Newflow

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LACT-Pro® TANK Configuration & User Manual

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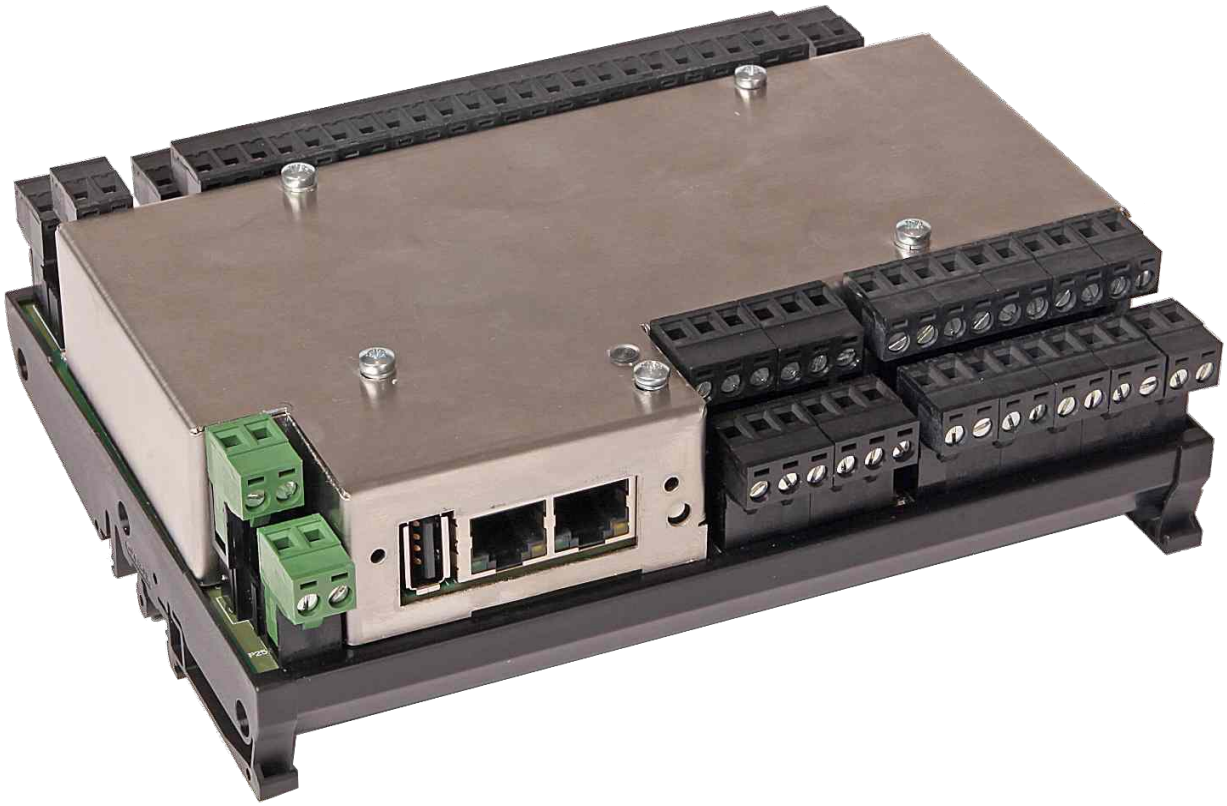

Tank Status		
Bullet Tank #1	Bullet Tank #2	Bullet Tank #3
HC 150.69 bbls	HC 85.38 bbls	HC 215.38 bbls
Rising		
Press Display To Continue / Pantalla Pulse Para Continuar		
Bullet Tank #4	Vertical Tank #1	
HC 223.88 bbls	Water 223.61 bbls	

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1 Introduction

The TANK-Pro® is one of a range of applications designed specifically to automate and regulate the movements of crude oil from small scale production areas to crude gathering and pipeline injection points.

By recording flow at the gathering point, and making the information immediately available in an electronic form, disputes can be readily resolved, and transportation losses minimised, adding significant transparency to the process.

TANK-Pro has been designed specifically for the loading of trucks from storage tanks equipped with electronic level gauging. Up to 6 tanks can be measured by a single TANK-Pro controller and the product can be Hydrocarbons or waste/produced water.

The range of applications available include:

- **LACT-Pro®** Optimized for Truck Loading Applications, off-loading to day tanks with measurement of produced water.
- **LACT-Pro® PI** For pipeline injection
- **MASS-Pro™** Tanker loading using Scales
- **ACT-Pro™ MS** Multi-Sampler ACT off-loading Application
- **LACT-Pro® TANK** Truck loading using tank gauging

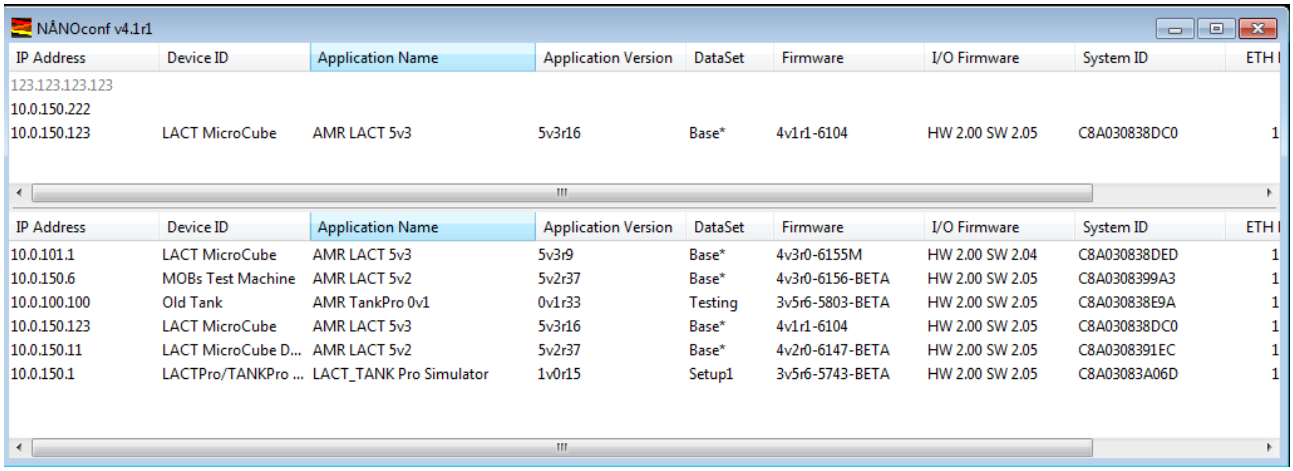
In addition to this manual, a range of further documentation is available, which includes:

- Micro³ ™ Installation Manual
- TANK-Pro® Modbus Manual
- TANK-Pro® Reports Manual
- Micro³ ™ XML Manual
- LACT-Pro® TANK Local Panel / Driver Manual

2 Loading the Application

If the required version of LACT-Pro® TANK controller is already loaded into the Micro³ ™ unit, and the IP address of the unit is known, then skip this section, and proceed to Section 3, Configuring the Application.

Loading of applications, and a host of additional tasks can be accomplished with the MicroConf program. A screenshot of a Windows PC running MicroConf is shown below.



The MicroConf program shows two panes when started. The upper pane is used to display machines that are being actively managed, with known and fixed IP address, and the lower pane shows all the machines that have been discovered using the Micro³ hardware form of Zero-Configuration networking.

Each machine is shown on a separate row, and there are 10 columns of information shown for each machine, which are explained in the table below.

NOTE: MicroConf has the concept of Local and Remote machines. A local machine is one that is available over an office LAN, which supports the full range of TCP/IP commands, and allows broadcast messages to be sent. A remote machine is one with more limited connectivity, internet connected, but outside the corporate firewall, and hence having restricted TCP/IP connectivity, and with broadcast messages filtered out.

The Micro³ Zero-Configuration networking eliminates the highly frustrating and convoluted methods needed to set up some Ethernet enabled equipment. There is no requirement to change either your PC/Laptop's IP address or subnet in order to connect to a Micro³, even if it has been set on addresses outside the range used on the LAN network.

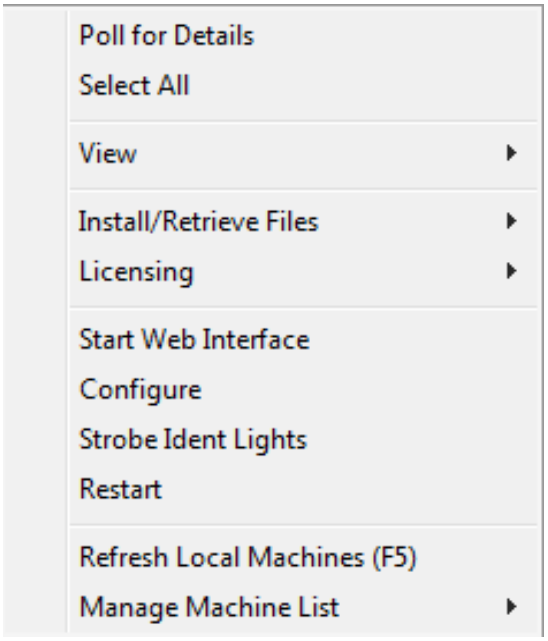
IP Address	This column shows the IP addresses in IPv4 quad-dotted decimal representation.
Device ID	The Device ID is a user changeable field that can be used to differentiate between machines.
Application Name	This is the name given to the application by the application developer and is not changeable.
Application Version	This shows the Application Version number.

DataSet	Applications may have several sets of default constants and default settings, for example a USC DataSet, may have inches, bbls and US calculations whereas a Metric DataSet could be in centimeters, Cubic Meters with ISO calculations selected. This column shows which DataSet was selected during the installation of the application.
Firmware	This column shows the version number of the run-time firmware resident.
I/O Firmware	This column shows the version number of the I/O processor firmware resident.
System ID	This is a unique hardware identifier of each machine listed.
ETH Port	This column shows which Ethernet Interface (ETH1 or ETH2) on each Micro³ is connected to the machine running MicroConf.
Comment	This shows the Device ID, unless a comment has been previously saved to a machine using MicroConf. The comment is changed in the Configure (Machine) right-click options.

MicroConf is a deceptively powerful program. Although it only appears to have two similar panes, without tabs or menu items, access to the additional functions is obtained by the use of the right-click mouse button.

If you left-click on the line which shows the Micro³ machine you wish to interact with, the line will be highlighted.

If you now right-click whilst pointing at the highlighted line, the menu shown here on the right will be displayed. All of the menu items are shown as available. If you do not highlight a line and right click over white space on the screen, then the menu displayed will have most of the items shown "grayed-out" indicating these options are not available for use.



For example you cannot install an application if you have not selected a target device.

It is possible to select more than one Micro³ using the shift and control keys, in line with the usual Windows conventions. When you right-click after selecting more than one Micro³, you will get a different selection of options in the right-click menu.

Poll for Details	This will bring up a small window, confirming the IP address selected and it will attempt to contact the addressed unit, and will display the connection status.
Select All	This will select all the machine in the pane where the mouse cursor resides.
View	There are 3 sub-menus for this menu, these are: **Filters** - Allows the user to filter each column, which is helpful when a large number of machines are being maintained. **Log Window** - This option opens a 3rd pane below the two standard panes and additional information can be displayed. **Debug** - When this option is enabled, the verbose low level message data is shown in the Log window.
Install/Retrieve Files.	There are 5 sub-menus for this menu, these are: **Install Application** - This option is only available when one or more machines have been selected. Selecting this option will open a File Explore type window, so the user can navigate to where the relevant application file is stored. Application files have a .CCC extension. **NOTE:** To install an application or firmware to a Micro³ device, the Admin password of the unit is required. The user will also need to know which DataSet to install. **Get a Backup of the Running Application** - This option is only available when one or more machines have been selected. An explorer style window is opened, and the user prompted to save the application on to the PC. Backing up an Application allows machines to be replaced with ease, and allows cloning of multiple LACT-Pro® controllers. **Get System Event Log** - This item is available if only one machine has been selected and allows the Linux operating system debug log to be saved to the PC. This is for debugging purposes only and will not be required during normal operation. **Update Firmware** - This item is available if one or more machines have been selected, and is used to update the system firmware. The Admin password of the unit will be required. **Update I/O Firmware** - This is similar in operation to the sub-menu above, but is used to update the I/O Processor firmware.
Licensing	Licensing is not currently used with the LACT-Pro® Tank application.
Start Web Interface	This item is only available when one machine has been selected. Selecting this option will start the PC/Laptop's default browser and load the selected IP address into the browser.
Configure (Machines)	This item is only available when one machine has been selected. Selecting this option opens the Configure Machine window. This shows the Network settings for each of the Ethernet Interfaces. Ethernet Interface 1 has a check box for DHCP. If selected, this network interface will be given its setting by the DHCP server. If the box is not checked, the user can then enter the IP address, the Netmask and the Gateway in standard quad-dotted notation. The second port does not support DHCP, and is fixed as a static address. The second port does not support a gateway.

Strobe Ident Lights	This item is only available when one machine has been selected, and causes the LACT-Pro® controller hardware ident light to flash. **NOTE:** Depressing the Ident Switch on the LACT-Pro® controller hardware will also cause the Ident Light to flash and the selected unit will also be highlighted in the MicroConf window.
Restart	This sub-menu items is only available when one machine has been selected. Restart causes the selected LACT-Pro® controller to warm start, as if power cycled. **NOTE:** To restart a Micro³ device via MicroConf, the Admin password of the unit is required.
Refresh Local Machines (F5)	This option is available with none, one or several machines selected. This action forces the auto-discovery mechanism to do an immediate check for machines that may be on the Local Area Network (LAN).
Manage Machine List	This option is used to select which machines appear in the managed (upper) pane. There are 4 sub-menus available: **Add** - This option is always available, and allows the user to type in an IP address or a range of addresses. **NOTE:** The user can highlight one or more machines in the discovered (lower) pane, and drag them to the upper pane to add them to the managed list. **Remove** - This option is only available with one or more of the managed machines selected in the upper pane. **Import** - With the cursor in the managed (upper) pane, this option opens an explorer style dialog, a nanolist file (.nnl suffix) can then be selected, and the upper window will be populated. **Export** - This allows the user to export the list of managed machines in .nnl format. One or more managed machines must be selected, this option then exports the details of the only the selected machines to the .nnl list.

3 Configuring the Application

This section of the manual assumes that the TANK-Pro® application has been installed, and the address of the machine is known. This document explains how the application is configured to match the site.

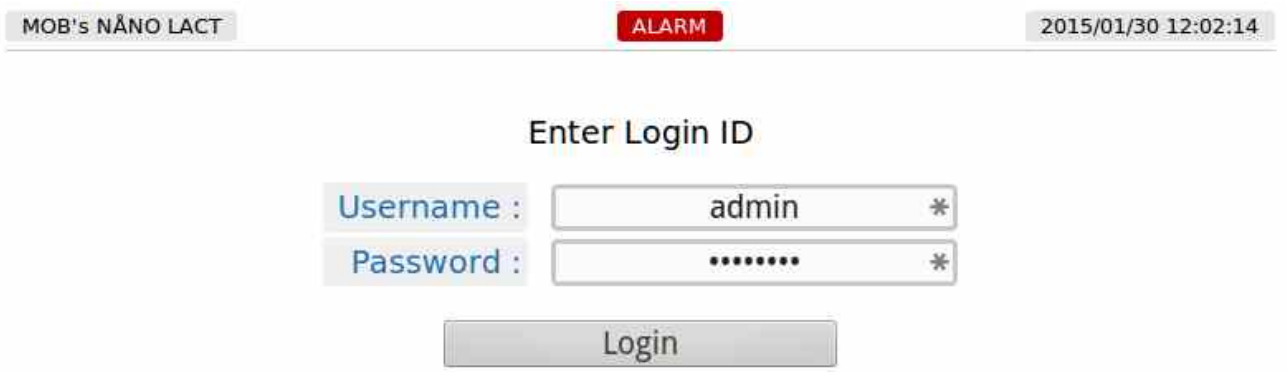
There are a number of site specific options that need to be configured before the controller will provide useful results.

These options can be grouped as:

- Initial System Setup, such as the Lease ID and Device ID and the number of tanks
- Matching the application to the site P&ID, including the tank setup and I/O assignments
- System Setup, including controller specific items such as Network Settings and Users
- Communications Setup, including Printer and Report Routing, Local Panel and Comms links
- Final Field Set-up, Units, Auxiliary Inputs and Atmospheric Pressure
- Field Calibration, commissioning tools and diagnostics

The following configuration sequence is recommended, but not obligatory. The menu structure is dynamic, and as items are selected or deselected, associated information may appear or be hidden.

Once you had identified the physical TANK-Pro® controller, using MicroConf, you can right click on the unit you wish to set-up, and select "Start Web Interface". Alternatively, take a note of the IP address, open a web browser (Firefox, Chrome or Safari are preferred) and type the LACT-Pro® controller's IP address into the browser's address bar and press ENTER.



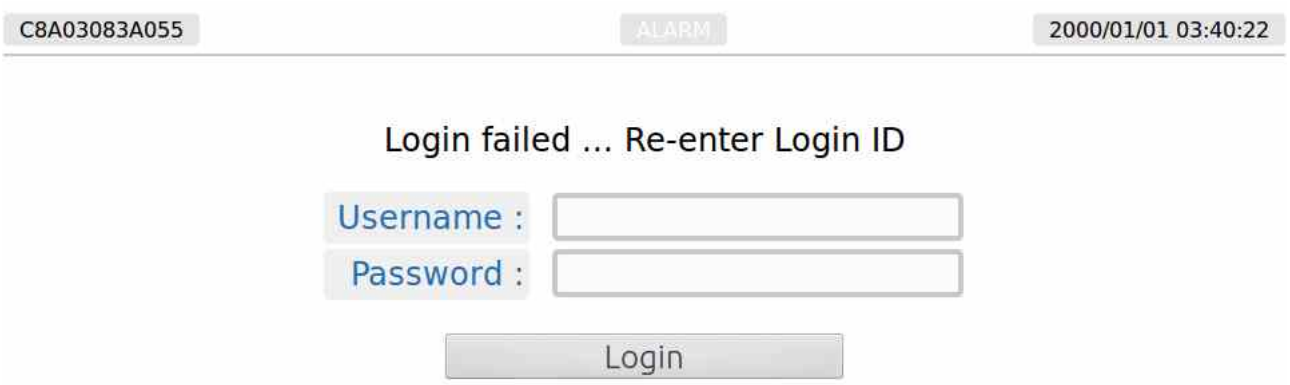
The default Login screen will be displayed, as shown above.

Unless someone has already configured the machine, and changed the login credentials, the user name will be admin, and the password will be 00000000 (that is the number zero repeated 8 times)

After typing the password, you can press the 

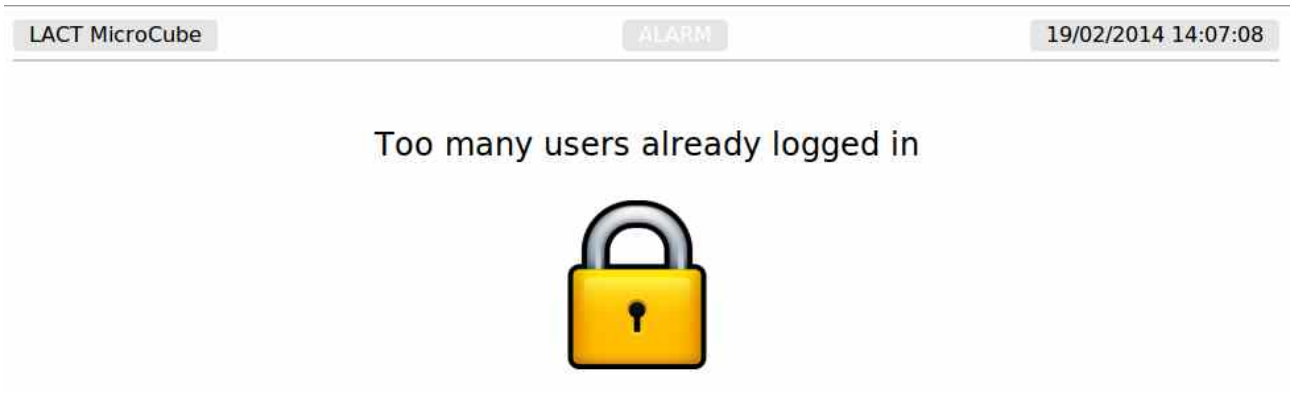
key on the keyboard (works with most browsers) or click the Login button, which will work for all browsers.

If the Password and/or Username have been changed from the default, then you will see this:

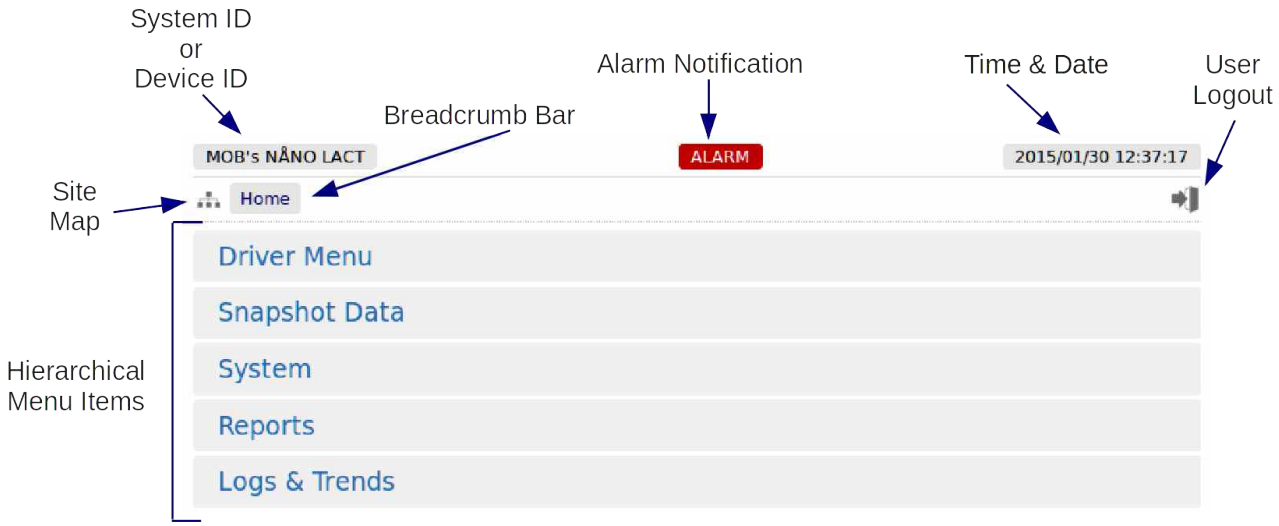


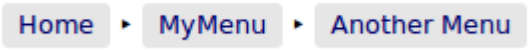
NOTE: If the Password & Username combination for the machine cannot be determined, then there is no back-door method of logging into the LACT-Pro® controller. The passwords cannot be recovered, but the machine can be reset to factory defaults, but this will remove the LACT-Pro® application.

NOTE: The maximum number of concurrent web browser connections is 4. If this is exceeded, the following screen is displayed.



Assuming that the user limit has not been exceeded and you login correctly, then the home screen will be displayed, as shown below.



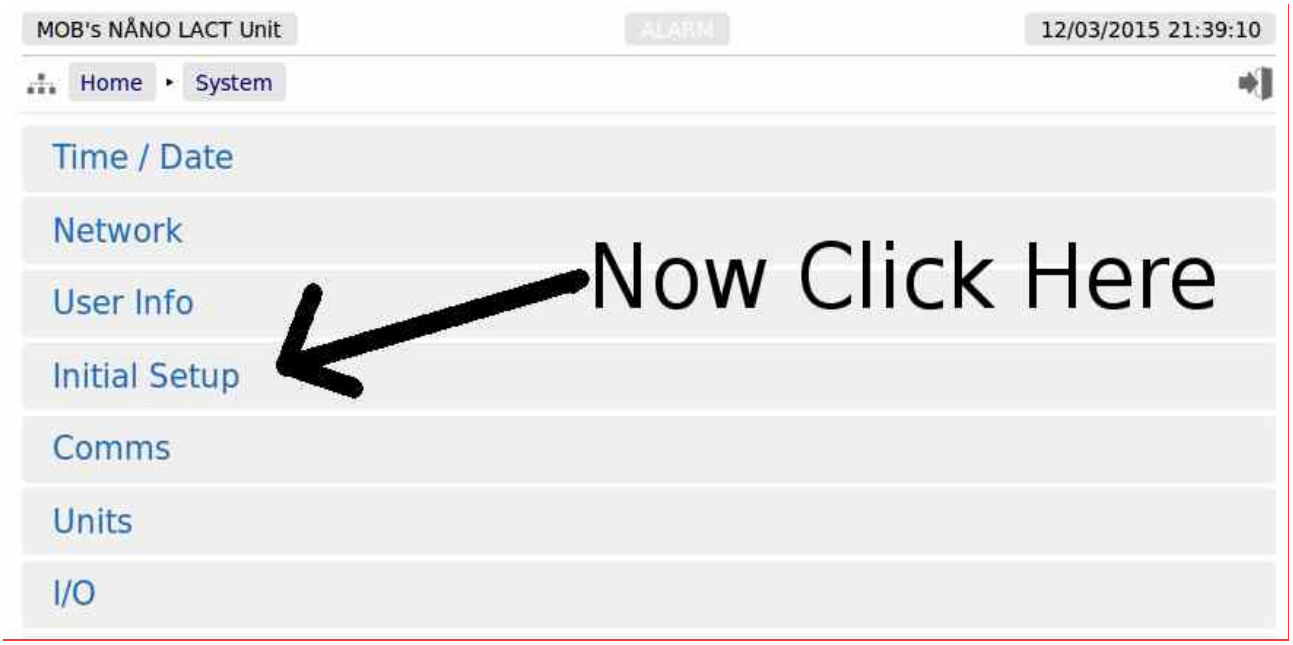
System ID / Device ID	The System ID / Device ID Name is configured in the application. The Device ID is defaulted to "TANK-Pro", but can be changed by administrator level users in the System → System Initial Setup Menu. If the Device ID is removed, the System ID will be displayed.
Alarm Notification	Clicking on this item will take you to the Alarms page. The colour of the alarm indicator shows the current alarm status: Flashing red - there are unaccepted alarms. Solid red - there are only accepted but not cleared alarms. Gray - there are no alarms present.
Time / Date	This area of the screen displays the current machine time. Clicking on this item will jump to the Time / Date settings page (see 5.1. Time / Date).
Site Map	Clicking this icon takes you to a page showing all of the displays. The menu structure is dynamic, and as items are selected or deselected, associated configuration information may appear or be hidden. This enables rapid navigation of the display tree.
Breadcrumb Bar	This navigation aid shows the hierarchical location of the current page:  In the manual, the hierarchical address will be shown as: Home → MyMenu → Another Menu Clicking on any of the breadcrumb items will jump to the relevant page.
User Logout	Clicking this icon immediately logs out the current user and returns you to the default login screen.
Hierarchical Menu Items	The main area of the display can show either Hierarchical Menu Items, shown in larger light blue text (as in the screen above) or display points, in smaller darker blue text. Clicking on a Hierarchical Menu Item can take you to either further Hierarchical Menu Items or items names and their associated value.

4 Stage 1 of 5: Initial Setup

NOTE: The following configuration sequence is recommended, but not mandatory. The menu structure is dynamic, and as items are selected or deselected, associated information may appear or be hidden. The Initial Setup screen is sub-menu of the System screen.

There are two ways to navigate to the Initial Setup screen.

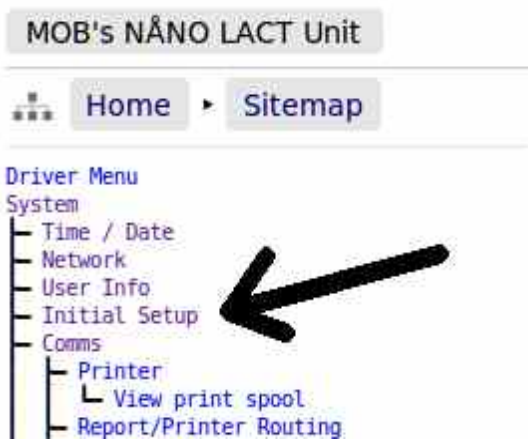
The first way is to click on “System” on the home screen, this screen will be displayed (only the top half of the System screen shown below)



Clicking on “Initial Setup” you will be taken to the Initial Setup page, as shown below.

Alternatively, clicking on the icon,  will open up the site-map view.

From the site-map view, simply click on the name of the menu item you wish to navigate to. In this case, click on the Initial Setup text as highlighted in the screenshot on the right.



It is possible to get all menu entries in no more than two clicks, using the site-map Feature.

All of the text is fully clickable, and you can navigate to any menu item from this page. You can go back to the home page by clicking on the Home icon in the breadcrumb bar.

4.1 Conventions used in this manual

Menu locations will be shown as Home → System → Initial Setup in this manual.

The browser can show a range of different screen types, such as menus, items names and associated value or status, dialog boxes for editing parameters, previews of reports, and other types of pages.

When a hierarchical menu is displayed, the menu name is on the left hand side of the screen, and there is nothing else on the line. Clicking a menu will either take you to another lower level menu, to a page of items and the related value or status of these items, or to a special report.

When an item name is being described in this manual, it will be shown in Bold Italics, as is ***Application Type*** in the next paragraph.

Any line which has a blue gear icon at the end of the line, is an editable line. Clicking anywhere on a line with a blue gear icon will open an edit dialog box. The type of dialog depends upon the context.

If the gear icon is shown in a gray color, this indicates it is an editable field, but you are not logged in at the correct user level, or another lock-out is active and the user is not able to change the item.

4.2 TANK-Pro - Initial Setup

Company Name	This is an alphanumeric text field of up to 32 ACSII characters. Unicode characters can be used, but this will reduce the total number of characters supported. The ***Company Nam***e is printed on all reports.
Device ID	This is a text field, like the ***Company Name***, above, and appears on all reports but the ***Device ID*** is also shown on the top left of all web browser pages if configured. **NOTE:** If no ***Device ID*** name is set, then the hardware unique System ID will be displayed on the web browser.
Comment	This is a text field, like the ***Company Name***, and is printed on all reports. This field can be used for any purpose.
Lease Location	This is a text field, like the ***Company Name***, and it is intended to be populated with the physical LACT site address information. It is shown on all reports.
Auto Web Logout (0 = Disabled)	By default, if you do not interact with the website for 10 minutes the user will be logged out, and you will have to re-enter the User Name and Password. This auto-logout is a safety feature to ensure that if a user forgets to logout, it will be less likely that someone else can take control of the machine. On occasion, such as configuring a machine for the first time, the auto-logout feature can be an annoyance, so you can either change the period, by selecting a different number of minutes for the timeout, or if you enter 0, then the timeout is disabled. **NOTE:** It is recommended that a reasonable number is used once the machine is commissioned, to help limit unauthorized access.
Driver Data Entry Timeout	If the driver is required to enter product data during a load, this is the maximum allowable time after ending a load, that the driver has to enter the requested data. If the data is not successfully entered before the timeout expires, then -999 will be loaded into any field not entered. The default setting is 120 seconds.
Ground Input Timeout	The ***Ground Input Timeout*** defaults to 120 Seconds. If the Ground input becomes detached, the LACT-Pro® controller local panel will display the RECONNECT GROUND dialog, with a count-down displayed. If the ground is re-attached before the count down expires, then the sequence will continue as before. If during a load, the count-down does expire, the current load will be ended and a BOL will be produced.
End of Day Time	The accounting end of day time can be set to any whole hour of the day. The minutes are always set as 00. The time is shown in military time format to eliminate ambiguity. To set 6pm, write in 18. To set 12pm midnight, set 0.
Trend Sample Period	This sets the interval between trend data points being recorded in Historical Zone 1. The period can be set to 5, 10, 15, 20 or 30 seconds, or once every minute, which is the default. **NOTE:** Information is only logged into the Historical Zone 1 trend data area during the loading process. When the controller is inactive, or before the driver has started a load, no data is recorded in Historical Zone 1, although Historical Zone 2 records continuously at a fixed 5 minute interval.
Modbus Totals # Decimal Places	The standard Modbus data transfer uses 2 Decimal Places (DP) to comply with API regulations. Some operators require no decimal places, and this is accomplished by selecting 0 DP.

PIN Code Required	This is a ***Yes*** or ***No*** choice. If ***Yes*** is selected, the driver will have to enter the PIN number, specified in the field below, before the driver can operate the LACT-Pro® controller. The Pin Code Value can also be downloaded via XML communications.
Pin Code Value	This can be any positive number between 1 and 999,999,999.
Tank Selection Option	There are four options available: **Fixed/Telemetry** - If Fixed/Telemetry is chosen, then the Fixed Tank option is shown below, and the Tank has to be selected using the Website or Telemetry, using XML or Modbus. **Digital Input/Switch** - Tank Select (Bit 0,1 &2) determine the Tank. These are from Digital Inputs configured in Home→System→Tank Initial Setup→I/O→Assignment/Settings - Digital I/O. **Driver Entered** - This option allows the driver to select the tank, but limits the driver to a single tank at a time. **Multitank –** This also allows the driver to select the tank, but allows Rifled/Multi-Tank selections to be made.
Fixed Tank	If ***Tank Selection Option*** is set to "Fixed/Telemetry", an edit dialog showing the number of configured tanks is displayed, and a radio button allow the selection of one of the tanks or No Tank Selected.
Stop Loading Trigger Volume	This value is the maximum volume that can be loaded before the Pump Permissive output will be set to Off (inactive). The ***Stop loading trigger volume*** cannot be disabled, but can be set to a very large number.
Suspend Load Trigger Option	There are 3 options: **Disabled** **Fixed Value** - When selected, the ***Suspend Loading Trigger Volume*** option below is shown. **Driver Entered** - When selected, the Driver's Local Panel will request he enters the suspend Load Trigger volume before loading commences.
Suspend Loading Trigger Volume	The LACT-Pro® TANK application has the option to suspend the loading cycle when a preset volume has been loaded. The default value is 180 bbls. If a value of 0 is set, then this option is disabled. When the load level is greater than the trigger level, the Pump permissive will be dropped, the diverter valve permissive will be commanded to divert position and the load limit exceeded message will be displayed on the driver display. The driver will be given the option to continue loading, or to finish the load. If the driver selects to continue loading the Pump and diverter valve permissives will be made active once again.
Available Languages	Clicking this line will open a check box dialog, and selection can be made for the language choices available at the the Driver's Local Panel. If only one language is selected, then the driver will not be asked to make a selection, and the single language will always be used.
Idle Screen Timeout	This timeout determines the gap between the Driver Screen being displayed on the Local Panel, and the background Pumper Screen being displayed. The default is 300 seconds (5 minutes).

Tank Status Type	There are two options for this selection: **Level** - the Tank Level (in Feet & Inches) is shown on the pumper and driver Multi-Tank selection screen. **Volume** - the Tank Volume (in bbls) is shown on the pumper and driver Multi-Tank selection screen.

To change any of the editable text fields (those with a blue GEAR Icon), simply click on the line. The original web page is now grayed out and the “Edit value” dialog box overlays the background, as shown below.

The Edit value dialog box shows the name of the item being edited (Item name) and it has a large data entry entry area, which shows "Old Company Name" being replaced with "New Corporation Name" in the screenshot below.

Then click Apply to accept or Cancel to keep the current value.

NOTE: The format of the data entered is checked, but not the validity of that data. In the case of the Device ID, the format is free, and you can enter any numbers, characters or Unicode Symbols as you wish, up to the equivalent of 32 ASCII characters.

The user can now accept the new value by clicking the green Apply button, or reject the changes by clicking the red Cancel button, at which point the Edit value dialog box closes and the main screen is displayed as normal. If you have changed the Device ID, you will need to refresh the page view before the System ID/Device ID Name, on the top left of the screen will be updated.

This completes the Initial Setup page.

NOTE: The manual now expects that the user is familiar with navigating the menu structure, and in the interests of clarity, the intermediate steps are not shown from now onwards.

4.3 Stage 2 of 5 : Matching the application to the site P&ID

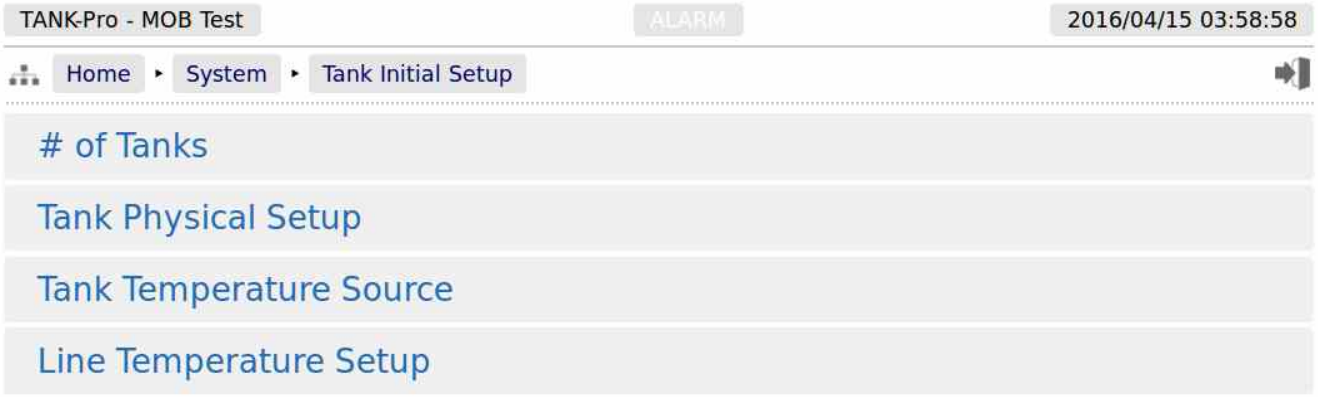
The LACT-Pro® TANK controller has been designed to work with between 1 and 6 Tanks, and up to 3 line measurements points. This part of the setup procedure is to match the settings to the physical plant installation.

The table below lists the additional information needed when configuring the controller:

Number of Tanks ?	1 to 6
Should the charge pump permissive be driven by the TANK-Pro controller, rather than manual?	Yes / No
How many Measured Temperature Sources are used?	1 to 3[1]
Are the Measured Temperature Sources 4-20mA, 100 Ohm Platinum RTD, Thermistor or a mixture of the above?	4-20, RTD or Thermistor
Are both Hydrocarbons and Water movements to be measured?	Yes / No

Once the answers to the questions above have been determined, the site configuration can be performed.

From the Home → System → Tank Setup menu there are 4 sub-menus. These are shown in the screenshot below:



1 - There can only be 6 Analogs used in total

# of Tanks	A radio button allows the selection of 1 to 6 tanks.
Tank Physical Setup	Depending upon the number of tanks selected, there will be sub-menus for each tank to set the parameters for the tank and its associated gauge.
Tank Temperature Source	This takes you to the Tank Temperature source menu, where the temperature measurements are mapped to the relevant tanks.
Line Temperature Setup	There will be a setup entry for each line temperature configured above.

4.4 Choose number of Tanks

Click the ***# of Tanks*** and using the radio buttons select the appropriate number. Once the number of tanks has been selected, move to the ***Tank Physical Setup*** page. In the example below, number of tanks has been set to 5.

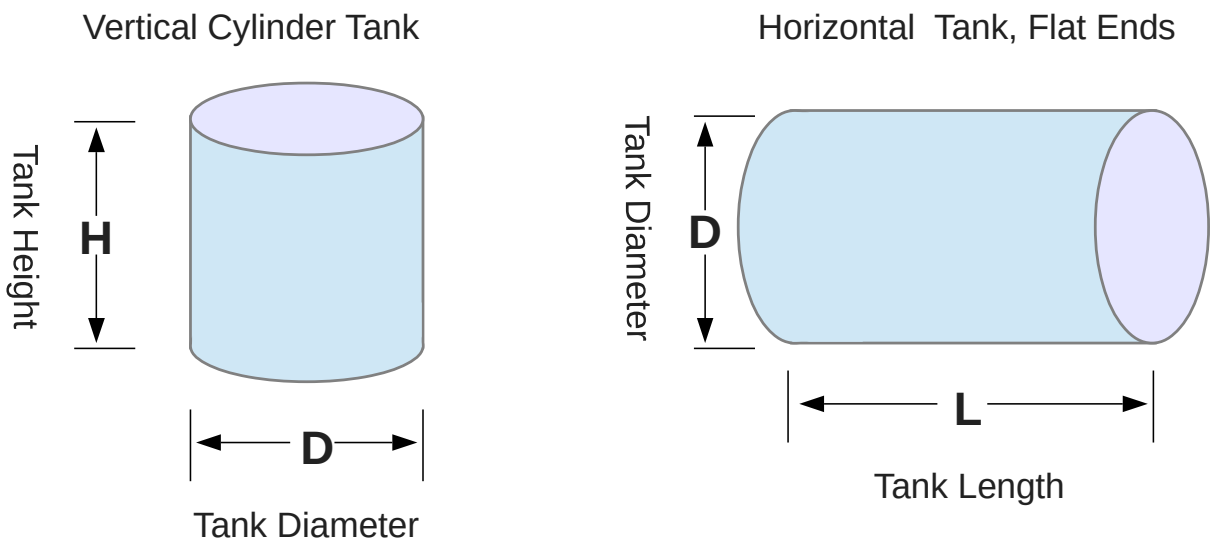
4.5 Tank Setup

Then work through each of the tanks in turn, by clicking on the line for each tank. The example below shows the two sub-menus associated with Tank 4.

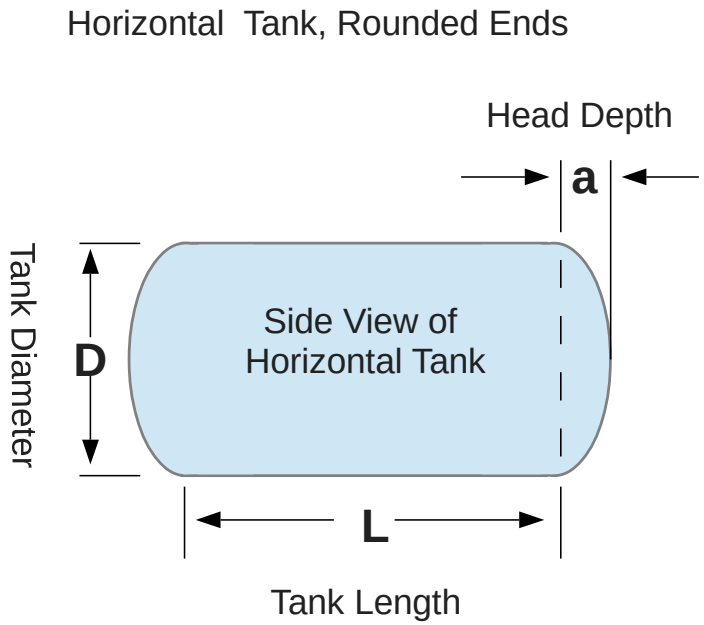
For each tank, first setup the ***Geometry*** of the tank, and then setup the ***Tank Level*** gauge.

Tank/product Name	By default, the ***Tank/product Name*** is set to the same as the Tank Number, but can be changed. The maximum length of the name is 24 characters.
Product	This option allows the selection of Hydrocarbons (HC) or Water.
Tank Type	This option determines the parameters needed to configure the Tank. If a Vertical Cylinder Tank is selected, only the Tank Height and Diameter are needed. For a Horizontal Tank, the Tank Length, Diameter and Head Depth are needed. If the Strap Table option is selected, and addition menu appears and up to 50 strap points can be entered for each tank. The tank geometry is not needed.
Tank Height (H)	This is the tank height shown in inches and decimal inches.
Tank Diameter (D)	This is the tank internal diameter shown in inches and decimal inches. The tanks is assumed to be of equal cross-section at all heights in the tank
Tank Nominal Volume	From the Geometry and tank parameters, this is the calculated Nominal (absolute maximum) volume for the tank, shown in bbls.
Fluid Indicated Volume Tank"n"	Using the current level indication, and gauge settings, this figure is the current volume contained within the tank, shown in bbls.

4.5.1 Vertical and Horizontal Flat Ended Tanks



4.5.2 Horizontal Tank with Rounded Ends



For Spherical ended tanks, the diameter of the tank is the same as the diameter of the end. Therefore the head Depth "a" would be equal to the radius, or D/2.

For an Ellipsoidal ended tank, the diameter of the end is twice the diameter of the tank and in this case Head Depth "a" would equal D/4.

4.5.3 Inches & Decimal Inches

If the tank dimensions are in Feet, Inches and fractions of an Inch, the dimensions have to be converted to decimal inches. Multiply the number of feet by 12, add the inches and then add the fractions of an inch as decimal inches. The tables below are quick look-ups.

Feet to Inches

Feet	1	2	3	4	5	6	7	8	9	10	11	12
Inches	12	24	36	48	60	72	84	96	108	120	132	144

Feet	13	14	15	16	17	18	19	20	21	22	23	24
Inches	156	168	180	192	204	216	228	240	252	264	276	288

Fractions of an inch

Fractions	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2
Decimals	0.0625	0.125	0.1875	0.25	0.3125	0.375	0.4375	0.5

Fractions	09/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Decimals	0.5625	0.625	0.6875	0.75	0.8125	0.875	0.9375	1.0

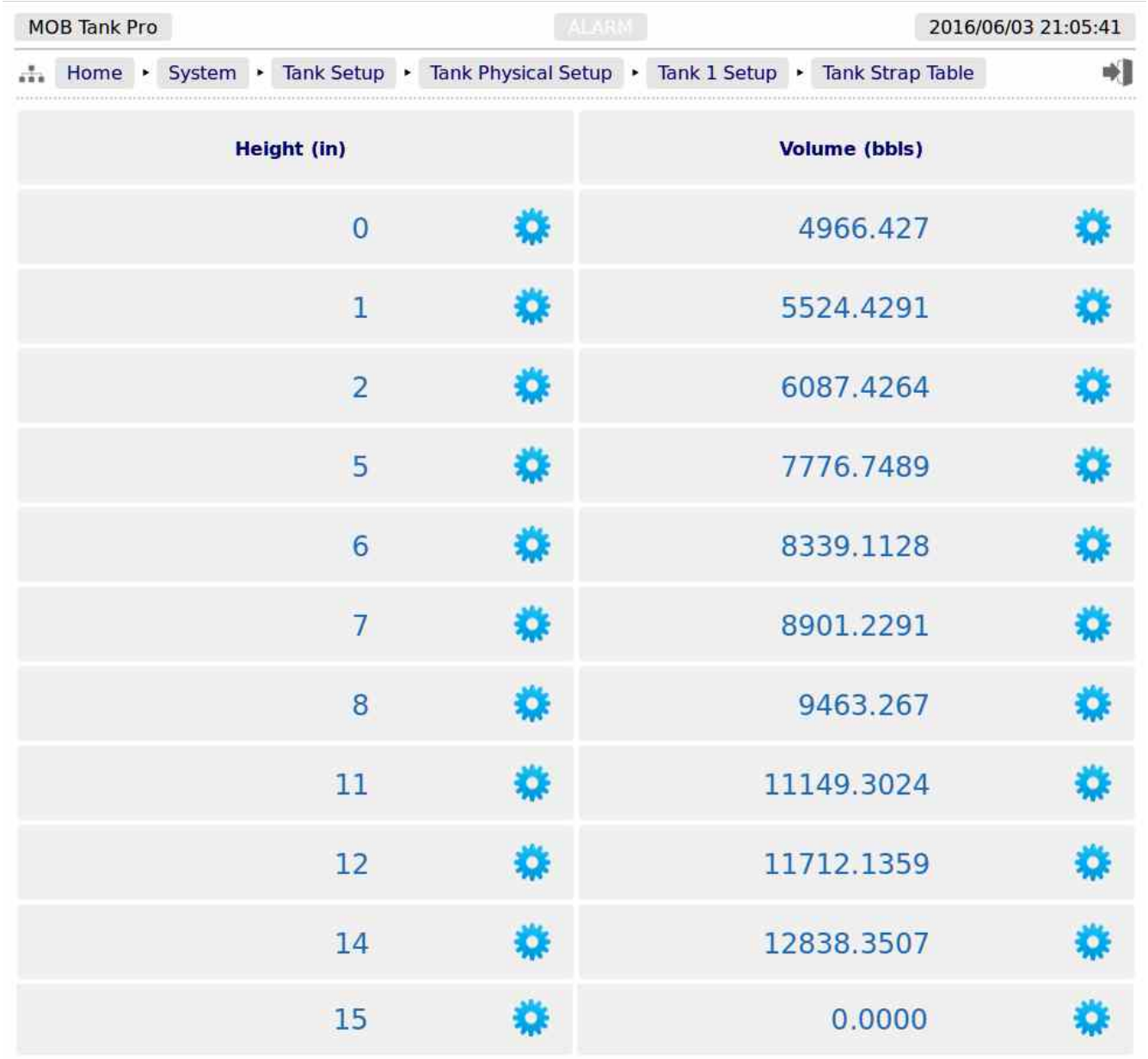
Examples:

8' 8 1/8" in decimal inches is the sum of 96" + 8" + 0.125" = 104.125"

15' 11 3/4" in decimal inches is the sum of 180" + 11" + 0.75" = 191.75"

4.5.4 Tank Strap Table

Certain installations require the Tank Strap information to be used, rather than the geometry. In these cases, up to 50 table entries may be added.



To enter Strap Table data, start from the lowest height, and the least volume, enter the significant data points from the strap table. The heights must be input in inches (or decimal inches) and the volume in bbls. Note each height and associated volume must be larger than the previous entry. To finish the table entry, put a zero value into the Volume (bbls) column.

NOTE: If any volume is less than the previous value (or zero) this will be treated as the end of the strapping table data.

4.6 Tank Level, Gauge Setup

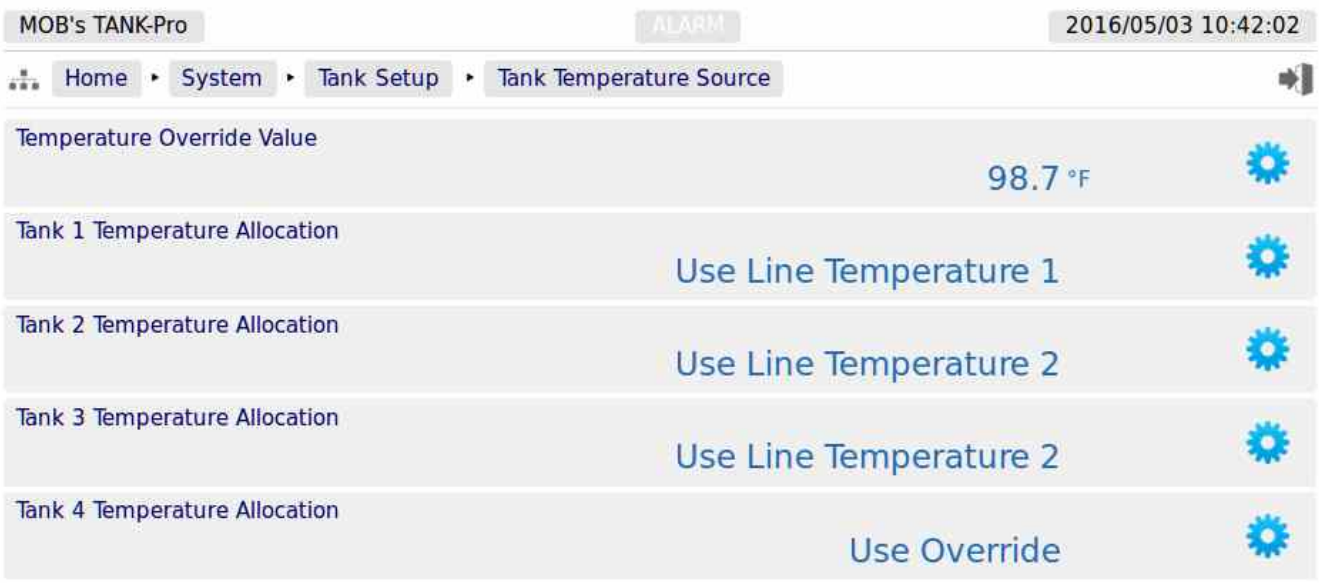
For each tank, the level gauge must match the physical installation.

Tank Level In Use	This display point shows the tank level being used in the calculations and reports. This may be a live value, a manual override value or a (fail-over) default.
Tank Level 4mA Scale	This point indicates the tank level represented by 4 mA. This will normally equate to 0 inches, but clicking this line opens the dialog box allowing an alternative tank level to be input.
Tank Level 20mA Scale	This point indicates the tank level represented by 20 mA. This should normally be the maximum height of the level gauge. Clicking the line opens the dialog box allowing entry of the tank level.
Tank Level Operating Mode/Status	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to select which of the 3 modes to select: **Always Measured** - Uses the calculated value from the measured input regardless of it being within acceptable limits or not. **Always Override** - Uses the Override value at all times. **Use Default on Failure** - Uses the calculated value from the measured input unless it is either lower than the ***Low Input Fail Point*** or higher than the ***High Input Fail Point,*** in which case it would use the Temperature Default value**.**
Tank Level Recover After Fail	Tank Level Recover After Fail can be assigned two values, **Yes** or **No**. If Yes is selected, once the measured value is between the low and high Input Fail Points, the measured value will be used instead of the fail-over default value. If No has been selected, the fail-over default value will continue to be used, even when a valid reading is available. Once the fault has been resolved, an engineer can reset the mode to measured by changing the Operating Status selection.
Tank Level Override Value	This is the value used when ***Tank Level Operating Mode*** has been set to Always Override.
Tank Level Default Value	This is the value used when the ***Tank Level Operating Mode*** has been set to Use Default on Failure, and the measured value is NOT between the low and high Input Fail Points.
Tank Level Transmitter Value with Bias	This is the sum of the ***Tank Level Transmitter Value (No Bias)*** and the associated Bias value.
Tank Level Bias Value	This is the Bias or Offset value that is being applied to the measured value. If logged in at Technician level, this value can be viewed and edited. It can also be set by the Technician Menu using the Local Panel. If logged in at Admin level, this is a read-only status display.
Tank Level Transmitter Value (No Bias)	This point displays the live measured tank level value. This item is for information only and cannot be edited.
Tank Level Low Alarm Limit	This point shows the currently configured Low Alarm limit. If the ***Tank Level In Use*** reading goes below the configured value, the Low tank level Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value. If an impossibly low default value is used, no Low tank level Alarm will ever be raised.

Tank Level High Alarm Limit	This point shows the currently configured High Alarm limit. If the ***Tank Level In Use*** reading goes above the configured value, the High Tank Level Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the use to choose a different value. If an impossibly high default value is used, no High tank level Alarm will ever be raised.
Low Input Fail Point	If the Measured Input live value goes below the ***Low Input Fail Point*** and the ***Tank Level Operating Mode*** is set to Use Default on Failure, then the tank level In Use will be the fail-over Default tank level. This is set at 3.5mA by default.
High Input Fail Point	If the Measured Input live value goes above the ***High Input Fail Point*** and the ***Tank Level Operating Mode*** is set to Use Default on Failure, then the Tank Level In Use will be the fail-over default tank level. This is set at 20.5mA by default.

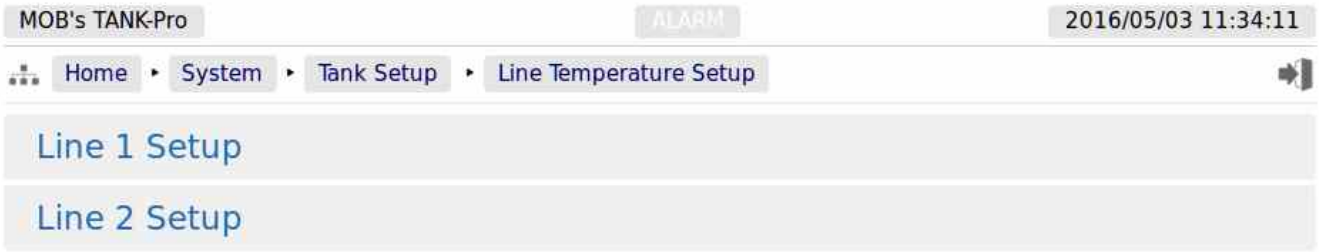
4.7 Allocation of Temperature sources

Once the Tanks and the Tank Level Gauging has been configured, the line temperature measurement points (if any) must be mapped to the tank supplying the fluid.

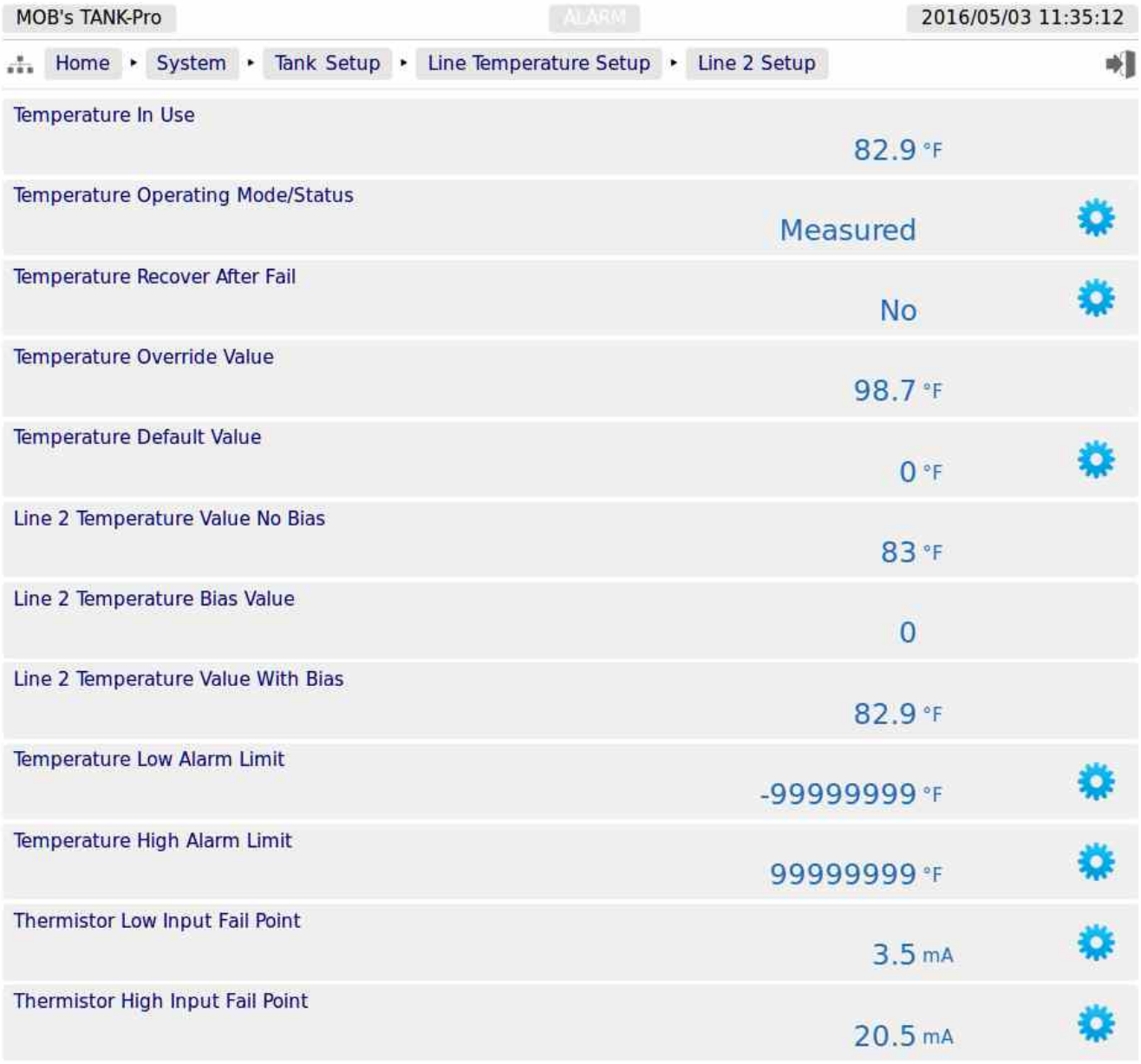


The ***Temperature Override Value*** is a default value that can be applied to the line temperatures from any of the tanks. This value can also be set using the Metering Technician mode on the local panel.

For each Tank, select from from the Use Override option or select one of the three Line Temperature options. Next the Line Temperatures must be configured using the ***Line Temperature Setup*** menu.



In the current example, only two independent line temperature measurements have been configured. Each is set up in the same way, below is the example for Line 2.



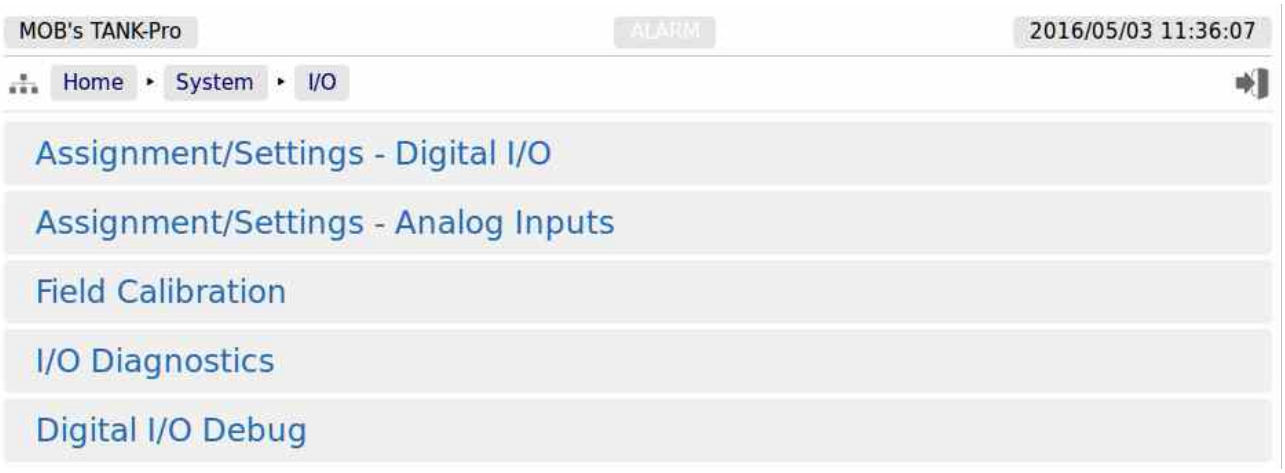
NOTE: Before configuring the Line Temperature setup screen, it is recommended that you set the type of temperature measurement, 4 to 20 mA Transmitter, Thermistor or RTD in the Home→System→I/O→Assignment/Settings - Analog Inputs menu. Refer to section 5.7. I/O Assignments – Analog Inputs.

Temperature In Use	This display point shows the temperature being used in the calculations, FWA & reports. This may be a live value, a manual override value or a (fail-over) default.
Temperature 4mA Scale Value	This point indicates the temperature represented by 4 mA. Clicking this line opens the dialog box allowing an alternative temperature to be input. **NOTE**: If the ***Measured Temperature Type*** was set as RTD or Thermistor, the point will not appear, since the RTD and Thermistor give a direct temperature reading.
Temperature 20mA Scale Value	This point indicates the temperature represented by 20 mA. Clicking the line opens the dialog box allowing an different temperature to be input. **NOTE:** If the ***Measured Temperature Type*** was set as RTD or Thermistor, the point will not appear, since the RTD and Thermistor give a direct temperature reading.
Temperature Operating Mode/Status	This point indicates the current operating status, and allows the selection of the different modes supported. Clicking the line opens the dialog box allowing the user to select which of the 3 modes to select: **Always Measured** - Uses the calculated value from the measured input regardless of it being within acceptable limits or not. **Always Override** - Uses the Override value at all times. **Use Default on Failure** - Uses the calculated value from the measured input unless it is either lower than the ***Low Input Fail Point*** or higher than the ***High Input Fail Point,*** in which case it would use the Temperature Default value**.**
Temperature Recover After Fail	***Temperature Recover After Fail*** can be assigned two values, **Yes** or **No**. If Yes is selected, once the measured value is between the low and high Input Fail Points, the measured value will be used instead of the fail-over default value. If No has been selected, the fail-over default value will continue to be used, even when a valid reading is available. Once the fault has been resolved, an engineer can reset the mode to measured by changing the Operating Status selection.
Temperature Override Value	This is the value used when ***Temperature Operating Mode*** has been set to Always Override. If no transmitter has been assigned to the Temperature, this override value is always used.
Temperature Default Value	This is the value used when the ***Temperature Operating Mode*** has been set to Use Default on Failure, and the measured value is NOT between the low and high Input Fail Points.
Line "x" Temperature Transmitter Value with Bias	This is the sum of the Temperature Transmitter Value and the associated Bias value.
Line "x" Temperature Bias Value	This is the Bias or Offset value that is being applied to the measured value. If logged in at Technician level, this value can be viewed and edited. It can also be set by the Technician Menu using the Local Panel. If logged in at Admin level, this is a read-only status display.

Line "x" Temperature Transmitter Value (No Bias)	This point displays the live measured temperature value. This item is for information only and cannot be edited.
Temperature Low Alarm Limit	This point shows the currently configured Low Alarm limit. If the ***Temperature In Use*** reading goes below the configured value, the Low Temperature Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value. If an impossibly low default value is used, no Low Temperature Alarm will ever be raised.
Temperature High Alarm Limit	This point shows the currently configured High Alarm limit. If the ***Temperature In Use*** reading goes above the configured value, the High Temperature Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the use to choose a different value. If an impossibly high default value is used, no High Temperature Alarm will ever be raised.
(4-20mA, Thermistor or RTD) Low Input Fail Point	If the Measured Input live value goes below the ***Low Input Fail Point*** and the ***Temperature Operating Mode*** is set to Use Default on Failure, then the Temperature In Use will be the fail-over Default temperature. In 4-20 mA mode this value will be 3.5 mA by default. If the Measured Temperature Type was set as RTD, then this will be 60 Ohms as standard, and in Thermistor mode it will 3.5 mA as standard. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.
(4-20mA, Thermistor or RTD) High Input Fail Point	If the Measured Input live value goes above the ***High Input Fail Point*** and the ***Temperature Operating Mode*** is set to Use Default on Failure, then the Temperature In Use will be the fail-over Default temperature. In 4-20 mA mode this value will be 20.5 mA by default. If the Measured Temperature Type was set as RTD, then this will be 180 Ohms as standard, and 18 mA in Thermistor mode. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.

4.8 General I/O Assignments

From the Home→System→I/O Menu, the I/O assignments for the Digital and Analog I/O are made.



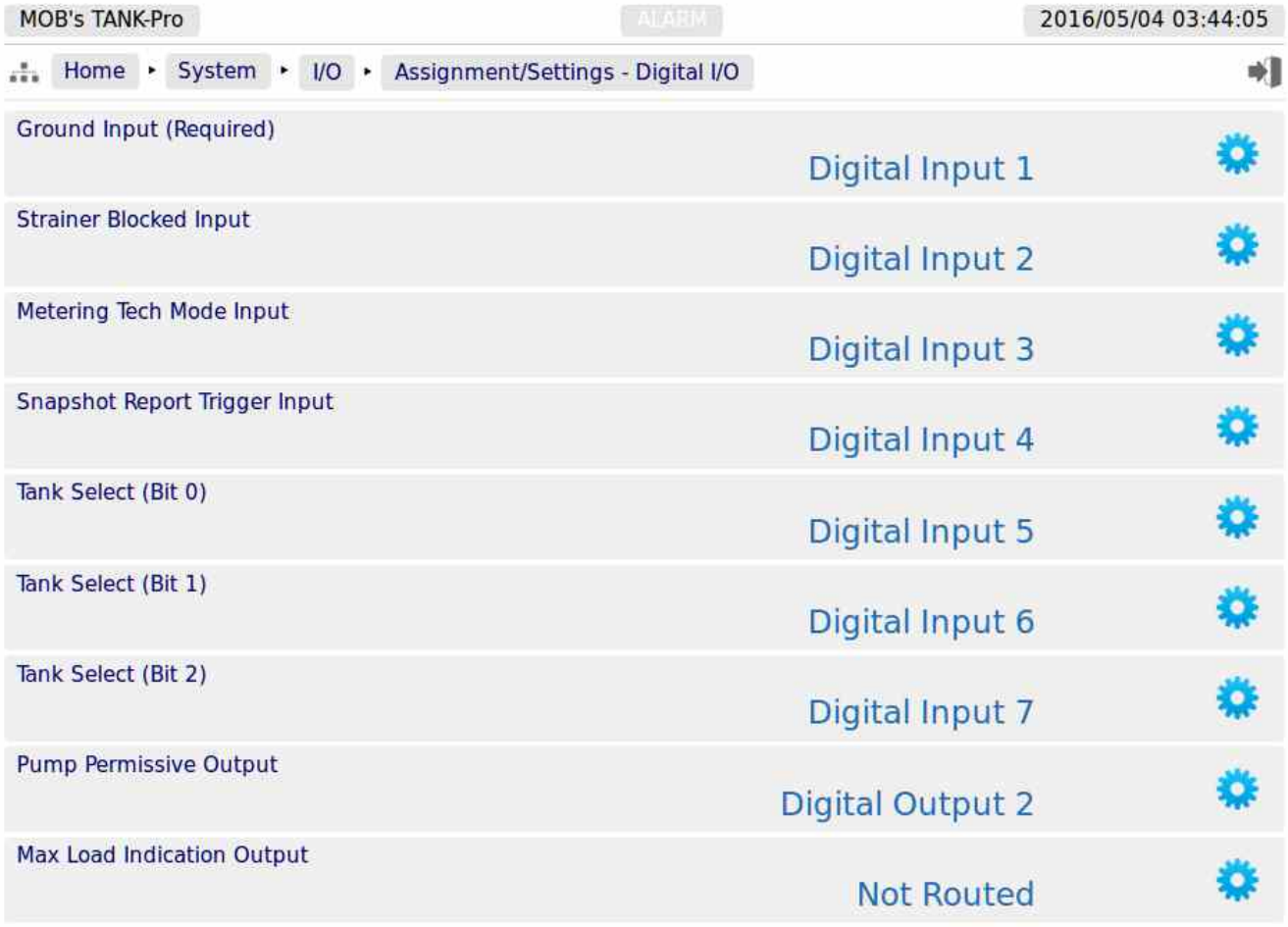
There are five options from this menu screen. The first two options are to configure the settings for the Digital Inputs/Outputs and the Analog Inputs.

The third entry allows two-point field calibration (this feature is in addition to the one point bias adjustment). This topic is covered in section 9.1. Field Calibration.

The fourth entry is a diagnostic page which can be used to ensure the assignments have been correctly selected. This topic is covered in section 9.2. I/O Diagnostics.

The final entry is a digital I/O debug page. If logged in at the Admin level, this page can only be viewed. When logged in as technician, this allows temporary overruling of the Digital Outputs, which is cleared on exit of the page. This topic is covered in section 9.3. Digital I/O Debug.

4.9 I/O Assignments – Digital Inputs & Outputs



NOTE: The LACT-Pro® TANK application does not check for exclusive assignment of any I/O points. It is recommended to record any changes to the I/O using the I/O schedule drawings available in Section 12. I/O Schedules.

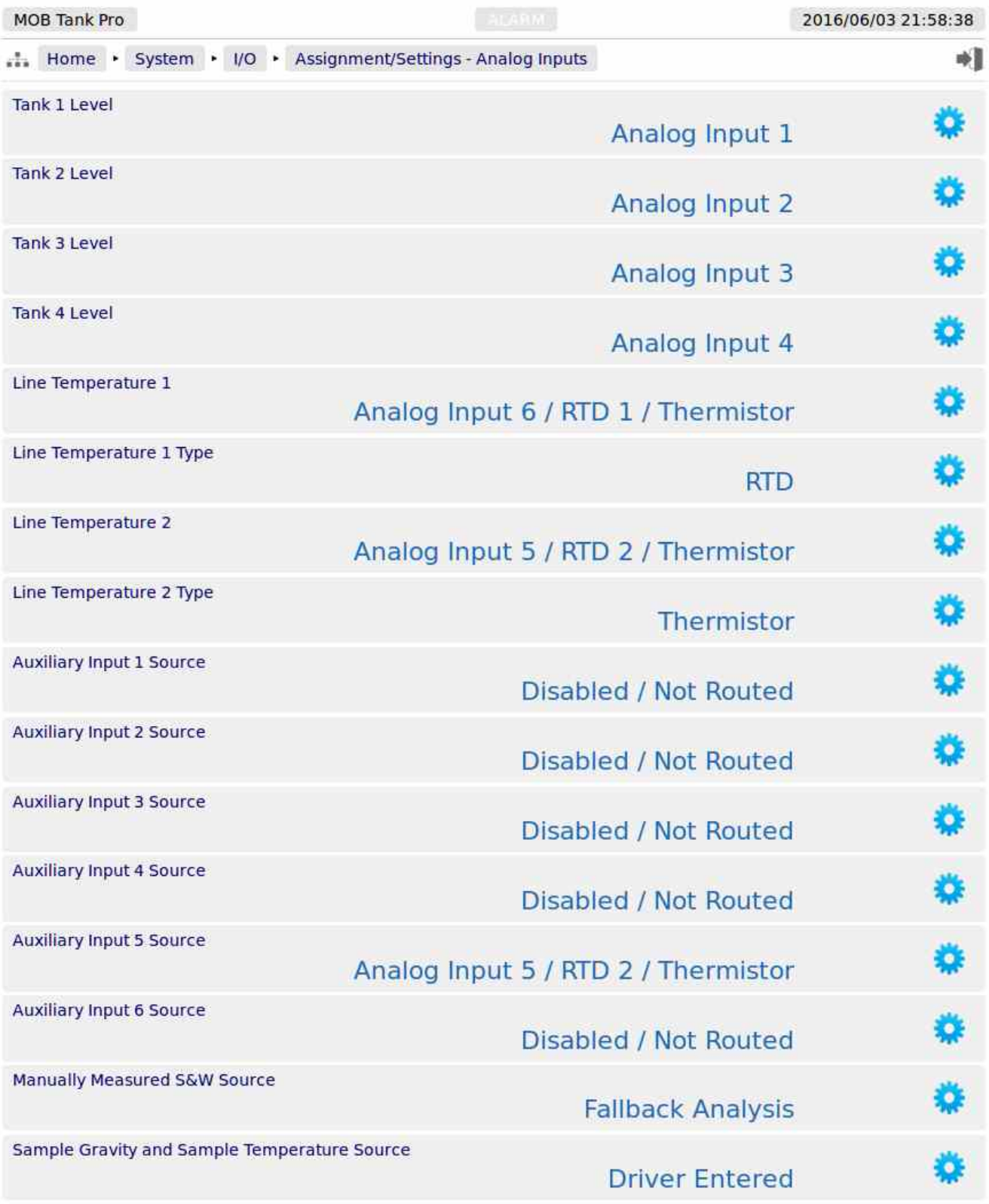
Ground Input (Required)	The LACT-Pro® TANK application requires a Ground Input signal. This can come from a ground verification system (such as a Scully system) or a manually operated switch. By default, this input is assigned to Digital Input 1, but by clicking on the line with the gear icon, any of the nine Digital Inputs can be selected.
Strainer Blocked Input	If the answer to the question “Does the site have a filter/strainer with a filter/strainer blocked switch output?” was No, then click the associated line, and select the Not Installed option. Digital Input 2 could now be used for other purposes. If the answer was Yes, you can leave the signal assigned to Digital Input 2, or reassign it, but read the Note above.
Metering Tech Mode Input	A switch should be connected to this input to enable the local panel to be swapped from "Driver Mode" to "Metering Tech Mode". This allows a metering technician to change some of the metering parameters following a meter prove. The switch should be secured so that tampering can be detected. The default setting is for this input to use Digital Input 3.

Snapshot Report Trigger Input	Driving the selected Digital Input will cause the LACT-Pro® controller to snapshot the live data Home → Logs & Trends → Live Data and print it to the printer designated in Home → System → Comms → Report/Printer Routing.
Tank Select (Bits 0, 1 & 2)	This input together with Bits 0, 1 & 2 determine which tank is selected if Option 2 - Digital Input/Switch was chosen for the Tank Option in the Home → System → System Initial Setup menu. The table below ***Tank Selection Digital Inputs*** shows the encoding of the digital inputs.
• ***Pump Permissive Output***	If the answer to the question "Should the charge pump be driven by the LACT controller?" was Yes, the Pump Command Output is assigned to Digital Output 2 by default. It can be assigned to a different Digital Output, but once again refer to the note at the top of this table. If the Answer was No, then either select the Not Routed option from the edit dialog box or do not connect anything to the Digital Output assigned.
• ***Max Load Indication Output***	If the ***System Stop Load Volume*** trigger has been reached during a load, this Digital Output will become active. When the driver has acknowledged that the valves have been closed, the output will become inactive.

Tank Selection Digital Inputs Encoding:

Code	***Tank Selection Digital Inputs***			***Tank in use***
	Bit 2	***Bit 1***	***Bit 0***	
0	OFF	OFF	OFF	No Tank Selected
1	OFF	OFF	ON	Tank 1 Selected
2	OFF	ON	OFF	Tank 2 Selected
3	OFF	ON	ON	Tank 3 Selected
4	ON	OFF	OFF	Tank 4 Selected
5	ON	OFF	ON	Tank 5 Selected
6	ON	ON	OFF	Tank 6 Selected
7	ON	ON	ON	No Tank Selected

4.10 I/O Assignments – Analog Inputs



NOTE: The LACT-Pro® TANK application does not check for exclusive assignment of any I/O points. It is recommended to record any changes to the I/O using the I/O schedule drawings available in Section 12. I/O Schedules.

Tank 1 Level	The TANK-Pro® application requires a 4-20 mA gauge input for each selected tank. A choice is provided from any of the 6 Analog inputs.
Tank "X" Level	There will be an additional Tank Level item for all additional tanks as configured in Home → System → Tank Setup → # of Tanks.
Line Temperature 1	Depending on how many temperature sources were used in this menu Home → System → Tank Setup → Tank Temperature Source will determine the number of Line Temperature sources. Note each line temperature source will also have an accompanying type.
Line Temperature 1 Type	The live temperature may be from a Temperature Transmitter, a 4-wire RTD device or a thermistor probe. These 3 options are selected as 4-20 mA, RTD or Thermistor.
Auxiliary Input 1 Source	An Auxiliary Input is an Analog Input that is not used directly by the LACT-Pro® TANK application, but allows unused Analog Inputs to be used as a data logger, or already allocated Analog Inputs to be scaled differently. Auxiliary Input data can be scaled to engineering units and logged in the historical data archive, charted and displayed on a web browser, using the in-built trending feature. Live and historical data can be retrieved over the XML data link. Live data is also available via Modbus. Each Auxiliary input source can be set to any of the Analog Inputs, or Disabled, which is the default selection. It is the responsibility of the administrator to check the assignment of the Field I/O inputs and outputs.
Auxiliary Input 2, 3, 4 & 6 Source	As Auxiliary Input 1 above
Auxiliary Input 5 Source	As Auxiliary Input 1 above, but in the screenshot above, Auxiliary Input 5 Source is connected to the Analog Input 5, so will show the Raw information from the Thermistor Interface, rather than the temperature, for diagnostic purposes.
Manually Measured S&W Source	The S&W source used for each ticket can be "Driver Entered" in which case the driver will be prompted to supply the information, or "Sampler Can Recorded Value" will be used. This is the historical S&W value derived during the last Sampler Can Pull by a metering technician, and entered when the LACT-Pro® TANK application was in Metering Technician mode.
Sample Gravity and Sample Temperature Source	The Sample Gravity and Sample Temperature sources used for each ticket are either "Driver Entered" in which case the driver will be prompted to supply the information, or "Sampler Can Recorded Value" - the historical Sample Gravity and Sample Temperature value derived during the last Pot Pull by a metering technician, and entered when the LACT-Pro® TANK controller was in Metering Technician mode.

NOTE: The final three items in the Home → System → I/O menus are dealt with in later sections.

Field Calibration, see section 9.1. Field Calibration.

I/O Diagnostics and Digital I/O Debug, see sections 9.2. I/O Diagnostics and 9.3. Digital I/O Debug.

5 Stage 3 of 5: System Setup

The System Setup page is dynamic as there may be one or more Auxiliary inputs shown, depending on how the system has been configured.

5.1 Time / Date

The LACT-Pro® TANK controller has a very high stability clock source, which is used for a variety of measurement tasks, such as period measurement, as well as driving the internal time and date system. The internal clock will have an error of less than one second per day when running from a DC power source.

The time facilities in the LACT-Pro® TANK controller can be used in two ways.

5.1.1 The Local Time Method

The Administrator can decide to use a very simple time setting method. Ignore the ***TimeZone*** setting, and set the ***Time Offset (HH:MM)*** to 0:00. **Note:** the ***TimeZone*** value will now state Unknown.

The Date and Time fields should then be set to the local time.

The Daylight Saving Time option may still be used if required. If not required, state the ***Start Date*** to be the same as the ***End Date***, and this feature is disabled.

5.1.2 The NTP time method

If however, you want to synchronise the LACT-Pro® TANK controller to an Internet time server using the Network Time Protocol (NTP), you must input a time offset which represents your geographical time zone, as Internet time is always expressed in UTC.

An NTP server has no knowledge of where the client resides and so local time is calculated by adding or subtracting the local time zone time offset. The time zone offset can be input manually, for example, during the winter months in Houston, you would set the ***Time Offset (HH:MM)*** as -06:00 (subtract 6 hours from UTC time).

Similarly, in Mumbai, India, you would set the ***Time Offset (HH:MM)*** as +05:30 (add 5 Hours and 30 minutes to UTC time). However, for convenience, the US Time zones have been built in, so in most of Texas for example, click on ***TimeZone*** and select Central, and the ***Time Offset (HH:MM)*** value will be set to -06:00.

NOTE: To use an NTP time server, the Network setup must have a valid gateway setting, otherwise the NTP server will be unreachable.

NOTE2: NTP servers are now relatively inexpensive, and can use a range of time sources. A number of medium and large enterprises run their own time servers, and then can manage daylight savings and time zones as they wish, and set their own time server to reflect the local time, rather than UTC.

The following system settings are shown:-

TimeZone	The dialog box above shows the options available: Alaskan is -9 Hours Pacific is -8 Hours Mountain is -7 Hours Central is -6 Hours Eastern is -5 Hours Clicking an option pre-loads the Time Offset (HH:MM) item with the relevant time zone offset.
Time Offset (HH:MM)	This shows the current time offset (in Hours:Minutes). Clicking on the line will open the Time Offset dialog box which allows the user to input the time offset associated with the local time zone. The ':' (colon) character is used to separate hours and minutes. The :Minutes is optional, hence if only whole hours are needed, then you can enter -6 for US Central time during the Winter.
Date Format	Shows the current date format. The three following formats are available and each shows an example of the date for Christmas day for the year 2015: YYYY/MM/DD for example: 2015/12/25 DD/MM/YYYY for example: 25/12/2015 MM/DD/YYYY for example: 12/25/2015 Clicking on the line opens a selection box with the 3 options, and clicking any of the lines, selects the appropriate option, and indicates the selection with the radio style button.
Date	Shows the current date (using the format defined above). Clicking on the line containing the gear icon allows the user to enter a date in the format specified above. The '/' (slash or forward-slash character) is used to separate the day, month and year.
Time	Shows the current local time in 24 hour military time format. Clicking on the line takes you to the Edit value screen where the user can enter the time. **NOTE:** The ':' (colon) symbol must be used to separate the hours from the minutes and seconds.
Daylight Saving Time - This is the heading for the Daylight Savings options. This bar also indicates if Daylight Saving Time is in effect.	
Start Date (MM/DD)	This should be the date in the Spring when the hour is moved forward. Once the start date is reached, at either 1 a.m. or 2 a.m. (as set in the Changeover Hour), the LACT-Pro® TANK controller time will jump forward by one hour to 2 a.m. or 3 a.m. **NOTE:** It is not recommended that you load during this period, as report times and averaged data may be confusing, however, no pulses will be lost, and the accumulators and totals will be correct.
End Date (MM/DD)	This is the date in the Fall, when the hour moves back. At the changeover hour, the time will go back from say 2 a.m. to 1 a.m. and appear to repeat for an hour. When it reaches 2 a.m. for the second time, it will NOT jump back another hour.

Changeover Hour	This can be either 1 a.m. or 2 a.m., and determines the time of the day, on the selected date, that the time will spring forward by one hour in Spring or back by one hour in the Fall.
NTP - This is the heading for the NTP options section	
Automatic Sync	Shows whether the NTP (Network Time Protocol) automatic update service is ***Enabled*** or ***Disabled*** on the LACT-Pro® TANK controller. Clicking the line allows the user to select between enable or disable. If enabled, at a pseudo-random time within the minute around 03:33 (local time), the time will be checked. If the time difference is less than 15 minutes and greater than 0.5 seconds, the machine time will be set to Network time, with the Time Offset applied, otherwise no action takes place. **NOTE:** Time changes are logged in the System Event Log.
Server IP Address	Specifies the IP address of the NTP Server to use. The IP address must be entered in IPv4 human readable quad-dotted format. There are large numbers of time servers, from government bodies and larger companies. A number of oil companies have their own time server. The NIST time server list can be found at http://tf.nist.gov/tf-cgi/servers.cgi For example: LDSBC, Salt Lake City, Utah is 198.60.73.8 NIST, Macon, Georgia is 98.175.203.200
Last Sync	This field records the time and date of the last NTP synchronisation, and the time offset between the computer and Network time.
NTP Manual Sync	Clicking the ***Manual Sync*** line will force the NTP server to request an immediate time update. The time will be applied directly. **NOTE:** No checking is provided on a manual sync, so it is the operator's responsibility to sanity check the result. We advise clicking the ***Manual Sync*** a second time, checking that the Last Sync message shows a very small correction, and check that the ***Date*** and ***Time*** information looks correct.

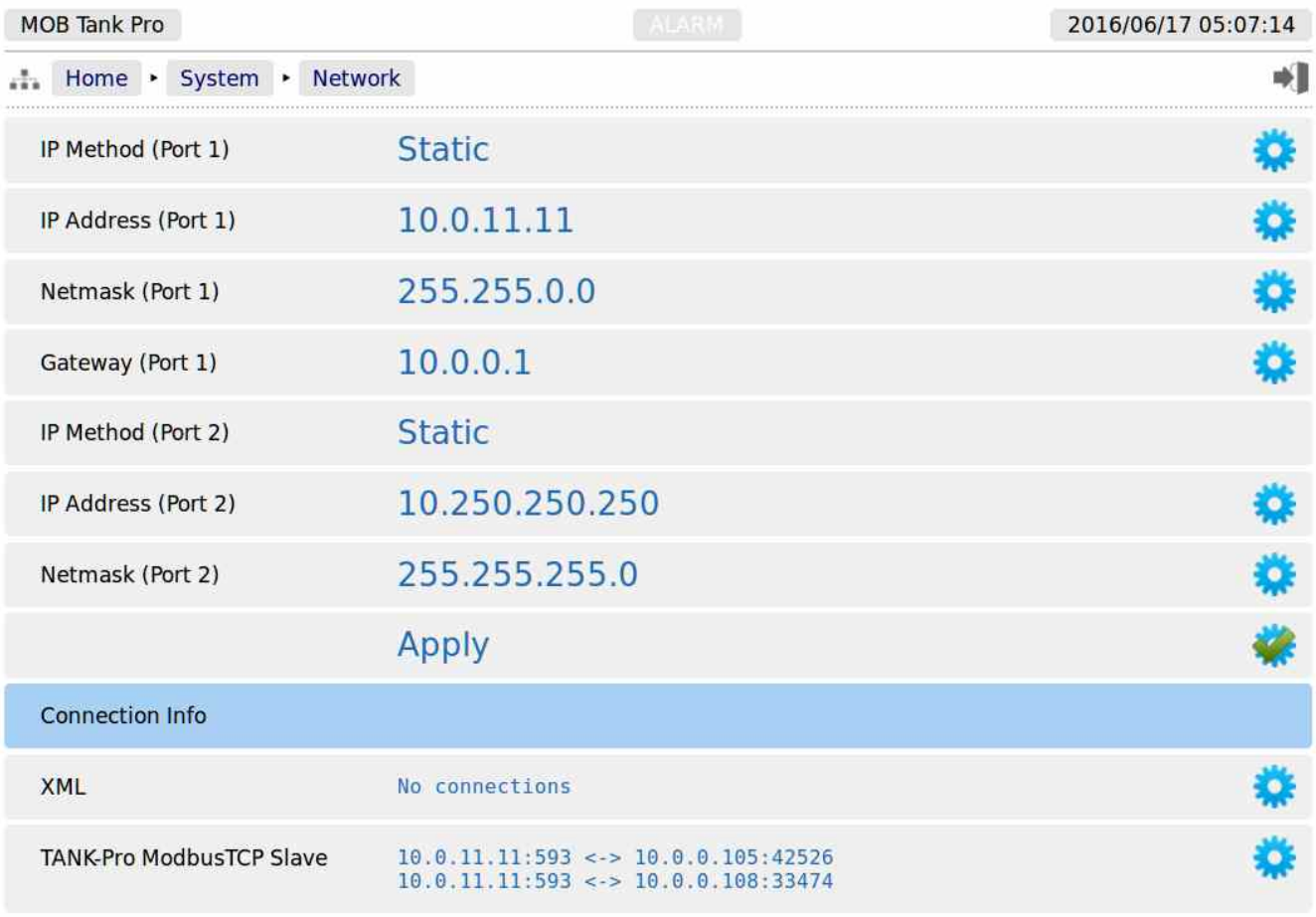
5.2 Network

The TANK-Pro® controller has two 10/100 MHz Ethernet ports. These ports are connected to two independent network controllers. These can be connected to entirely separate networks (for highest reliability systems) or the same physical network. However, in both cases, each controller must be configured so that they are on entirely separate subnets.

The Network page shows the current network settings for both network ports.

The settings can be changed only by Administrator users. The operation of this page is slightly different to other pages, in that each line is NOT actioned as it is changed. The user pre-loads a consistent set of information (IP address, Netmask and Gateway) and all the information gets applied together when the ***Apply*** line is clicked.

If you wish to cancel a setting before the ***Apply*** is clicked, simply change page by clicking on the breadcrumb bar.

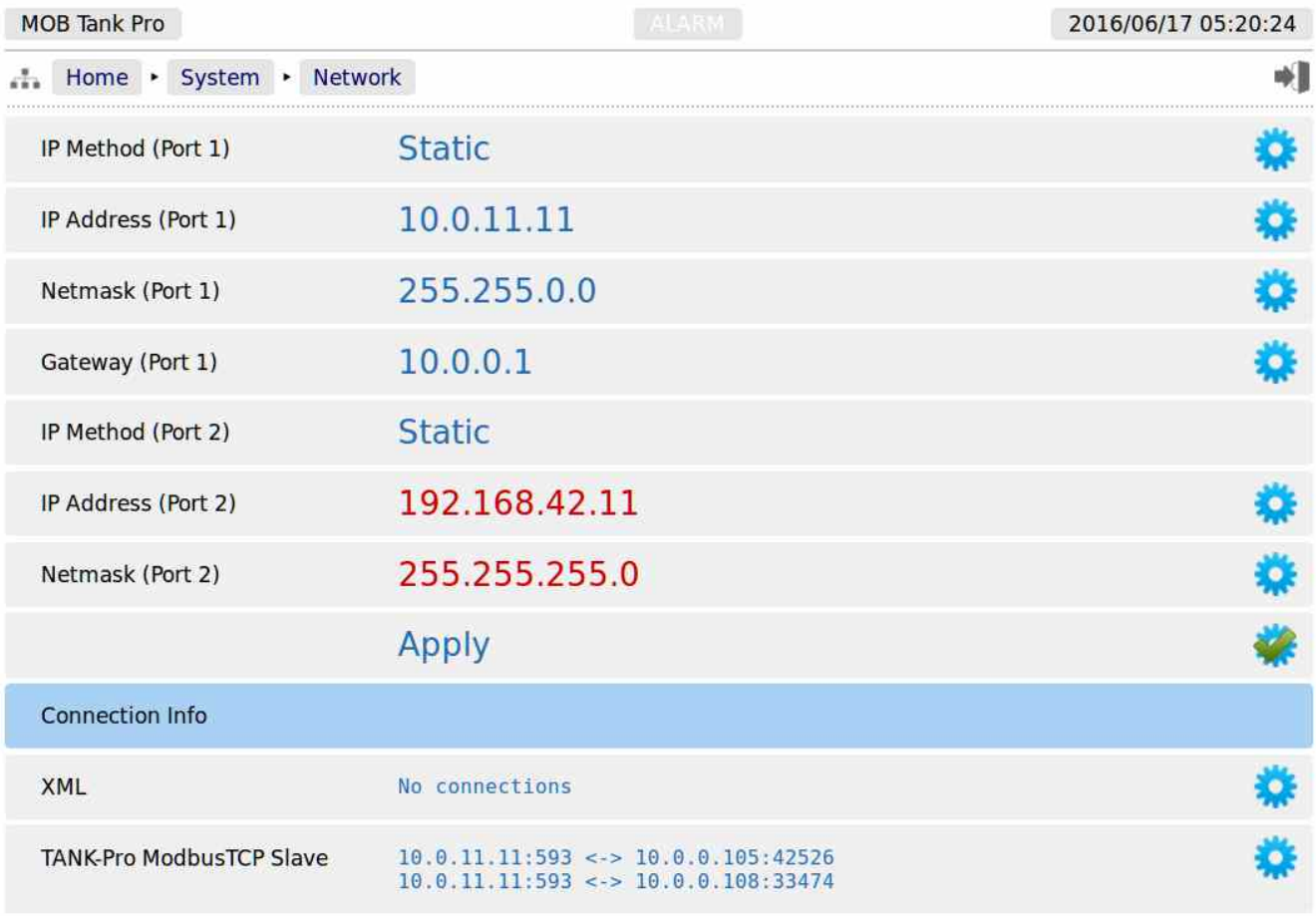


NOTE: Changed but not yet applied information is shown in RED text.

IP Method (Port 1)	This line indicates Static (manually configured) address or a DHCP (automatic) address setting method has been selected for Ethernet Port 1 (ETH1). Clicking on the line containing the gear icon allows the Administrator to select between the two options. **NOTE:** If DHCP is chosen as the IP Method, the current in-use IP address, Netmask and Gateway values are shown, but grayed out as they are for information only.
IP Address (Port 1)	If DHCP has been selected, then this field will show, in gray text, the IP address that has been allocated to the unit by the DHCP server. If Static IP method has been selected, then the line will contain the gear icon, and if the line clicked, the Edit Value dialog box will be opened, so the manual IP address can be entered. The IP address must be entered in commonly used IPv4 quad-dotted decimal representation, as shown by the example screen on the previous page.
Netmask (Port 1)	If DHCP has been selected, then this field will show, in gray text, the Netmask that has been allocated to the unit by the DHCP server. If Static IP method has been selected, then the line will contain the gear icon and can be changed by clicking the line and the Edit Value dialog box will be opened, so the manual Netmask can be entered. The Netmask must be entered in IPv4 quad-dotted decimal representation, like an IP address.
Gateway (Port 1)	If DHCP has been selected, then this field will show, in gray text, the gateway that has been allocated to the unit by the DHCP server. If Static IP method has been selected, then the line will contain the gear icon, and if the gear icon is clicked, the Edit Value dialog box will be opened, so the manual Gateway address can be entered. The Gateway address must be entered in IPv4 quad-dotted decimal representation.
IP Method (Port 2)	This line is for information only, and indicates that Port 2 is set to statically allocated address. If the second port is not required, do not connect to ETH2 port.
IP Address (Port 2)	Clicking the line allows the user to input the IP address for the second port.
Netmask (Port 2)	Clicking the line allows the user to input the Netmask for the second port.
Apply	Clicking Apply line will accept and action any of the changes, highlighted in red on the Network page. Once the changes are accepted, the lines changed will revert to blue colored text.
Connection Info	
XML	This line indicates the number of XML links currently open to the LACT-Pro® TANK controller. It shows the IP address and port of the originating connection. Clicking the line opens a dialogue box that enables all the active XML links to be dropped.
TANK-Pro Modbus TCP Slave	This line indicates the number of Modbus links currently open to the LACT-Pro® TANK controller. It shows the IP address and port of the originating connection. Clicking the line opens a dialogue box that enables all the active Modbus TCP links to be dropped.

The screen below shows a Network setup screen, with changes pending. When the Apply line is

clicked, Ethernet Port 2 IP Address and Netmask will be changed to those shown in RED text.



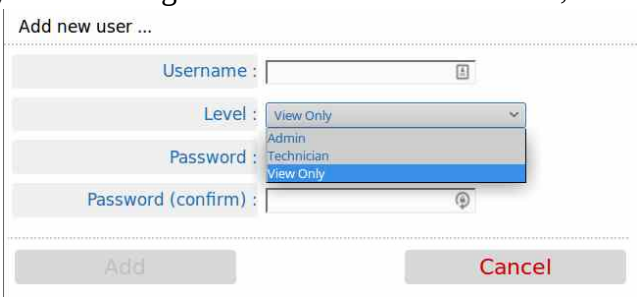
NOTE: The IP address for each port must NOT be in the same subnet. Due to the fundamental design of the TCP/IP routing mechanism, Ethernet will not work reliably if the two network ports share the same subnet.

5.3 User Info

The User Info page shows a list of currently configured users.

User details can be viewed by clicking on the relevant line containing the gear icon. Clicking on the ***admin*** line opens the Edit Value dialogue box, and you can change the Username and Password, but not the user level. **Note**, if you change the admin name to something else, you need to record the new name since you will need this name to log back into the machine.

The second line in the example above has "Add new user …". Clicking on the line opens the "Add new user" dialog box, as shown on the right.

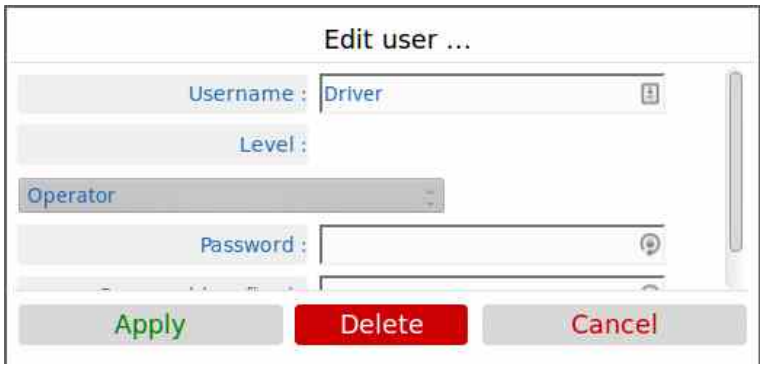


The following details can be changed:-

Username	Sets the username. All usernames must be unique.
Level	Sets the access level of the user. Three access levels are available in the LACT-Pro® TANK application: **Admin** Can change all parameters, except those designated as Technician only. There must be at least one user at Admin level. **Technician** The technician can change the Field Calibration, the Analog Bias (offset) and the Meter Factor, exactly as can be performed from the local panel when the Technician Mode is selected. In addition the Digital I/O diagnostics can be viewed and driven in this mode. **View Only** Allow viewing of all data, except the ***System*** menus, but nothing can be changed.
Password	To change the password, enter the new password into both password boxes.

Administrator users can edit any user's details or delete a user by selecting the line and clicking the red **Delete** button.

Non-administrator users can only edit their own username or password.



Adding a new user or clicking on an existing user opens the Edit user dialog box

NOTE: At least one user MUST be set at Admin level.

5.4 Remaining System Setup Items

Comms, see next page, section 6. Stage 4 of 5 : Communications Setup.

Units, see section 8.1. Configuring the Measurement Units.

Atmospheric Pressure, see section 8.2. Atmospheric Pressure.

Totals Reset, see section 8.4. Totals Reset.

System Information, see section 13.3. System Information.

6 Stage 4 of 5 : Communications Setup

The Comms menu is used to configure the printers and the mapping of the various reports to the printers available, setting the serial port for the Local Panel, as well as the communications to SCADA and Enterprise systems. The menu is shown below.

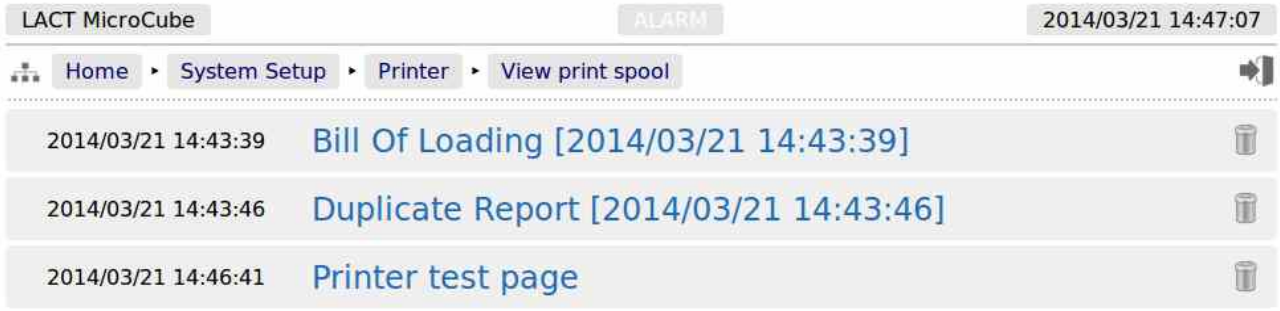
6.1 Printers

The LACT-Pro® TANK application currently supports up to 3 physical printers and a virtual printer on an SD-Card.

One printer may be serial or networked (PostScript), and the other two printers may be network addressed PostScript printers. The screenshot overleaf shows a configured machine.

In the example, Printer 1 has been configured to be a serial printer, using COM1 (the RS232 port) with 9600 baud. Printers 2 and 3 are configured as Networked printers. The relevant IP address has been added, and the default port of 9100 used. Printer 2 and Printer 3 have also had their default names overwritten to "Office LaserJet" and "OK City, Ticket_Pool#3".

The first item in the menu ***Printer Spool*** shows the number of files in the print spooler waiting to be printed. If there are none, this will state Empty, as overleaf. If there are any spool files not yet printed, then clicking the line showing the gear icon, will open the View Print Spool page. Shown below is an example with 3 reports in the print spooler.




MOB Tank Pro
ALARM
2016/06/17 05:48:30
Home
System
Comms
Printer
Print spool
Empty
Printer 1
Name
Printer 1
Type
Serial (Codepage 437)
Serial Port
None
Baud Rate
9600
Printer 2
Name
Office LaserJet
Type
Network (Postscript)
Network Address
10.0.0.107
Network Port
9100
Zoom (%)
100
Print Test Page
Printer 3
Name
OK City, Ticket_Pool#3
Type
Network (Postscript)
Network Address
10.0.0.11
Network Port
9100
Zoom (%)
100
Print Test Page
SD Card
Status
Installed (free 1.80 GiB, total 1.87 GiB)
Archive Historicals
Disabled
Archive Alarms/Events
Disabled

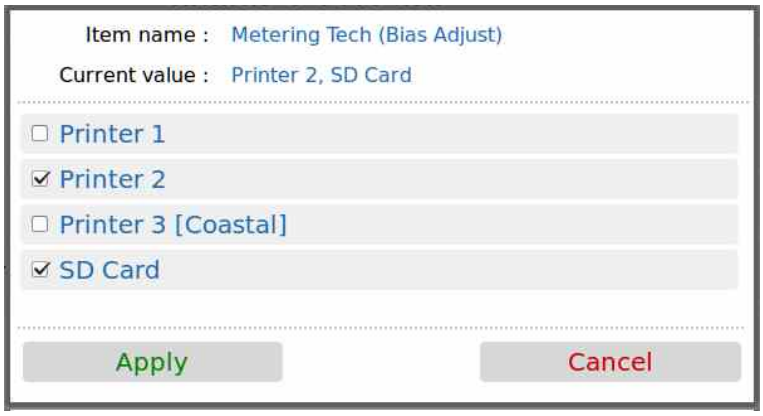
Print spool	This will show Empty if files generated have all been printed, but will show the number of files in the printer spool, if the generated file(s) have not been printed.
Printer 1	
Name	Clicking on the line opens the Edit dialog box, and printer name can be changed.
Type	Printer 1 can be disabled by selecting None, or set as a Serial or Networked (PostScript) printer. In this example, Serial has been selected. Baud rate is only shown for Serial printing.
Serial Port	The Serial printer can be connected to Serial Port 1 or 3.
Baud Rate	The edit value dialog box allow free form data entry. Take care to enter a valid value from the following list: 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200.
Printer 2	
Name	Clicking on the line opens the Edit dialog box, and printer name can be changed.
Type	This printer has been configured as Network (Postscript) printer, so the Network information and Zoom (%) options are displayed.
Network Address	The IP address must be entered in IPv4 human readable quad-dotted format, as shown in the screenshot above.
Network Port	This is the TCP port number, and depends upon the printer used. Port 9100 is the TCP port number reserved for Page Description Language Data Streams, and is the most common.
Zoom (%)	Many postscript printers render data slightly differently, so to accommodate this possible variation, a percentage scaling factor can be applied. This is defaulted to 100%, but a different scaling factor can be applied if the test print does not fill the paper correctly.
Print Test Page	Clicking this line forces an immediate test page to be sent to the printer. The test print is 64 lines by 80 characters, and is made up of a grid of asterisk (*) characters, with line number and column numbers. The zoom factor can be used to adjust for the printer page size.
Printer 3	
	This section is setup as Printer 2 above.
SD Card	
Status	This will state No Card Inserted, if no SD Card is present, or has been dismounted. When the TANK-Pro® controller is turned off, SD Cards may be inserted or removed at will, and when powered up, the controller will automatically mount a card if available. When installed, the status line will show the free space and the total card size in GibiBytes (GiB) or in MibiBytes (MiB). If a card is to be removed from a running system, the status line should be clicked, and the SD Card Install or Remove dialog box will be presented. Click the Remove Radio button and take out the SD Card. To fit a card to a running machine, put the card into the card slot beneath the Ethernet ports, click the SD Card Status line, and select Install. If the card can be mounted, the status line will now show the SD Card information.

Archive Historicals	By Default, this line will show Disabled. Clicking the line gives the option of selecting Daily, Weekly or Monthly. If one of these periods is selected, then at the chosen repetition rate, the entire historical data archive, used for Trending, is zipped and stored on to the SD card. This would allow 5 second Trend Sample Period to be used, and all the data stored at this resolution for 10's of years, even on a small SD Card.
Archive Alarms/Events	This feature operates as the ***Archive Historicals*** above, but makes a copy of the Alarm & Event information at regular intervals, to further extend the huge internal storage available.

6.2 Report & Printer Routing

The LACT-Pro® TANK application is configured to have 10 reports. Each report can be sent to any or all of the printers as required.

Clicking on a report line will open the printer routing options for that report.



Clicking on the check box causes the report, when generated, to be directed to the selected printer. Reports can be directed to any or all printers. If no printers are selected, the report will not be printed, but will still be generated and stored in the reports archive.

6.3 Local Panel

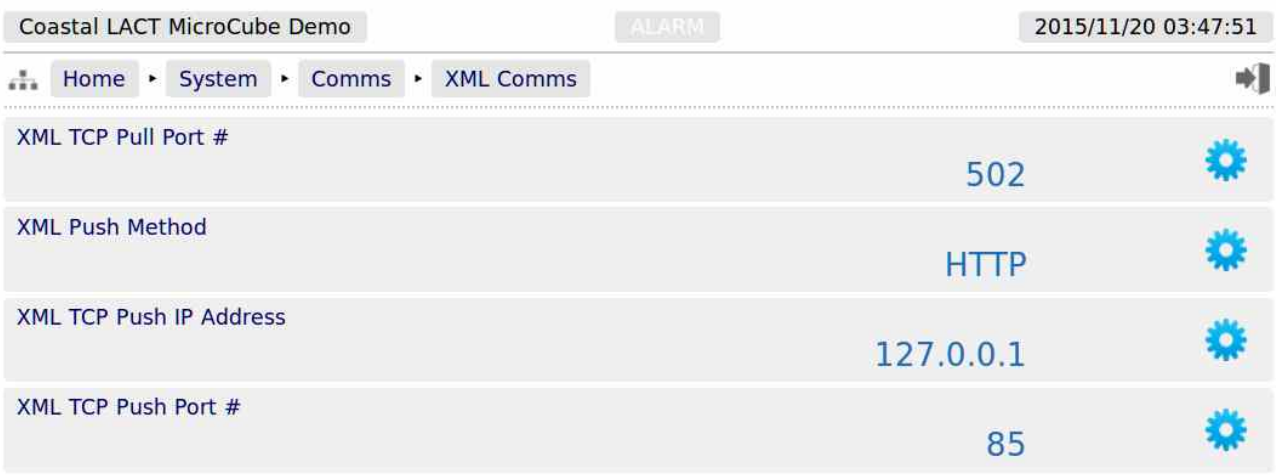
The Local Panel is used by the tanker driver and metering technician.

The panel can be connected to either of the full-duplex serial ports COM1 or COM3. COM2 is unsuitable for the local panel because it is half duplex RS485 only.

The radio button only allows the selection of one port at a time. If the radio button is grayed out, this indicates that the serial port has already been allocated to another service, in this case, a serial printer is in use.

6.4 XML Communications

XML communications is the preferred method of retrieving data from the LACT-Pro® TANK controller. The LACT-Pro® TANK controller can be polled periodically for new information, but to save bandwidth and data usages charges there is also an XML push notification. The push notification informs that an alarm has changed state or a report generated, and then the machine can be polled to retrieve the required information. This allows remote systems to be informed of new reports or alarms, without having to constantly poll the unit.



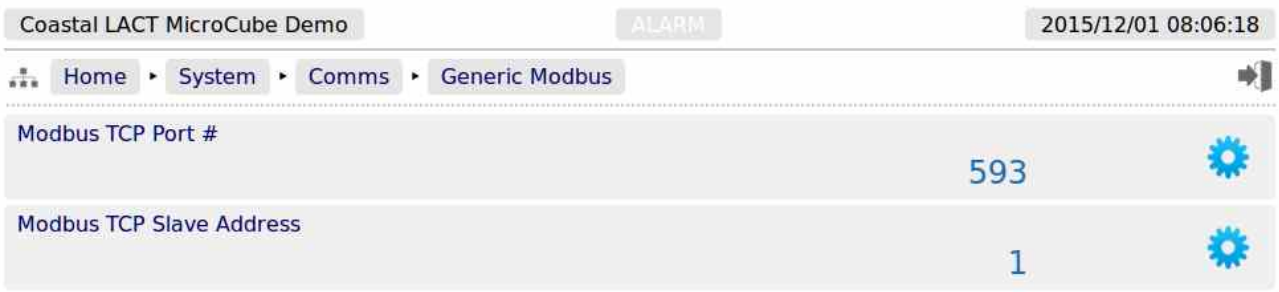
XML TCP Pull Port #	In XML TCP Pull mode, the LACT-Pro® TANK controller acts as a slave device and waits for a remote server to initiate the XML requests. The TCP/IP port number can be set to any number between 0 and 65535, but care must be taken in choosing the port number. We recommend the port number is left as 502, unless there is a good reason for changing it.
XML Push Method	This is where the TANK-Pro® controller acts as a master device, and, upon some internal trigger (new report or a change to Alarm status), sends a "status" packet to a remote server. Two "push" connection modes are possible: **Raw** - the target sends the status packet as raw XML data to the server. **HTTP** - the target uses an HTTP POST request to send the status packet to http://<server>/notify.
XML TCP Push IP Address	This is the TCP/IP address of the remote server which will receive the push notifications from the LACT-Pro® TANK controller.
XML TCP Push Port #	This is the TCP/IP port number of the remote server which will receive the push notifications from the LACT-Pro® TANK controller. Setting the Port # to 0 will disable the Push notification.

For a full description of the XML communications, please refer to the additional manual, Nano_XML_Comms - Rev20.pdf or later versions.

6.5 Modbus Slave Communications

The TANK-Pro® controller supports a Generic Modbus/TCP Link – populating live information and grouped tightly so that few polls are required to get live data.

NOTE: The preferred method of receiving all data (archived and live) is via XML comms.



Modbus TCP Port #	This is the port number that the Modbus Master device must use to talk to the selected Modbus Map. The default port number is 593 for the Generic Modbus map.
Modbus TCP Slave Address	This is usually set to 1, but can be changed to match the requirements of the Master, as required.

NOTE: The TANK Modbus Manual describes all of the Modbus data points available in the Generic Modbus map.

7 Stage 5 of 5 : Configuring Final settings

In this final stage, the Units, the Atmospheric Pressure, and any Auxiliary inputs are configured.

7.1 Configuring the Measurement Units

There are 2 measurement units that can be configured, the Temperature Unit and the Gravity Unit.

Volume Unit	This is always US Oil Barrels (bbls).
Temperature Unit	This can be set to degrees Centigrade (°C) or degrees Fahrenheit (°F). The default is degrees Fahrenheit (°F).
Absolute Pressure Unit	This is for information, absolute pressure is always shown as psia.
Gravity Unit	This can be °API, lbs/US gallon, lbs/barrel or grams per cubic centimeter (g/cc).
Tank Dimension Unit	This is always in inches. 10 Foot 8 1/4 inches, would be entered as 128.25 inches. See section 5.1.3. Inches & Decimal Inches.

7.2 Atmospheric Pressure

This simple menu allows the user to set the default Local Atmospheric Pressure, in absolute pressure units of psia.

7.3 Auxiliary Inputs 1 to 6

For each unused Analog Input, that is allocated as an auxiliary input, an entry will appear in the Home→System→Auxiliary Input "X" menu.

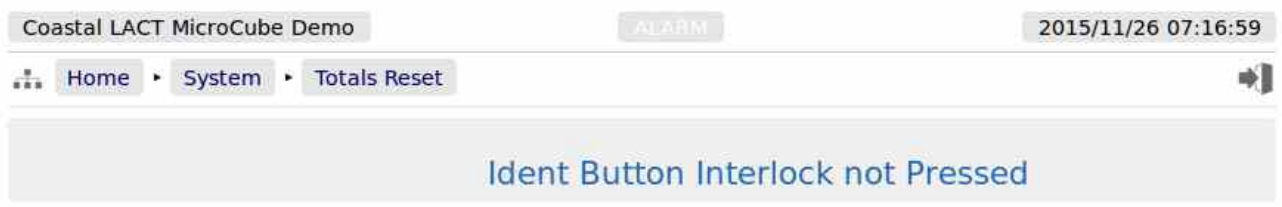
Auxiliary Input "X" - Description	This field allows the Auxiliary Input to be named. The name is then visible on the Home→System→I/O→I/O Diagnostics report.
Auxiliary Input "X" - In Use	This field shows the scaled engineering result that is made available to the trending system and can be retrieved via XML and Modbus communications. This is for information only and cannot be changed.
Auxiliary Input "X" - 4 mA Scale	This field sets the 4 mA scaling value. It is recommended to set the Engineering Units (shown below) first, then set the scaling.
Auxiliary Input "X" - 20 mA Scale	This field sets the 20 mA scaling value. It is recommended to set the Engineering Units (shown below) first, then set the scaling.
Auxiliary Input "X" - Unit	Clicking the line brings up a selection dialog box. Select one of the 5 different units available. The options are °F, %, psig, g/cc or °API and the default is percentage.
Auxiliary Input "X" - mA	This field shows the equivalent current for the associated Analog Input channel . This is for information only and cannot be changed.

Auxiliary Input "X" Transmitter Value with Bias	This is the sum of the Transmitter Value and the associated Bias Value. This is for information only and cannot be changed.
Auxiliary Input "X"Bias Value	This is the Bias or Offset value that is being applied to the measured value. If logged in at Technician level, this value can be viewed and edited. It can also be set by the Technician Menu using the Local Panel. If logged in at Admin level, this is a read-only status display.
Auxiliary Input "X" Transmitter Value (No Bias)	This point displays the live measured engineering value, with the units and scaling factors applied. This item cannot be edited.

7.4 Totals Reset

During testing or when a unit is redeployed, it can be useful to reset the totals, HOWEVER, it is imperative to ensure that it isn't possible to accidentally or deliberately reset the totals remotely.

To ensure the totals cannot be reset without physical access to the LACT-Pro® TANK controller, the IDENT button is used as an interlock. Navigating to the Home→System→Totals Reset page, will show the following:



If you want to reset the totals of a packaged LACT-Pro® TANK controller, the seal must be broken and the housing opened. The IDENT button must be held down for several seconds, before navigating to the Home→System→Totals Reset page. The page will now display the Reset Totals button, and clicking the button will reset the totals. As soon as the IDENT button is not held down, the "Interlock not Pressed" display will be shown.

NOTE: The Non-Resettable Totals will NOT be reset by this action.

NOTE1: This ends the setup of the LACT-Pro® TANK controller. The following information details the Reports generated by the controller, the Logs and trending data provided as well as the diagnostic information available in the Controller.

NOTE2: Now would be a good time to back up your changes. With MicroConf, machine configurations can be uploaded to the PC, for back-up purposes, and for cloning more controllers.

NOTE3: When commissioning the unit, enter the Technician Menu mode using the local panel and select "Oil Proving / Batch End". Enter "No" to the question "**Oil Prove ?**" and "Yes" to the question "**Batch End ?**" and input relevant default sample data as requested.

8 Field Calibration & I/O Debug

8.1 Field Calibration

The LACT-Pro® TANK controller has very stable, high resolution Analog Input and RTD measurement circuitry which are factory calibrated to a high standard, which will give excellent measurement results without additional user input.

However real-world issues, such as transmitter error or physical problems, such as a sub-standard design of thermowell, or incorrect placement of a transmitter can lead to the measured value being different to the reality. There are two ways to solve this problem.

The simplest is to apply a one-point bias, or offset adjustment, and this is easily achieved in Technician Mode using the Local Panel. A bias adjustment however may only be reasonable when the operating point does not change too much. If for example, the bias function is used to adjust a temperature reading, this Bias Adjustment should be checked between Summer and Winter as a minimum.

In addition to the bias or offset for a Process Variable , the Application features a site calibration mode, to enable loop calibration of each Analog Input.

This can eliminate certain transmitter errors, such as offset errors and span/gain errors. Loop calibration cannot eliminate problems of non-linearity, although good operating practice can indicate these type of transmitter problems.

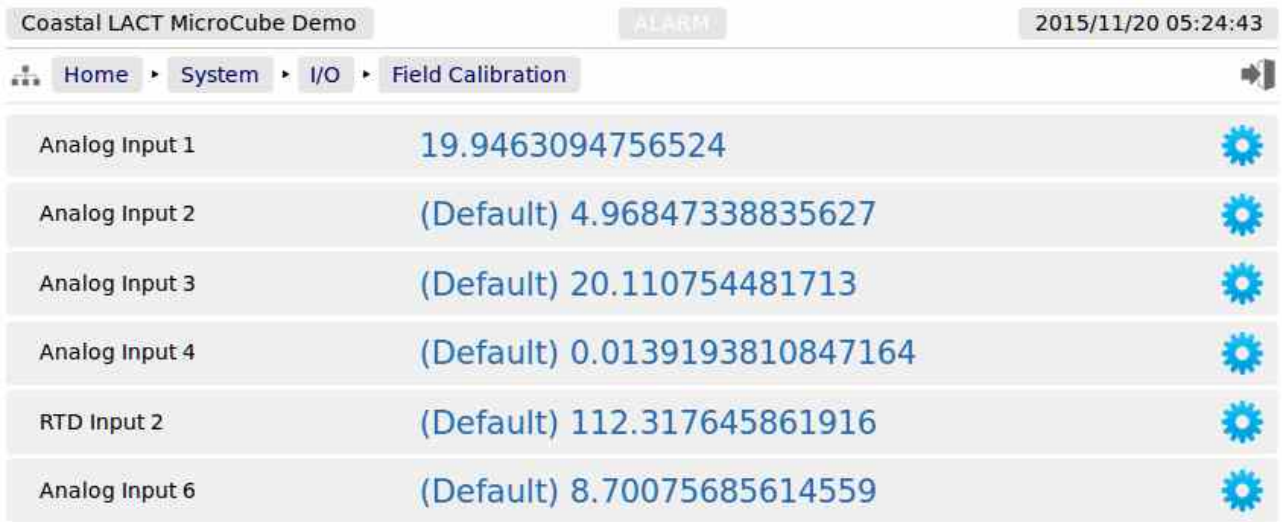
The process for calibrating an Analog input is straightforward, but remember, the user MUST be logged in at Technician Level.

Example:

In this example, the pressure input configured to use Analog Input 1 is to be loop calibrated.

Before the Calibration process can commence, the operator must know the range the transmitter will operate over and the scaling value. Referring to Section 8.3.3. Measured Line Pressure, we can see that the Pressure 4 mA Scale Value (which is 4 mA) was set to 0 psig and the Pressure 20 mA Scale Value (which is 20 mA) was set to 200 psig.

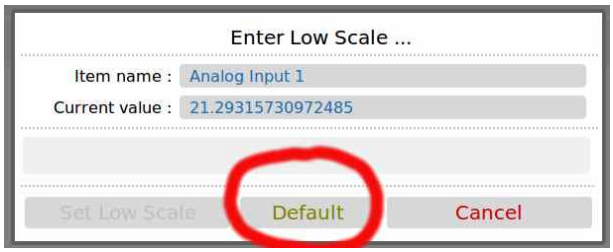
To start the calibration process, navigate to Home → System → I/O → Field Calibration, as shown below. This web page shows all 6 Analog Inputs.



NOTE: Unless logged in at technician level, the edit icons will appear grayed out, and the Analog Inputs cannot be edited.

You can see that ***Analog Input 2*** through to ***Analog Input 6***, shows (Default) at the beginning of the line. This show that these inputs are using the factory calibration values. ***Analog Input 1*** however does not show (Default), so Analog Input 1 is running with replacement values.

Step 1 is to clear the replacement values, and set it back to default. Click the line associated with the relevant input which will open the Enter Low Scale dialog box, and then click the button named Default. You will be asked to Reset Scale to Default, and click the Confirm button.



You will be taken back to the previous screen, but now ***Analog Input 1*** will show (Default) in front of the live reading, and you are ready to proceed.

Step 2. Once again click the line associated with the input. This will open the Enter Low Scale dialog box.

Vent the pressure as seen by the Pressure Transmitter to atmosphere, the reading shown as the current value in the Enter Low Scale dialog box should be around 4 mA. If it is drastically different, the cause should be investigated. Once the pressure has normalized to atmospheric, type 4 into the data entry box, and click the Set Low Scale Button.

This has preloaded 4.0 mA into the low scale field. It is not yet being used and will not become active unless confirmed at the end of the process.

Step 3. The dialog box now prompts you to enter the high value. Load the dead weight tester until pressure is at full scale, 250 psi in this example.

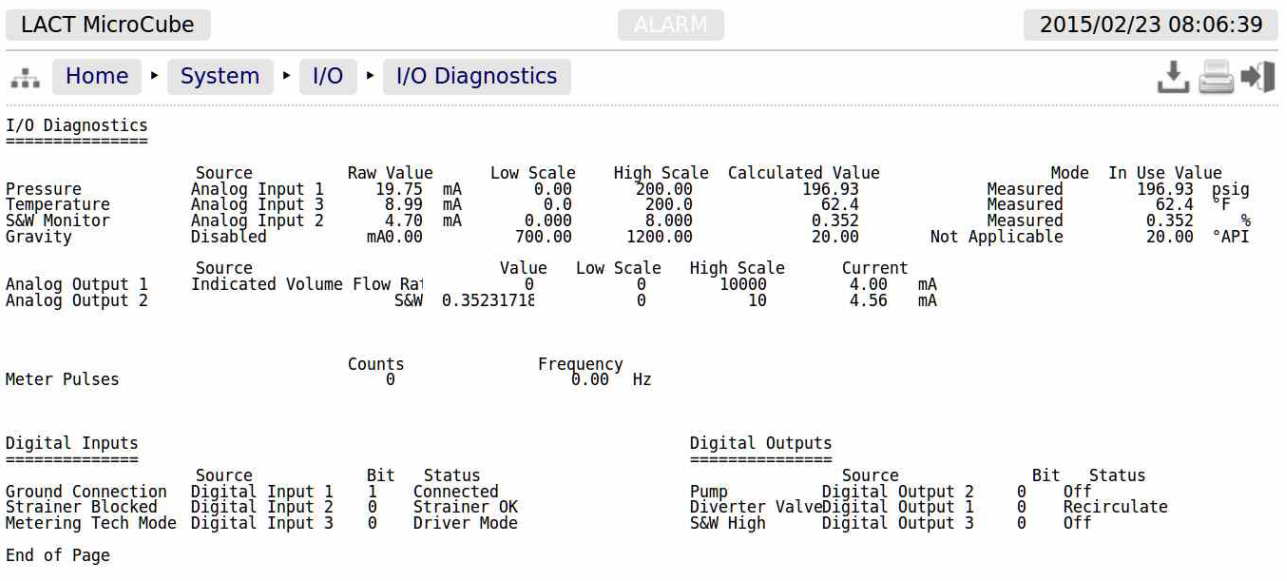
The live reading should be display numbers around 20 mA. Now type 20 into the Enter High Scale dialog box, and click the Set High Scale button to preset the value.

Step 4. The dialog box now changes to the confirm scaling as shown. The confirm scaling dialog box shows both the low scale and high scale before and after values. If these values appear to be reasonable, pressing the confirm button will accept the field calibration replacement values.

If subsequently a problem is found with the field calibration replacement values, the default values can be restored, by clicking the relevant line and selecting the ***Default*** button.

NOTE: Calibration replacement values are stored in the Metrology Event Log. The replacement values are stored in non volatile memory and retained following a power cycle, update of the Application and update of the firmware.

8.2 I/O Diagnostics



The data shown on this page is live, and will be updated every heartbeat, however the web page only updates approximately every second, depending upon bandwidth and connection type.

On this page, two additional screen icons are shown:

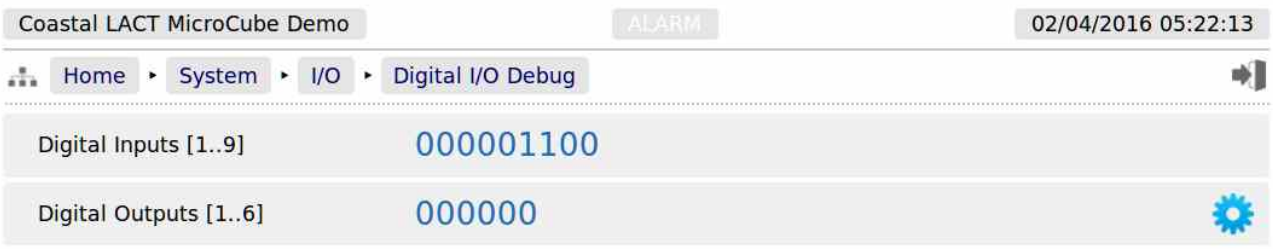
The Download Icon indicates that the data on the screen can be downloaded to the PC currently viewing the LACT-Pro® TANK controller web page. After clicking on this icon, your browser may ask the user what action should be performed with this file. Normally these options are to save or view the data.

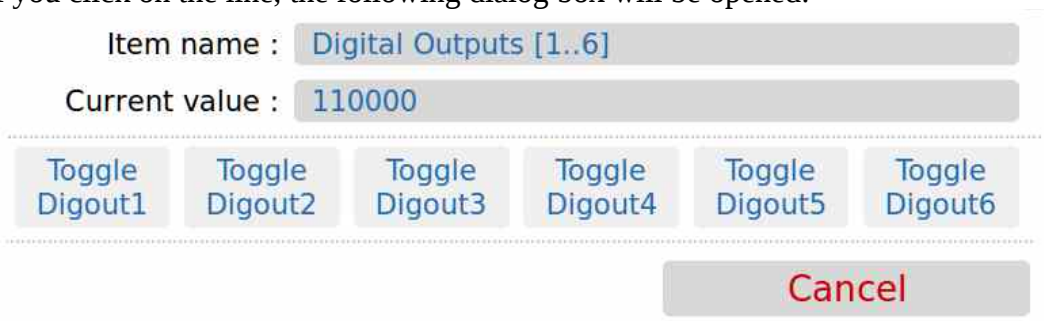
The Print Icon indicates that the data on the screen can be printed, via the web printer configured on the LACT-Pro® TANK controller, at Home → System → Comms → Report/Printer Routing.

NOTE: To print to the PC running the browser, use the browser's specific printing method, or type Ctrl + P on most browsers, on most operating systems.

8.3 Digital I/O Debug

The screenshot below shows the display when logged in at Technician level



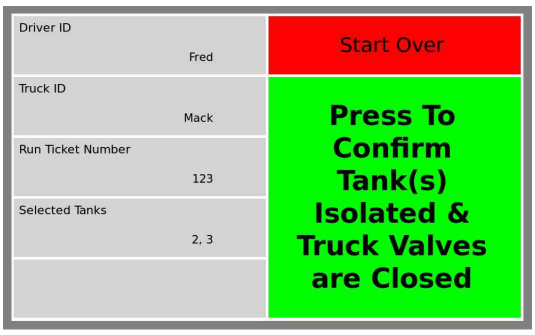
Digital Inputs [1..9]	This shows the current status of the Digital Inputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Input 1.
Digital Outputs [1..6]	There are two aspects to the Digital outputs, a display and an override. The display shows the current status of the Digital Outputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Output 1. If you click on the line, the following dialog box will be opened:  **NOTE**: Unless logged in at the Technician Level, Digital Outputs are not changeable. **CAUTION:** Careless use of this feature may cause operational problems, such as inadvertently changing the state of a permissive output, and so this feature should be used with caution. **Do NOT use or disclose Technician Level passwords without careful consideration.** The current state of the Digital Outputs are shown in the Current Value field. In the example above Digout 1 and Digout 2 are "ON" and the rest are "OFF". If you click on the Toggle Digout for any of the output channels, the output state will be inverted each time you click, and the Current value field will be updated. In the above example, clicking on Toggle Digout 6 would result in Digout 6 changing from "OFF" to "ON", and the current value would then be 110001. Pressing Cancel will restore the previous values.

9 TANK-Pro Operation

The TANK-pro controller monitors and logs tank level and line temperature levels continuously, but during a load additional information is recorded.

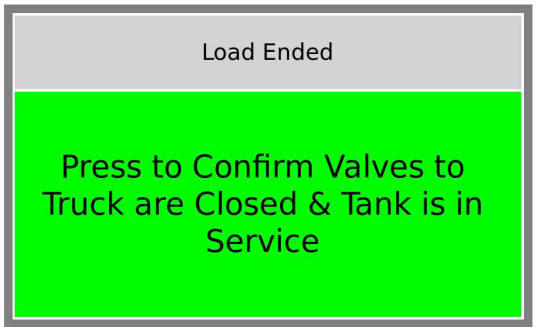
Once the driver has confirmed that tanks are isolated all levels, calculated volumes and temperatures are recorded.

Opening Values recorded



Then during a load, as the selected tank levels change, the TANK-Pro compares the initial tank volume with the current tank volume, and produced a display showing the change in volume due to loading the truck.

Closing Values recorded



When the load is completed, and the valves again set to isolate the tanks and confirmed by the driver, a final closing measurement is recorded, and the opening and closing values used to determine the BOL ticket.

Charge Pump state table

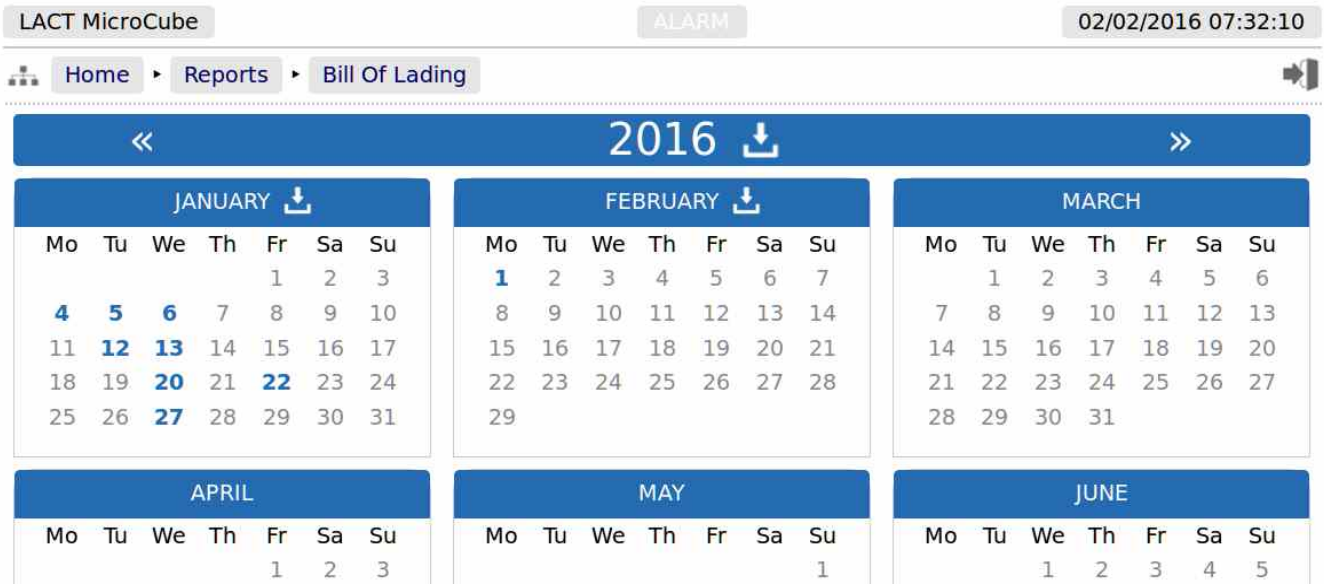
Event and status	***Charge Pump permissive Output***
Tank-Pro powered off	Pump Off
Powered On, but not loading	Pump Off
During Load	**Pump ON**
Suspend Volume Trigger Volume reached during a load and now awaiting driver input	Pump Off
During suspend, driver selects Continue loading	**Pump ON**
After reaching ***Stop Loading Trigger Volume*** or driver has selected End Load.	Pump Off

10 Reports

The purpose of the LACT-Pro® TANK controller is to record all the relevant loading or unloading data, and produce a set of reports for agreement between the buyer and seller of all transactions.

10.1 Reports Calendar View

Clicking on the Report menu items shown above will show a year calendar for the current year for all of the reports listed. The screenshot below shows just the top of the screen.



The << and >> arrow icons on the Year header move the currently displayed calendar year backwards or forwards. If there are any downloadable files associated with the selected calendar year, then the download icon will be displayed in the Year header. Clicking this icon will download all the files for that year, as a single .zip archive file.

NOTE: This could be a very large file.

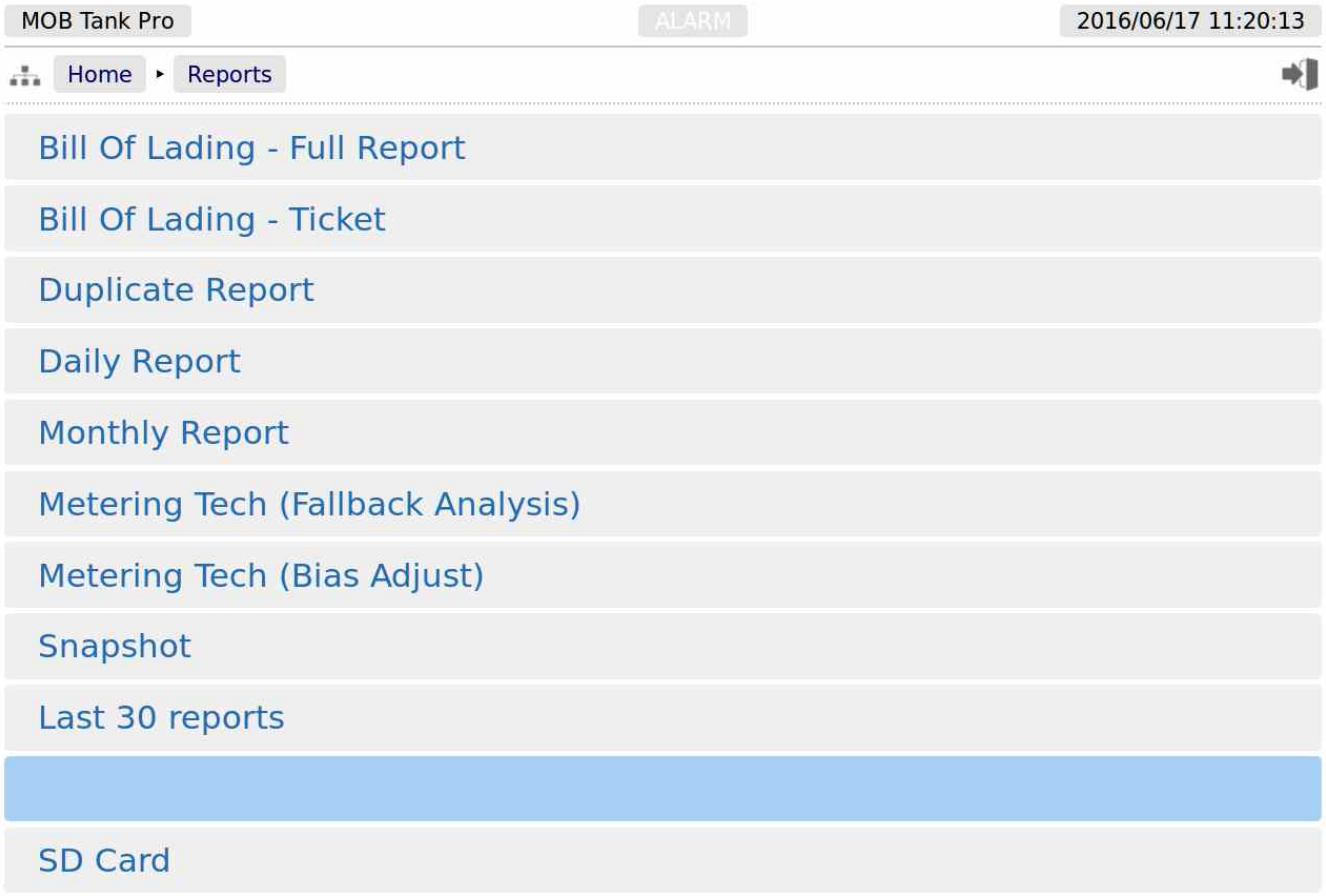
Each year is split into the months, and each day of the month is shown in a light gray typeface. If there any reports associated with the day, then the day will be shown in a bold blue typeface. If there are any reports in the month, then the download icon will be shown in Month header. Clicking the Month download icon will download all the reports for that month as a single .zip archive file.

Clicking on any day, shown in a bold blue typeface, will open the daily view screen, which will show all reports associated with that day. All reports are shown with their date and time of creation. Clicking the associated line will open a report preview. The breadcrumb bar will show the download icon which allows the single report currently previewed to be downloaded.

The Daily header has << and >> arrow icons which will allows the user to move backwards or forwards a day for each click. If there are no reports for the selected day, the screen will show ***No reports***.

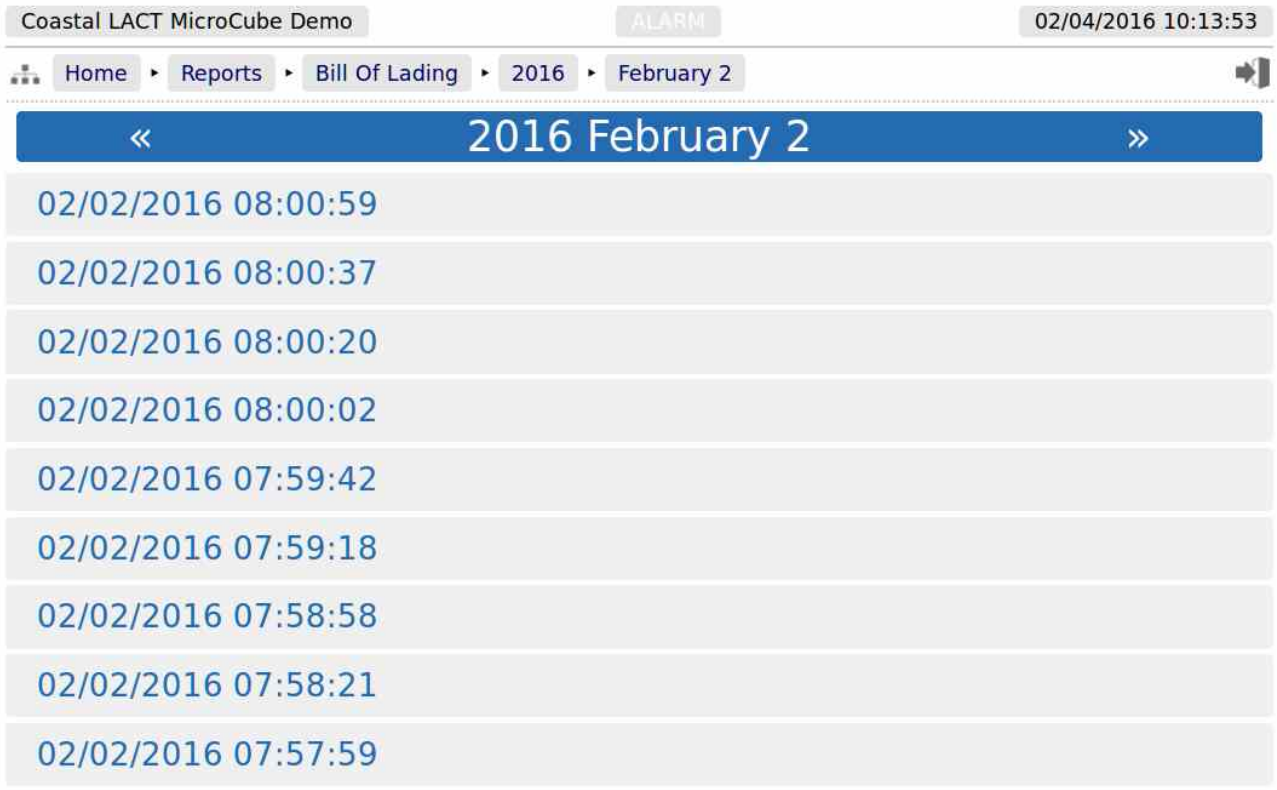
The last entry ***Last 30 Reports*** is not a calendar view and shows the latest 30 reports, regardless of the type.

10.2 LACT-Pro TANK Report Types

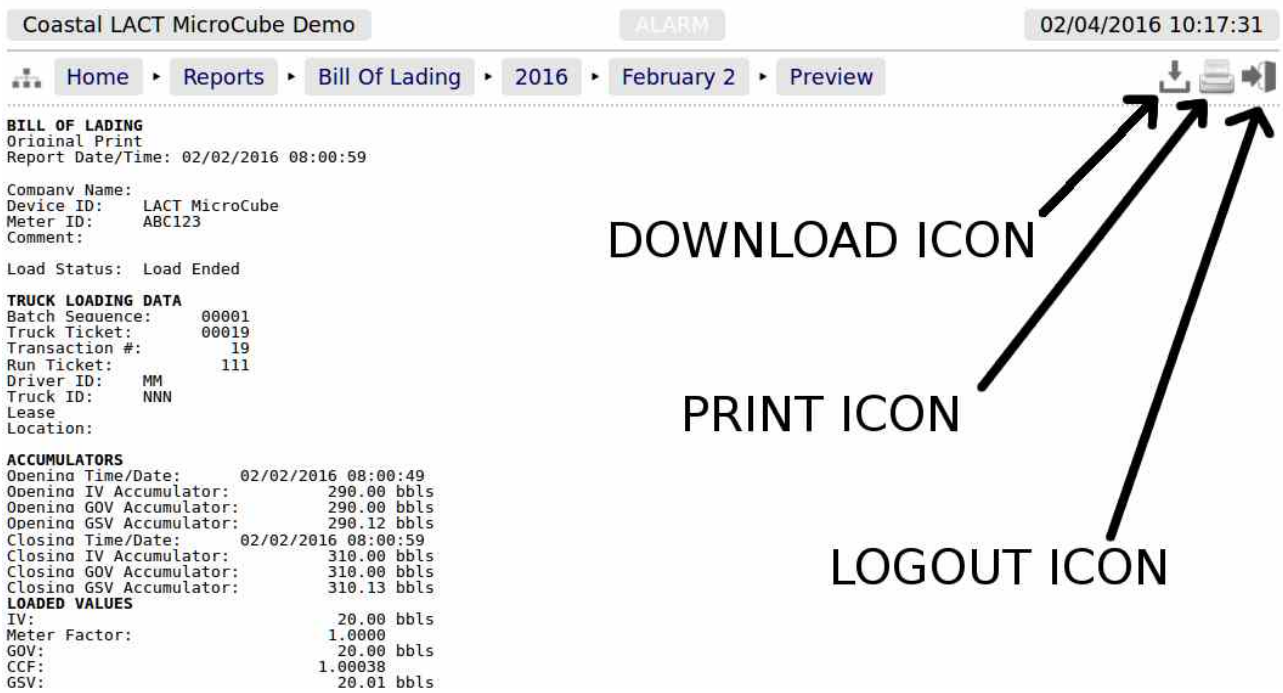


Bill Of Lading - Full Report	This is the full transaction report with information on all tanks and all line temperatures, and indicates which are selected and which are not. A useful report for consolidation in the case of driver selection errors. This report is generated as each load is completed.
Bill Of Lading - Ticket	This is the transaction ticket. This report uses a narrow format suitable for ticket printers. This report is generated as each load is completed.
Duplicate Report	The Driver is given the opportunity to reprint the BOL Ticket from the Local Panel display so that should there be a problem for example, with the printer paper, the printer can be reloaded and a duplicate ticket produced.
Daily Report	Every day at the ***End of Day Time*** (see Home → System → Initial Setup) a daily report will be generated. This will be stored in secure non-volatile memory, and may be printed automatically, depending upon the printer settings and printer routing (see Home → System → Comms → Printer → Report Printer Routing). When the Application is started for the very first time, a Daily Report will be generated, with the initial data.
Monthly Report	On the first day of each calendar month at the End of Day Time (see Home → System → Initial Setup) a monthly report will be generated. This will be stored in secure non-volatile memory, and may be printed, see above. When the Application is started for the very first time, a Monthly Report will be generated, with the initial data.
Metering Tech (Fallback Analysis)	These reports are generated when the LACT-Pro® TANK application is in Metering Technician mode (see section 5.6. I/O Assignments – Digital Inputs & Outputs) and the Metering Technician has completed the witnessed analysis of the Sampler Can. This report records the Oil measurement accumulators, the Batch sequence #, the Last truck Ticket # and the last transaction #.
Metering Tech (Bias Adjust)	This report records the As Left Bias (Offset) values applied to the analog measured values.
Snapshot	If a snapshot report has been generated it will be stored here, by time and date, but it should be noted that only the last generated report is shown, and the snapshot report is NOT stored in Non-Volatile memory, so will be cleared on a restart or power cycle.
Last 30 reports	This shows the last 30 of all reports generated in time & date order.
SD Card	The SD Card menu is a hierarchical viewer in date order. First select the year, then the month, and finally the day, and all files created on that day will be visible.

The display below shows the a set of BOL reports during an accelerated test.



By clicking on any of the reports listed, a preview of the report will be shown. When looking at any report preview page, the report can also be downloaded directly to the PC, by clicking on the File Download Icon. The preview below shows the first few lines of the Bill of Lading ticket for clarity and the arrow indicate the purpose of the additional icons on the breadcrumb navigation bar.



Reports will be downloaded to the PC as plain text files, but the text attributes will be shown in the downloaded text, for example <b> for bold and <u> for underline.

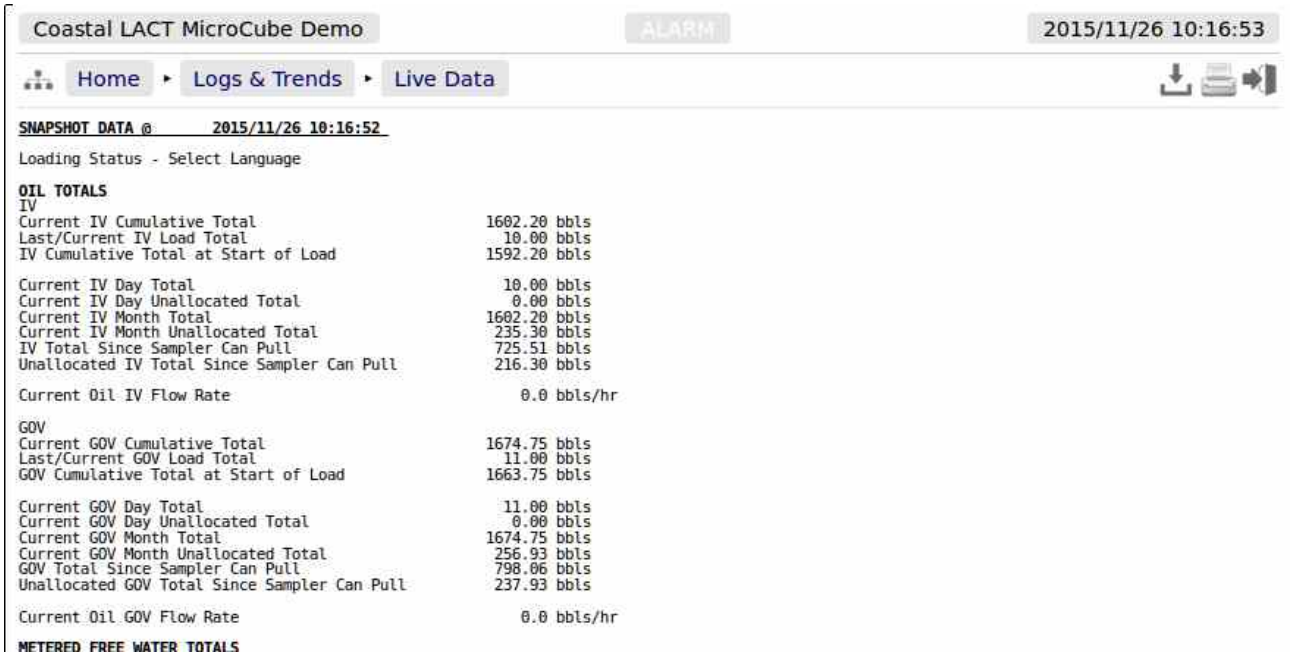
Clicking the Printer icon, adjacent to the Download icon, will cause the file to be printed to whichever printer has been designated as the web-printer during the setup phase.

Alternatively, the screen can be printed from the browser, using the usual method. Frequently Control-P allows printing from a browser.

11 Logs and Trends

The LACT-Pro® TANK application supports 3 different log files types. The Events Logs, has 6 sub-categories. In addition the LACT-Pro® TANK has a powerful historical storage and graphical representation facility for trending data. and can show the most significant information in the machine in real time, from the Home→Logs & Trends→Live Data pages. The screenshot below is just a small part of the live data available.

11.1 Live Data



11.2 AO Data

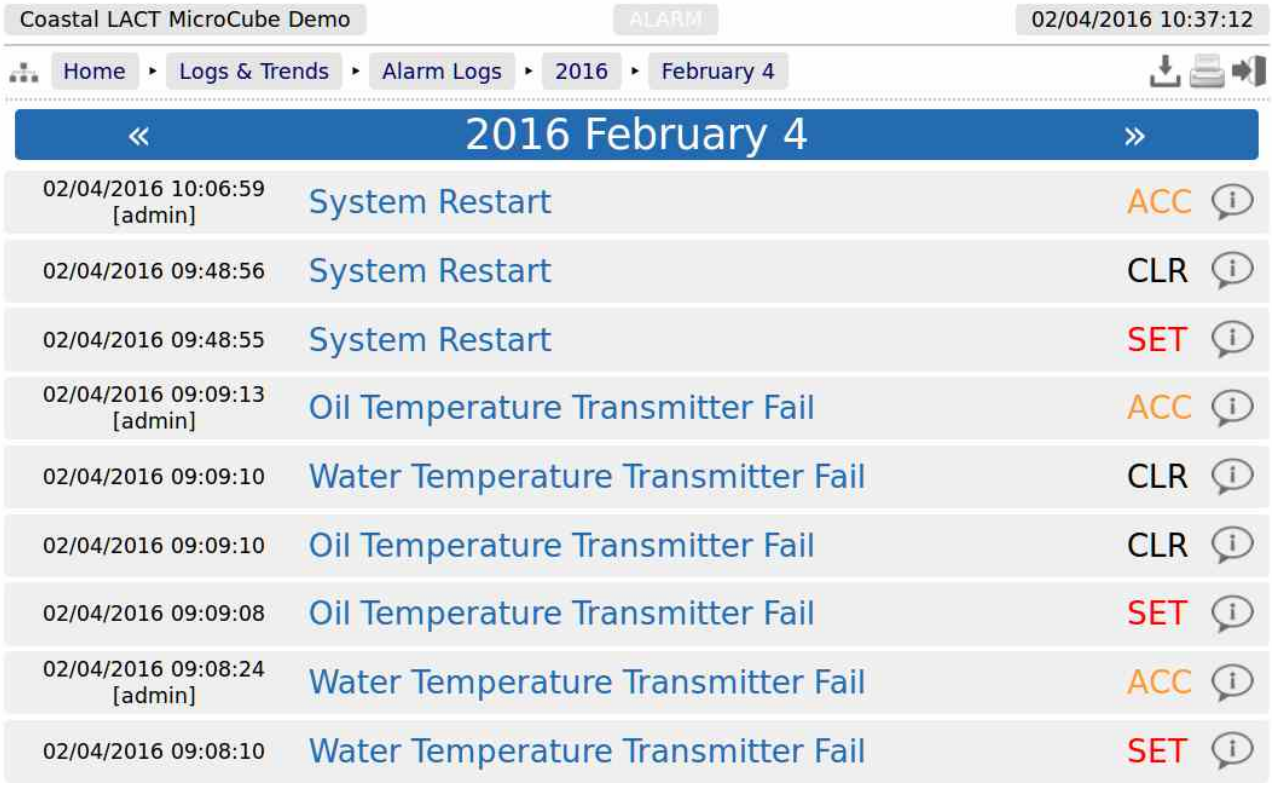
The AO data is a web accessible copy of the live report that can be displayed on the Local Panel, so that the BLM Authorised Officer, can ensure that the essential metering matches the records, and that the fidelity of the measurement is assured.

11.3 Alarm Logs

Clicking on Alarm Logs will show calender view for the Alarm logs. The calendar view operates in the same manner as the Reports Calendar View, see section 9.1 for more details. Drilling down to each day shows all of the alarms stored in sequential time order. The controller stores 1000 Alarms, and they can all be downloaded from the website or via XML communications.

Each Alarm is time and date stamped, has a description of the Alarm, states if the Alarm is being set, accepted or cleared, and at the end of the line is an information bubble, known as the Additional Log Values (ALVs).

Hovering the mouse pointer over the information bubble result in a small pop-up window that shows the cumulative totals for the Oil Indicated Volume (IV) and Oil Gross Observed Volume (GOV) together with the Water IV, GOV and NSV at the time the Alarm was recorded.



If the entire Alarm history is needed, it can be retrieved using the XML communications for routine and regular use, but for immediate access, the data can be downloaded from the LACT-Pro® TANK controller website, simply by clicking on the Download Icon, at the top of the screen. The data will be downloaded as a single file in Tab Separated Value (.TSV) format and can be opened and manipulated in OpenOffice, Excel or other spreadsheet programs.

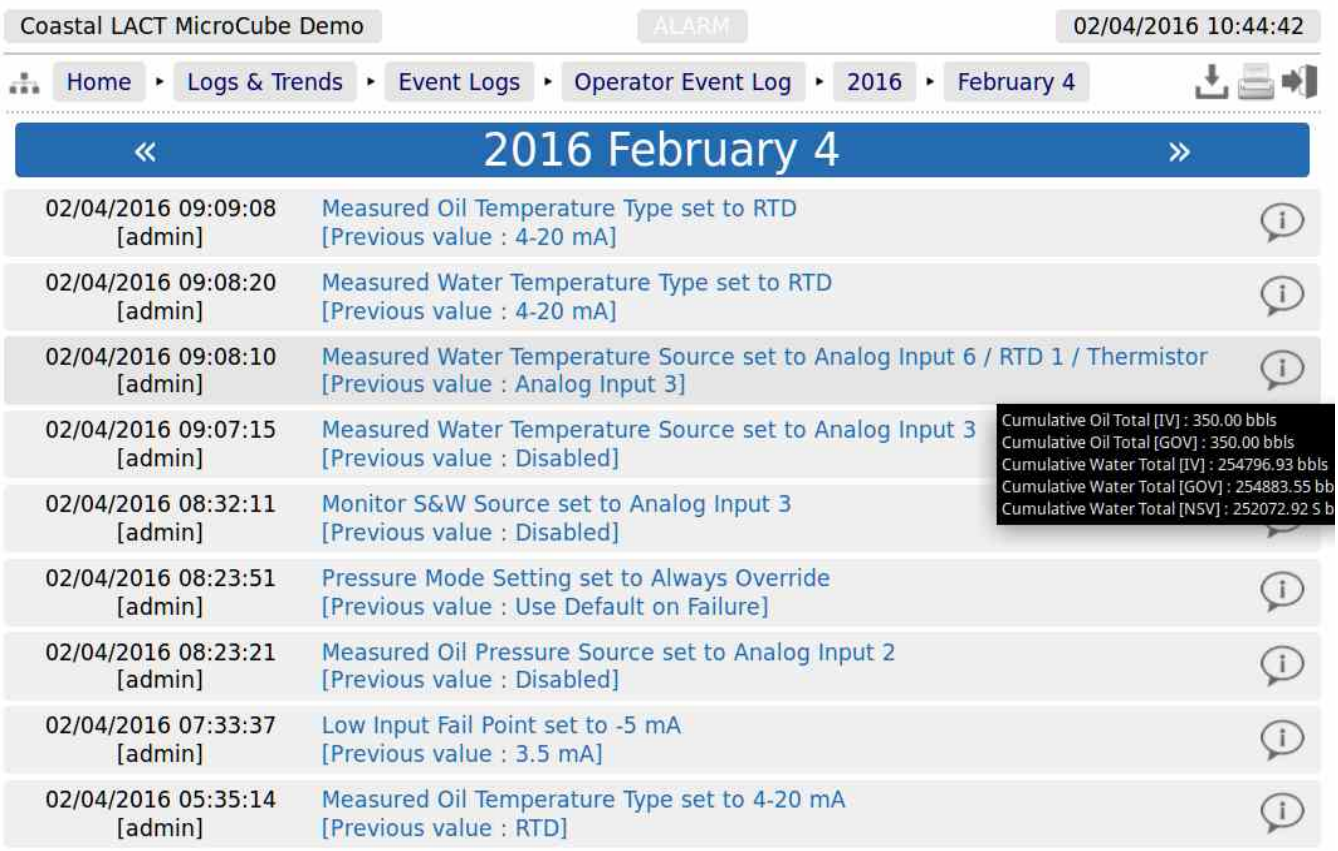
11.4 Event Logs

There are 5 categories of events. The Operator Event Log stores 2500 events, and all the other store 1000 events each (6500 events in total). Each event also has the ALVs logged, to aid forensic analysis.

System Event Log	Events that change the Time / Date settings, Network Settings, User Information, SD Card state, Power Cycles and Communications (including Printers, XML and Modbus ports, Local Panel) as well as remote events using the MicroConf configuration tool.
Operator Event Log	This log records all the input from the Local Panel, from the driver or the Metering Technician, as well as changes to the Application settings made from the website.
Metrology Event Log	Any item changed that is declared as a Metrology point is logged here. Field calibration event is also stored in this log.
Security Event Log	This log is used to record who logged in and out, the type of login, web or XML and the IP address of the user.
Application Event Log	In the LACT-Pro® TANK application, this log is used to record when the Maximum Volume Load interrupt has occurred.
Combined Event Log	This shows the last 32 events of any type in reverse time order.

As an example, clicking on System Event Log will show all events for the selected day, in sequential time order. The screenshot below is part of the log.

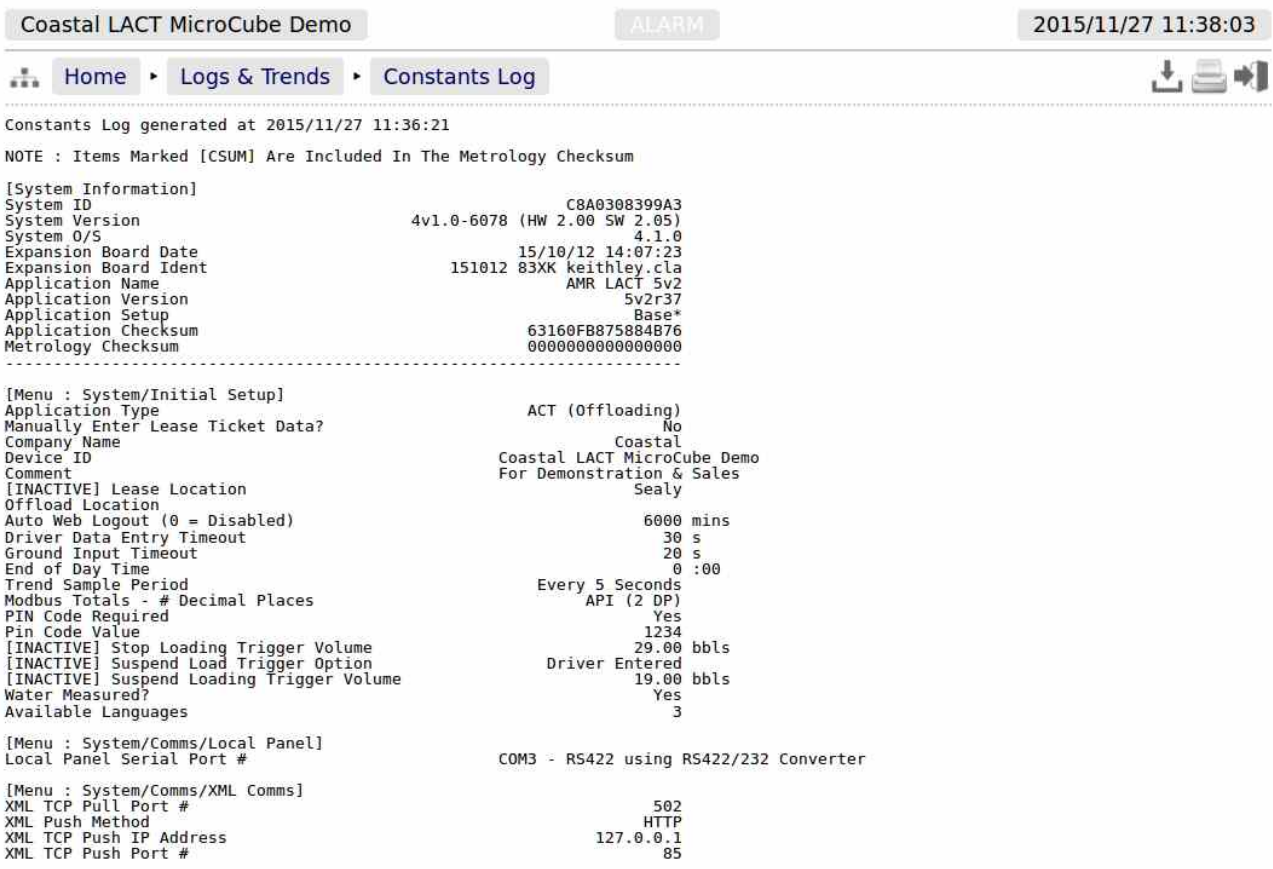
NOTE: The ALVs are shown in the smaller white text within the black box.



The Event Log is similar to the Alarm Log, in that only days events are displayed at a time on the website, but all the data can be collected using the XML communications, or downloaded from the website as a TSV document.

The Event Log fields are slightly different: the 1st Column shows both the time the event was logged and the source of the event. The second column is a description of the event and the last column shows the information bubble, containing the cumulative totals for Oil IV & GOV and the Water IV, GOV & NSV snapshot values.

11.5 Constants Log



Clicking on the Constants Log generates a log file with all the editable data points. This file can be printed or downloaded via XML or from the website.

NOTE: The example shown above is only part of the constants log, it would take several pages to display all data generated.

11.6 Trending

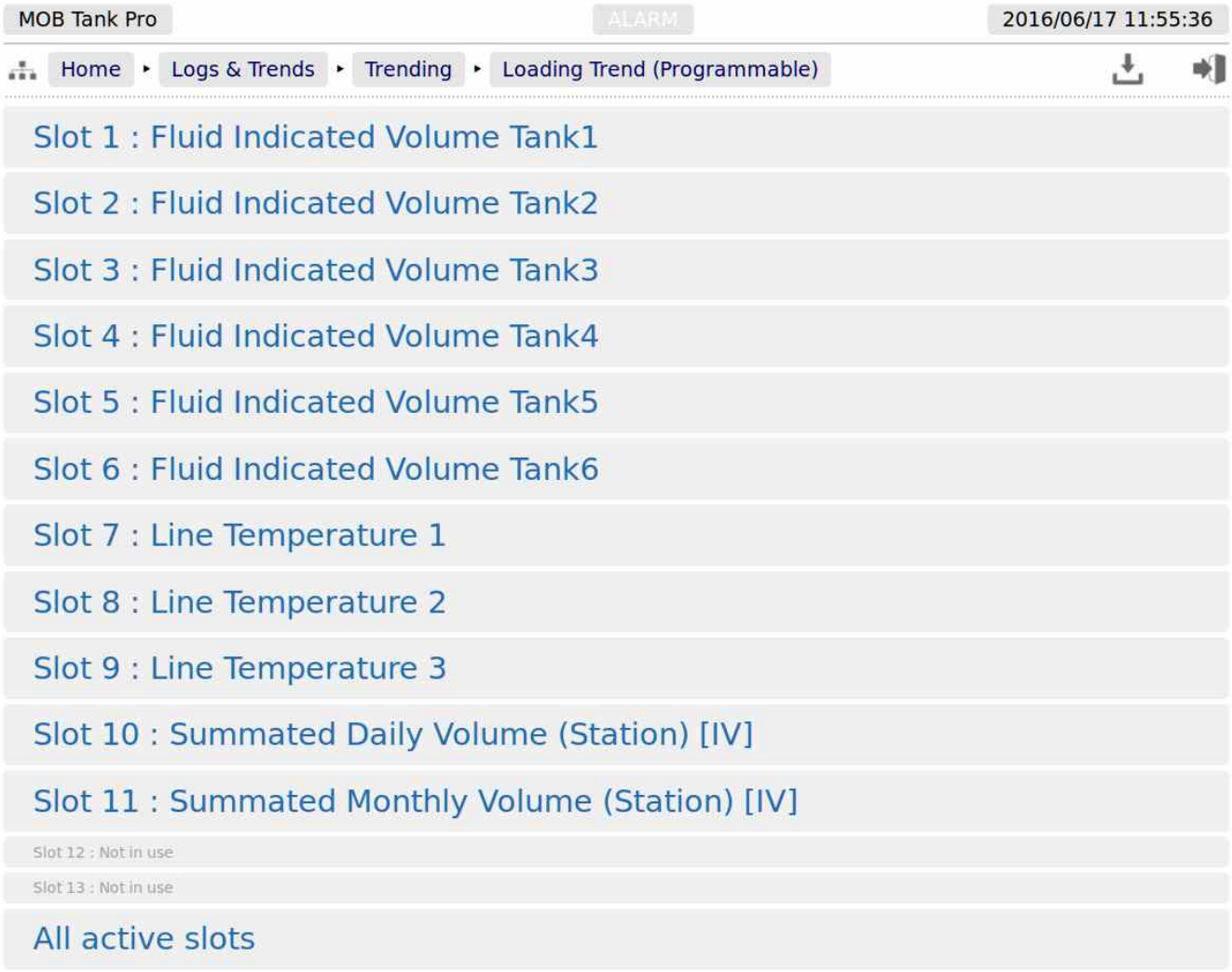
The LACT-Pro® TANK controller has a powerful data logging facility combined with an easy to use web-based visualisation tool which gives unrivalled trending information.

There are 3 separate historical data zones, each of which can store 20,000 records. Each record is comprised of up to 13 data points, which snapshot the selected data points when triggered. Each historical data zone can have a separate trigger, and the collection of data points, known as slots in each Zone can be different.

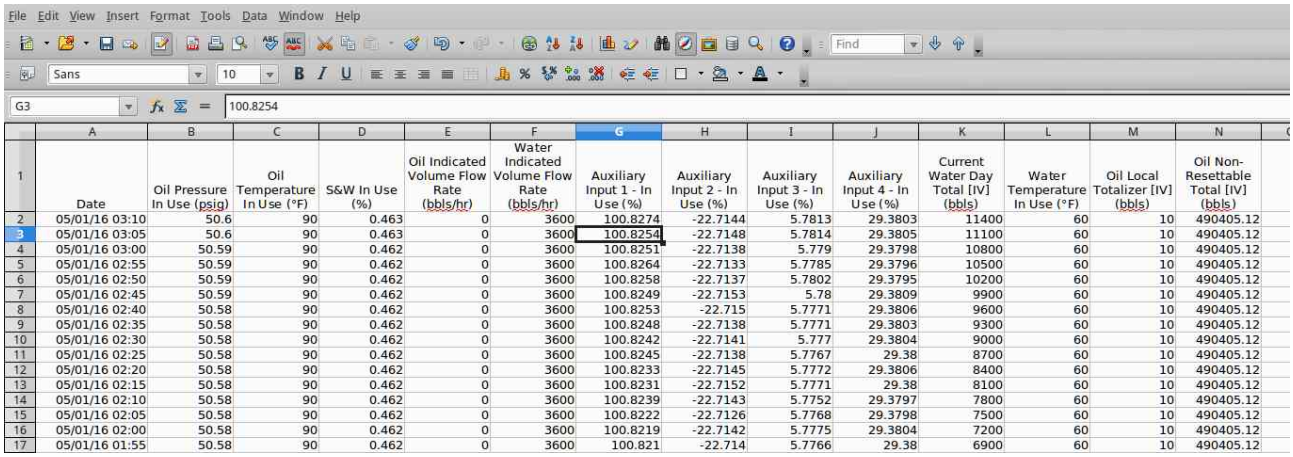
The LACT-Pro® TANK application utilizes all three Zones, and uses the same data points in Zones 1 and 2, but the two zones have different triggers: Zone 1 logs values during a load, Zone 2 logs values every 5 minutes. Zone 3 uses the same 5 minute trigger as Zone 2, but has the tank levels, in inches, rather than the volumes, in bbls.

There are 13 data slots used in this application. The screenshot below shows the contents of each slot.

Clicking on a particular line will generate a chart showing just the data points in that particular slot, and the last line, ***All active slots*** will show a chart with all 13 slots overlaid.



NOTE: As well as being able to display the Historical Data in a zoom-able chart, the Historical Data can be downloaded and saved on a PC and displayed in a spreadsheet. To accomplished this, simply click on the download icon.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	Oil Pressure In Use (psig)	Oil Temperature In Use (°F)	S&W In Use (%)	Oil Indicated Volume Flow Rate (bbls/hr)	Water Indicated Volume Flow Rate (bbls/hr)	Auxiliary Input 1 - In Use (%)	Auxiliary Input 2 - In Use (%)	Auxiliary Input 3 - In Use (%)	Auxiliary Input 4 - In Use (%)	Current Water Day Total [IV] (bbls)	Water Temperature In Use (°F)	Oil Local Totalizer [IV] (bbls)	Oil Non-Resettable Total [IV] (bbls)
2	05/01/16 03:10	50.6	90	0.463	0	3600	100.8274	-22.7144	5.7813	29.3803	11400	60	10	490405.12
3	05/01/16 03:05	50.6	90	0.463	0	3600	100.8254	-22.7148	5.7814	29.3805	11100	60	10	490405.12
4	05/01/16 03:00	50.59	90	0.462	0	3600	100.8251	-22.7138	5.779	29.3798	10800	60	10	490405.12
5	05/01/16 02:55	50.59	90	0.462	0	3600	100.8264	-22.7133	5.7785	29.3796	10500	60	10	490405.12
6	05/01/16 02:50	50.59	90	0.462	0	3600	100.8258	-22.7137	5.7802	29.3795	10200	60	10	490405.12
7	05/01/16 02:45	50.59	90	0.462	0	3600	100.8249	-22.7153	5.78	29.3809	9900	60	10	490405.12
8	05/01/16 02:40	50.58	90	0.462	0	3600	100.8253	-22.715	5.7771	29.3806	9600	60	10	490405.12
9	05/01/16 02:35	50.58	90	0.462	0	3600	100.8248	-22.7138	5.7771	29.3803	9300	60	10	490405.12
10	05/01/16 02:30	50.58	90	0.462	0	3600	100.8242	-22.7141	5.777	29.3804	9000	60	10	490405.12
11	05/01/16 02:25	50.58	90	0.462	0	3600	100.8245	-22.7138	5.7767	29.38	8700	60	10	490405.12
12	05/01/16 02:20	50.58	90	0.462	0	3600	100.8233	-22.7145	5.7772	29.3806	8400	60	10	490405.12
13	05/01/16 02:15	50.58	90	0.462	0	3600	100.8231	-22.7152	5.7771	29.38	8100	60	10	490405.12
14	05/01/16 02:10	50.58	90	0.462	0	3600	100.8239	-22.7143	5.7752	29.3797	7800	60	10	490405.12
15	05/01/16 02:05	50.58	90	0.462	0	3600	100.8222	-22.7126	5.7768	29.3798	7500	60	10	490405.12
16	05/01/16 02:00	50.58	90	0.462	0	3600	100.8219	-22.7142	5.7775	29.3804	7200	60	10	490405.12
17	05/01/16 01:55	50.58	90	0.462	0	3600	100.821	-22.714	5.7766	29.38	6900	60	10	490405.12

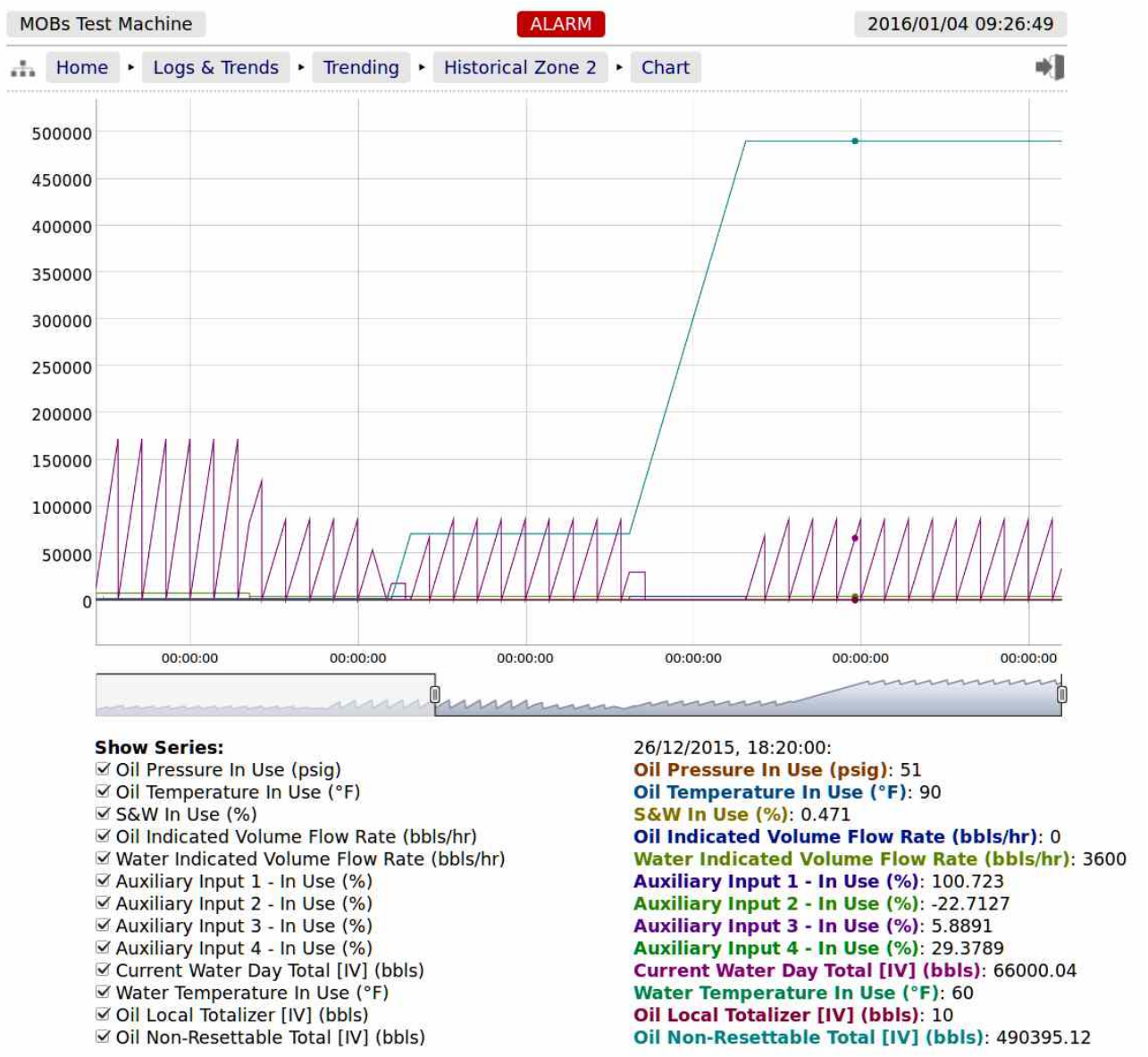
The example above only shows 16 of the possible 20,000 records.

If ***All active slots*** was selected then a chart showing a composite of all the data points is generated, in a time line (x-axis) against a single y-axis which indicates the value. In the example shown below, the chart is dominated by two data slots with large values.

Under the **Show Series** (or **Show Slots**) title, there is a list of each data slot with an associated tick box. If the larger value item, in this example "Oil Non-Resettable Total [IV] (bbls)" checkbox is clicked to toggle the tick to "off", then this slot will no longer be displayed and the display will rescale.

You can also scale the time line by using the slider bars between the graph and the list of slots in use. The example below has the left-hand slider moved inwards by about a third.

If the cursor is placed over the graph, a dot will appear on each slot at the same instance in time, and a readout of the value for each slot and the time the record was made is shown. In the example below (taken from LACT-Pro, Tank-Pro does not measure pressure), the cursor is highlighting 26/12/2015 at 18:20:00 and the **Oil Pressure In Use (psig)** is showing 51.



12 Additional Diagnostic Information

The LACT-Pro® TANK controller has been designed for ease of use as well as simplifying installation and commissioning and gives a remarkable amount of information to help diagnose process problems. There are four main areas of information:-

Driver Menu Mimic	Home → Driver Menu This allows remote support and training of the driver, using a mimic of the local panel, that the driver is using on site. The Driver Menu Mimic gives the ability to intervene and enter driver data. When in Metering Technician Mode, this display still mimics the local panel.
Live Data and Snapshots of live data	Home → Logs & Trends → Live Data The Live Data gives a page of live information of the application data, allowing an engineer to instantly see the effects of any changes made to the system. The Live Snapshot Data can be printed or downloaded with a one button click. If the Snapshot Report Trigger Input (defaulted to Digital Input 4) is briefly turned on, the live data will be snapshot, and directed to the assigned printer.
System Information	Home → System → System Information This shows the System Information for the LACT-Pro® TANK controller.
Totals	Home → System → Totals Daily and Previous Day, Monthly and Previous Month, and Cumulative (non-resettable) Totals can be viewed live, sorted by type of total.

12.1 Driver Menu Mimic

The Driver Menu Mimic on the web site produces a dynamic web page page that changes as the Local Panel is updated. Refer to TANK Driver_Local Panel Manual.pdf for further information on the Driver Menu.

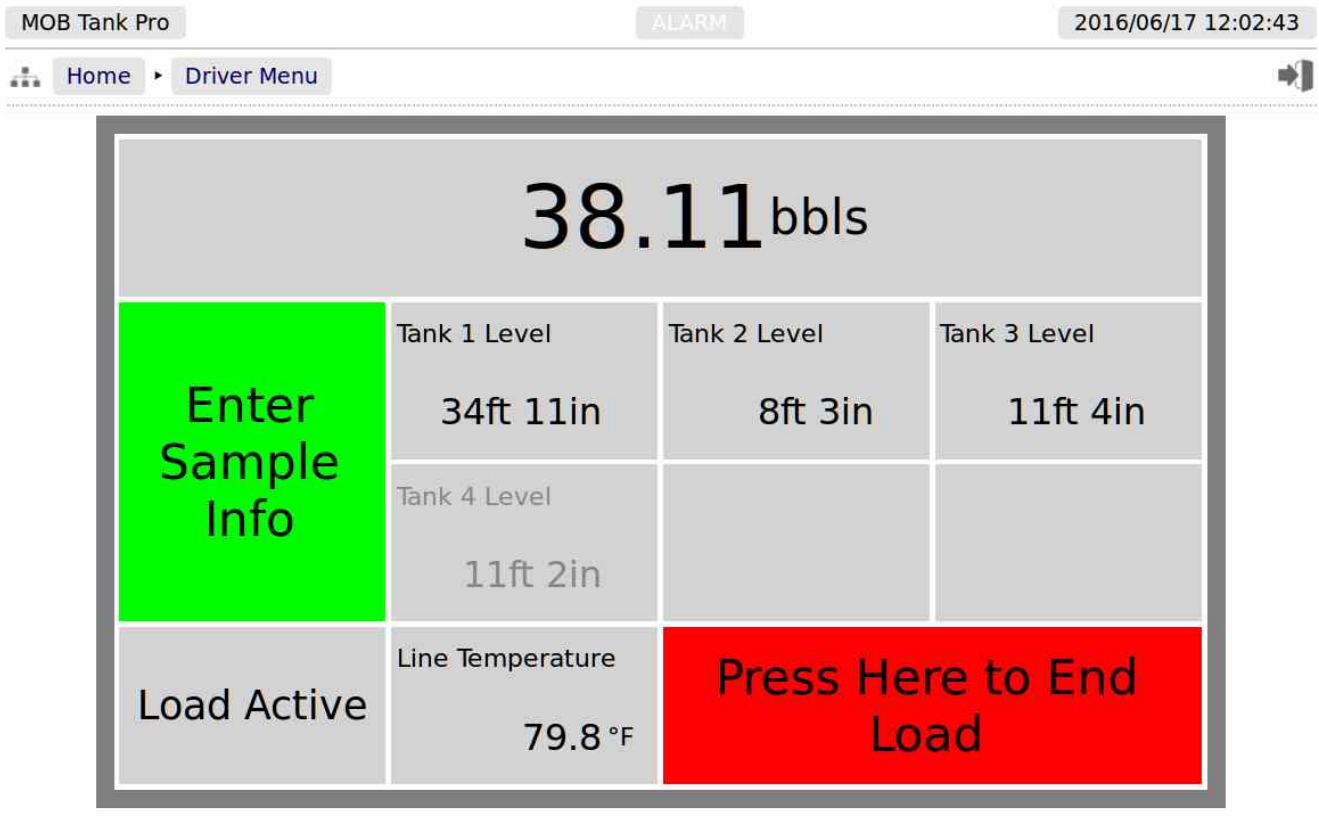
When the tanker driver sees the image shown below on the local panel.

A remote support engineer, looking at the same LACT-Pro® TANK controller, using a web browser will see a very similar screen via the web browser. As the driver moves through the loading process, both screens will change and the support engineer will see a very similar page using the browser.

NOTE: If the driver has selected Spanish, the Local Panel will display Spanish, however the website mimic will be shown in English.

When the driver has clicked the screen, to remove the default pumper screen display, and the language selected, if multi-language selected, then the next screen will be the connect ground screen as shown on the next page.

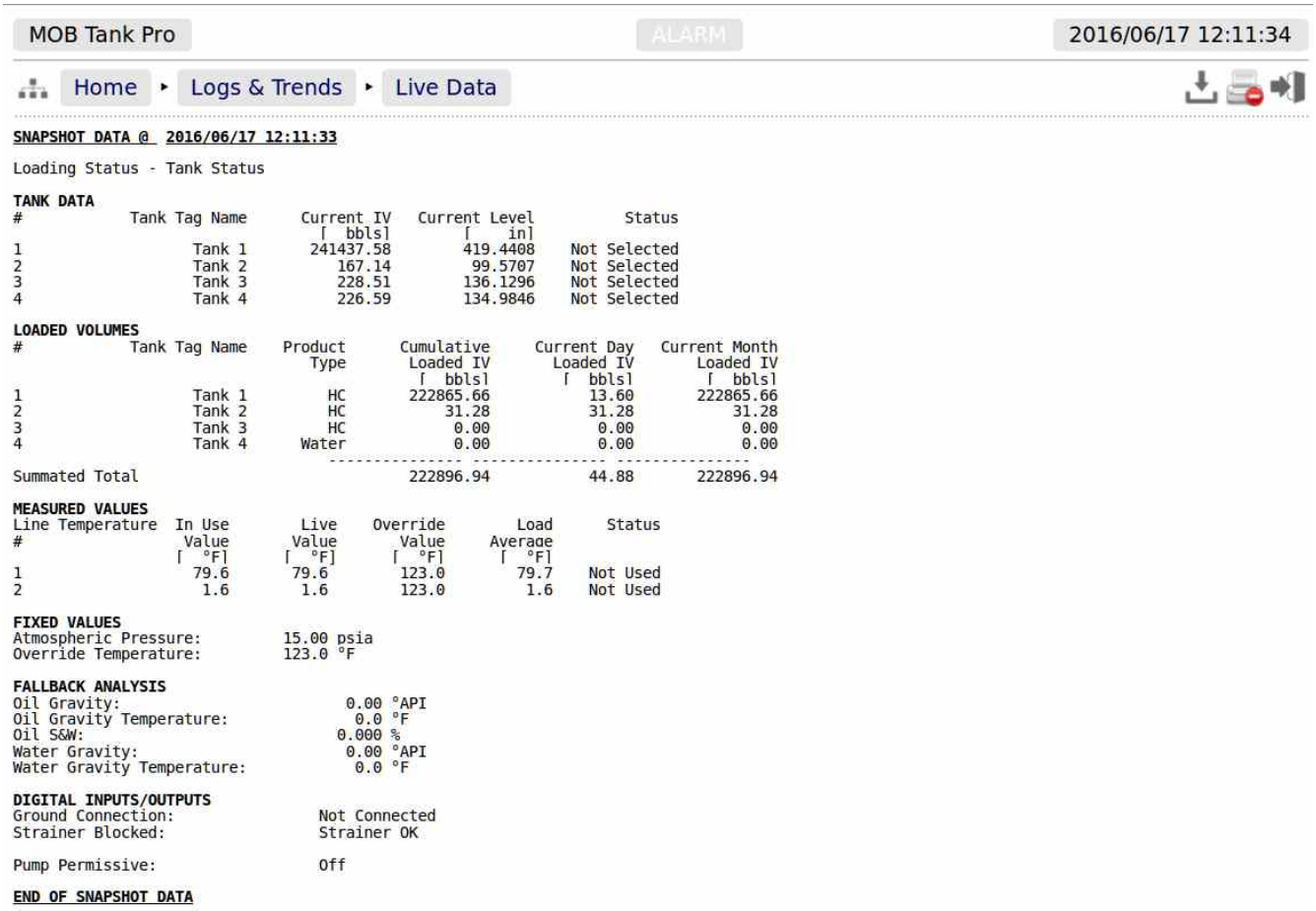
As the loading sequence continues, the driver is guided through the process, the next screen is shown as the Tanker is loaded.



12.2 Live Data

The Live Data page brings together all the important data that a metering engineer may need to support a TANK site, and this information is available both locally and remotely.

The picture below shows some of the information available, scrolling down in the browser would reveal the rest of the snapshot data.



MOB Tank Pro ALARM 2016/06/17 12:11:34

Home ▸ Logs & Trends ▸ Live Data

SNAPSHOT DATA @ 2016/06/17 12:11:33

Loading Status - Tank Status

TANK DATA

#	Tank Tag Name	Current IV [bbls]	Current Level [in]	Status
1	Tank 1	241437.58	419.4408	Not Selected
2	Tank 2	167.14	99.5707	Not Selected
3	Tank 3	228.51	136.1296	Not Selected
4	Tank 4	226.59	134.9846	Not Selected

LOADED VOLUMES

#	Tank Tag Name	Product Type	Cumulative Loaded IV [bbls]	Current Day Loaded IV [bbls]	Current Month Loaded IV [bbls]
1	Tank 1	HC	222865.66	13.60	222865.66
2	Tank 2	HC	31.28	31.28	31.28
3	Tank 3	HC	0.00	0.00	0.00
4	Tank 4	Water	0.00	0.00	0.00
Summated Total			222896.94	44.88	222896.94

MEASURED VALUES

Line Temperature #	In Use Value [°F]	Live Value [°F]	Override Value [°F]	Load Average [°F]	Status
1	79.6	79.6	123.0	79.7	Not Used
2	1.6	1.6	123.0	1.6	Not Used

FIXED VALUES

Atmospheric Pressure: 15.00 psia
Override Temperature: 123.0 °F

FALLBACK ANALYSIS

Oil Gravity: 0.00 °API
Oil Gravity Temperature: 0.0 °F
Oil S&W: 0.000 %
Water Gravity: 0.00 °API
Water Gravity Temperature: 0.0 °F

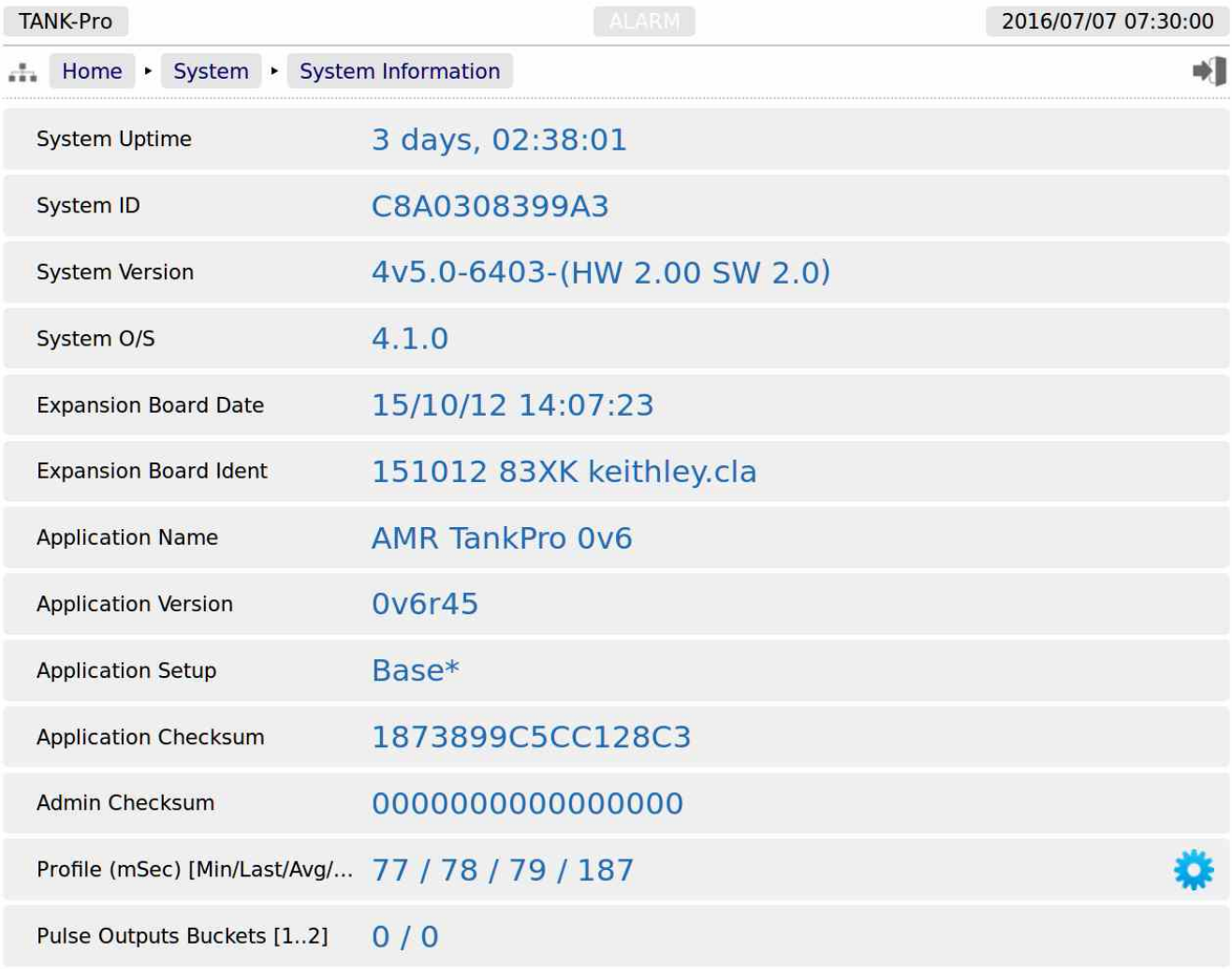
DIGITAL INPUTS/OUTPUTS

Ground Connection: Not Connected
Strainer Blocked: Strainer OK

Pump Permissive: Off

END OF SNAPSHOT DATA

12.3 System Information



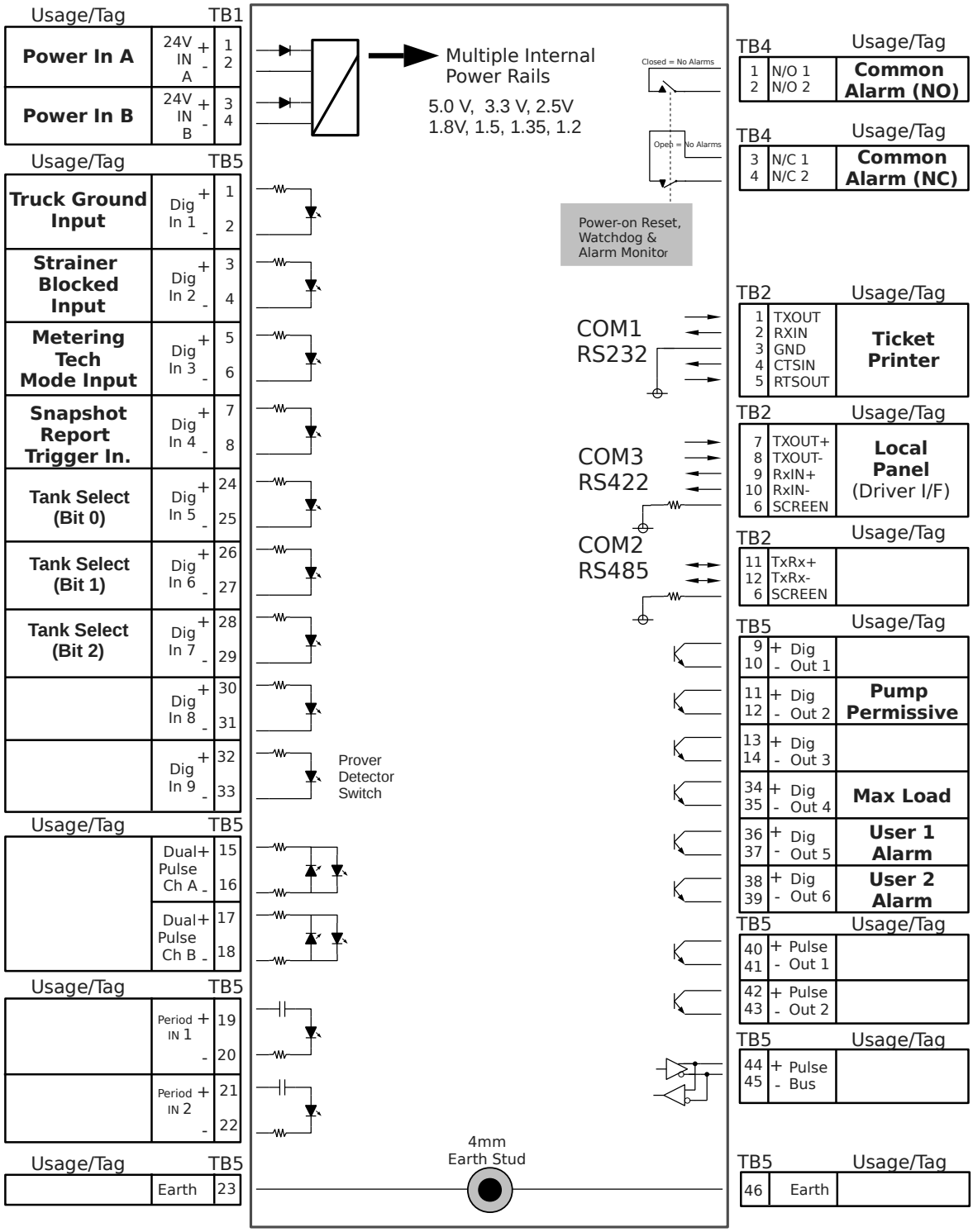
System Uptime	This shows how long the unit has been running since the last restart.
System ID	The System ID is a unique hardware number for every device.
System Version	The first part of the number, in this case 4v3.0-6240, is the runtime firmware version. The information in brackets refers to the Logic design and the CPU firmware within the I/O Processor.
System O/S	Version of the Linux Operating System in use.
Expansion Board Date	This is the date the expansion board was calibrated. The expansion board type fitted to the LACT-Pro® TANK controller is the 6+2 Channel Analog I/O board.
Expansion Board Ident	This factory information contains the expansion board serial number and calibration information.
Application Name	This is the name of the application current running.
Application Version	This is the version number of the application current running.
Application Setup	This shows which DataSet was selected when the application was downloaded by MicroConf.

Application Checksum	This is the checksum value of the application current running, including the cold start constants.
Metrology Checksum	Any code or constants designated as a Metrology field will be included in this checksum, but data such as a Tag Name, or a site address field would not be. The LACT-Pro® TANK application does not have any metrology designated data.
Profile (mSec) [Min/Last/Avg/ Maximum	These four numbers indicate the performance of the C||Cure™ runtime engine. Clicking the line opens a window that allows the maximum recorded profile information to be reset.
Pulse Outputs Buckets [1..2]	This is a status only display, and shows the number of pulses generated by the application that are still waiting to be output. The value to the left of the "/" is associated with Pulse Output 1 and the value on the right is associated with Pulse Output 2. The LACT-Pro® TANK application does not use Pulse Outputs.

13 I/O Schedules

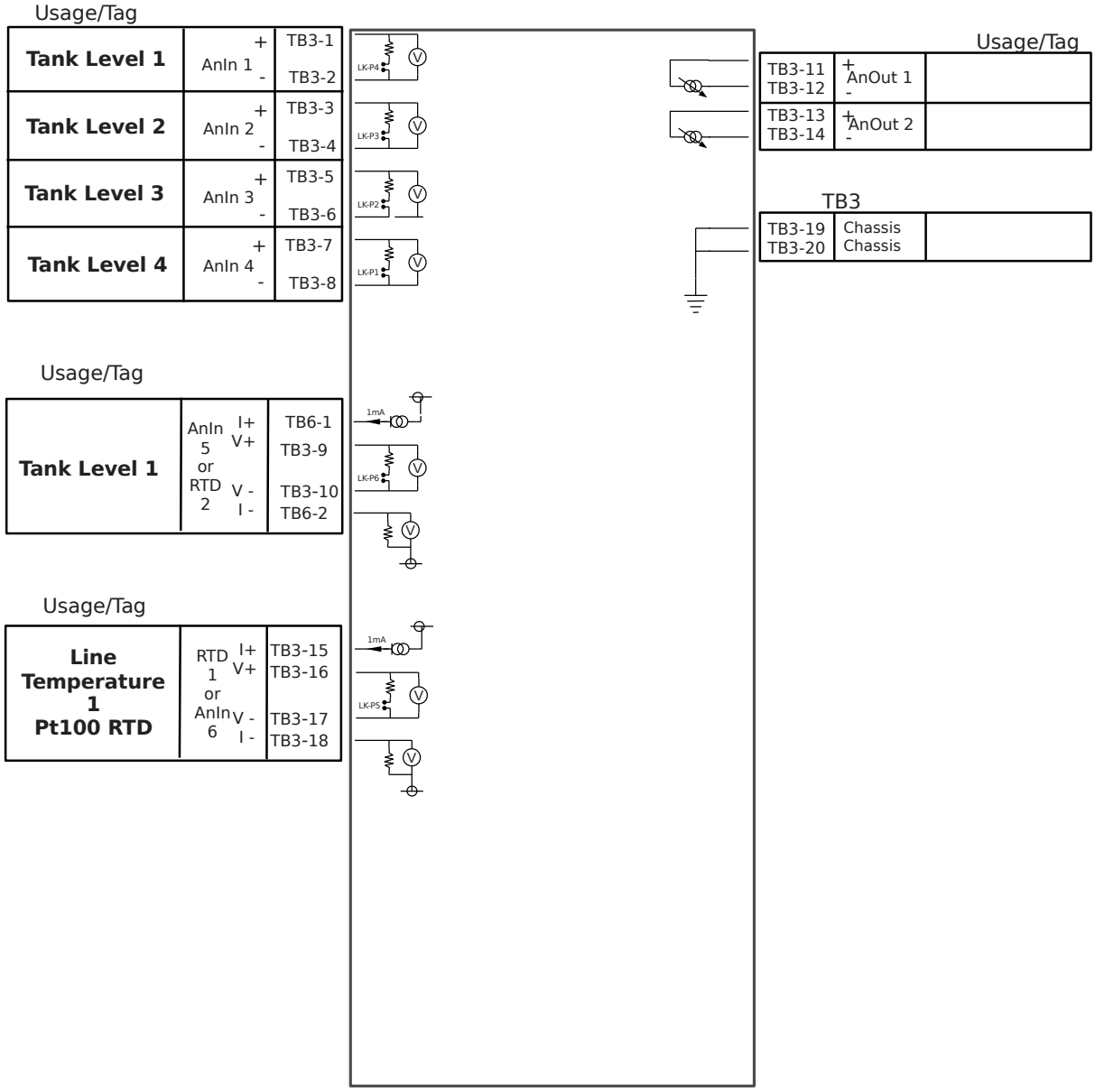
Default Settings

Digital & Serial – LACT-Pro TANK Defaults



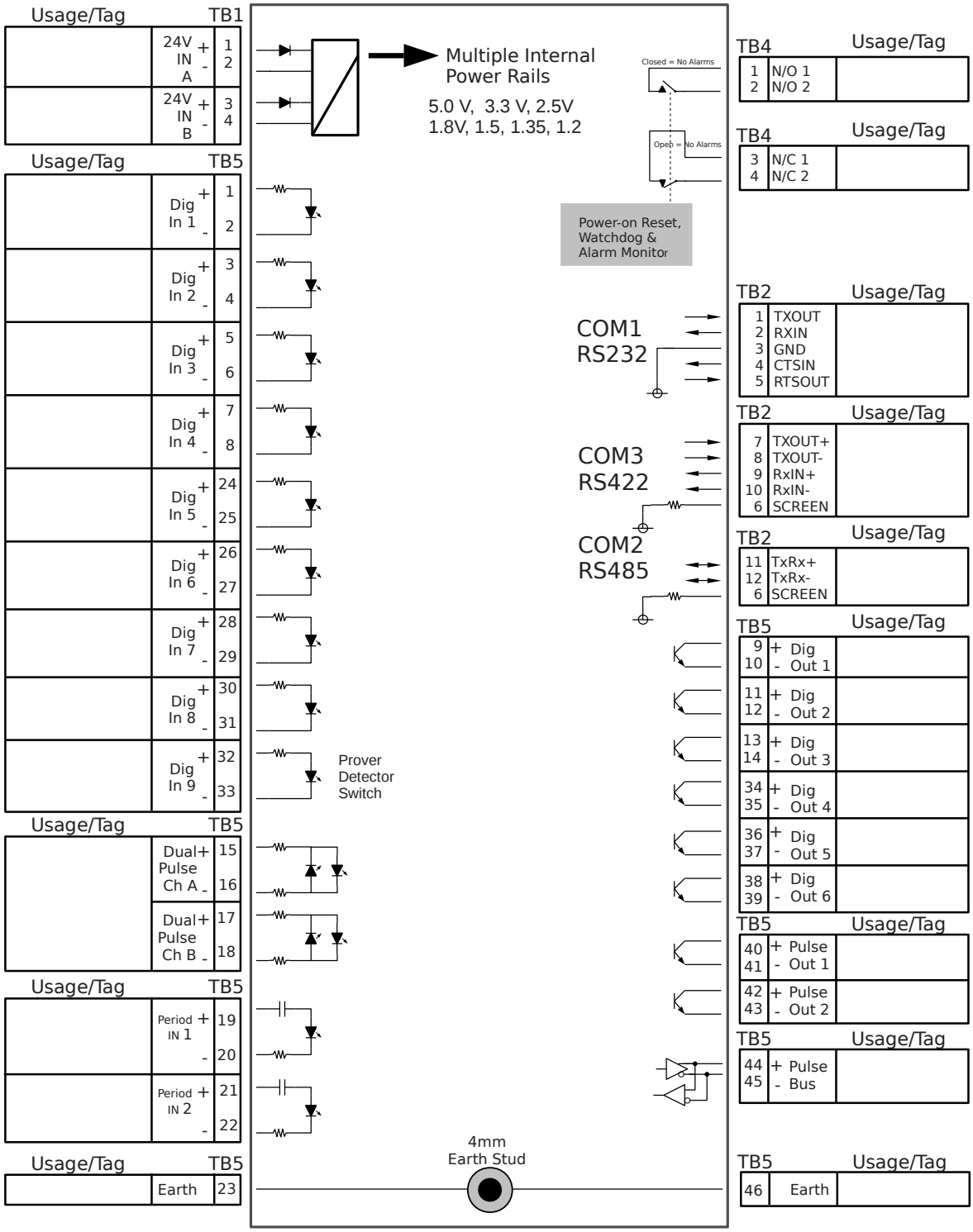
Default Settings

Analog Expansion - LACT-Pro TANK Defaults



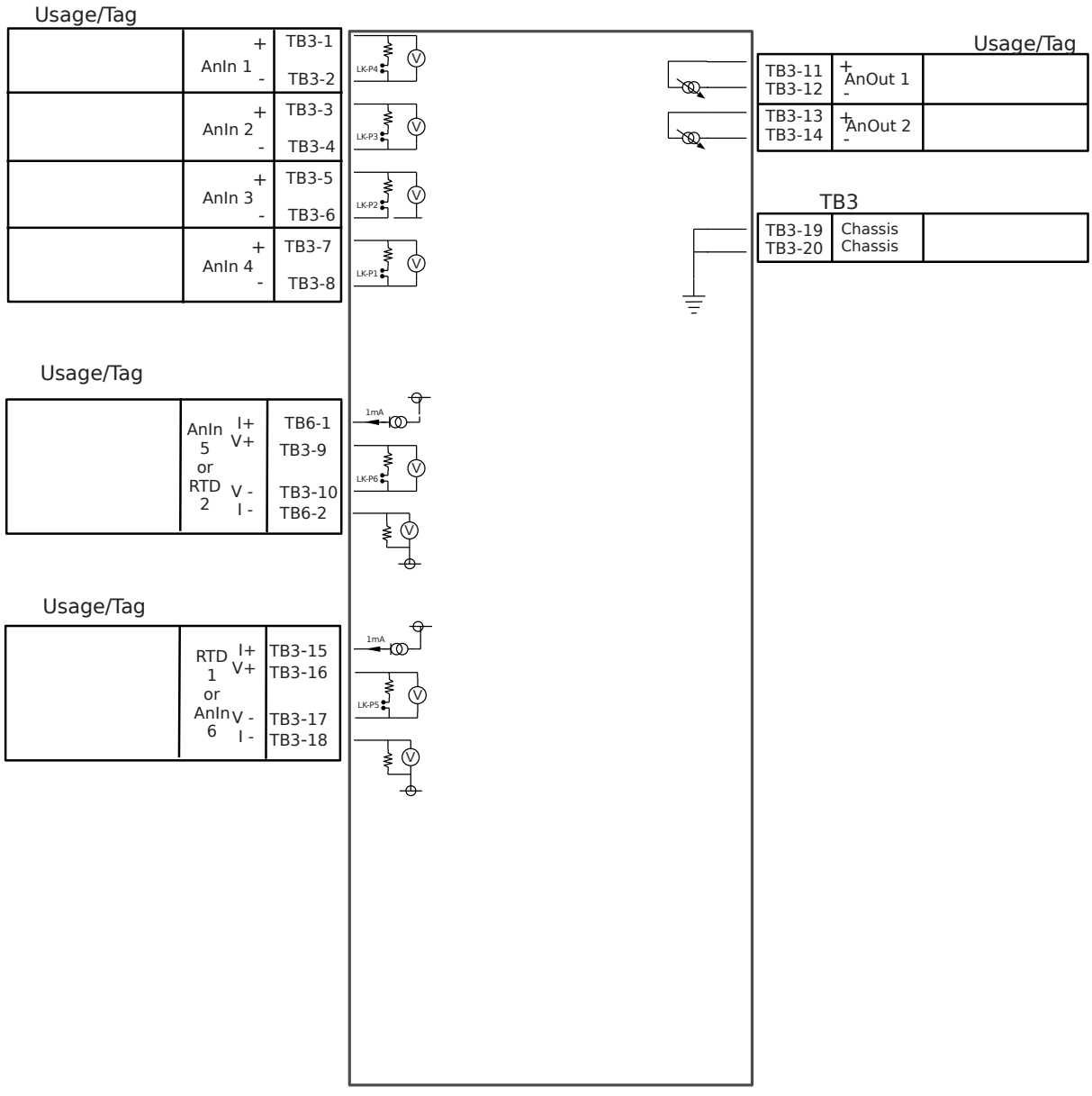
Blank Template to record field settings

Digital & Serial – Blank Template

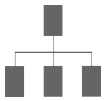


Blank Template to record field settings

Analog Expansion – Blank Template



14 Glossary

Icon	*Description*
	If a line contains the "blue gear" icon, this indicates that the line can be edited. Click the line to open the edit dialog.
	The gray gear icon indicates that the item can be edited, but the current user does not have the correct authority. This may be due to user level or other lockout.
	Sitemap icon. Clicking this icon opens the Sitemap allowing rapid navigation around the website.
	Logout icon. Clicking this icon will logout the current user of the session, and takes you back to the login screen.
	Download icon. This icon is visible when information is available for downloading from the LACT-Pro TANK controller. Clicking this icon allows the information to be viewed or downloaded depending upon browser preferences.
	Print icon. Clicking this item causes the current viewed screen to be printed to the designated web printer.
	This icon is the accept and apply icon. It is used when several pieces of information are preset, and then action as a group, for example setting networking parameters

Term	*Description*
ADC	Analog to Digital Converter
ALVs	Additional Log Values
APPLICATION	An application is a program (written in Visual C||Cure® that defines the overall functionality, but may require configuration for field parameters.
CONSTANTS	Numbers which are only infrequently changed.
CPU	Central Processor Unit
DCS	Distributed Control System
DEFAULT VALUE	A fallback value that the input 'defaults' to if measurement is not possible due to the input from the transmitter being determined BAD.

Term	*Description*
FIELD SETTINGS	Constants, Limits, Scalings for a specific Meter Run. This does not relate to specific calculations as these will be defined in the Application.
FWA	Flow Weighted Average
HMI	Human Machine Interface
mA	milliamp
METER RUN	The pipework and associated instrumentation for a single device to measure flow. Typically a turbine meter, orifice meter, Coriolis meter, ultrasonic meter, etc.
OVERRIDE VALUE	A fixed manual entry to 'override' any transmitter values.
PLC	Programmable Logic Controller
PROVER	The pipework and associated instrumentation for a single device to verify the data produced by a meter run flow device. Typically a Ball or Piston type prover.
RTD	Resistance Temperature Detector
RX	Received Information
SECURITY CODE	Security Codes are used to limit access by operators to parameters retained in NON VOLATILE memory.
STATION	Possibly pipework and associated instrumentation or just an application to collate data (and possibly disseminate header data) from a number of meter runs and possibly a prover into a single source for display and/or passing to a Supervisory Computer.
TAGNAME	Alphanumeric string used to represent an item held within the computer database.
TX	Transmitted Information
VARIABLES	Changeable values.