tanks Setup tab, click on the applicable tank. Configure the parameters as shown:

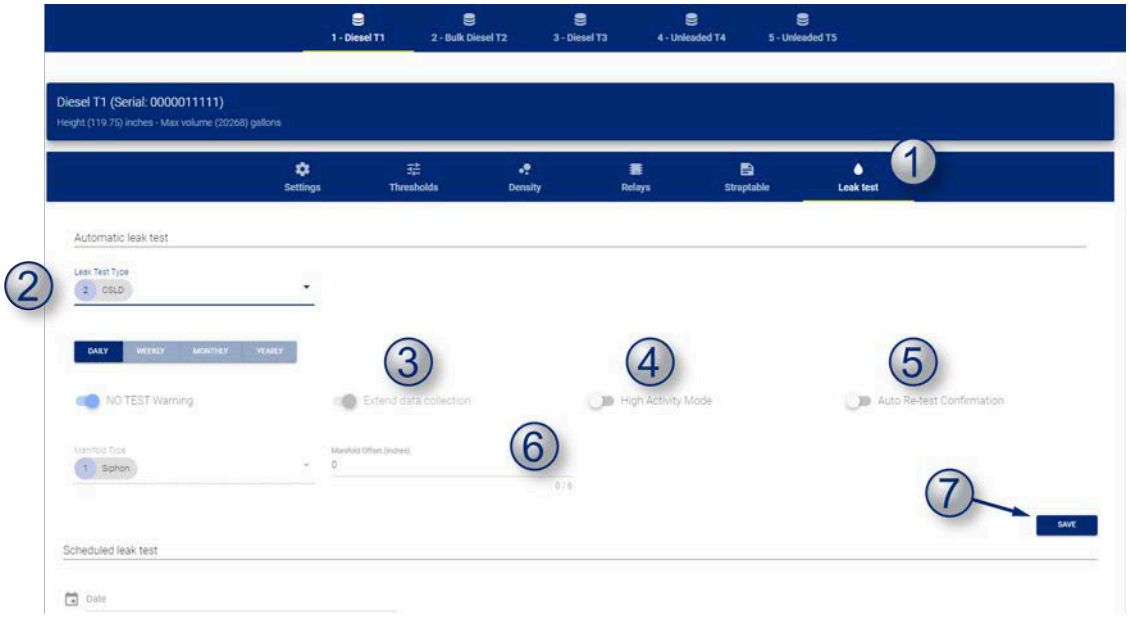
1. Select the **Leak Test** tab.
2. In the *Leak Test Type* drop-down, select **Static**.
3. Select the **frequency** of the test (Daily, Weekly, Monthly, Yearly).
4. **Leak test warning period in days**: This warning is in use when the user has selected the weekly, monthly or yearly frequency for an automatic test. If the console has not completed a leak test within x number of days in the frequency period, this warning will show to warn the user.

   EXAMPLE: *If Weekly auto test frequency is selected and the Warning period = 6 days. If after 6 days from the start of the week the console has not completed a leak test, a warning will show to notify the user.*
5. **Duration (mins)**: This is how long the test will run. The minimum is 30 mins. It is recommended to set this parameter to 120 mins.
6. **Minimum fill (%)**: This is the minimum fill in the tank for a leak test to start. If the fill in the tank is less than this threshold, the leak test will not start. It is recommended to set this parameter to 50%.
7. **Leak test threshold (liters per hour, shown only when DMP-IS or XMT-SI probes with 1 temperature sensor is connected)**: For probes that are not certified for EPA leak detection, this is the minimum leak rate that can be detected. Depends on tank capacity. The system will show the minimum detectable leak rate, and it is recommended to use that value.

   NOTE: *For EPA certified leak detection probe (924B probes and DMP LD probes), the minimum leak rate is already predetermined as 0.76 lt/hr (0.2 gph).*
8. Push **Save** to save this configuration.

For a Scheduled Test, select a date from the date picker, then configure the parameters as above.

CSLD (Continuous Statistical Leak Test) Setup (LX Plus and LX Ultimate Only)



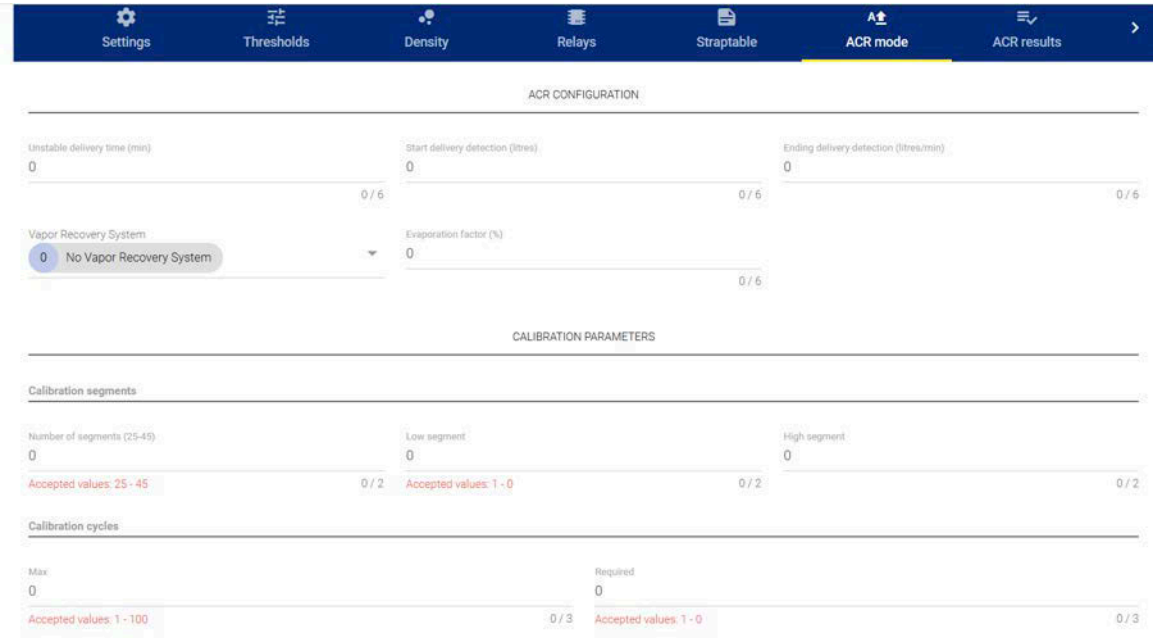
1. Select the **Leak Test** tab.
2. In the *Leak Test Type* drop-down, select **CSLD**.
3. **Extend data collection**: During data collection for tests, this option increases the data collection time so the reliability of the results is higher. This setting is automatically set to ON for manifolded tanks and for tanks with capacity more than 49205 liters (13000 US gallons).
4. **High Activity mode**: For sites with high throughput, enable this option to decrease the quiet time for data collection.
5. **Auto Re-test Confirmation**: If this option is enabled and the SLD test fails the first time, the system will not show a FAIL result. The system will run the test a second time.
6. **Manifold offset**: Enable this option to cause an alarm for loss of siphon. The Manifold offset is the difference of the product levels in manifolded tanks. The manifold offset is added to the calculation of product levels to equalize the levels. Different product levels can be seen if the tanks are not leveled out within the ground.
7. Push **Save** to save this configuration.

On-demand Test

From the tank status tab, click on the **Leakage test** drop-down menu. Use the Start/Stop buttons to start or to stop a test.

6.3.8 ACR mode

The menu in the image below will show when the tank is in ACR Mode.



ACR Configuration Parameters

- **Unstable delivery timer**: Enter the time necessary to let the product settle at the end of delivery.

  Turbulence can occur during and after a delivery. This can cause incorrect indications. Enter a time from 0 (disable) to 59 minutes. After this time a probe can be monitored as usual.

  The recommended value is five (5) minutes.
- **Start delivery detection**: This shows the minimum quantity of product increase necessary to start delivery detection. The recommended value is 100 liters.
- **End delivery detection**: This is the quantity (in gallons/liters) for each minute to show the end of delivery. The recommended value is 20 liters (5.25 gallons).
- **Vapor Recovery system**:
- **Evaporation factor (%)**: This is used only when ACR tank mode is selected to calculate evaporation loss as a percentage of unit volume. For diesel products enter “0,” for unleaded products enter “0.17.”

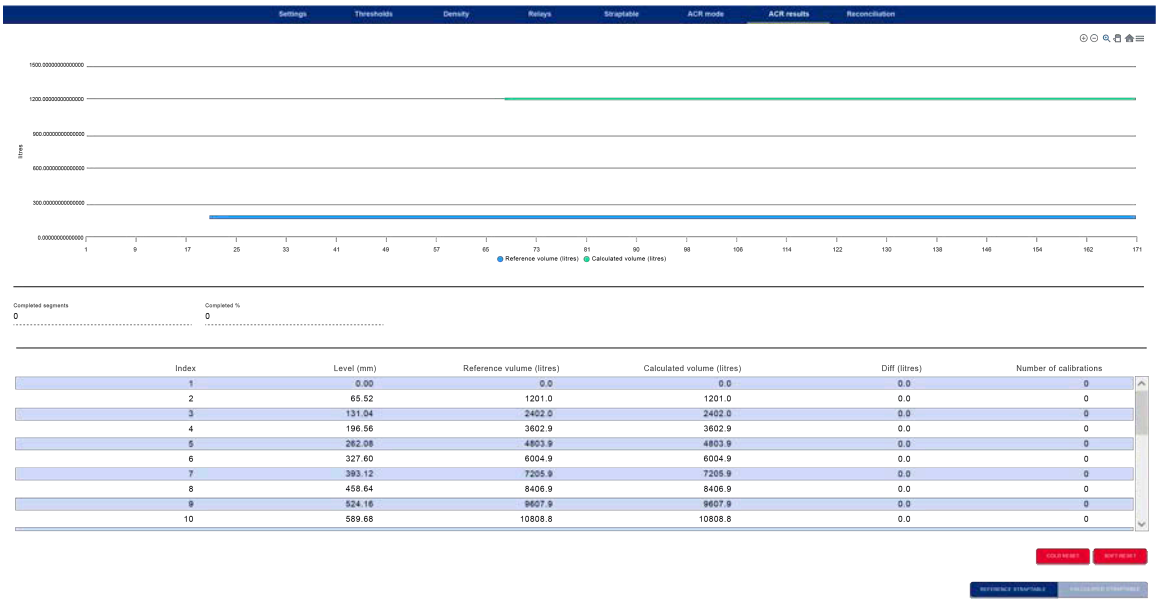
Calibration Parameters

- **Number of segments**: The tank is divided into a specified number of segments for Autocalibration. The permitted range is 25-45 segments. The higher number of segments selected, the more precision in the Autocalibration. This would also increase the time to complete Autocalibration.
- **Low segment**: This shows the lowest segment of the calibration range.
- **High segment**: This shows the top segment of the calibration range.

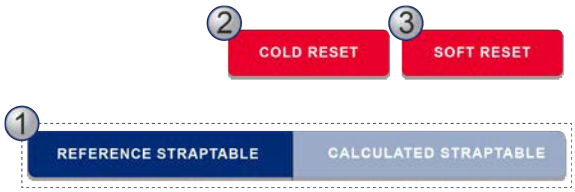
- **Calibration cycles max**: This is the maximum calibration cycles value parameter. This sets the number of auto calibration cycles in which the segments will not be changed if the auto calibration process is not complete. the minimum value is 5 and the maximum is 10.
- **Calibration cycles required**: This value specifies the Autocalibration status percentage (%).

  When each segment of the specified auto calibration volume range is at this value, Auto-calibration is complete. Because there can be segments in an Autocalibration cycle that are not changed, some segments can be changed more than the required value.

6.3.9 ACR Results

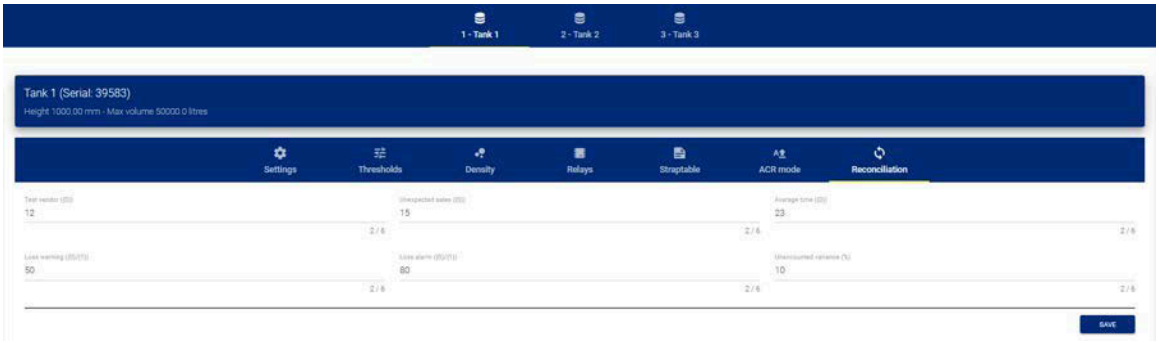


The graphic shows the reference chart (entered by the user) and the autocalibration chart.



1. The **Reference straptable** and **Calculated straptable** buttons control which of the two straptables to use for the current volume conversions. When autocalibration is complete, the user must select one of the two buttons to use the “Reference” table or to use the “Autocalibration” table.
2. The **Cold reset** button will delete all data (autocalibration table and number of calibrations) and the procedure will start again.
3. The **Soft reset** button will delete the number of calibrations but will keep the autocalibration table. This lets the user improve the autocalibration if the autocalibrated data is not sufficient.

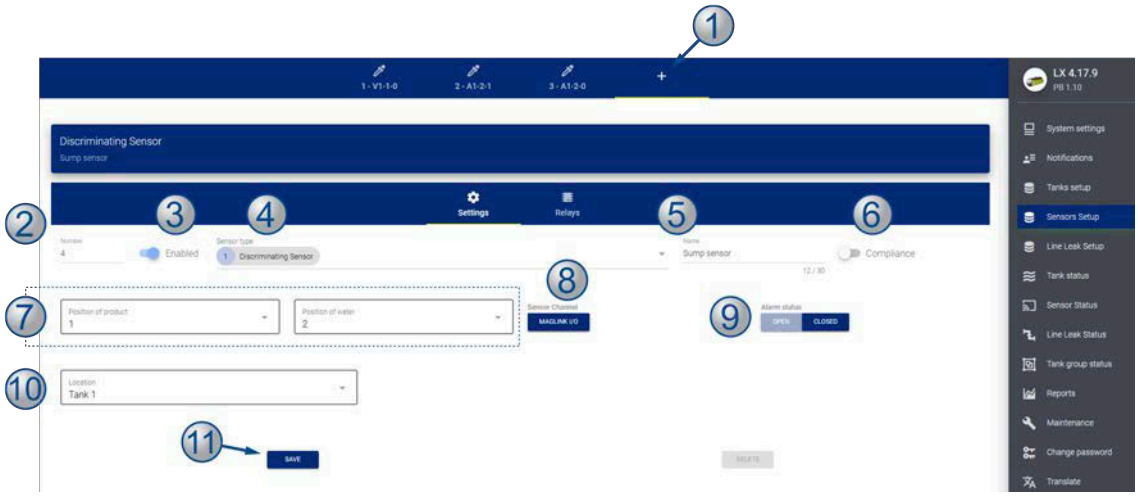
6.3.10 Reconciliation



- **Test vend**: This is the quantity of product used in the calibration of hose meters. In meter calibration, there is a product quantity removed from the tank without a related sale. if *Unaccounted variance* is greater than Test vend threshold, then it is reported as “Test vend” and it is not thought of as a “Loss”.
- **Unexpected sales (liters)**: An alarm will be caused when the tank is in a quiet mode (there are no sales) and product loss is sensed.
- **Average time**: This specifies the time for the loss warning or loss alarm.
- **Loss warning (liters)**: A difference more than this threshold will cause a Loss Warning
- **Loss alarm (liters)**: A difference more than this threshold will cause a Loss Alarm.
- **Unaccounted variance (%)**: If a difference in the daily reconciliation is more than this threshold, it will cause an alarm.

7 Sensor Setup

7.1 ProGauge Sensors



To add a ProGauge sensor:

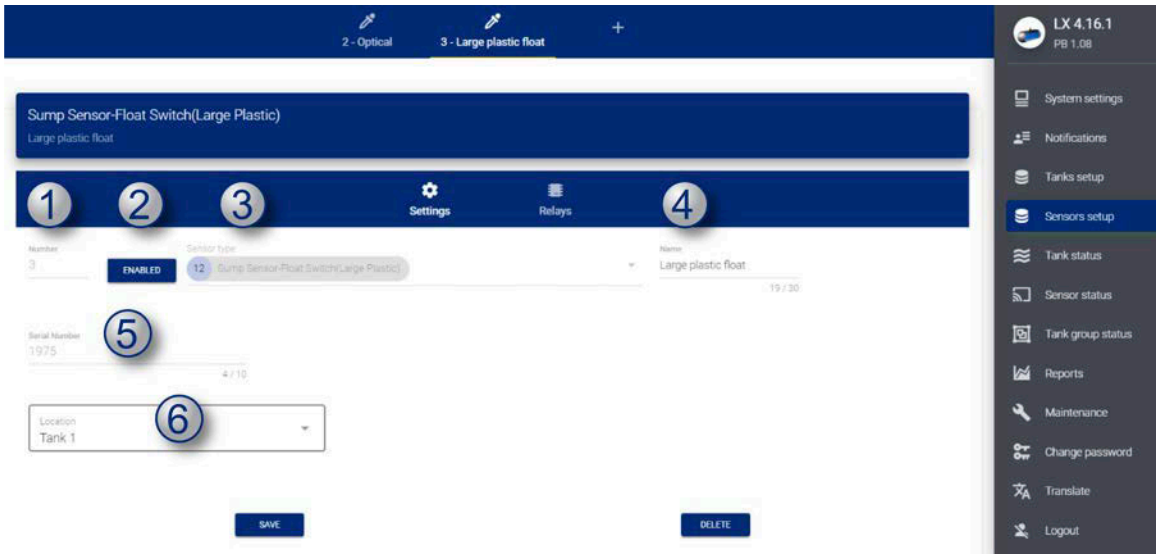
1. Tap the "**+**" sign to add a new sensor.
2. Enter a Sensor Id **number**(e.g. 1, 2, 3 etc.).
3. When the **Enabled** button is on (blue), the sensor is enabled in the system. To disable a sensor, tap this button again so it is "grayed-out." The sensor's configuration will stay but alarm conditions cannot be caused.
4. Select a**Sensor Type** from the drop-down:
   - **On/off**: ProGauge sensor with one float only.
   - **Discriminating**: ProGauge sensor with two floats. One float that can sense product and one float to sense water.
   - **2 Ch Wireless sensor**: ProGauge wireless RF sensor with two floats (product, water).
   - **1 Ch Wireless sensor**: ProGauge wireless RF sensor with one float (product).
   - Other selections refer to OPW-FMS Smart Sensors (for the LX Plus and LX Ultimate models only).
5. Enter a **Name** for the sensor (up to 30 characters).
6. **Compliance**: Put the button in the ON (blue) position if the sensor is to be part of the Compliance reporting. The sensor compliance feature is a way to see the report for specified sensors for 3 periods: Today, Last 24 Hours and Last 12 Months (or selected date).
7. **Position of Product / Position of Water**: This field is enabled only when a ProGauge discriminating sensor has been selected. The user must give a slot number on the CN10 connector or on the input card of the MagLink I/O.

8. **Sensor Channel**: This is applicable only when a ProGauge On/off or Discriminating sensor has been selected. Select where the sensor is to be connected. Internal refers to the internal CN10 connector (only EXd sensors can connect to the CN10). For Intrinsically Safe sensors, select the MagLink I/O.
9. **Alarm status**: Select the method that will cause an alarm:
   - **Open**: For normally open sensors, the alarm is caused when the sensor contact closes.
   - **Closed**: For normally closed sensors, the alarm is caused when the sensor contact opens.

NOTE: *The ProGauge on/off and discriminating operate as normally closed sensors.*

10. Select the **Location** (Tank number) of the sensor.
11. Click **Save** to save the Settings configuration.

7.2 OPW FMS Smart Sensors (LX Plus and Ultimate only)



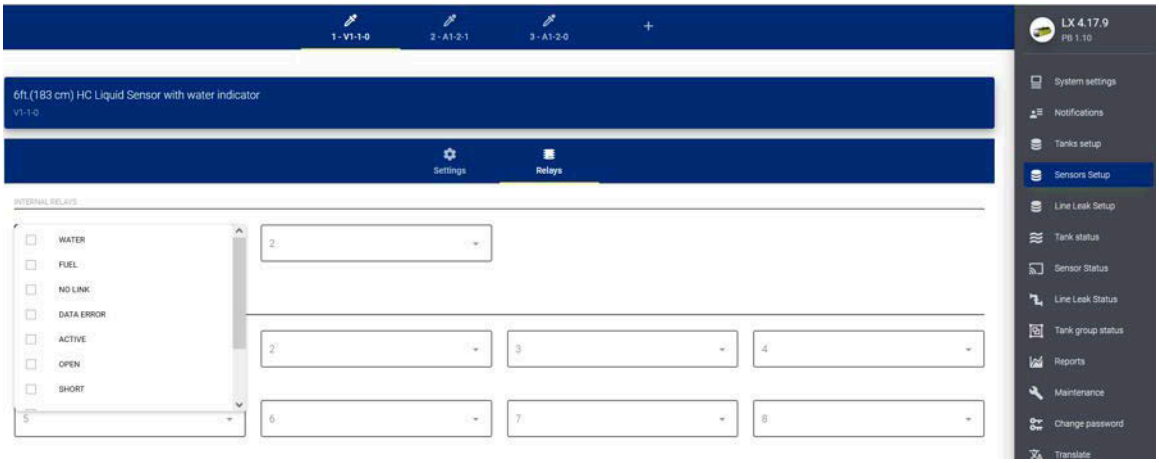
OPW-FMS Smart Sensors are automatically detected and will come into view next to the "+" sign in the header. The sensor type and serial number will show automatically on the relevant fields (fields 3,5).

To configure the sensor:

1. Make sure the applicable sensor is selected in the header. Enter a number for the sensor to identify the sensor in the configuration.
2. Push the **Enable** button. If the sensor is not enabled (and the button is "grayed-out") the system cannot read the sensor status (but the sensor configuration can continue to be saved).
3. The **Sensor Type** will automatically show when the sensor is detected.
4. Enter a **name** for the sensor
5. The **Serial Number** will automatically show when the sensor is detected.
6. Select a **Location** from the drop-down. This is used for information only.

Click **Save** to save the Settings configuration.

7.3 Relays



Use this screen to start a relay when a sensor is in an alarm condition.

Select between the internal relays or the external relays on the MagLink I/O or the OM4 relays (for LX Plus/Ultimate only). The external relays must first be configured in the *System Settings* > *Site Info* menu).

Select the sensor alarm that will start the relay:

The table below shows the warnings/alarms that will be caused by the different FMS smart sensors:

Sensor part number	Description	Warning/Alarm message generated on console
30-0232-DH-10 30-0232-DH-20	Discriminating Dispenser sump sensor Discriminating STP sump sensor	No link Open Short High (when sensor detects hydrocarbons) Liquid warning (when bottom float lifts in liquid) High liquid (when top float lifts in liquid)
30-0236-LW	Discriminating interstitial sensor (optical)	No link Water (when sensor detects water) High liquid (when sensor detects any liquid other than water)
30-0234-HW-06/15/20	Hydrocarbon liquid sensor with water indicator (6, 15, 24 ft lengths)	No link Open Short Water (when sensor detects water) High liquid (when sensor detects hydrocarbons)

Sensor part number	Description	Warning/Alarm message generated on console
30-0234-HW-01	Interstitial hydrocarbon liquid with water indicator	No link Open Short Water (when sensor detects water) High liquid (when sensor detects hydrocarbons)
30-0231-S	Interstitial sensor-float switch-(small plastic)	
30-0231-L	Sump sensor-float switch-(large plastic)	No link High
30-0230-S	Liquid only float sensor (brass)	
30-0232-D-10	Dual float non-discriminating dispenser sump sensor	No link Open Short Liquid warning (when bottom float lifts in liquid) High liquid (when top float lifts in liquid)
30-0232-D-20	Dual float non-discriminating STP sump sensor	
30-0232-D-10B	Dual float brine sensor for containment sump	No link Open Short Low liquid (when bottom float falls below normal position) High liquid (when top float lifts above normal position)
30-0232-D-20B	Dual float brine sensor for fiberglass tanks	
30-0235-V	Hydrocarbon vapor sensor	No link Open Short Vapor (when sensor detects hydrocarbon vapor)

The table below shows the warnings/alarms that will be caused by the different ProGauge sensors:

Sensor part number	Description	Warning/Alarm message generated on console
10-SL1-L110-C 10-SL1-L110-GJE	On/Off sensor	No link High
10-SL2-L200-GCD 10-SL2-L200-GJKE	Discriminating sensor	No link High (when top float lifts) Water (when bottom float lifts)
3-XRF600GAB-D1R0-DSC	Wireless (2 floats)	No link High (when top float lifts) Water (when bottom float lifts)
3-XRF600GAB-D1R0-DSC	Wireless (1 float)	No link High

8 Tank Status

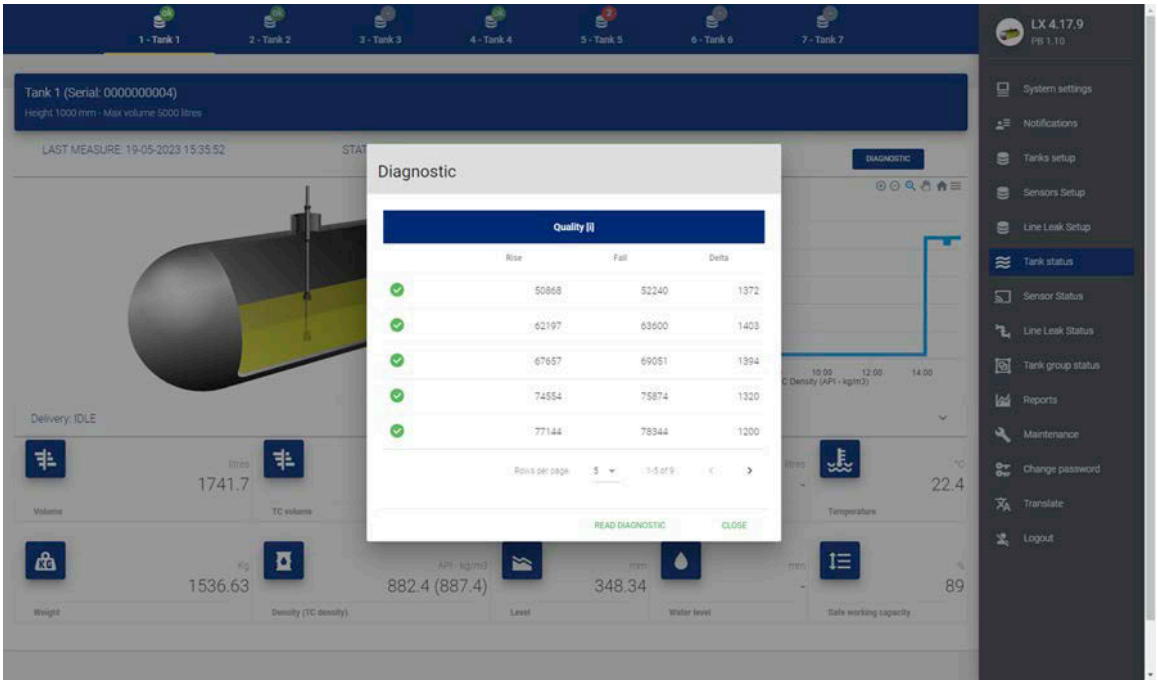
A colored icon next to each tank icon in the top bar shows the status of the tanks:

- Yellow: Alarms are active and they have been acknowledged.
- Red: Alarms are active but they have not been acknowledged.
- Green: There are no alarms for this tank.
- Grey: The tank is disabled.

The graph on the right side of the screen will scroll automatically to show the information that follows:

- Product / water height
- Product volume / Product volume TC
- Water volume
- Density / TC density
- Temperature

Select the Diagnostic button to open the Diagnostic panel to show information on the quality of the probe signal (to be assessed by the Progauge factory personnel).

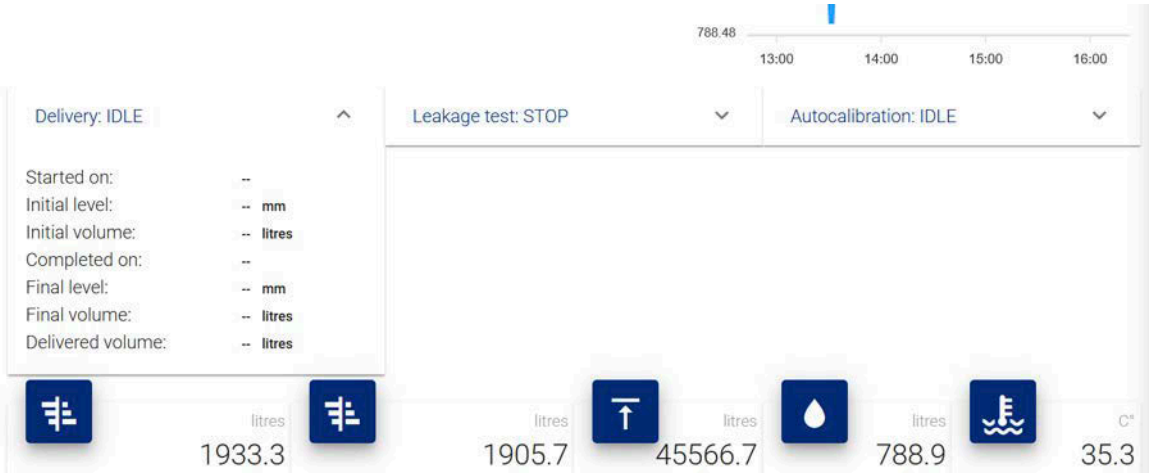


The green check-mark in the left column shows that the signal strength is sufficient.

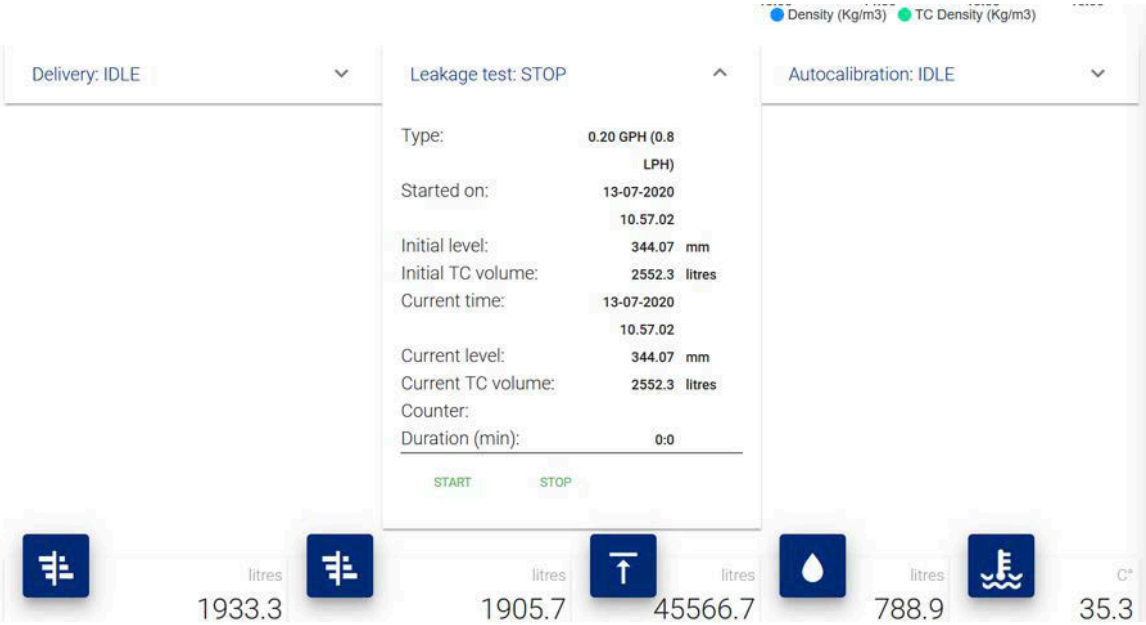
A yellow check-mark shows a medium signal while a red check-mark would show a low quality probe signal.

The bottom of the screen shows information on the Deliveries, Leak Tests and Autocalibration.

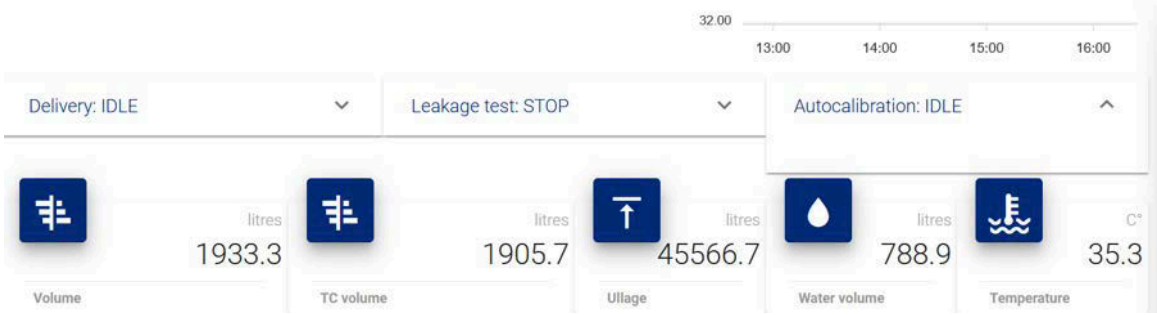
- **Delivery**: Click on the Delivery drop-down menu to show information on the last delivery recorded.



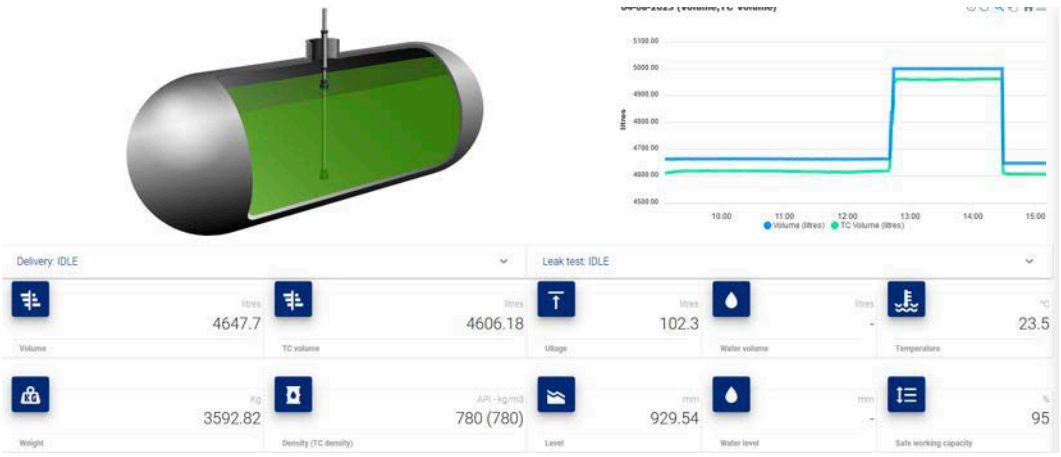
- **Leakage test**: Click on the Leakage drop-down menu to show information on the status of the leakage function. The user can manually start and stop a leak test from this menu.



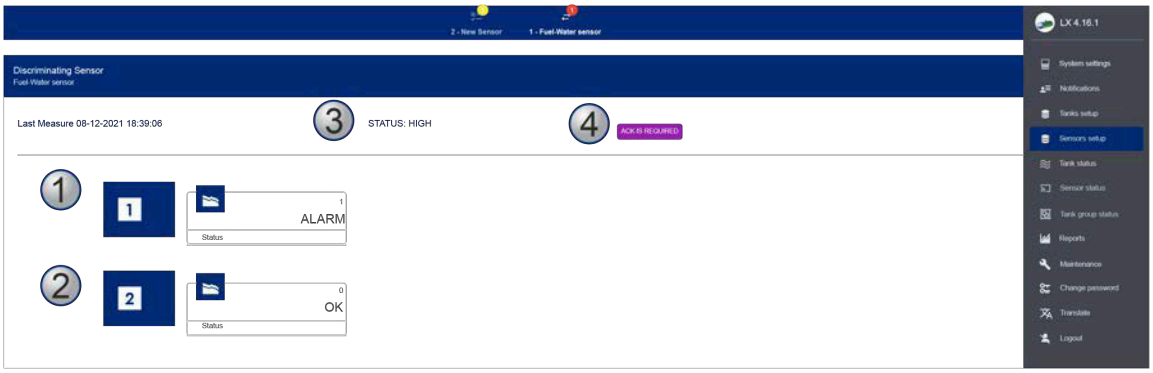
- **Autocalibration**: This is only available when the tank is in ACR mode.Click the **Autocalibration** drop-down menu to show information on the status of the autocalibration function.



Tank inventory is shown at the bottom of the page. TC volume refers to the temperature compensated volume. This is calculated through the API tables.



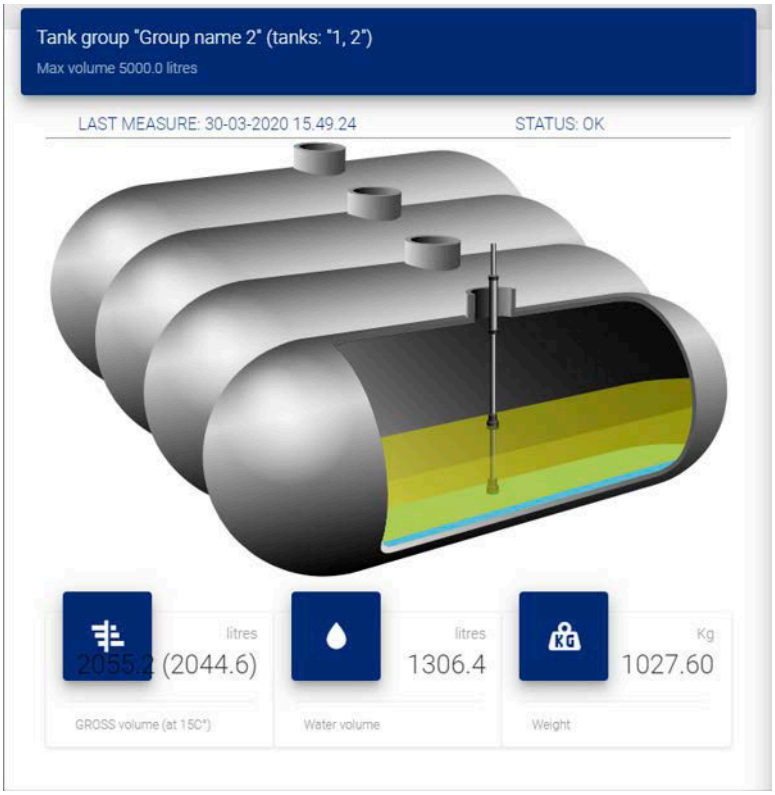
9 Sensor Status



The Sensor Status screen is shown in the image above. The icons in the example refer to a ProGauge Discriminating Sensor with two floats.

1. Icon 1 shows the status of the **Product** float.
2. Icon 2 shows the status of the **Water** float.
3. The full sensor status is shown at the top of the panel.
4. Push the ACK IS REQUIRED button to acknowledge the alarm. This will also stop the alarm buzzer.

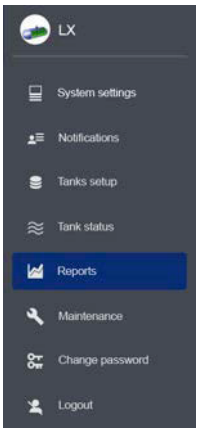
10 Tank Group Status



A summary of the tank group is shown on this screen:

- Gross volume (at 15°C)
- Water volume
- Mass (in Kg)

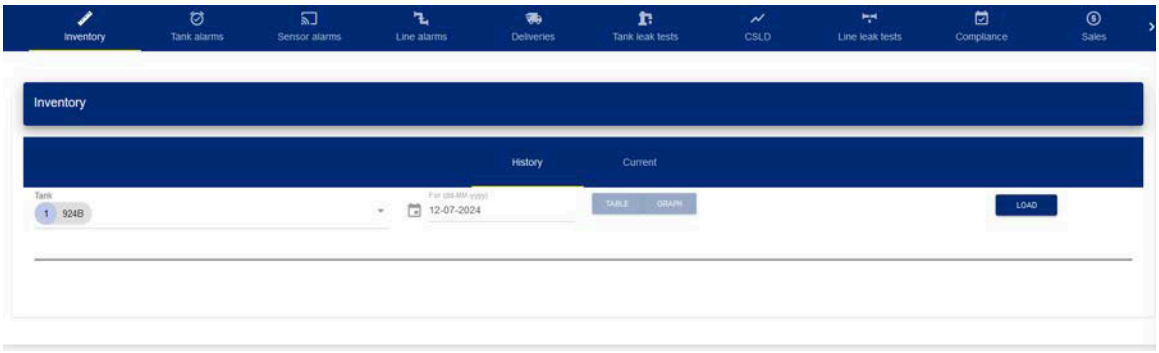
11 Reports Menu



Reports can be made for 12 types of information:

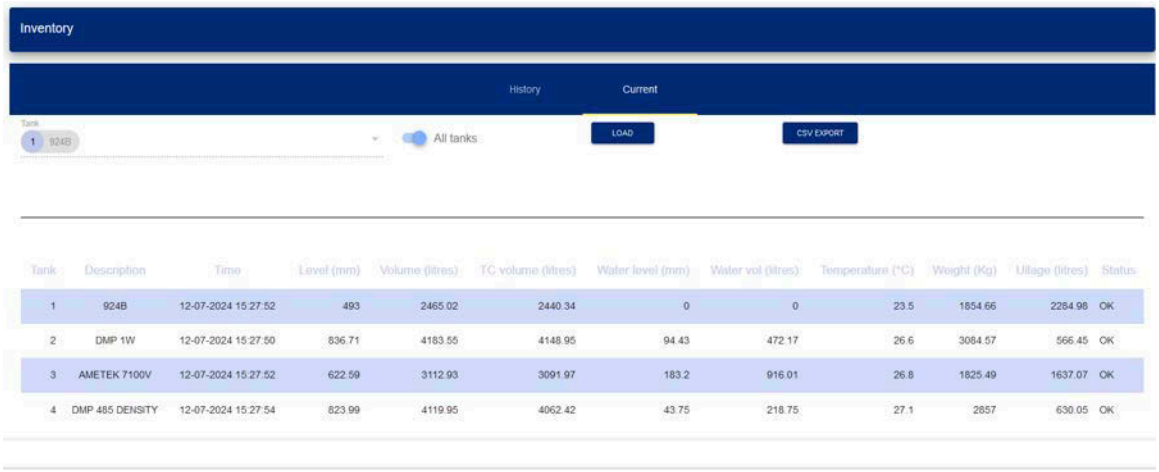
- Tank inventory History
- Tank Alarms
- Sensor Alarms
- Line Alarms (LX Plus and LX Ultimate models only)
- Product Deliveries
- Tank Leak Tests
- CSLD Leak Tests (LX Plus and LX Ultimate models only)
- Line Leak Tests (LX Plus and LX Ultimate models only)
- Compliance
- Pump Sales
- Shifts
- Reconciliation
- Configuration

11.1 History



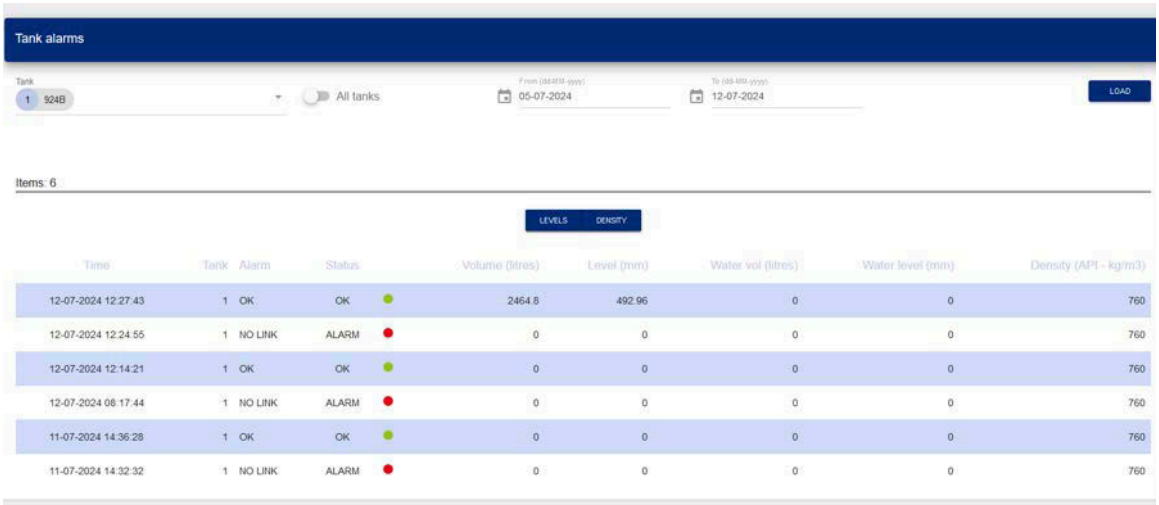
To set up a History Report:

- Select a **Tank Number** from the drop-down.
- Use the date-selector to select a **From Date** for your report.
- Select to see the data in a **Table** or **Graph**.
- The History Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.



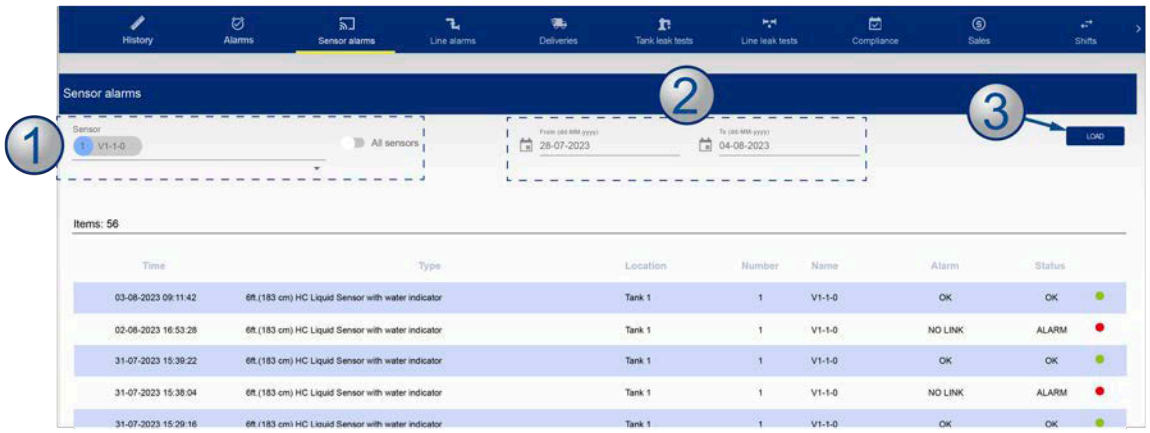
In the Current sub-menu, the current inventory of the tanks can be seen and can be exported into a csv file. Select the tank or activate the **All Tanks** slider button. Then, select **Load**.

11.2 Tank Alarms



1. Select a **Tank Number** from the drop-down. Alternatively, use the slider button to select **All tanks**.
2. Use the date selector to select a **From Date** and **To Date** for your report.
3. Click the **Load** button to show the data.
4. Click the **Density** button to see the density values in the table.

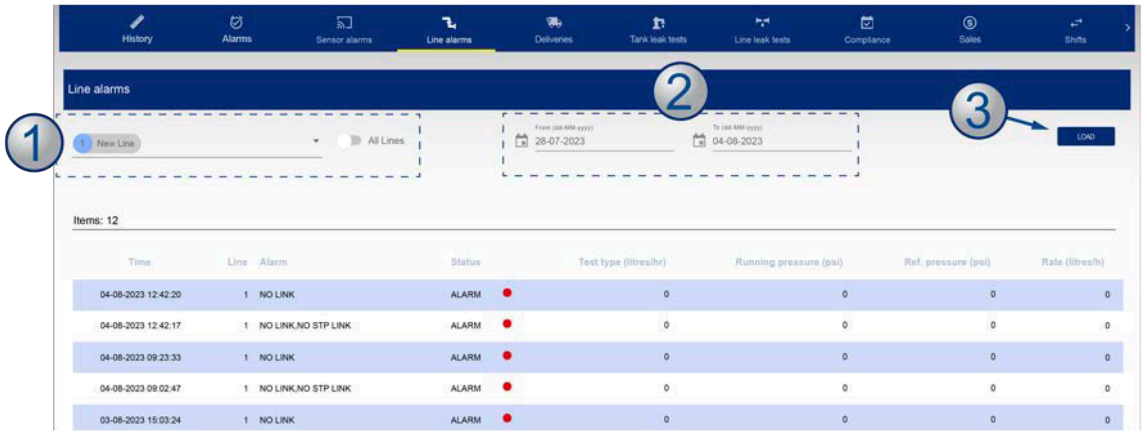
11.3 Sensor Alarms



1. Select a **Sensor** from the drop-down. Alternatively, use the slider button to select **All sensors**.
2. Use the date-selector to select a **From Date** and **To Date** for your report.
3. Click the **Load** button to show the data.

11.4 Line Alarms (LX Plus and Ultimate only)

This report shows all alarms related to line leak. It will also show the results of leak tests with the test type, the running pressure in psi, the reference pressure of the test in psi and the leak rate (in gph on lts/hr).

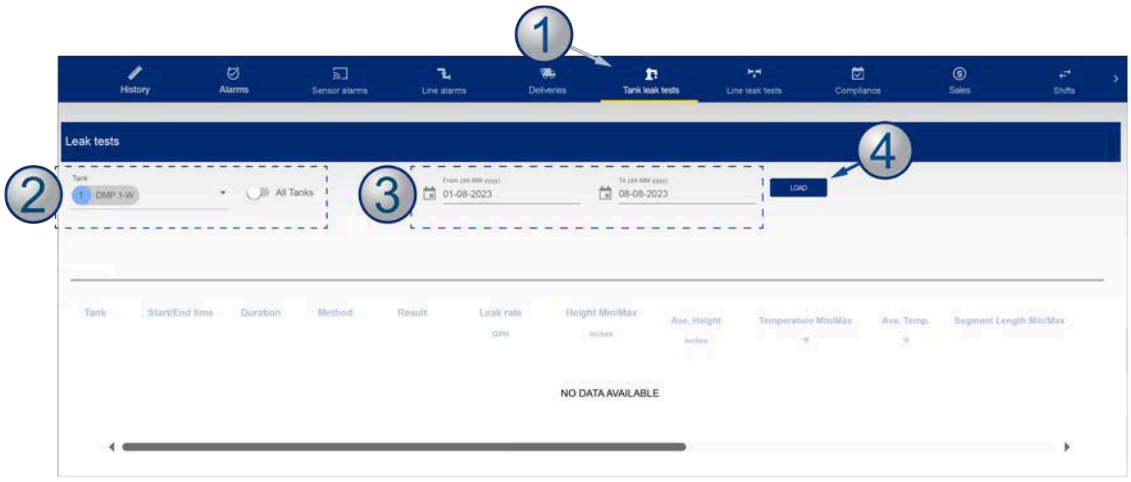


1. Select a **Line** from the drop-down. Alternatively, use the slider button to select **All Lines**.
2. Use the date-selector to select a **From Date** and **To Date** for your report.
3. Click the **Load** button to show the data.

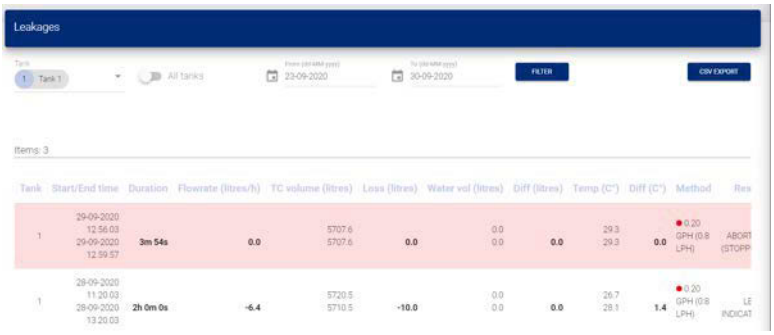
11.5 Delivery

1. Select a **Tank Number** from the drop-down.
2. Use the date-selector to select a **From Date** and **To Date** for your report.
3. Click the **Load** button to show the data.
4. The Delivery Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

11.6 Tank Leak Tests



1. Select **Tank Leak Tests** from the *Reports* menu.
2. Select a **Tank Number** from the drop-down.
3. Use the date-selector to select a **From Date** and **To Date** for your report.
4. Click the **Load** button to show the data.



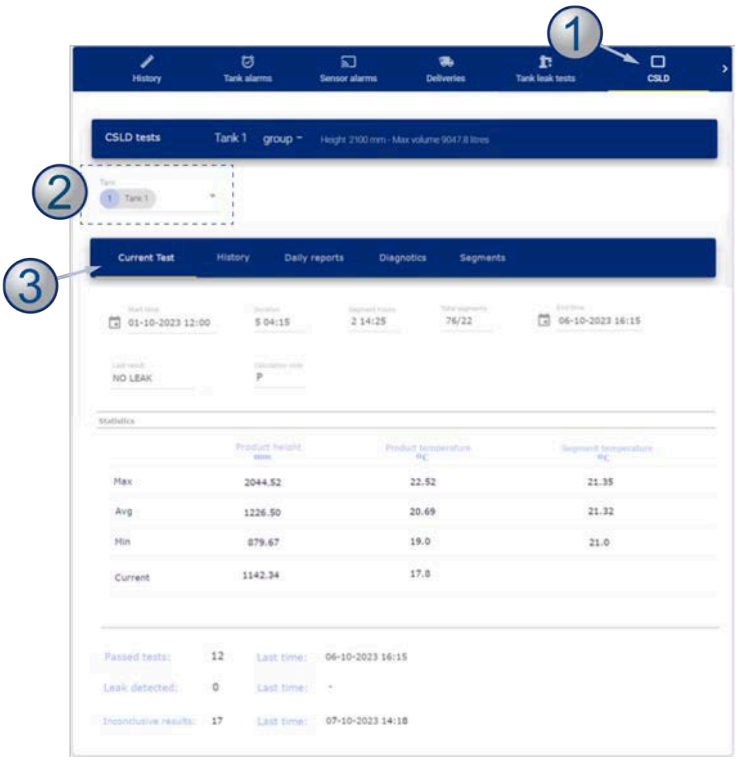
This report will show the results of leak tests that have been done in the tanks.

The report will show:

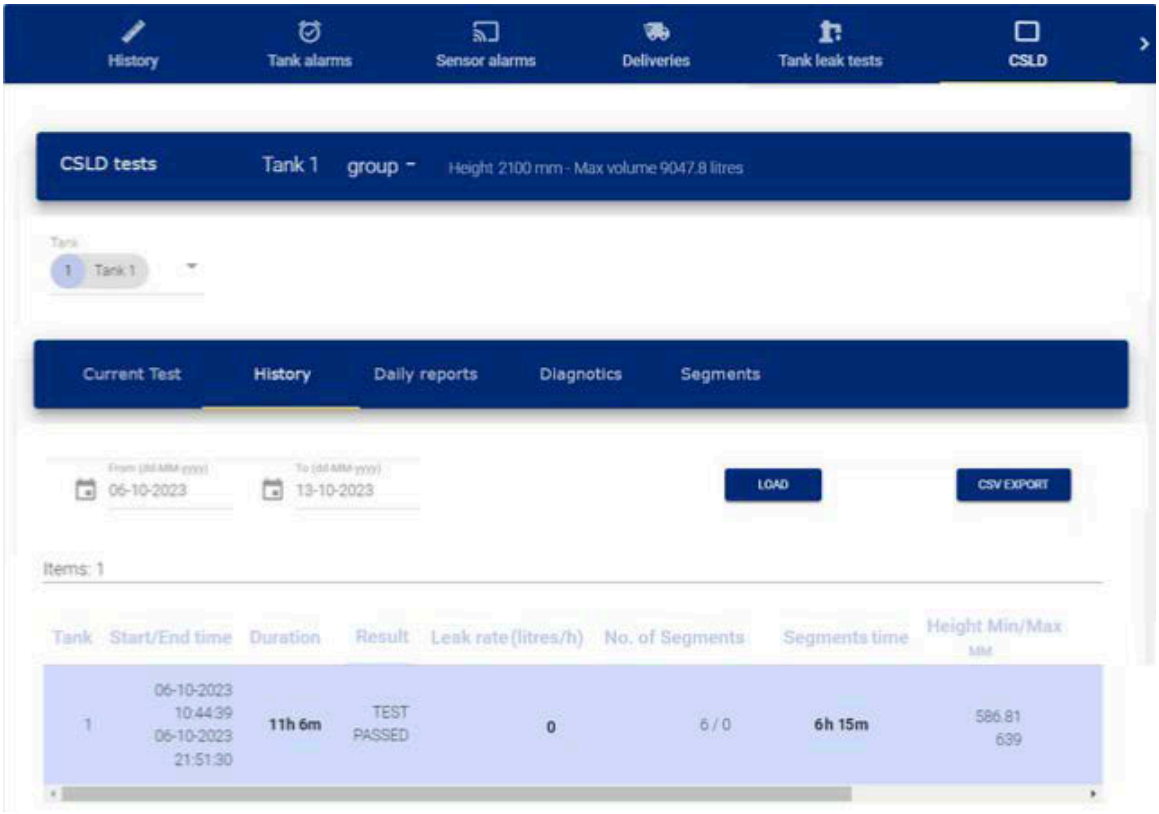
- The start and end time of the test
- The Leak threshold
- The volume difference between the start-end (at ambient temperature and temperature compensated)
- The result of the test and if the test was aborted.

11.7 CSLD Leak Tests (LX Plus and LX Ultimate Models Only)

This report will show the results of CSLD leak tests that have been done in the tanks.



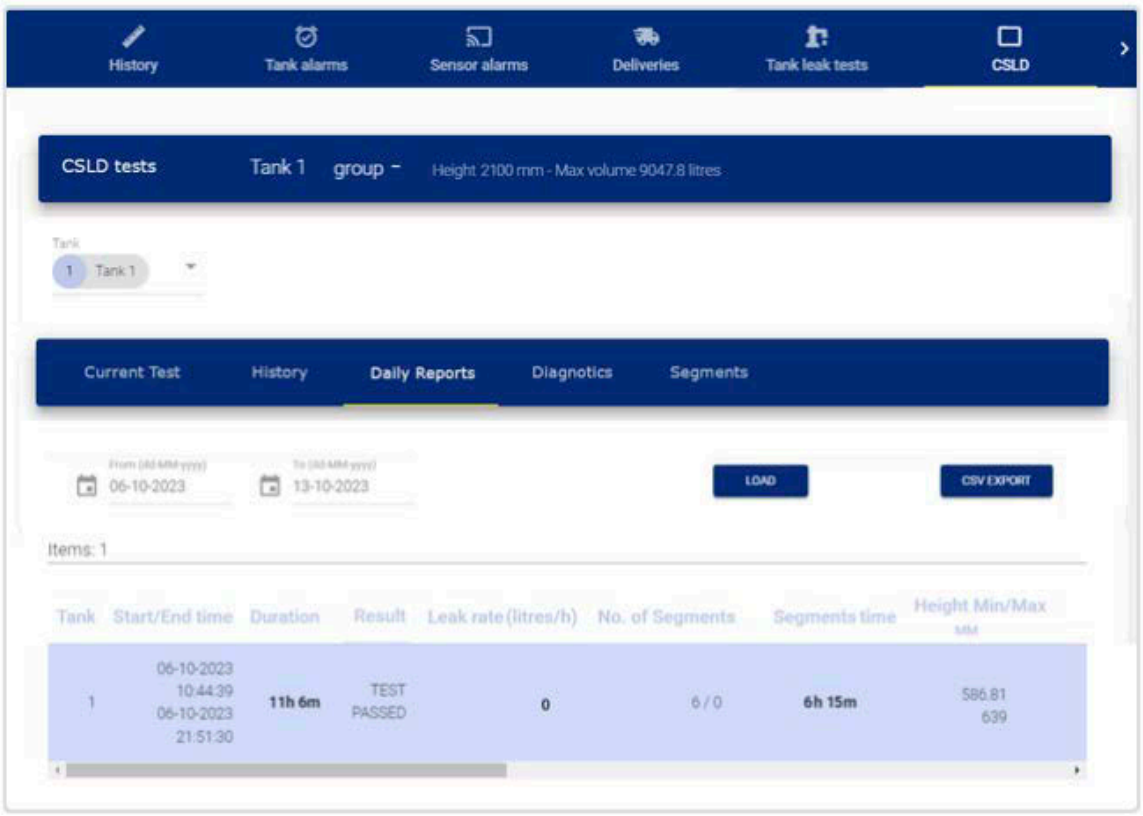
1. Select **CSLD** from the *Reports* menu.
2. Select a **Tank Number** from the drop-down.
3. Select Current Test from the sub-menu to see the results of the latest test.



Select the **History** tab in the sub-menu to see:

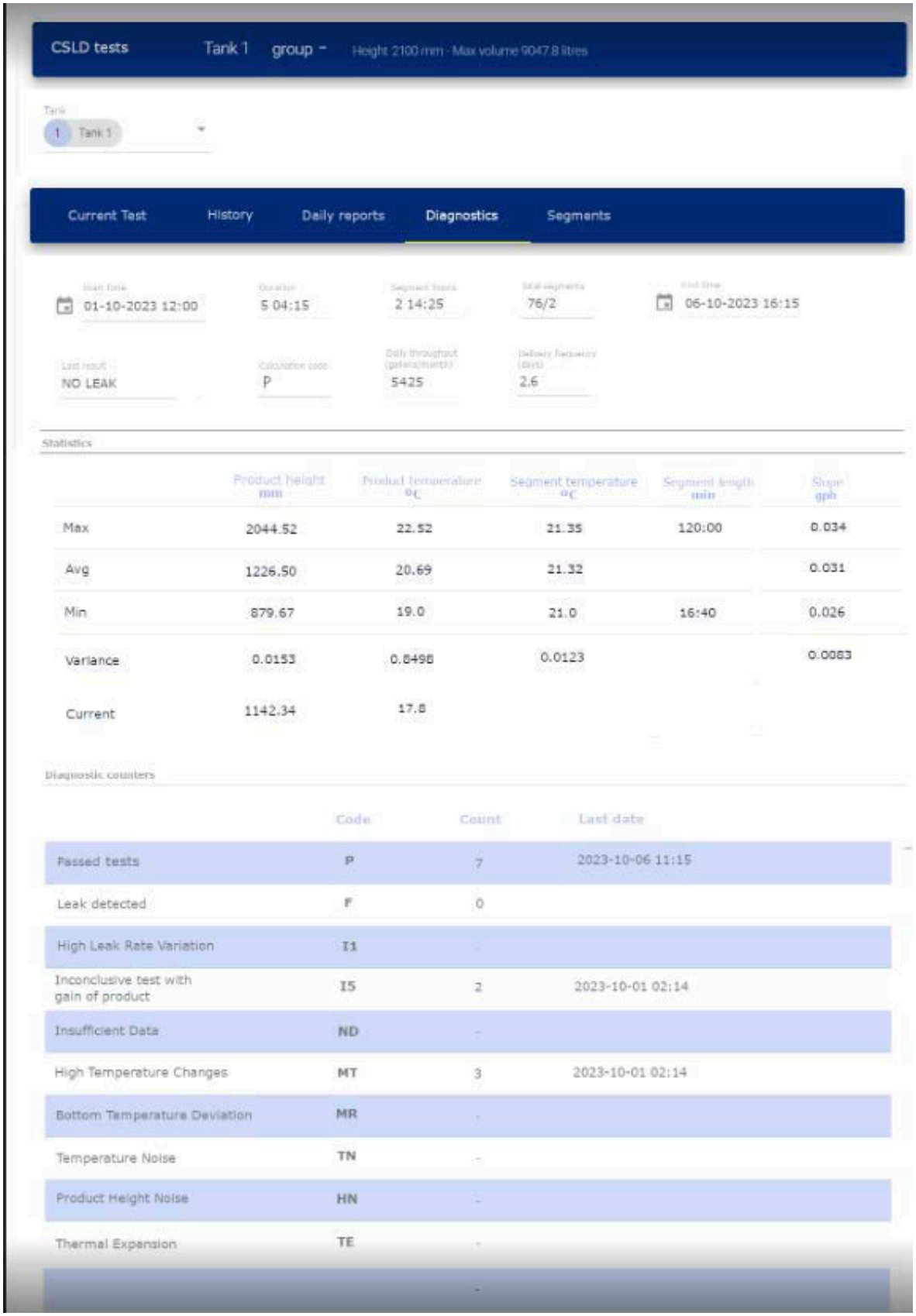
- The start and end times of the test
- The duration of the test
- The test method
- The test result (pass or fail)
- The calculated leak rate
- The min/max product level during the test
- The average product level
- The min/max product temperature recorded during the test and the average temperature

NOTE: *The Daily report, the Diagnostics and the Segments section are only available to the Technician account. See below.*



Select the **Daily Reports** tab (only available for Technician accounts) in the sub-menu to see:

- Test start time
- Test end time
- Test duration
- Test result
- Calculated leak rate
- Total segments (valid/invalid)
- Accumulated segment time
- Daily throughput
- Delivery frequency
- Segment length (min, max)
- Height of product (min, max, avg)
- Temperature of segments (min, max, avg, variance)
- Temperature of product (min, max, avg, variance)
- ht (min, max, avg, variance)
- mn (min, max, avg, variance)

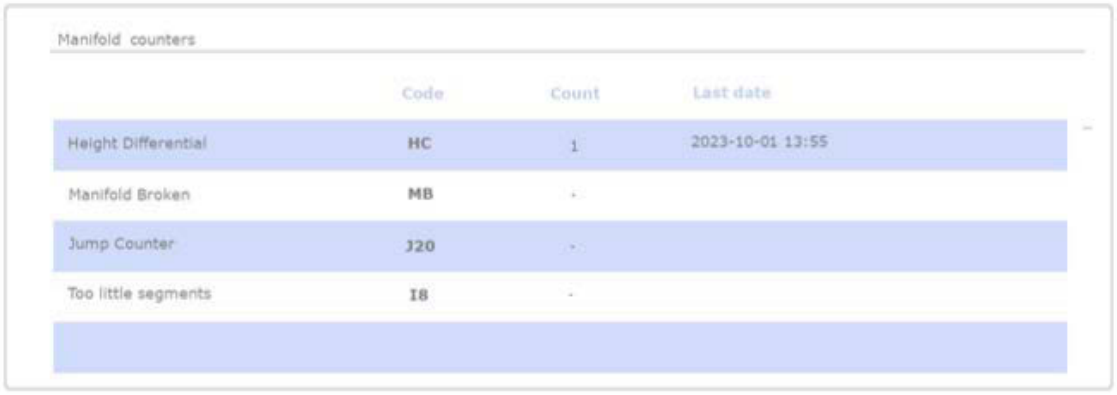

CSLD tests
Tank 1
group -
Height 2100 mm - Max volume 9047.8 litres
Tank
1 Tank 1
Current Test
History
Daily reports
Diagnostics
Segments
Start Date
01-10-2023 12:00
Duration
5 04:15
Segment hours
2 14:25
Total segments
76/2
End time
06-10-2023 16:15
Last result
NO LEAK
Calculation code
P
Daily throughput (gallons/month)
5425
Delivery frequency (days)
2.6
Statistics
Product height mm
Product temperature °C
Segment temperature °C
Segment length min
Slope gph
Max 2044.52 22.52 21.35 120:00 0.034
Avg 1226.50 20.69 21.32 0.031
Min 879.67 19.0 21.0 16:40 0.026
Variance 0.0153 0.8498 0.0123 0.0003
Current 1142.34 17.8
Diagnostic counters
Code
Count
Last date
Passed tests P 7 2023-10-06 11:15
Leak detected F 0
High Leak Rate Variation I1
Inconclusive test with gain of product I5 2 2023-10-01 02:14
Insufficient Data ND
High Temperature Changes MT 3 2023-10-01 02:14
Bottom Temperature Deviation MR
Temperature Noise TN
Product Height Noise HN
Thermal Expansion TE

Select the **Diagnostics** tab (only available for Technician accounts) in the sub-menu to see:

- Test start time,
- Test end time
- Test duration
- Last test result
- Last calculation code (inconclusive code)
- Total segments (valid/invalid)
- Accumulated segment time
- Daily throughput
- Delivery frequency
- Current product level
- Current product temperature
- Segment length (min, max)
- Product level (min, max, avg, variance)
- Temperature of segments (min, max, avg, variance)
- Temperature of product (min, max, avg, variance)
- Slope (min, max, avg, variance)

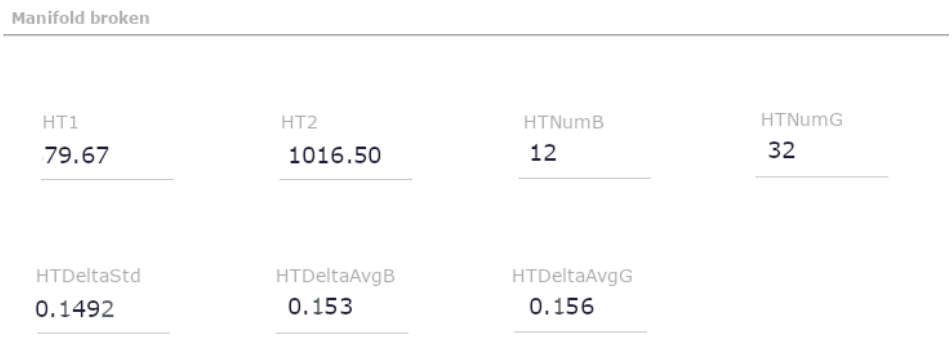
Test diagnostic counters contain a table with the information that follows:

	Calculation Code	Count	Last Date
Passed Tests	P		
Leak Detected	F		
High Leak Rate Variation	I1		
Product Gain During Test	I5		
Insufficient Data	ND		
High Temperature Changes	MT		
Bottom Temperature Deviation	MR		
Temperature Noise	TN		
Product Height Noise	HN		
Invalid Thermal Expansion	TE		



If the tank is manifolded an additional table of diagnostic data is shown:

	Calculation Code	Count	Last Date
Height Differential	HD		
Manifold Broken	MB		
Jump Counter	J20		
Not Enough Segments	I8		

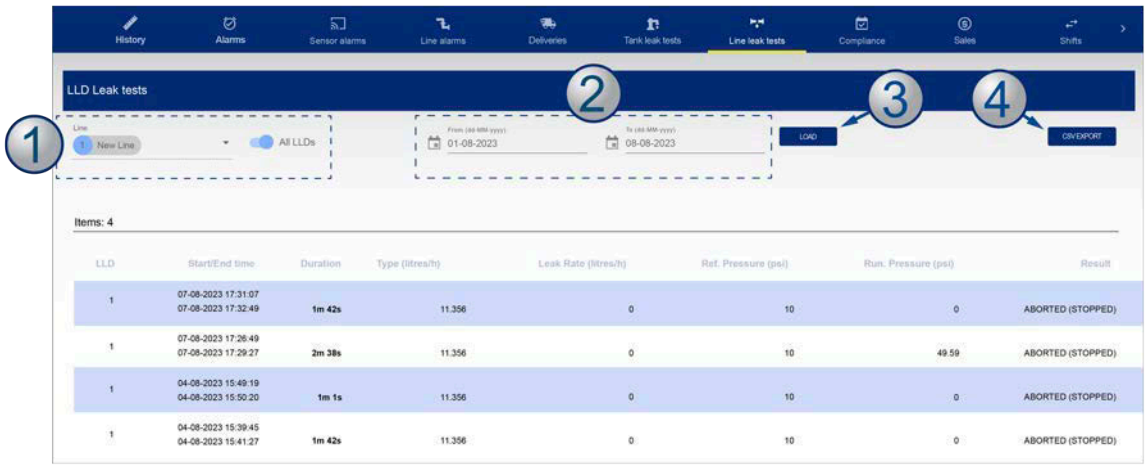


For manifolded tanks the additional Manifold Broken diagnostic is shown with the information that follows:

- HT1
- HT2
- HTDeltaStd
- HTDeltaAvgB
- HTDeltaAvgG
- HTNumB
- HTNumG

Select the **Segments** tab (only available for Technician accounts) in the sub-menu to see table and graph information related to the tank's segments.

11.8 Line Leak Tests (LX Plus and LX Ultimate models only)



1. Select an **LLD number** from the drop-down.
2. Use the date-selector to select a **From Date** and **To Date** for your report.
3. Click the **Load** button to show the data.
4. The LLD leak test report can be exported to a csv format that can be saved in a spread-sheet or text editor. Click the **CSV Export** button to continue.

This report will show the results of line leak tests that have been completed. The report will show:

- The start and end time of the test
- The Leak threshold (type)
- The leak rate calculated in liters/hr
- The reference pressure for the leak threshold
- The Running pressure (the running pressure is the pressure in the pipeline which is recorded once the STP has stopped to pressurize).
- The LLD leak test result.

11.9 Compliance

The Compliance report has three (3) sub-reports:

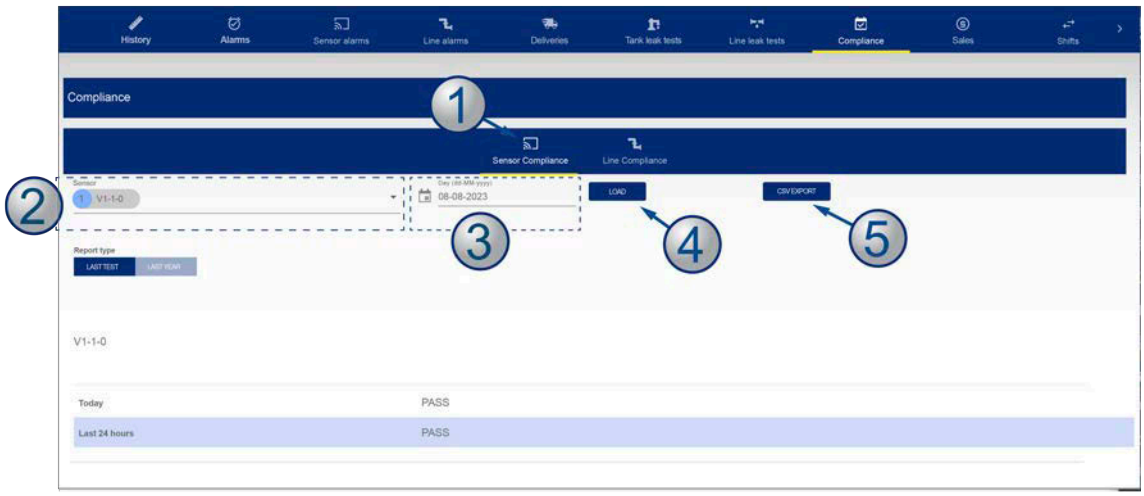
- A tank compliance report
- A sensor compliance report
- A LLD compliance report

Both reports show data related to the sensor statuses and the LLD leak tests.

11.9.1 Tank Compliance

1. Select **Tank Compliance** from the *Compliance* menu bar.
2. Select a **Tank Number** from the drop-down.
3. Use the date-selector to select a **Date**.
4. Select the applicable **timezone** radio button to which the data will be time-stamped.
5. Click the **Load** button to show the data.
6. The Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

11.9.2 Sensor Compliance Report



1. Select **Sensor Compliance** from the *Compliance* menu bar.
2. Select a **SensorNumber** from the drop-down.
3. Use the date-selector to select a **Date**.
4. Select the applicable **timezone** radio button to which the data will be time-stamped.
5. Click the **Load** button to show the data.
6. The Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

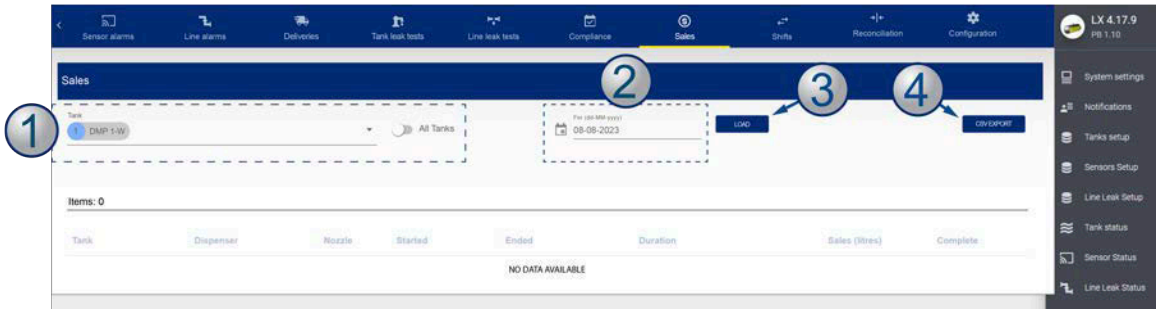
11.9.3 Line Compliance Report

This report shows a summary of LLD tests done for each line “today” and in the last 24 hours and identifies the last test passed.

1. Select **Line Compliance** from the *Compliance* menu bar.
2. Select a **Line Number** from the drop-down.
3. Use the date-selector to select a **Date**.
4. Select the applicable **timezone** radio button to which the data will be time-stamped.
5. Click the **Load** button to show the data.
6. The Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

11.10 Sales

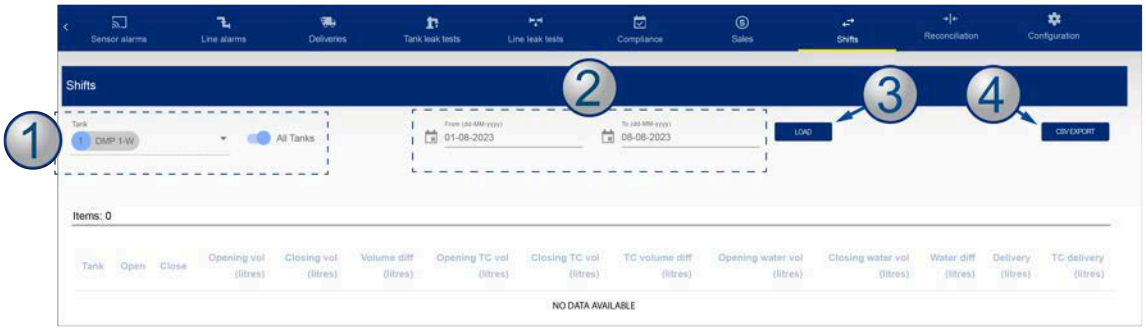
This report will show the pump sales that are sent by the forecourt controller.



NOTE: *Pump Sales Reports related to tanks can only be made when the reconciliation function is in operation and there is communication with a forecourt controller.*

1. Select a **Tank Number** from the drop-down or use the slider button to select **All tanks**.
2. Use the date-selector to select a **Date** for your report.
3. Click the **Load** button to show the data.
4. The Sales Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

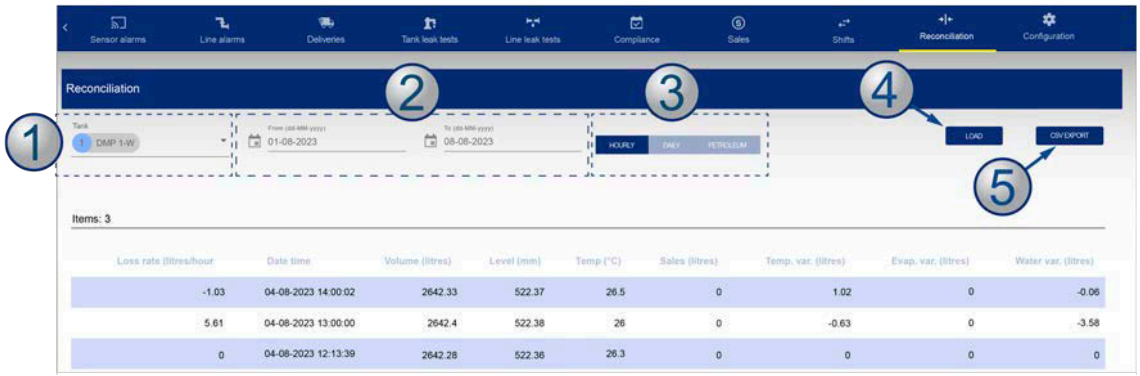
11.11 Shifts



This report will show the shifts related to specified tanks.

1. Select a **Tank Number** from the drop-down or use the slider button to select **All tanks**.
2. Use the date selector to select a **From Date** and **To Date** for your report.
3. Push the **Load** button to show the data.
4. The Shift Report can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

11.12 Reconciliation



There are three types of reconciliation reports available:

- Hourly
- Daily
- Petroleum (periodic)

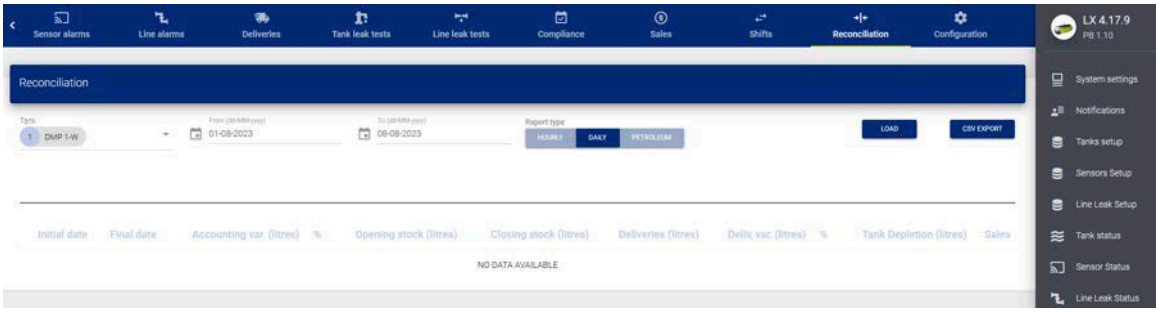
1. Select a **Tank Number** from the drop-down.
2. Use the date selector to select a **From Date** and **To Date** for your report.
3. Select a **report type** (Hourly, Daily, Petroleum).
4. Push the **Load** button to show the data.
5. These reports can be exported to a csv format that can be saved in a spreadsheet or text editor. Click the **CSV Export** button to continue.

Below are descriptions of the contents of each report:

HOURLY REPORT

This report will show (see the image above):

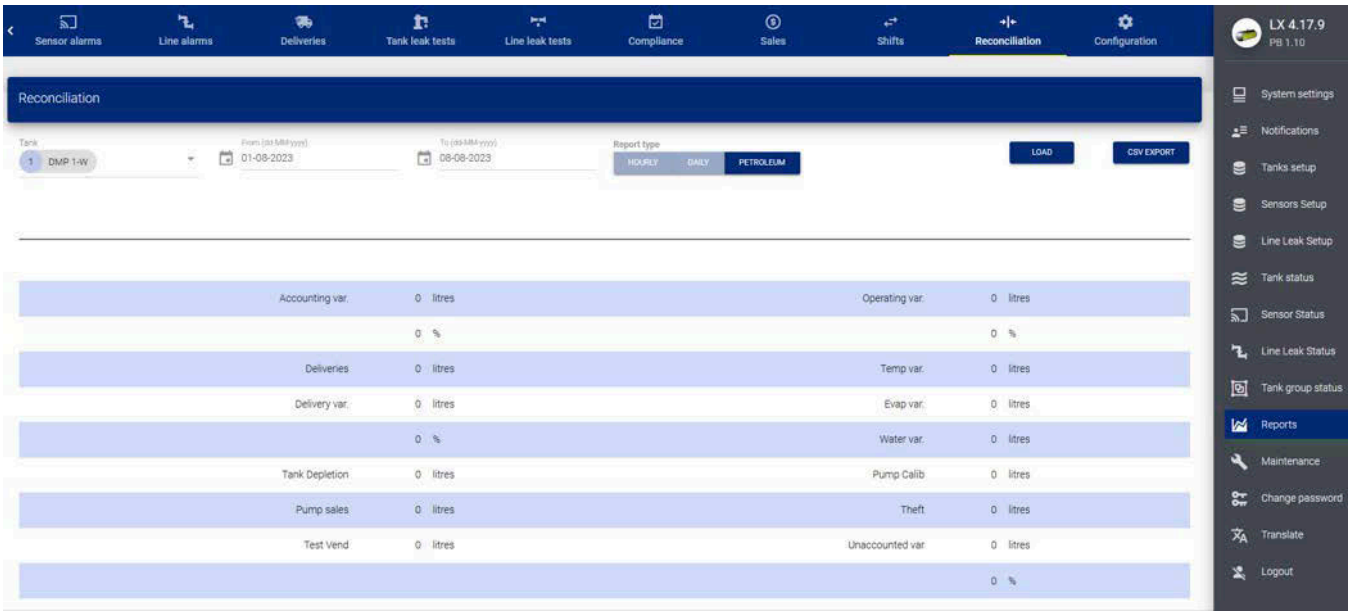
- The Loss rate in liters / hour up to that hour (cumulative figure).
- The volume, the level and the temperature at the end of the hour.
- The cumulative dispenser sales (field Sales) up to that hour.
- The difference in liters because of the temperature difference between the current hour and the hour before.
- The difference in liters because of the evaporation between the current hour and the hour before (only if an evaporation factor has been programmed in the ACR settings in the Tank Setup).
- The difference because of the water change in liters between the current hour and the hour before.



DAILY REPORT

This report will show (see the image above):

- The opening and closing stock for the day.
- The delivered volume for the day.
- The delivery variance for the day.
- The tank depletion for the day.
- The pump sales for the day.



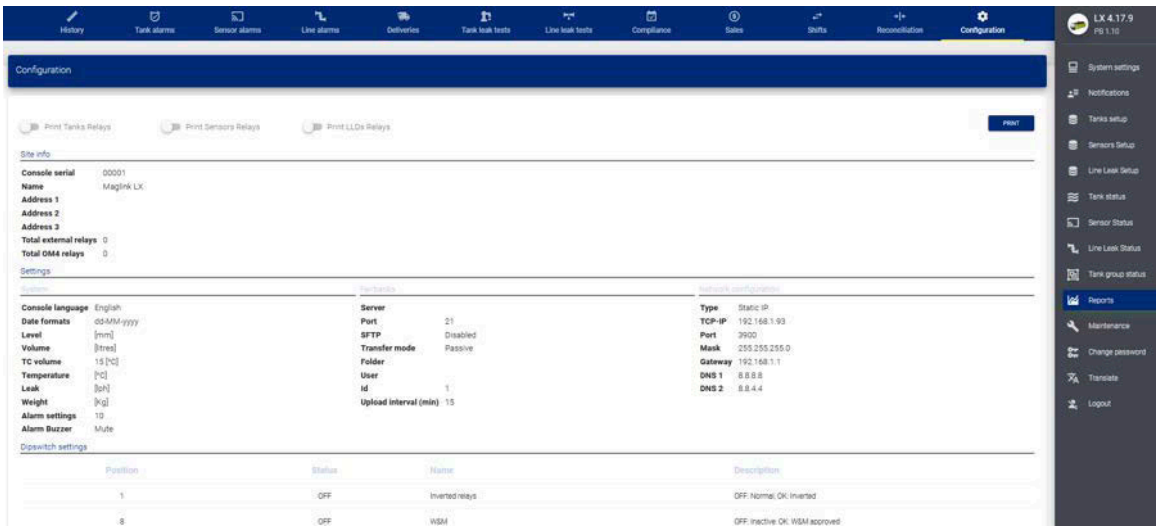
PETROLEUM REPORT

For a given period, this report will show (see the image above):

- **Accounting var** (variance): This is the sum of Operating variance and Delivery variance, shown in liters and as a % of tank sales
- **Deliveries**: The quantity of liters delivered.
- **Delivery var** (variance): This is the Delivery variance. This is calculated as the difference between ATG measured delivery and invoiced delivery (invoice detail entered manually during delivery report). The result is shown in liters and as a % of tank sales.
- **Tank depletion**: The quantity of liters physically kept in the tank.

- **Pump sales**: The quantity of liters that were sold by the tank (as recorded by the dispensers).
- **Test vend**: The quantity of fuel that was pumped out of the tank during a pump calibration check.
- **Operating var** (variance): This is the difference between Tank Depletion and Pump Sales, In liters and as a % of tank sales.
- **Temp var** (variance): This is a temperature difference for the given time period.
- **Evap var** (Evaporation variance): This is an evaporation difference for the given time period.
- **Water var** (variance): This is a difference because of a change in the water volume for the given time period.
- **Pump calib** (calibration): This is a difference because of the dispenser meter drift (this is only applicable if a meter offset has been programmed in the Site Mapping).
- **Theft**: This is a difference that was recorded as a theft (it will be necessary for the Unexpected Sales threshold to be programmed in the Reconciliation settings in the Tank Setup).
- **Unaccounted var** (variance): This is calculated as:
  - Unaccounted variance = Operating variance – Temp variance – Evap variance – Water variance - Pump calibration – Theft.
  - This is calculated in liters and as a percent of sales.

11.13 Configuration



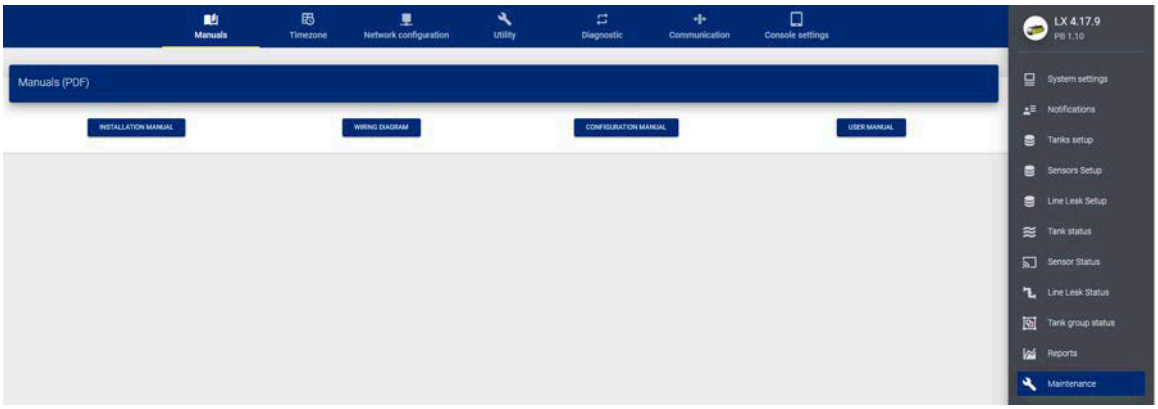
A summary of the configuration is given in this menu. Click the **PRINT** button to print the configuration report to a printer connected to the PC.

Use the three (3) relay slider buttons (“Print Tanks Relays”, “Print Sensors Relays”, “Print LLDs Relays”) to include relay configurations for the different modules.

12 Maintenance

The Maintenance Menu has tabs to get access to technical manuals, wiring diagrams configure the console's Time zone (and Time and date), Network Configuration, Utility functions and Console settings.

12.1 Manuals



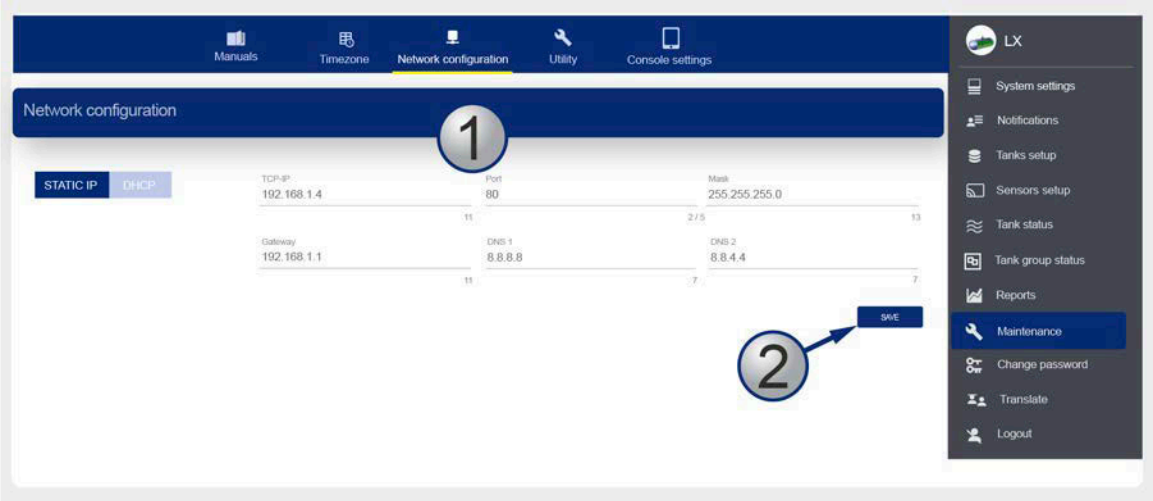
Click the **Manuals** icon in the *Maintenance* menu to get access to the Installation (M2050 for LX 4, M2050-PLUS for LX Plus and M2060 for LX Ultimate), Configuration (M2051 for LX 4, LX Plus and LX Ultimate) and User (M2052 for LX 4, LX Plus and LX Ultimate) manuals and Wiring diagrams (for LX Plus and LX Ultimate) for your console.

IMPORTANT: *There are separate manuals for Installation. M2050 is for the installation of the LX 4 console, M2050-PLUS is for installation of the LX Plus console and M2060 for the installation of the LX Ultimate console.*

12.2 Timezone

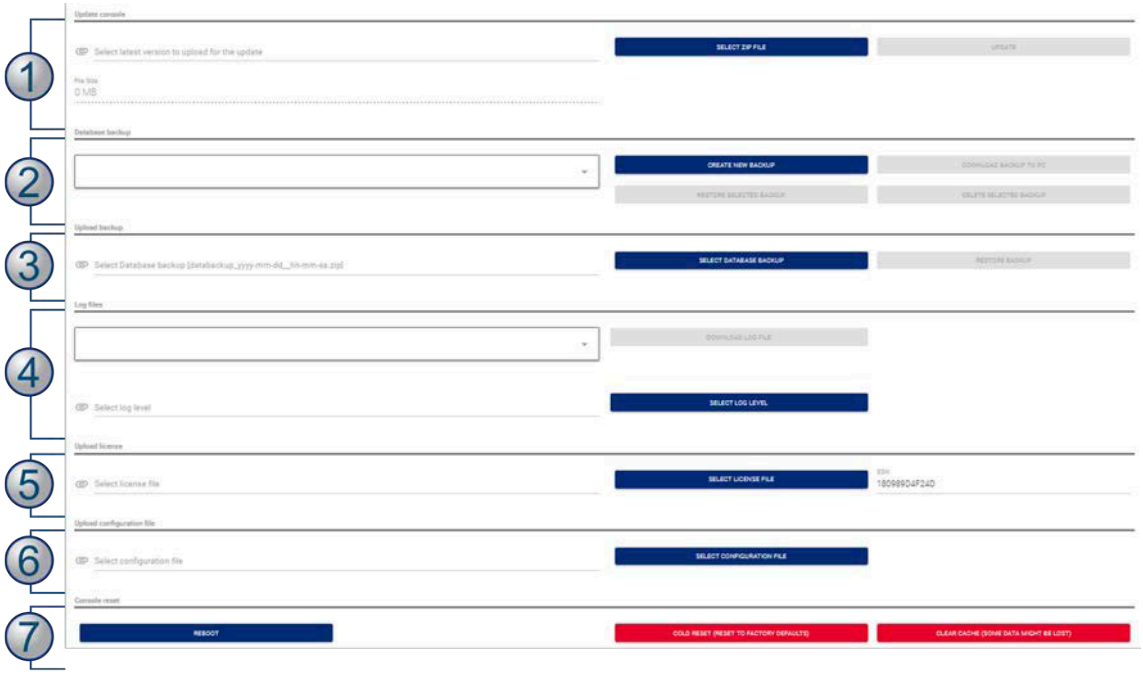
1. Use the calendar and clock tools to select the date and time.
2. Select the applicable **time zone** from the drop-down.
3. Click **Save**. The console application will restart.

12.3 Network Configuration



1. Enter the **network parameters** into the applicable fields
2. Click **Save** when you have completed all applicable fields.

12.4 Utility



Utility functions can be done in this screen.

1. **Update Console**: Use this function to do a software update. You must get the update zip file through DFS.
   - Click the **Select zip file** button to select the update file.
   - Click the **Update** button to install the update.
2. **Database backup**: In this part of the screen you can;
   - Make a database backup and store it on the SD card. Click the **Create new backup** button. A new, date-stamped backup file is stored on the SD card.
   - Download the backup to your computer. Select the applicable file from the drop down menu. Click the **Download backup to PC** button. The console will automatically reboot.

NOTE: *The download procedure downloads two (2) files:*

- data_yyyy-mm-dd_hh-mm-ss.zip. This is the database backup that contains the configuration and events.
- temp_data_yyyy-mm-dd_hh-mm-ss.zip. This is the configuration backup only.

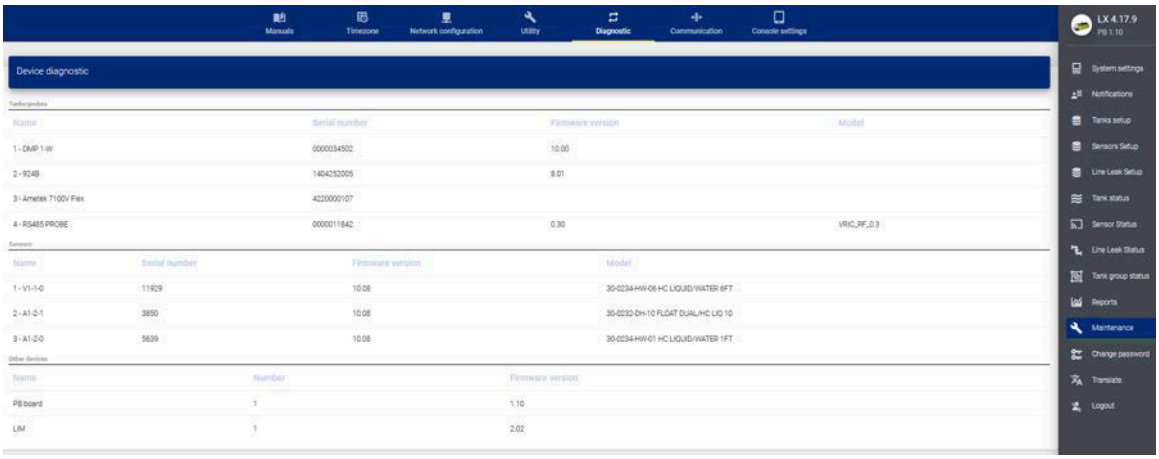
   - Restore the backup that is stored on the SD card: Select the applicable file from the drop-down menu. Click the **Restore selected backup** button.
   - Delete the backup that is stored on the SD card: Select the applicable file from the drop-down menu. Click the **Delete selected backup** button.

3. **Upload backup**: Use this part of the screen to upload the database backup file **data_yyyy-mm-dd_hh-mm-ss.zip** and the configuration backup **temp_-data_yyyy-mm-dd_hh-mm-ss.zip**.
   - Select the applicable **database backup** file.
   - Select the applicable **configuration backup** file.
   - Click the **Restore backup** button to install these backup files.
4. **Log files**: To download log files to your computer:
   - Select the applicable **log file** from the drop-down menu.

NOTE: *It is recommended to download the "all_logs.zip" file. This is the most common log file that DFS tech support will ask for when troubleshooting a problem.*

   - Click the **Download Log File** button.
5. **Upload License**: To upload the applicable license file for your system:
   - Click the **Select license file** button to select the applicable file.
6. **Upload Configuration File**: For specific regions, a special configuration can be given that will update the products list and will set some specific parameters such as customer Id and daily one time password management.
   - Click the **Select Configuration File** button to select the applicable file.
7. **Console reset**:
   - Click the **Reboot** button to restart the console.
   - Click the **Cold Reset** button to put the console back in original factory default settings. This procedure will remove the database.
   - Click the **Clear Cache** button to clear the cache memory of the console. This is useful if the console responds to functions too slowly or when the alarms status does not update correctly.

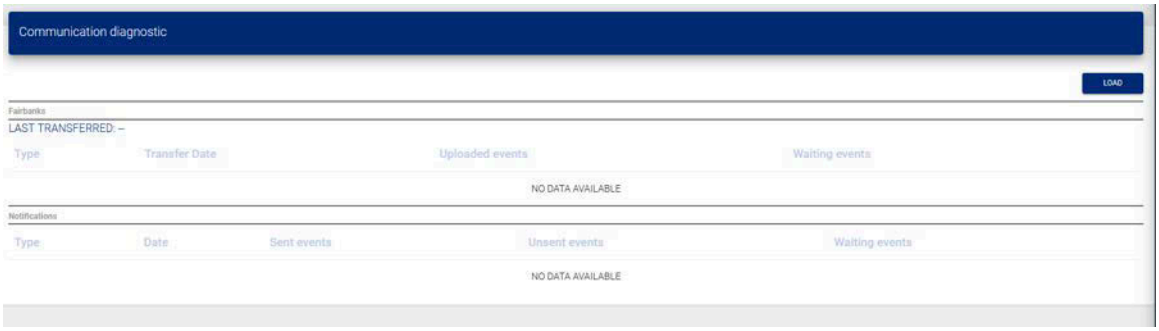
12.5 Diagnostic (for LX Plus and LX Ultimate Only)



This menu shows a summary of the devices that have been detected on the ISB (LX Plus and LX Ultimate models only) and devices that have been configured.

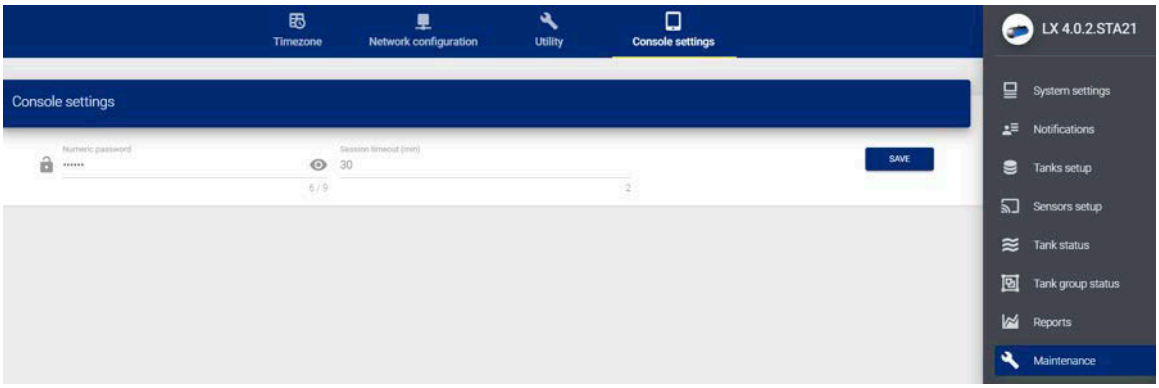
NOTE: *In the Other Devices panel (for LX Plus and LX Ultimate models only) these devices will show when they are detected: PC board (auxiliary board where the ISB connects) LIM (Line Interface Module) VSmart Module*

12.6 Communication



Communication: This is a report that will show the Fairbanks transfers history and what is waiting in the buffer to be sent. Similarly it shows email notifications history and what is waiting in the buffer.

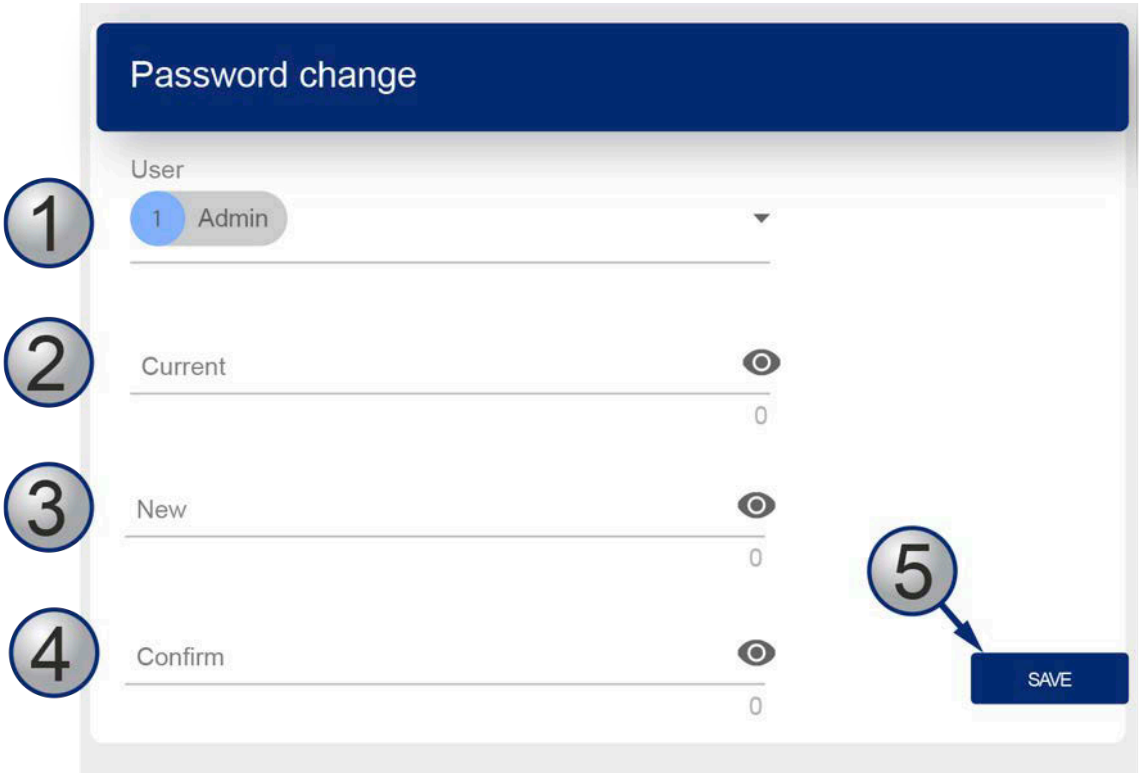
12.7 Console Settings



In this section, the numeric password to get access to the Maintenance section on the Graphical User Interface of the console can be changed.

The timeout session gives the time that the user can be logged in to the Maintenance section before the system automatically logs the user out.

13 Change Password

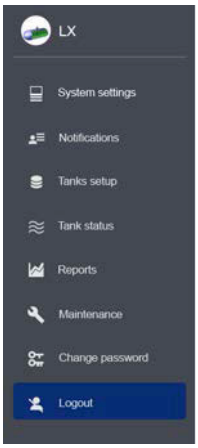


NOTE: *Only an Admin user can change passwords.*

1. Select the applicable **User** from the drop-down.
2. Enter the **Current password** for the selected user.
3. Enter the **New password**.
4. Enter the **new password** again in the *Confirm* field.
5. Click **Save** when you have completed all fields.

TIP: *As you type your password only neutral "bullet" characters will show (e.g. • • • • • •). Select the "eye" icon to show the password characters as you type.*

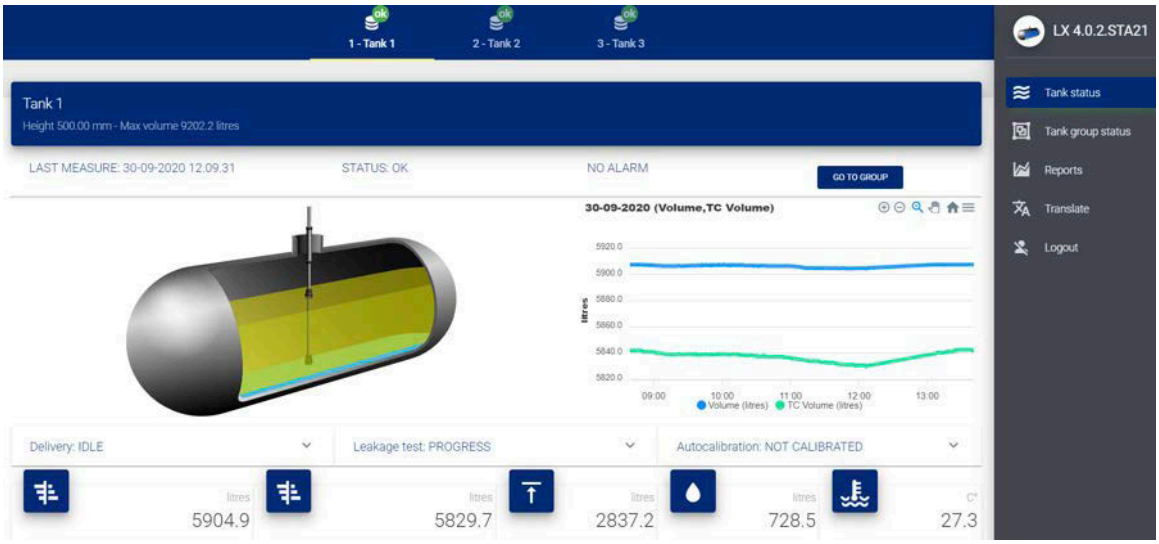
14 Logout



Select **Logout** from the *Main Menu*. The Login screen will come into view.

Click the **Logout** button to log out of the console.

15 Guest Account



A Guest account only gives access to the Tank Status page and a view of data from Reports.

16 Technical Support

When you ask for technical support from DFS, it is recommended that you give direct access to the console over the Internet through ports 3000 and 22. As an alternative, the console can be connected to a site computer and technical support can get access through a third-party program (such as TeamViewer). If technical support cannot get access to the console in one of these two methods, the user must supply technical support with the log files and the database backup of the console.

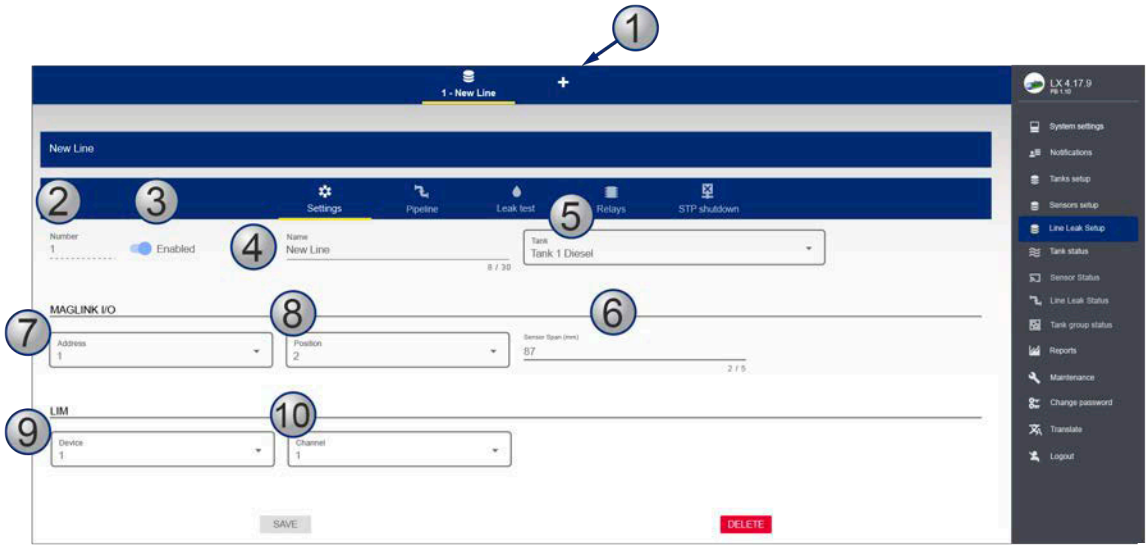
Refer to *Utility* (p. 94) for information on log files and the database backup in the console.

Appendix A MagLink LX PLUS and LX Ultimate Pressurized Line Leak Detection (PLLD)

A.1 Line Leak Setup

The Line Leak Setup menu is used to:

- Configure the PLLD-DAS (or older model I/O module) and the LIM (Line Interface Module).
- Configure the pipeline characteristics (length, size, Beta factor).
- Schedule leak tests (run a test now/later, run automatic testing).



1. Click on the "+" icon in the top menu bar to add a new PLLD configuration. Each PLLD sensor must have its own configuration.
2. **Number**: Enter a **number** to identify the PLLD sensor configuration.
3. **Enabled**: When the "Enabled" button is in its ON position, the PLLD configuration is active. The system will try to start tests on the applicable pipeline.

> ***NOTE:*** *If the "Enabled" button is OFF, then the system will not try to run tests on the applicable pipeline. Pressure readings will not be received and the pipe stiffness calibration procedure will not be able to start.*

4. **Name**: Enter a **name** to identify the line.
5. **Tank**: Select the **tank number** from the drop-down that has the STP with the PLLD sensor installed.
6. **Sensor span**: The default value is 87 psi. *Do not change this value*.

7. **Address**: Select address **1** for the first PLLD-DAS module, address **2** for the second PLLD-DAS module, and so on.

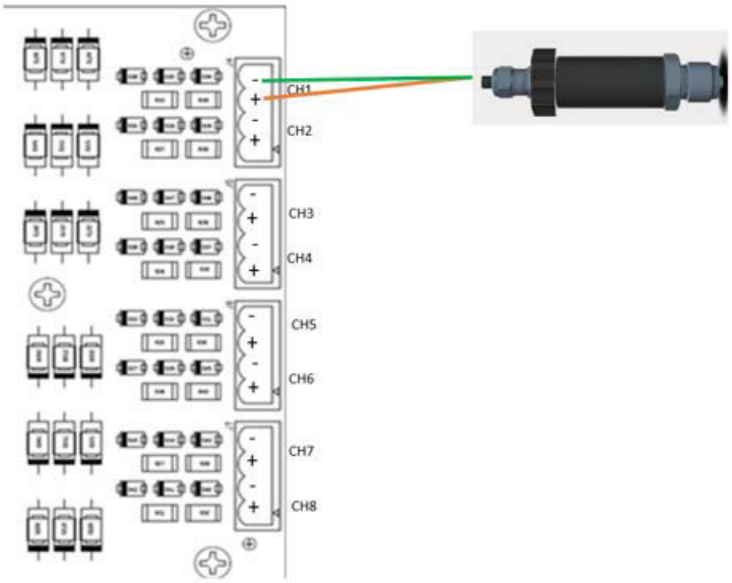
NOTE: *There can be more than one PLLD-DAS module connected to the LX Plus/Ultimate console. Each PLLD-DAS module must have its address set by the dip switches on its motherboard.*

Only one MagLink I/O module can be connected to the LX Plus/Ultimate console.

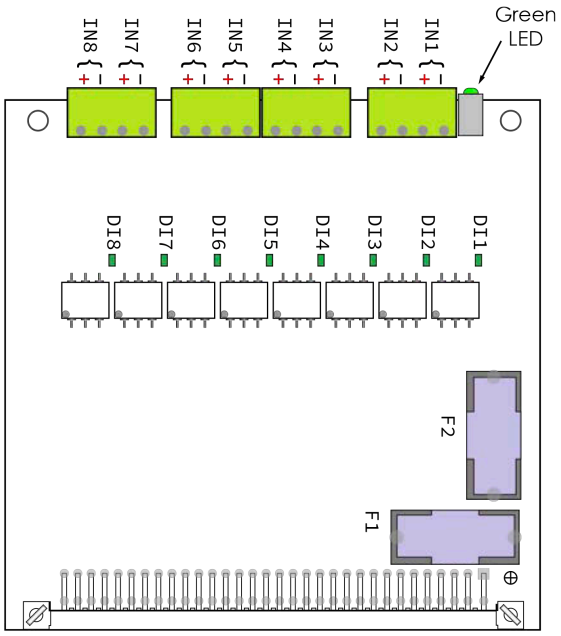
For more information on how to set the PLLD-DAS address Dip Switches, refer to the ID Addresses/Dip Switches sub-section of the PLLD-DAS section of the M2050-PLUS MagLink LX PlusInstallation Manual or M2060 MagLink LX UltimateInstallation Manual.

8. **Position**: Enter the **Position** (connector slot) where the PLLD sensor is connected to the PLLD board.
   – The PLLD board has 8 connector slots.

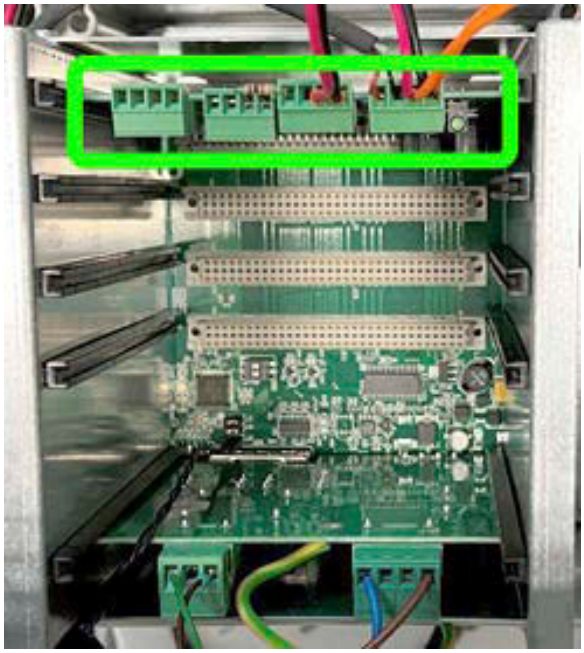
NOTE: *For PLLD-DAS: Position 1 is at the top (CH1). See the illustration below.*



NOTE: *For MagLink I/O: Slot No1 is next to the Green LED. Slot No8 is on the opposite side of the Green LED. See schematic below.*



The PLLD board must be installed on the top slot of the I/O, see the image below.



9. **Device**: Select the LIM address identification number from the drop-down (select 1 through 4). Each LIM module must have its own LIM address. Use the rotary switch on the LIM board to configure the LIM address.

INFORMATION: *Refer to the M00-20-8321-LIMLIM Procedure Guide for information on configuration of the LIM device..*

10. **Channel**: Select the LIM Channel from the drop-down (1 through 4) where the applicable STP is connected

A.2 Pipeline

1. **Line length**: Enter the total length of the pipeline (from the STP to the last dispenser. Include the length of all branches that are installed between the STP and dispensers)
2. **Pipeline**: A series of specific pipelines is included in this field. The user can select a pipeline and the system will automatically populate the volume/length parameter in the next field.

   NOTE: *If your pipeline is not listed here, you can select the closest pipeline and manually enter the volume/length parameter in the next field (it will override the automatically selected volume/length).*

3. **Volume/length**: You can keep the default value (automatically given when a Pipeline is selected above) or, manually enter a specified value.

   NOTE: *If you enter a value manually, make sure you use the correct units of measure.*

4. **Minimum Test Pressure**: This is the minimum pressure that is required to be maintained in the pipeline during the 3.0 gph (11 lt/hr) leak test. It is recommended to keep the default value of 20 psi. If the pressure is lower than the “Minimum Test Pressure” then leak tests cannot be executed.
5. **Minimum Dispensing Pressure**: This is the minimum pressure in the pipeline during normal dispensing. If the pressure falls below the “Minimum Dispensing Pressure” then a “Pressure Low” alarm will be activated for that pipeline.
6. **Idle Monitoring duration (mins):** number of minutes that the system checks the line pressure since an idle state (STP off). Default value is 60 minutes, maximum value is 1440 minutes. Setting the value at 0 will disable the Idle Monitoring function.

Idle Pressure Monitoring function
The console can monitor the line pressure during idle periods (no dispensing, no leak testing) and alert if the pressure drops below a threshold. A very low idle pressure would indicate either a large leak in the pipeline or a malfunction in the equipment (e.g faulty check valve in the submersible pump).
To clear the alert (alarm “Pressure Low”) the user must run a 3 gph leak test that must pass successfully.

7. **Minimum Idle pressure (psi):** the system will trigger an alarm “Pressure Low” if the idle pressure drops below the set value in psi. Default value is 8 psi. Setting the value at 0 will disable the Idle Monitoring function.
8. **Beta**: Pipe stiffness in psi and pipe material can have an effect on pressure calculations. Refer to the “Pipe Data” tables at the end of this Appendix. These values are theoretical.
9. **Calibrated Beta**: This is the pipe stiffness in psi that has been calculated by the console’s algorithm during the process “Beta calibration” (internal process that can calculate the pipe stiffness through a controlled leak in the system). The system uses the Calibrated Beta value for the leak rate calculations once it has been calculated and shown on the field here. If there is no Calibrated Beta value, the system will use the theoretical Beta for the leak rate calculations.
10. **RESET button**: If you click the RESET button, the Calibrated Beta value is erased and the system will use the theoretical Beta for the leak rate calculations.

11. To open the “Calibrate” panel, select the arrow on the right side of the collapsed panel.

The system can calculate the pipe stiffness in the “Calibrate” panel. The user must start a controlled leak in the system for the calibration to occur.

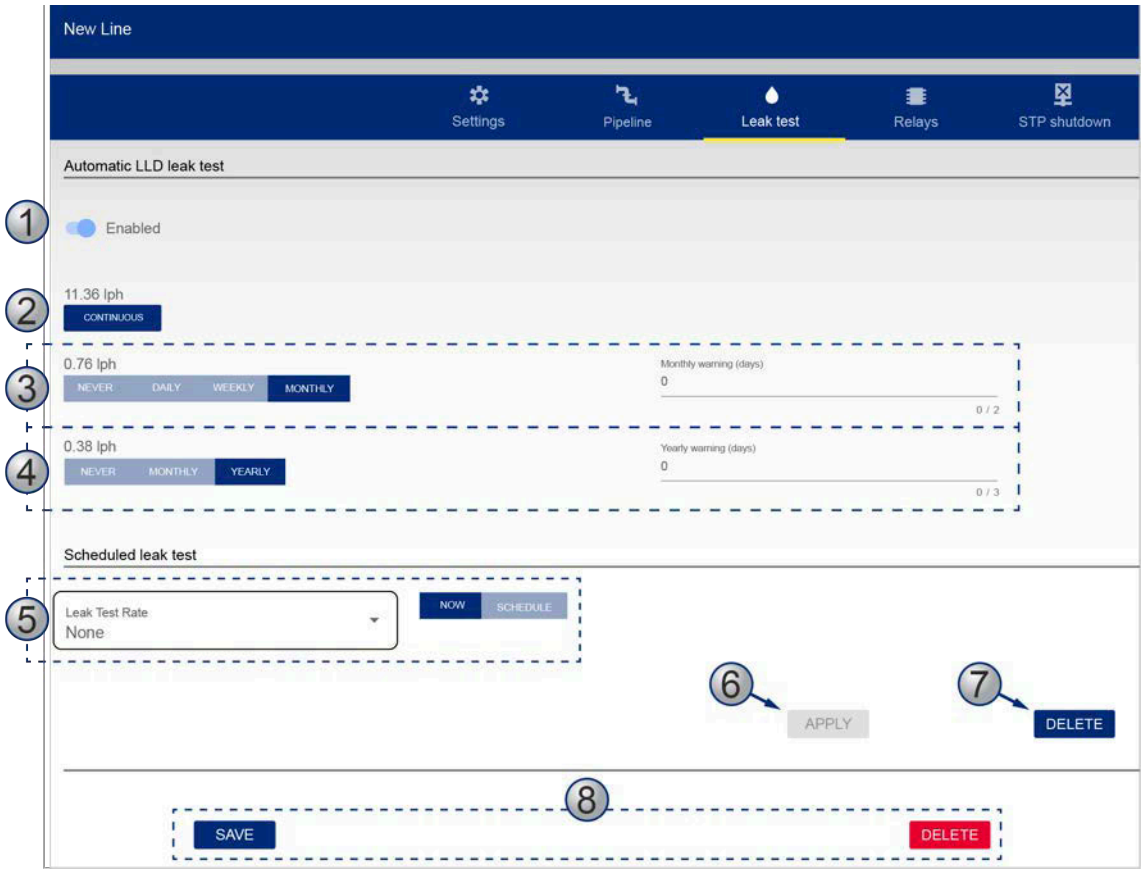
12. **Leak generator (gph)**: Enter the type of the leak generator. The most common leak generators can start a 3 gallon per hour (gph) leak at 10 psi.
13. **Number of calibration cycles (3-12)**: During each calibration cycle the system will pressurize the STP. It will then stop the STP and record the pressure in the line. It is recommended to complete the maximum number of cycles (12) for the best calibration results.
14. **Start calibration immediately**: If this slider button is enabled (pushed to the right and shown in blue), the system will then start the calibration sequence when the START button is clicked.

    If the slider button is disabled, when the START button is clicked: the system waits for the dispenser nozzle to be picked up momentarily, then be put back into the cradle. This will cause the system to start the calibration once the nozzle is back into the cradle. This method is used to start the calibration process from the forecourt (the technician lifts the nozzle for 2 seconds and puts the nozzle back in the cradle. The calibration will then start).
15. **Calibration status**: This is an information window that shows the current status of the process.
16. **START button**: This starts the calibration sequence (this can be immediately or through the nozzle signal. Refer to “Start calibration immediately” in the previous step.).
17. **STOP button**: This will stop the calibration sequence.

Click the **SAVE** button to save the current pipeline setup.

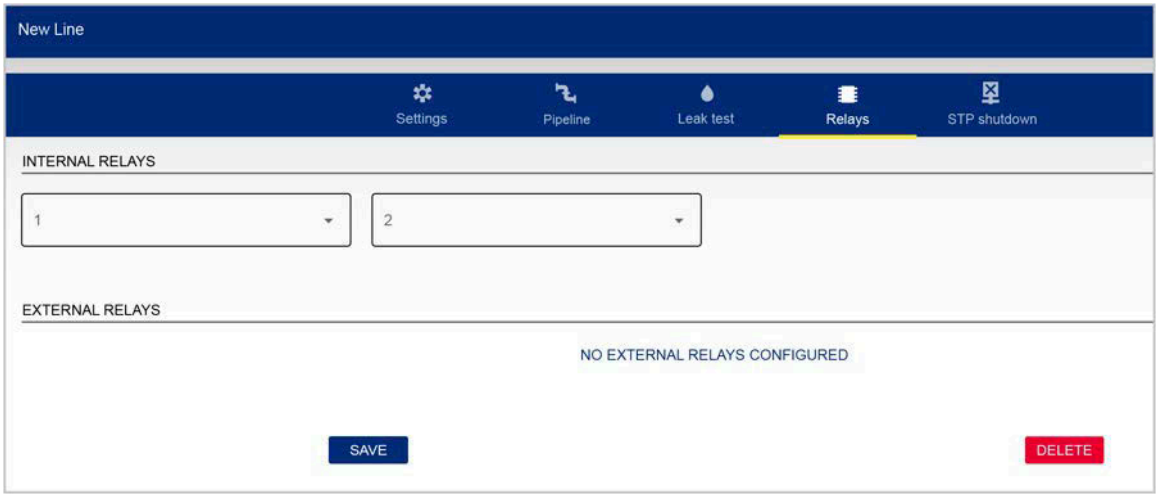
NOTE: *If the DELETE button is selected, it will erase the PLLD configuration.*

A.3 Leak Test



1. **Enabled**: When this button is “Enabled,” the system will run a leak test automatically that uses specified frequencies.
2. **3 gph (11.36 lph)**: The automatic 3 gph (11.36 lph) test will run continuously every hour. The test will start after the last dispensing transaction if the last test was done more than 1 hour before.
3. **0.2 gph (0.76 lph)**: Select the applicable frequency. Select a monthly warning in days if applicable (if a leak test has not been done within "x" days, then a warning will be caused).
4. **0.1 gph (0.38 lph)**: Select the applicable frequency. Select a yearly warning in days if applicable (if a leak test has not been conducted within "x" days, then a warning will be caused).
5. **Leak Test Rate**: Select the leak test rate. Then select if the test will start now (click the **NOW** button or later at a scheduled date and time by (select the **SCHEDULE** button).
6. **Apply** button: Click **Apply** to apply the settings.
7. **Delete**: The Delete button will delete the scheduled leak test configuration.
8. Click **SAVE** to save the setup. Click **DELETE** to erase it.

A.4 Relays



In the Relays tab, the user can program a relay to be started when an LLD condition occurs. Configure the internal, external (an I/O module is necessary for an external relay) or OM4 relays.

The available conditions that can cause a relay to start include:

SENSORS NO LINK: there is no communication between console and PLLD-DAS or MagLink I/O PLLD module

NO STP LINK: there is no communication between console and LIM

SENSOR OPEN:there is no reading from PLLD sensor

SENSOR SHORT: the PLLD sensor wires shorted

STP CONTROLLER: the STP contactor fused or stuck

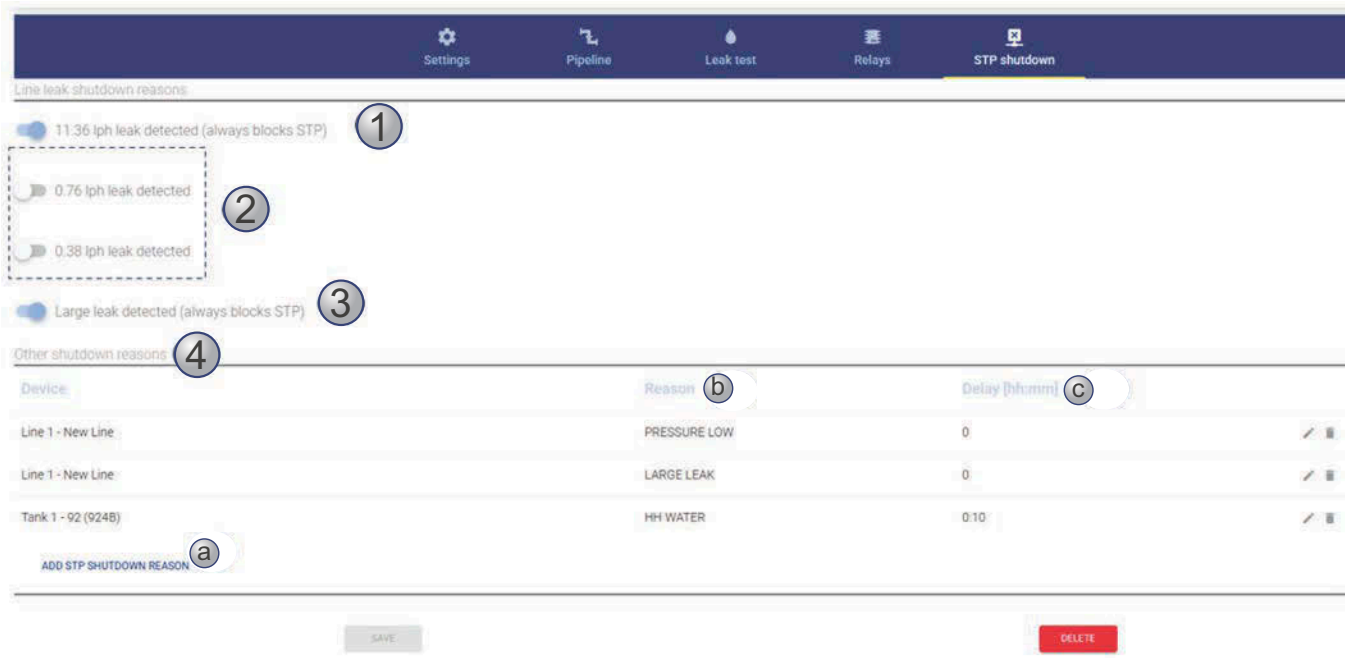
LINE LEAK: a leak test failed

NO LEAK TEST: no leak test has been done as the WARNINGS setup in the Leak Test tab

NO ANNUAL LEAK TEST: no annual leak test has been done as the WARNINGS setup in the Leak Test tab

PRESSURE LOW: triggers when either a) the STP dispensing pressure is less than the Minimum Dispensing Pressure configured at the Pipeline tab, or b) when the STP idle pressure is less than the Minimum Idle Pressure configured at the Pipeline tab

A.5 STP Shutdown



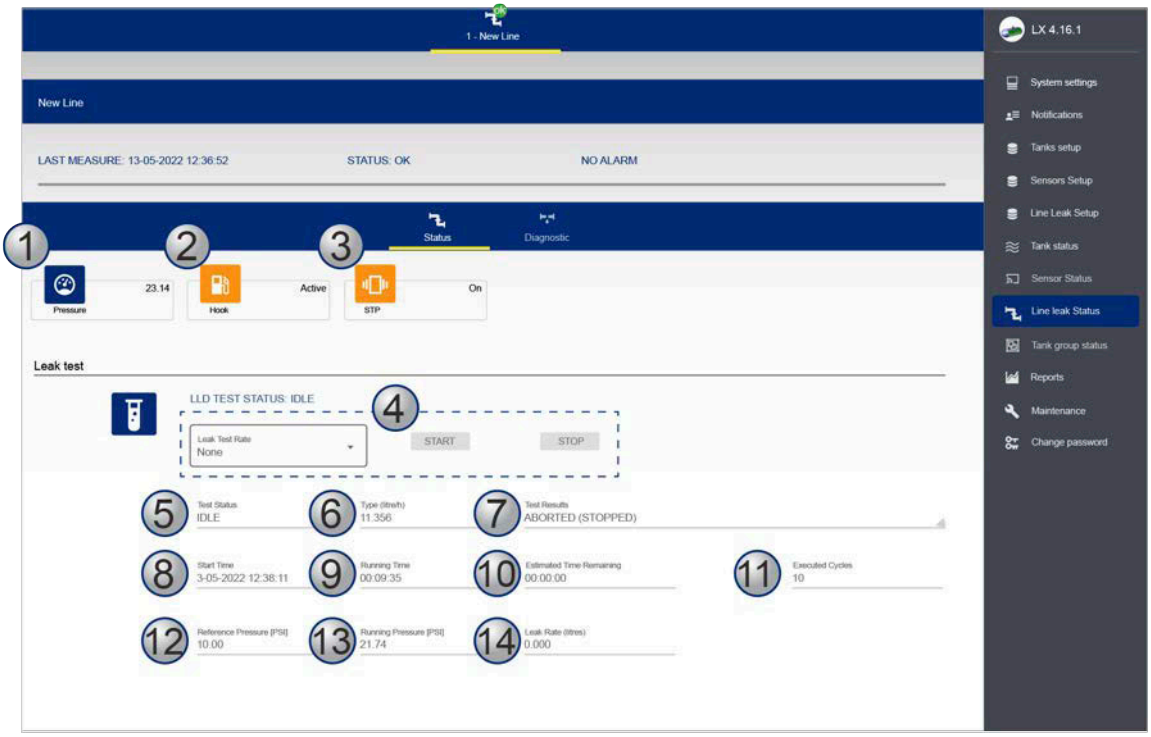
In the STP Shutdown tab the user can configure the conditions under which the STP will automatically shutdown.

1. A 3 gph (11.36 lph) line leak fail will always shut down the STP.
2. Where applicable, select the STP to be shutdown during a 0.2 gph (0.76 lph) fail and/or a 0.1 gph (0.38 lph) fail.
3. Monitors the product volume in the tank during a leak test and if the level drops over a threshold (not user configurable, dynamically calculated based on pipeline volume) then the STP will be blocked and to unblock it a 3 gph test will need to be passed successfully. This functionality is inactive in software versions up to 4.20.8 (LX Plus) / 5.20.8 (LX Ultimate) and it is scheduled to be activated in Q3 of 2026.
4. The STP can also be configured to shutdown by other causes, (for example, high water detected by the probe in the tank or by an environmental sensor activating).
   a. To configure an event that will cause an STP shutdown, select **ADD STP SHUTDOWN REASON**.
   b. Select the applicable event.
   c. The *Delay* is a timer that starts a countdown from the point in time the event was caused. The STP will shutdown once the timer ends.

In the example shown in the image above for Line 1, a HH Water alarm event on Tank 1 will shutdown the STP after 10 continuous minutes that the alarm is active.

Also, a PRESSURE LOW alarm and a LARGE LEAK alarm will cause the STP to shutdown immediately.

A.6 Line Leak Status



1. **Pressure** icon: This shows the current pressure in the pipeline.
2. **Hook** icon: This changes to show to “Active” when the hook signal is in operation.
3. **STP** icon: This changes to show that the STP is “On” when the STP is operational.
4. **Leak Test Rate**: Select a **Leak Test Rate** from the drop-down. Click the **Start** button to start an On Demand test. Click the **Stop** button to stop a test that has been started.
5. **Test Status Idle**: This shows *Idle* if a test is not in progress.
6. **Type**: This shows the type of leak test.
7. **Test Results**: Shows the result of the test. Possible results are: PASSED, FAILED, ABORTED (STOPPED) and IN PROGRESS.
8. **Start Time**: This shows the time when the test started.
9. **Running Time**: This shows the total time of the test since it started.
10. **Estimated Remaining Time**: Approximate time until the test is complete.
11. **Executed Cycles**: The system will start and stop the STP a number of times during the test to get pressure readings. Each start and stop sequence is considered to be a cycle. This field shows how many cycles have been completed so far.
12. **Reference Pressure**: This is the reference pressure at which the test will run. A 3 gph test is referenced at 10 psi.
13. **Running Pressure**: This is the pressure in the pipeline once the STP has stopped fueling.
14. **Leak Rate**: The calculated leak rate in liters/gallons per hour.

A.7 Graphical User Interface

Refer to the PLLD section of M2052 MagLink LX 4, LX Plus& LX Ultimate User Manual.

A.8 Pipe Data Tables

The data for some industry known pipes is shown below.

Rigid Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
FIBERGLASS (2 INCH)	25000	0,017	0,0253	0,0025
FIBERGLASS (3 INCH)	25000	0,038	0,0566	0,0057
STEEL (2 INCH)	50000	0,016	0,0238	0,0024
COPPER (1 INCH, TYPE K)	55000	0,003	0,0045	0,0004

Advanced Polymer Technology Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
1.5-INCH (P150SC)	8800	0,008	0,0119	0,0012
1.75-INCH (P175SC)	7400	0,01	0,0149	0,0015
2.0-INCH (P200SC)	5600	0,014	0,0209	0,0021
2.5-INCH (P250SC)	4400	0,021	0,0313	0,0031
1.5-INCH (XP-150-SC)	5042	0,008	0,0119	0,0012
2.0-INCH (XP-200-SC)	5420	0,014	0,0209	0,0021

Ameron Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
DUALOY 3000/FLS III	5400	0,008	0,0119	0,0012
DUALOY 3000/FLS III	7600	0,014	0,0209	0,0021

Brugg Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
FLEXWELL HL-40 (1.5 INCH)	33000	0,008	0,0119	0,0012

Environ Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
GEOFLEX D (1.5 INCH)	14500	0,008	0,0119	0,0012
GEOFLEX D (2 INCH)	11000	0,014	0,0209	0,0021
GEOFLEX D (3 INCH)	4100	0,031	0,0462	0,0046
GEOFLEX PLUS D (1.5 INCH)	16500	0,008	0,0119	0,0012

Flexworks Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
C15 (1.5 INCH)	14500	0,008	0,0119	0,0012
C20 (2.0 INCH)	11000	0,014	0,0209	0,0021
C30 (3.0 INCH)	4100	0,031	0,0462	0,0046

Furon Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
SP15 (1.5 INCH)	9000	0,008	0,0119	0,0012
SP20 (2 INCH)	7000	0,014	0,0209	0,0021
CP15 (1.5 INCH)	11650	0,008	0,0119	0,0012
CP15DW (1.5 INCH)	5400	0,008	0,0119	0,0012
CP20 (2 INCH)	7600	0,014	0,0209	0,0021
COFLEX (1.5 INCH)	14500	0,008	0,0119	0,0012
COFLEX (2 INCH)	11000	0,014	0,0209	0,0021

Nupi Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
SMARTFLEX (1.5 INCH)	8600	0,008	0,0119	0,0012
SMARTFLEX (2.0 INCH)	15000	0,014	0,0209	0,0021

Petrotechnik Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
UPP EXTRA (63 mm)	1500	0,014	0,0209	0,0021

Total Containment Flexible Pipe Types

	BETA	Gals/inch	Liters/cm	Liters/mm
PP1500 (1.5 INCH)	2400	0,008	0,0119	0,0012
PP1501 (1.5 INCH)	3500	0,008	0,0119	0,0012
PP1502 (1.5 INCH)	7300	0,008	0,0119	0,0012
PP1503 (1.5 INCH)	2500	0,008	0,0119	0,0012
PP2500 AND PP2501				
PP2502 (2.5 INCH)	8700	0,021	0,0313	0,0031
PP2503 (2.5 INCH)	3100	0,021	0,0313	0,0031
CP1501 (1.5 INCH)	13000	0,008	0,0119	0,0012
CP1503 (1.5 INCH)	4500	0,008	0,0119	0,0012
CP2503 (2.5 INCH)	3900	0,021	0,0313	0,0031

A.9 Wiring Diagram

Refer to FMM2058-PLS LX Plus/UltimateWiring Diagram.

Site Configuration Chart

Use the chart below to record information that will be necessary for the programming of the PLLD in the LX PLUS.

Tank No	Product	STP No	STP manifolded	Pipe inner Diameter (in/cm/mm)	Pipe Type	Beta	Pipe length (in/cm/mm)	Pipe volume (gals/in, lts/cm, lts/mm)	PLLD DAS / I/O channel	LIM1 CHANNEL	LIM2 CHANNEL

NOTES:

- At ***STP manifolded***, record if a specified STP is manifolded with another STP. Enter the manifolded STP in the box. If there is no manifold, enter N/A.
- At ***Pipe volume***, use this formula: If cm is used as the unit of measure, then Pipe volume liters/cm = 3.14 * Diameter (cm) * Diameter (cm) ÷ 4000. If inches is used as the unit of measure, then Pipe Volume Gallons/inch = 3.14 * Diameter (in) * Diameter (in) * 0.00108.

Appendix B Appendix How to Configure a Siemens LR120 Radar

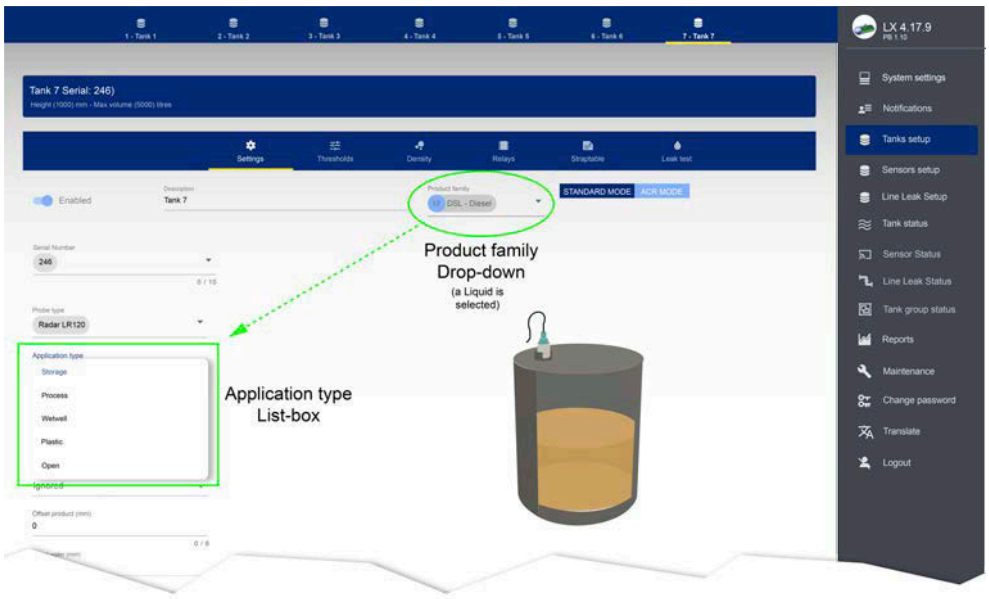
Before you connect the Siemens LR120 Radar to a MagLink LX console, the SIEMENS mobile IQ app must be used to configure the device.

- After you connect the Radar device to a power source (8-30 V DC), a Bluetooth PIN is required to connect to the device.
- When a connection has been made, go to *Setup* > *Detailed setup* > *Communication* > *Address*, and change the address (the default is 246). This address will show as a Serial Number in the MagLink LX.

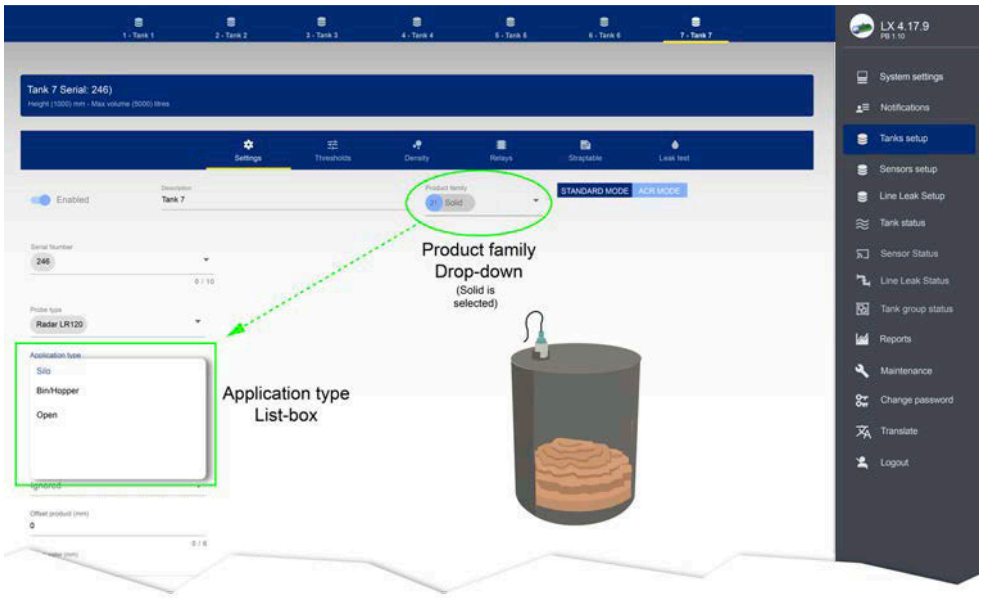
IMPORTANT: *Separate addresses must be set up for each site. Two or more Radar devices cannot have the same address.*

- After address configuration, the Radar device can be connected to the MagLink LX console.
- On *Web UI* > *Tanks setup* > *Settings Serial Number*, the Radar device address must be entered. After “QUERY PROBE” the system should automatically adjust the probe type to “Radar LR120.”

- When a liquid is selected in the “Product Family” drop-down, the “Application type” list-box will show the values below (see the screen image below):
  - Storage
  - Process
  - Wetwell
  - Plastic
  - Open



- When “Solid” is selected in the “Product family” drop-down, the “Application type” list-box will show the values below (see the screen image below):
  - Silo
  - Bin/Hopper
  - Open



Appendix C Modbus Protocol Support

On MagLink LX Ultimate software versions 4.20.4 and later support for the Modbus RTU protocol used in Building Management Systems (BMS) has become available.

C.1 Supported Functions

The MagLink LX Ultimate ATG supports the following Modbus functions:

- 03 (0x03) Read Holding Registers
- 04 (0x04) Read Input Registers

C.2 Limitations

The MagLink LX Ultimate supports Modbus RTU over RS-485. The Modbus protocol supports up to 10 tanks and up to 10 sensors. The last 3 deliveries for each tank are available.

C.3 Connections

Modbus over RS-485 is available on connector X800 on the main board as shown below.

Pin	Function
2	RS485 A+
3	RS485 B-
4	GND

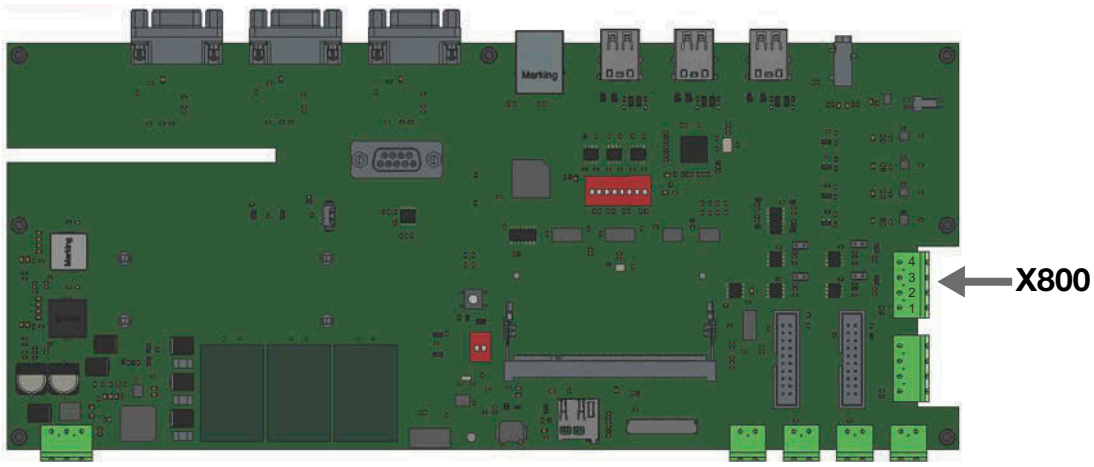


Figure C-1 MagLink LX Ultimate Main Board

C.4 Tanks, alarms, deliveries

Tanks from id 1 to 10 are supported by MODBUS.

The t value can range from 0 to 9 where 0 means tank 1 and 9 means tank 10, e.g. 00201 is the tank status for tank id 3.

Values are presented in units configured in MagLink LX Ultimate ATG.

Exception code 03 is returned if data is unavailable (tank volume is unavailable when probe out alarm is presented).

Last three deliveries are presented. The newest one is tank delivery 1.

Register	MODBUS address	PLC address	Values	Units	Description
tank product code	00t00	40t01			
tank status	00t01	40t02	0,1,2		1 - delivery in progress 2 - leak test in progress
tank volume	00t02	40t03	0 to 65535	gallons / liters	Exception 03 returned if probe out alarm
tank TC volume	00t03	40t04	0 to 65535	gallons / liters	Exception 03 returned if probe out alarm
tank ullage	00t04	40t05	0 to 65535	gallons / liters	Exception 03 returned if probe out alarm
tank height	00t05	40t06	0 to 65535	inches / cm / mm	Exception 03 returned if probe out alarm
tank water level	00t06	40t07	0 to 65535	inches / cm / mm	Exception 03 returned if probe out alarm
tank temperature	00t07	40t08	-32768 to 32767	Fahrenheit / Celsius	Exception 03 returned if probe out alarm
tank water volume	00t08	40t09	0 to 65535	gallons / liters	Exception 03 returned if probe out alarm
tank common alarm	00t09	40t10	0 or 1		1 indicates alarm, for details check registers 00t10 to 00t40
setup data warning	00t10	40t11	0		for compatibility
tank leak alarm	00t11	40t12	0 or 1		
tank HH Water alarm	00t12	40t13	0 or 1		
tank overfill alarm	00t13	40t14	0 or 1		

Register	MODBUS address	PLC address	Values	Units	Description
tank Low Low product alarm	00t14	40t15	0 or 1		
tank sudden loss alarm	00t15	40t16	0 or 1		
tank High product alarm	00t16	40t17	0 or 1		
tank invalid fuel level alarm	00t17	40t18	0		for compatibility
tank probe out alarm	00t18	40t19	0 or 1		
tank Water alarm	00t19	40t20	0 or 1		
tank Low product alarm	00t20	40t21	0 or 1		
tank Safe working capacity alarm	00t21	40t22	0 or 1		
tank gross leak test fail alarm	00t22	40t23	0		for compatibility
tank periodic leak test fail alarm	00t23	40t24	0		for compatibility
tank annual leak test fail alarm	00t24	40t25	0		for compatibility
tank periodic test needed warning	00t25	40t26	0		for compatibility
tank annual test needed warning	00t26	40t27	0		for compatibility
tank periodic test needed alarm	00t27	40t28	0 or 1		
tank annual test needed alarm	00t28	40t29	0		for compatibility
tank leak test active	00t29	40t30	0		
tank no csld idle time warning	00t30	40t31	0		for compatibility
tank siphon break active warning	00t31	40t32	0		for compatibility

Register	MODBUS address	PLC address	Values	Units	Description
tank csld rate increase warning	00t32	40t33	0		for compatibility
tank accuchart calibration warning	00t33	40t34	0		for compatibility
tank hrm reconciliation warning	00t34	40t35	0 or 1		
tank hrm reconciliation alarm	00t35	40t36	0 or 1		
tank cold temperature warning	00t36	40t37	0		
tank missing delivery ticket warning	00t37	40t38	0		for compatibility
tank/line gross leak alarm	00t38	40t39	0		
delivery density warning	00t39	40t40	0		for compatibility
tank unknown alarm	00t40	40t41	0 or 1		AEF separation/water
tank delivery 1 start year	01t00	41t01	0 or 2018 to 2038		0 if delivery unavailable
tank delivery 1 start month	01t01	41t02	0 or 1 to 12		0 if delivery unavailable
tank delivery 1 start day	01t02	41t03	0 or 1 to 31		0 if delivery unavailable
tank delivery 1 start hour	01t03	41t04	0 to 23		0 if delivery unavailable
tank delivery 1 start minute	01t04	41t05	0 to 59		0 if delivery unavailable
tank delivery 1 end year	01t05	41t06	0 or 2018 to 2038		0 if delivery unavailable
tank delivery 1 end month	01t06	41t07	0 or 1 to 12		0 if delivery unavailable
tank delivery 1 end day	01t07	41t08	0 or 1 to 31		0 if delivery unavailable

Register	MODBUS address	PLC address	Values	Units	Description
tank delivery 1 end hour	01t08	41t09	0 to 23		0 if delivery unavailable
tank delivery 1 end minute	01t09	41t10	0 to 59		0 if delivery unavailable
tank delivery 1 start volume	01t10	41t11	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 1 start TC volume	01t11	41t12	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 1 start water	01t12	41t13	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 1 start temperature	01t13	41t14	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 1 end volume	01t14	41t15	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 1 end TC volume	01t15	41t16	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 1 end water	01t16	41t17	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 1 end temperature	01t17	41t18	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 1 start height	01t18	41t19	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 1 end height	01t19	41t20	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 2 start year	01t20	41t21	0 or 2018 to 2038		0 if delivery unavailable
tank delivery 2 start month	01t21	41t22	0 or 1 to 12		0 if delivery unavailable
tank delivery 2 start day	01t22	41t23	0 or 1 to 31		0 if delivery unavailable
tank delivery 2 start hour	01t23	41t24	0 to 23		0 if delivery unavailable
tank delivery 2 start minute	01t24	41t25	0 to 59		0 if delivery unavailable
tank delivery 2 end year	01t25	41t26	0 or 2018 to 2038		0 if delivery unavailable
tank delivery 2 end month	01t26	41t27	0 or 1 to 12		0 if delivery unavailable

Register	MODBUS address	PLC address	Values	Units	Description
tank delivery 2 end day	01t27	41t28	0 or 1 to 31		0 if delivery unavailable
tank delivery 2 end hour	01t28	41t29	0 to 23		0 if delivery unavailable
tank delivery 2 end minute	01t29	41t30	0 to 59		0 if delivery unavailable
tank delivery 2 start volume	01t30	41t31	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 2 start TC volume	01t31	41t32	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 2 start water	01t32	41t33	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 2 start temperature	01t33	41t34	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 2 end volume	01t34	41t35	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 2 end TC volume	01t35	41t36	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 2 end water	01t36	41t37	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 2 end temperature	01t37	41t38	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 2 start height	01t38	41t39	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 2 end height	01t39	41t40	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 3 start year	01t40	41t41	0 or 2018 to 2038		0 if delivery unavailable
tank delivery 3 start month	01t41	41t42	0 or 1 to 12		0 if delivery unavailable
tank delivery 3 start day	01t42	41t43	0 or 1 to 31		0 if delivery unavailable
tank delivery 3 start hour	01t43	41t44	0 to 23		0 if delivery unavailable
tank delivery 3 start minute	01t44	41t45	0 to 59		0 if delivery unavailable
tank delivery 3 end year	01t45	41t46	0 or 2018 to 2038		0 if delivery unavailable

Register	MODBUS address	PLC address	Values	Units	Description
tank delivery 3 end month	01t46	41t47	0 or 1 to 12		0 if delivery unavailable
tank delivery 3 end day	01t47	41t48	0 or 1 to 31		0 if delivery unavailable
tank delivery 3 end hour	01t48	41t49	0 to 23		0 if delivery unavailable
tank delivery 3 end minute	01t49	41t50	0 to 59		0 if delivery unavailable
tank delivery 3 start volume	01t50	41t51	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 3 start TC volume	01t51	41t52	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 3 start water	01t52	41t53	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 3 start temperature	01t53	41t54	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 3 end volume	01t54	41t55	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 3 end TC volume	01t55	41t56	0 to 65535	gallons / liters	0 if delivery unavailable
tank delivery 3 end water	01t56	41t57	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 3 end temperature	01t57	41t58	-32768 to 32767	Fahrenheit / Celsius	0 if delivery unavailable
tank delivery 3 start height	01t58	41t59	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank
tank delivery 3 end height	01t59	41t60	0 to 65535	inches / cm / mm	0 if delivery unavailable or manifolded tank

C.5 Sensors

The MagLink LX Ultimate support many types of sensors and presents them in two groups.

Sensors from id 1 to 10 are supported by MODBUS.

The s value can range from 0 to 9 where 0 means sensor 1 and 9 means sensor 10, e.g. 03400 is the sensor common alarm register for sensor id 5.

C.5.1 Group one

- Interstitial Sensor-Float Switch (Small Plastic)
- Sump Sensor-Float Switch (Large Plastic)
- Liquid Only Float Sensor (Brass)
- Dual Float Non-Discriminating Dispenser Sump Sensor
- Dual Float Non-Discriminating STP Sump Sensor
- Dual Float Brine Sensor for Containment Sump
- Dual Float Brine Sensor for Fiberglass Tanks
- Hydrocarbon Vapor Sensor
- Generic Float Sensor NO
- Generic Float Sensor NC
- Wired discriminating
- 1 Ch Wireless
- 2 Ch Wireless
- Wired non discriminating

Map of registers for those sensors:

Register	MODBUS address	PLC address	Values	Units	Description
sensor common alarm	03s00	43s01	0 or 1		1 indicates alarm, for details check registers 03s01 to 03s10
sensor setup data warning	03s01	43s02	0		for compatibility
sensor fuel alarm	03s02	43s03	0 or 1		
sensor out alarm	03s03	43s04	0 or 1		
sensor short alarm	03s04	43s05	0 or 1		
sensor water alarm	03s05	43s06	0 or 1		
sensor water out alarm	03s06	43s07	0		for compatibility
sensor high liquid alarm	03s07	43s08	0 or 1		
sensor low liquid alarm	03s08	43s09	0 or 1		
sensor liquid warning	03s09	43s10	0 or 1		
sensor unknown alarm	03s10	43s11	0		for compatibility

Sensors generate different types of alarms described in table.

	sensor common alarm	sensor setup data warning	sensor fuel alarm	sensor out alarm	sensor short alarm	sensor water alarm	sensor water out alarm	sensor high liquid alarm	sensor low liquid alarm	sensor liquid warning	sensor unknown alarm
Interstitial Sensor-Float Switch (Small Plastic)	X		X	X							
Sump Sensor-Float Switch (Large Plastic)	X		X	X							
Liquid Only Float Sensor (Brass)	X		X	X							
Dual Float Non-Discriminating Dispenser Sump Sensor	X			X	X			X		X	
Dual Float Non-Discriminating STP Sump Sensor	X			X	X			X		X	
Dual Float Brine Sensor for Containment Sump	X			X	X			X	X		
Dual Float Brine Sensor for Fiberglass Tanks	X			X	X			X	X		
Hydrocarbon Vapor Sensor	X		X	X	X						
Generic Float Sensor NO	X			X	X						
Generic Float Sensor NC	X			X	X						
Wired discriminating	X		X	X		X					
1 Ch Wireless	X		X	X							
2 Ch Wireless	X		X	X		X					
Wired non discriminating	X		X	X							

C.5.2 Group two

- Discriminating Dispenser Sump Sensor
- Discriminating STP Sump Sensor
- Discriminating Interstitial Sensor (Optical)
- 6ft. (183 cm) HC Liquid Sensor with water indicator
- 15ft. (457 cm) HC Liquid Sensor with water indicator
- 20ft. (610 cm) HC Liquid Sensor with water indicator
- Interstitial HC Liquid with water indicator

Map of registers for those sensors:

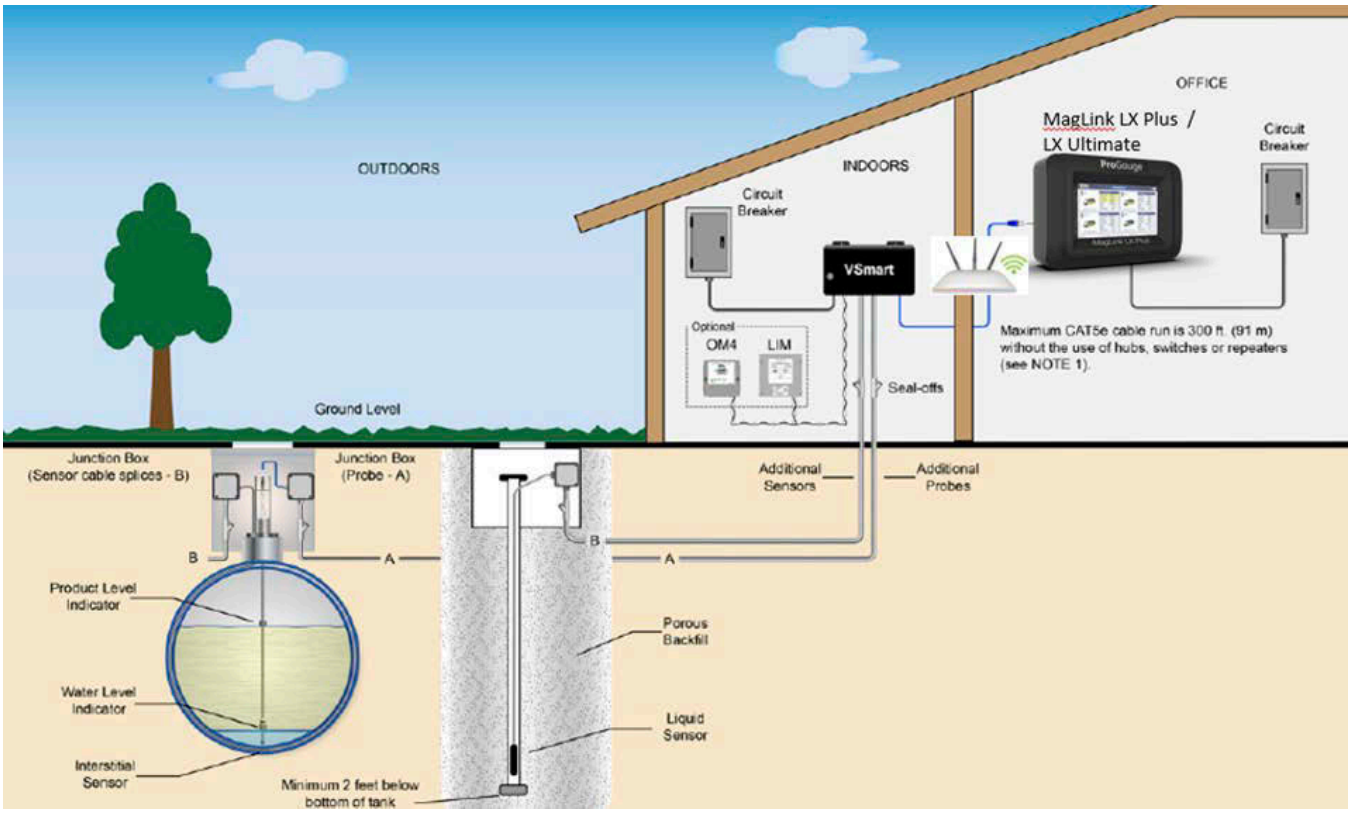
Register	MODBUS address	PLC address	Values	Units	Description
smart sensor common alarm	03s00	43s01	0 or 1		1 indicates alarm, for details check registers 03s01 to 03s18
smart sensor setup data warning	03s01	43s02	0		for compatibility
smart sensor communication alarm	03s02	43s03	0 or 1		
smart sensor fault alarm	03s03	43s04	0 or 1		
smart sensor fuel warning	03s04	43s05	0		for compatibility
smart sensor fuel alarm	03s05	43s06	0 or 1		
smart sensor water warning	03s06	43s07	0		for compatibility
smart sensor water alarm	03s07	43s08	0 or 1		
smart sensor high liquid warning	03s08	43s09	0 or 1		
smart sensor high liquid alarm	03s09	43s10	0 or 1		
smart sensor low liquid warning	03s10	43s11	0		for compatibility
smart sensor low liquid alarm	03s11	43s12	0		for compatibility

Register	MODBUS address	PLC address	Values	Units	Description
smart sensor temperature warning	03s12	43s13	0		for compatibility
smart sensor relay active	03s13	43s14	0		for compatibility
smart sensor install alarm	03s14	43s15	0		for compatibility
smart sensor sensor fault warning	03s15	43s16	0		for compatibility
smart sensor vacuum warning	03s16	43s17	0		for compatibility
smart sensor no vacuum warning	03s17	43s18	0		for compatibility
smart sensor unknown alarm	03s18	43s19	0		for compatibility

The alarms generated by the sensors are shown in the table.

	smart sensor common alarm	smart sensor setup data warning	smart sensor communication alarm	smart sensor fault alarm	smart sensor fuel warning	smart sensor fuel alarm	smart sensor water warning	smart sensor water alarm	smart sensor high liquid warning	smart sensor high liquid alarm
Discriminating Dispenser Sump Sensor	X		X	X		X			X	X
Discriminating STP Sump Sensor	X		X	X		X			X	X
Discriminating Interstitial Sensor (Optical)	X		X					X		X
6ft.(183 cm) HC Liquid Sensor with water indicator	X		X	X				X		X
15ft.(457 cm) HC Liquid Sensor with water indicator	X		X	X				X		X
20ft.(610 cm) HC Liquid Sensor with water indicator	X		X	X				X		X
Interstitial HC Liquid with water indicator	X		X	X				X		X

Appendix D OPW VSmart Module Connection to MagLink LX Plus / LX Ultimate via TCP/IP



With the optional VSmart LAN function, Ethernet connections are the only option to establish communications between the console and a VSmart module. For this type of connection an Ethernet cable is run between devices at a maximum length of 300 feet (92 m). This distance can be extended through the use of hubs and routers.

To make connection through a network, connect the console to one node on the network and the VSmart Module to another node.

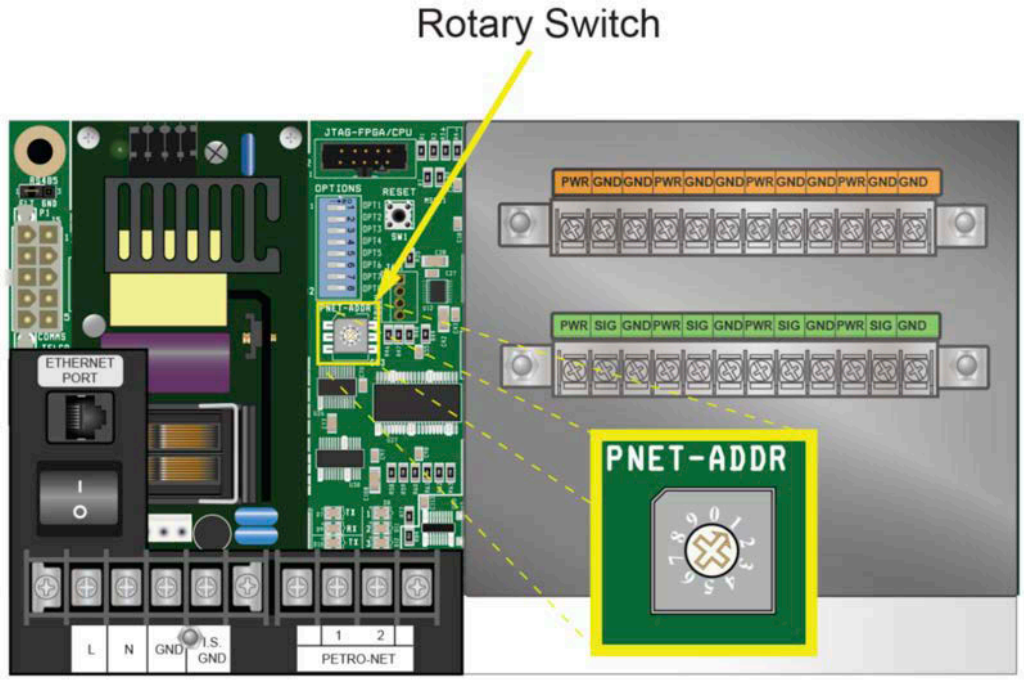
NOTE: *The VSmart module must be ordered with this option.*

IMPORTANT: *The use of conduit to protect the cable is recommended if more than 6 feet (1.85 m) of cable is necessary.*

It is advised that the console is set on DHCP at the network configuration. The Ethernet module on the VSmart module is by default set on DHCP and it will also acquire an IP address automatically from the network.

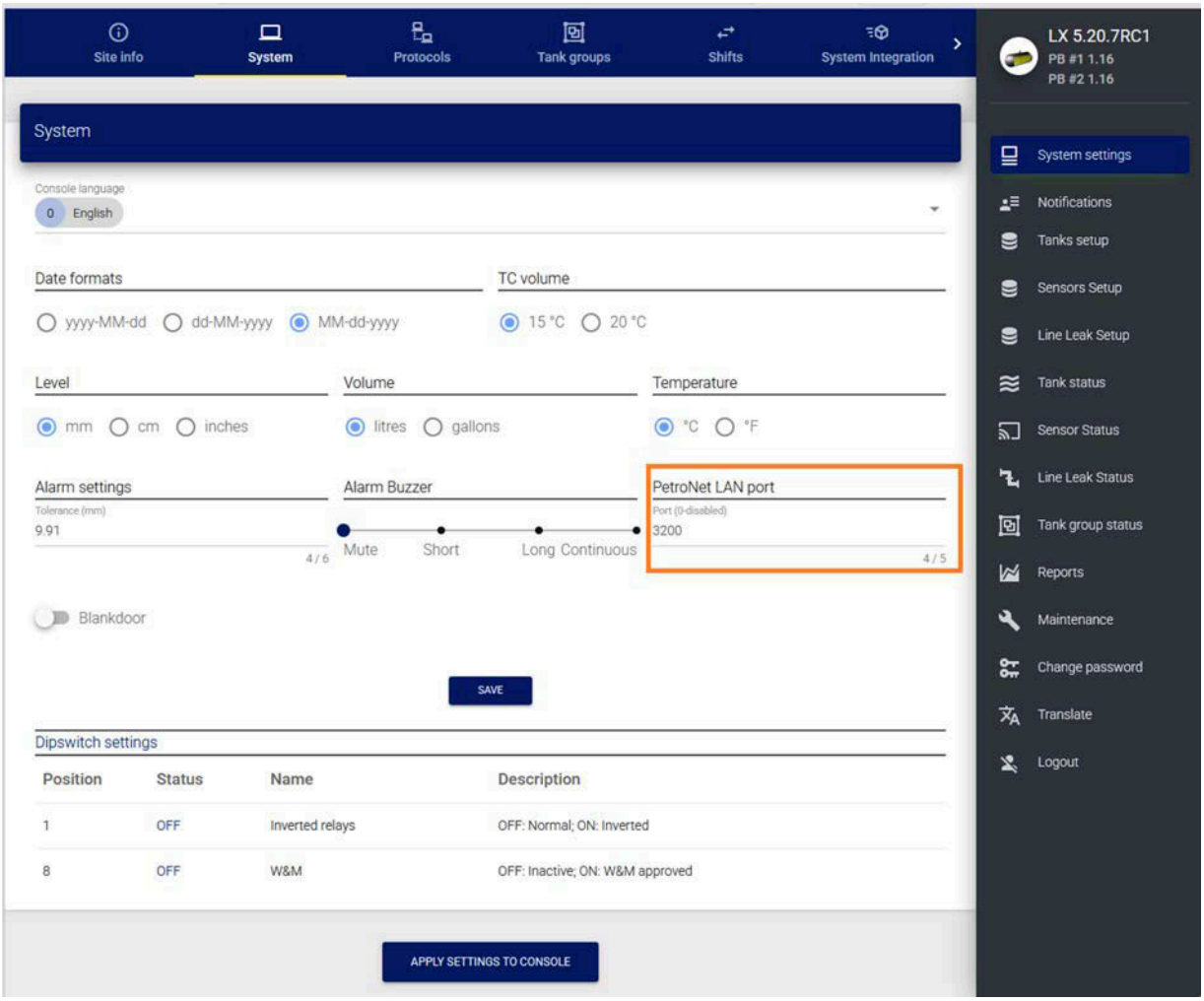
NOTE: *The DHCP server must be set on the network. If the network was set on DHCP after the VSmart was connected, then the VSmart should be restarted in order to acquire new LAN parameters.*

If connecting multiple VSmart modules to the network then it must be ensured that each module has a different Id. This is done via the rotary selector on the VSmart main board.



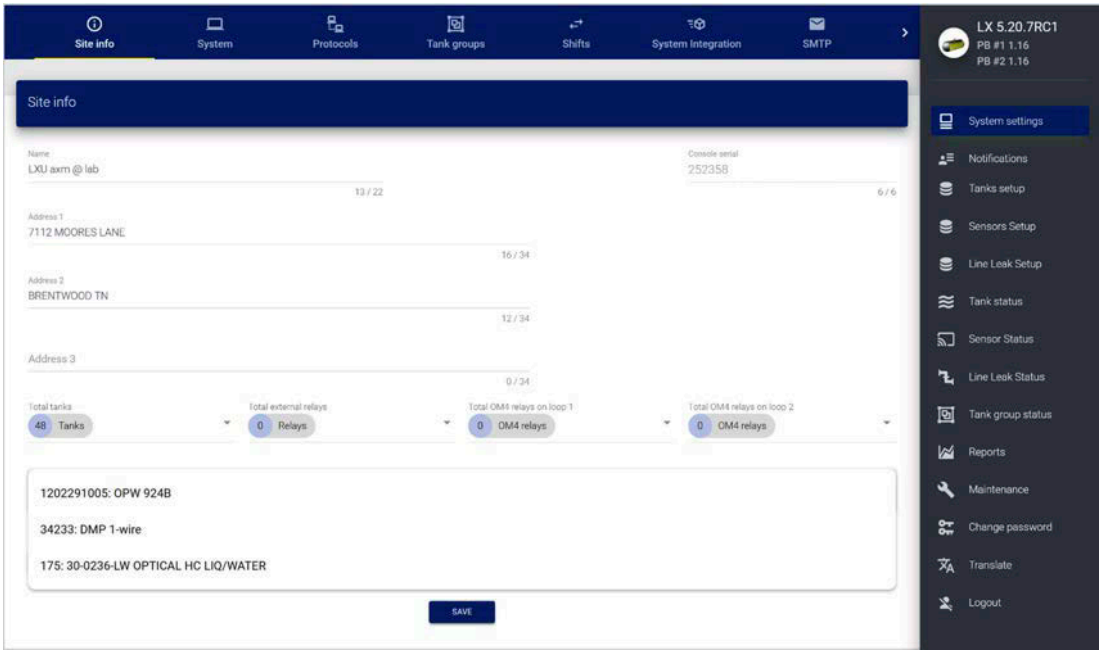
D.1 MagLink Configuration

The MagLink communication with a VSmart over ethernet is enabled by setting the “PetroNet LAN port” at 3200 at (System settings/System menu).

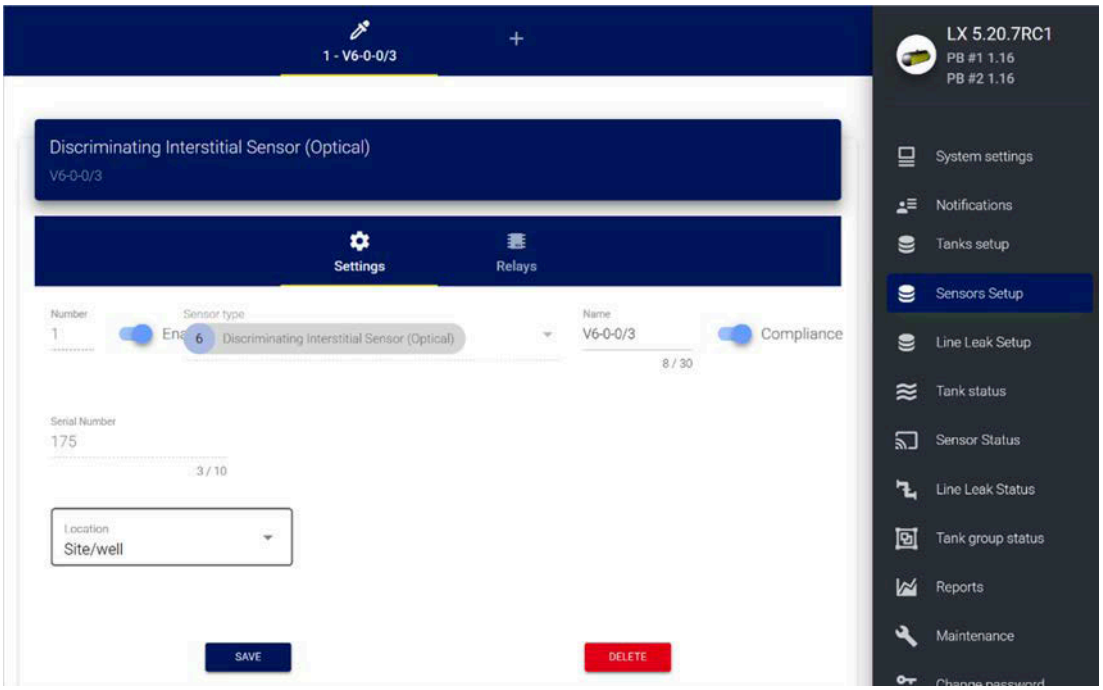


D.2 Device Detection

At the Site Info menu, hit the “Detect” button. Devices connected on the VSmart module will appear on the drop down menu once the detection process has completed.



Smart sensors connected to an Ethernet VSmart module will appear on the Sensors Setup menu with a Vx prefix in the sensor name where the "x" represents the VSmart Id. In the example below, the sensor V6-0-0/3 is connected to the VSmart with Id 6.



Appendix E Equipment fault alarms and their causes

A list of common fault alarms related to the malfunctioning of equipment and their causes are shown in the tables below.

Table E-1 Probe Fault Alarms

Alarm	Description	Possible Cause
No Link	The console does not communicate with the probe	Probe serial number configured incorrectly
		I.S barrier channel faulty
		Probe cabling problem
		Wrong probe protocol type e.g RS485 probe connected to 1-wire ISB.
		Probe hardware fault
Data Error	The probe communicates with the controller but there is an error in the data	Wrong water float configuration or floats missing
		Wrong density float configuration e.g density float configured when not physically installed
		Wrong floats installed e.g XMT floats installed on a DMP probe
		Probe hardware fault

Table E-2 Sensor Fault Alarms

Alarm	Description	Possible Cause
No Link	The console does not communicate with the sensor	I.S barrier channel faulty (for digital smart sensors on ISB)
		Sensor cabling problem (for digital smart sensors on ISB)
		Digital smart sensor iSIM hardware fault
		ProGauge I/O module not communicating with the console (for analog sensors via I/O)
Open	For digital smart sensors only: no connection with the sensing element	The cable to the digital smart sensor is disconnected
		Digital smart sensor iSIM hardware fault

Table E-3 PLLD Fault Alarms

Alarm	Description	Possible Cause
No STP Link	The console does not communicate with the LIM	Wiring problem
		Electromagnetic interference caused by STP contactor. Ensure noise suppressors are installed.
		LIM hardware fault
No Link	The console does not communicate with the DAS or I/O PLLD module	Wiring problem
		DAS or I/O PLLD hardware fault
Pressure Low	Low pressure in the pipeline detected either during dispensing or during an idle period	Malfunctioning STP check valve
		Malfunctioning STP (perhaps 3-phase supply wired incorrectly)
Leak	A leak in the pipeline was detected	Leak in the pipeline
		Incorrect Beta pipe stiffness configured
		Incorrect pipeline volume configured
Large Leak	Excessive product loss from the tank was detected during a leak test	Large leak
		Sticky product float
		Abnormal tank chart

Table E-4 Tank Special Alarms

Alarm	Description	Possible Cause
Leak	A leak in the tank was detected following a leak test	Leak in the tank
		Incorrect tank leak threshold configured
		Incorrect tank table configured
		Excessive ground vibration
		Excessive product evaporation (for gasoline tanks)
Sudden Loss	A volume decrease was detected after the site close time	Theft of product
		Incorrect sudden loss threshold configured
		Incorrect site close time configured

Appendix F DEF/AdBlue Recirculation and Monitoring (MagLink LX Ultimate only)

Diesel Exhaust Fluid (DEF) also named as AdBlue is a crucial additive for diesel powered vehicles, required by law in many countries for modern diesel vehicles. DEF/AdBlue is to be stored within the temperature range 12°F (-11°C) and 86°F (+30°C) to prevent premature degradation of the solution.

The MagLink LX Ultimate console has the “DEF/AdBlue Recirculation” feature that can automatically pump the liquid through the forward and return pipes to keep its temperature within the acceptable range. See *Figure F-1*.

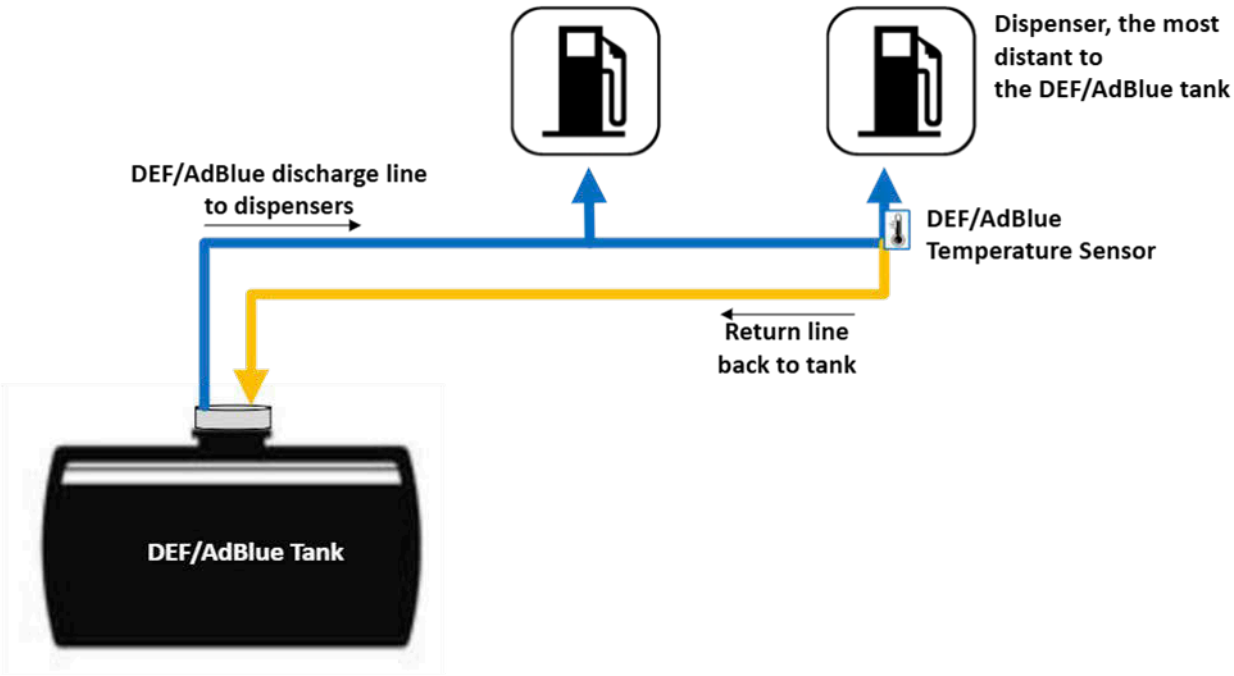


Figure F-1 DEF/AdBlue Main Components Diagram

An external Temperature Sensor that monitors the temperature of the liquid in the pipeline is required. This temperature sensor must connect the LX Ultimate console via an iSIM board so that it will get detected through the ISB.

The console monitors the temperature in the pipeline and it can automatically turn ON and OFF the DEF/AdBlue pump in order to recirculate the liquid and maintain its temperature within the acceptable limits. At the same time the console aims to run the pump in the most efficient way so as to minimize wear and unnecessary starts/stops.

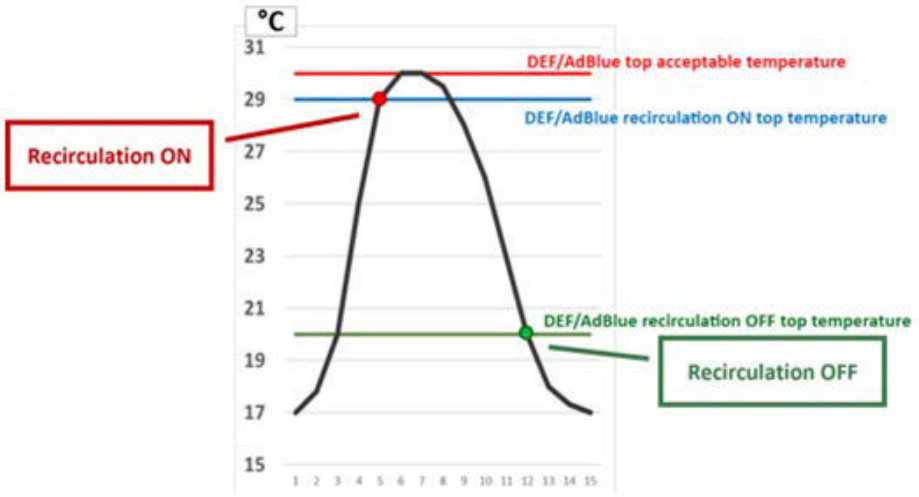


Figure F-2 Recirculation activation and deactivation at high temperature (actual temperatures may vary)

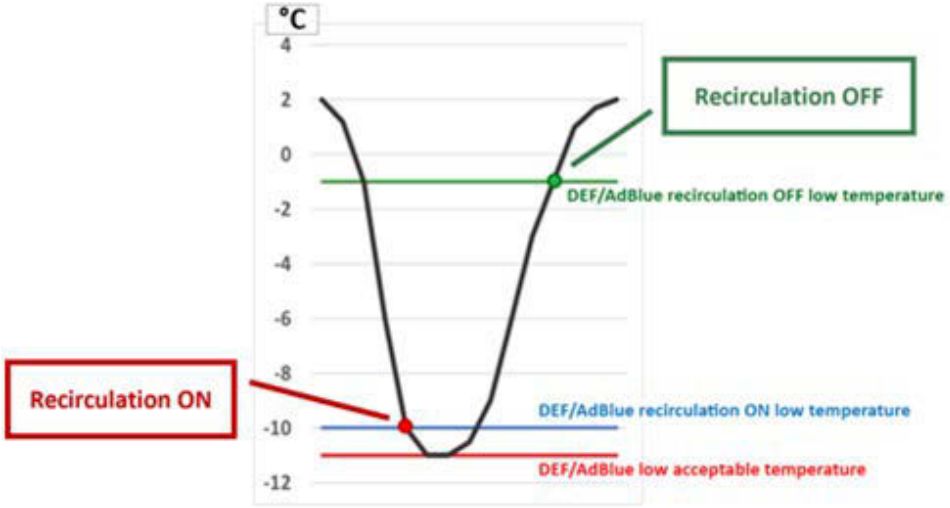


Figure F-3 Recirculation activation and deactivation at low temperature (actual temperatures may vary)

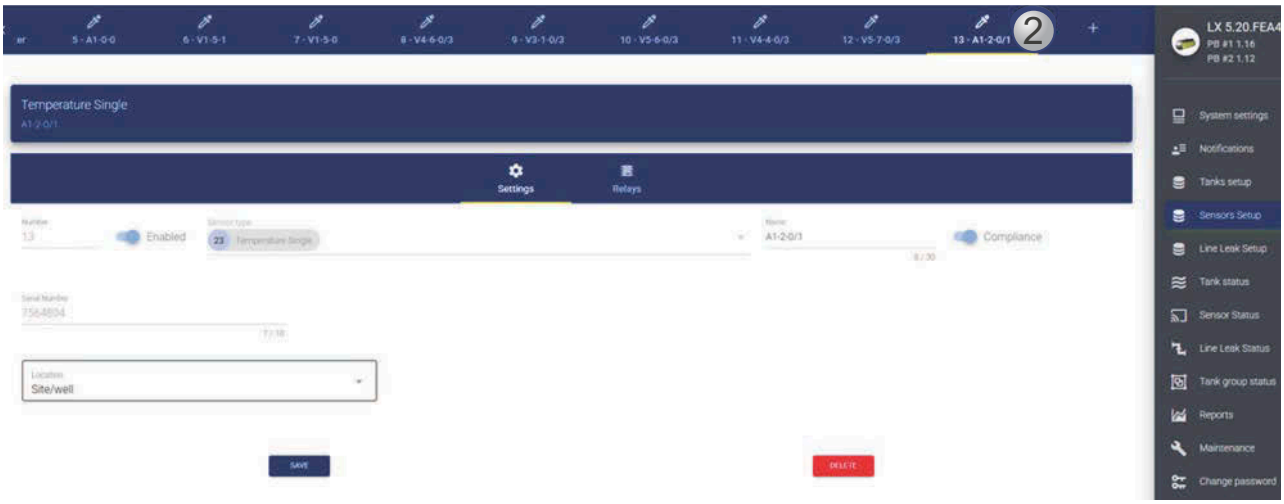
F.1 Requirements

- MagLink LX Ultimate console with software version 5.20.5 or higher
- Tank configured with DEF/AdBlue product and probe
- Temperature sensor with iSIM, located in the pipeline

F.2 Recirculation Configuration

A temperature sensor with an iSIM must be detected in the System Settings / Site Info menu at the “Detect” drop down list (Item 1)

In the Sensors setup menu the temperature sensor must be enabled (Item 2).



At the Tank setup menu, the tank must be configured to have the product DEF or Adblue (Item 3). Note that when such a product is selected, the tab “Recirculation” appears (Item 4).

Within the tank setup, at the “Thresholds” menu, a High and a Low temperature threshold need to be configured; these will be the limits of the optimal range of the liquid.

At the “Recirculation” menu configure the options below.

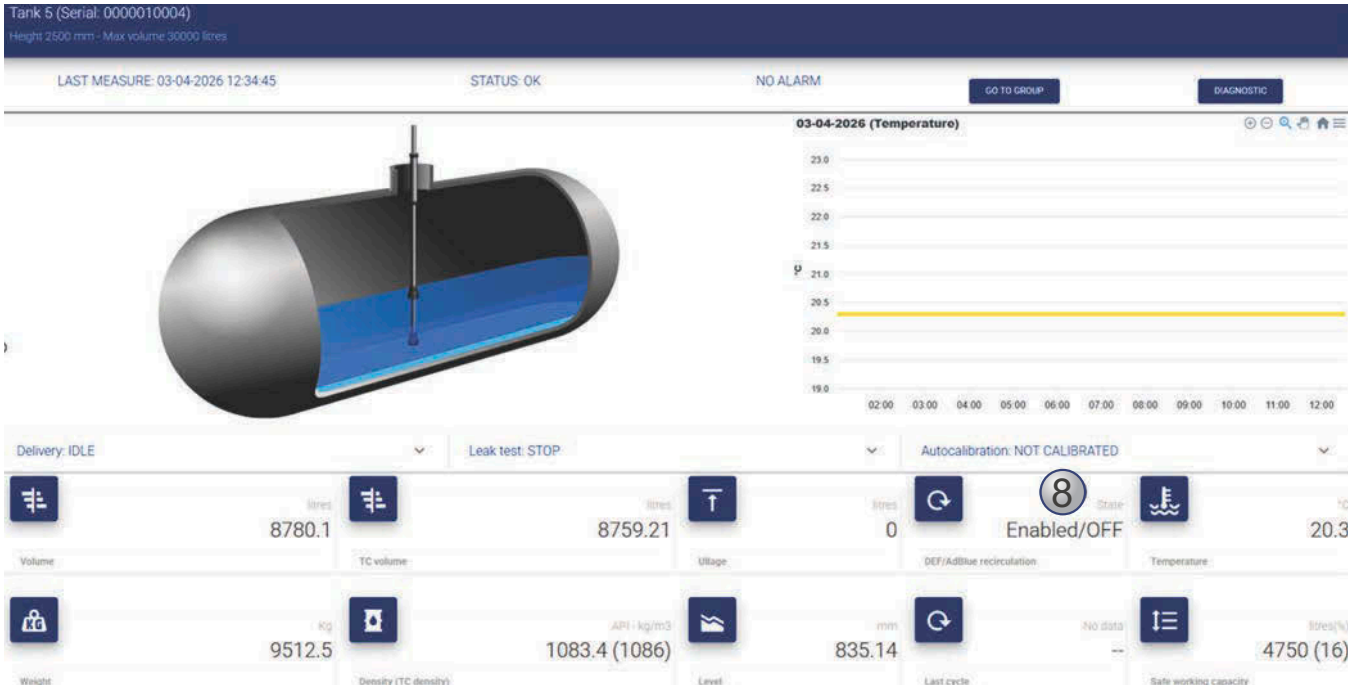
- **Automatic mode enabled (Item 5):** The automatic recirculation process can be enabled or disabled. Disabling this process means that the device responsible for circulating the product will not be activated automatically. However, even with automatic recirculation turned off, the system will continue to monitor temperature alarms according to the configured threshold settings and alarms related to the product temperature in the tank will still be generated if thresholds are crossed.
- **Location (Item 6):** Select the temperature sensor that is monitoring the temperature in the pipeline of this tank.
- **Activation (Item 7):** Select the device that will activate/deactivate the pump. This can be:
  - a LIM device or a Relay on a ProGauge I/O module
  - an Internal Relay
  - a Relay on a OM4 module

  A LIM and a OM4 module need to be detected before they can be used for activation.

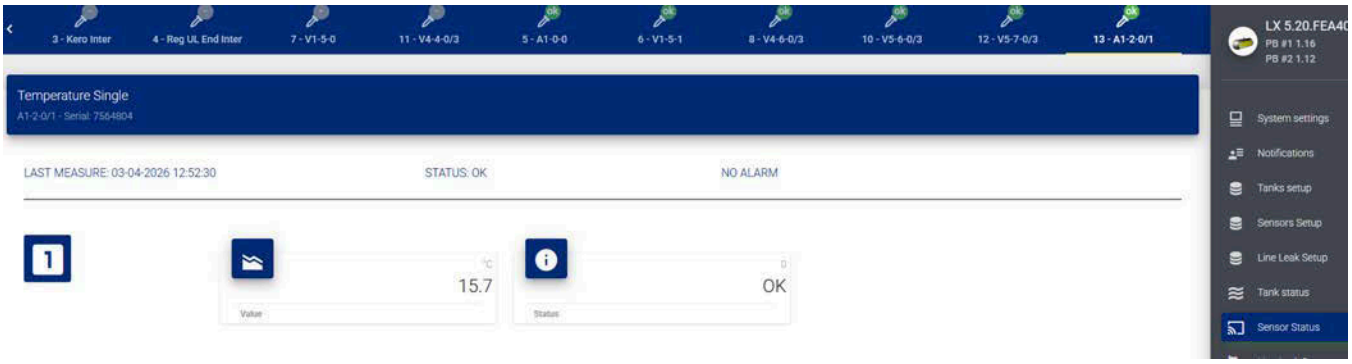
  A ProGauge I/O module with relays needs to be configured at the System Settings / Site Info menu before it can be used.

F.3 Recirculation Status Monitoring

At the Tank Status screen, there is an icon for the Recirculation state (Item 8) which indicates whether the Automatic Recirculation is Enabled or Disabled and if Enabled it indicates the current status i.e whether the recirculation is ON (pump ON recirculating the liquid) or OFF (pump OFF). Take note that the temperature shown in the Tank Status screen refers to the in-tank temperature as measured by the tank probe.



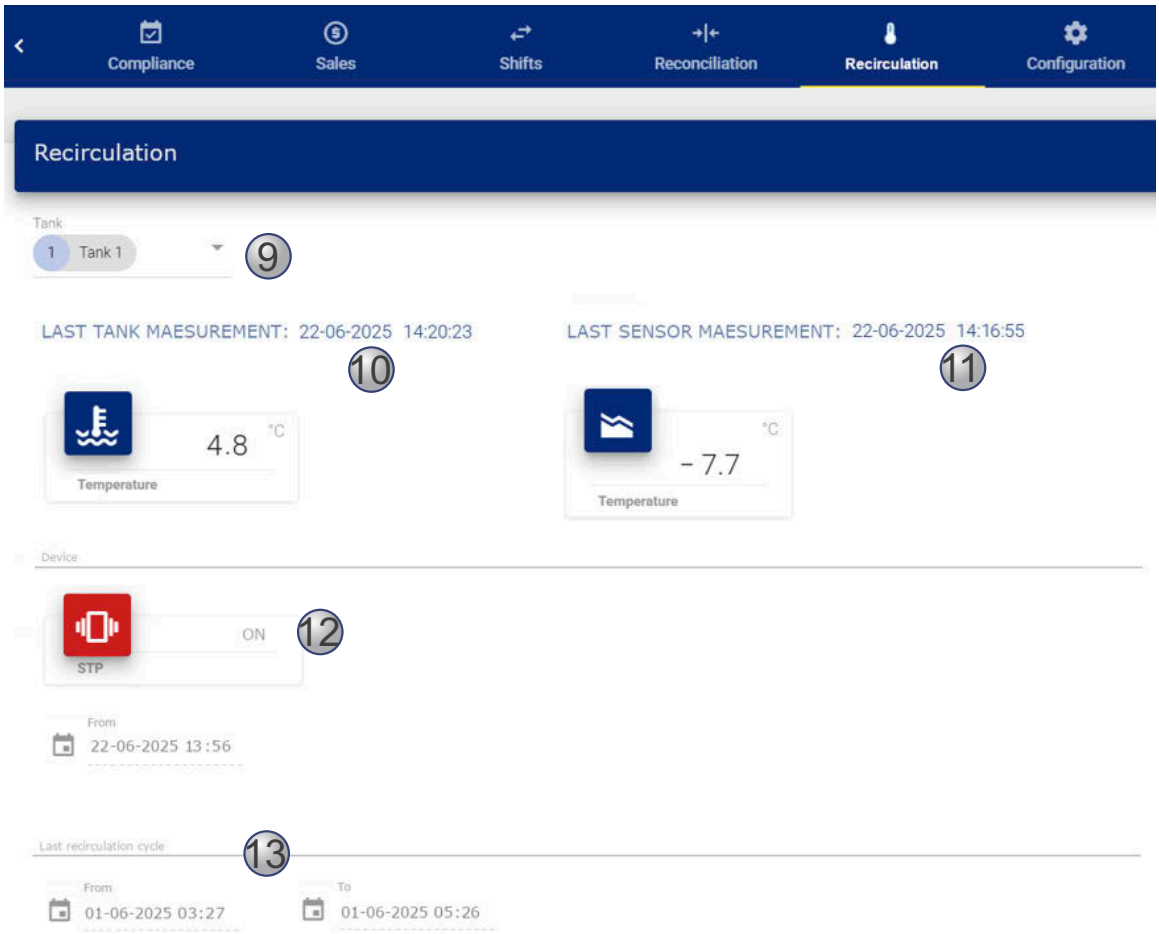
At the Sensors Status menu, when selecting the relevant temperature sensor, the temperature and the status of the sensor are displayed.



At the Reports menu, select the Tank (Item 9) where the DEF/AdBlue monitoring is taking place and the “Recirculation” report will show the information below:

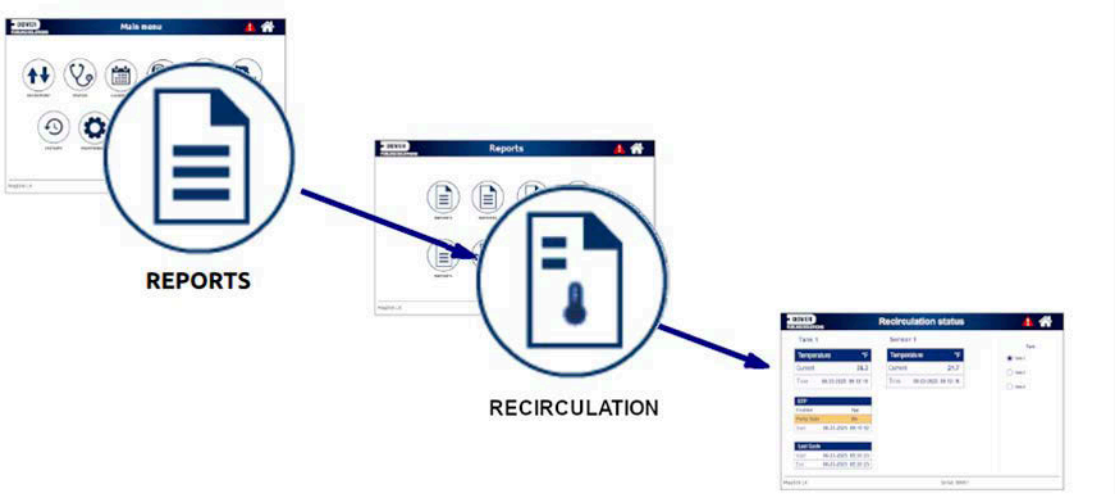
- The in-tank temperature (Item 10) as measured by the tank probe
- The temperature (Item 11) as measured by the external temperature sensor
- The status of the Activation device (Item 12) and if the device is currently active it will show the exact activation time

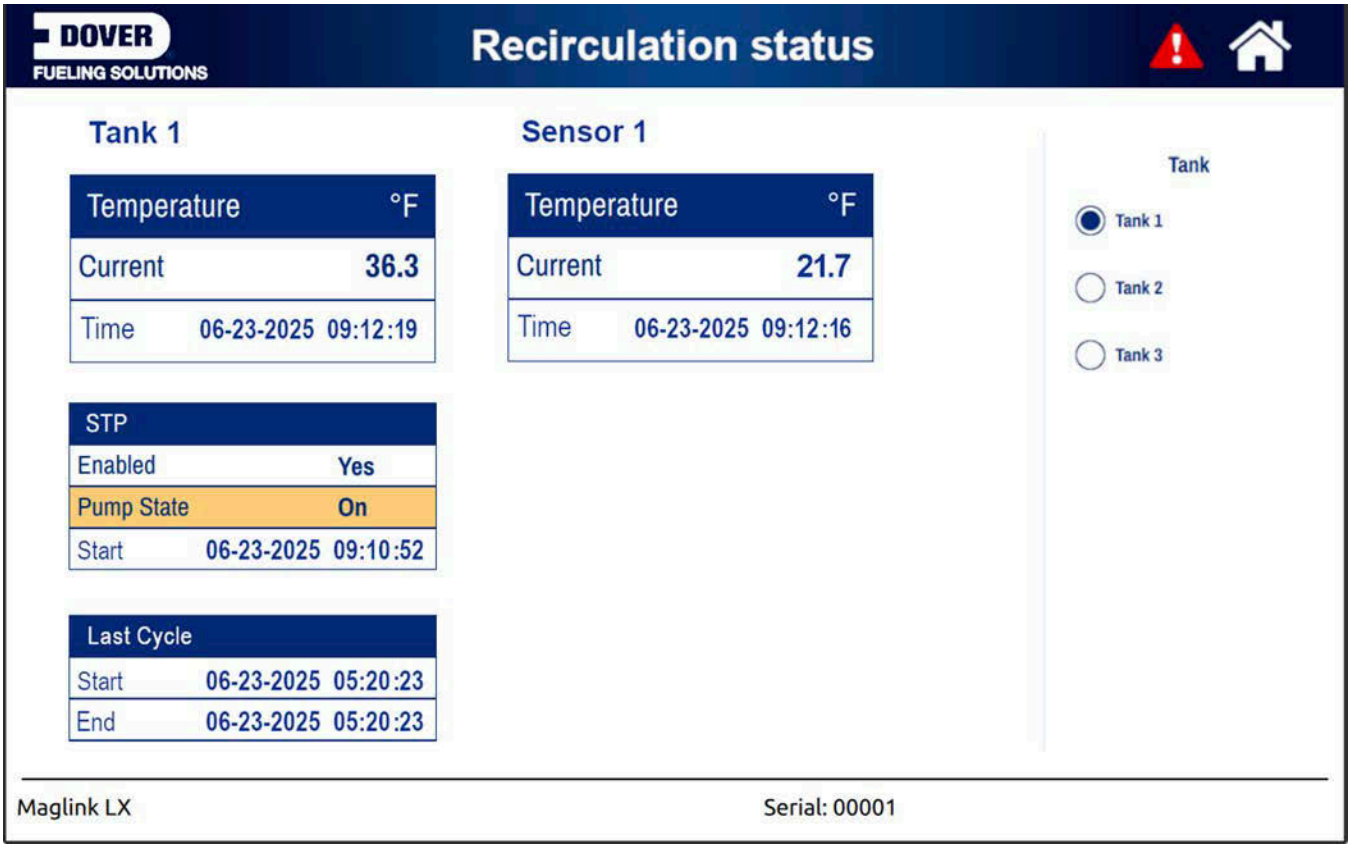
- The most recent complete recirculation cycle (Item 13) showing both the date and time when the cycle started and when it ended



F.4 Recirculation Report on the User Interface Display

At the Reports menu, the Recirculation report will display the details regarding the recirculation process. This data refreshes automatically every several seconds to ensure operators always see up-to-date information.





Appendix G MagLink Anywhere Mobile Application Setup

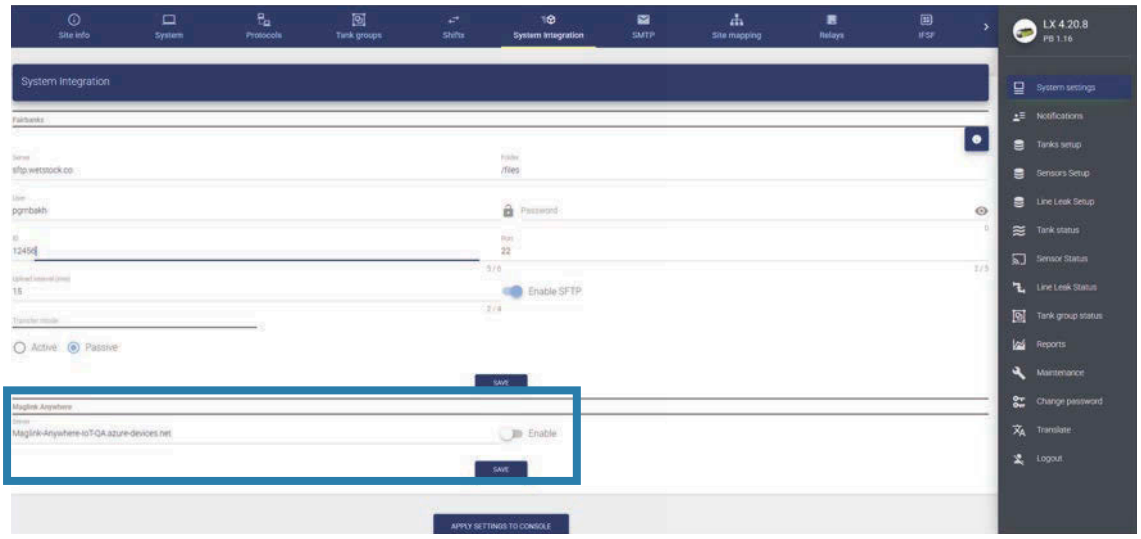
The MagLink Anywhere is a mobile application that enable users with the functionality to see essential information from MagLink LX ATG consoles on their smartphone / tablet. The information available includes:

- Basic site/console data
  - Site name
  - Console model and software version
  - Communication status with the console
- Tank information
  - Tank id and title/description
  - Probe model and serial number
  - Product
  - Probe communication status
  - Tank status
  - Tank inventory
  - Latest delivery data

The process involves the pairing of the console with the DFS cloud that manages the data.

G.1 Console Configuration

The functionality can be enabled or disabled (default setting) at the System Integration menu of the System Settings. Enabling the functionality allows the integration of the console with the DFS cloud. The server should be kept to default unless otherwise instructed by DFS.

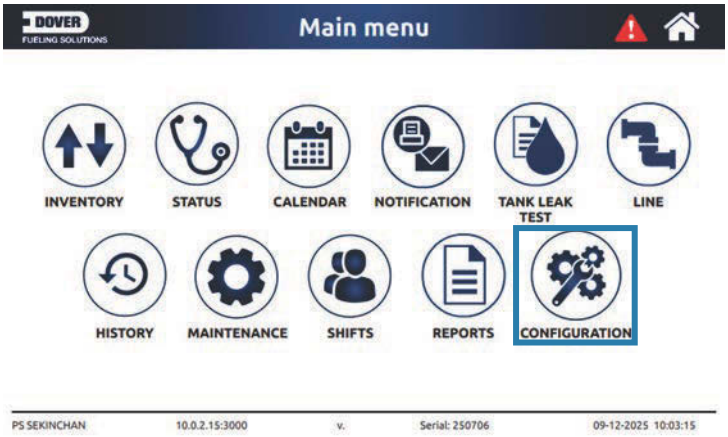


G.2 Pairing the Console with the Cloud

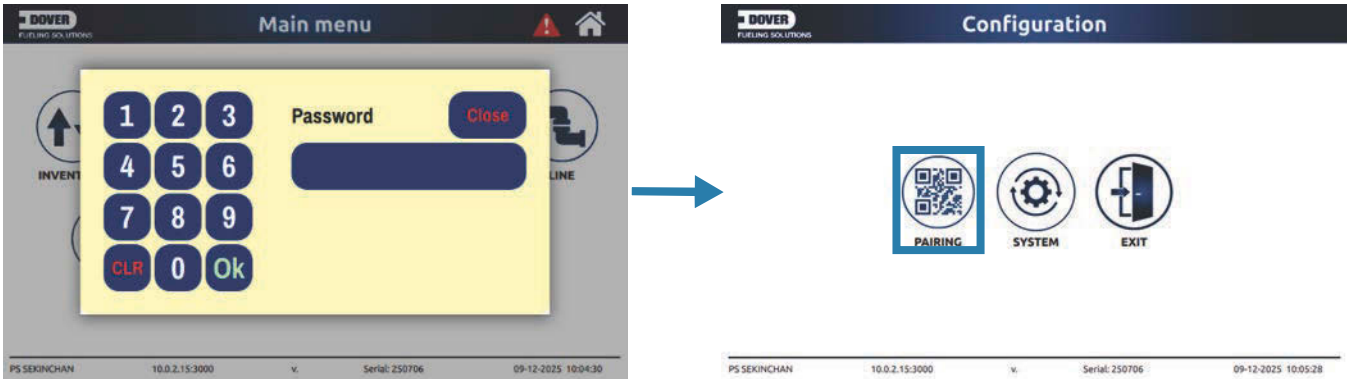
To pair the console with the DFS cloud the user must have installed the MagLink Anywhere application on a smartphone/tablet device (contact DFS tech support for this resource). Multiple consoles can be paired on one smartphone application.

Follow the steps below to perform the pairing:

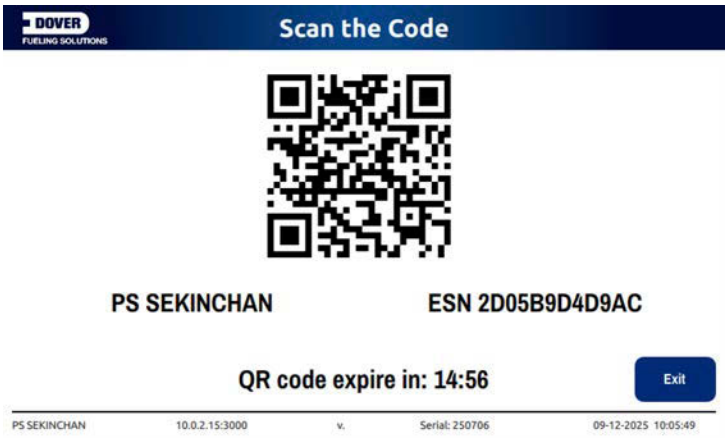
1. On the Main menu of the Graphical User Interface (display) select **Configuration**.



2. Enter the numerical password and select **Pairing**.

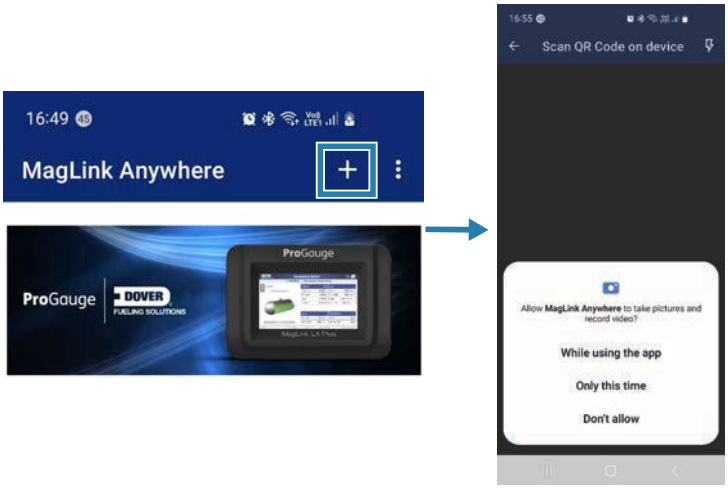


3. A QR code will appear which will need to be scanned with the mobile application.

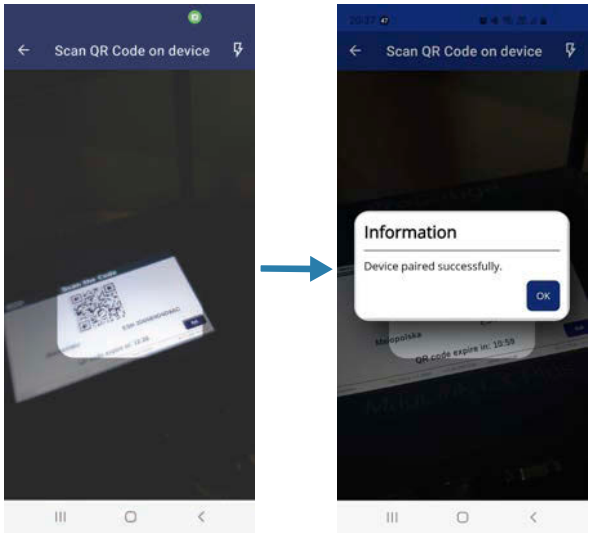


4. Start the MagLink Anywhere application on your smartphone/tablet device.

5. Click on the “+” sign and allow access to the camera when prompted.



6. Scan the QR code. Upon successful pairing, the notification will appear.

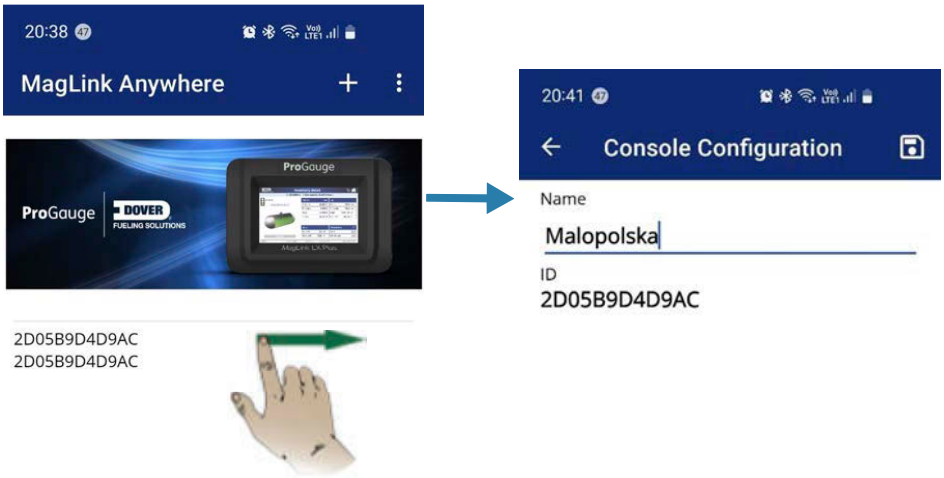


NOTE: *If the pairing is unsuccessful check that:*

- -The console has access to the internet
- -The date and time are set correctly-The MagLink Anywhere function is enabled at the System Integration configuration menu.

7. On the home screen of the app, the device Id of the console will be displayed.

8. To add a name to the console that has been paired, swipe the id to the right and edit the name.



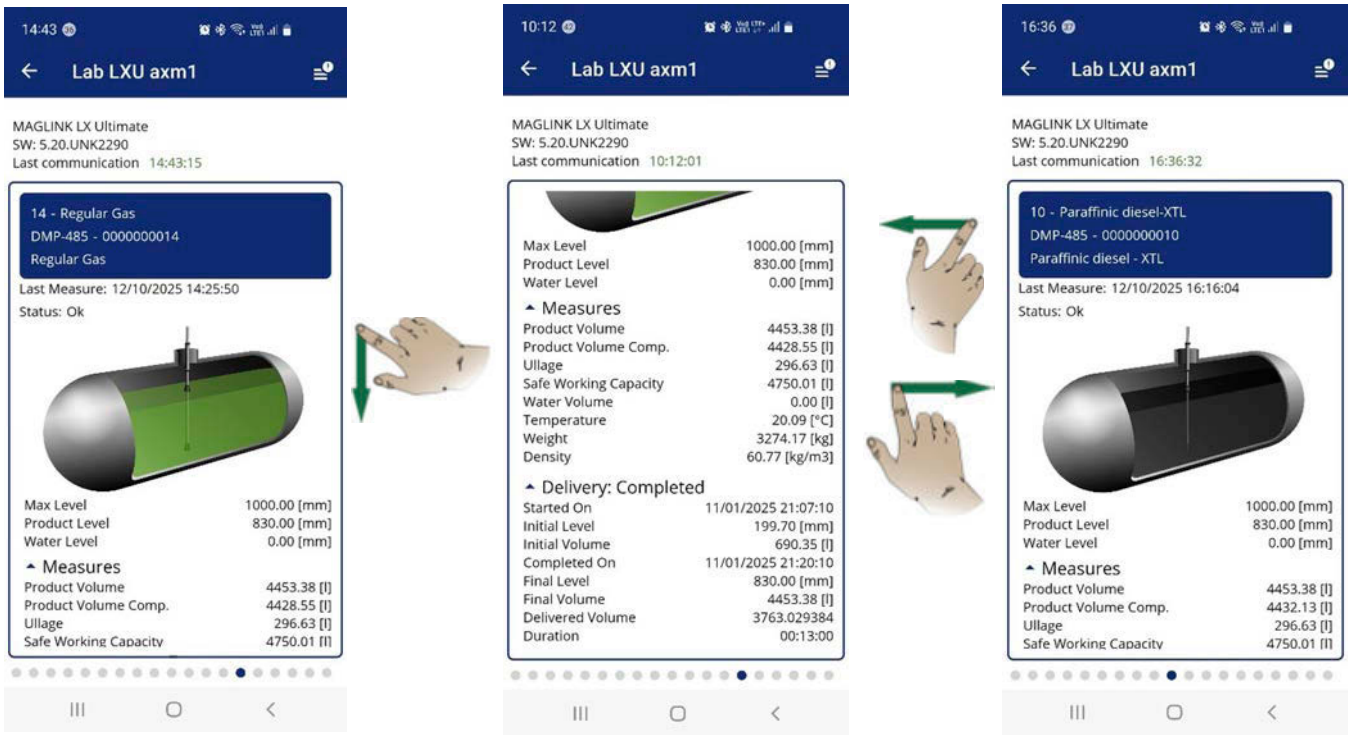
9. To delete a paired console if required, swipe the id to the left and hit the Delete button.

G.3 Viewing ATG Data on the MagLink Anywhere App

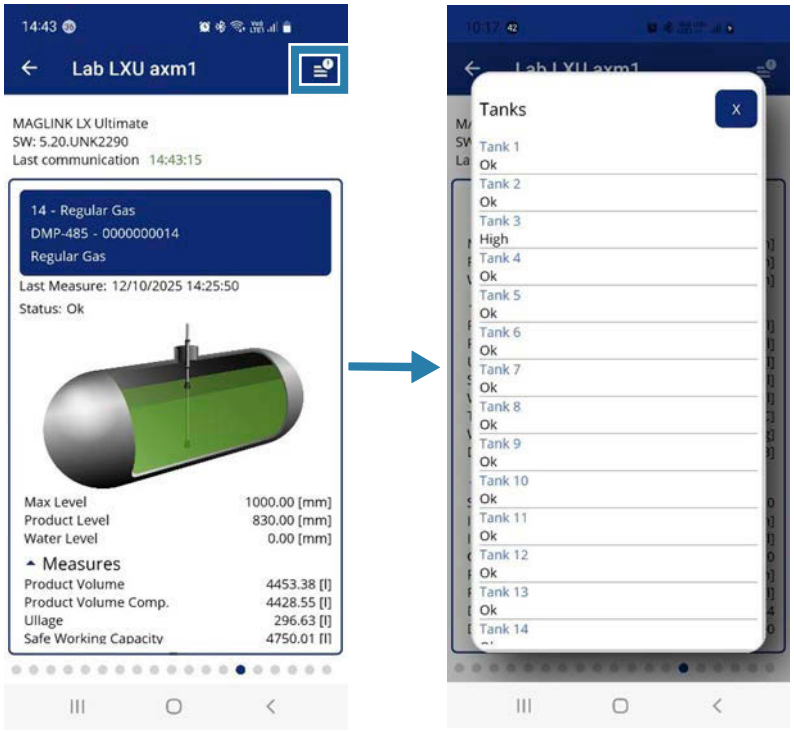
At the home screen, double tap on the console to connect.

The tank status will display the console type, software version, last communication timestamp with the cloud, product, probe type and serial number, tank inventory and last delivery details.

Swiping left or right will move to the previous / next tank.



To view the tanks list and alarms, tap the menu icon at the top right.



Revisions-M2051

NOTE: *It is possible that older software versions might not support all features*

Revision #	ECO	Effective	Software Version	Key Changes
11	GWJ	04/15/2026	4.20.8 / 5.20.8	General Updates, added VSmart, Equipment Alarms, DEF Recirculation, MagLink Anywhere appendices.
10	GWJ	7/7/2025	4.20.4	Added Modbus RTU
9	GWJ	6/9/2025	4.20.3	Added Russian to languages. Updated screenshots for System, Protocols, Tank Setup. Added “Petronet LAN port”, “Security code”, “Printer paper cut”, offset calculation, Scheduled Actions, Lift-off level. Updated Leak test threshold, relay alarms.
8	DB	7/25/2024	4.19.11	General Updates, Login P/Ws, Blankdoor, TSG DCD, End of Day (Shifts)
7	DB	7/1/2024		SMTP Port options note
6	NA/WP/DB	6/17/24		Security Best Practices, secure browser instructions
5.1	LC/DB	3/22/2024		Add LX Ultimate
5	DB	11/21/2023		CSLD setup and reports.
4	DB	9/11/2023		General Updates, screen updates, add languages, new AEF w/PG and OPW, PLLD, PLLD-DAS, Siemens LR120 Radar setup. Added Relays
3	1998	3/14/2022		General Updates, screen updates, AEF Thresholds, Sensor relays.
2	1944	10/8/2021		New Start Italiana address, update ip address set up, available languages, new system screen, removed DIP-Switch section, Density and ACR Results update, new Tech Support procedure.
1	1836	12/3/2020		Added Autocalibration and Reconciliation. Updated screens and procedures
0	1784	8/19/20		Initial Release

Configuration

ProGauge MagLink LX 4®, LX Plus® and LX Ultimate®

M2051

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