



Newflow

NANO

**LACT-Pro®
Metering
App**

**Configuration & User
Manual**





Contact:

Newflow Ltd
George House
Derwent Road
Malton, North Yorkshire
YO17 6YB, UK

Tel: +44 1653 697 200
Fax: +44 8700 667 325
Email: sales@newflow.co.uk

Document Information

Document Name: LACT-Pro® Configuration and User Manual
Document Identifier: NF_LPUM

Rev	Date	Changes	Prepared	Checked	Authorised
0	14 Feb 2014	Original Draft	MOB	MPFJ	GPL
1	17 Nov 2015	Added Produced water	MOB	GPL	MPFJ
2	4 Feb 2016	Reworked for V4 release	MOB	MPFJ/GPL	MOB
3	20 Apr 2018	Menu Structures simplified, functional updates, including FTP	MOB	MPFJ	MOB

NANO™ (with Angstrom Symbol) is a trade mark of Newflow Ltd.
ClCure® is a registered trade mark of Newflow Ltd.

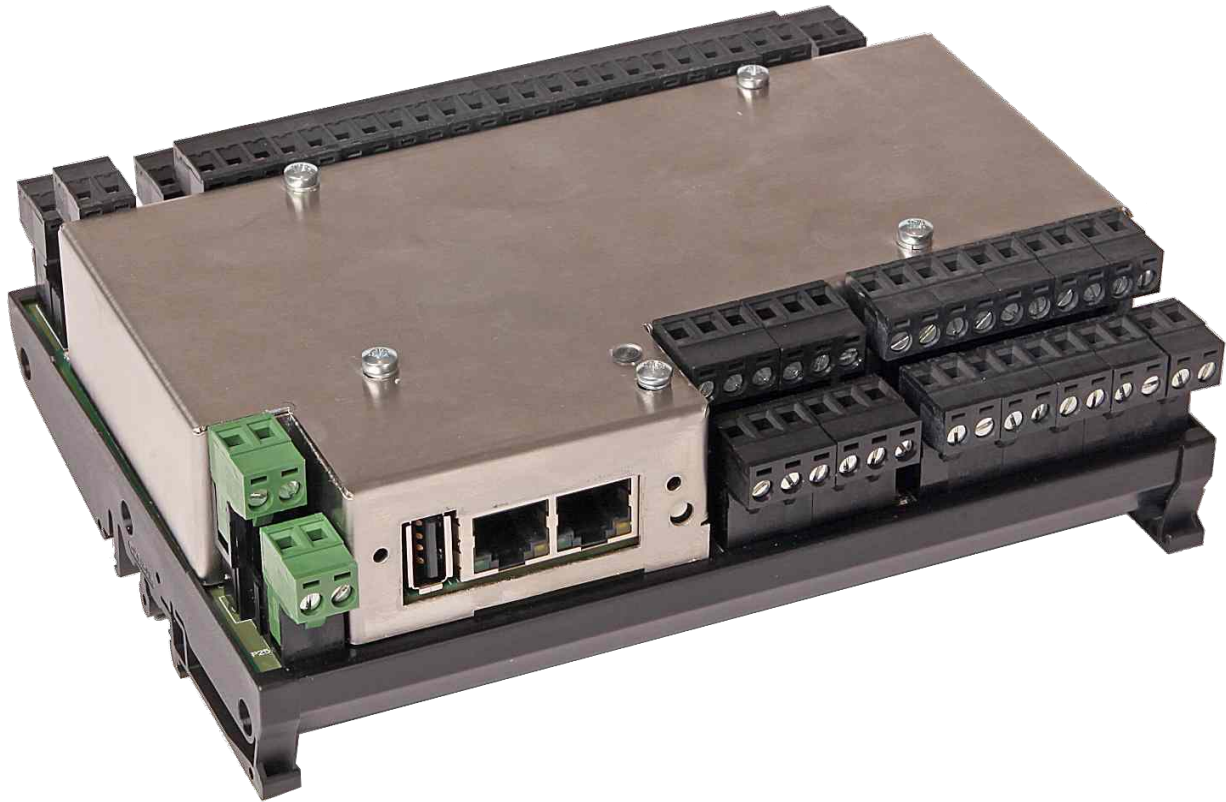
All trademarks are acknowledged as the property of their respective owners.

This document, submitted in confidence contains proprietary information, which shall not be reproduced or transferred to others without prior written permission of Newflow Ltd.

This document shall not form part of any contract. Specifications are subject to change without notice and Newflow Ltd accepts no liability of any kind for errors or omissions.

Full contractual terms are available on the website at www.newflow.co.uk/pdf/tandc.pdf

MMXVIII



**Disconnect Ground or
Press Here to Re-Print Last Report**

Driver ID	TOM THUMB
Truck ID	MACK TRUCKING CORP
Run Ticket Number	1234567
Lease Location	Polk, Texas 77077
Lease ID	Ma & Pa's Pension Fund #2
Load Total [IV]	178.56 bbls



View Summary

Table of Contents

1	Introduction.....	6
2	Loading the Application.....	7
3	Configuration Overview.....	11
3.1	Conventions used in this manual.....	14
4	Stage 1 of 5: Initial App Setup.....	16
4.1	LACT (Loading) or ACT (Unloading).....	17
4.2	LACT Specific.....	18
4.2.1	LACT Specific - Site Location Setup.....	18
4.2.2	Security Modes.....	20
4.2.3	Entry of Destination Required.....	21
4.2.4	QR Code Support.....	22
4.2.5	Initial App Setup, Time Based Settings.....	24
4.2.6	LACT Specific Load Trigger Options.....	26
4.2.7	Suspend and Stop Loading Sequence Diagram.....	27
4.3	ACT (Offloading) Specific.....	28
5	Stage 2 of 5: RTU Setup.....	31
5.1	Time / Date.....	32
5.1.1	The Local Time Method.....	32
5.1.2	The NTP Time Method.....	33
5.2	Network.....	35
5.2.1	User Info.....	38
5.3	Communications Setup.....	41
5.3.1	Printers.....	41
5.3.2	Report & Printer Routing.....	47
5.3.3	Local Panel.....	48
5.3.4	XML Communications.....	48
5.3.5	Modbus Slave Communications.....	50
6	Stage 3 of 5: Product Setup.....	51
6.1	Oil - Menu for Oil Measurement.....	51
6.1.1	Oil Flow Meter.....	52
6.1.2	Measured Oil Temperature (or "over-ride" Oil Temperature).....	53
6.1.3	Measured Oil (Line) Pressure.....	58
6.1.4	Monitor S&W.....	61
6.1.5	Sampler Pulse.....	64
6.1.6	Totals (Oil).....	66
6.2	Water - Menu for Water Measurement.....	67
6.2.1	Water Flow Meter.....	67
6.2.2	Measured Water Temperature.....	68
6.2.3	Totals (Produced Water).....	69
7	Stage 4 of 5: Configuring the Measurement Units.....	70
8	Stage 5 of 5 : Matching the I/O to the P&ID.....	71
8.1	I/O Assignments – Digital Inputs & Outputs.....	72
8.1.1	Diverter Valve Settings.....	73
8.2	I/O Assignments – Analog Inputs.....	75
8.2.1	Auxiliary Input Setup Menu.....	78
8.3	Configuring Analog Outputs.....	80
8.4	Configuring the Pulse Inputs.....	81
8.5	Field Calibration.....	82
8.6	I/O Diagnostics.....	84
8.7	Digital I/O Debug.....	85
8.8	Simulation.....	86
8.9	Totals Reset.....	87
9	Reports.....	88
9.1	Reports Calendar View.....	88
9.2	LACT-Pro Report Types.....	90
10	Logs and Trends.....	93
10.1	Live Data.....	94
10.2	System Information.....	95
10.3	AO Data.....	96
10.4	Alarm Logs.....	97
10.5	Event Logs.....	98
10.6	Constants Log.....	100
10.7	Trending.....	100

11 Diagnostic Information.....	103
11.1 Driver Menu Mimic.....	103
12 I/O Schedules.....	105
13 API Ch 11 Calculations.....	107
14 Glossary.....	108
15 LACT-Pro Controller Configuration Prompt.....	110

1 Introduction

The LACT-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.

The range of applications available include:

- | | |
|----------------------------------|-------------------------------------------------------------------------------------------------------------|
| ▶ LACT-Pro® Metering App. | Flow Meter based Truck Loading Applications and off-loading to day tanks with measurement of produced water |
| ▶ LACT-Pro® Tank App. | Loading using gauging from Bullet & Cylindrical tanks |
| ▶ LACT-Pro® Scales App. | Weighbridge tanker loading |
| ▶ LACT-Pro® PI. | For pipeline injection |

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

- Micro³™ Installation Manual
- LACT-Pro® Modbus Manual
- LACT-Pro® Reports Manual
- Micro³™ XML Comms Manual Rev20
- LACT-Pro® Local Panel / Driver Manual

2 Loading the Application

If the version of LACT-Pro® required 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. Configuration Overview](#).

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 screenshot shows the NANOconf v4.1r1 application window. It displays two panes, each containing a table of machine configurations. The tables have the following columns: IP Address, Device ID, Application Name, Application Version, DataSet, Firmware, I/O Firmware, System ID, and ETH I.

IP Address	Device ID	Application Name	Application Version	DataSet	Firmware	I/O Firmware	System ID	ETH I
123.123.123.123								
10.0.150.222								
10.0.150.123	LACT MicroCube	AMR LACT 5v3	5v3r16	Base*	4v1r1-6104	HW 2.00 SW 2.05	C8A030838DC0	1
...								
IP Address	Device ID	Application Name	Application Version	DataSet	Firmware	I/O Firmware	System ID	ETH I
10.0.101.1	LACT MicroCube	AMR LACT 5v3	5v3r9	Base*	4v3r0-6155M	HW 2.00 SW 2.04	C8A030838DED	1
10.0.150.6	MOBs Test Machine	AMR LACT 5v2	5v2r37	Base*	4v3r0-6156-BETA	HW 2.00 SW 2.05	C8A0308399A3	1
10.0.100.100	Old Tank	AMR TankPro 0v1	0v1r33	Testing	3v5r6-5803-BETA	HW 2.00 SW 2.05	C8A030838E9A	1
10.0.150.123	LACT MicroCube	AMR LACT 5v3	5v3r16	Base*	4v1r1-6104	HW 2.00 SW 2.05	C8A030838DC0	1
10.0.150.11	LACT MicroCube D...	AMR LACT 5v2	5v2r37	Base*	4v2r0-6147-BETA	HW 2.00 SW 2.05	C8A0308391EC	1
10.0.150.1	LACTPro/TANKPro ...	LACT_TANK Pro Simulator	1v0r15	Setup1	3v5r6-5743-BETA	HW 2.00 SW 2.05	C8A03083A06D	1

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 selectable 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.

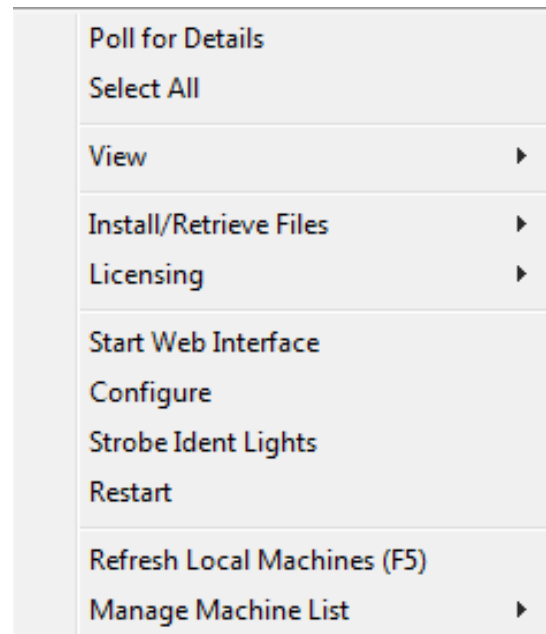
Application Version	This shows the Application Version number.
DataSet	Applications may have several sets of default constants and default settings. For example a USC DataSet may have inches, bbls and US calculations whereas a Metric Dataset could be in centimeters, Cubic Meters with ISO calculations 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 Micro ³ 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 option.

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	<p>There are 3 sub-menus for this menu, these are:</p> <p>Filters - Allows the user to filter each column, which is helpful when a large number of machines are being maintained.</p> <p>Log Window - This option opens a 3rd pane below the two standard panes and additional information can be displayed.</p> <p>Debug - When this option is enabled, the verbose low level message data is shown in the Log Window.</p>
Install/Retrieve Files.	<p>There are 5 sub-menus for this menu, these are:</p> <p>Install Application - This option is only available when one or more machines have been selected. Selecting this option will open a File Explorer 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.</p> <p>Get a Backup of the Running Application - This option is only available when one or more machines have been selected. A File 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.</p> <p>Get System Event Log - This item is available if only one machine has been selected and allows the event log data to be save to the PC.</p> <p>Update Firmware - This item is available if one or more machines have been selected. The Admin Password of the unit will be required.</p> <p>Update I/O Firmware - This is similar in operation to the sub-menu above.</p>
Licensing	Licensing is not currently used with the LACT-Pro® 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 one 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 in standard dot notation the IP address, the Netmask and the Gateway address. The second port does not support DHCP, and has to be either a static address, or disabled. The second port does not support a gateway.

Strobe Ident Lights	<p>This item is only available when one machine has been selected, and causes the LACT-Pro® controller hardware Ident Lights to flash.</p> <p>NOTE: Pressing the Ident Switch on the LACT-Pro® controller hardware for 10 seconds will also cause the Ident Lights to flash and the selected unit will also be highlighted in the MicroConf window.</p>
Restart	<p>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.</p>
Refresh Local Machines (F5)	<p>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).</p>
Manage Machine List	<p>This option is used to select which machines appear in the managed (upper) pane. There are 4 sub-menus available, these are:.</p> <p>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.</p> <p>Remove - This option is only available with one or more of the managed machines selected in the upper pane.</p> <p>Import - With the cursor in the managed (upper) pane, this option opens an explorer style dialog, and a nanolist file (.nnl suffix) can be selected, and the upper window will be populated.</p> <p>Export - This allows the user to export the list of managed machines in .nnl format. One or more managed machines must be selected, and this option then exports the details of the only the selected machines to the .nnl list.</p>

3 Configuration Overview

This section of the manual assumes that the LACT-Pro® application has been installed, and the IP 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 Site report data, such as the Lease ID and Device ID
- System Setup. These controller specific items include Network Settings, Printers, Time & Date
- User Information, allows additional users & driver login details to be added
- Matching the application to the site Piping and Instrumentation Diagram (P&ID)
- Setting the I/O assignments. These have rational default values, but may be changed to suit local wiring requirements, or for fault diagnostic purposes
- Final Field Set-up and Analog Calibration, if applicable

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 LACT-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.

MOB's NANO LACT

ALARM

2015/01/30 12:02:14

Enter Login ID


Username : admin *

Password : *

Login

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:

C8A03083A055 ALARM 2000/01/01 03:40:22

Login failed ... Re-enter Login ID

Username :


Password :

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, and stored reports. The SD-Card information is preserved.

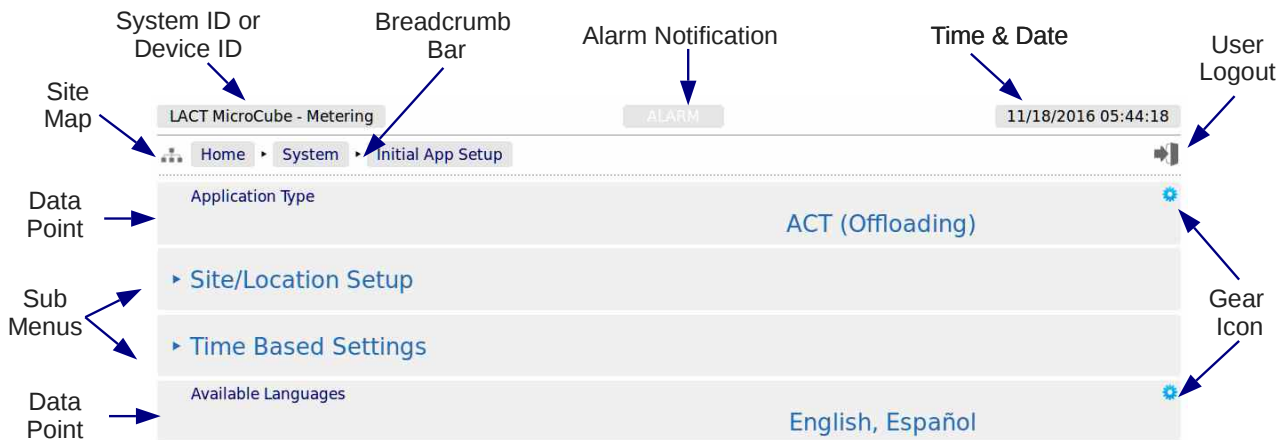
NOTE: The maximum number of concurrent web browser connections is 4. If this is exceeded, the following screen is displayed.

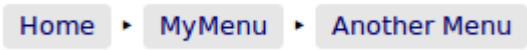
LACT MicroCube ALARM 19/02/2014 14:07:08

Too many users already logged in



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 is configured in the application. The Device ID is defaulted to "LACT Microcube", but can be changed by administrator level users in the Home ▶ System ▶ Initial App Setup ▶ Site/Location 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. Grey - 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, for users who are familiar with the layout of the data and sub menus. It is possible to get all menu entries in no more than two clicks, using the site-map feature.
Breadcrumb Bar	This navigation aid shows the hierarchical location of the current page:  In the manual, the hierarchical address will be show 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.
Data Point	The left hand side will show the name of the display point and the right hand side will show the current value of this data.
Gear Icon	A blue gear icon indicates that the value of the Display Point can be edited by the current user. If the gear icon is gray, this indicates that the display point can be edited, but the current user does not have the required user level. If no icon is show, the display point is read-only, and shown for information only.
Sub Menu	A line on the menu with a leading triangle ▶ is the entry to the next sub menu. Clicking on a sub menu line will take you to the next level in the Hierarchical Menu. The browser "back" button will take you back up a level

3.1 Conventions used 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.

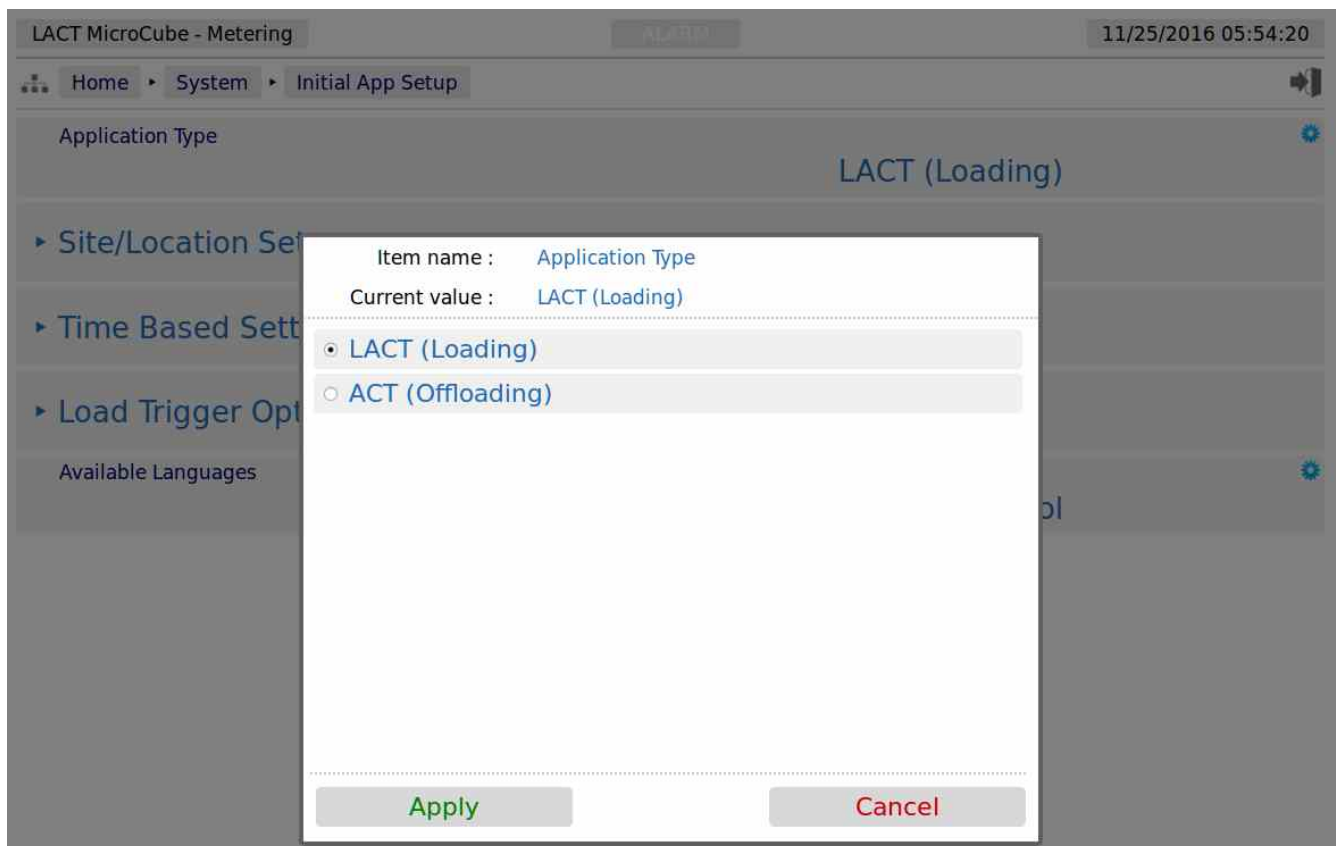
When a data point is being described in this manual, it will be shown in Bold Italics, as is ***Application Type*** in the next paragraph.

Menu locations will be shown as [Home](#) ▶ [System](#) ▶ [Initial Setup](#) in this manual.

Any line which has a gear icon at the end of the line, is an editable line. 

Clicking anywhere on a line with the gear icon will open an edit dialog box. The original web page is now grayed out and the appropriate dialog box overlays the background.

The type of dialog depends upon the context. For example, If you navigate to [Home](#) ▶ [System](#) ▶ [Initial App Setup](#) and click the top line ***Application Type*** will open a Radio Button dialog box , which only allows one choice from several options. This type of dialog box is shown below.



This radio button type dialog box only has two choices, click the line that matches your requirement and click on the ***Apply*** button, to make the selection, or cancel to lose any change made.

There are a range of other dialog boxes, for example the Edit value dialog box shows the name of the item being edited (Item name) and it has a large data entry area, which shows "Old Company Name" being replaced with "New Corporation Name" in the screenshot overleaf.



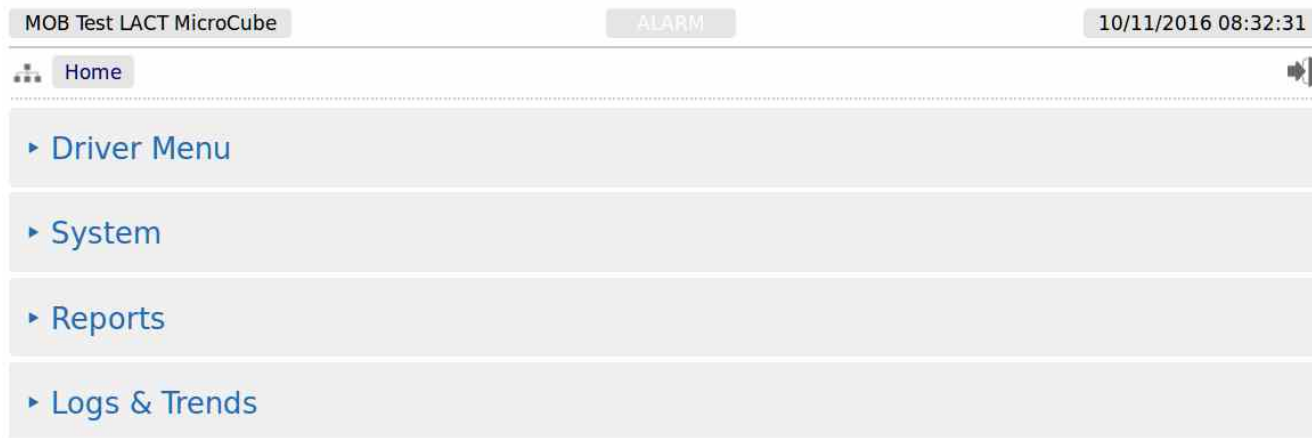
The user can now accept the new value by clicking the green Apply button, or reject the changes by clicking the red Cancel button, at which point, the Edit value dialog box closes and the main screen is displayed as normal. If you have changed the Device ID, you will need to refresh the page view before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

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.

4 Stage 1 of 5: Initial App 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.

The default or home page that will be displayed in the browser is shown below



<i>Driver Menu</i>	This is a mimic of the Local Panel, and can be used to support and train the drivers. In addition, it will also mimic the Technician menus and any other Local Panel screens.
<i>System</i>	This is the entry point to the system configuration sub-menus.
<i>Reports</i>	This section will contain all of the reports produced by the Application.
<i>Logs & Trends</i>	All the information supplementary to the reports will be found in the section.

To start the configuration, click the line containing the ▶ [System](#) sub menu, then click the top line, ▶ [Initial App Setup](#)

4.1 LACT (Loading) or ACT (Unloading)

The screenshot shows a web interface for 'LACT MicroCube - Metering'. At the top right, there is a date and time stamp: '11/18/2016 05:44:18'. Below this, there is a navigation breadcrumb: 'Home > System > Initial App Setup'. The main content area is titled 'Application Type' and shows 'ACT (Offloading)' selected. Below this, there are three expandable sections: 'Site/Location Setup', 'Time Based Settings', and 'Available Languages'. The 'Available Languages' section shows 'English, Español' selected. There are gear icons on the right side of the 'Application Type' and 'Available Languages' sections.

The first line, showing the data point **Application Type** needs to be configured before any further settings are made.

Currently there are two options, LACT and ACT. It is important to select the appropriate application type, by highlighting the radio button, and clicking on the **Apply** button.

It is recommended that you then work your way through each item in the list, in order.

Although there is a lot of similarities between the LACT and the ACT setup, there are differences so for clarity each is described separately.

To configure a LACT site, carry on to the next section 4.2.

To configure an ACT site, skip to section 4.3

4.2 LACT Specific

LACT MicroCube - Metering ALARM 11/18/2016 06:02:24

Home ▸ System ▸ Initial App Setup

Application Type LACT (Loading)

▸ Site/Location Setup

▸ Time Based Settings

▸ Load Trigger Options

Available Languages English, Español

By selecting the LACT (Loading) option, a sub-menu for the Load Trigger Options has been made visible. Clicking [Site/Location Setup](#) sub-menu will show the screen below.

4.2.1 LACT Specific - Site Location Setup

LACT MicroCube - Metering ALARM 11/18/2016 08:06:10

Home ▸ System ▸ Initial App Setup ▸ Site/Location Setup

Company Name FPH Site 1234

Device ID LACT MicroCube - Metering

Comment/FMP # blm number here

Lease Location WolfCamp 57/B/136

Security Mode No Security

Entry of Destination Required No

QR Code Support Disabled

Manually Measured S&W Source Sampler Can Recorded Value

Sample Gravity and Sample Temperature Source Sampler Can Recorded Value

Local Atmospheric Pressure 0.00 psia

Company Name	<p>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.</p> <p>The Company Name is printed on all reports.</p>
Device ID	<p>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.</p> <p>NOTE: if no Device ID name is set, then the hardware unique System ID will be displayed on the web browser.</p>
Comment/FMP#	<p>This is a text field, like the Company Name, and is printed on all reports. For BLM applications, this field can be used to record the Facilities Measurement Point FMP number. It is also shown on the Authorized Officer (AO) screen.</p>
Lease Location	<p>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.</p>
Security Mode	<p>There are four choices for the security mode. These are explained in section #4.2.2 Security Modes below.</p>
Entry of Destination Required	<p>There are three choices shown in section 4.2.3 Entry of Destination Required shown below.</p>
QR Code Support	<p>This is further explained in section shown 4.2.4 QR Code Support below.</p>
Manually Measured S&W Source	<p>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" (the historical S&W value derived during the last Sampler Can Pull by a metering technician, and entered when the LACT-Pro® application was in Metering Technician mode).</p>
Sample Gravity and Sample Temperature Source	<p>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® controller was in Metering Technician mode).</p>
Local Atmospheric Pressure	<p>This data point allows the user to set the default Local Atmospheric Pressure, in absolute pressure units of psia.</p>

4.2.2 Security Modes

Security Mode	<p>There are four choices for the security mode. These are:</p> <p>No Security: There are no checks on the user of the driver local panel.</p> <p>Single Pin: If this option is selected, the driver will have to enter the PIN number, specified in the PIN Code Value field which will appear below, before the driver can operate the LACT-Pro® controller. The PIN code can be any positive number between 1 and 999,999,999. The Pin Code Value can also be downloaded via XML Communications.</p> <p>Hauler ID Only: If this option is selected, the driver must match one of the Hauler IDs which are accessed via the Hauler ID Setup sub-menu, which appears when this option is selected.</p> <p>Hauler ID & PIN: If this option is selected, the driver must firstly match one of the Hauler IDs which are accessed via the Hauler ID Setup sub-menu, which appears when this option is selected, and secondly, must supply the matching PIN code associated with the Hauler ID. The Hauler ID setup screen is shown below.</p>
----------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

If Single Pin is selected, the menu will change to show:

Security Mode	Single PIN Code
Pin Code Value	1234

If Hauler ID Only or Hauler ID & PIN is selected, a link to the ► [Hauler ID Setup](#) sub-menu will appear as shown below.

Security Mode	Hauler ID Only
► Hauler ID Setup	

Clicking the Hauler ID Setup sub-menu link will open the menu, part of which is shown on the next page.

The LACT-Pro can support up to 20 different Hauler IDs. The associated Hauler PIN can be any positive number between 1 and 999,999,999. The Hauler ID and the Hauler PIN can be downloaded to the LACT-Pro using XML communications.

If Hauler ID only security is used, the values in the associated Hauler Pin column are ignored, but will be shown in the setup screen.



Hauler ID	Hauler PIN
Hauler ID [Hauler 1] Tom	Hauler PIN [Hauler 1] 1111
Hauler ID [Hauler 2] Dick	Hauler PIN [Hauler 2] 2222
Hauler ID [Hauler 3] Harry	Hauler PIN [Hauler 3] 3333
Hauler ID [Hauler 4]	Hauler PIN [Hauler 4]

4.2.3 Entry of Destination Required

Entry of Destination Required	<p>There are three choices for the Entry of Destination option. These are:</p> <p>No: There is no destination information on the reports and electronic data</p> <p>Driver Entered: The driver can enter any Alphanumeric data, and this will be copied on to the reports.</p> <p>Pre-Defined List: If this option is selected, the driver has to pick one entry from a list of up to 15 destinations. The chosen entry will be copied on to the BOL Ticket. When the Pre-Defined List option is selected, the fixed Destination sub menu is shown below.</p>
--------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Entry of Destination Required

Pre-Defined List

▸ Fixed Destinations

Clicking the sub-menu link will open, the fixed destinations menu:

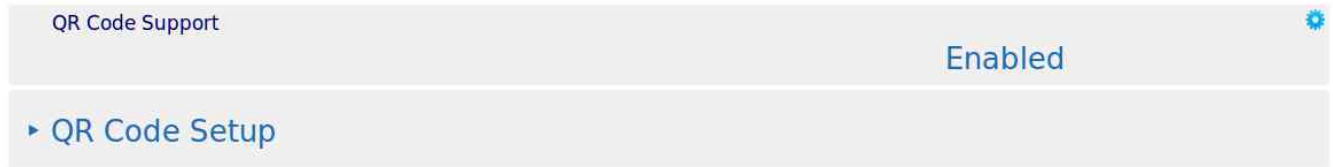
LACT MicroCube - Metering		ALARM	11/18/2016 09:23:39
Home ▸ System ▸ Initial App Setup ▸ Site/Location Setup ▸ Fixed Destinations			
Destination Name [Destination 1] Sealy	Destination Name [Destination 2] Pecos		
Destination Name [Destination 3]	Destination Name [Destination 4]		
Destination Name [Destination 5]	Destination Name [Destination 6]		

The screenshot above just show a part of the menu, 15 Fixed Destinations are supported. The destination can also be configured remotely using the XML communications.

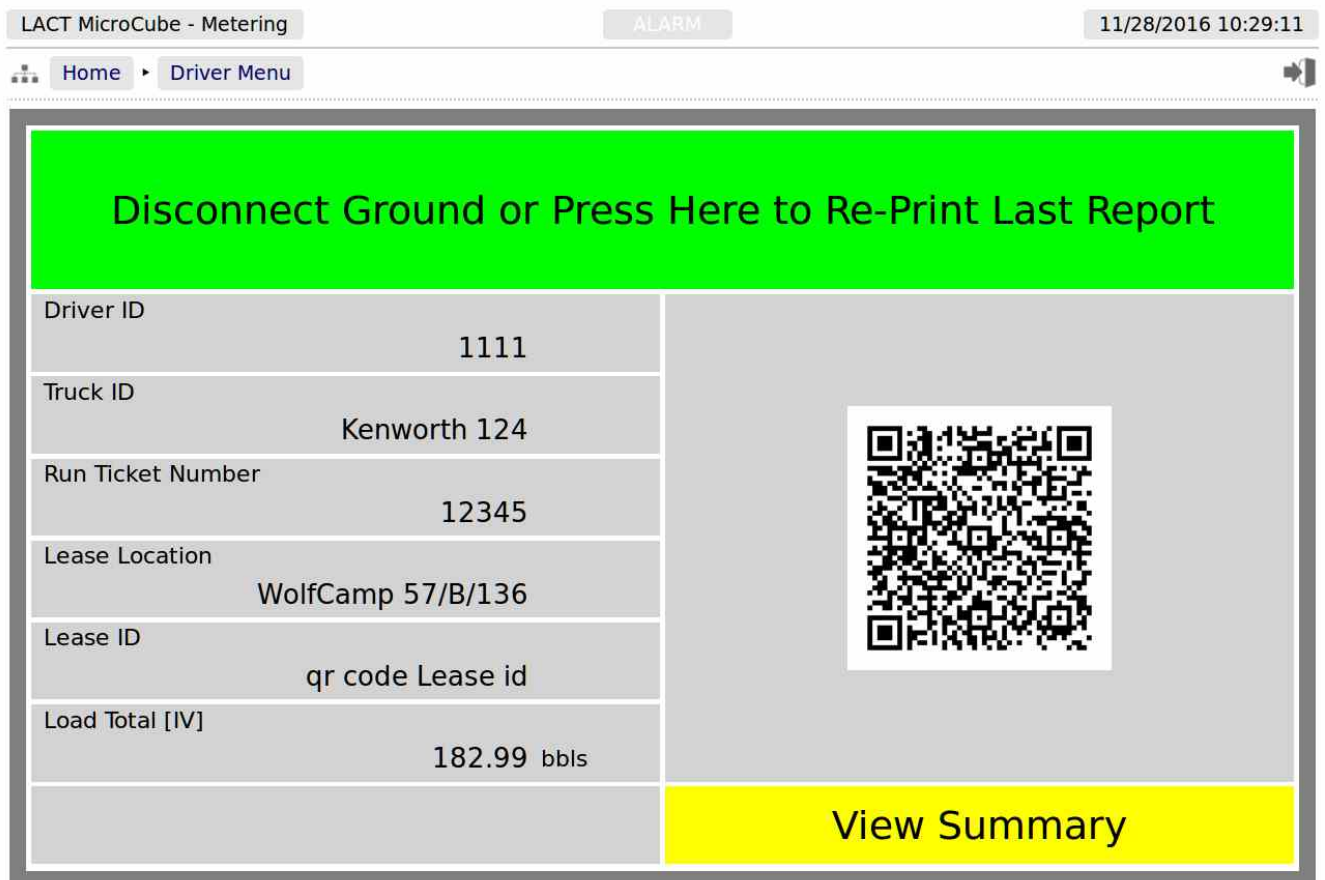
4.2.4 QR Code Support

QR Code Support	There are two choices, Disabled or Enabled . If enabled, the final screen on the driver local panel will display a QR code with the BOL Ticket incorporated. When enabled, a QR Code Setup sub-menu will appear where some of the fixed data in the QR code can be programmed.
------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

If QR Code Support is enabled, the sub-menu option will appear:



When QR Code Support has been enabled, the final screen on the Local Panel used by the driver is modified to generate both the QR Code itself, and some additional information. The options to re-print the last BOL ticket is still present, and the BOL Ticket can be previewed as a summary.



The Driver ID, the Truck ID and the Run Ticket Number are as entered by the Driver.

The Lease Location is taken from [Section 4.2.1 LACT Specific - Site Location Setup](#).

The Lease ID is taken from:

[Home](#) ▶ [System](#) ▶ [Initial App Setup](#) ▶ [Site/Location Setup](#) ▶ [QR Code Setup](#) as shown below.

The Load Total is as the BOL ticketed volume.

In addition the QR Code has 12 data fields, these are:

Item Index	Data in Example	Source of the Data
A	6	Unique Transaction number from BOL report
B	1111	Driver ID
C	Kenworth 124	Truck ID
D	12345	Run Ticket Number
E	WolfCamp 57/B/136	Lease Location
F	qr code Lease id	Lease ID (see below)
G	182.99	Loaded IV Volume
H	0	Product Type (see below)
I	11-28-2016	BOL Report Creation Date
J	10:22:25	BOL Report Creation Time
K	T	Record Type (see below)
L	33	Division (see below)

LACT MicroCube - Metering ALARM 11/18/2016 09:41:08

[Home](#) ▶ [System](#) ▶ [Initial App Setup](#) ▶ [Site/Location Setup](#) ▶ [QR Code Setup](#)

Lease ID	qr code Lease id
Product Type	0
Record Type	T
Division	33

The QR Code Setup information can be used for any purpose, but Lease ID and Record type are text fields, up to 32 characters.

The Product Type and Division are 32 bit integer numbers.

This completes the ▶ [Site/Location Setup](#).

Click Initial App Setup on the breadcrumb bar, and then chose the ▶ [Time Based Settings](#) sub-menu to continue the configuration.

4.2.5 Initial App Setup, Time Based Settings

MOB LACT MicroCube #23		ALARM	04/11/2018 16:35:22
Home ▶ System ▶ Initial App Setup ▶ Time Based Settings			
Auto Web Logout (0 = Disabled)	999 mins		
Driver Data Entry Timeout	30 s		
Ground Input Timeout	20 s		
End of Day Time	02:00 (2am)		
Trend Sample Period	Every 5 Seconds		
Low Flow Cut Off Timeout	0 s		
Diverter Valve Start Up Divert Time	8 s		
Maximum Recirculation Time	25 s		
Max Recirculation Cycles Allowed	5		

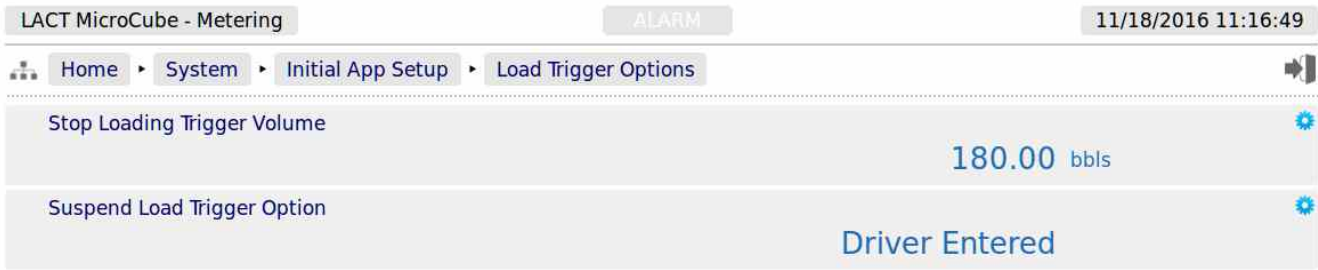
<p>Auto Web Logout (0 = Disabled)</p>	<p>By default, if you do not interact with the website for 10 minutes the user will be logged out, and you will have to re-enter the User Name and Password. This auto-logout is a safety feature to ensure that if a user forgets to logout, it will be less likely that 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.</p> <p>NOTE: In this instance only a number can be typed into the Edit Value Dialog box</p> <p>NOTE: It is recommended that a reasonable number is used once the machine is commissioned, to limit unauthorized access.</p>
<p>Driver Data Entry Timeout</p>	<p>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.</p>
<p>Ground Input Timeout</p>	<p>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.</p>

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. Clicking the line opens a table, with radio buttons, showing the times in both 24 Hour / Military time and 12 Hour am/pm times.
Trend Sample Period	This sets the interval between trend data points being recorded in zone ▶ Loading Trend (Programmable) . 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 ▶ Loading Trend (Programmable) , although zone ▶ Continuous Trend (5 Minute Interval) records continuously at a fixed 5 minute interval.
Low Flow Cut Off Timeout	This field is used together with the Oil Flow Meter Cut Off Frequency field on the Home ▶ System ▶ Product Setup ▶ Oil ▶ Oil Flow Meter menu page. This feature automatically ends a load, and therefore cuts the permissive to the charge pump if it determines that the meter is not being driven, as a pump protection feature. If the Oil Meter Pulse frequency is less than the configured Cut Off frequency, and the Low Flow Cut Off Timeout period is exceeded, then the load cycle will be terminated. If either the timeout period or the cut off frequency are set to "0" then this feature is disabled, and these field are both set to "0" by default. Note, the Low Flow Cut Off Timeout is disabled when the Diverter Valve is in Divert.
	NOTE: If the Diverter Valve Permissive Output is set to Not Routed in the Home ▶ System ▶ I/O ▶ Assignment/Settings - Digital I/O menu or the Application Type has been set to ACT (Offloading) , then the Low Flow Cut Off Timeout will be the last item on this menu. If the system does have a diverter valve configured, the extra menu items below will be displayed.
Diverter Valve Start Up Divert Time	This menu item is only visible if the Diverter Valve Permissive Output is set to a Digital Output. When the Pump Permissive Output is enabled at the start of the load, the LACT-Pro® application can be programmed to start in recirculation mode, so that any free water that may have settled out in the LACT skid is removed. This Start Up divert does not decrement the Recirculation counter from the item above.
Maximum Recirculation Time	This menu item is only visible if the Diverter Valve Permissive Output is set to a Digital Output. Clicking this line allows the user to type in a different value, to the 30 Second default. If bad oil (Oil with a water cut above the pre-configured maximum) is detected for a period in excess of this Maximum Recirculation Time, then the current load will be aborted and a BOL report generated.
Max Recirculation Cycles Allowed	This menu item is only visible if a Diverter Valve Permissive Output is set to a Digital Output. Each time a slug of bad oil is detected (for a period of time less than the Maximum Recirculation Time), a counter is decremented. When this counter reaches zero, the current load will be aborted. This menu item is used to determine the number of times the LACT-Pro® application can perform a recirculation cycle.

This completes the ▶ [Time Based Settings](#).

Now chose the ▶ [Load Trigger Options](#) sub-menu to continue the configuration.

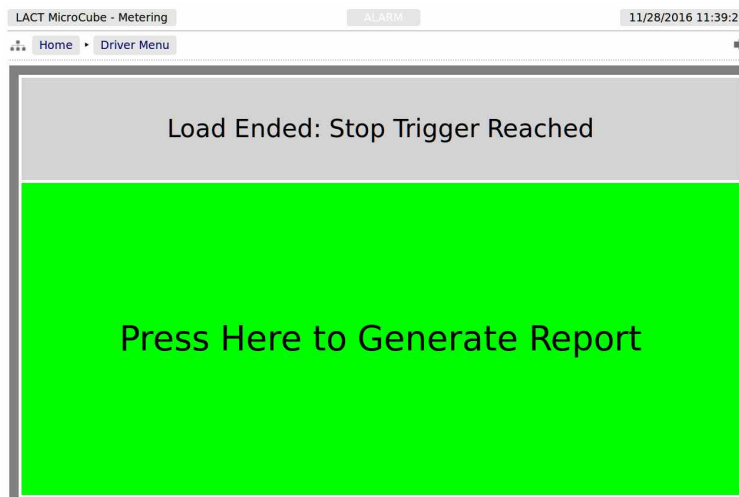
4.2.6 LACT Specific Load Trigger Options



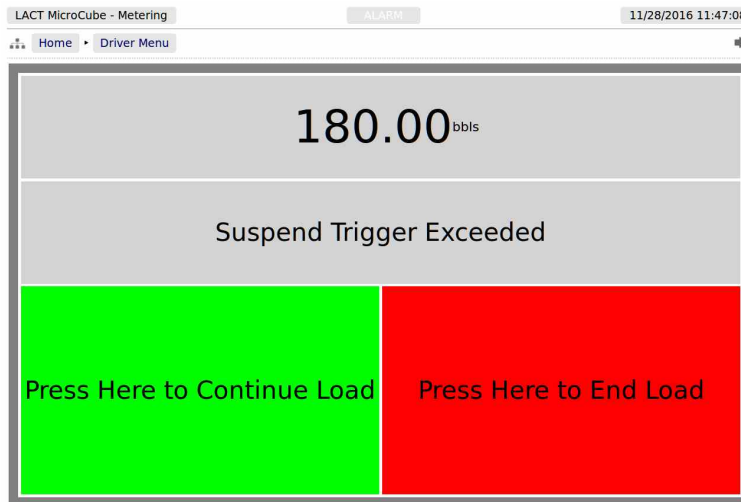
NOTE: If the **Load Trigger Options** sub-menu is not shown, the LACT-Pro is in ACT (Offloading) mode, rather than LACT (Loading) mode.

<i>Stop Loading Trigger Volume</i>	<p>This value is the maximum volume that can be loaded before the load is ended, the Pump Permissive output will be set to Off (inactive) and the diverter valve to Off/Recirculate, and the driver prompted to generate the BOL report. A screenshot of the driver display is shown below.</p> <p>The <i>Stop loading trigger volume</i> cannot be disabled, but can be set to a very large number.</p>
<i>Suspend Load Trigger Option</i>	<p>There are 3 options: Disabled, Fixed Value and Driver Entered. Only when Fixed Value is selected is the <i>Suspend Loading Trigger Volume</i> line below shown. If the Driver Entered option is selected, the Driver's Local Panel will request he enters the suspend Load Trigger volume before loading commences.</p>
<i>Suspend Loading Trigger Volume</i>	<p>The LACT-Pro® 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.</p>

Stop Loading Trigger Volume Reached Screenshot.



Suspend Loading Trigger Volume Reached Screenshot



This completes the ► [Load Trigger Options](#). Click Initial App Setup on the breadcrumb bar to go back, and the single remaining data point is the *Available Languages*.

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 this selection will always be used.
----------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

This completes the ► [Initial App Setup](#). For the next phase, click System on the breadcrumb bar to go back, and select ► [RTU Setup](#).

4.2.7 Suspend and Stop Loading Sequence Diagram

Event and status	Charge Pump permissive Output	Diverter Valve Output
Tank-Pro powered off	Pump Off	OFF (Recirculate)
Powered On, but not loading	Pump Off	OFF (Recirculate)
Start of load (during Start Up Divert Time)	Pump ON	OFF (Recirculate)
During Load, after divert time	Pump ON	ON (Loading)
Suspend Volume Trigger Volume reached during a load and now awaiting driver input	Pump Off	OFF (Recirculate)
During suspend, driver selects Continue loading, then	Pump ON	ON (Loading)
After reaching Stop Loading Trigger Volume or driver has selected End Load.	Pump Off	OFF (Recirculate)

To continue configuring the LACT application, skip to section 5.

4.3 ACT (Offloading) Specific

If ACT (Offloading) has been selected for the initial choice, the menu will appear as shown below. The Load Trigger Options sub-menu is not available in ACT mode.

The screenshot shows the 'Initial App Setup' menu. The top bar includes 'LACT MicroCube - Metering', 'ALARM', and the date '11/24/2016 11:30:25'. The breadcrumb trail is 'Home > System > Initial App Setup'. The menu items are: 'Application Type' (set to 'ACT (Offloading)'), 'Site/Location Setup', 'Time Based Settings', and 'Available Languages' (set to 'English, Español').

The Time Based Settings menu [Section 4.2.5 Initial App Setup, Time Based Settings](#) options are exactly the same as for LACT, but the Site/Location Setup sub-menu is slightly different.

The screenshot shows the 'Site/Location Setup' sub-menu. The top bar includes 'LACT MicroCube - Metering', 'ALARM', and the date '11/24/2016 11:39:46'. The breadcrumb trail is 'Home > System > Initial App Setup > Site/Location Setup'. The configuration items are: 'Company Name' (company_name_4567890123456789012), 'Device ID' (LACT MicroCube - Metering), 'Comment/FMP #' (blm number here), 'Offload Location', 'Security Mode' (No Security), 'Manually Enter Lease Ticket Data?' (Yes), 'QR Code Support' (Disabled), 'Sampler Type' (Multi Sampler), 'Sampler Names' (expandable), 'Manually Measured S&W Source' (Sampler Can Recorded Value), 'Sample Gravity and Sample Temperature Source' (Sampler Can Recorded Value), and 'Local Atmospheric Pressure' (0.00 psia).

Company Name	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .
Device ID	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .
Comment/FMP#	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .
Offload Location	This replaces the Lease Location field. This is a text field, like the Company Name, and it is intended to be populated with the physical ACT site address information. It is shown on all reports.
Security Mode	As for LACT, see Section 4.2.2 Security Modes .
Manually Enter Lease Ticket Data?	The Entry of Destination Required is a LACT only option and is replaced with a Manually Enter Lease Ticket Data? option. If YES is selected, the driver will be requested to transcribe the information from the ticker produced when the Tanker was loaded.
QR Code Support	As for LACT, see Section 4.2.4 QR Code Support .
Sampler Type	This is an ACT only menu option. There are two options, single sampler or multi-sampler. If Multi-sampler selected, the sample names sub-menu will be displayed, see below.
Manually Measured S&W Source	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .
Sample Gravity and Sample Temperature Source	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .
Local Atmospheric Pressure	As for LACT, see Section 4.2.1 LACT Specific - Site Location Setup .



Clicking the Sampler Names opens the menu that allows each of the possible six Sampler systems to be given a unique name, which will appear on the BOL report.

NOTE: The Multi-Sampler option requires the P552 Multi-Sampler Interface, contact your local distributor for details.

The Sampler Names menu is shown below:

LACT MicroCube - Metering ALARM 11/25/2016 09:41:14

Home > System > Initial App Setup > Site/Location Setup > Sampler Names

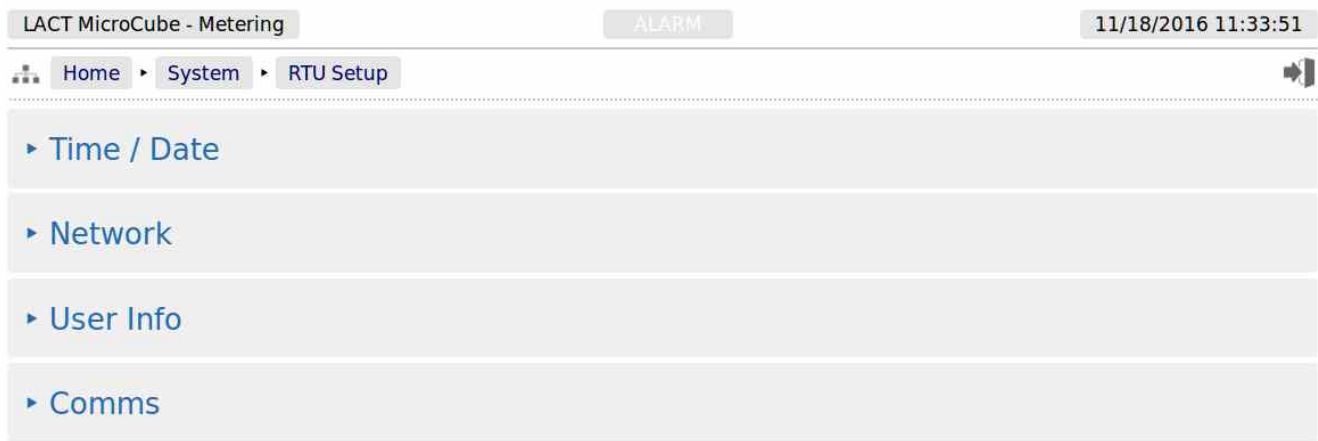
Sampler Name [Sampler 1] GOE Resources	Sampler Name [Sampler 2] ACME Midstream
Sampler Name [Sampler 3] Enterprise Energy	Sampler Name [Sampler 4] Reno Ranch
Sampler Name [Sampler 5] Wolfcamp Energy	Sampler Name [Sampler 6] Sampler 6 - Not Used

This completes the Initial Setup page for an ACT system.

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.

5 Stage 2 of 5: RTU Setup

The RTU setup configures the computer aspects of the LACT-Pro. The screenshot below shows the four main sub-menus.



Clicking the ► **Time / Date** sub-menu will show the screen on the next page.

5.1 Time / Date

LACT MicroCube - Metering ALARM 11/18/2016 12:39:04

Home ▸ System ▸ RTU Setup ▸ Time / Date

TimeZone	Eastern	
Time Offset (HH:MM)	-05:00	
Date Format	MM/DD/YYYY	
Date	11/18/2016	
Time	12:39:04	
Daylight Saving Time (In Effect)		
Start Date (MM/DD)	05/25	
End Date (MM/DD)	12/25	
Changeover Hour	01:00	
NTP		
Automatic Sync	Enabled	
Server IP Address	143.210.16.201	
Last Sync	11/18/2016 12:35:21 +0.634528 seconds	
	Manual Sync	

The LACT-Pro® 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 & 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® 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® controller to the Internet time 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. This is because the NTP server has no knowledge of where the client resides and local time is derived from 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). 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 .

Item name : TimeZone
Current value : Central

Alaska
 Pacific
 Mountain
 Central
 Eastern

Apply Cancel

The following system settings are shown:

TimeZone	The dialog box above shows the options available. Alaskan zone is -9 Hours, Pacific is -8 Hours, Mountain is -7 Hours, Central is -6 and 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 just 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. As usual, select Apply or Cancel to exit this editor.
Date	Shows the current date (using the format defined below). Clicking on the line containing the gear icon allows the user to enter a date, in the format specified below. 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® 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 or back by one hour in the Fall.
NTP - This is the heading for the NTP options	
Automatic Sync	Shows whether the NTP (Network Time Protocol) automatic update service is Enabled or Disabled on the LACT-Pro® 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	<p>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.</p> <p>The NIST time server list can be found at http://tf.nist.gov/tf-cgi/servers.cgi</p> <p>For example: NIST, Boulder is 132.163.96.1</p> <p>Google also has a series of time servers, at 216.239.35.0, 216.239.35.4, 216.239.35.8 and 216.239.35.12</p>
Last Sync	<p>This field records the time & date of the last NTP synchronisation, and the time offset between the computer and Network time.</p>
NTP Manual Sync	<p>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.</p>

This completes the ► **Time / Date settings**. For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ► **Network**.

5.2 Network

The LACT-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 either case, 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 changed. The user pre-loads a consistent set of information (IP address, Netmask & 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.

Pre-loaded but not yet applied information is shown in RED text.

In addition to being able set up the Ethernet interfaces, this page has information on the connections made to the machine, and allows a System Administrator to close links if required.

LACT MicroCube - Metering ALARM 11/18/2016 13:34:55

Home ▸ System ▸ RTU Setup ▸ Network ⌂

IP Method (Port 1)	Static	
IP Address (Port 1)	10.0.101.1	
Netmask (Port 1)	255.255.0.0	
Gateway (Port 1)	10.0.0.1	
IP Method (Port 2)	Static	
IP Address (Port 2)	10.250.250.250	
Netmask (Port 2)	255.255.255.0	
Apply		
Connection Info		
XML	10.0.101.1:502 <-> 10.0.0.109:49781	
Generic Modbus/TCP Slave Link	10.0.101.1:593 <-> 10.0.0.112:35050	
Legacy Modbus/TCP Slave Link	10.0.101.1:592 <-> 10.0.0.112:56978	

NOTE: When configuring the Ethernet IP addresses, the following **MUST** be carefully noted:

The IP address for each port must **NOT** be in the same subnet. Due to the fundamental design of the routing mechanism, Ethernet cannot work reliably if two separate controllers share the same subnet.

IP Method (Port 1)	<p>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.</p> <p>NOTE: If DHCP is chosen as the IP Method, the current in-use IP address, Netmask and Gateway values are shown, but greyed out as they are for information only.</p>
IP Address (Port 1)	<p>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.</p> <p>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 to be input. The IP address must be entered in commonly used IPv4 quad-dotted decimal representation, as shown by the example screen on the previous page.</p>
Netmask (Port 1)	<p>If DHCP has been selected, then this field will show, in grey text, the Netmask that has been allocated to the unit by the DHCP server.</p> <p>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 input. The netmask must be entered in IPv4 quad-dotted decimal representation, like an IP address.</p>
Gateway (Port 1)	<p>If DHCP has been selected, then this field will show, in grey text, the gateway that has been allocated to the unit by the DHCP server.</p> <p>If Static IP method has been selected, then the line will contain the gear icon, and if the Icon is clicked, the Edit Value dialog box will be opened, so the manual Gateway address can be set. The Gateway address must be entered in IPv4 quad-dotted decimal representation.</p>
IP Method (Port 2)	<p>Ethernet Port 2 (ETH2) does not allow DHCP to be used. This eliminates a potential problem where both ports are allocated addresses in the same subnet.</p> <p>The two options for the second port are Static, or Off to disable the second Ethernet port.</p>
IP Address (Port 2)	<p>If Port 2 IP Method is selected to Static, then the gear icon will shown, and clicking the line allows the user to input the IP address for the second port. If the second Ethernet port is selected as OFF, then this line will be grayed out.</p>
Netmask (Port 2)	<p>If Port 2 IP Method is selected to Static, then the gear icon will shown, and clicking the Icon allows the user to input the netmask for the second port. If the second Ethernet port is selected as OFF, then this line will be grayed out.</p>
Apply	<p>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.</p>
Connection Info	
XML (Link)	<p>In the screenshot above, the XML link information shows that 10.0.101.1 Port 502 (the LACT-pro unit) is connected to a SCADA system with an IP address of 10.0.0.109 using port 49781. Up to 10 simultaneous XML links can be supported. Clicking on this line opens a "Close Connections?" dialog box. Selecting Confirm will close ALL the XML links.</p>

Generic Modbus/TCP Slave Link	This line will show how many remote machines are connected using the Generic Modbus Map, and shows the IP addresses and port numbers of the remotely connected machines. Clicking the line opens the "Close Connections?" dialog box, as with the XML link above.
Legacy Modbus/TCP Slave Link	This line is similar to the Generic Link, above, but shows connections using the Legacy Modbus map.

The screen below shows a Network setup screen, that is currently running using DHCP. When the Apply line is clicked, Ethernet Port 1 will change to the settings currently shown in red. At this point, the browser will no longer appear to function. The user will have to type the new address into the browser address bar, and login once again, to continue configuration.

LACT MicroCube - Metering
ALARM
11/18/2016 13:46:48

Home > System > RTU Setup > Network

IP Method (Port 1)	Static	⚙
IP Address (Port 1)	10.0.150.6	⚙
Netmask (Port 1)	255.255.0.0	⚙
Gateway (Port 1)	10.0.0.1	⚙
IP Method (Port 2)	Static	⚙
IP Address (Port 2)	10.250.250.250	⚙
Netmask (Port 2)	255.255.255.0	⚙
Apply		⚙
Connection Info		
XML	10.0.101.1:502 <-> 10.0.0.109:49781	⚙
Generic Modbus/TCP Slave Link	No connections	⚙
Legacy Modbus/TCP Slave Link	No connections	⚙

5.2.1 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 name 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 text 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	<p>Sets the access level of the user.</p> <p>Three access levels are available in the LACT-Pro® application.</p> <p>Admin Can change all parameters, except those designated as Technician only. One user at Admin level is mandatory.</p> <p>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.</p> <p>View Only Allow viewing of all data, except the System menus, but nothing can be changed.</p>
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.

Add new user ...

Username :	<input type="text"/>
Level :	View Only
Password :	<input type="password"/>
Password (confirm) :	<input type="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.

We recommend user names use the following characters only:

Upper and Lower case letters, A..Z and a..z
Numbers, 0..9 Hyphen (-), full-stop (.) and space.

NOTE: As stated previously, there is no back-door to the security. If you lose the Administrator password, it cannot be recovered, and the only course of action is reset to factory default, which will clear all reports and data.

5.3 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.



5.3.1 Printers

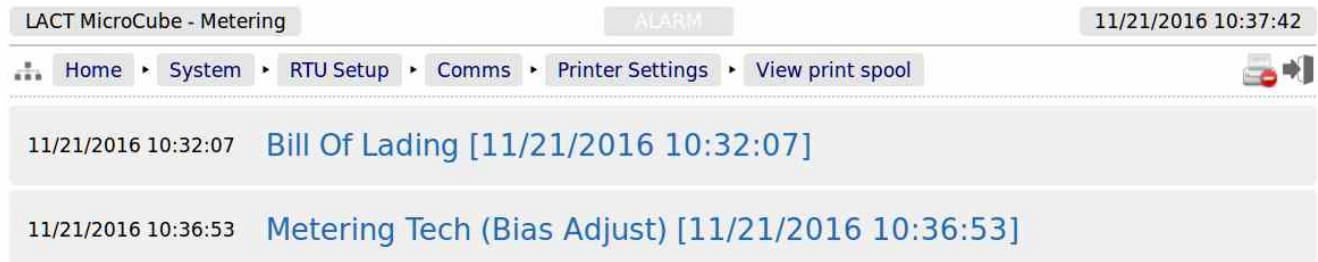
The LACT-Pro® application supports up to 3 physical printers, a virtual printer on the SD-Card and remote "push" FTP printer. The FTP printer can push data in both Spreadsheet compatible TSV format as well as FlowCal TFX format, in addition to text format, as a physical printer replacement.

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

In the following example, Printer 1 has the default name and Printers 2 & 3 have been renamed. Printer 2 has been named Management Office and Printer 3 overwritten with Oklahoma Accounts Dept.

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 TCP port of 9100 used.

The first item in the menu shows the number of files in the print spooler waiting to be printed. If there are none, this will state Empty, as on the next page. 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 two reports in the print spooler.



Print spool	Empty	
Printer 1		
Name	Ticket	
Type	Serial (Codepage 437)	
Serial Port	COM1 - RS232	
Baud Rate	9600	
Printer 2		
Name	Management Office	
Type	Network (Postscript)	
Network Address	10.0.0.107	
Network Port	9100	
Zoom (%)	100	
Print Test Page		
Printer 3		
Name	Oklahoma Accounts Dept.	
Type	Network (Postscript)	
Network Address	10.0.0.11	
Network Port	9100	
Zoom (%)	100	
Print Test Page		
SD Card		

and continued from page above:

SD Card	
Status	Installed (free 1.41 GiB, total 1.87 GiB)
Archive Alarms/Events	Weekly
Archive Historicals	Daily
FTP	
Server IP Address	66.220.9.50
Port	21
Username	mpfj
Password	*****
Upload Directory	/mob/LP-Oil
Upload Format	Plain Text
	Send Test File

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 default printer name can be replaced.
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 default printer name can be replaced.
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 with the Apply/Accept Icon forces an immediate test page to be printed. 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.

The SD Card is a versatile extension to the on-board non-volatile memory, and can be used as a virtual printer, see [Home](#) ▶ [System](#) ▶ [RTU Setup](#) ▶ [Comms](#) ▶ [Report/Printer Routing](#) as well as being able to extend the Archive & Events and the Data Logging almost indefinitely.

SD Card	
Status	<p>This will state No Card Inserted, if no SD Card is present, or has been dismounted.</p> <p>When the LACT-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 (or in MibiBytes MiB if very small).</p> <p>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.</p> <p>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. The status line will now show the SD Card information.</p>
Archive Alarms/Events	<p>In addition to being able to use the SD card as a 4th virtual printer, the Alarms and Events can also be "archived" to the SD card a regular intervals, so that in essence, all Alarms & Events, over the lifetime of the machine could be stored within the LACT-Pro Controller. The archive can be turned-off by selecting the "Disabled" option, or the time period between archives can be selected from Daily, Weekly or Monthly, depending upon how often information is generated. The file generated is a ZIP archive file containing six .TSV files containing the Alarm Log, Application Event Log, Metrology Event Log, Operator Event Log, Security Event log and the System Event log.</p>
Archive Historicals	<p>The Historical Data Logger collects data which can be viewed graphically in a browser by navigating to Home ▶ Logs & Trends ▶ Trending, and selecting which data to view. The data from each data logging zone can be viewed or downloaded as a .TSV for viewing in a spreadsheet, but the archive module will generate the TSV for each logging zone, and will ZIP these files, and place them onto the SD card. The time period between archives can be selected from Daily, Weekly or Monthly, depending upon how often information is generated.</p>
FTP	
Server IP Address	The IP address of the remote FTP server must be entered in IPv4 human readable quad-dotted format, as shown in the screenshot above
Port	This is the TCP port number, and depends upon the FTP server settings. Port 21 is the usual TCP port number reserved for the File Transfer Protocol (FTP).
Username	The username and password will be allocated by the FTP server administrator
Password	See above
Upload Directory	<p>The upload directory can be a fixed path, for example /Site1123/Unit-AB12 and when a report is generated, it is placed within this fixed directory path, using a "report name" + "datestamp" filename format so in the FTP server it appears as: Hourly Report-05052017092716.tsv</p> <p>Alternatively a very flexible, dynamic path method is available using a %TAG format. This method is exceedingly powerful, but may require factory support to implement. If you need additional options, as your distributor for MiniSpec18.</p>

Upload Format	<p>Clicking this line gives the choice of one of four options selected with a radio button. The 4 options are:</p> <p>Plain Text If this Option is selected all reports are transferred to the FTP server as text formatted documents</p> <p>TSV If this Option is selected all reports are transferred to the FTP server as Tab Separated Values. There is a version of the BOL specially formatted for use as a TSV</p> <p>TFX/P..Text If this Option is selected, reports with the TFX attributes will be transferred as a TFX file, and all other files will be transferred as text formatted. Only the BOL (Print Format) has TFX attributes.</p> <p>TFX/TSV If this Option is selected, reports with the TFX attributes will be transferred as a TFX file, and all other files will be transferred in TSV format.</p>
Send Test File	Clicking this line causes a test file to be transferred to the designated FTP server. A pop-up window shows the low level transaction information for debug purposes.

5.3.2 Report & Printer Routing

The LACT-Pro® application is configured to have 11 reports. Each report can be sent to any or all of the printers as required.

Item Name	Current Value	Action
Web Printer	Printer 2 [MGMT Off], SD Card	
Bill Of Lading (Print Format)	Printer 1 [Ticket], Printer 2 [MGMT Off], SD ...	
Bill Of Lading (TSV Format)	FTP	
Snapshot	Printer 2 [MGMT Off]	
Daily Report	Printer 3 [OKC Acc Dept], SD Card, FTP	
Monthly Report	Printer 3 [OKC Acc Dept], SD Card, FTP	
Duplicate Report	Printer 1 [Ticket]	
Metering Tech (Sampler Can P...	Printer 2 [MGMT Off], SD Card	
Metering Tech (Oil Prove)	Printer 2 [MGMT Off], SD Card	
Metering Tech (Water Prove)	Printer 2 [MGMT Off], SD Card	
Metering Tech (Bias Adjust)	Printer 2 [MGMT Off], SD Card	

Clicking the line will open the printer selection menu.

Item name : Snapshot

Current value : Printer 2 [MGMT Off]

Printer 1 [Ticket]

Printer 2 [MGMT Off]

Printer 3 [OKC Acc Dept]

SD Card

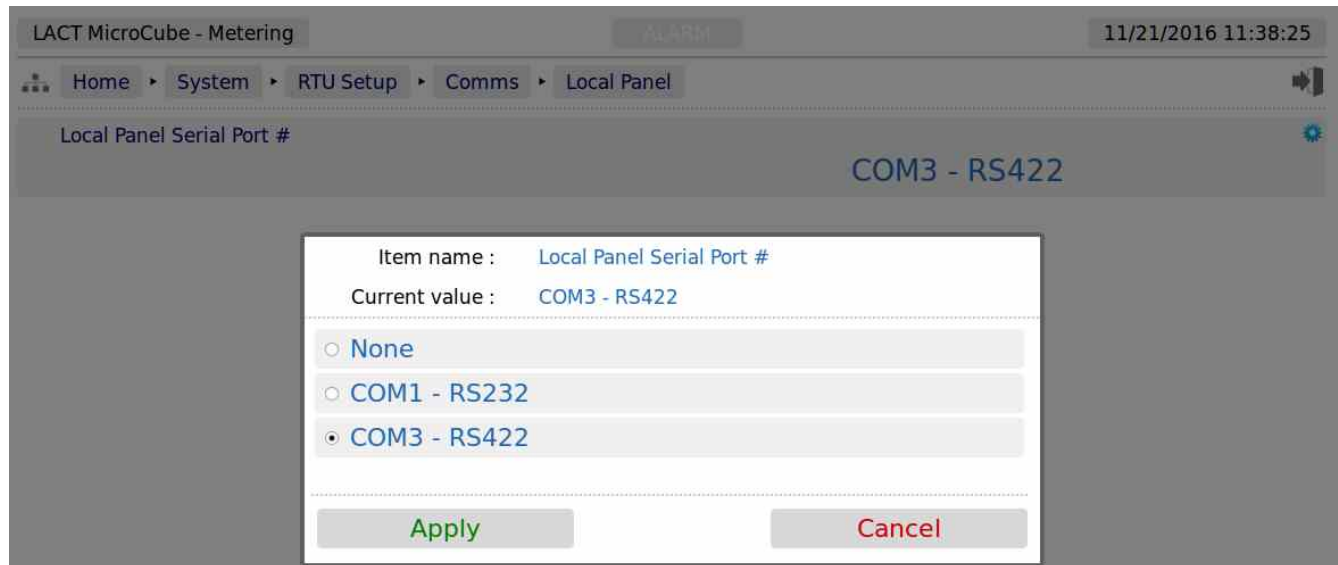
FTP

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.

5.3.3 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, or None if no local panel is required. 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.

5.3.4 XML Communications

XML communications is the preferred method of retrieving data from the LACT-Pro® controller.

All data within the LACT-Pro® controller can be accessed using the XML communications method.

The LACT-Pro® 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.

The full potential of the XML communications can be found in the accompanying Micro³™ XML Comms Manual Rev20, available from your distributor. In addition, there is a Windows based, demonstration program available for test purposes.

Coastal LACT MicroCube Demo ALARM 2015/11/20 03:47:51

Home ▸ System ▸ Comms ▸ XML Comms

XML TCP Pull Port #	502	
XML Push Method	HTTP	
XML TCP Push IP Address	127.0.0.1	
XML TCP Push Port #	85	

The following details can be changed:-

<i>XML TCP Pull Port #</i>	In XML TCP Pull mode, the LACT-Pro® controller acts as a slave device and waits for a remote server to initiate the XML requests. The TCP 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.
<i>XML Push Method</i>	This is where the LACT-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 <code>http://<server>/notify</code>
<i>XML TCP Push IP Address</i>	This is the IP address of the remote server which will receive the push notifications from the LACT-Pro® controller.
<i>XML TCP Push Port #</i>	This is the TCP port number of the remote server which will receive the push notifications from the LACT-Pro® controller. Setting the Port # to 0 will disable the Push notification.

5.3.5 Modbus Slave Communications

The LACT-Pro® controller supports two different Modbus slaves maps.

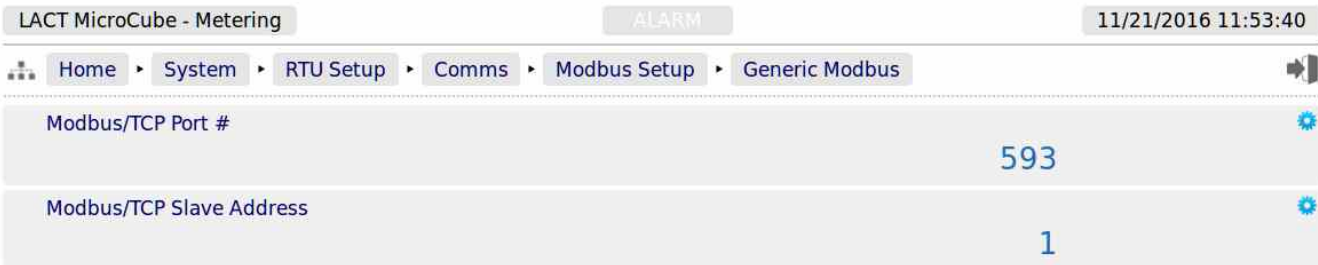
- Generic Modbus/TCP Link – populating live information and grouped tightly so that few polls are required to get live data.
- Legacy Modbus/TCP Link – mainly giving points in the same location as those from other manufacturers, however this means that data is scattered across a wide range of addresses, making it poor to poll for in 'chunks'. It should be noted that Produced Water data cannot be fitted into the legacy map. It is only available in the Generic Modbus Map.



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.
---------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Select either of the two maps, the controls are identical, only the Modbus TCP Port Numbers are different. The Generic map is shown below.

NOTE: When configuring the Modbus, you must ensure unique port number are assigned to each of the Modbus maps.



Modbus TCP Port #	This is the TCP port number that the Modbus Master device must use to talk to the selected Modbus Map. The default port numbers are 592 for the Legacy Modbus map and 593 for the Generic Modbus map. To disable a Modbus Map, set the Port Number to zero.
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 LACT Modbus Manual describes all of the Modbus data points available in both the Legacy and Generic Modbus maps.

6 Stage 3 of 5: Product Setup

LACT MicroCube - Metering ALARM 11/21/2016 12:11:10

Home ▸ System ▸ Product Setup

- Oil

Water Measured? Yes

- Water

Water Measured?	This is a simple Yes or No dialog choice: If No water is being measured, the Oil Flow Meter pulses can be connected to Dual Pulse Inputs Channel A or Channel B. If Water is being measured, then the Oil Flow Meter pulses must be connected to Channel A and the Water Flow Meter to Channel B.
------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

The Product Setup menus always has a sub-menu for the Oil product settings, and a data point for the Water Measured? question. If water is being measured, as in the example screenshot above, then the Water Sub-menu will be shown.

6.1 Oil - Menu for Oil Measurement

Clicking the Oil line will open the Oil Sub-Menu, as shown below, with six further sub-menus.

LACT MicroCube - Metering ALARM 11/21/2016 12:17:27

Home ▸ System ▸ Product Setup ▸ Oil

- Oil Flow Meter
- Measured Oil Temperature
- Measured Oil Pressure
- Monitor S&W
- Sampler Pulse
- Totals

6.1.1 Oil Flow Meter

The screen below is used to configure the parameter associated with the flow meter.

MOB LACT MicroCube #23		ALARM	04/12/2018 08:14:15
Home > System > Product Setup > Oil > Oil Flow Meter			
Oil Flow Meter K Factor	1000.00	pulses/bbl	
Oil Meter Factor	1.0000		
Oil Indicated Volume Flow Rate	3599.9	bbls/hr	
Oil Flow Meter Cut Off Frequency	10	Hz	
Oil Flow Meter Serial Number	NF-123 QB		
Oil Flow Meter Size	4"		
Oil Flow Meter Model	Smith Meter Ultra6		
Oil Flow Meter ID	ABC123		
Oil Flow Meter Manufacturer	FMC Technologies		
Oil Flow Meter Type	Coriolis		

K Factor is usually the nominal manufacturers K factor, which will be corrected by the Meter Factor derived from meter proving. Alternatively a composite K Factor can be used with unity (1.0) Meter Factor depending upon customer operating methods.

If logged in at the Admin level, the Oil Meter Factor is shown, but cannot be edited. If however the user has logged in at Technician level, the Meter Factor can now be changed. The Meter Factor can also be changed using the Local Panel, whilst in Metering Tech mode.

Oil Flow Meter K Factor	K Factor is usually the nominal manufacturers K factor, which will be corrected by the Meter Factor derived from meter proving. Alternatively a composite K Factor can be used with unity (1.0) Meter Factor depending upon customer operating methods
Oil Meter Factor	If logged in at the Admin level, the Oil Meter Factor is shown, but the gray Gear Wheel Icon indicates that the value cannot be edited by this user. If however the user has logged in at Technician level, the Meter Factor can be changed. The Meter Factor can also be changed using the Local Panel, whilst in Metering Tech mode.
Oil Indicated Volume Flow Rate	This show the current Indicated Flow Rate in bbls per Hour
Oil Flow Meter Cut-Off Frequency	This is used in conjunction with the Low Flow Cut Off Timeout , see Section 4.2.5. Initial App Setup, Time Based Settings\outline to terminate the load if insufficient oil is being delivered, to protect the charge pump.
Oil Flow Meter Serial Number	This field is purely a text field which is used to populate reports
Oil Flow Meter Size	As Above
Oil Flow Meter Model	As Above
Oil Flow Meter ID	As Above
Oil Flow Meter Manufacturer	As Above
Oil Flow Meter Type	This opens a select dialog box with three options, Coriolis, PD and Turbine. This information does not affect any measurement within the unit, but is used during TFX report generation.

6.1.2 Measured Oil Temperature (or "over-ride" Oil Temperature)

If the system has a measured oil temperature configured,

(see [Section 8.2 I/O Assignments – Analog Inputs](#)), the System menu will show an item for "Measured Oil Temperature". If no measured oil temperature is configured, then the System menu will show an item for "Oil Temperature".

When the I/O assignment for the Measured Oil Temperature Source has been set to any input other than disabled, and the measured oil Temperature Type has been set to 4-20mA, the measured oil temperature menu will be similar to that shown below.

Home ▸ System ▸ Product Setup ▸ Oil ▸ Measured Oil Temperature

Oil Temperature In Use	58.6 °F	
Oil Temperature 4mA Scale Value	30 °F	
Oil Temperature 20mA Scale Value	130 °F	
Oil Temperature Operating Status	Measured	
Oil Temperature Automatically Recover to Measured	Yes	
Oil Temperature Override Value	55 °F	
Oil Temperature Default Value	60 °F	
Oil Temperature Transmitter Value with Bias	58.6 °F	
Oil Temperature Bias Value	-0.15 °F	
Oil Temperature Transmitter Value No Bias	58.7 °F	
Oil Temperature - Raw Transmitter Value	8.60 mA	
Oil Temperature Low Alarm Limit	-99999999 °F	
Oil Temperature High Alarm Limit	99999999 °F	
Oil Temperature User 1 Low Alarm Limit	-99999999 °F	
Oil Temperature User 1 High Alarm Limit	99999999 °F	
Oil Temperature User 2 Low Alarm Limit	-99999999 °F	
Oil Temperature User 2 High Alarm Limit	99999999 °F	
Low Input Fail Point	3.5 mA	
High Input Fail Point	20.5 mA	

Oil 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.	
Oil Temperature 4mA Scale Value	This point indicates the temperature represented by 4mA. Clicking this line opens the dialog box allowing an alternative temperature to be input. NOTE: If the <i>Measured Temperature Type</i> was set as RTD or Thermistor, the point will not appear, since the RTD & Thermistor give a direct temperature reading.	
Oil Temperature 20mA Scale Value	This point indicates the temperature represented by 20mA. Clicking the line opens the dialog box allowing an different temperature to be input. NOTE: If the <i>Measured Temperature Type</i> was set as RTD or Thermistor, the point will not appear, since the RTD & Thermistor give a direct temperature reading.	
Oil Temperature Operating Status	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.
Oil Temperature Automatically Recover to Measured	Oil 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.	
Oil Temperature Override Value	This is the value used when Oil Temperature Operating Status has been set to Always Override. If no transmitter has been assigned to the Oil Temperature, this override value is always used.	
Oil Temperature Default Value	This is the value used when the Temperature Operating Status has been set to Use Default on Failure, and the measured value is NOT between the low and high Input Fail Points.	
Oil Temperature Transmitter Value with Bias	This is the sum of the Oil Temperature Transmitter Value and the associated Bias value.	
Oil 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.	

Oil Temperature Transmitter Value (No Bias)	This point displays the live measured temperature value. This item is for information only and cannot be edited.
Oil Temperature - Raw Transmitter Value	This shows the instantaneous current flow from the 4-20mA Transmitter. This is NOT shown, if a direct transmitter, such as RTD or Thermistor used.
Oil Temperature Low Alarm Limit	This point shows the currently configured Low Alarm limit. If the Oil Temperature In Use 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.
Oil Temperature High Alarm Limit	This point shows the currently configured High Alarm limit. If the Oil Temperature In Use goes above the configured value, the High 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 high default value is used, no High Temperature Alarm will ever be raised.
Oil Temperature User 1 Low Alarm Limit	If the Oil Temperature In Use goes below the User 1 Low Alarm Limit, the User 1 Alarm will be set.
Oil Temperature User 1 High Alarm Limit	If the Oil Temperature In Use goes above the User 1 High Alarm Limit, the User 1 Alarm will be set.
Oil Temperature User 2 Low Alarm Limit	If the Oil Temperature In Use goes below the User 2 Low Alarm Limit, the User 2 Alarm will be set.
Oil Temperature User 2 High Alarm Limit	If the Oil Temperature In Use goes above the User 2 High Alarm Limit, the User 2 Alarm will be set.
Low Input Fail Point	<p>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 4-20mA mode this value will be 3.5mA by default.</p> <p>If the Measured Temperature Type was set as RTD, then this will be 60 Ohms, as standard and in Thermistor mode it will 3.5mA as standard. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.</p>
High Input Fail Point	<p>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 20.5mA by default.</p> <p>If the Measured Temperature Type was set as RTD, then this will be 180 Ohms, as standard and 18mA in Thermistor mode. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.</p>

If the Oil temperature was not configured to be a live value, then this display menu is much simpler, having only the one item, the Oil Temperature Override Value.



This point shows the Oil Temperature Override Value. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value.

6.1.3 Measured Oil (Line) Pressure

LACT MicroCube - Metering		ALARM	11/21/2016 13:27:06
Home ▸ System ▸ Product Setup ▸ Oil ▸ Measured Oil Pressure			
Oil Pressure In Use	84.76	psig	
Oil Pressure 4mA Scale Value	0	psig	
Oil Pressure 20mA Scale Value	200	psig	
Oil Pressure Operating Status	Measured		
Oil Pressure Automatically Recover to Measured	Yes		
Oil Pressure Override Value	120	psig	
Oil Pressure Default Value	45	psig	
Oil Pressure Transmitter Value with Bias	84.76	psig	
Oil Pressure Bias Value	0	psig	
Oil Pressure Transmitter Value No Bias	84.76	psig	
Oil Pressure - Raw Transmitter Value	10.78	mA	
Oil Pressure Low Alarm Limit	-99999999	psig	
Oil Pressure High Alarm Limit	99999999	psig	
Oil Pressure User 1 Low Alarm Limit	-99999999	psig	
Oil Pressure User 1 High Alarm Limit	99999999	psig	
Oil Pressure User 2 Low Alarm Limit	-99999999	psig	
Oil Pressure User 2 High Alarm Limit	99999999	psig	
Low Input Fail Point	3.5	mA	
High Input Fail Point	20.5	mA	

If the system has a measured line pressure configured (see [section 8.2 I/O Assignments – Analog Inputs](#)), the settings menu will show an item for Measured Line Pressure. If no measured oil line pressure is configured, then the Local Atmospheric Pressure is used.

Display points associated with the Measured Line Pressure are shown on the previous page.

Oil Pressure In Use	This display point shows the pressure being used in the calculations, FWA & reports. This may be a live value, a manual override value or a (fail-over) default.	
Oil Pressure 4mA Scale Value	This point indicates the pressure represented by 4mA. Clicking the line opens the dialog box allowing an alternative pressure to be input.	
Oil Pressure 20mA Scale Value	This point indicates the pressure represented by 20mA. Clicking the line opens the dialog box allowing an different pressure to be input.	
Oil Pressure Operating 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.	
	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 Oil Pressure Default value .
Oil Pressure Automatically Recover to Measured	Pressure 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.	
Oil Pressure Override Value	This is the value used when Pressure Operating Status has been set to Always Override.	
Oil Pressure Default Value	This is the value used when the Pressure Operating Status has been set to Use Default on Failure, and the measured value is NOT between the low and high Input Fail Points.	
Oil Pressure Transmitter Value with Bias	This is the sum of the Oil Pressure Transmitter Value and the associated Bias Value.	
Oil Pressure 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.	

<i>Oil Pressure Transmitter Value (No Bias)</i>	This point displays the live measured Pressure value. This item cannot be edited.
<i>Oil Pressure - Raw Transmitter Value</i>	This shows the instantaneous current flow from the 4-20mA Transmitter.
<i>Oil Pressure Low Alarm Limit</i>	This point shows the currently configured Low Alarm limit. If the measured Pressure goes below the configured value, the Low Pressure 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 Pressure Alarm will ever be raised.
<i>Oil Pressure High Alarm Limit</i>	This point shows the currently configured High Alarm limit. If the measured Pressure goes above the configured value, the High Pressure Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value. If an impossibly high default value is used, no High Pressure Alarm will ever be raised.
<i>Oil Pressure User 1 Low Alarm Limit</i>	If the <i>Oil Pressure In Use</i> goes below the User 1 Low Alarm Limit, the User 1 Alarm will be set.
<i>Oil Pressure User 1 High Alarm Limit</i>	If the <i>Oil Pressure In Use</i> goes above the User 1 High Alarm Limit, the User 1 Alarm will be set.
<i>Oil Pressure User 2 Low Alarm Limit</i>	If the <i>Oil Pressure In Use</i> goes below the User 2 Low Alarm Limit, the User 2 Alarm will be set.
<i>Oil Pressure User 2 High Alarm Limit</i>	If the <i>Oil Pressure In Use</i> goes above the User 2 High Alarm Limit, the User 2 Alarm will be set.
<i>Low Input Fail Point</i>	If the Measured Input live value goes below the Low Input Fail Point and the Pressure Operating Mode is set to Use Default on Failure, then the Pressure in Use will be the fail-over Default Pressure. As standard, this value will be 3.5mA. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.
<i>High Input Fail Point</i>	If the Measured Input live value goes above the High Input Fail Point and the Pressure Operating Mode is set to Use Default on Failure, then the Pressure in Use will be the fail-over Default Pressure. The High Input Fail Point default value is 20.5mA. Clicking the line opens the Edit Value dialog box, allowing the user to input a different value.

6.1.4 Monitor S&W

If the system has a Measured S&W and this has been configured (see section [#8.2 I/O Assignments – Analog Inputs](#)), then the settings menu will show an item for Measured S&W.

LACT MicroCube - Metering		ALARM	11/22/2016 05:15:59
Home ▸ System ▸ Product Setup ▸ Oil ▸ Monitor S&W			
S&W In Use	3.416 %		
S&W 4mA Scale Value	0 %		
S&W 20mA Scale Value	8 %		
S&W Operating Status	Measured		
S&W Automatically Recover to Measured	Yes		
S&W Override Value	0.2 %		
S&W Default Value	0.45 %		
S&W Transmitter Value with Bias	3.416 %		
S&W Bias Value	0 %		
S&W Transmitter Value No Bias	3.416 %		
S&W - Raw Transmitter Value	10.83 mA		
S&W Low Alarm Limit	-99999999 %		
S&W High Alarm Limit	5 %		
S&W User 1 Low Alarm Limit	-99999999 %		
S&W User 1 High Alarm Limit	99999999 %		
S&W User 2 Low Alarm Limit	-99999999 %		
S&W User 2 High Alarm Limit	99999999 %		
Low Input Fail Point	3.5 mA		
High Input Fail Point	20.5 mA		

The Data Points associated with the Measured S&W are:

S&W In Use	This display point shows the S&W value used in the calculations, FWA & reports. This may be a live value, a manual override value or a (fail-over) default.	
S&W 4mA Scale Value	This point indicates the S&W represented by 4mA. Clicking the line opens the dialog box allowing an alternative S&W value to be input.	
S&W 20mA Scale Value	This point indicates the S&W represented by 20mA. Clicking the line opens the dialog box allowing an different S&W value to be input.	
S&W Operating 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.	
	Always Measured	Uses the calculated value from the measured input regardless of it being within acceptable limits or not.
	Always Override	The In Use values 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.
S&W Automatically Recover to Measured	S&W 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.	
S&W Override Value	This is the value used when S&W Operating Status has been set to Always Override.	
S&W Default Value	This is the value used when the S&W Operating Status has been set to Use Default on Failure, and the measured value is NOT between the low and high Input Fail Points.	
S&W Transmitter Value with Bias	This is the sum of the S&W Transmitter Value and the associated Bias Value.	
S&W 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.	
S&W Transmitter Value (No Bias)	This point displays the live measured S&W value. This item cannot be edited.	
S&W - Raw Transmitter Value	This shows the instantaneous current flow from the 4-20mA Transmitter.	

<i>S&W Low Alarm Limit</i>	This point shows the currently configured Low Alarm limit. If the measured S&W goes below the configured value, the Low S&W 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 value is used, no S&W Low Alarm will ever be raised.
<i>S&W High Alarm Limit</i>	This point shows the currently configured High Alarm limit. If the measured S&W goes above the configured value, the High S&W Alarm will be raised. Click line to open the Edit Value dialog box. The default value for this is set to 5%. If an impossibly high value is used, no S&W High Alarm will ever be raised
<i>S&W User 1 Low Alarm Limit</i>	If the <i>S&W In Use</i> goes below the User 1 Low Alarm Limit, the User 1 Alarm will be set.
<i>S&W User 1 High Alarm Limit</i>	If the <i>S&W In Use</i> goes above the User 1 High Alarm Limit, the User 1 Alarm will be set.
<i>S&W User 2 Low Alarm Limit</i>	If the <i>S&W In Use</i> goes below the User 2 Low Alarm Limit, the User 2 Alarm will be set.
<i>S&W User 2 High Alarm Limit</i>	If the <i>S&W In Use</i> goes above the User 2 High Alarm Limit, the User 2 Alarm will be set.
<i>Low Input Fail Point</i>	If the Measured Input live value goes below the Low Input Fail Point and the S&W Operating Mode is set to Use Default on Failure, the S&W in use will be the fail-over Default S&W Value. As standard, this value will be 3.5mA. Click line to open the Edit Value dialog box.
<i>High Input Fail Point</i>	If the Measured Input live value goes above the High Input Fail Point and the S&W Operating Mode is set to Use Default on Failure, the S&W in Use will be the fail-over Default S&W value. The High Input Fail Point default value is 20.5mA. Click line to open the Edit Value dialog box.

The S&W monitor is used to control the Diverter Valve, in LACT mode. If the measured S&W value exceeds the ***S&W High Alarm Limit*** then the Diverter Valve will set into the recirculation position, and the Digital Output associated with the ***S&W High Output*** will be turned on. See [Section 8.1 I/O Assignments – Digital Inputs & Outputs](#) for further information.

The ***S&W High Output*** is allocated to Digital Output 3 by default.

6.1.5 Sampler Pulse

LACT MicroCube - Metering ALARM 11/22/2016 10:10:36

Home ▸ System ▸ Product Setup ▸ Oil ▸ Sampler Pulse

Pulse Out 1 - Output Selection Indicated Volume

Pulse Out 1 - Quantity per Pulse 1 bbls

Pulse Out 1 - Pulse Width 1000 ms

Pulse Out 1 - Reset [Reset](#)

<i>Pulse Out 1 - Output Selection</i>	Pulse Out 1 is always driven from the Indicated Volume (IV) totalization. This is for information only and is not changeable.
<i>Pulse Out 1 - Quantity per Pulse</i>	Assuming that the volume unit has been set to barrels, then the default is one pulse per barrel. Clicking on the line opens the Edit Value box and a new value can be input. If 10 is input, the controller will generate one Pulse for every ten barrels loaded. If faster sampling was needed, for example, two sample pulses for each barrel, then 0.5 should be entered as the Quantity per Pulse.
<i>Pulse Out 1 - Pulse Width</i>	This sets the minimum width of the pulse, both the On and Off periods, and thus the maximum repetition rate. The width of the pulse should be set to match the requirements of the sampler grab solenoid. By default, the output will be low until a whole barrel has been loaded. At this point, the output will go high, and stay high for one second (1000 ms). It will then go low again and stay low until a further barrel has been loaded. With the Pulse Out Pulse width set to 1000ms, the pulses will never be sent out any faster than once every two seconds, regardless of the flow rate.
<i>Pulse Out 1 - Reset</i>	During testing, if a very high Meter Pulse frequency is used or if a very small quantity per pulse has been configured, it is possible to build up a number of pulses waiting to be sent. This Reset button will clear any stored sampler pulses. This button should not be needed in normal operation.

<i>Line Number</i>	<i>bbls/Hour</i>	<i>bbls/Minute</i>	<i>bbls/Pulse</i>	<i>Pulse Width (ms)</i>	<i>On Time (Seconds)</i>	<i>Off Time (Seconds)</i>
1	50	0.83	1	1000	1	71
2	100	1.67	1	1000	1	35
3	240	4	1	1000	1	14
4	480	8	1	1000	1	6.5
5	1000	16.67	1	1000	1	2.6
6	1200	20	1	1000	1	2
7	1500	25	5	1000	1	10
8	60	1	0.1	2000	2	5

In the examples on line numbers 1 to 6 above, the Quantity per Pulse (bbls/Pulse) has been left as the default value, 1 and the Pulse Out Pulse width has also been left as the default, 1000 ms. As the flow rate increases, the time between sample pulses decreases. The sample system minimum time between pulse must be considered. If for example, the minimum time between pulses is 5 seconds, then you would be limited to 600bbls/Hour at 1 barrel per pulse. Line numbers 5 and 6, with a flow rate above 600bbls/Hour show the off times as on 2.6 seconds and 2 seconds respectively, so would not be compatible with this theoretical sample system.

If you needed to use higher flow rates, the number of pulse produced must be reduced.

Line number 7 shows the Quantity per Pulse (bbls/Pulse) has been set to 5, so only one pulse is produced for every 5 barrels measured, and even at 1500 bbls/hour, there would be 10 seconds off-time between pulses, and so would be compatible with our theoretical sample system.

NOTE: In normal operation, Pulse Output 2 is an exact copy of Pulse Output 1.

This can be useful to drive a counter or for additional redundancy. Normal operation is with simulation mode disabled, See [Section 8.8 Simulation](#) for configuration of the simulation function.

6.1.6 Totals (Oil)

The Totals menu has access to the live cumulatives and Non-Resettable totals for IV, GOV and GSV, as well as the period (both daily & monthly) current period opening, previous period opening & closing cumulatives and the previous period IV, GOV, GSV totals.

These are indicated in a Live Report format, as shown below.

MOB LACT MicroCube #23		ALARM		04/12/2018 08:38:39	
Home		System		Product Setup	
Oil		Totals			
OIL TOTALS/ACCUMULATORS					
	Unit:	Non-Resettable:	Cumulative:		
IV:	bbbs	4529.43	4529.43		
GOV:	bbbs	4529.43	4529.43		
GSV:	bbbs	4523.54	4523.54		
	Unit:	Current Day:	Previous Day Start:	Previous Day:	Previous Day End:
IV:	bbbs	1518.17	896.51	2114.75	3011.26
GOV:	bbbs	1518.17	896.51	2114.75	3011.26
GSV:	bbbs	1509.96	897.2	2116.38	3013.58
	Unit:	Current Month:	Previous Month Start:	Previous Month:	Previous Month End:
IV:	bbbs	4529.43	0	0	0
GOV:	bbbs	4529.43	0	0	0
GSV:	bbbs	4523.54	0	0	0
	Unit:	Current Sampler Can Pull:	Previous Sampler Can Pull Start:	Previous Sampler Can Pull:	Previous Sampler Can Pull End:
IV:	bbbs	4529.43	0	0	0
GOV:	bbbs	4529.43	0	0	0
GSV:	bbbs	4523.54	0	0	0

In addition, similar information is available for the batch totals, which are triggered by the sampler can pull.

6.2 Water - Menu for Water Measurement

This section is used to set the parameters which are specific to the Produced Water measurement.

The screenshot shows the top navigation bar with 'LACT MicroCube - Metering', 'ALARM', and the date '11/22/2016 10:16:25'. Below the navigation bar is a breadcrumb trail: 'Home > System > Product Setup > Water'. The main content area contains three menu items: 'Water Flow Meter', 'Measured Water Temperature', and 'Totals', each with a right-pointing arrow.

Taking these in order:

6.2.1 Water Flow Meter

The screenshot shows the configuration page for the Water Flow Meter. The breadcrumb trail is 'Home > System > Product Setup > Water > Water Flow Meter'. The page contains a table of configuration parameters:

Water Flow Meter K Factor	1000.00 pulses/bbl	⚙️
Water Meter Factor	1.0000	⚙️
Water Flow Meter Serial Number	123ABC	⚙️
Water Flow Meter Size	2"	⚙️
Water Flow Meter Model	Smiths Ultra	⚙️
Water Flow Meter ID	Water#1	⚙️
Water Flow Meter Manufacturer	FMC	⚙️
Water Indicated Volume Flow Rate	1800.1 bbls/hr	

The water flow meter settings are exactly the same as for the oil meter, except for the names, so refer to [Section 6.1.1 Oil Flow Meter](#) for additional information.

6.2.2 Measured Water Temperature

LACT MicroCube - Metering

ALARM

11/22/2016 10:19:35

Home ▸ System ▸ Product Setup ▸ Water ▸ Measured Water Temperature		
Water Temperature In Use	83.7 °F	
Water Temperature 4mA Scale Value	32 °F	
Water Temperature 20mA Scale Value	212 °F	
Water Temperature Operating Status	Measured	
Water Temperature Automatically Recover to Measured	Yes	
Water Temperature Override Value	55 °F	
Water Temperature Default Value	60 °F	
Water Temperature Transmitter Value with Bias	83.7 °F	
Water Temperature Bias Value	0 °F	
Water Temperature Transmitter Value No Bias	83.7 °F	
Water Temperature - Raw Transmitter Value	8.60 mA	
Water Temperature Low Alarm Limit	-99999999 °F	
Water Temperature High Alarm Limit	99999999 °F	
Water Temperature User 1 Low Alarm Limit	-99999999 °F	
Water Temperature User 1 High Alarm Limit	99999999 °F	
Water Temperature User 2 Low Alarm Limit	-99999999 °F	
Water Temperature User 2 High Alarm Limit	99999999 °F	
Low Input Fail Point	3.5 mA	
High Input Fail Point	20.5 mA	
Low Thermistor Input Fail Point	3.5 mA	
High Thermistor Input Fail Point	20.5 mA	

In the example screen shown above, the water temperature has been configured to use a RTD device, so the fail points are shown in terms of resistance (in Ohms) and, as it is a direct measurement, no 4mA or 20mA scaling factors are required.

The settings for the measured water temperature are exactly the same as for the Oil meter, so refer to [Section 6.1.2 Measured Oil Temperature \(or Oil Temperature\)](#) for the detailed description.

6.2.3 Totals (Produced Water)

The Produced Water totals are similar to the Oil totals, except that there is an additional total of Net Standard Volume (NSV) in addition to the IV and GOV water totals. Since the water movement is not tied to the Sampler Can Pull activity, only the Cumulatives, Daily and Monthly period totals data is generated.

MOB LACT MicroCube #23		ALARM		04/12/2018 09:00:37	
Home		System		Product Setup	
Water		Totals			
WATER TOTALS/ACCUMULATORS					
	Unit:	Non-Resettable:	Cumulative:		
IV:	bbls	0.00	0.00		
GOV:	bbls	---	0.00		
NSV:	bbls	---	0.00		
	Unit:	Current Day:	Previous Day Start:	Previous Day:	Previous Day End:
IV:	bbls	0.00	0.00	0.00	0.00
GOV:	bbls	0.00	0.00	0.00	0.00
NSV:	bbls	0.00	0.00	0.00	0.00
	Unit:	Current Month:	Previous Month Start:	Previous Month:	Previous Month End:
IV:	bbls	0.00	0.00	0.00	0.00
GOV:	bbls	0.00	0.00	0.00	0.00
NSV:	bbls	0.00	0.00	0.00	0.00

7 Stage 4 of 5: Configuring the Measurement Units

There are 5 measurement units that can be configured, Volume Unit, Flow Rate Time Unit, Temperature Unit, Gravity Unit and the K Factor Unit.

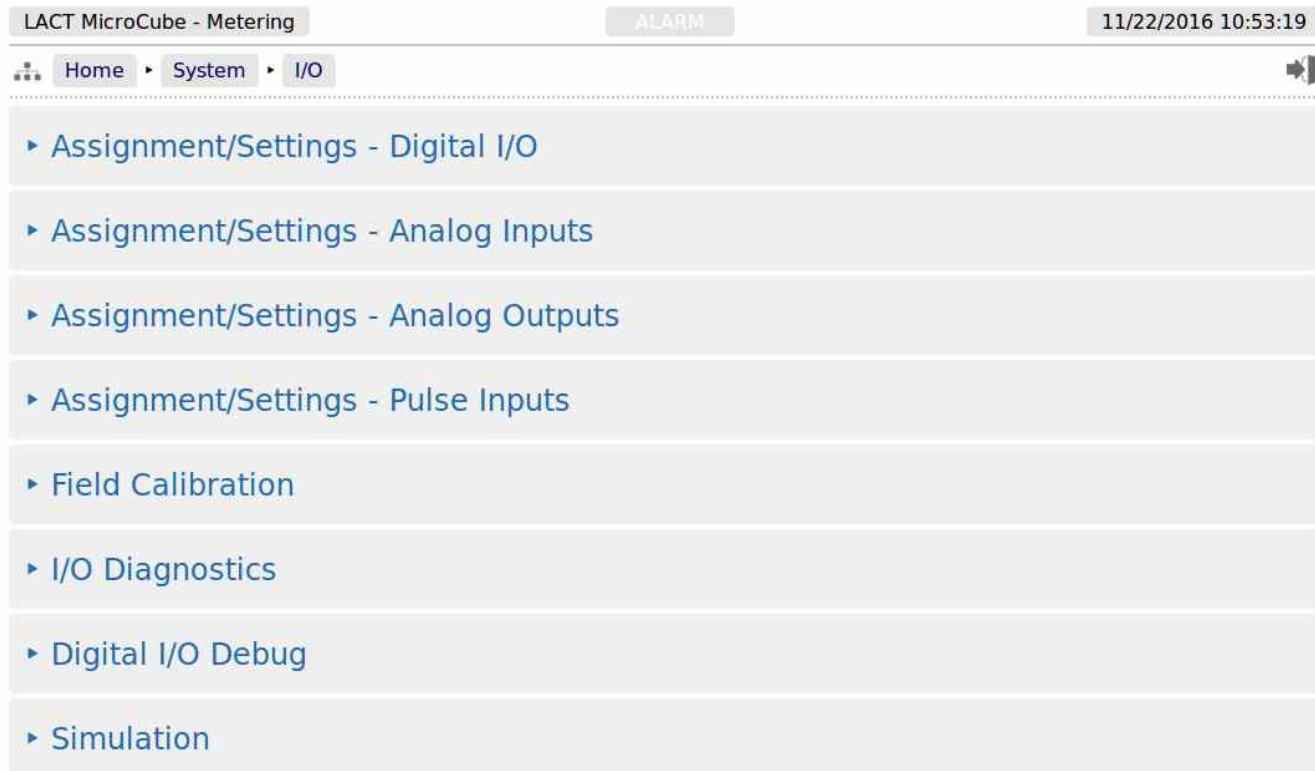
LACT MicroCube - Metering
ALARM
11/22/2016 10:51:52

Home > System > Measurement Units

Volume Unit	bbls	
Mass Unit	lbs	
Flow Rate Time Unit	hr	
Temperature Unit	°F	
Pressure Unit	psig	
Absolute Pressure Unit	psia	
Gravity Unit	°API	
K Factor Unit	pulses/bbl	

<i>Volume Unit</i>	This can be Liters, Cubic Meters (m ³) US Gallons, US Oil Barrels (bbls), 100 Cubic Feet (CCF) or 1000 Cubic Feet (MCF).
<i>Mass Unit</i>	This is for information. Mass will always be in pounds (lbs).
<i>Flow Rate Time Unit</i>	This can be set to seconds (s), minutes (min), hours (hr) or days (d).
<i>Temperature Unit</i>	This can be set to degrees Centigrade (°C) or degrees Fahrenheit (°F).
<i>Pressure Unit</i>	This is for information. Pressure is always psig.
<i>Absolute Pressure Unit</i>	This is for information. Absolute pressure is always shown as psia.
<i>Gravity Unit</i>	This can be °API, lbs/US gallon, lbs/barrel or grams per cubic centimeter (g/cc).
<i>K Factor Unit</i>	This can be pulses/liter, pulses/m ³ , pulses/bbl or pulses/US Gallon.

8 Stage 5 of 5 : Matching the I/O to the P&ID



There are eight options from this menu screen. The first 3 options are to configure the settings for the Digital Inputs & Outputs, the Analog Inputs and Analog Outputs.

The fourth line, Assignment/Settings - Pulse Inputs, is purely for information, no changes allowed.

The fifth entry Field Calibration allows two-point field calibration (this feature is in addition to the one point bias adjustment).

The sixth entry, I/O Diagnostics, is a diagnostic page which can be used to ensure the assignments have been correctly selected.

The seventh entry, Digital I/O Debug, is an 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.

The last entry is Simulation. Full description of all these menus is shown on the next page.

8.1 I/O Assignments – Digital Inputs & Outputs

MOB LACT MicroCube #23		ALARM	04/12/2018 09:20:53
Home > System > I/O > Assignment/Settings - Digital I/O			
Ground Input (Required)	Digital Input 1		
Strainer Blocked Input	Digital Input 2		
Metering Tech Mode Input	Digital Input 3		
Snapshot Report Trigger Input	Digital Input 4		
AO Report Input	Digital Input 9		
User 1 Alarms	Not Routed		
User 2 Alarms	Not Routed		
Diverter Valve Permissive Output	Digital Output 1		
Pump Permissive Output	Digital Output 2		
S&W High Output	Digital Output 3		

NOTE: The LACT-Pro® 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® 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.
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 ▶ RTU Setup ▶ Comms ▶ Report/Printer Routing .
AO Report Input	This digital input is intended to be wired to a switch. When the BLM Authorized Officer wishes to inspect certain critical data on the LACT-Pro device, this is easily accomplished by setting this switch to on. The Idle screen, Loading screens or Metering Technician menus will be over-ridden and the AO report displayed on the local panel.
User 1 Alarms	If any User 1 High alarms are exceeded, or the value is lower than the User 1 Low alarms, then this Digital Output will become active.
User 2 Alarms	As for User 1 Alarms, but for the second user alarm group, User 2 Alarms.
Diverter Valve Permissive Output	If the answer to the question “Does the site have a divert valve for recirculation?” was No, then click this line, and select the Not Routed Option. The Maximum Recirculation Time, the Max Recirculation Cycles and the Start Up Divert Time lines will disappear. If the answer was Yes, then you can leave the signal assigned to Digital Output 1, or reassign it.
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.
S&W High Output	If an S&W High (Bad Oil) signal is needed, it is assigned to Digital Output 3 by default. This can be assigned to a different Digital Output, or suppress altogether if required. Alternatively, the Output can be left unconnected if not required.

8.1.1 Diverter Valve Settings

NOTE: The diverter valve is only operational in LACT Mode.

The diverter valve is controlled by two independent mechanisms.

Firstly, there is a time delay from when the charge pump is initially energized at the start of a load until the diverter valve is moved from the recirculate position to truck loading position. This is to allow any free water that may have settled out in the LACT skid to be swept out.

The time delay is the **Start Up Divert Time** described above.

The second mechanism which controls the diverter valve is the S&W Monitor. If the **S&W In Use** value exceeds the **S&W High Alarm Limit**, "Bad Oil" is flagged to the system.

The **S&W High Alarm Limit** is configured on the [Home ▸ System ▸ Oil ▸ Monitor S&W](#) page.

The result of "Bad Oil" being detected triggers the recirculation, and the maximum recirculation time (in seconds) and the number of recirculation events are programmable as shown above.

<i>Event and status</i>	<i>Charge Pump permissive Output</i>	<i>Diverter Valve Output</i>	<i>S&W High Output</i>
Tank-Pro powered off	Pump Off	OFF (Recirculate)	Off
Powered On, but not loading	Pump Off	OFF (Recirculate)	Off
Start of load (during Start Up Divert Time)	Pump ON	OFF (Recirculate)	Off
During Load, after divert time	Pump ON	ON (Loading)	Off
During a Load, S&W exceeds High Alarm Limit	Pump ON	OFF (Recirculate)	ON
During a load the S&W has been too high for too long, or too many recirculation cycles have happened (hence load aborted)	Pump Off	OFF (Recirculate)	Off

8.2 I/O Assignments – Analog Inputs

LACT MicroCube - Metering		ALARM	11/22/2016 10:55:51
Home > System > I/O > Assignment/Settings - Analog Inputs			
Measured Oil Temperature Source	Analog Input 5 / RTD 2 / Thermistor		
Measured Oil Temperature Type	4-20 mA		
Measured Water Temperature Source	Analog Input 5 / RTD 2 / Thermistor		
Measured Water Temperature Type	4-20 mA		
Measured Oil Pressure Source	Analog Input 1		
Monitor S&W Source	Analog Input 2		
Auxiliary Input 1 Source	Disabled		
Auxiliary Input 2 Source	Disabled		
Auxiliary Input 3 Source	Analog Input 3		
▶ Auxiliary Input 3 Setup			
Auxiliary Input 4 Source	Analog Input 4		
▶ Auxiliary Input 4 Setup			
Auxiliary Input 5 Source	Disabled		
Auxiliary Input 6 Source	Disabled		

NOTE: The LACT-Pro® 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](#).

<p>Measured Oil Temperature Source</p>	<p>The LACT-Pro® application can use a live line temperature with an optional Default (fail-over) value in the case of a transmitter failure, a user (manual) Override value or a driver entered average load temperature for the Oil Temperature measurement.</p> <p>In this example, the unit is configured assuming that line temperature is being measured, and Analog Input 6 has been assigned and configured for a thermistor probe.</p> <p>Clicking this line allows the user to assign different Analog Inputs, or to Disable the Measured Temperature Source, if an alternative method is being used.</p> <p>It should be noted that 4-wire 100 Ohm Platinum RTD devices can only be used with Analog Input 6 or Analog Input 5. For a thermistor probe, a P554 Thermistor Interface Module must be used with Analog Input 5 or 6.</p> <p>If a Measured Temperature Source has been selected as 4-20mA, then the Measured Temperature parameters will also need to be set, see Section 6.1.2. Measured Oil Temperature (or Oil Temperature).</p>
<p>Measured Oil Temperature Type</p>	<p>The live temperature may be from a Temperature Transmitter, a 4-wire RTD device or a thermistor probe. These 3 options are selected as 4-20mA, RTD or Thermistor.</p>
<p>Measured Water Temperature Source</p>	<p>If in the Home ▶ System ▶ Initial Setup menu, the Water Measured parameter has been set to Yes, this option will be visible. This line is configured as for Measured Oil Temperature above, except that Analog Input 5 is selected by default.</p>
<p>Measured Water Temperature Type</p>	<p>This option is the similar to the Measured Oil Temperature Type above, but pertaining to the water measurement.</p>
<p>Measured Oil Pressure Source</p>	<p>The LACT-Pro® application can use either a live line Pressure Source, with an optional default (fail-over) value in the case of a transmitter failure or a user Override value. The default has a live measured pressure, and Analog Input 1 is assigned to measure this input. Clicking this line, the assignment can be changed to another Analog Input channel, or disabled, if a measured value is not used.</p> <p>If a Measured Pressure Source has been selected, then the Measured Pressure parameters will also need to be set, see Section 6.1.3. Measured Oil (Line) Pressure .</p>
<p>Monitor S&W Source</p>	<p>The LACT-Pro® application can use either live Sediment and Water reading, with an optional fail-over value in the case of an instrument failure, a user Override value or a driver entered value. The application defaults to live S&W measurement, and Analog Input 2 is assigned to measure this input. Clicking this line the assignment can be changed to another Analog Input channel, or Disable, if a measured value is not used.</p> <p>If a Measured S&W has been selected, then the Measured S&W parameters will also need to be set, see Section 6.1.4. Monitor S&W.</p>

<p>Auxiliary Input 1 Source</p>	<p>An Auxiliary Input is an Analog Input that is not used directly by the LACT-Pro® application, but allows unused Analog Inputs to be used as a data logger, or already allocated Analog Inputs to be scaled differently.</p> <p>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 inbuilt trending feature. Live and historical data can be retrieved over the XML data link. Live data is also available via Modbus.</p> <p>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.</p> <p>In this example, Auxiliary Input 1 Source is disabled.</p>
<p>Auxiliary Input 2 Source</p>	<p>As Auxiliary Input 1 above, but in this example, Auxiliary Input 2 Source is not configured (disabled).</p>
<p>Auxiliary Input 3 Source</p>	<p>As Auxiliary Input 1 above, but in this example, Auxiliary Input 3 Source is connected to unused Analog Input 3.</p>
<p>Auxiliary Input 3 Setup</p>	<p>This sub-menu takes you to the setup page for Auxiliary Input 3, see below.</p>
<p>Auxiliary Input 4 Source</p>	<p>As Auxiliary Input 1 above, but in the screenshot above, Auxiliary Input 4 Source is connected to the Analog Input 6, so will show the raw information from the thermistor Interface, rather than the temperature, for diagnostic purposes.</p>
<p>Auxiliary Input 4 Setup</p>	<p>This sub-menu takes you to the setup page for Auxiliary Input 4</p>
<p>Auxiliary Input 5 Source</p>	<p>As Auxiliary Input 1 above, but not configured in the screenshot above.</p>
<p>Auxiliary Input 6 Source</p>	<p>As Auxiliary Input 1 above, but not configured in the screenshot above.</p>

8.2.1 Auxiliary Input Setup Menu

LACT MicroCube - Metering ALARM 11/22/2016 11:11:51

Home ▶ System ▶ I/O ▶ Assignment/Settings - Analog Inputs ▶ Auxiliary Input 3 Setup

Auxiliary Input 3 - Description	ACME Water Cut Meter
Auxiliary Input 3 - In Use	52.6028 psig
Auxiliary Input 3 - 4mA Scale	0.0000 psig
Auxiliary Input 3 - 20mA Scale	100.0000 psig
Auxiliary Input 3 - Unit	psig
Auxiliary Input 3 Transmitter Value With Bias	52.6028 psig
Auxiliary Input 3 - Bias	0.0000 psig
Auxiliary Input 3 Transmitter Value No Bias	52.6028 psig
Auxiliary Input 3 - Raw Transmitter Value	12.4165 mA

This Auxiliary input is being used to test another vendors water cut meter. The performance of the alternative meter is monitored by using the information from the data logger, either from the Trending Display, or by downloading the information from the data logger.

Auxiliary Input "X" - Description	This field allows the Auxiliary Input to be named. The name is then visible on the Home ▶ System menu ▶ I/O ▶ I/O Diagnostics report page.
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" - 4mA Scale	This field sets the 4mA scaling value. It is recommended to set the Engineering Units (shown below) first, then set the scaling.
Auxiliary Input "X" - 20mA Scale	This field sets the 20mA 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.

<i>Auxiliary Input "X" - mA</i>	This field shows the equivalent current for the associated Analog Input channel. This is for information only and cannot be changed.
<i>Auxiliary Input "X" Transmitter Value with Bias</i>	This is the sum of the S&W Transmitter Value and the associated Bias Value. This is for information only and cannot be changed.
<i>Auxiliary Input "X" Bias Value</i>	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.
<i>Auxiliary Input "X" Transmitter Value (No Bias)</i>	This point displays the live measured engineering value, with the units and scaling factors applied. This item cannot be edited.

8.3 Configuring Analog Outputs

The LACT-Pro® controller has two independent Analog outputs. Either can be set to show one of the following five options, together with the scaling values needed.

- Meter Pressure
- Meter Temperature
- Indicated Volume Flow Rate
- Gross Observed Volume Flow Rate
- S&W

NOTE: The Analog Outputs are always driven. You can change what they are driven by, but cannot disable them. If Analog Outputs are not required, do not connect anything to the Analog Output terminals.

The screenshot shows the configuration page for Analog Outputs. At the top, there is a header with 'LACT MicroCube - Metering', an 'ALARM' indicator, and the date/time '11/22/2016 10:56:48'. Below the header is a breadcrumb trail: 'Home > System > I/O > Assignment/Settings - Analog Outputs'. The main content area is a table with six rows, each representing a different output configuration. Each row has a gear icon on the right side for editing.

Configuration Item	Selected Value
Analog Out 1 Output Selection	Indicated Volume Flow Rate
Analog Out 1 4mA Scale	0
Analog Out 1 20mA Scale	10000
Analog Out 2 Output Selection	S&W
Analog Out 2 4mA Scale	0
Analog Out 2 20mA Scale	10

Analog Out 1 Output Selection	Clicking the Analog Out 1 Output Selection line will open the selection dialog box, and any one of the five options listed can be selected. The options are: Meter Pressure, Meter Temperature, Indicated Volume Flow Rate , Gross Observed Volume Flow Rate or S&W. The default is shown in bold.
Analog Out 1 4mA Scale	This is the value of the selected output variable required drive the output to 4mA.
Analog Out 1 20mA Scale	This is the value of the selected output variable required drive the output to 20mA. Any value selected between the low and high scale value will be driven out of the Analog output, proportionally
Analog Out 2 Output Selection	Clicking the Analog Out 2 Output Selection line will open the selection dialog box, and any one of the five options listed can be selected. The options are: Meter Pressure, Meter Temperature, Indicated Volume Flow Rate, Gross Observed Volume Flow Rate or S&W . The default is shown in bold.

Analog Out 2 4mA Scale	This is the value of the selected output variable required drive the output to 4mA.
Analog Out 2 20mA Scale	This is the value of the selected output variable required drive the output to 20mA. Any value selected between the low and high scale value will be driven out of the Analog output, proportionally

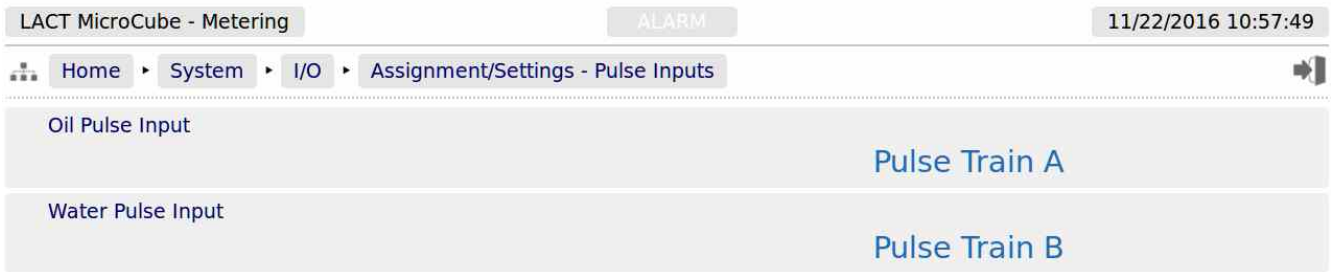
Example:

Assume that in the Units Setting page, the Volume Units has been chosen as bbls, and the Flow Rate Time Unit as Hours (hr). Also assume that the **Analog Out 1 Output Selection** is Indicated Flow Rate and **Analog Out 1 4mA Scale** is set to 0 and the **Analog Out 1 20mA Scale** is set to 10,000.

Example Results:

Less than 4mA indicates a fault. This could be negative flow, a wiring fault or the controller is off
 4.0mA represents No Flow
 6.0mA represents flow rate of 1,250 bbls/hour
 8.0mA represents flow rate of 2,500 bbls/hour
 12.0mA represents flow rate of 5,000 bbls/hour
 16.0mA represents flow rate of 7,500 bbls/hour
 20.0mA represents flow rate of 10,000 bbls/hour
 Over 20mA indicates a flow rate in excess of 10,000 bbls/hour

8.4 Configuring the Pulse Inputs



Oil Pulse Input	This is not configurable, but indicates which input is in use.
Water Pulse Input	This is not configurable, but indicates which input is in use.

Note: If water is not being measured, see:

[Home](#) > [System](#) > [Product Setup](#), Water Measured? is No

Then the Oil Meter pulses can be connected to either Pulse Train A input or Pulse Train B input, but not BOTH.

8.5 Field Calibration

The LACT-Pro® controller has very stable, high resolution Analog Input and RTD measurement circuitry, which are factory calibrated to a high standard. This 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 6.1.3. Measured Oil \(Line\) Pressure](#), we can see that the Pressure 4mA Scale Value was set to 0 psig and the Pressure 20mA Scale Value 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.

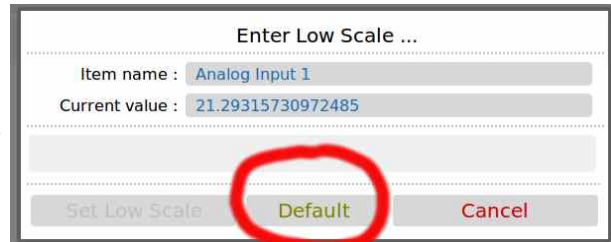


LACT MicroCube - Metering		ALARM	11/22/2016 12:17:08
Home ▶ System ▶ I/O ▶ Field Calibration			
Analog Input 1	19.9375543308721		
Analog Input 2	(Default) 10.8374030066887		
Analog Input 3	(Default) 12.4164531071523		
Analog Input 4	(Default) 10.5472745745472		
Analog Input 5	(Default) 8.59662123580521		
Analog Input 6	(Default) 0.481820510264499		

NOTE: Unless logged in at Technician level, the edit icons will be shown in gray, and the Analog Inputs cannot be edited.

You can see that **Analog Input 2** through to **Analog Input 6**, show (Default) at the beginning of the line. This shows 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.



Enter Low Scale ...

Item name : Analog Input 1

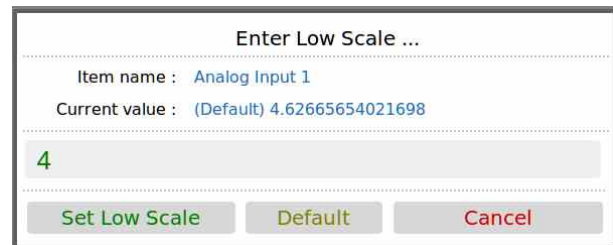
Current value : 21.29315730972485

Set Low Scale Default Cancel

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, and the reading shown as the current value in the Enter Low Scale dialog box should be around 4mA. 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.



Enter Low Scale ...

Item name : Analog Input 1

Current value : (Default) 4.62665654021698

4

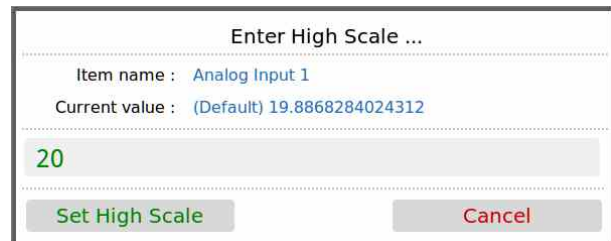
Set Low Scale Default Cancel

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

The dialog box now prompts you to enter the High Scale value.

Step 3. Now load the dead weight tester until pressure is at full scale, 250 psi in this example.

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



Enter High Scale ...

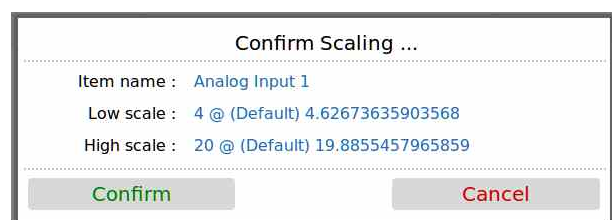
Item name : Analog Input 1

Current value : (Default) 19.8868284024312

20

Set High Scale Cancel

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.



Confirm Scaling ...

Item name : Analog Input 1

Low scale : 4 @ (Default) 4.62673635903568

High scale : 20 @ (Default) 19.8855457965859

Confirm Cancel

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.

8.6 I/O Diagnostics

LACT MicroCube ALARM 2015/02/23 08:06:39

Home ▸ System ▸ I/O ▸ I/O Diagnostics ↓ 🖨️ ↗️

I/O Diagnostics

	Source	Raw Value	Low Scale	High Scale	Calculated Value	Mode	In Use Value
Pressure	Analog Input 1	19.75 mA	0.00	200.00	196.93	Measured	196.93 psig
Temperature	Analog Input 3	8.99 mA	0.0	200.0	62.4	Measured	62.4 °F
S&W Monitor	Analog Input 2	4.70 mA	0.000	8.000	0.352	Measured	0.352 %
Gravity	Disabled	mA0.00	700.00	1200.00	20.00	Not Applicable	20.00 °API

	Source	Value	Low Scale	High Scale	Current
Analog Output 1	Indicated Volume Flow Ra1	0	0	10000	4.00 mA
Analog Output 2	S&W	0.3523171E	0	10	4.56 mA

Meter Pulses	Counts	Frequency
	0	0.00 Hz

Digital Inputs				Digital Outputs			
	Source	Bit	Status		Source	Bit	Status
Ground Connection	Digital Input 1	1	Connected	Pump	Digital Output 2	0	Off
Strainer Blocked	Digital Input 2	0	Strainer OK	Diverter Valve	Digital Output 1	0	Recirculate
Metering Tech Mode	Digital Input 3	0	Driver Mode	S&W High	Digital Output 3	0	Off

End of Page

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® 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.

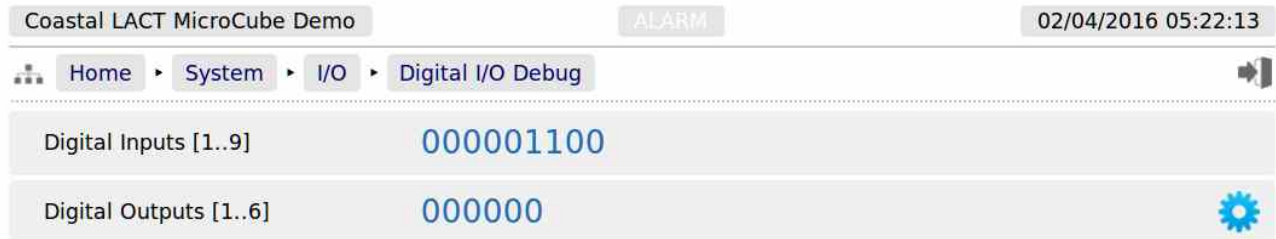


The Print icon indicates that the data on the screen can be printed, via the web printer configured on via [Home ▸ System ▸ RTU Setup ▸ Comms ▸ Report/Printer Routing](#).

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.

8.7 Digital I/O Debug

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



<p>Digital Inputs [1..9]</p>	<p>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.</p>
<p>Digital Outputs [1..6]</p>	<p>There are two aspects to the Digital outputs, a display and an override.</p> <p>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.</p> <p>If you click on the line, the following dialog box will be opened:-</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Item name : <input type="text" value="Digital Outputs [1..6]"/></p> <p>Current value : <input type="text" value="110000"/></p> <hr/> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout1</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout2</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout3</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout4</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout5</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Toggle Digout6</div> </div> <div style="text-align: right; margin-top: 10px;"> <div style="border: 1px solid #ccc; padding: 5px 20px; display: inline-block; color: red; font-weight: bold;">Cancel</div> </div> </div> <p>NOTE: Unless logged in at the Technician Level, Digital Outputs are not changeable.</p> <p>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.</p> <p style="text-align: center;"><u>Do NOT use or disclose Technician Level passwords without careful consideration.</u></p> <p>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.</p> <p>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.</p>

8.8 Simulation

For bench testing and demonstration purposes, a Meter Pulse simulation function has been built into the LACT-Pro® controller.

The simulation mode should normally be set as OFF, as this enables Pulse Output 2 to be an exact copy of Pulse Output 1. If enabled, Pulse Output Channel 2 generates a stream of pulses when the following conditions apply:

- a) The Charge Pump permissive is active, **and**
- b) The diverter valve is not in recirculation mode.

LACT MicroCube - Metering		ALARM	11/22/2016 12:26:45
Home ▸ System ▸ I/O ▸ Simulation			
Enable Simulation	Yes		⚙️
Simulation Rate	25 Hz		⚙️
Pulse Out 2 - Reset	Reset		
Output Mode	Output 0		
Pump State	Off		
Diverter Valve Position	Recirculate		

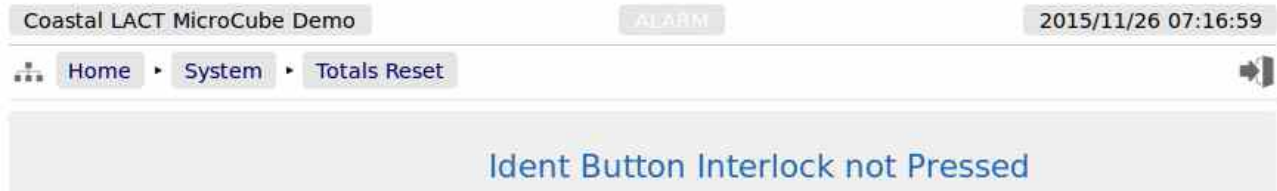
The simulated pulse rate is programmable in 8 steps between 10 Hz and 500 Hz.

NOTE: When this mode is enabled, an Alarm is raised, as Pulse Output 2 is no longer a copy of Pulse Output 1. However it will not affect the operation of the LACT-Pro® controller, if not connected.

8.9 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® 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® 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" message will be shown again.

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



NOTE1: This ends the setup of the LACT-Pro® 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. Additionally, printing a constants log generate a list of configured data points.

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.

[This ends the setup of the LACT-Pro® controller](#)

9 Reports

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

MOB LACT MicroCube #23 ALARM 04/12/2018 09:52:54

Home ▸ Reports ➔

- Bill Of Lading (Print Format)
- Bill Of Lading (TSV Format)
- Snapshot
- Daily Report
- Monthly Report
- Duplicate Report
- Metering Tech (Sampler Can Pull)
- Metering Tech (Oil Prove)
- Metering Tech (Water Prove)
- Metering Tech (Bias Adjust)
- Last 30 reports
- [Redacted]
- SD Card

9.1 Reports Calendar View

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

The screenshot displays the top portion of a web application interface. At the top left, there is a breadcrumb trail: "Home > Reports > Bill Of Lading". To the right of the breadcrumb, there are three status indicators: "LACT MicroCube", "ALARM", and a timestamp "02/02/2016 07:32:10". Below the breadcrumb, a blue header bar contains navigation arrows (left and right) and the year "2016" with a download icon. Underneath this header, six calendar grids are arranged in a 2x3 grid, representing the months from January to June. Each calendar grid has a blue header with the month name and a download icon. The days of the week are listed as "Mo", "Tu", "We", "Th", "Fr", "Sa", "Su". Dates are shown in a light gray typeface, while dates with reports are shown in a bold blue typeface. For example, in January, the 4th, 5th, 6th, 12th, 13th, 20th, and 27th are bolded. In February, the 1st is bolded. In March, no dates are bolded. In April, no dates are bolded. In May, the 1st is bolded. In June, no dates are bolded.

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 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 Day 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.

9.2 LACT-Pro Report Types

Bill Of Lading (Print Format)	This is the transaction ticket, formatted for printing. This report uses a narrow format suitable for ticket printers. This report is generated as each load is completed.
Bill Of Lading (TSV Format)	This report is laid out to produce a consistent TSV file output, when transmitted electronically. It can be printed or viewed, but note, duplicate information, for example units, such as bbls, which are duplicated on the print format report are not duplicated in the TSV formatted report
Snapshot	If a snapshot report has been generated it will be stored here, by time and date. Note: 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.
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 ▶ RTU Setup ▶ 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, as above. When the Application is started for the very first time, a Monthly Report will be generated, with the initial data.
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.
Metering Tech (Sampler Can Pull Report)	These reports are generated when the LACT-Pro® application is in Metering Technician mode (see section 8.1 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 (Oil Prove)	This report is generated when the Metering Technician has proved the LACT Oil Flow meter and has then updated the Meter Factor. It snapshots the time and the IV and GOV accumulators and displays the "As Found" old Meter Factor and the "As Left" new Meter Factor.
Metering Tech (Water Prove)	This report is generated when the Metering Technician has proved the LACT water meter. The report is similar to the Oil Prove report, except that the Net accumulator together with the temperature and temperature bias (offset) are also recorded.
Metering Tech (Bias Adjust)	This report records the As Left Bias (Offset) values applied to the analog measured values.
Last 30 reports	This shows the last 30 of all types of report 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:

The screenshot displays a web application interface for "Coastal LACT MicroCube Demo". At the top right, it shows "ALARM" and the timestamp "02/04/2016 10:13:53". A breadcrumb navigation bar includes "Home", "Reports", "Bill Of Lading", "2016", and "February 2". Below this is a blue header bar with "2016 February 2" and navigation arrows. A list of nine report timestamps follows, ranging from 07:57:59 to 08:00:59 on 02/02/2016.

Report Timestamp
02/02/2016 08:00:59
02/02/2016 08:00:37
02/02/2016 08:00:20
02/02/2016 08:00:02
02/02/2016 07:59:42
02/02/2016 07:59:18
02/02/2016 07:58:58
02/02/2016 07:58:21
02/02/2016 07:57:59

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.



BILL OF LADING
Original Print
Report Date/Time: 02/02/2016 08:00:59

Company Name:
Device ID: LACT MicroCube
Meter ID: ABC123
Comment:

Load Status: Load Ended

TRUCK LOADING DATA
Batch Sequence: 00001
Truck Ticket: 00019
Transaction #: 19
Run Ticket: 111
Driver ID: MM
Truck ID: NNN
Lease
Location:

ACCUMULATORS
Opening Time/Date: 02/02/2016 08:00:49
Opening IV Accumulator: 290.00 bbls
Opening GOV Accumulator: 290.00 bbls
Opening GSV Accumulator: 290.12 bbls
Closing Time/Date: 02/02/2016 08:00:59
Closing IV Accumulator: 310.00 bbls
Closing GOV Accumulator: 310.00 bbls
Closing GSV Accumulator: 310.13 bbls

LOADED VALUES
IV: 20.00 bbls
Meter Factor: 1.0000
GOV: 20.00 bbls
CCF: 1.00038
GSV: 20.01 bbls

DOWNLOAD ICON

PRINT ICON

LOGOUT ICON

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

Clicking the Printer icon, adjacent to the Download icon, will cause the file to be printed to the 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 Ctrl-P allows printing from a browser.

10 Logs and Trends

The Logs & Trends menu gives the user access to all the accessible data, except for the reports, which are described in [Section 9. Reports](#) shown above.

The screenshot shows the LACT-Pro interface. At the top, there are three status indicators: 'MOB LACT MicroCube #23', 'ALARM', and '04/12/2018 10:12:09'. Below this is a navigation bar with 'Home' and 'Logs & Trends'. The main content area displays a vertical list of menu items, each with a right-pointing arrow: 'Live Data', 'System Information', 'AO Data', 'Alarm Logs', 'Event Logs', 'Constants Log', and 'Trending'.

Live Data	This is a live report, that shows Oil Totals, Water Totals, Measured values, Operating Modes, and other information , see Section 10.1 below
System Information	Low level information regarding the hardware and software in use. See Section 10.2 below for more details.
AO Data	This menu shows the data compiled for the BLM's Authorized Officer. See Section 10.3 below , for more information
Alarm Logs	The comprehensive Alarm Logs are explained in Section 10.4 below .
Events Logs	There are 5 categories of events, detailed in Section 10.5 below .
Constants Log	The constant log is detailed in Section 10.6 below .
Trending	The MicroCube has an in-built data logger, which runs independently from the LACT Controller and flow measurement. The historical data from the logger can be downloaded for analysis, or the trends can be viewed graphically via the embedded web-server. Section 10.7, shown below , details the Trending display.

The LACT-Pro® application supports 3 different log files types: Alarms, Events (split into 5 sub-categories) and Constants.

In addition the LACT-Pro® 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.

10.1 Live Data

The screenshot below shows the live data available in the LACT-Pro® Controller.

LACT MicroCube - Metering ALARM 11/25/2016 10:31:23

Home ▸ Logs & Trends ▸ Live Data ↓ ⏪ ⏩ ↻

SNAPSHOT DATA @ 11/25/2016 10:31:22

Loading Status - Select Language

OIL TOTALS

IV
Current IV Cumulative Total 491.00 bbls
Last/Current IV Load Total 50.00 bbls
IV Cumulative Total at Start of Load 441.00 bbls

Current IV Day Total 0.00 bbls
Current IV Day Unallocated Total 0.00 bbls
Current IV Month Total 491.00 bbls
Current IV Month Unallocated Total 0.00 bbls
IV Total Since Sampler Can Pull 491.00 bbls
Unallocated IV Total Since Sampler Can Pull 0.00 bbls

Current Oil IV Flow Rate 0.0 bbls/hr

GOV
Current GOV Cumulative Total 491.00 bbls
Last/Current GOV Load Total 50.00 bbls
GOV Cumulative Total at Start of Load 441.00 bbls

Current GOV Day Total 0.00 bbls
Current GOV Day Unallocated Total 0.00 bbls
Current GOV Month Total 491.00 bbls
Current GOV Month Unallocated Total 0.00 bbls
GOV Total Since Sampler Can Pull 491.00 bbls
Unallocated GOV Total Since Sampler Can Pull 0.00 bbls

Current Oil GOV Flow Rate 0.0 bbls/hr

GSV
Current GSV Cumulative Total 488.51 S bbls
Last/Current GSV Load Total 49.83 S bbls
GSV Cumulative Total at Start of Load 438.68 S bbls

Current GSV Day Total 0.00 S bbls
Current GSV Day Unallocated Total 0.00 S bbls
Current GSV Month Total 488.51 S bbls
Current GSV Month Unallocated Total 0.00 S bbls
GSV Total Since Sampler Can Pull 488.51 S bbls
Unallocated GSV Total Since Sampler Can Pull 0.00 S bbls

Current Oil GSV Flow Rate 0.0 S bbls/hr

MEASURED VALUES

		In Use Value	Live Value	Last Hour Override Value	Last Hour Average Value
Oil Pressure -	psia	199.23	199.23	120	0.00
Oil Temperature -	°F	58.6	58.6	55	0.0
S&W Monitor -	%	3.419	3.419	0.2	0.000

OPERATING MODES

Oil Pressure Measured
Oil Temperature Measured
S&W Monitor Measured

FIXED VALUES

Atmospheric Pressure - 0.00 psia
Oil Temperature - 55 °F

INSTANTANEOUS CORRECTION FACTORS

CTL - 1.00042
CPL - 1.00063
CTPL - 1.00105

SAMPLER CAN DATA

Current Grab Count 491
Entered Sample Temperature 0.0 °F
Entered Sample Gravity 0.00 °API
Entered Shakeout S&W 0.000 %

DIGITAL INPUTS

Ground Connection Not Connected
Strainer Blocked Strainer OK
Metering Tech Mode Driver Mode

DIGITAL OUTPUTS

Pump Permissive Off
Diverter Valve Permissive Recirculate
S&W High Off
General Alarm Off
User 1 Alarm Off
User 2 Alarm Off

END OF SNAPSHOT DATA

10.2 System Information

LACT MicroCube - Metering		ALARM	11/25/2016 10:22:37
Home > Logs & Trends > System Information			
System Uptime	8 days, 00:40:58		
System ID	C8A030838DED		
System Version	4v5.5-6632M-BETA (HW 2.00 SW 2.		
System O/S	4.1.0		
Expansion Board Date	15/10/12 13:48:22		
Expansion Board Ident	151012 83YM cal keithley		
Application Name	LACT-Pro Meter App 5v4		
Application Version	5v4r153		
Application Setup	Base*		
Application Checksum	BEAE2F5CFE97C36D		
Metrology Checksum	0000000000000000		
Profile (mSec) [Min/Last/Avg/M...	36 / 46 / 46 / 195		
Pulse Outputs Buckets [1..2]	0 / 0		

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 4v1.0-6078, 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® 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® application does not have any metrology designated data.
Profile (mSec) [Min/Last/Avg/Maximum	These four numbers indicate the performance of the C Cure™ run time 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. In normal operation, these should show 0 or occasionally 1, but any other value indicates a mismatch in the Sampler Pulse setup, and pulse are being generated faster than they can be delivered. NOTE: If Simulation is in use, the value associated with Pulse Output 2 will be around 65000 and changing continuously.

10.3 AO Data

Below is a screenshot of the BLM AO screen, which is also duplicated on the Local Panel when the AO screen is requested.

MOB LACT MicroCube #23
ALARM
04/13/2018 04:12:51

Home > Logs & Trends > AO Data

AO REPORT

Date/Time: 04/13/2018 04:12:50

System ID: C8A030838DED
Device ID: MOB LACT MicroCube #23
FMP #: BLM Number - 1234567890abcdefa..
BLM Checksum: 0000000000000000
Application Checksum: 6E4D243E02FE3537
Application Name: LACT-Pro Meter App 5v4
Application Version: 5v4r212
System Version: 4v7.0-7128-BETA (HW 2.00 SW 2.0)

Alarm Status **Alarm(s) Set**

Last/Current Transaction #: 7
Current Flow Rate: 86399.6 bbls/d (System)
Current Flow Rate: 3600.0 bbls/hr (User Defined)

Oil Flow Meter ID: ABC123
Oil Flow Meter Serial Number: NF-123 0B
Oil Flow Meter K-Factor In Use: 1000.00 pulses/bbl
Oil Flow Meter Meter Factor In Use: 1.0000

Live Oil Pressure: 131.17 psia
Live Oil Temperature: 77.4 °F
Live S&W: 2.635 %
Load Average Temperature: 60.0 °F
Non-Resettable GSV Total: 74676.39 bbls
Previous Day GSV Total: 63730.52 bbls

Active Alarms
Unallocated Flow Detected

10.4 Alarm Logs

Clicking on Alarm Logs will show calendar view for the Alarm logs. The calendar view operates in the same manner as the Reports Calendar View, see section [9.1 Reports Calendar View](#) 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.

Coastal LACT MicroCube Demo		ALARM	02/04/2016 10:37:12
Home > Logs & Trends > Alarm Logs > 2016 > February 4			
2016 February 4			
02/04/2016 10:06:59 [admin]	System Restart	ACC	
02/04/2016 09:48:56	System Restart	CLR	
02/04/2016 09:48:55	System Restart	SET	
02/04/2016 09:09:13 [admin]	Oil Temperature Transmitter Fail	ACC	
02/04/2016 09:09:10	Water Temperature Transmitter Fail	CLR	
02/04/2016 09:09:10	Oil Temperature Transmitter Fail	CLR	
02/04/2016 09:09:08	Oil Temperature Transmitter Fail	SET	
02/04/2016 09:08:24 [admin]	Water Temperature Transmitter Fail	ACC	
02/04/2016 09:08:10	Water Temperature Transmitter Fail	SET	

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® 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 Variable (.TSV) format and can be opened and manipulated in OpenOffice, Excel or other spreadsheet programs.

10.5 Event Logs



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

<i>System Event Log</i>	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.
<i>Operator Event Log</i>	This log records all the input from the Local Panel, from the driver or the Metering Technician, as well as changes to the App settings made from the website.
<i>Metrology Event Log</i>	Any item changed that is declared as a metrology point is logged here. Field calibration events are stored in this log.
<i>Security Event Log</i>	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.
<i>Application Event Log</i>	In the LACT-Pro® controller App, this log is used to record when the Maximum Volume Load interrupt has occurred.
<i>Combined Event Log</i>	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: An example of the ALVs is shown in the smaller white text within the black box.

Home ▸ Logs & Trends ▸ Event Logs ▸ Operator Event Log ▸ 2016 ▸ February 4

« 2016 February 4 »

02/04/2016 09:09:08 [admin]	Measured Oil Temperature Type set to RTD [Previous value : 4-20 mA]	
02/04/2016 09:08:20 [admin]	Measured Water Temperature Type set to RTD [Previous value : 4-20 mA]	
02/04/2016 09:08:10 [admin]	Measured Water Temperature Source set to Analog Input 6 / RTD 1 / Thermistor [Previous value : Analog Input 3]	
02/04/2016 09:07:15 [admin]	Measured Water Temperature Source set to Analog Input 3 [Previous value : Disabled]	
02/04/2016 08:32:11 [admin]	Monitor S&W Source set to Analog Input 3 [Previous value : Disabled]	
02/04/2016 08:23:51 [admin]	Pressure Mode Setting set to Always Override [Previous value : Use Default on Failure]	
02/04/2016 08:23:21 [admin]	Measured Oil Pressure Source set to Analog Input 2 [Previous value : Disabled]	
02/04/2016 07:33:37 [admin]	Low Input Fail Point set to -5 mA [Previous value : 3.5 mA]	
02/04/2016 05:35:14 [admin]	Measured Oil Temperature Type set to 4-20 mA [Previous value : RTD]	

Cumulative Oil Total [IV] : 350.00 bbls
 Cumulative Oil Total [GOV] : 350.00 bbls
 Cumulative Water Total [IV] : 254796.93 bbls
 Cumulative Water Total [GOV] : 254883.55 bbls
 Cumulative Water Total [NSV] : 252072.92 bbls

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 Tab Separated Variable 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.

10.6 Constants Log

```
Coastal LACT MicroCube Demo ALARM 2015/11/27 11:38:03
Home ▸ Logs & Trends ▸ Constants Log ⏴ ⏵ 🖨️ ⬇️
-----
Constants Log generated at 2015/11/27 11:36:21
NOTE : Items Marked [CSUM] Are Included In The Metrology Checksum

[System Information]
System ID                               C8A0308399A3
System Version                          4v1.0-6078 (HW 2.00 SW 2.05)
System O/S                               4.1.0
Expansion Board Date                     15/10/12 14:07:23
Expansion Board Ident                    151012 83XX keithley.cla
Application Name                         AMR LACT 5v2
Application Version                      5v2r37
Application Setup                        Base*
Application Checksum                     63160FB875884B76
Metrology Checksum                      0000000000000000
-----

[Menu : System/Initial Setup]
Application Type                          ACT (Offloading)
Manually Enter Lease Ticket Data?        No
Company Name                             Coastal
Device ID                               Coastal LACT MicroCube Demo
Comment                                  For Demonstration & Sales
[INACTIVE] Lease Location                 Sealy
Offload Location
Auto Web Logout (0 = Disabled)           6000 mins
Driver Data Entry Timeout                 30 s
Ground Input Timeout                     20 s
End of Day Time                           0 :00
Trend Sample Period                      Every 5 Seconds
Modbus Totals - # Decimal Places         API (2 DP)
PIN Code Required                        Yes
Pin Code Value                           1234
[INACTIVE] Stop Loading Trigger Volume    29.00 bbls
[INACTIVE] Suspend Load Trigger Option    Driver Entered
[INACTIVE] Suspend Loading Trigger Volume 19.00 bbls
Water Measured?                          Yes
Available Languages                       3

[Menu : System/Comms/Local Panel]
Local Panel Serial Port #                 COM3 - RS422 using RS422/232 Converter

[Menu : System/Comms/XML Comms]
XML TCP Pull Port #                      502
XML Push Method                           HTTP
XML TCP Push IP Address                   127.0.0.1
XML TCP Push Port #                       85
-----
```

----- cut -----

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.

10.7 Trending

The LACT-Pro® controller has a powerful data logging facility combined with an easy to use web-based visualisation tool which gives unrivaled 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 and the time-stamp for when the selected data points were snapshot by the trigger. Each historical data zone can have a separate trigger, and the collection of data points in each Zone can be different.

The LACT-Pro® Application only utilizes two of the three Zones, and uses the same data points in each Zone, but the two zones have different triggers. Zone 3 is not used.

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.



Slot 1 : Oil Pressure In Use

Slot 2 : Oil Temperature In Use

Slot 3 : S&W In Use

Slot 4 : Oil Indicated Volume Flow Rate

Slot 5 : Water Indicated Volume Flow Rate

Slot 6 : Auxiliary Input 1 - In Use

Slot 7 : Auxiliary Input 2 - In Use

Slot 8 : Auxiliary Input 3 - In Use

Slot 9 : Auxiliary Input 4 - In Use

Slot 10 : Current Water Day Total [IV]

Slot 11 : Water Temperature In Use

Slot 12 : Oil Local Totalizer [IV]

Slot 13 : Oil Non-Resetable Total [IV]

All active slots

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 accomplish this, simply click on the download icon.



1	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	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-Resetable 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	-22.7138	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	5.7779	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

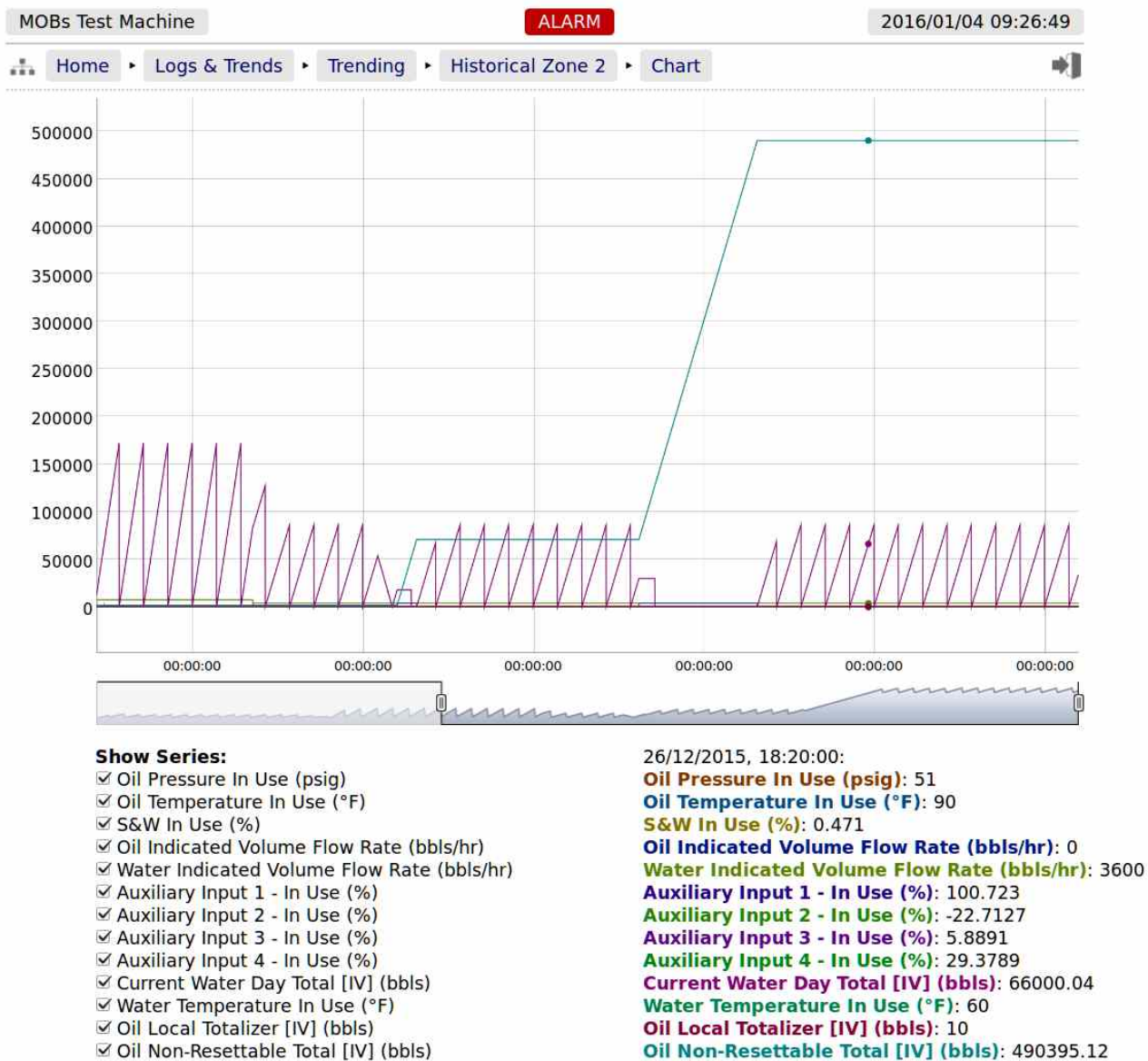
The example above only shows 16 of the possible 20,000 records

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** 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 re-scale.

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, the cursor is highlighting 26/12/2015 at 18:20:00 and the **Oil Pressure In Use (psig)** is showing 51.



11 Diagnostic Information

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

Driver Menu Mimic	<p>Home ▶ Driver Menu</p> <p>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.</p>
Live Data and Snapshots of live data	<p>Home ▶ Logs & Trends ▶ Live Data</p> <p>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.</p> <p>See Section 10.1 above for more details</p>
System Information	<p>Home ▶ Logs & Trends ▶ System Information</p> <p>This shows the System Information for the LACT-Pro® controller.</p> <p>See Section 10.2 above for more details</p>
Totals	<p>Home ▶ System ▶ Product Setup ▶ Oil ▶ Totals and Home ▶ System ▶ Product Setup ▶ Water ▶ Totals</p> <p>Daily, Monthly, Cumulative and Sampler Can/Batch Totals can be viewed live, sorted by type of total.</p> <p>See Section 6.1.6 above for the Oil Totals and Section 6.2.3 for the Water Totals</p>

11.1 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 LACT 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.

Connect Truck Ground

A remote support engineer, looking at the same LACT-Pro® controller, using a web browser will see a very similar screen via the web browser.

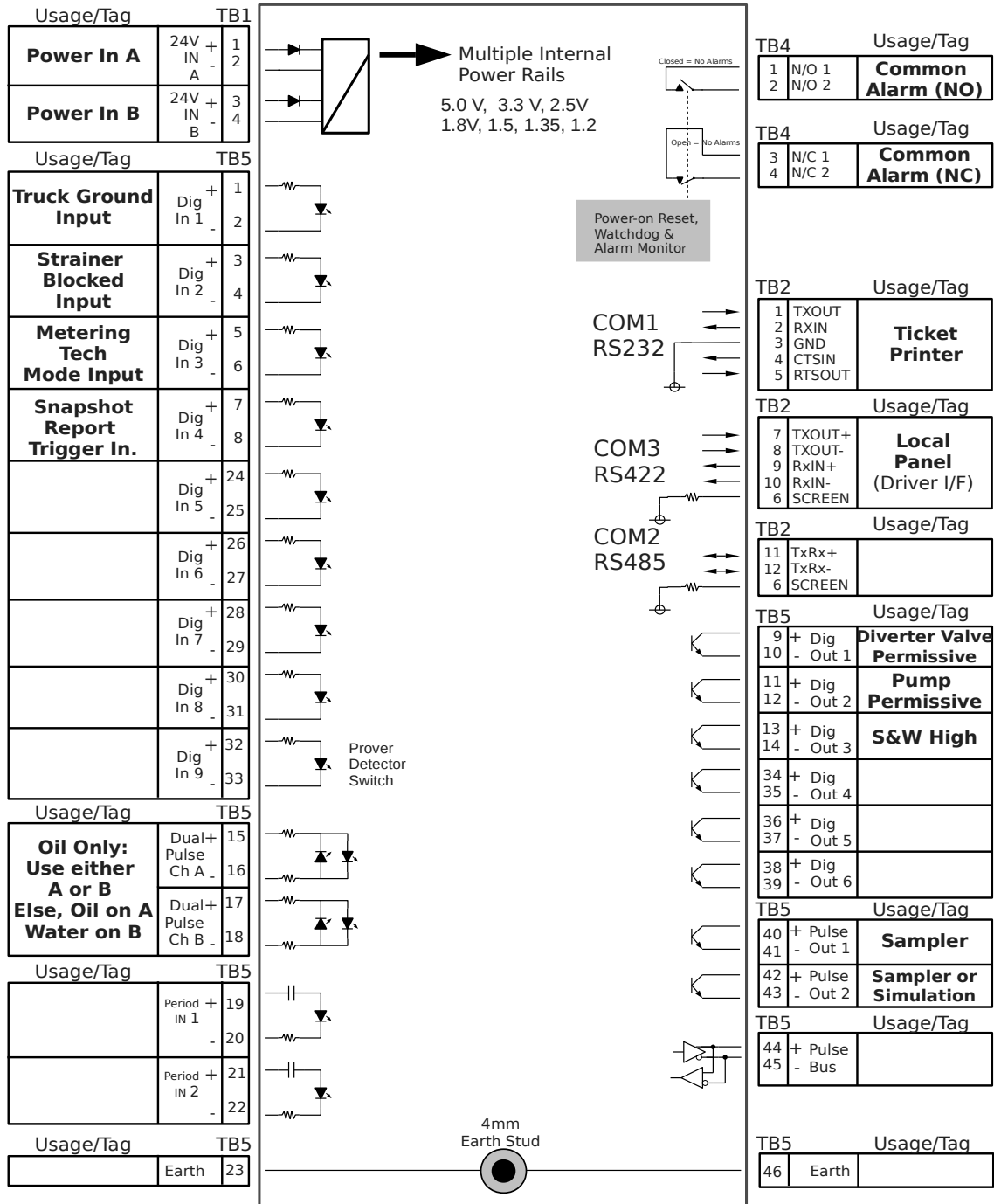
As the driver moves through the loading process, both screens will change. During the load for example, the tanker driver will see the local panel displaying the image below.

40.00 bbls	
Temperature In Use	72.4 °F
Pressure In Use	145.00 psig
S&W In Use	1.586 %
	Load Active
	Press Here to End Load

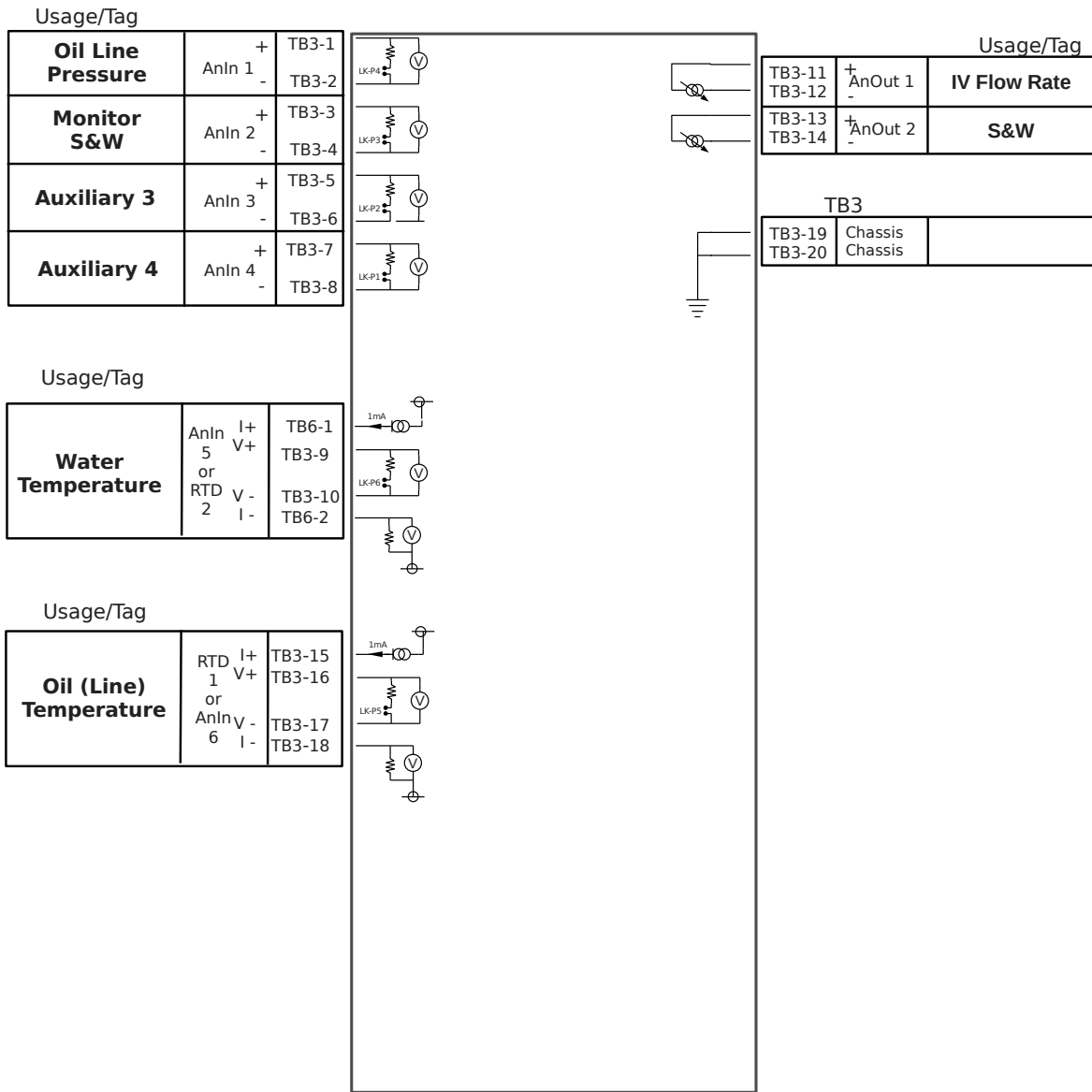
The support engineer will see a very similar page using the browser.

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

Digital & Serial



Analog Expansion



13 API Ch 11 Calculations

The LACT-Pro controller generates GSV using the API Ch11.1.6.

The Base Gravity is derived from the Sample Can Pull analysis, so it may not exactly represent the Gravity of the oil being loaded.

NOTE: If the Driver Entered has been selected for the Sample Gravity and Sample Temperature Source options, this information will appear on the BOL ticket, but the NSV is NOT recalculated by the LACT-Pro® controller using this information.

The Sampler Can Pull Gravity & Sampler Can Pull Temperature, together with an assumed pressure of zero psig are used as the observed conditions fed into API Ch11.1.6.2, to generate the Base Gravity (at 60°F reference).

The meter pulses divided by the K-Factor (in Pulse per bbl) generates the Indicated Volume (IV).


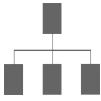




The Meter Factor, (MF) a dimensionless unit, multiplied by the IV generates the Gross Observed Volume (GOV).

The measured Line Temperature and the measured Line Pressure are used as the Alternate Conditions and drive API Ch11.1.6.1, together with the Base Gravity with the Commodity Type set to Crude Oil. This information is used to generate the CTPL and the GSV.

Both the measured Line Temperature and the measured Line Pressure can be forced to an override value if required.

If the Line Temperature or Line Pressure is not measured, then the override value(s) should be configured, and these values will be used as the Alternate Conditions fed into the API Ch11.1.6.1 calculation.

14 Glossary

<i>Icon</i>	<i>Description</i>
	If a line contains the "gear" icon, this indicates that the line can be edited. Click the line to open the edit dialog.
	This is the 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 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.
<i>Term</i>	<i>Description</i>
ADC	Analog to Digital Converter
ALVs	Additional Log Values
APPLICATION	A configuration file for the LACT-Pro controller where all hard coded calculation routing has been finalized. Field settings may or may not have been entered.
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.
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

<i>Icon</i>	<i>Description</i>
	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.

15 LACT-Pro Controller Configuration Prompt

LACT-Pro® controller has been designed to work with a number of different installations and different measurement units. This part of the setup procedure is to match the settings to the physical plant installation.

The table below assist in the configuration process.

Is the installation a LACT (Truck Loading) or ACT (offloading) site	LACT / ACT
Does the site have a filter/strainer with a filter/strainer blocked switch output?	Yes / No
Does the site have a divert valve for recirculation?	Yes / No
If the site has a diverter/recirculation valve, choose the recirculation time.	Time in Seconds
Should the charge pump permissive be driven by the LACT controller, rather than manual?	Yes / No
Is an S&W high output signal required?	Yes / No
Is there a Measured Temperature Source?	Yes / No
If there is a Measured Temperature Source, is it 4-20mA, a 100 Ohm Platinum RTD or a Thermistor?	4-20, RTD or Thermistor
Is there a Measured Pressure Source?	Yes / No
Are any Analog Outputs needed. If Yes, see 8.3 Configuring Analog Outputs	Yes / No
Is Produced Water to be measured?	Yes / No
Is the Produced Water temperature measured?	Yes / No
If there is a Produced Water Measured Temperature Source, is it 4-20mA, a 100 Ohm Platinum RTD or a Thermistor?	4-20, RTD or Thermistor
Does the driver need an on-screen QR code BOL?	Yes / No
Determine the security mode required	
Does the ACT point need more than 1 Sampler system to be driven? Note the P552 Multi-Sampler Driver expansion unit will also be required.	Yes / No