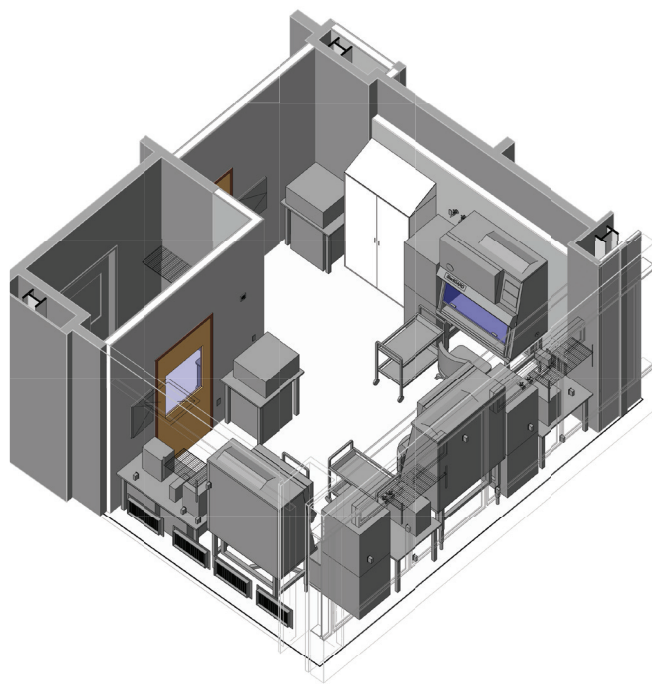


LMSExpress

MONITORING SOFTWARE



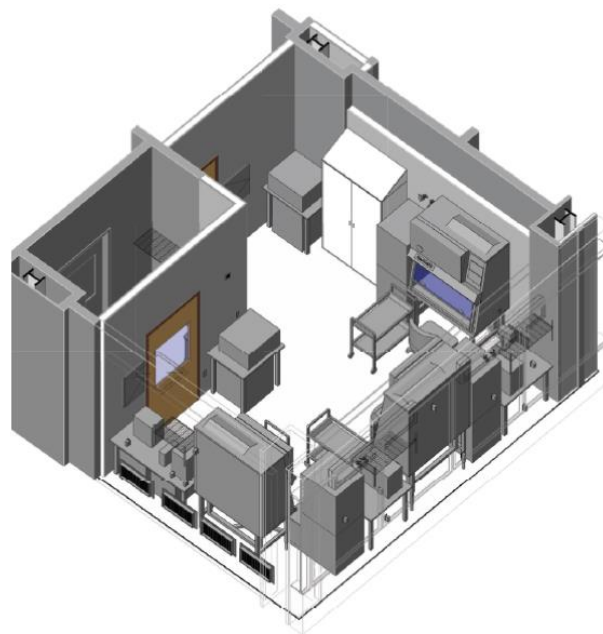
Operators Manual



Lighthouse Worldwide Solutions

LMS Express

Monitoring Software



Operators Manual

Copyright © 2002-2025 by Lighthouse Worldwide Solutions. All rights reserved. No part of this document may be reproduced by any means except as permitted in writing by Lighthouse Worldwide Solutions.

Any difficulties encountered when running other programs in conjunction with LMS Express will not be supported by Lighthouse Worldwide Solutions.

The information contained herein is subject to change without notice. Lighthouse Worldwide Solutions is not responsible for any damages arising out of your use of the LMS Express program.

LMS Express™ is a trademark of Lighthouse Worldwide Solutions.

Piccolo.NET BSD License Copyright (c) 2003-2004, University of Maryland, All rights reserved.

Microsoft®, Microsoft Windows™ and Excel™ are trademarks of Microsoft Corporation.

Manufactured by:

Lighthouse Worldwide Solutions
300 West Antelope Road
White City, Oregon 97503

248083470-1 R4

About This Manual

Note: A note appears in the sidebar to give extra information regarding a feature or suggestion.

WARNING: A warning appears in a paragraph like this and warns that doing something incorrectly could result in personal injury, damage to the instrument or loss of data.

This manual describes the LMS Express monitoring system and its usage. This monitoring system is designed to download and analyze data from **ApexPortable, ApexRemote, ApexZ, Remote, Solair, and Handheld Particle Counters, Vertex, 32 Position Manifold Controllers, ICP/DAS Modules, and Remote Active Counts.**

Audience

This manual is written for users who want to monitor the conditions in their cleanroom or environment.

If you need additional or expanded monitoring capabilities, or a multi-user monitoring system, please call your Lighthouse Worldwide Solutions sales representative for information about the full scale Lighthouse Monitoring System (LMS).

Blank Page



SOFTWARE END USER LICENSE AGREEMENT

This End User License Agreement (the "Agreement") is a binding agreement between you, the person accessing the software ("you" or "your"), on behalf of yourself and any company or entity who provided you with access to the software (the "Company"), and Lighthouse Worldwide Solutions, Inc ("LWS"), and governs your access to the software provided to you through the Company by LWS (the "Software"). You are being allowed to access the Software under an agreement between LWS and the Company (the "Master Agreement"). If the Master Agreement ends, or if your access to the Software is otherwise terminated or suspended pursuant to this Agreement or the Master Agreement, then LWS may terminate and/or suspend your access to the Software without liability. You agree that the Company will be fully liable for your acts and omissions in connection with the Software, that you are authorized to enter into this Agreement on behalf of the Company, and that this Agreement is a legally binding agreement on yourself and the Company, with LWS.

LWS PROVIDES THE SOFTWARE SOLELY ON THE TERMS AND CONDITIONS SET FORTH IN THIS AGREEMENT AND ON THE CONDITION THAT YOU ACCEPT AND COMPLY WITH THEM. BY CLICKING THE "ACCEPT" BUTTON YOU: (A) ACCEPT THIS AGREEMENT AND AGREE TO BE LEGALLY BOUND BY ITS TERMS; AND (B) REPRESENT AND WARRANT THAT YOU ARE OF LEGAL AGE TO ENTER INTO A BINDING AGREEMENT. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, LWS WILL NOT AND DOES NOT LICENSE THE SOFTWARE TO YOU, YOU MUST NOT USE OR ACCESS THE SOFTWARE, AND YOUR USE OF THE SOFTWARE WILL BE AN INTENTIONAL INFRINGEMENT OF LWS'S INTELLECTUAL PROPERTY RIGHTS. NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS AGREEMENT, NO LICENSE IS GRANTED (WHETHER EXPRESSLY, BY IMPLICATION, OR OTHERWISE) UNDER THIS AGREEMENT, AND THIS AGREEMENT EXPRESSLY EXCLUDES ANY RIGHT, CONCERNING ANY SOFTWARE THAT YOU OR THE COMPANY DID NOT ACQUIRE LAWFULLY OR THAT IS NOT A LEGITIMATE, AUTHORIZED COPY OF LWS'S SOFTWARE.

1. **License Grant and Scope.** Subject to and conditioned on Company's payment of all amounts owed and your and Company's compliance with all terms and conditions outlined in this Agreement and the Master Agreement, LWS hereby grants you a limited, nonexclusive, non-transferable, non-sublicensable license to access and use the Software during the subscription period identified in the Master Agreement. Your use of the Software will be subject to the restrictions under Section 3 of this Agreement, and to any user, installation, or other metrics and limitations in the Master Agreement.
2. **Third Party Software.** The Software includes not only computer programs developed by LWS, but also proprietary computer programs developed by third parties ("Third Parties"). Third Party software may also be subject to additional terms from the applicable Third Party. To the extent a Third Party license conflicts with the terms of this Agreement, the terms of that Third Party license will control but only with respect to the portion of the Software that is subject to that Third Party license, and nothing in this Agreement will be deemed to replace or amend any Third Party license.
3. **Restrictions.** Except as expressly authorized in this Agreement, you will not: (a) copy the Software; (b) modify, translate or create derivative works of the Software; (c) reverse engineer, decompile, disassemble or attempt to derive the source code or underlying ideas or algorithms included in the Software, except to the minimum extent necessary to comply with applicable nonwaivable law; (d) rent, lease, distribute, sell, assign, sublicense, transfer, encumber or otherwise make available the Software to others; (e) export the Software except in compliance with applicable laws, including safety and standard setting laws and regulations in the country where the Software will be used and all export and import laws and regulations; (f) provide, disclose, or make the Software available to anyone; (g) change any proprietary rights notices on the Software; (h) use the Software for any purpose other than for the Company's internal purposes, as intended for the Software by LWS, and in no event for any reason detrimental to LWS's interests; or (i) permit any other person to take any of the actions described in subparagraphs (a) through (h) above.
4. **Access Credentials; Responsibility for Use of Software.** If access credentials are necessary for your access to the Software, then you shall not provide any other person or entity with your access credentials and shall take reasonable efforts to keep your access credentials secure. You are responsible and liable for all uses of the Software via your access credentials, whether by you or by any other person or entity. If you experience issues with accessing the Software, please contact your Company administrator or LWS support for assistance.
5. **Compliance Measures**
 - (a) The Software may contain technological copy protection or other security features designed to prevent unauthorized use of the Software, including features to protect against any use of the Software that is prohibited under Section 3. You shall not, and shall not attempt to, remove, disable, circumvent, or otherwise create or implement any workaround to, any such copy protection or security features.
 - (b) LWS may, but is not obligated to, audit your use of the Software to ensure your compliance with this Agreement and the Master Agreement. You will provide reasonable cooperation in any such audits.
6. **Collection and Use of Information.** LWS may collect and store information regarding the use of the Software and about the equipment on which the Software is installed or through which it otherwise is accessed and used. LWS may use such information for any purpose related to the Software, including but not limited to improving the performance of the Software or developing updates, and verifying your compliance with the terms of this Agreement and enforcing LWS's rights. LWS's data handling practices are further described in its Privacy Policy. LWS's handling of such information is further described in its Privacy Policy, available at www.golighthouse.com/en/privacy-policy/.
7. **Intellectual Property Rights.** You agree that the Software is provided under license and not sold. Other than the limited license granted under this Agreement, LWS and its suppliers and licensors retain all right, title, and interest in and to the Software, including all trademarks, copyrights, patents, trade secrets, and other intellectual property and other proprietary rights in and to the Software. You shall safeguard the Software from infringement, misappropriation, theft, misuse, and unauthorized access, and shall promptly notify LWS in writing if any of the foregoing occurs.
8. **Term and Termination.** This Agreement and the license granted hereunder shall come into effect when you accept this Agreement and will continue until the subscription period under the Master Agreement terminates or expires, or this Agreement is terminated in accordance with its terms. You may terminate this Agreement by ceasing to use and destroying all copies of the Software. LWS may terminate this Agreement, effective upon written notice to you, if you breach this Agreement. On expiration or termination of this Agreement, the license granted hereunder shall also terminate, and you shall cease using and destroy all copies of the Software.
9. **Warranty Disclaimer.** THE SOFTWARE IS PROVIDED "AS IS" AND WITH ALL FAULTS AND DEFECTS WITHOUT WARRANTY OF ANY KIND. TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, LWS, ON ITS OWN BEHALF AND ON BEHALF OF ITS AFFILIATES AND ON BEHALF OF ITS SUPPLIERS, EXPRESSLY DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, WITH RESPECT TO THE SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND NON-INFRINGEMENT, AND WARRANTIES THAT MAY ARISE OUT OF COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE, OR TRADE PRACTICE. WITHOUT LIMITATION TO THE FOREGOING, LWS PROVIDES NO WARRANTY OR UNDERTAKING, AND MAKES NO REPRESENTATION OF ANY KIND THAT THE SOFTWARE WILL MEET YOUR REQUIREMENTS, ACHIEVE ANY INTENDED RESULTS, BE COMPATIBLE, OR WORK WITH ANY OTHER SOFTWARE, APPLICATIONS, SYSTEMS, OR SERVICES, OPERATE WITHOUT INTERRUPTION, MEET ANY PERFORMANCE OR RELIABILITY STANDARDS OR BE ERROR FREE, OR THAT ANY ERRORS OR DEFECTS CAN OR WILL BE CORRECTED.
10. **Limitation of Liability.** IN NO EVENT WILL LWS OR ITS AFFILIATES, OR ANY OF ITS OR THEIR RESPECTIVE LICENSORS OR SUPPLIERS, BE LIABLE TO YOU FOR ANY USE, INTERRUPTION, DELAY, OR INABILITY TO USE THE SOFTWARE. YOU ARE PROVIDED THE SOFTWARE PURSUANT TO THE MASTER AGREEMENT BETWEEN LWS AND THE COMPANY, SOLELY FOR THE BENEFIT OF THE COMPANY AND AT COMPANY'S DISCRETION. YOU ACKNOWLEDGE THAT YOU HAVE NO RIGHTS UNDER THE MASTER AGREEMENT INCLUDING ANY RIGHTS TO ENFORCE ANY OF ITS TERMS. ANY OBLIGATION OR LIABILITY LWS OR ITS AFFILIATES, OR ANY OF ITS OR THEIR LICENSORS OR SERVICE PROVIDERS, MAY HAVE WITH RESPECT TO YOUR USE OR INABILITY TO USE THE SOFTWARE, IF ANY SUCH OBLIGATION OR LIABILITY EXISTS, SHALL BE SOLELY TO COMPANY PURSUANT TO THE MASTER AGREEMENT AND SUBJECT TO ALL

LIMITATIONS OF LIABILITY SET FORTH THEREIN.

- 11. US Government Rights.** The Software is a “commercial product” as that term is defined at 48 C.F.R. § 2.101, consisting of “commercial computer software” and “commercial computer software documentation” as such terms are used in 48 C.F.R. § 12.212. Accordingly, if you are part of an agency of the US Government or any contractor thereof, you only receive those rights with respect to the Software as are granted to all other end users under license, in accordance with (a) 48 C.F.R. § 227.7201 through 48 C.F.R. § 227.7204, with respect to the Department of Defense and their contractors, or (b) 48 C.F.R. § 12.212, with respect to all other US Government licensees and their contractors.
- 12. Proprietary Information.** You will not use Proprietary Information except as strictly required for the use of the Software as intended by LWS, will not disclose Proprietary Information to any third party, except as may be authorized in writing by LWS, and will keep the Proprietary Information confidential using the same efforts you are required to use to protect the confidentiality of Company’s proprietary or confidential information of similar sensitivity, but in no event less than reasonable efforts. This Section 12 will survive termination of the Agreement. “Proprietary Information” will mean the Software, and any documentation for the Software, and all other information or data of LWS, or of a third party to whom LWS owes obligations of confidentiality, and which is furnished to you orally or in written, graphic, or machine-readable form, and that is either marked or designated as proprietary or confidential or that you should reasonably understand, based on the contents of the information or the circumstances of its disclosure, is proprietary or confidential information.
- 13. Arbitration.**
- (a) Any dispute arising out of this Agreement will be settled through final and binding arbitration, conducted in accordance with the American Arbitration Association’s Commercial Arbitration Rules. The arbitral tribunal shall have the sole power to rule on any challenge to its own jurisdiction without any need to refer such matters first to a court and all issues regarding arbitrability shall be decided solely by the arbitral tribunal. The place of arbitration shall be White City, Oregon. The language of the arbitration shall be English. The claimant shall commence the arbitration by delivering a notice of arbitration to the respondent setting out the nature of the claim(s) and the relief requested. Within 30 days of the receipt of the notice of arbitration, the respondent shall deliver to the claimant its answer and any counterclaim(s), setting out the nature of such counterclaims(s) and the relief requested.
 - (b) The tribunal shall consist of three arbitrators, appointed as follows:
 - (i) The claimant shall appoint an arbitrator in the request for arbitration, and the respondent shall appoint an arbitrator in the answer. The two arbitrators so appointed shall, within 30 days of delivery of the answer, appoint a third arbitrator who shall act as the chair of the tribunal. No party and no one acting on behalf of any party shall communicate ex parte with an arbitrator or a candidate for arbitrator concerning the arbitration, except that a party, or someone acting on behalf of a party, may communicate ex parte with a candidate for party appointment in order to advise the candidate of the general nature of the controversy and of the anticipated proceedings and to discuss the candidate’s qualifications, availability, or independence in relation to the parties or to discuss the suitability of candidates for selection of the chair.
 - (ii) If any arbitrators are not selected within this time period, such arbitrator shall be appointed at the request of any party by the American Arbitration Association.
 - (iii) Any challenge of an arbitrator for lack of impartiality or other ground shall be decided by the American Arbitration Association.
 - (iv) If a vacancy of an arbitrator arises, the vacancy shall be filled by the same procedure set forth above, provided, however, that if a vacancy arises during or after the hearing on the merits, the remaining two arbitrators may proceed with the arbitration and render an award.
 - (c) The parties agree to keep confidential the existence of the arbitration, the arbitral proceedings, the submissions made by the parties and the decisions made by the arbitral tribunal, including its awards to the extent not already in the public domain, except in judicial proceedings related to the award or where required by applicable law.
 - (d) The tribunal shall decide the procedures to be followed in the arbitration after consultation with the parties. The tribunal may make its decisions by a majority or by the chair if no majority is possible. The tribunal shall have the power to grant any provisional or final remedy or relief that it deems appropriate, including conservatory measures and an award of attorneys’ fees. The parties expressly waive and forego any right to punitive, exemplary, or similar damages unless any applicable law(s) requires that compensatory damages be increased in a specified manner. The parties further agree that judgment may be entered upon the award by any court having jurisdiction.
- 14. Miscellaneous.** This Agreement will be governed by the laws of the State of Oregon. If any provision of this Agreement is held to be unenforceable, such holding will not affect the enforceability of any other provision. Any legal presumption that terms herein will be strictly construed against the party who drafted such terms or who benefits from such terms will not be employed in construing or interpreting this Agreement. Any action arising out of this Agreement must be commenced within one year after such action accrues and in no event later than two years after first date of access to the Software. If either party institutes any action to enforce its rights hereunder, the successful party in any such action shall be entitled to recover from the other reasonable attorneys’ fees in such action and in any associated appeals. LWS will be excused for any delay or failure to perform due to any cause beyond its reasonable control, including but not limited to acts of governments, natural catastrophes, interruptions of transportation, and inability to obtain necessary labor or materials. This Agreement constitutes the sole and entire agreement between you and LWS with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations, and warranties, both written and oral, with respect to such subject matter. You may not assign your rights or obligations under this Agreement to any third party. This Agreement may only be amended, modified, or supplemented by an agreement in writing signed by you and LWS. No waiver of any of the provisions hereof shall be effective unless explicitly set forth in writing and signed by the waiving party. If any term or provision of this Agreement is invalid, illegal, or unenforceable in any jurisdiction, such invalidity, illegality, or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

Additional Help

For more information about LMS Express, contact Lighthouse Worldwide Solutions.

(800) 945-5905 Sales and Service
 (541) 770-5905 Outside of USA

techsupport@golighthouse.com www.golighthouse.com

Table of Contents

About This Manual.....	3
Audience	3
SOFTWARE END USER LICENSE AGREEMENT	5
Additional Help	6
Chapter 1 Overview	13
Basic Concepts	15
Features	16
Full Screen.....	16
Graphs.....	16
Data Tables	16
Standard Reports	17
Data Status.....	17
Maps	17
Alarm Status and Alarm Acknowledgement.....	17
Alarm Groups.....	17
Data Sets.....	18
Instrument Setup.....	18
Location Setup	18
Database Maintenance.....	18
Instrument Download.....	18
Users	19
Event Log	19
Application Properties	19
Chapter 2 Getting Started	21
Installation Requirements	21
Startup	21
Setup Wizard	22
Licensing Operations During Startup.....	24
Online Activation	24
Offline Activation	24
Login	26
Splash Screen.....	26

Main Window	27
Basic User Interface	27
View	28
Status Bar	28
Navigation.....	29
Toolbar.....	29
Menu.....	32
Task Panel	34
Navigation Panel.....	34
Shutdown.....	36
LMS Express Shutdown.....	36
LMS Express Shutdown (real time data active)	36
Chapter 3 Graphs.....	37
Graphs.....	37
Sort Criteria.....	37
Task Panel	39
Tool Bar Buttons	40
Displaying a New Graph.....	41
Displaying Existing Graphs	47
Graph Display Features.....	48
Printing	51
Printing Graph.....	51
Exporting Data	51
Export Graph.....	51
Chapter 4 Data Tables	53
Data Tables	53
Sort Criteria.....	54
Task Panel	55
Tool Bar Buttons	56
Creating a New Data Table	57
Displayed Decimals and Units.....	63
Displaying Existing Data Tables.....	63

Printing	64
Printing Data Table.....	64
Exporting Data	64
Exporting Data Tables	64
Chapter 5 Maps	65
Maps	65
Sort Criteria.....	66
Task Panel	67
Tool Bar Buttons	68
Displaying a New Map	69
Displaying Existing Maps.....	75
Map Real Time Status View	76
Printing Maps.....	78
Export Map Data.....	79
Chapter 6 Report Display.....	81
Standard Reports	81
Report View	81
Sort Criteria.....	82
Task Panel	83
Tool Bar Buttons	84
Displaying Report Data	84
Report Display.....	87
Federal Standard 209E.....	93
ISO 14644-1 Report	96
British Standard 5295 Report	100
EU GMP Annex 1 Report.....	102
Printing Standard Report.....	104
Exporting Standard Reports.....	104
Chapter 7 Status and Alarms.....	105
Real Time Status	105
Real Time Data Status.....	106
Real Time Alarm Group Status	108

Alarms.....	109
Adding and Modifying Alarm Triggers	110
Alarm Groups	115
Alarms and Warnings Log	118
Viewing Alarm Status.....	121
Acknowledging Alarms	124
Enable/Disable Alarm Acknowledgement	126
Predefined Acknowledgement Messages	127
Chapter 8 LMS Express Web Client.....	129
Home Screen.....	130
Channel Status Filter.....	130
Filter Home Page Datasets	131
Unacknowledged Alarms.....	132
Filter Unacknowledged Alarms List	133
Alarm Log.....	134
Filter Alarm Log.....	135
Event Log	136
Filter Event Log	137
Data Table Screen	138
Filter Data Tables	139
Data Table Live Updates and Rolling Window	140
Graphs Screen.....	141
Filter Graph.....	142
Reports.....	143
Alarm Report.....	144
Configuration Report	145
Conformance Report	146
Instrument Screen	147
Languages Supported	148
Chapter 9 System Setup	149
Administrator Options	149
Unit Conversion and Other Application Properties.....	150

Units.....	151
Sample Time	152
Displaying Units	153
Signatures	154
Calculation Settings	156
Other Properties	157
Web Server Options.....	158
User Logins.....	167
Notifications.....	171
Instruments.....	173
Locations.....	175
Upload Location Names to Instrument	178
Event Log	182
Database Maintenance.....	187
Chapter 10 Data Collection.....	195
Downloading Data Manually	195
Download Data from ApexZ Instruments	195
Download data from Lighthouse instruments.....	198
Trouble Shooting	202
Import Data.....	203
Data Import Wizard	204
Real Time Data Collection.....	208
Real Time Configuration	208
Instrument Tree.....	209
Configuration Setup.....	210

Blank Page

Chapter 1 Overview

LMS Express monitoring system is designed for use with Lighthouse instruments such as the ApexPortable, ApexRemote, ApexZ, Solair, Handheld and Remote Particle Counters, Vertex, 32 Port Manifold Controller, ICP/DAS Modules and Remote Active Counts.

LMS Express allows you to manually download the data collected by these instruments and view it in graphs, data tables and standard reports.

Data can be automatically collected in real time so that you can analyze the live data.

LMS Express has the following features:

- Allows users to configure and collect real time data from up to 100 data points, including any combination of particle counting instruments, Vertex, ICP/DAS Modules and 32-Port Manifold Controllers.
- Allows users to manually download data.
- Allows users to import data files output via Solair, ApexP, ApexZ and Vertex flash drive ports.
- Auto-detects Lighthouse particle counters on the system's COM ports, TCP/IP or Wi-Fi without special port or driver configuration requirements.
- Allows users to display and print the following cleanliness standards reports:
 - ISO-14644-1, 1999 and 2015 revisions,
 - Federal Standard 209E (ft.),
 - Federal Standard 209E (m),
 - British Standard 5295,
 - EU GMP Annex 1, 2003 revision and 2009 revisions.
- Minimal setup is required to begin collecting real time data.
- Allows users to display a Graph or Data Table for a specified time range.
- LMS Express users can view a rolling graph and data table, real time

maps, data status and alarm log.

- LMS Express can be set up to be 21 CFR part 11 compliant.
- Includes three levels of user accounts - regular users, power users and administrative users. Only administrative users can create other user accounts.
- Logins can be enforced, meaning LMS Express can be configured so that it will not start unless a user has logged in.
- Password aging – LMS Express passwords can be set to expire after a selectable number of days.
- Automatically log off a user (Auto-Logout) - if LMS Express detects that the software has not been used for a user-defined period.
- Print data from a graph or export it to a bitmap (*.bmp), Jpeg (*.jpg) or one of several other file types.
- A data table or report can be printed or exported to a Microsoft Excel file (*.xls) or comma separated value file (*.csv).
- Perform basic database maintenance features such as archive and delete.
- Synchronizes the clocks of the instrument(s) connected to it weekly.
- Uses Window's regional settings for displaying localized dates and decimal numbers.
- Tracks logins, logouts, additions, updates, deletes, downloads, archives, etc., in an event log. The event log updates on a real time basis.
- LMS Express can host an OPC DA server that exports all real time collected data.

Basic Concepts

Terms and concepts important to LMS Express are explained below.

Data Sets: A data set is a collection of related data points based on instrument, location, date/time, channel and type of data. Data sets are automatically created when data is downloaded from the instrument.

Instrument: LMS Express supports getting data from ApexPortable, ApexRemote, ApexZ, Solair, Remote, and Handheld particle counters, Vertex and the Lighthouse 32 port Manifold Controller. Instruments are identified by their model. You can assign the instrument an alias that will be displayed throughout LMS Express.

Manifold Controller: A manifold system from Lighthouse that consists of an intelligent Manifold Controller, a Universal Manifold and a Lighthouse particle counter. The Manifold controller can sample from up to 32 locations, with separate hold and purge times for each one.

Room: ApexZ instruments allow locations to be assigned to a Room Name. When LMS Express imports data from ApexZ the Room Name and the Location Name on ApexZ will be saved in LMS Express as a new location name [Room+Location] independent of the standard 999 LMS Express location names.

Location: Numbers assigned by the instrument to represent different areas where samples were taken. In LMS Express, the numeric location number downloaded from an instrument can be assigned a descriptive alphanumeric name.

Data Type: Describes the kind of data collected. For particle counters, this is the micron size of the particle; for environmental sensors, this is the kind of analog sensor (i.e. air velocity, temperature, etc.) used.

Channel: Channels are only used by environmental sensors. A channel number indicates the physical connector to which the environmental sensor is attached.

Class: Cleanrooms are designated certain “class” levels based on the level of cleanliness required for the industry.

Features

Full Screen

LMS Express uses **Windows'** screen features, such as, minimize, restore, close and maximize screen. For the convenience of the user, an additional Full Screen button has been added to the program's toolbar that performs a similar function to the 'maximize window' button, expanding the program screen to replace the entire screen contents, including Windows' taskbar and side bar. Clicking this button (Figure 1-1 top) maximizes the program screen to occupy the full screen.

To restore the screen to the normal Windows' screen, click the button shown in the bottom of Figure 1-1.

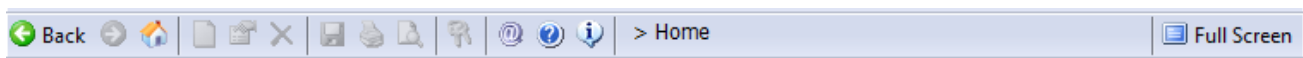


Figure 1-1 LMS Express Toolbar

Graphs

The Graph view allows you to see your data for a specified date/time range displayed as a line graph. Each data set is represented with a different color. The graph can be printed or exported to several different formats, including bitmap (*.bmp) file and JPEG (*.jpg). Graphs can be rolling or for a fixed date and time.

Data Tables

The Data Table view allows you to display data in a table format. Each data set displays statistics (Standard deviation, Average, Maximum data point, Minimum data point) calculated for the range of data displayed. Data Tables can be printed or exported to Microsoft Excel *.xls or *.csv (comma separated values) files. Data tables can be rolling or for a fixed date and time.

Standard Reports

The following Cleanliness Standards reports can be run: Federal Standard 209E (ft), Federal Standard 209E (m), ISO 14644-1 (1999 revision), ISO 14644-1 (2015 revision), British Standard 5295, EU GMP Annex 1 (2003 revision) and EU GMP Annex 1 (2009 revision).

Each report calculates the classification of the data based on the chosen standard. A displayed report can be printed or exported to a Microsoft Excel (*.xls) or comma separated file (*.csv) file.

Data Status

LMS Express users can view the current real time status of all data filtered by location, instrument, data type and/or alarm group.

Maps

LMS Express users can create and display real time maps with each using a distinct bitmap background assigned to it and display multiple data sets, alarm groups, and/or instruments. If alarms are enabled, maps will be updated with current alarm or warning status.

Alarm Status and Alarm Acknowledgement

LMS Express administrators can configure alarm triggers to display a warning or alarm when certain conditions occur. Conditions can be programmed for locations or instruments. When alarm triggers are enabled, the status bar will show the overall status of the system ("Normal", "Warning" or "Alarm").

Users can acknowledge alarms on the Unacknowledged alarms view and add a note to any transition between normal and alarm or warning on the Alarms and Warnings Log view.

Alarm Groups

Alarm Groups allow LMS Express users to quickly see the worst status out of a sub-set of data sets. Alarm groups can be tied to an instrument's relays to display the status of a particular area. An alarm group can also be used to display a grouped status in Maps and in the Real-Time Alarm Group Status screen so that these screens display a specific set of data.

Data Sets

Data set information (instrument name, location name, channel and data type) can be displayed on graphs and data tables. You can decide which parts of the Data Set Name you wish to display.

Instrument Setup

By default, the “name” of the instrument is its model name. The first time an instrument uploads data to LMS Express, the application will record the instrument’s serial number and model name. You can give a meaningful name to an instrument to help distinguish it from the others. You can select whether to display the instrument name in the graph and data table or keep it hidden.

Location Setup

When the data is downloaded to LMS Express, the location(s) associated with the data are recorded by their numeric Location ID. By default, the “name” of a location is its numeric ID. You can change the location name to a more meaningful text description and select whether to display the location name in the graph and data table or keep it hidden.

Database Maintenance

You can archive an LMS Express database, open an existing archive database to look at historical data or delete data in the current database. An Automatic Database Maintenance feature can be enabled to clear out expired data at user-configured expiration times.

Instrument Download

LMS Express will detect Lighthouse instruments via any COM port connection, TCP/IP or Wi-Fi (ApexZ). Data can be downloaded manually or real time.

When a manual download is complete, the serial number and model of the instrument, as well as the number of data records downloaded, will be displayed. At the end of a manual data download the user will be given an opportunity to clear the data from the instrument.

When configured to download data real time, LMS Express will collect data from the instrument(s) at least once every 30 seconds, depending on how the instruments are configured.

Users

LMS Express allows administrator users to create, modify and delete other user accounts. Accounts may have a password, and the password can be set to expire after a given amount of time. LMS Express can be configured to automatically log users out after a programmable period of idle time. Email and SMS notifications may also be set up to alert users in real-time of current sensor alarm conditions.

Event Log

All user logins, logouts, data downloaded, archives and changes to LMS Express graphs, data tables, standard reports and properties are logged in the event log. Users can view the event log to track what has occurred in the system.

Application Properties

System parameters that can be set include enabling and disabling signature lines on graphs, data tables and reports; automatic starting of LMS Express when Windows starts and selecting what units of measure are displayed.

Blank Page

Chapter 2 Getting Started

This chapter describes the **LMS Express** environment and the operating system requirements necessary to run.

Installation Requirements

Note: The LMS Express installation program will configure your system such that even if you installed it when logged in as a Windows Administrator, you can login as a Windows low level user and access LMS Express.

The Minimum PC Requirements are a computer running one of the following MS Windows Operating Systems.

- Windows 10, 32 & 64 Bit
- Windows 11 64 Bit
- Windows Server 2019 64 Bit
- Windows Server 2022 64 Bit

And have:

- Available serial, USB, or Network port for manual data downloads.
- Available serial, USB, or Network port for real-time data collection.

A digital copy of this manual is available through your installation program.

Startup

Once LMS Express is installed launch LMS Express by double clicking the icon on your desktop:



Figure 2-1 LMS Express Icon

Alternately, LMS Express can be started by opening the Start Menu, Programs Menu, Lighthouse Worldwide Solutions, and select LMS Express.

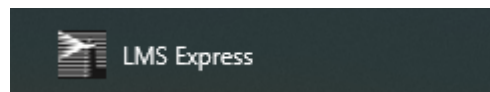


Figure 2-2 Start Menu access to LMS Express

Setup Wizard

Once LMS Express is installed and the first time LMS Express is launched, the LMS Express Setup Wizard - Welcome to LMS Express screen will display.

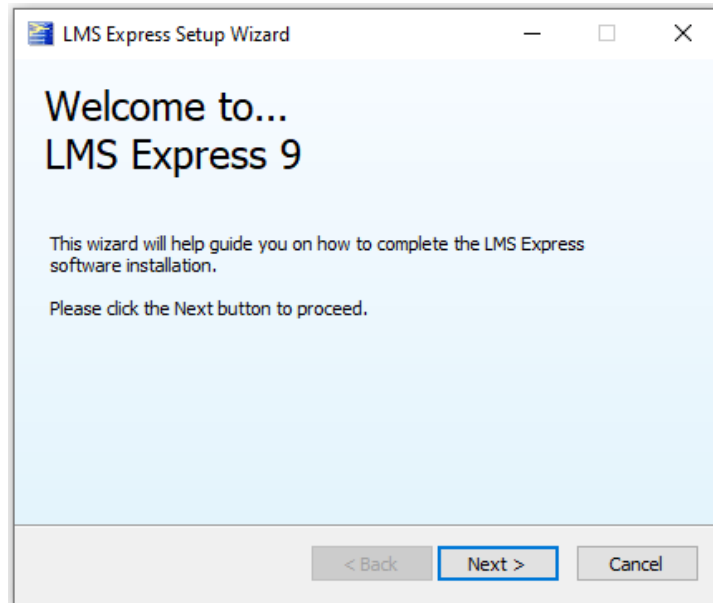


Figure 2-4 LMS Express Setup Wizard

Click the Next button.

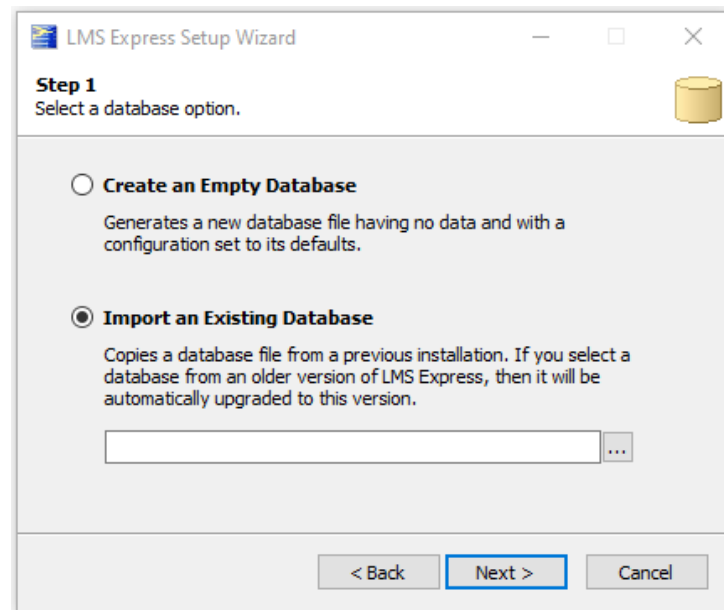


Figure 2-5 LMS Express Setup Wizard - Step 1

If this is a new installation of LMS Express, select Create an Empty Database and click Next.

If you are upgrading from a previous version of LMS Express and want to keep your previous data and configuration, select Import an Existing Database, use the “...” button to locate the previous “main.mdb” (LMS Express 7) or “main.db3” (LMS Express 8, LMS Express 9) LMS Express database file, and click Next.

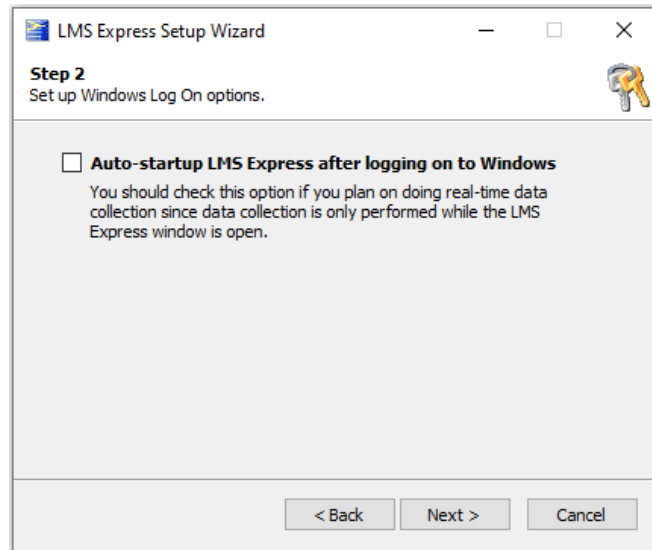


Figure 2-6 LMS Express Setup Wizard - Step 2

If you want LMS Express to automatically start when Windows starts, check the Auto-startup check box. This is especially recommended if you collect data real-time.

Click Next. The LMS Express Setup Wizard will display its closing window. Clicking Finish will launch LMS Express.

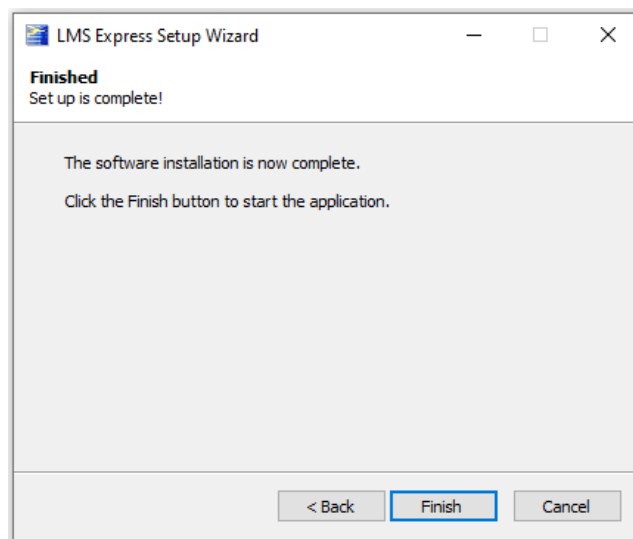


Figure 2-7 LMS Express Setup Wizard – Finish

Licensing Operations During Startup

- A license window will display on the initial setup.
- Your Product Key is 30 characters and should be provided when you purchase LMS Express. If you cannot find your Product Key, please contact support and they will be able to assist.

Lms Express 9

Enter your Product Key

Need to find your Product Key?

Your Product Key is 30 characters and should be provided when you purchase Lms Express. If you cannot find your Product Key, please contact support and they will be able to assist.

Example: EXP12-123AB-ABC12-123AB-ABC12-123AB

Continue

Attempt to automatically activate my product online. ☐

Offline Registration
To register your product offline, please contact support.

Machine ID
200a0b06dcf83009dcdbd01f1c7ef8c8a

Finish Cancel

Import

Our customer support team can generate a license file using your Product Key and Machine ID that you can then import.

Online Activation

Online activation will connect to our LWS License Server and check for a license that matches that product key and registers it to the current Machine ID.

- Check box “Attempt to automatically activate my product online”.
- Enter your Product Key (30 characters).
- Click Continue. (The **Finish** button will become active after product key is validated)
- Click Finish

Offline Activation

Offline activation requires the user to contact LWS Support and provide the Machine ID from the computer with LMS Express installed. License request can be emailed to licensing@golighthouse.com.

- LWS Support will provide a license file.
- Enter the Product Key (30 character code). Uncheck the “Attempt to automatically activate my product online” checkbox. The Import button will enable.
- Enter the Product Key and click the Import button.

If an invalid, corrupted or the wrong license file is located, the license error screen (Figure 2-3) displays:

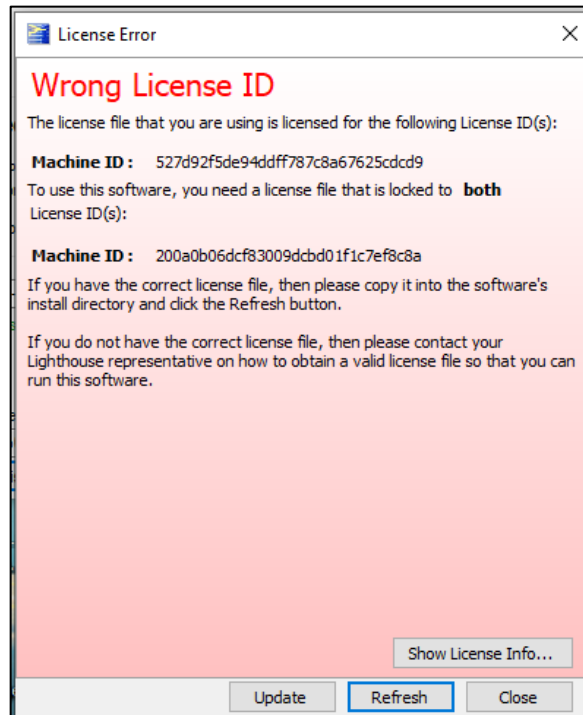


Figure 2-3 License Error Screen

When you have a valid license file available, press Update and repeat the Online or Offline instructions to load the valid license file and product key.

License Expiration Warning Notices

- License expiring notices at 90 days, 60 days, and 30 days prior
- License expiring alerts on the LMS Express Thin Client are indicated on the bottom banner.
- **Green** color banner when expiration is over 90 days away.
- **Yellow** color banner when expiration is < 90 days away (number of days until expiration is also displayed).
- **Yellow** color and pulsing when expiration are < 60 days away (number of days until expiration is also displayed).
- **Red color** and **pulsing** when expiration are < 30 days away (number of days until expiration is also displayed).
- **Red color** and **pulsing** when license is expired or otherwise invalid.

When a license is expired:

- Real-time data collection capabilities will be disabled.
- No manual data transfer, no real-time data collection.
- Users can always view and analyze previously collected data from a valid license period.
- Users can view charts, graphs, and historical data.

Login

Once the correct Product Key and License file have been detected and the database has been initialized or updated, LMS Express will start.

Logins are disabled by default and LMS Express starts and immediately displays the splash screen followed by the main application window.

Enabling logins and checking the “Force user to log in on application startup” property in the Setup User Logins window, causes the program to display one of the following Login screens when the application starts.



Figure 2-8 Login Window(s)

Splash Screen

The splash screen displays upon starting or logging into LMS Express.

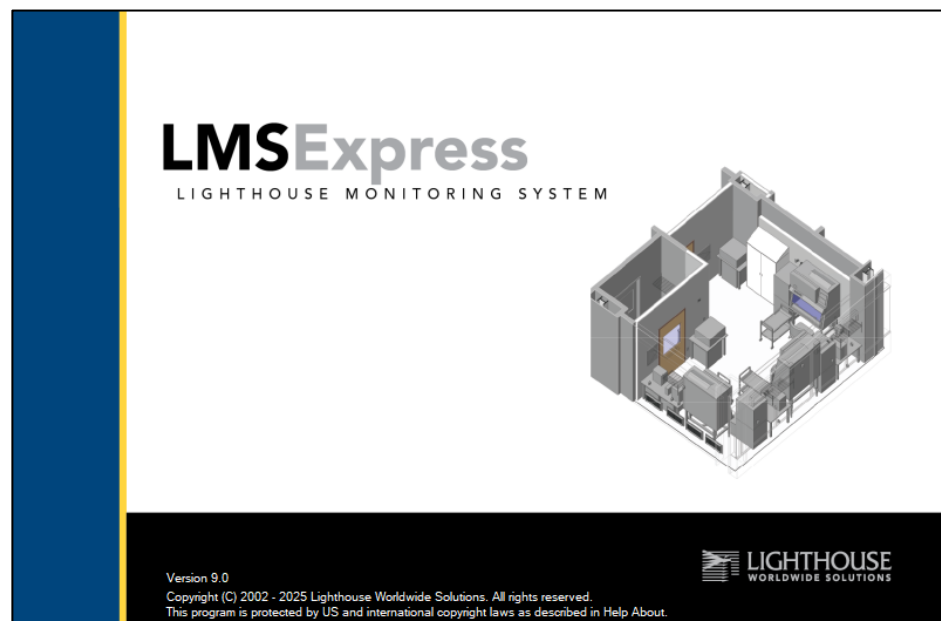


Figure 2-9 LMS Express Splash Screen

Main Window

After LMS Express startup is complete, the Home screen is displayed.

Note: Real-Time Data Status and Alarm Logging and Maps are available.

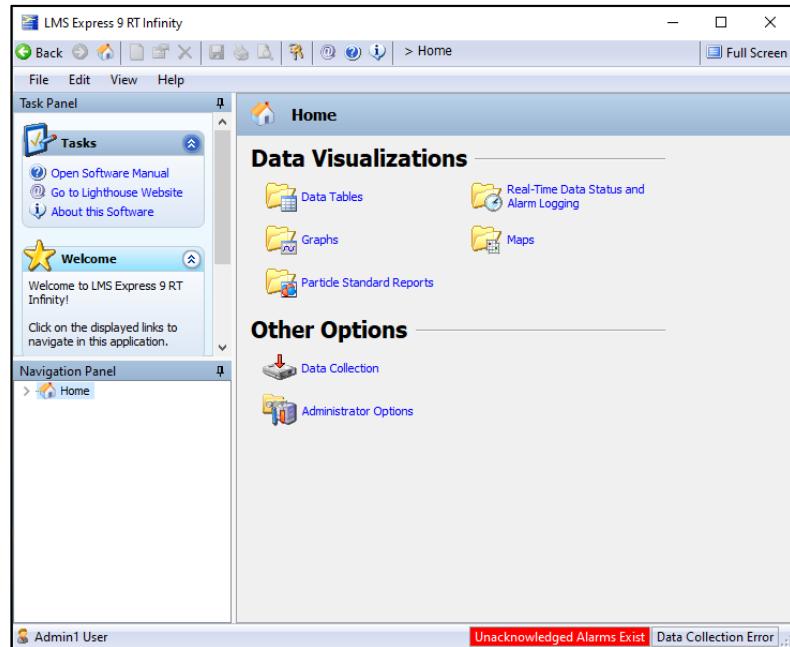


Figure 2-10 Main Window

Basic User Interface

The LMS Express user interface was designed to be easy to use. It is split into two basic parts: Data View area (status bar and view area.) and Navigation Tools (Menu, Toolbar, Task Panel and Navigation Panel).

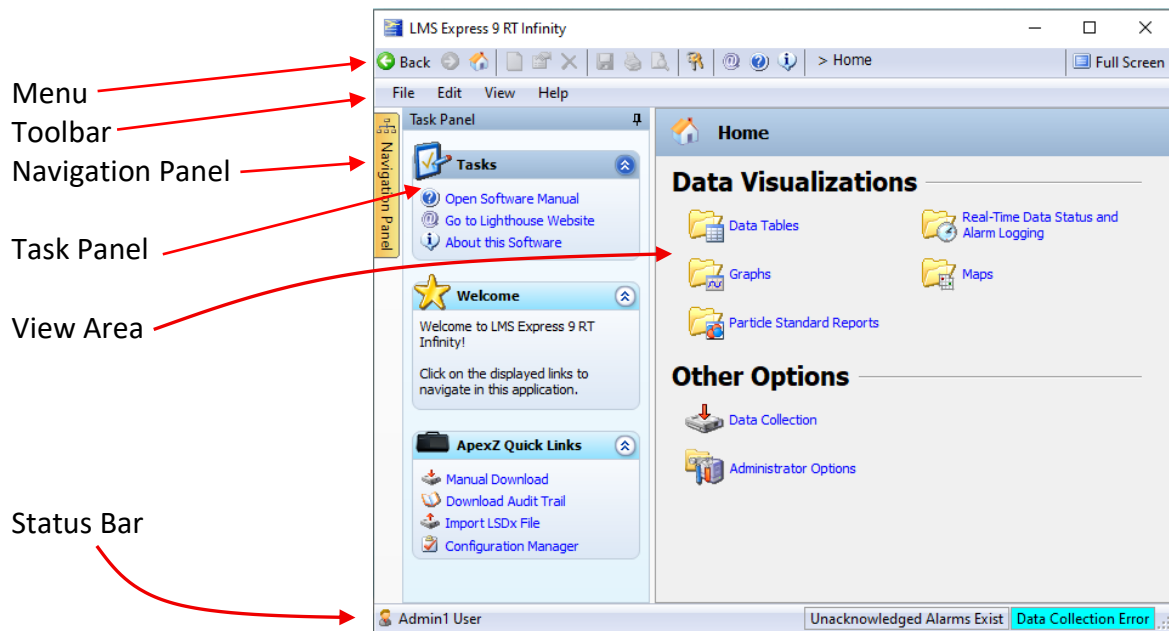


Figure 2-11 User Interface

View

The View Area displays graphs, data tables, reports, logs or active configuration information. LMS Express allows the user to save multiple graphs, data tables and standard reports but only one view can be displayed at a time, i.e. one graph, data table or standard report.

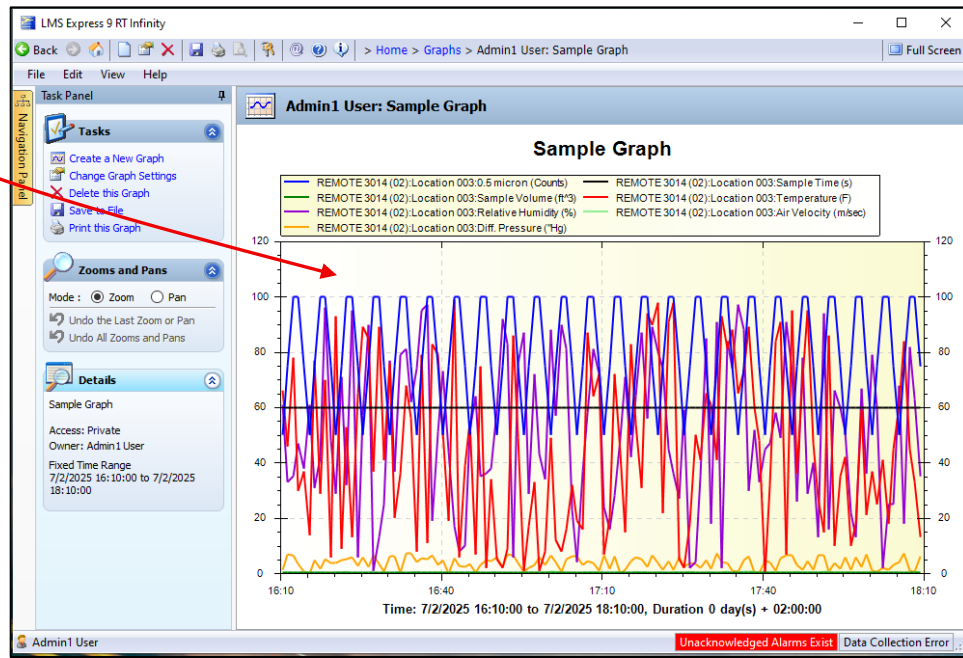


Figure 2-12 Example Graph View Area

Status Bar

The Status bar at the bottom of the LMS Express Main window displays the logged-in user's full name. If LMS Express is installed and alarms are enabled, the current overall status will appear on the right side of the status bar. See "Status and Alarms" for more details. If the user has loaded an archive database, the right side of the status bar will say "Archive".



Figure 2-13 LMS Express Status bar

Navigation

Toolbar

The Toolbar buttons navigate between views, implement actions on the current view and open a web browser link to our corporate website www.golighthouse.com. Not all buttons apply to all views and some are disabled for views that do not use them.



Figure 2-14 LMS Express Tool bar

The first three buttons, Back, Forward and Home, provide a simple way to navigate through LMS Express.



Figure 2-15 Browser Navigation - Back, Forward and Home

Note: Use the Back, Forward and Home buttons to quickly navigate through Express

Click the Back button to re-display previous views, including previously viewed graphs, data tables, standard reports and menus.

Click the Forward button to advance to the next view.

Click the Home button to return to the Home view and display the Main menu in the View Area.



Figure 2-16 Home View, Main Menu Displayed in View Area

Click a menu item on the Home view area to go to that item.
The Home Main menu contains the following options:

Data Table: Display a data table.

Graph: Display a graph.

Particle Standard Report: Display a standard report (Fed Std 209E, ISO 14644-1:1999, ISO 14644-1:2015, EU GMP Annex 1, or BS-5295).

Real-Time Data Status and Alarm Logging: Display real time location, instrument and data set status.

Maps: Display a map.

Data Collection: Manually download data from an instrument. Set up real-time data collection from instrument(s).

Note: You must be logged in as an Administrator to view or use the functions on the Administrator Options screen.

Administrator Options: Administrators can access system options for LMS Express, including unit conversion; naming and viewing instruments; editing location names and numbers; database maintenance and archiving; managing user accounts and logins; viewing the Event log; and setting up alarms and warnings.

Browser Path

The browser path of the current view is displayed on the right side of the toolbar at all times.

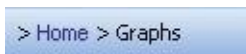


Figure 2-17 Example of Browser Path

Blue items in this path are links. Clicking on one of these links will display the associated view.

Toolbar Buttons

The following table describes the commands available on the toolbar.

Note: Use the Home menu and/or toolbar buttons to access graph, data table, standard reports, data collection and administrator options.

Button	Command	Description
	Back	Click this button to re-display the most recent display view.
	Forward	Click this button to display the next previously displayed view. If the current view is the most current view, this button will be disabled.
	Home	Click Home to display the Home view, i.e. the home menu in the view area.
	New	Add a new item such as a new graph, data table, standard report, user account or log entry. This button is disabled in some views.
	Setup	Open a configuration dialog for the current view. For example, display the Graph's information if a graph is  currently viewed. The dialog window will be different for different views. This button is disabled in some views.
	Delete	Delete the current item. For instance, delete the current user or graph. This button is disabled in some views.
	Save As	Opens Save As dialog box and saves the current view's information to a file. The file format depends on the view being saved. This button is disabled in some views.
	Print	Open a Print Setup dialog box and print the current view. This button is disabled in some views.

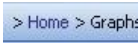
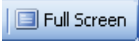
Button	Command	Description
	Print Preview	Use Print Preview for viewing Locations, Data tables, Alarms & Warning Log, Particle Standard Reports, and Event Log on screen before printing.
	Login/Logout	Only enabled if logins have been enabled by an administrator.
	Open	Opens a web browser to display the Lighthouse website www.golighthouse.com .
	Operators Manual	Display the Operators Manual (Adobe Acrobat Reader must be installed to view this file).
	About	Open the About dialog window to display the version number, copyright information and license agreement.
	Browser Path	Displays the current browser path at all times.
	Full Screen	Displays Full Screen, instead of a 'windowed' display.

Table 2-18 Table of Toolbar Buttons

Menu

The menu is used to select features or functions. The menu consists of four drop down menus: File, Edit, View and Help.

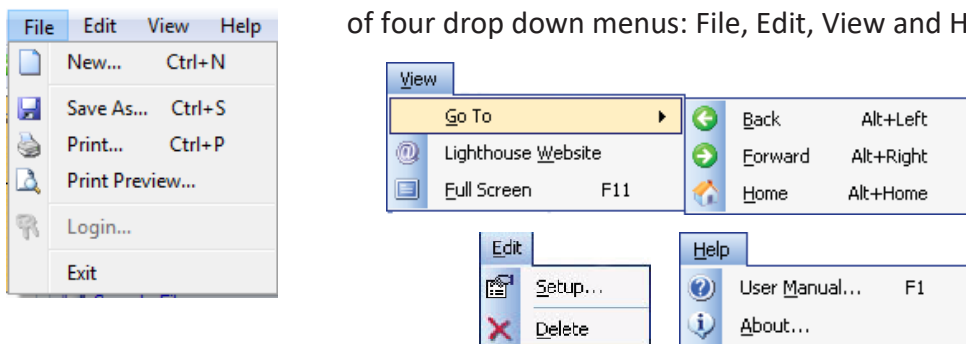


Figure 2-19 Drop Down Menus

About Window

Click the About toolbar button to display the LMS Express About window.



Figure 2-20 About Window

Click on the blue “Lighthouse Worldwide Solutions” to go to the website home page, www.golighthouse.com

Click on the License: type (blue text “**Subscription**”) will display the License information window for the LMS Express software installation.

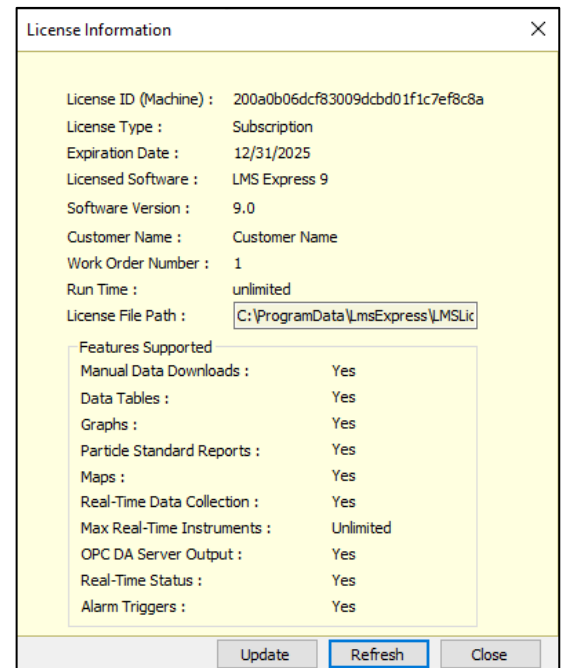


Figure 2-21 License Information Window

Note: The Task Panel can be minimized to expand the View area.

Task Panel

The Task Panel provides options for the current view and is located on the left side of the Express window.

Typical options on the Task Panel include New, Setup and Delete, but options vary by the view chosen. For example, the Task Panel options for graphs will be different than the options available on the real-time data collection task panel.

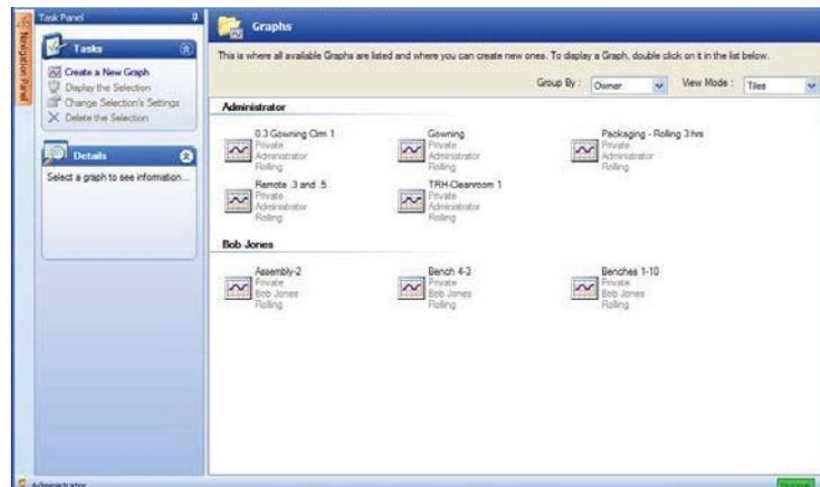


Figure 2-23 Task Panel, Graph Tasks

Navigation Panel

Note: Beginning users may want to use the Home, Back and Forward buttons for navigation until they feel comfortable with LMS Express' Advanced options.

The Navigation Panel gives advanced users a quick way to move between LMS Express views and options.

The Navigation Panel is located on the left side of the LMS Express window.

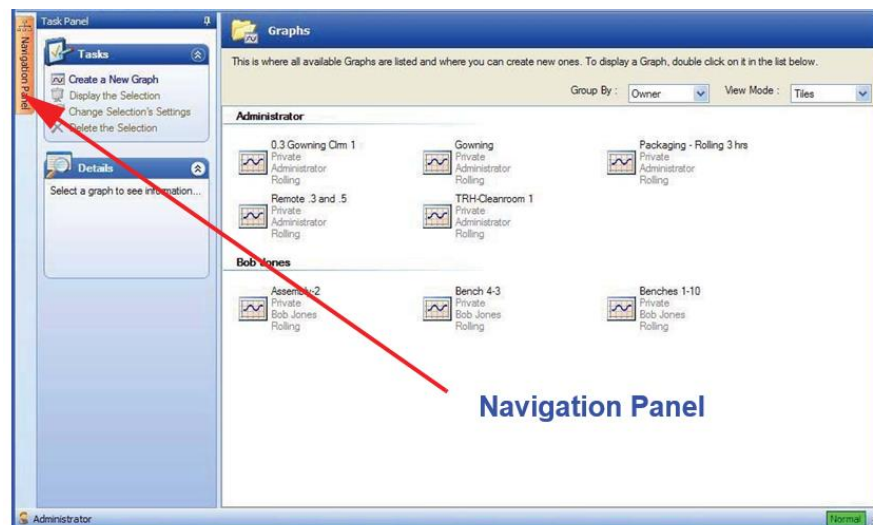


Figure 2-24 Navigation Panel - Minimized

Clicking on the Navigation Panel will display the Navigation list. The Navigation Panel window initially contains only the root option, Home. Clicking on Home expands the Navigation Panel.

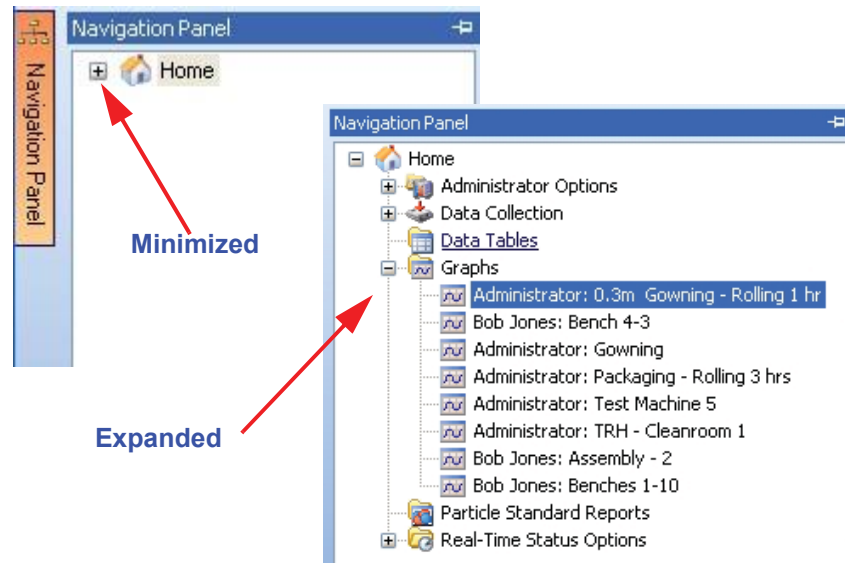


Figure 2-25 Navigation Panel - Initial and Expanded Examples

As you open new options, the Navigation Panel will reflect which options have been accessed by expanding them in its menu tree.

Shutdown

LMS Express Shutdown

If logins are not enabled, you may shut down LMS Express in one of three ways:

- Click **Alt+F4**;
- click on the “x” in the program’s upper right corner;
- click on the system menu (the icon in upper left corner of the window) and select Exit.

If logins have been enabled, the current user must be at least a Power User to shut down LMS Express. If the current user is not a Power User or an Administrator, the user must log off and a Power User or Administrator log on. After a successful change of users, you may use any of the above choices to shut the program down.

LMS Express Shutdown (real time data active)

If real time data retrieval is active when shutdown is requested and Prompt User on Exit is enabled in the Application Properties window, LMS Express will prompt the user to confirm the shutdown action, shown in Figure 2-25.



Figure 2-26 LMS Express Shutdown Warning Dialog Box

If the request comes through an automatic shutdown/restart as in during Windows Automatic Update process or if Prompt User on Exit is disabled in the Application Properties window, it will close the program and allow automatic restarting of the system.

Chapter 3 Graphs

This chapter describes how to create and display graphs in LMS Express.

Graphs

LMS Express users can create and display static graphs. LMS Express users can additionally create and display rolling graphs.

Graphs can be viewed by either everyone (Public) or only by owner and administrator. Each graph can display data for up to 10 data sets at a time and have up to 5 control lines enabled.

To display or create a graph, first display the Graph view by clicking the Home button and then the Graphs option from the Home menu.

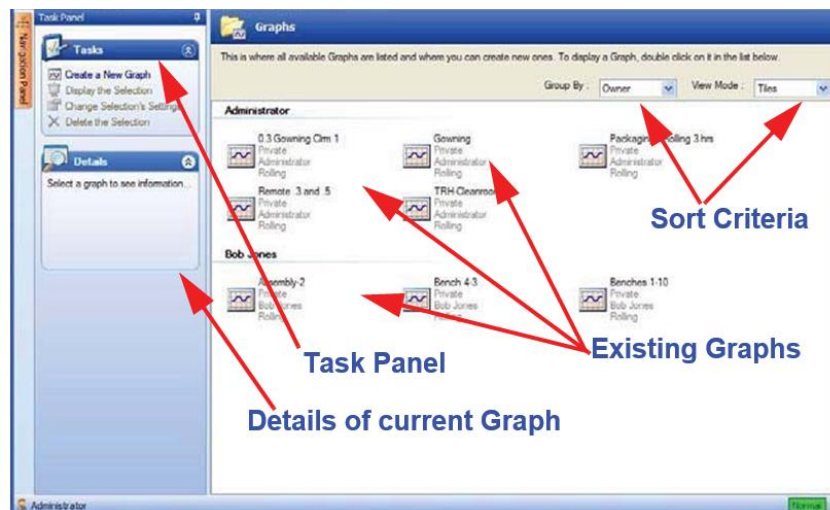


Figure 3-1 Graph View

Sort Criteria

Existing graphs can be sorted by several types of group criteria (<None>, Access, Owner, or Time Range) and displayed as icons, tiles, or detailed records.

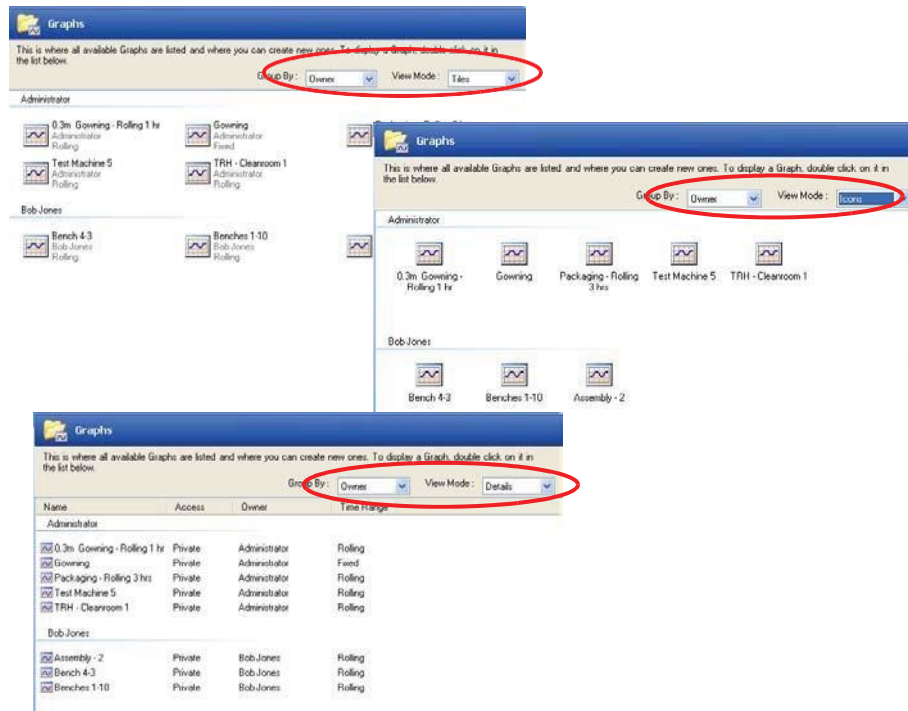


Figure 3-2 Sort By Criteria and Results

Task Panel

When a graph, or list of graphs, is displayed in the View, the Graph's Task Panel appears on the left side of the active window.

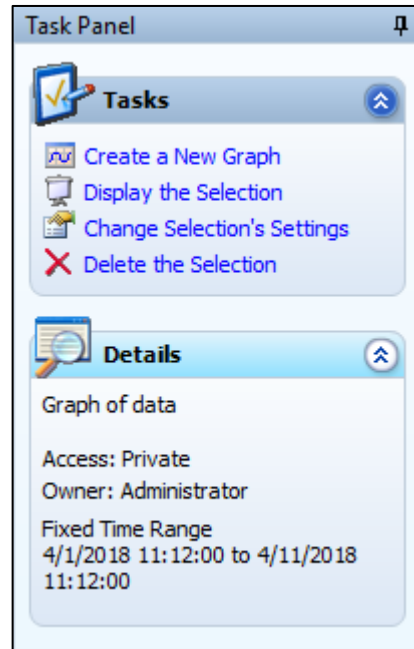


Figure 3-3 Graph Task Panel

The Graph Task Panel contains two sections: Tasks and Details.

Under the Tasks section users can:

- Create a New Graph
- Display the Selection
- Change Selection's Settings
- Delete the Selection

Under the Details section, users see details about the currently selected Graph, including its name, who can access it, who owns it and its type (fixed time range or rolling) and data range.

Tool Bar Buttons

When the Graph view is displayed the following toolbar buttons are enabled:

Button	Function
	New: Create a new graph.
	Setup: Opens the Setup Graph dialog.
	Delete: Delete the current graph.
	Save As: Opens a Save As dialog window and allows the user to export the currently displayed graph to a bitmap (*.bmp), GIF (*.gif), Jpeg (*.jpg, *.jpeg), PNG (*.png) or Tiff (*.tif, *.tiff) file.
	Print: Opens the Printer Setup dialog and allows the user to print the currently displayed graph.

Table 3-4 Graph Toolbar Buttons

Displaying a New Graph

To create a graph, follow these steps:

1. Click on “Create a New Graph” on the Graph Task Panel. The Graph Setup window appears.

Note: Only Administrators can change who owns or can view a graph.

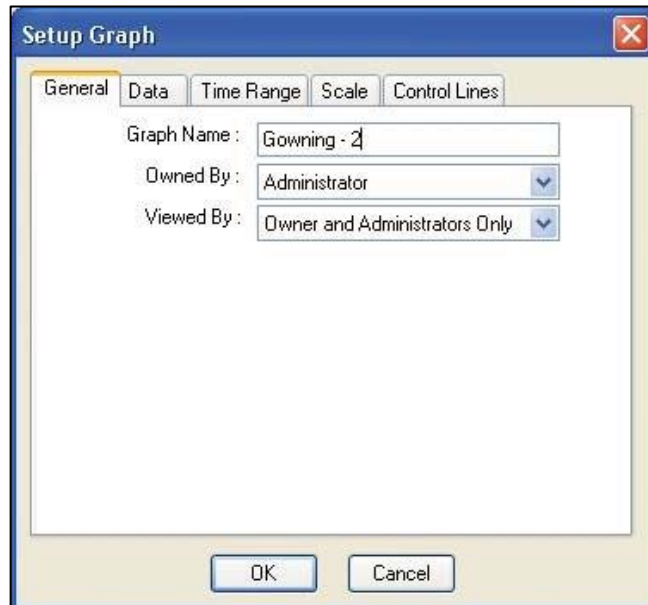


Figure 3-5 Graph Setup - General Information

Note: By default, users see only graphs of their own or that were made public. Administrators can see all graphs.

2. Enter a name for the graph.
3. Administrators can change or choose the owner of the graph by selecting a username from the Owned By list. If the user is not an administrator, this field is grayed out.
4. Administrators can select which users can see the graph - either just the owner and administrators, or everyone. If the user is not an administrator, this field is grayed out.

- Click on the Data tab. The following information is displayed.

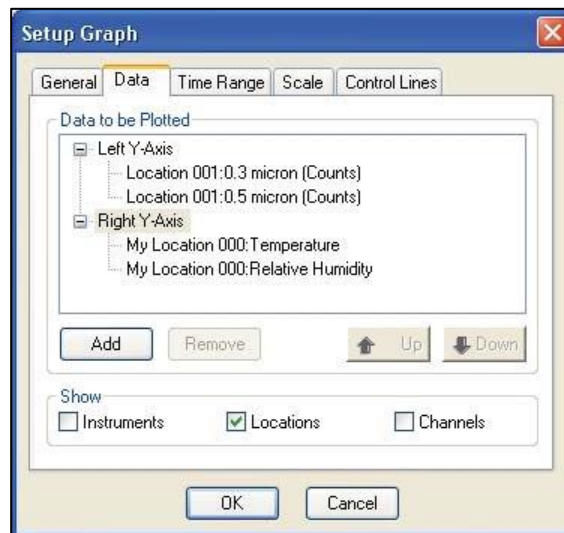


Figure 3-6 Graph Setup - Data Set Information

- Data can be plotted on either the left or right axis. Click on either the Left Y-Axis or Right Y-Axis items in the “Data to be Plotted” list to select an axis.
- Next, select at least one data set. Select data set(s) by clicking the Add button in the “Data to be Plotted” section of the Setup Graph window (Figure 3-6).

Note: The graph’s Y-Axis can be linear or logarithmic. The logarithmic Y-Axis minimum is 1. See the Graph Setup - Scale tab

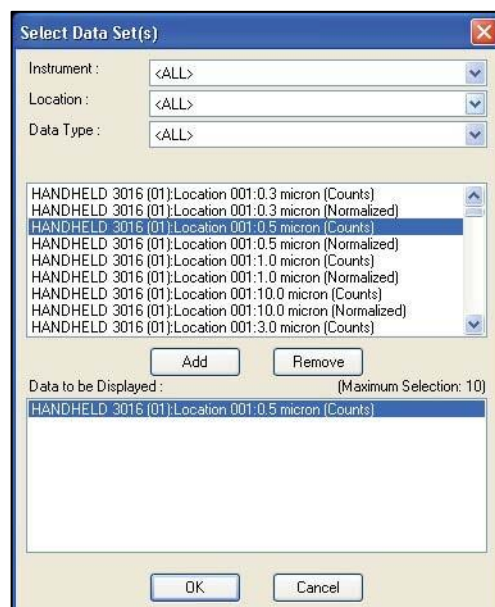


Figure 3-7 Select Data Set(s) window

Note: At least one data set must be selected before a graph can be displayed.

Note: You can select up to 10 Data Sets to be displayed on the graph.

8. By default, all data sets are shown in the list. To filter the list, select an Instrument, Location or Data Type from the appropriate pull down list box. The list of available data set names is updated according to the chosen criteria.

9. Add data set names to the list at the bottom of the window by highlighting a data set in the list and clicking the Add button.

10. When you have added all the data set names you wish to display to the "Data to be Displayed" list, click the OK button.

11. To change the order of the data sets in the Graph legend, select a data set name and click the up or down arrow buttons.

12. To remove a data set from the "Data to be Plotted" list, select it and click Remove.

13. In the Show section of the window, checking or unchecking Instrument, Location and/or Channel displays or hides, the respective part of Data Set Name(s) in the Graph Legend and in the Data to be Plotted list on the Graph Setup window.

Note: Channels are only shown for analog data.

For example, if Show Instrument, Location and Channel are all checked, the legend of the displayed graph appears (Figure 3-7).

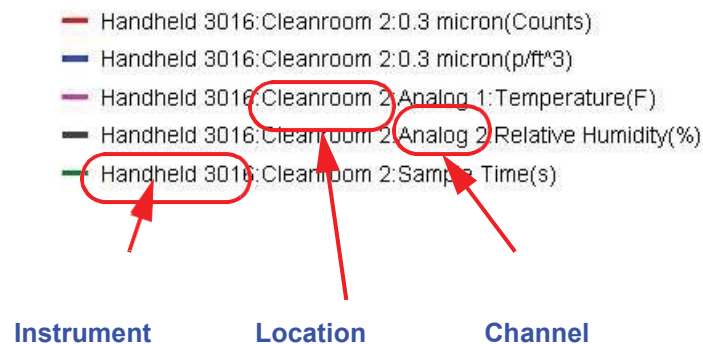


Figure 3-8 Graph Legend

Note: You can find the date range of all the data in the database by clicking on the Database icon in the Administration Options section.

Note: LMS Express users can build and display rolling or static Graphs.

14. Next, click the Time Range tab, as shown in Figure 3-8.

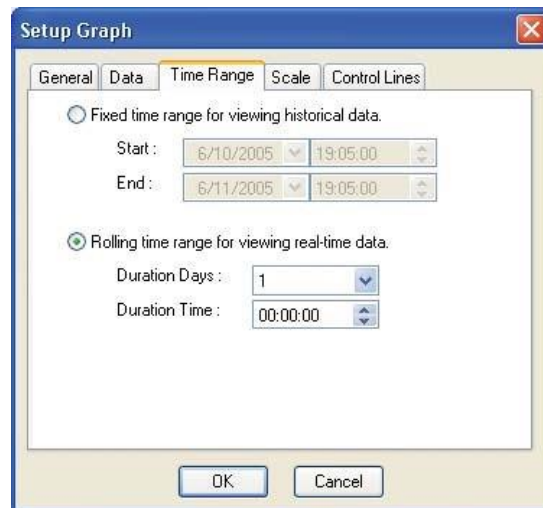


Figure 3-9 Graph Setup - Time Range Information

15. In the Time Range section of the Setup Graph window, select the type of graph.

Rolling Graph

LMS Express users can display a rolling graph. If Rolling is selected, enter a duration of data to be displayed. Users can enter a number of days, hours, or a combination of both for duration. Data for the last hours or number of days entered is displayed. The displayed data updates continuously, given the sample and hold times.

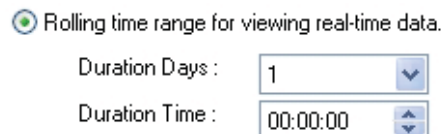


Figure 3-10 Time Range fields for a Rolling Graph

Fixed Graph

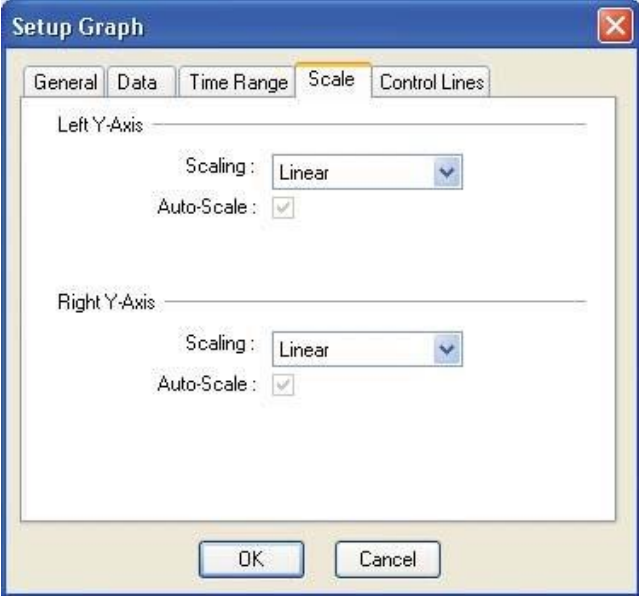
If you select fixed for the time range, enter the start and end date and time for which you wish to display data. Only data in this date and time range is displayed.

 Fixed time range for viewing historical data.

Start :	6/10/2005	12:15:00
End :	6/10/2005	16:00:00

Figure 3-11 Time Range fields for a Fixed Graph

16. Next, click the Scale tab. The following information is displayed.



The image shows a 'Setup Graph' dialog box with the 'Scale' tab selected. The dialog has five tabs: General, Data, Time Range, Scale, and Control Lines. Under the 'Scale' tab, there are two sections: 'Left Y-Axis' and 'Right Y-Axis'. Each section has a 'Scaling' dropdown menu set to 'Linear' and an 'Auto-Scale' checkbox that is checked. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Figure 3-12 Graph Setup - Scale Information

17. The graph can be scaled linear or logarithmic on both the left and right Y-Axis. Select linear or logarithmic from the pull down lists for each axis.

18. Click next on the Control Lines tab. The following information displays.

Note: The names of enabled graph control lines appear on the graph's legend.

Note: Enabled Control Lines always display on the graph. They are not auto scaled off the graph.

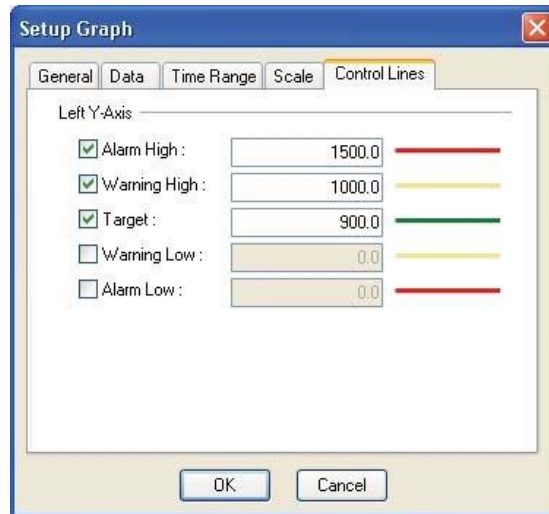


Figure 3-13 Graph Setup - Control Line Information

19. Five control lines are available: Alarm High, Warning High, Target, Warning Low and Alarm Low. To enable a control line, check the box next to the line you want to display and then enter a value for the line. Disable a control line by un-checking it.

Select 1 or more control lines to display on the graph.

Click on the pulldown field to choose the style and width for the control line.

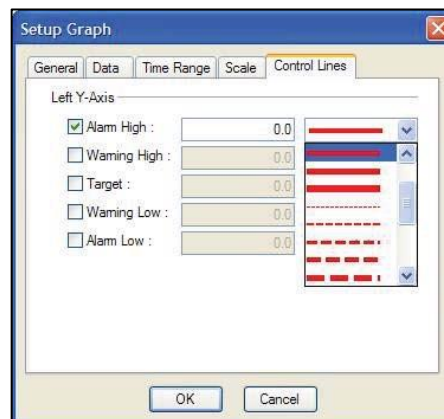


Figure 3-14 Graph Setup - Selecting Control Line Style and Width

20. Click OK to build the graph. The graph view area updates to display data for the instruments, date and time, that you selected.

Displaying Existing Graphs

If you have created one or more graphs, the names of the graphs are displayed in the graph view. Users can create unlimited graphs.

Note: Administrators can see all graphs users and administrators have created. By default, users can see only their own graphs unless an Administrator changes it to be viewable by "Everyone (Public)"

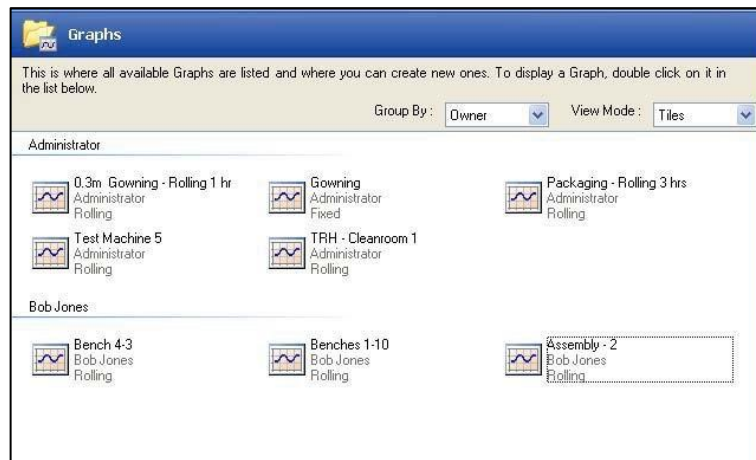


Figure 3-15 Graph View -List of Graphs (Administrator)

Use the Group By and View Mode lists to sort and display the graphs in different ways. A list of all graphs the user can access is also available under Graphs in the Navigation Panel.

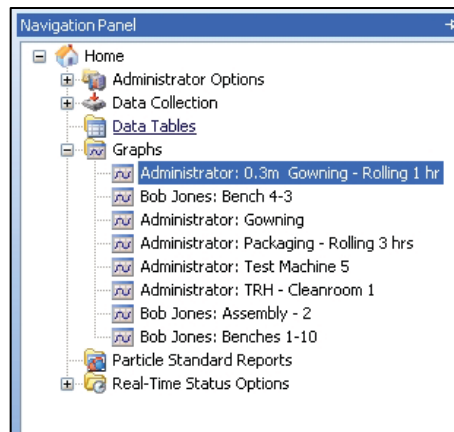


Figure 3-16 Navigation Panel - Graphs (Administrator User)

Note: Everyone can view a graph that is set to "Everyone (Public)". Only Administrators can view graphs that are set to "Owner and Administrators Only".

In the Navigation Panel, graph names are prefaced by the username.

For example,

BJones: Gowning - Assembly 2
Administrator: Gowning

To display another existing graph, click on it in the Navigation Panel, or double click on it on the Graph view.

Graph Display Features

When a graph is displayed the following features are available for the user.

Data Point Pop up (Mouse Over)

Moving the mouse over a data point and pausing displays the data point's date, time and value.

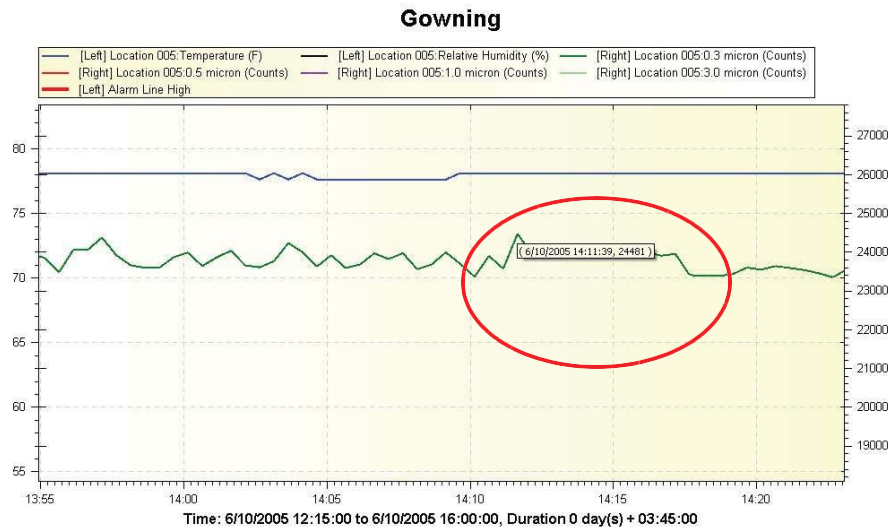


Figure 3-17 Graph - Data Point Tool Tip

Zoom

To zoom data on a graph, first select Zoom Mode from the Task Panel.

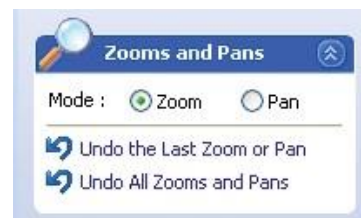


Figure 3-18 Graph - Zoom mode selected

Then, select an area on the graph to zoom by clicking and holding down the left mouse and dragging it. This highlights and selects an area of the graph.

The graph rebuilds to display just the selected area once the user releases the left mouse button.

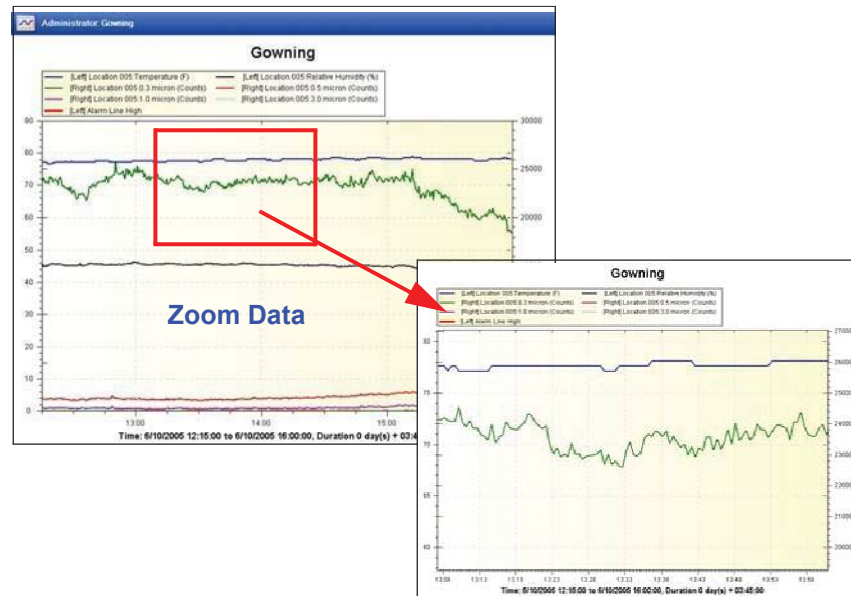


Figure 3-19 Zooming Graph Data

To undo the current zoom, select "Undo the Last Zoom or Pan" from the Task Panel.

To return to the original view of the graph, click "Undo All Zooms and Pans" on the Task Panel.

Pan

The pan feature allows moving the data displayed in the window left, right, up or down. Select Pan on the Graph Task Panel.

Note: Use the zoom and pan features together to zoom into an area, such as a particular data set, then pan the data, which, in effect, scrolls through that data.



Figure 3-20 Graph - Pan Mode Selected

Move (hover) the cursor over the Graph View area, which changes it to a large 4-point cross. Choose a spot on the graph, click and hold the left mouse button and move the mouse. This action moves the graph within the graph display area.

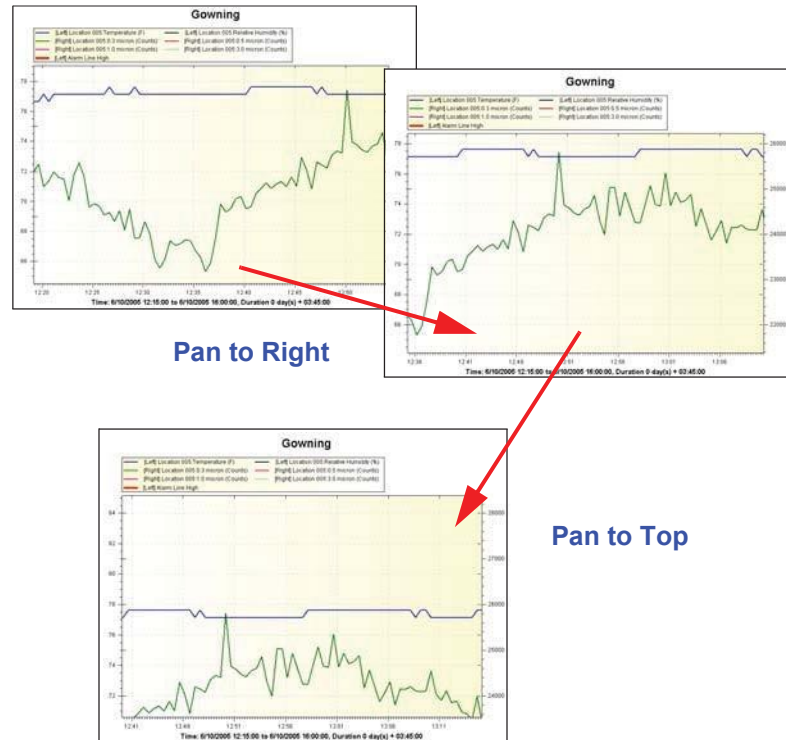


Figure 3-21 Graph - Pan Example

To undo the current pan, select "Undo the Last Zoom or Pan" from the Task Panel.

To return to the original view of the graph, click "Undo All Zooms and Pans" on the Task Panel.

Details

The Details section on the Graph Task Panel displays information about the currently selected or displayed graph, including name, access, owner, type (fixed or rolling time range) and date range.



Figure 3-22 Graph – Details



Printing

Printing Graph

When the Graph is viewed you can print it by clicking on the Print button on the toolbar.

1. Display the Graph.
2. Click the Print button.
3. On the default print window that appears, select a printer and click OK

Exporting Data

Data can be exported to several different file types.



Export Graph

To save the graph as a Bitmap, Gif, Jpeg, PNG, or Tiff file, follow these steps:

1. Display a graph.
2. Click on the Save As button.
3. On the Save As window that appears, select the file type to save to: Bitmap (*.bmp), Gif (*.gif), JPEG (*.jpg, *.jpeg), PNG (*.png), or Tiff (*.tif, *.tiff).
4. Use the navigation tools at the top of the dialog box to select the directory into which to save the file.
5. Enter a name in the "File Name" field.
6. Click Save.

Blank Page

Chapter 4 Data Tables

This chapter describes how to create and display data tables in **LMS Express**.

Data Tables



Data tables allow you to view data in a tabular, Excel like format and can be used for historical data review. Summary information, such as average, minimum and maximum values help you analyze data.

LMS Express users can create and display static Data Tables. LMS Express users can additionally create and display rolling Data Tables.

Data Tables can be viewed by either everyone (Public) or only by owner and administrator. Each Data Table can display data for up to 16 data sets at a time.

To display or create a Data Table, first display the Data Table view by clicking the Home button and then the Data Tables option from the Home menu.

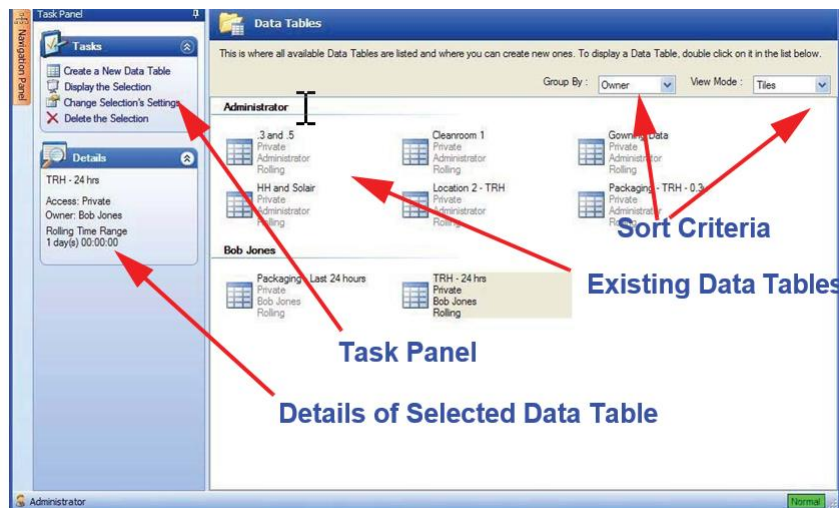


Figure 4-1 Data Table View

Sort Criteria

Existing Data Tables can be sorted by several types of group criteria (<None>, Access, Owner, or Time Range) and displayed as icons, tiles, or detailed records.

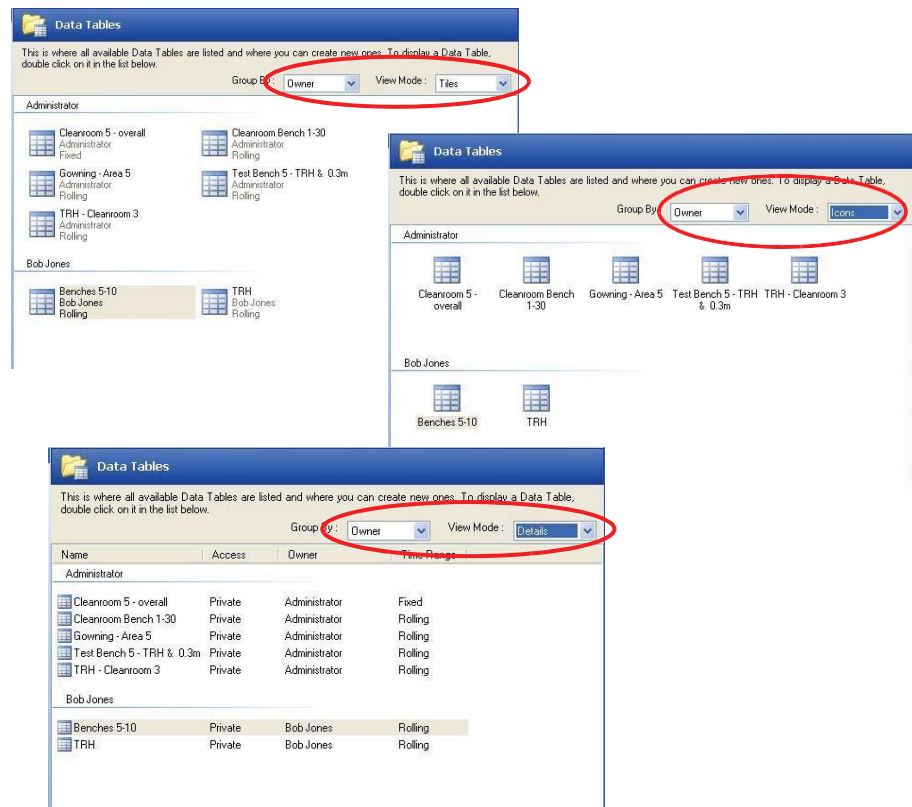


Figure 4-2 Sort By Criteria and Results

Task Panel

When a Data Table, or list of Data Tables, is displayed in the View, the Data Table's Task Panel appears on the left side of the LMS Express window.

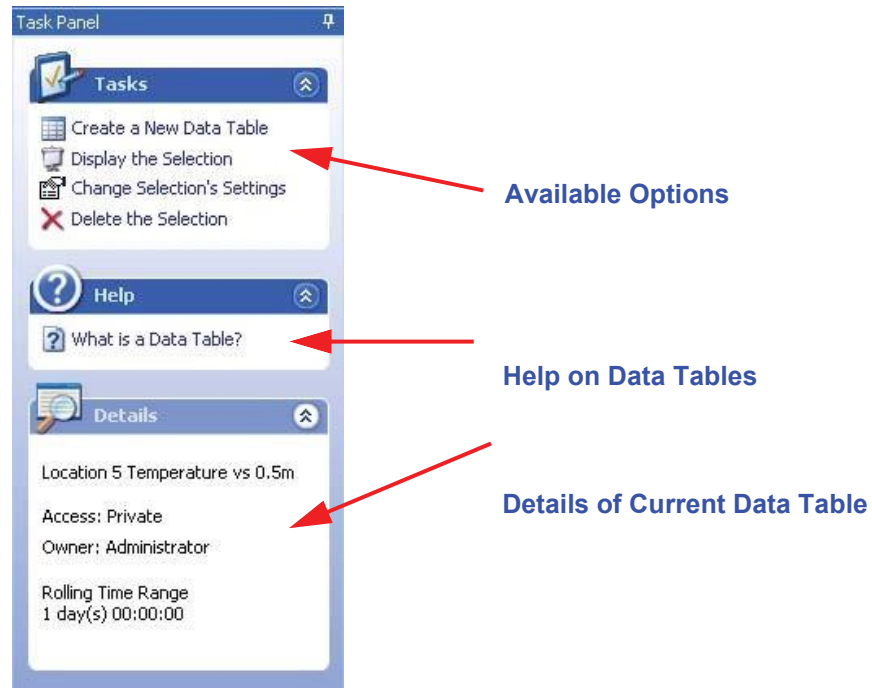


Figure 4-3 Task Panel

The Data Table Task Panel contains three sections: Tasks, Help and Details.

Under the Tasks section users can:

- Create a new Data Table
- Display an existing Data Table
- Change the selected Data Table's settings
- Delete the Data Table.

Under the Help section, users can click to get help on Data Tables.

Under the Details section, users see details about the currently selected Data Table, including its name, who can access it, who owns it, and time range (fixed time range or rolling).

Tool Bar Buttons

When the Data Table view is displayed the following toolbar buttons are enabled:

Button	Function
	Create a New Data Table: Creates a new data table.
	Display the Selection: Displays the data table.
	Change Selection's Settings: Opens the Setup Data Table dialog.
	Delete: Delete the current Data Table.
	Save to File: Opens a Save As dialog window and allows the user to export the currently displayed Data Table to an Excel (*.xls) or CSV (*.csv) file.
	Print Preview: Opens a Print Preview dialog window and allows the user to setup page dimensions and print.
	Print the Data Table: Opens the Printer Setup dialog and allows the user to print the currently displayed Data Table.

Table 4-4 Data Table Toolbar Buttons

Creating a New Data Table

Note: Only Administrators can change who owns or can view a Data Table.

To create a Data Table, follow these steps:

1. Click on “Create a New Data Table” on the Data Table Task Panel. The Data Table Setup window appears.

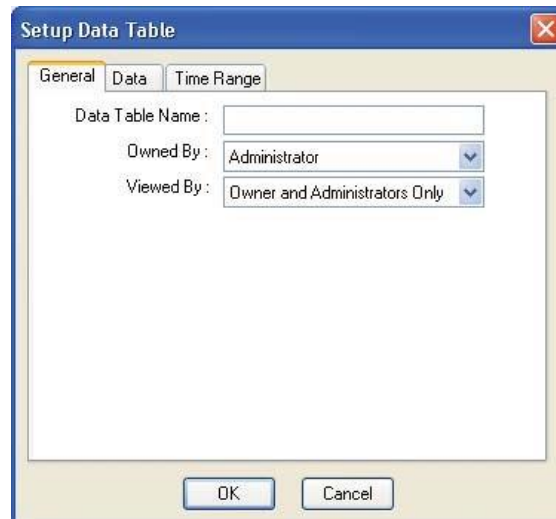


Figure 4-5 Setup Data Table General Tab

Note: By default, users only see data tables they own or data tables made public. Administrators can see all Data Tables.

2. Enter a name for the Data Table.
3. If the user is logged in as an administrator, the user can change or choose the owner of the Data Table by selecting a username from the Owned By list. If the user is not an administrator, this field is grayed out.
4. If the user is an administrator, the user can select which users can see the Data Table - either just the owner and administrators, or everyone. If the user is not an administrator, this field is grayed out.

- Click on the Data tab.

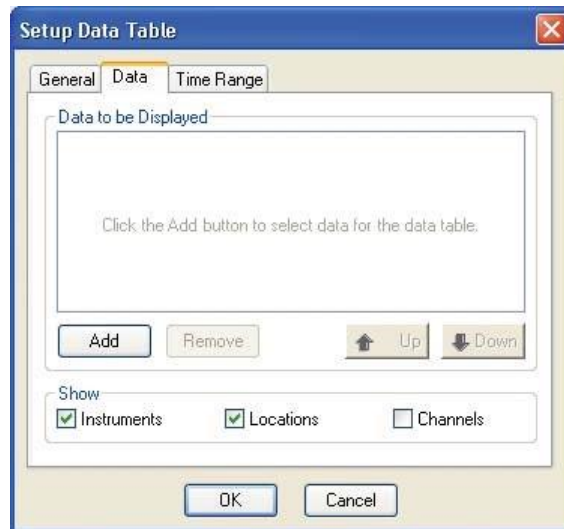


Figure 4-6 Data Tab

- Select at least one data set by clicking the Add button in the “Data to be Displayed” section of the Setup Data Table window. The following Select Data Set(s) window appears

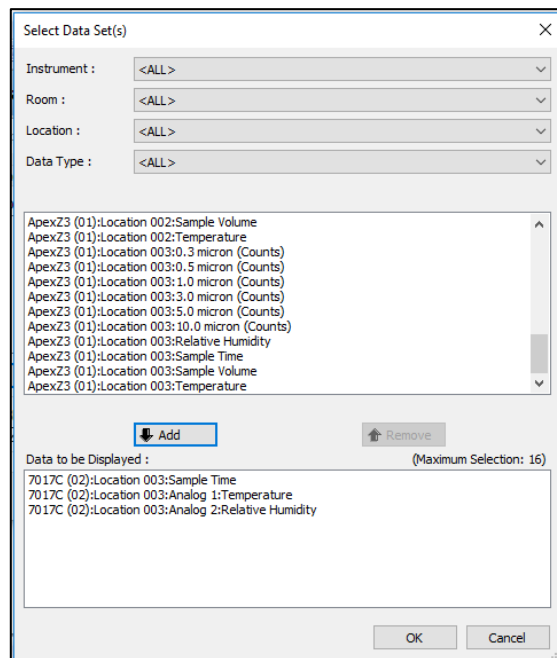


Figure 4-7 Select Data Set(s)

Note: At least one Data set must be selected before a Data Table can be displayed.

- By default, all data sets are shown in the list of data sets. To filter the list, select an Instrument, Room, Location or Data Type from the appropriate pull down list box. The list of available data set names is updated according to the chosen criteria.

Note: You can select up to 16 Data Sets to be displayed on the Data Table.

8. Add data set names to the list at the bottom of the window by highlighting a data set in the list and clicking the Add button or double clicking on the data set.
9. When you have added all the data set names you wish to display to the “Data to be Displayed” list, click the OK button.
10. To change the order of the data set columns, select a data set name and click the up or down arrow buttons.
11. To remove a data set from the Data to be Displayed list, select it and click Remove.
12. In the Show section of the window, checking or unchecking Instrument, Location and/or Channel displays or hides, the respective part of Data Set Name(s) in the Data Table header.

Note: Channel names are only shown for analog data.

For example, if you select Show Instrument, Show Location and Show Channel, the header of the Data Table appears as follows:

Instrument
Location
Channel
Data Type
Units

6/27/2005 10:38:00 to 6/28/2005 10:38:00					
	HANDHELD 3016 (01)	HANDHELD 3016 (01)	HANDHELD 3016 (01)	HANDHELD 3016 (01)	HANDHELD 3016 (01)
	Location 000	Location 000	Location 000	Location 000	Location 000
	0.3 micron	0.5 micron	Analog 1	Analog 2	Sample Time
Time Stamp	(Counts)	(Counts)	Temperature (F)	Relative Humidity (%)	(s)

Figure 4-8 Data Table header, All Parts of Data Set Name(s)

Note: You can find the date range of all the data in the database by clicking on the Database icon in the Administrator Options section.

13. Next, click the Time Range tab. This dialog box appears:

The screenshot shows the 'Setup Data Table' dialog box with the 'Time Range' tab selected. It contains two radio button options: 'Fixed time range for viewing historical data.' and 'Rolling time range for viewing real-time data.' The 'Fixed' option is currently selected. Below it, 'Start' and 'End' date and time fields are shown with dropdown arrows. The 'Rolling' option is also visible with 'Duration Days' and 'Duration Time' fields.

Figure 4-9 Data Table Setup - Time Range Information

14. In the Time Range section of the Setup Data Table window, select fixed or rolling.

Rolling Data Table

Note: LMS Express users can build fixed Data Tables, create and display rolling and fixed Data Tables.

Users can display a rolling Data Table. After selecting Rolling, enter a duration to be displayed. Enter a number of days, hours, or a combination of both. Data is displayed for the last hours or days entered. The displayed data updates continuously.

 Rolling time range for viewing real-time data.

Duration Days :

Duration Time :

Figure 4-10 Time Range fields for a Rolling Data Table

Fixed Data Table

If the user selects Fixed for the Time range, they must enter the start and end date and time. Only data in the entered date and time range is displayed when the Data Table is displayed.

 Fixed time range for viewing historical data.

Start :

End :

Figure 4-11 Time Range fields for a Fixed Data Table

15. Click OK to build the Data Table. The Data Table view area updates to display data for the instruments, date and time, that you selected.

7/11/2005 15:00:00 to 7/11/2005 15:50:00

Time Stamp	Location 001 0.3 micron (Counts)	Location 001 0.5 micron (Counts)	Location 001 0.7 micron (Counts)	Location 001 1.0 micron (Counts)	Location 001 Temperature (F)	Location 001 Relative Humidity (%)	Location 001 Sample Time (s)	Location Sample Volume (ft ³)
7/11/2005 15:39:05	0	0	0	0	81.0	47.3	30	
7/11/2005 15:39:35	0	0	0	0	81.0	47.3	30	
7/11/2005 15:40:05	0	0	0	0	81.0	47.5	30	
7/11/2005 15:40:35	0	0	0	0	81.0	47.6	30	
7/11/2005 15:41:05	0	0	0	0	81.0	47.5	30	
7/11/2005 15:41:35	0	0	0	0	81.0	47.5	30	
7/11/2005 15:42:05	0	0	0	0	81.0	47.5	30	
7/11/2005 15:42:35	0	0	0	0	81.0	47.3	30	
7/11/2005 15:43:05	0	0	0	0	81.0	47.2	30	
7/11/2005 15:43:35	1	0	0	0	81.5	47.2	30	
7/11/2005 15:44:05	0	0	0	0	81.0	47.2	30	
7/11/2005 15:44:35	0	0	0	0	81.0	47.3	30	
7/11/2005 15:45:05	0	0	0	0	81.0	47.3	30	
7/11/2005 15:45:35	0	0	0	0	81.0	47.5	30	
7/11/2005 15:46:05	0	0	0	0	81.0	47.3	30	
7/11/2005 15:46:35	0	0	0	0	81.0	47.6	30	
7/11/2005 15:47:05	0	0	0	0	80.5	47.5	30	
7/11/2005 15:47:35	0	0	0	0	80.5	47.6	30	
Average	0.1	0.0	0.0	0.0	81.1	47.6	30.0	
Maximum	1	0	0	0	81.5	48.3	30	
Minimum	0	0	0	0	80.5	47.0	30	
Standard Deviation	0.3	0.0	0.0	0.0	0.3	0.3	0.0	
Bad Flow Status	True	True	True	True	NA	NA	True	

Figure 4-12 Sample Data Table

Use the scroll bars to scroll through the data when there is more data in the view than the Data Table can display at one time.

When you scroll down or up through the data, the Data Table's header remains fixed. Only the data records will scroll.

The bottom of the Data Table will contain a section of summary statistics as shown in Figure 4-12.

Statistics

6/28/2003 12:32:41	19	1.0	19	2	17	2
6/28/2003 12:33:42	16	1.0	16	3	14	3
6/28/2003 12:34:43	20	1.0	20	3	18	3
Average	12.4	1.0	12.5	2.9	11.1	2.6
Maximum	120	1.0	121	16	108	14
Minimum	0	1.0	0	0	0	0
Standard Deviation	12.3	0.0	12.4	2.0	11.1	1.8

Figure 4-13 Data Table Statistics Summary

Data Status

When recorded data contains error conditions, it will be displayed on the data table in different color(s) so that you can easily identify it.

Data Status colors are as follows in order of priority.

- 1) Instrument Malfunction (purple)
- 2) Laser Status (purple)
- 3) Flow Status (blue)
- 4) Instrument Overflow (orange) Overflow occurs when particle counts on the instrument exceed its maximum count.

Data Table

Signature: Administrator
7/1/2003 00:00:00 to 7/6/2003 14:03:00

Time Stamp	Location 2 0.3 micron (Counts)	Location 2 0.3 micron (p/ft ³)	Location 2 0.5 micron (Counts)	Location 2 0.5 micron (p/ft ³)	Location 2 Temperature (F)	Location 2 Sample Time (s)
7/6/2003 14:01:24	1555	186600.0	800	96000.0	75.2	5
7/6/2003 14:01:30	800	96000.0	400	48000.0	75.2	5
7/6/2003 14:01:36	1555	186600.0	800	96000.0	75.6	5
7/6/2003 14:01:42	800	96000.0	400	48000.0	75.2	5
7/6/2003 14:01:48	1555	186600.0	800	96000.0	75.2	5
7/6/2003 14:01:54	800	96000.0	400	48000.0	75.6	5

Data Status

Figure 4-14 Data Table Showing Data Status

If any compromised data is displayed during a given time range, the summary section of the Data table will also report the compromised data and contain additional rows for each type of compromised data.

Average	14186.8	1979.6	79.5	43.4
Maximum	14841	2151	79.6	43.7
Minimum	13582	1857	79.1	43.3
Standard Deviation	404.4	90.7	0.2	0.1
Instrument Malfunction	True	True	NA	NA
Service Laser	True	True	NA	NA

Figure 4-15 Data Table Summary section

To see details about the data's status, place your cursor over any cell in the data table or its summary section that contains compromised data. The data's status' appears in a tooltip.

Data Status tooltip messages include:

- Instrument malfunctioned
- Service Laser
- Bad flow rate
- Instrument data overflowed

Displayed Decimals and Units

The number of decimal places shown in the Data Table depends on the selected data set and units. See the Application Properties section of this manual for how to set the display units.

Displaying Existing Data Tables

If you have created one or more Data Tables, the names of the Data Tables are displayed in the Data Table view.

Note: Administrators can see all Data Tables users and administrators have created. By default, users can see only their own Data Tables unless an Administrator changes a Data Table to be viewable by "Everyone (Public)"



Figure 4-16 List of Data Tables (Administrator User)

Use the Group By and View Mode lists to sort and display the Data Tables in different ways.

A list of all Data Tables the user can access is also available under Data Tables in the Navigation Panel.

Printing

Printing Data Table

When the Data Table is viewed you can print it by clicking on the Print button on the toolbar.

1. View Data Table.
2. Click on the Print button.
3. On the default print window select your printer and click OK to print the Data Table.

Exporting Data

Data can be exported to several different file types.

Exporting Data Tables

A data table can be saved to an Microsoft Excel (*.xls) or comma separated value file (*.csv) by following these steps,

1. View the Data Table.
2. Click the Save As button on the Toolbar.
3. On the Save As window that appears, use the navigation tools at the top of the dialog box to select a directory into which to save the file.
4. Enter a name in the "File Name" field.
5. Select which file type to save it as: *.xls or *.csv.
6. Click on Save.

Chapter 5 Maps

This chapter describes how to create and display real-time maps. To create and display maps, LMS Express must be installed.

Maps

LMS Express users can create and edit map, drag and drop up to 50 data sets or instruments onto each map and assign a bitmap background to each map.

When displayed, maps update real-time. If alarm triggers are enabled as well or alarm groups are displayed, maps show the status for each data set or alarm group and the worse status per instrument.

Each map can be viewed by either everyone (Public) or by its owner and/or administrator users.

To display or create a map, first display the Map view by clicking the Home button and then the Maps option on the Home menu.

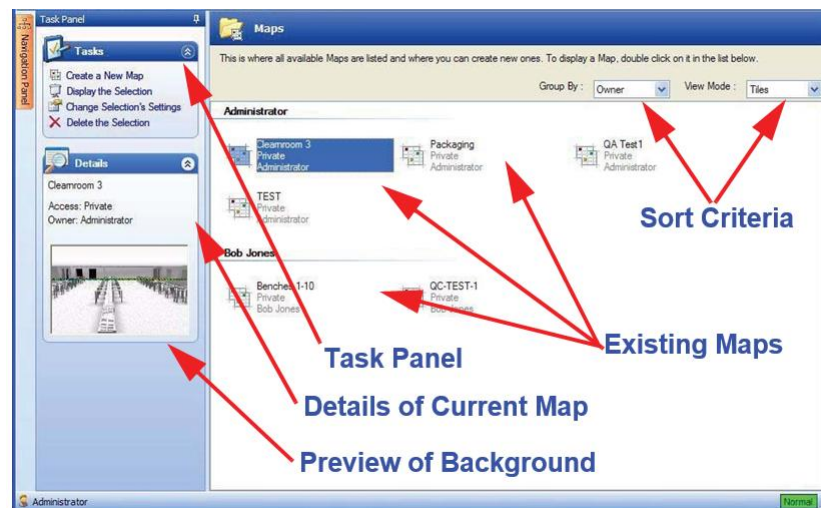
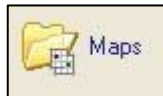


Figure 5-1 Map View

Sort Criteria

Existing maps can be sorted by several types of group criteria (<None>, Access or Owner) and displayed as icons, tiles, or detailed records.

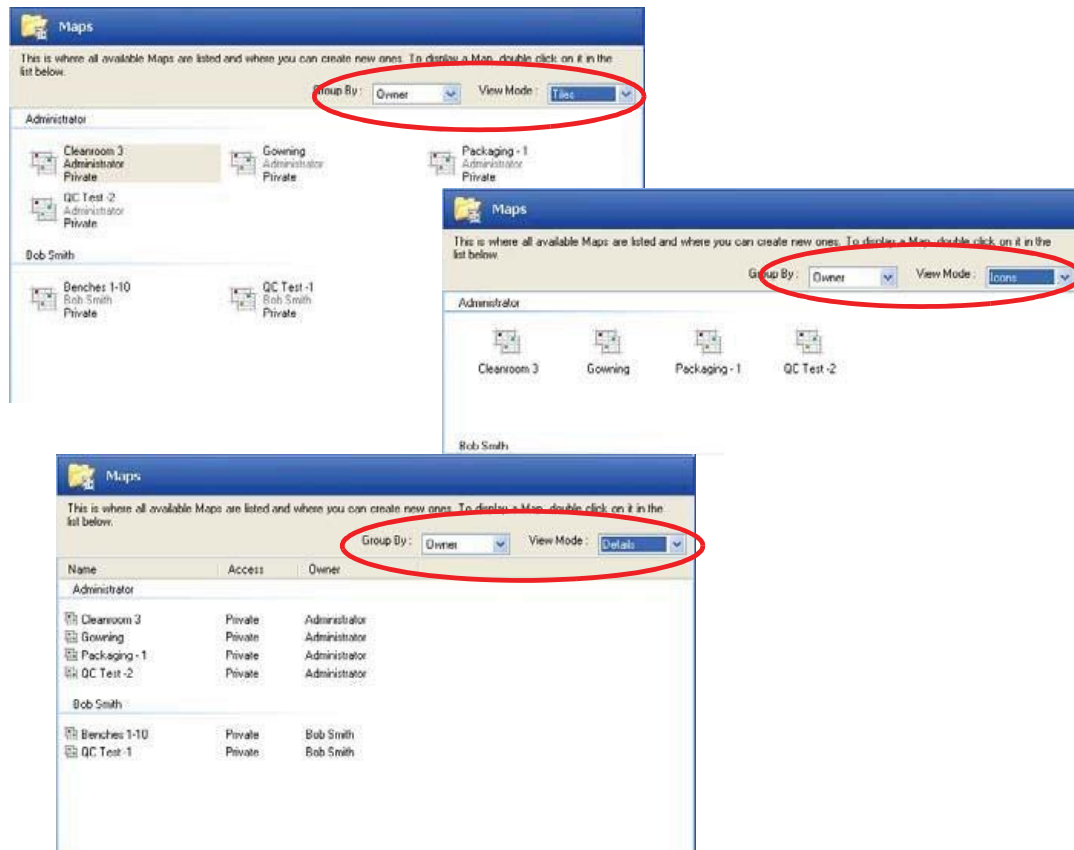


Figure 5-2 Sort By Criteria and Results

Task Panel

When a map, or list of maps, is displayed in the view, the Map's Task Panel appears on the left side of the LMS Express window.

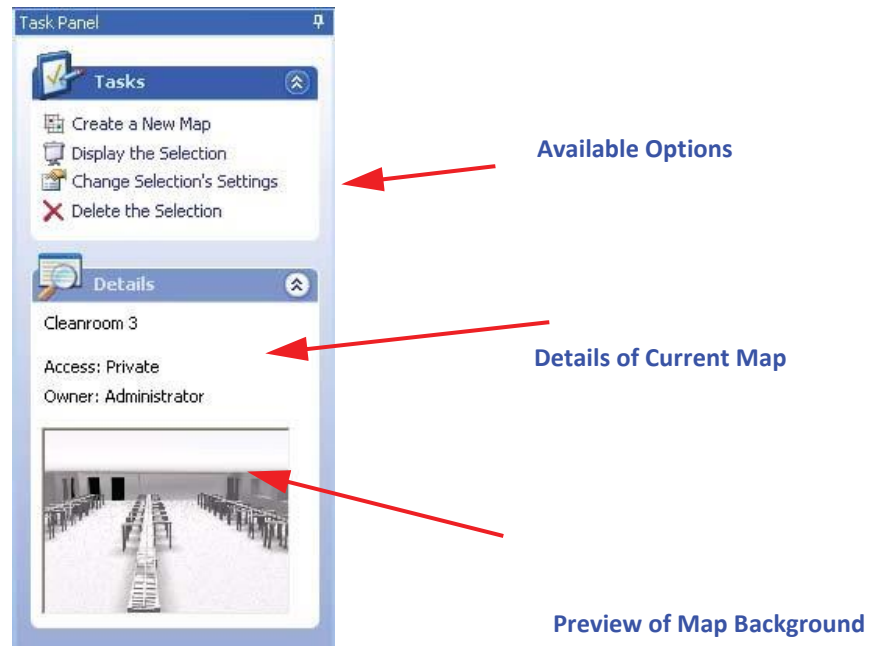


Figure 5-3 Task Panel Example

The Map Task Panel contains two sections: Tasks and Details.

Under the Tasks section users can:

- Create a new map
- Display an existing map
- Change the selected map's settings
- Delete the map.

Under the Details section, users see details about the currently selected map, including its name, who can access it, who owns it and a preview of its background.

Tool Bar Buttons

When the Map view is displayed, the following toolbar buttons are enabled:

Button	Function
	Create a New Map: Create a new map.
	Change Map Settings: Opens the Setup Map dialog.
	Delete this Map: Delete the current map.
	Save to Image File: Opens a Save As dialog window and allows the user to export the currently displayed map to a bitmap (*.bmp), GIF (*.gif), Jpeg (*.jpg,
	Print this Map: Opens the Printer Setup dialog and allows the user to print the currently displayed map.

Table 5-4 Map Toolbar Buttons

Displaying a New Map

To create a map, follow these steps:

1. Click on “Create a New Map” on the Map Task Panel. The Setup Map window appears.

Note: Only Administrators can change who owns or can view a map.

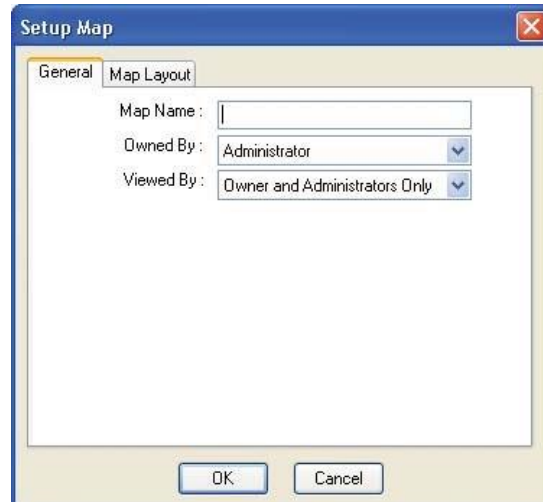
The image shows a 'Setup Map' dialog box with a blue title bar and a close button. It has two tabs: 'General' (selected) and 'Map Layout'. The 'General' tab contains three fields: 'Map Name' with a text input box, 'Owned By' with a dropdown menu showing 'Administrator', and 'Viewed By' with a dropdown menu showing 'Owner and Administrators Only'. At the bottom are 'OK' and 'Cancel' buttons.

Figure 5-5 Map Setup - General Information

2. Enter a name for the map.
3. If the user is logged in as an administrator, the user can change or choose the owner of the map by selecting a username from the Owned By list. If the user is not an administrator, this field is grayed out.
4. If the user is an administrator, the user can select which users can see the map - either just the owner and administrators, or everyone. If the user is not an administrator, this field is grayed out.

Note: By default, users see only maps they own or that were made public. Administrators can see all maps.

- Click on the Map Layout tab. The following information is displayed.



Figure 5-6 Map Setup - Map Layout

- The Map Layout window displays a preview of the map's background (if one is assigned) and how many instruments, alarm groups, data sets and/or cameras are assigned to the map.
- To edit the map, click the Edit Map button.
- The following Map Edit window appears.

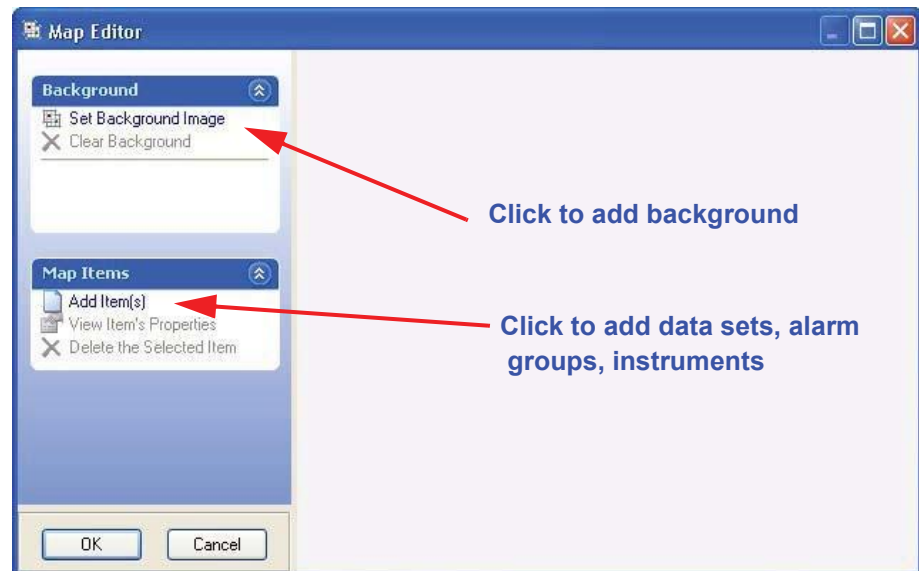


Figure 5-7 Map Edit window - New Map

9. Click Set Map Background Image.
10. On the Open window that appears, select a bitmap (*.bmp), Gif (*.gif), JPEG (*.jpg), PNG (*.png), or Tiff (*.tif, *.tiff) file to be used as the map's background.
11. After selecting the map background, click OK on the Open window to accept the selection.
12. The Map Editor window updates and displays the selected background.

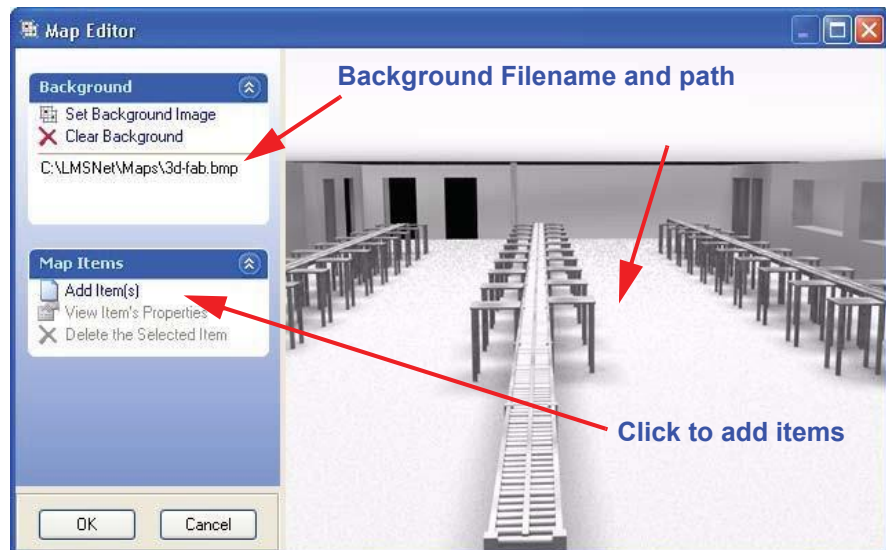


Figure 5-8 Map Editor - Background Assigned

Note: You can add up to 50 Data Sets, instruments, alarm groups, and cameras to each map.

13. If needed, to clear the background, click Clear Background.
14. To add a data set, alarm group, instrument or camera to the map, click Add Item(s).

15. Users can add instruments, alarm groups, data sets, and/or cameras to maps. On following window, select the type of item to add.

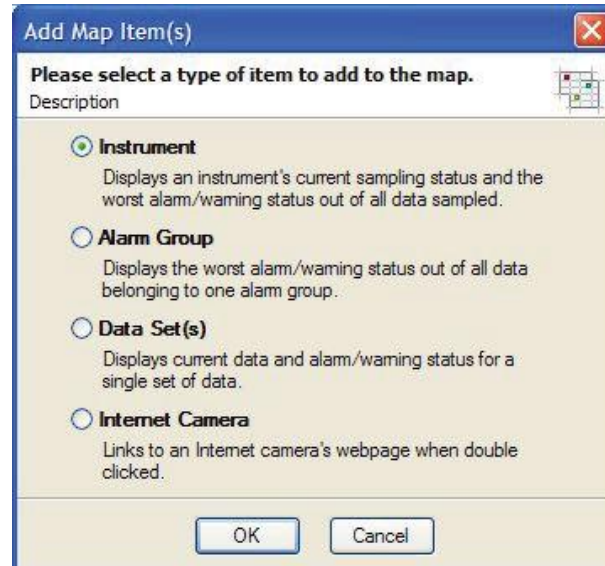


Figure 5-9 Map Editor - Add Map Items window

16. For this example, select Instrument and click OK.
17. The following Map Item: Instrument window appears.

Note: A map cannot have duplicate data sets, instruments, alarmgroups, or cameras.

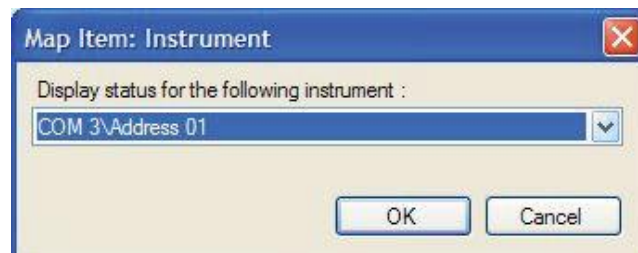


Figure 5-10 Map Editor: Add Instrument

18. Select an instrument from the pull down list.
19. Click OK.
20. The instrument (or item) is added to the map. By default, map items are added in the upper left corner of the Map Editor.

21. To move a map item to a different area of the map, select it and drag and drop it. When selected, a dashed circle will appear around the item.

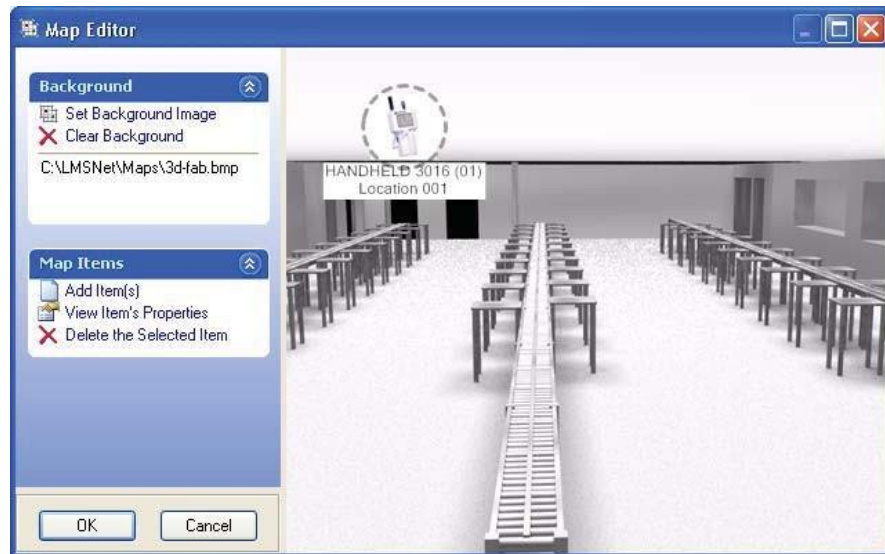


Figure 5-11 Map Editor - Selecting and Moving Map Item

Note: Right click on a map item in the Map Editor to show "Properties" and "Delete" options on the Map Editor Task Panel.

22. To remove an item from the map, select the item and click Delete the Selected Item.
23. To add more items, click Add Item(s) again.
24. After the user has added all the items they desire to the map, click the OK button to save the changes and close the Map Editor.
25. Click OK on the Setup Map window to close and save the map.

26. To display the map, double click on the map's name in the Map view area or select the map and click Display the Selection on the Task Panel.



Figure 5-12 New Map – Displayed

Displaying Existing Maps

If you have created one or more maps, the names of the maps are displayed in the map view.

Note: Administrators can see all maps users and administrators have created. By default, users can see only their own maps unless an Administrator changes a map to be viewable by “Everyone (Public)”.

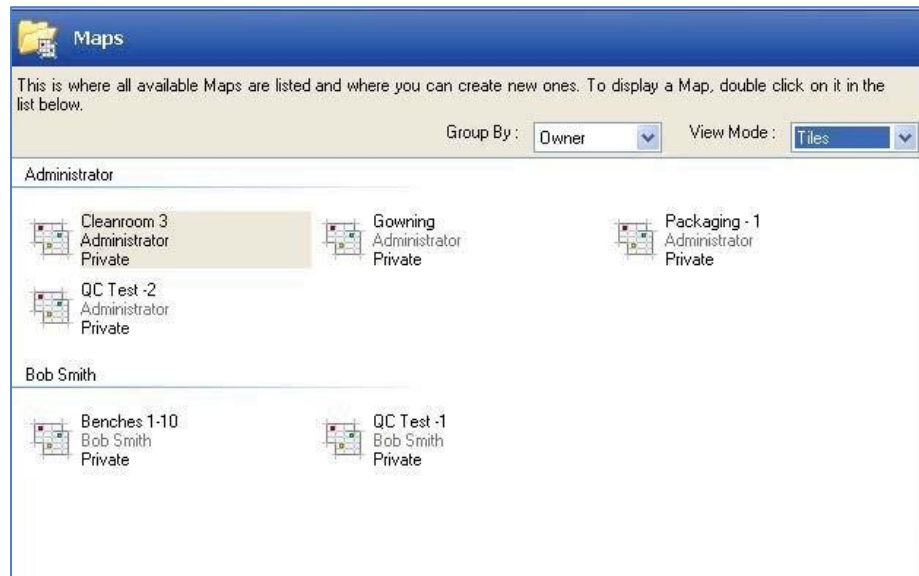


Figure 5-13 Map View - List of Maps (Administrator User)

Use the Group By and View Mode lists to sort and display the maps in different ways.

A list of all maps the user can access is also available in the Navigation Panel under the Maps folder.

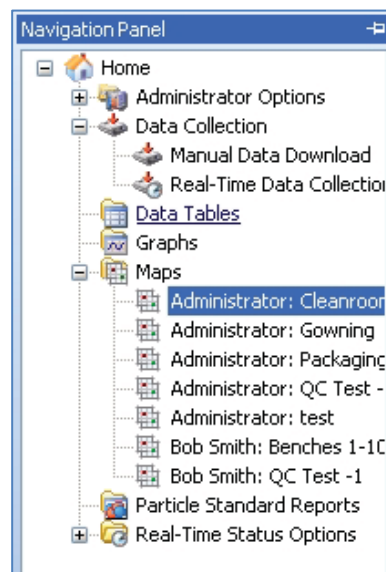


Figure 5-14 Navigation Panel - Maps (Administrator User)

Note: Everyone can view a map that is set to "Everyone ("Public)." Only Administrators can view maps that are set to "Owner and Administrators Only".

In the Navigation Panel, map names are prefaced by the username.

For example,

Bob Smith: QC Test - 1

Administrator: Gowning

To display another, existing map, double click on it on the Map view or Navigation Panel.

Map Real Time Status View

Note: Maps will show data collection errors for instruments, data sets and alarm groups.

When a map is displayed, the names of the instrument(s), camera(s), alarm group(s), and/or data set(s) are displayed under the icon for each map item. The last recorded value is also displayed for each data set and the status for each alarm group.

Instrument Status View

To see the real-time status of all data sets associated with the instrument, double click on an instrument on the map.

The image shows two screenshots of the LMS Express 9 RT Infinity software interface. The left screenshot shows the 'Map One' view with a map of a river and a red line indicating a data path. The right screenshot shows the 'Real-Time Data Status' view, which displays a table of data sets and their status.

Real-Time Data Status Table:

Name	Alarm Status	Value	Units	Date Time
location 001:0.3 micron (Counts)	Unknown		Counts	8/26/2025 09:00:09
location 001:0.3 micron (Normalized)	Unknown		p/ft^3	8/26/2025 09:00:09
location 001:0.3 micron (Differential)	Unknown		Counts	8/26/2025 09:00:09
location 001:0.3 micron (IAQ)	Unknown		µg/m^3	8/26/2025 09:00:09
location 001:0.3 micron (Summation)	Unknown		Counts	8/26/2025 09:00:09
location 001:0.5 micron (Counts)	Unknown		Counts	8/26/2025 09:00:09
location 001:0.5 micron (Normalized)	Unknown		p/ft^3	8/26/2025 09:00:09
location 001:0.5 micron (Differential)	Unknown		Counts	8/26/2025 09:00:09
location 001:0.5 micron (IAQ)	Unknown		µg/m^3	8/26/2025 09:00:09
location 001:0.5 micron (Summation)	Unknown		Counts	8/26/2025 09:00:09

At the bottom of the Real-Time Data Status window, there is a red status bar that reads: **Unacknowledged Alarms Exist Data Collection Error**.

Figure 5-15 Map Display - Instrument Status

Data Status View

To see details of a data set's real-time status, double click on a data set on the map. See below for an example.

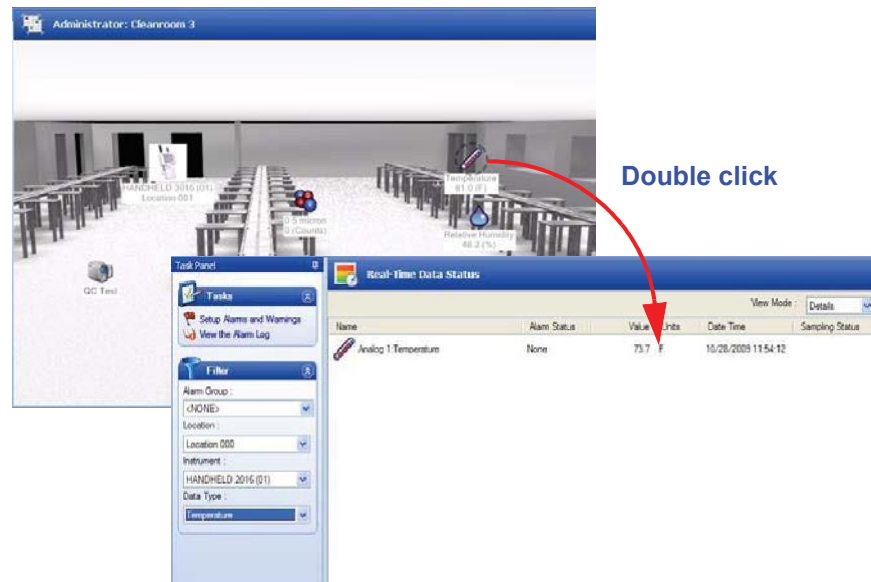


Figure 5-16 Map Display - Data Set Status

Alarm Group Status

To see details of an alarm group's real-time status, double click on an alarm group on the map like below.

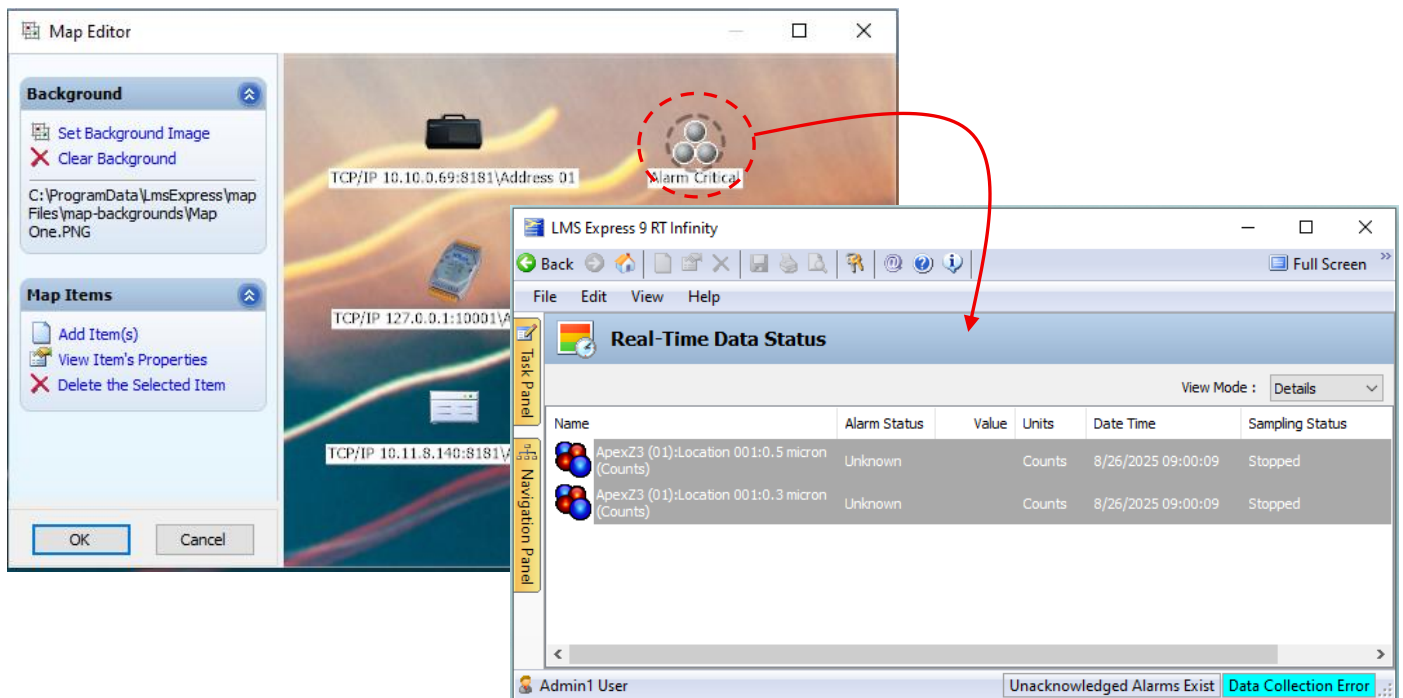


Figure 5-17 Map Display - Alarm Group Status

Camera View

Note: The example at right is just one sample web page for a camera.

To view a camera, double click on the camera's icon on the map. This opens its assigned URL in the camera's default WEB browser.

See the example below.

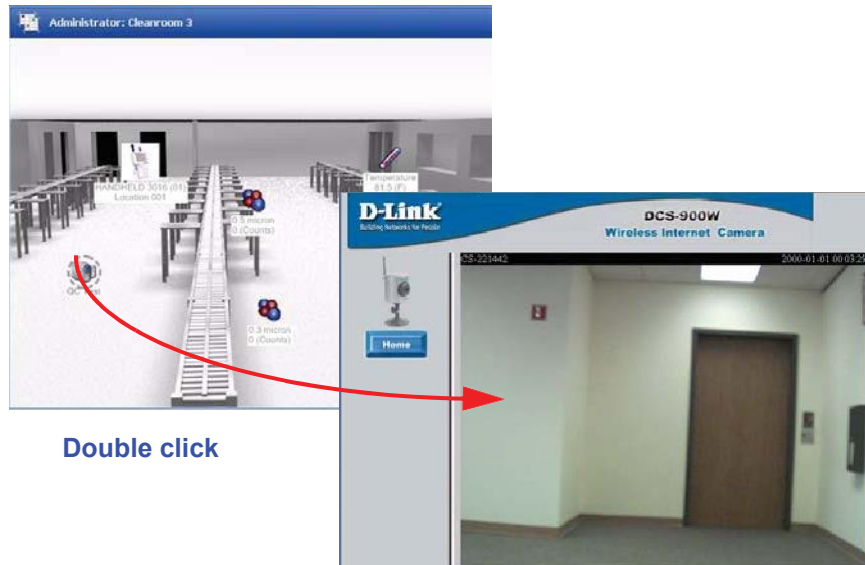


Figure 5-18 Map Display - Camera



Printing Maps

When the map is viewed, users can print it by clicking on the Print button on the toolbar.

1. Display the map.
2. Click Print this Map on the Task panel or click the following Print on the toolbar.
3. On the default print window that appears, select a printer and click OK.

Export Map Data



To save the map as a Bitmap, Gif, JPEG, PNG, or Tiff file, follow these steps:

1. Display a map.
2. Click Save to Image file on the Task Panel or click on the following Save As button on the toolbar.
3. On the Save As window that appears, select the file type to save to: Bitmap (*.bmp), Gif (*.gif), JPEG (*.jpg, *.jpeg), PNG (*.png), or Tiff (*.tif, *.tiff).
4. Use the navigation tools at the top of the dialog box to select the directory into which to save the file.
5. Enter a name in the “File Name” field.
6. Click Save.

Blank Page

Chapter 6 Report Display

Standard Reports

This chapter describes how to display data in LMS Express Standard Reports.



LMS Express output reports covering the following standards for cleanliness: Federal Standard 209E (Fed Std 209E), ISO 14644-1 revisions 1999 and 2015, European Union Good Manufacturing Practices (EU GMP) Annex 1 revisions 2003 and 2009, and British Standard 5295 (BS-5295).

Each report analyzes the conformance of the data according to the selected class level, room area, room status, room's air flow, instruments used, number of locations, number of samples and volume of air. The room is assigned a classification. For the Federal Standard 209E report each particle size is also assigned a classification.

Note: Included Standard Reports apply to airborne particle data, only. They will not use or show LPC particle sizes or data.

Data collected under compromised conditions, such as insufficient flow or laser voltage or when the instrument's service light is on, is excluded from reports.

Report View

Click the Home button and the Particle Standard Reports icon on the Home view to access Standard Reports.

Note: Particle sizes that do not apply to a given standard or its current class levels cannot be classified. Non-conforming values are highlighted in red.

Standard Reports can be viewed either by everyone (Public) or only by owner and administrator.

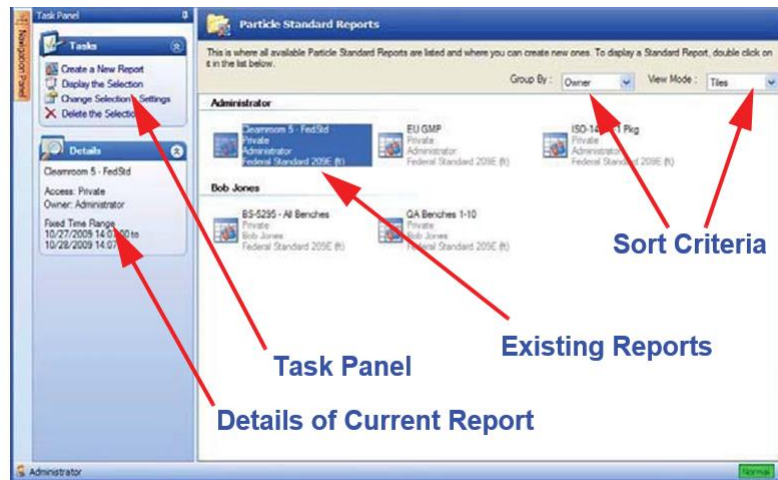


Figure 6-1 Particle Standard Reports View.

Sort Criteria

Existing Standard Reports can be sorted by several types of group criteria (<None>, Access, Owner, or Standard) and displayed as icons, tiles, or detailed records.

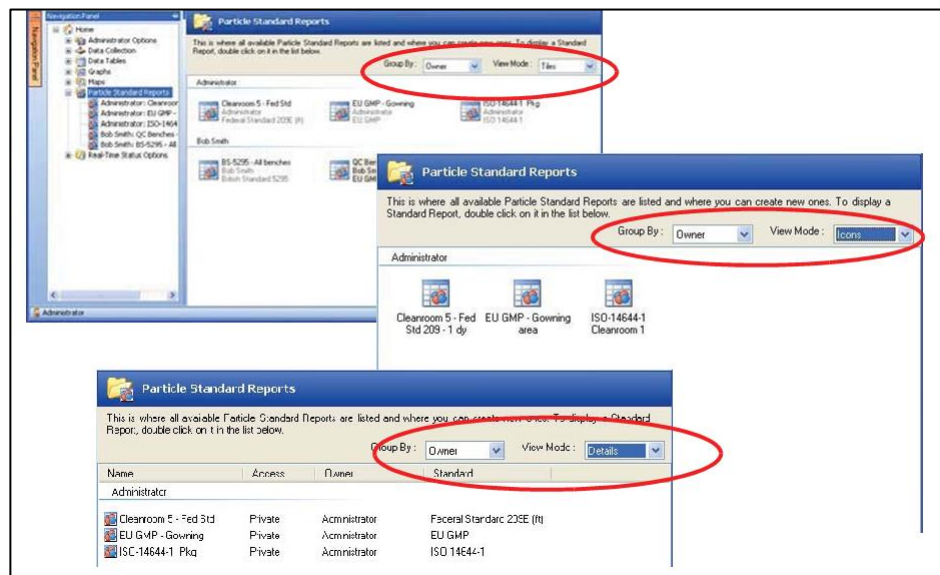


Figure 6-2 Sort By Criteria and Results

Task Panel

When a Standard Reports, or list of Standard Reports, is displayed in the View, the Standard Reports Task Panel appears on the left side of the **Express** window.

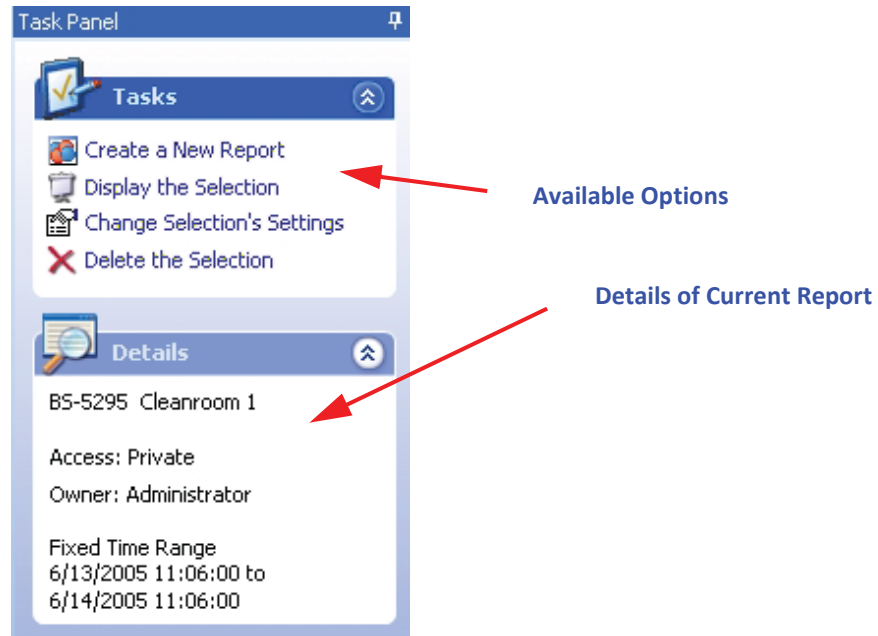


Figure 6-3 Standard Reports - Task Panel

The Standard Reports Task Panel contains two sections: Tasks and Details.

Under the Tasks section users can:

- Create a new report
- Display an existing report
- Change the selected report's settings
- Delete a report

Under the Details section, users see details about the currently selected report, including its name, who can access it, who owns it and its time range (fixed or rolling).

Tool Bar Buttons

When the Standard Report view is displayed the following toolbar buttons are enabled.

Button	Function
	New: Create a new standard report.
	Setup: Opens the Setup Standard Report dialog.
	Delete: Delete the current standard report.
	Save As: Opens a Save As dialog window and allows the user to export the currently displayed report to a Microsoft Excel, (*.xls) or Comma Separated Value file (*.csv)
	Print Preview: Opens a Print Preview dialog window and allows the user to setup page dimensions and print.
	Print: Opens the Printer Setup dialog and allows the user to print the currently displayed standard report.

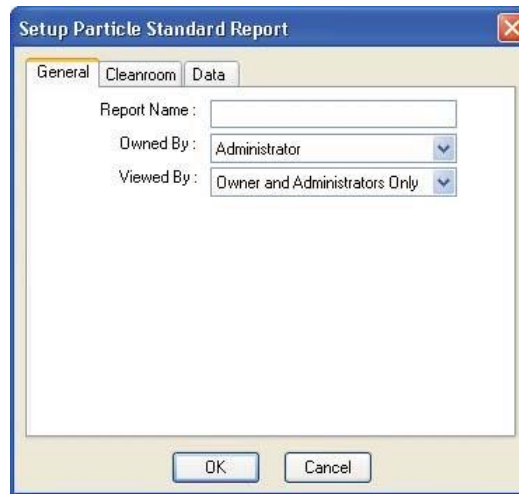
Table 6-4 Standard Report Toolbar Buttons

Displaying Report Data

To display data in a particular Standard Report immediately, double click on it in the Particle Standard Reports view.

To see the reports setup, select the report in the Particle Standard Reports view and click the Setup button on the toolbar or click the New Tool bar button to create a new report.

The following Setup Report window appears:

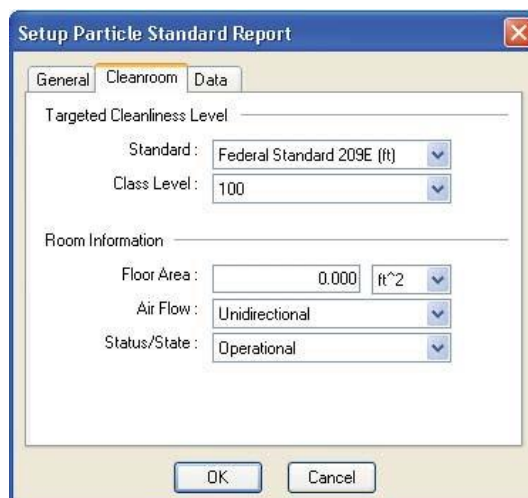


The image shows a software window titled "Setup Particle Standard Report". It has three tabs: "General", "Cleanroom", and "Data". The "General" tab is selected. Inside the "General" tab, there are three fields: "Report Name:" with a text input box, "Owned By:" with a dropdown menu showing "Administrator", and "Viewed By:" with a dropdown menu showing "Owner and Administrators Only". At the bottom of the window are "OK" and "Cancel" buttons.

Figure 6-5 Setup Report window - General Information

1. Enter a name for the report in the Report Name field.
2. If the user is logged in as an administrator, the user can change or choose the owner of the report by selecting a username from the Owned By list. If the user is not an administrator, this field is grayed out.
3. If the user is an administrator, the user can select which users can see the report - either just the owner and administrators, or every- one. If the user is not an administrator, this field is grayed out.
4. Click the Cleanroom tab. The following window appears,

Note: By default, users see only reports they own or that were made public. Administrators can see all graphs.



The image shows the same "Setup Particle Standard Report" window, but with the "Cleanroom" tab selected. The "General" tab is now grayed out. The "Cleanroom" tab contains two sections. The first section, "Targeted Cleanliness Level", has "Standard:" with a dropdown menu showing "Federal Standard 209E (ft)" and "Class Level:" with a dropdown menu showing "100". The second section, "Room Information", has "Floor Area:" with a text input box showing "0.000" and a unit dropdown menu showing "ft^2", "Air Flow:" with a dropdown menu showing "Unidirectional", and "Status/State:" with a dropdown menu showing "Operational". At the bottom are "OK" and "Cancel" buttons.

Figure 6-6 Setup Report window - Cleanroom Information

Note: The available cleanroom states or status will vary based on the standard selected.

5. In the Targeted Cleanliness Level section, select a standard and a class level from the available pull down lists. Class levels vary according to the selected standard.
6. In the Room Information section, enter information about the cleanroom, including the room area, units of measure for the room area (ft² or m²), type of air flow (Unidirectional or Nonunidirectional) and the cleanroom's state or status.
7. Click on the Data tab. The following Data window appears.

Note: At least one particle size must be checked; the number of particle sizes required is determined by the software when the report is built.

Note: At least one location must be checked; the number of locations required depends on the standard selected.

The screenshot shows a dialog box titled "Setup Particle Standard Report" with a close button (X) in the top right corner. It has three tabs: "General", "Cleanroom", and "Data". The "Data" tab is selected. Inside the "Data" tab, there are two sections: "Locations :" and "Particle Sizes :". The "Locations :" section has four checkboxes: "Location 001", "Location 002", "Location 005", and "My Location 000". The "Particle Sizes :" section has six checkboxes: "0.3 micron", "0.5 micron", "1.0 micron", "3.0 micron", "5.0 micron", and "10.0 micron". Below these sections is a "Time Range" section with "Start :" and "End :" labels. The "Start :" field shows "6/13/2005" and "11:46:00". The "End :" field shows "6/14/2005" and "11:46:00". At the bottom of the dialog are "OK" and "Cancel" buttons.

Figure 6-7 Setup Report - Data Information

8. Check the locations you want to report on.
9. Check the particle size(s) you want to report on.
10. Enter the start date and time of the sample set.
11. Enter the end date and time of the sample set.
12. Click the OK button to display the report or click the Cancel button to close the Setup Report window without displaying the report.

Note: Data that is collected under compromised conditions, such as insufficient flow or laser voltage or when the instrument's service light is on, is excluded from reports.

Report Display

When LMS Express finishes calculating values for the selected report, the Report view area is updated with the newly calculated report.

While the data content of each report is different, the Report view area has similar sections for all reports, as described below.

Each Standard Report contains five sections:

- Report Header.
- Particle Counter(s) used.
- Cleanroom Information.
- Concentration Tables of Selected Particle Sizes.
- Classification Errors (if any exist).

Below are details about the information displayed in each section of the Report view.

Report Header

The top of every report includes the following header:

Federal Standard 209E (ft)
Targeted Class Level: 100
Created On: 6/14/2005 15:13:09
6/10/2005 13:42:00 to 6/11/2005 13:42:00

Figure 6-8 General Report Header, Report view

Each Standard Report header contains the following fields:

Targeted Standard and Class: These values were selected on the Report Setup window and represent the cleanliness level specified for the cleanroom.

Created On: The Created On field displays the date and time the report was created.

Data Range: The Data Range field displays the start and end time the user selected in the Report Setup window.

Note: Fields which do not meet the targeted class level are highlighted in red in the report.

Particle Counter(s) Used

All the standards for which LMS Express can generate reports require information about the instruments used to collect data for the report. The Particle Counter(s) Used section of the Report View provides information about each instrument that was used to record data included in the current report.

Particle Counters Used
SolAir 3100+ (Serial #030303006)
SolAir 3100+ (Serial #030304011)
SolAir 3100+ (Serial #030603013)
SolAir 3100+ (Serial #030604106)
SolAir 3100+ (Serial #030604116)

Figure 6-9 Particle Counter(s) Used section, Report view

If samples from more than one instrument exist for the same location for the same time, their samples are combined for the report. Using multiple instruments can make sampling very large rooms with many locations easier and more time efficient.

Note: If all the data from a particular instrument has been excluded from a report, that instrument is not shown in the Particle Counter(s) Used section.

The name of each instrument and its serial number is displayed in this section of the Report View. The name used for the instrument is the instrument name the user defined in the Instruments view. By default, the instrument name is "<Model><Model Number>".

Cleanroom Information

The Cleanroom Information section of the Report View displays information about the cleanroom being classified.

Cleanroom Information
Floor Area: 5,000 m ²
Air Flow: Unidirectional
State: Operational
Classification: Pass

Figure 6-10 Cleanroom Information Section, Report View

Floor Area: The Floor Area is the square area of the cleanroom that the user entered on the Report Setup window. The value entered for Floor Area is automatically converted to the standard's required units.

Air Flow: The Air Flow displayed is the value the user entered on the Setup Report window. "Unidirectional" means the air flow in the room is in only one direction. "Non-unidirectional" means the cleanroom has multiple air flows.

Occupancy Status/State: Depending on the selected report, this field on the Report view is either "State" or "Status". This field indicates the operational status of the cleanroom and is titled either "Cleanroom Status" for the Federal Standard 209E report or "Operational State" for all other standards.

The Fed Std 209E standard defines Cleanroom Status as:

As-Built A cleanroom (facility) that is complete and ready for operation, with all services connected and functional, but without equipment or operating personnel in the facility.

At-Rest A cleanroom (facility) that is complete, with all services functioning and with equipment installed and operable or operating, as specified, but without operating personnel in the facility.

Operational A cleanroom (facility) in normal operation, with all services functioning and with equipment and personnel, if applicable, present and performing their normal work functions in the facility.

One of the above cleanroom statues must accompany the report. None of these statuses affect the report's calculations. The descriptions of the above statuses are direct quotes from the standard.

The ISO-14644-1:1999 and ISO-14644-1:2015 standard defines Occupancy State as:

As-Built Condition where the installation is complete with all services connected and functioning but with no production equipment, materials, or personnel present.

At-Rest Condition, where the installation is complete with equipment installed and operating in a manner agreed upon by the customer and supplier, but with no personnel present.

Operational Condition where the installation is functioning in the specified manner, with the specified number of personnel present and working in the manner agreed upon.

Note: ISO 14644-1 occupancy states are equivalent to Federal Standard's cleanroom statuses.

One of the above states must accompany the report. These states do not affect the report's calculations. The descriptions above are direct quotes from the standard.

The British Standard 5295 standard defines Occupancy State as:

As-Built On completion, prior to moving in.

Unmanned Operational, but not in use.

Manned In full operational use.

One of the above states must accompany the report. These states do not affect the report's calculations.

The EU GMP standard defines Occupancy State as:

At-Rest Condition where the installation is installed and operating, complete with production equipment but with no operating personnel present.

Operational Condition where the installation is functioning in the defined operating mode with the specified number of personnel working.

One of the above states must accompany the report. These states determine which concentration limit are used in the table in Appendix A. The descriptions above are direct quotes from the standard.

Note: EU GMP Occupancy States are equivalent to Federal Standard's cleanroom statuses.

Classification: The Classification field displays "Pass" or "Fail" against the targeted class level after LMS Express analyzes the provided concentration tables displayed below this section of the report

The Classification is listed as "Out of Range" if the sampled data exceeds all the standard's class limits. The Classification is listed as "Cannot Classify" if the user did not sample the data according to the standard's requirements. The Classification field and value displays in red if the data sampled does not meet the targeted class level or if it cannot be classified.

Cleanroom Information	
Floor Area: 0.186 m ²	
Air Flow: Unidirectional	
State: Operational	
Classification: Out of Range	Classification

Figure 6-11 Classification for Data Not Meeting Targeted Class Level

Concentration Tables of Selected Particle Sizes

A concentration table is generated and displayed in the Report view for each particle size the user selected in the Setup Report window.

Note: All values which do not meet the targeted class level are displayed in red

Particle Size: 0.5 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.4
Location 002	1	1602.734	0.0
Location 003	1	1602.734	0.0
Location 004	1	1602.734	1.2
Location 005	1	1602.734	82116.6
Location 006	1	1602.734	79530.4
Location 007	1	1602.734	84638.5
Location 008	1	1602.734	82727.4
Mean			41126.8
Maximum			84638.5
Minimum			0.0
Standard Deviation			43987.7
Standard Error			15552.0
95% UCL			70675.6
Class Limit			352000.0
Min Sample Volume Limit (L)			6.826
Classification			Pass

Figure 6-12 Concentration table

A concentration table lists all the locations selected for a given particle size. The following information is displayed for each particle size:

Samples: The number of samples taken at that location by one or more instruments. Samples which do not meet the standard sampling methods are excluded from this table.

Min Volume: The Minimum Volume column displays the smallest volume of air sampled at that location. Since data can come from multiple instruments and it is possible (but not recommended) to sample in manual mode, each sample can potentially have a

different volume of air. Samples which do not meet the minimum volume of air as defined by the standard are excluded from the concentration table.

Average Concentration: This field displays the result of averaging all the accepted concentrations taken at that location.

Statistics: The block of statistics displayed below the locations calculates the data shown in the average concentration column and is required by the standards. Only the Federal and ISO 14644-1 (1999 revision) Standard Reports displays “Standard Error”, “95% UCL” and Classification fields. All fields which do not meet the targeted class level are displayed in red.

Classification Errors

If the report encounters errors with the amount of data or locations needed for the desired report or finds that it must exclude some data samples, the errors and/or reasons why data was excluded are listed below the concentration table for each affected channel size. For example:

Excluded samples:
- With volumes of air less than 0.2 ft ³ .
Unable to classify:
- Must take at least 5 sample(s) in cleanroom.
- Must take at least 1 sample(s) per location.

Figure 6-13 Classification Error example

Excluded Data

If a concentration table encounters samples in the selected data range which do not conform to the selected standard, the non-compliant samples are noted and excluded from the displayed report.

Reports exclude non-compliant samples so that if valid samples are mixed in with invalid samples, the valid samples can still be used in the classification calculations. A list of the reasons samples were excluded is displayed under the concentration table and titled "Excluded Samples".

Data is excluded if it was:

- Measured during instrument failure (Bad Status).
- Measured with bad laser voltage.
- Measured with bad flow rate.
- Recorded with a sample time that is less than the required time.
- Recorded with a sample volume of air less than required.
- Measured from instrument(s) with flow rates less than the required flow rate.

Cannot Classify

If the classification field ever reads "Cannot Classify", then the data was either not sampled correctly, or the number of samples and locations do not meet the minimum required by the targeted standard. Whenever a "Cannot Classify" appears on a Report view, a list of the reasons why the data cannot be classified is listed below the concentration table, in a section entitled "Unable to classify".

The possibilities why LMS Express could not classify the data include,

- The selected standard and class does not support the given particle size.
- Data must be sampled from at least [required] location(s).
- There must be at least [required] sample(s) in cleanroom.
- There must be at least [required] sample(s) per location.

Classification errors are displayed so the user can see why the samples did not conform to the selected standard, allowing the user to recollect valid samples, correct the report configuration and rebuild the report.

Information and examples of specific Standard Reports are included below.

Federal Standard 209E

To display the Federal Standard 209E report, follow these steps:

Note: Federal Standard 209E (ft.) is the cubic feet version and Federal Standard 209E (m) is the cubic meters version of the Federal Standard 209E report

1. Click on the Home button and then Particle Standard Reports on the Home view's menu.
2. Click on New to create a new report. On the Setup Particle Standard Report window, enter a name for the report, on the cleanroom tab select Federal Standard 209E for the report's standard. You can select either Federal Standard 209E (ft), shown below on the left or Federal Standard 209E (m).
3. Select which Class Level to report. The default for the Federal Standard report is 100 for Federal Standard 209E (ft) and M2 for Federal Standard 209E (m).
4. Enter the area of the cleanroom and select units of either ft² or m².
5. Select air flow and status values.

6. Select which Locations and Channel Sizes you want to analyze.
This standard accepts all particle sizes. The number of locations required for a report to successfully run depends in part on the cleanroom area for which the report is being generated.
7. Select a data range Start and End date/time.
8. Click OK to build report.

Federal Standard 209E (ft)			
Targeted Class Level: 10,000			
Created By: Administrator			
Created On: 6/13/2016 10:45:59			
5/2/2016 14:00:00 to 5/2/2016 14:50:00			
Particle Counter(s) Used			
ApexR5 (01) (Serial #1402100007)			
Cleanroom Information			
Floor Area: 100.000 ft ²			
Air Flow: Unidirectional			
Status: Operational			
Classification: Pass			
Particle Size: 0.5 micron			
Location	Samples	Min Volume (ft ³)	Average p/ft ³
Location 001	5	56.600	0.0
Location 002	1	56.600	0.0
Location 003	1	56.600	0.0
Location 004	1	56.600	0.0
Location 005	1	56.600	2325.3
Location 008	1	56.600	2342.6
Location 009	1	56.600	2365.1
Location 010	2	4.717	1971.6
Mean			1125.6
Maximum			2365.1
Minimum			0.0
Standard Deviation			1209.5
Standard Error			427.6
95% UCL			1938.1
Class Limit			10000.0
Min Sample Volume Limit (ft ³)			0.100
Classification			Pass

Figure 6-14 Sample Fed Std 209E (ft) Report

Federal Standard 209E (m)			
Targeted Class Level: M5.5			
Created By: Administrator			
Created On: 6/13/2016 10:49:08			
5/2/2016 14:00:00 to 5/2/2016 14:50:00			
Particle Counter(s) Used			
ApexR5 (01) (Serial #1402100007)			
Cleanroom Information			
Floor Area: 10.000 m ²			
Air Flow: Unidirectional			
Status: Operational			
Classification: Pass			
Particle Size: 0.5 micron			
Location	Samples	Min Volume (m ³)	Average p/m ³
Location 001	5	1.603	0.4
Location 002	1	1.603	0.0
Location 003	1	1.603	0.0
Location 004	1	1.603	1.2
Location 005	1	1.603	82116.6
Location 006	1	1.603	79530.4
Location 010	2	0.134	69627.3
Location 014	2	0.134	18.7
Mean			28911.8
Maximum			82116.6
Minimum			0.0
Standard Deviation			40051.8
Standard Error			14160.4
95% UCL			55816.7
Class Limit			353000.0
Min Sample Volume Limit (m ³)			0.003
Classification			Pass

Figure 6-15 Sample Fed Std 209E (m) Report

ISO 14644-1 Report

LMS Express supports the 1999 and 2015 revisions of the ISO 14644-1 standard report.

To display an ISO 14644-1 report, follow these steps:

1. Click on the Home button and then Particle Standard Reports on the Home view's menu.
2. Click on New to create a new report.
3. On the Setup Particle Standard Report window, enter a name for the report. On the cleanroom tab select one of the two ISO-14644-1 reports in the list. Select the ISO 14644-:2015 revision unless required to report based on the 1999 revision.
4. Select which Class Level to report. The default for the ISO 14644-1 report is 5.
5. Enter the area of the cleanroom and select units of either ft² or m².
6. Select air flow and status values.
7. Select which Locations and Channel Sizes you want to analyze. The number of locations required for a report to successfully run depends in part on the cleanroom area for which the report is being generated.
8. If the ISO 14644-1:2015 revision is selected, Class 5 is selected as the targeted class, and channel size 5.0u is selected, the report will include M Descriptor information (only) for the 5.0u channel size.
9. Select a data range Start and End date/time.
10. Click OK to build report

Note: If the ISO 14644-1:2015 revision is selected, Class 5 is selected, and channel size 5.0u is selected, the report will include M Descriptor information for the 5.0u channel size and will not use the 5.0u channel to determine the cleanroom's class.

ISO 14644-1			
Targeted Class Level: 7			
Created By: Administrator			
Created On: 2016-06-13 11:05:42			
2016-05-02 14:00:00 to 2016-05-02 14:50:00			
Particle Counter(s) Used			
ApexR5 (01) (Serial #1402100007)			
Cleanroom Information			
Floor Area: 1.858 m ²			
Air Flow: Unidirectional			
State: Operational			
Classification: Pass			
Particle Size: 0.5 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.4
Location 002	1	1602.734	0.0
Mean			0.2
Maximum			0.4
Minimum			0.0
Standard Deviation			0.3
Standard Error			0.2
95% UCL			1.4
Class Limit			352000.0
Min Sample Volume Limit (L)			6.826
Classification			Pass
Particle Size: 5.0 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.0
Location 002	1	1602.734	0.0
Mean			0.0
Maximum			0.0
Minimum			0.0
Standard Deviation			0.0
Standard Error			0.0
95% UCL			0.0
Class Limit			2930.0
Min Sample Volume Limit (L)			6.826
Classification			Pass

Figure 6-16 Sample ISO 14644-1 Report, 1999 Revision

Administrator: ISO 14644-1 2015

ISO 14644-1:2015

Date: 2016-06-13 10:26:58

Targeted Class Level: 6

Created By: Administrator

Created On: 2016-05-02 18:34:37

Operator Name: Bob Jones

2016-05-02 14:00:00 to 2016-05-02 14:50:00

Particle Counter(s) Used

ApexR5 (01) (Serial #1402100007)

Cleanroom Information

Floor Area: 5.000 m²

Air Flow: Unidirectional

State: Operational

Classification: Pass

0.5 micron

Location	Samples	Min Volume (L)	Sample Average (counts)	Average p/m ³	Pass/Fail
Location 001	5	1602.734	0.6	0.4	Pass
Location 002	1	1602.734	0.0	0.0	Pass
Location 003	1	1602.734	0.0	0.0	Pass
Location 004	1	1602.734	2.0	1.2	Pass
Min Sample Volume Limit (L)					68.259
ISO Class 6 Limit					35200.0
Classification					Pass

5.0 micron

Location	Samples	Min Volume (L)	Sample Average (counts)	Average p/m ³	Pass/Fail
Location 001	5	1602.734	0.0	0.0	Pass
Location 002	1	1602.734	0.0	0.0	Pass
Location 003	1	1602.734	0.0	0.0	Pass
Location 004	1	1602.734	0.0	0.0	Pass
Min Sample Volume Limit (L)					68.259
ISO Class 6 Limit					293.0
Classification					Pass

Figure 6-17 Sample ISO 14644-1 Report, 2015 Revision

Administrator: ISO 14644-1 2015 M Descriptor

ISO 14644-1:2015

Date: 2016-06-13 10:29:13

Targeted Class Level: 5

Created By: Administrator

Created On: 2016-05-02 11:10:52

Operator Name: Test

2016-05-02 14:00:00 to 2016-05-02 14:50:00

Particle Counter(s) Used

ApexR5 (01) (Serial #1402100007)

Cleanroom Information

Floor Area: 10.000 m²

Air Flow: Unidirectional

State: Operational

Classification: Fail

0.5 micron

Location	Samples	Min Volume (L)	Sample Average (counts)	Average p/m ³	Pass/Fail
Location 001	5	1602.734	0.6	0.4	Pass
Location 002	1	1602.734	0.0	0.0	Pass
Location 003	1	1602.734	0.0	0.0	Pass
Location 004	1	1602.734	2.0	1.2	Pass
Location 008	1	1602.734	132590.0	82727.4	Fail
Min Sample Volume Limit (L)				5.682	
ISO Class 5 Limit				3520.0	
Classification					Fail

5.0 micron

Location	Samples	Min Volume (L)	Sample Average (counts)	Average p/m ³
Location 001	5	1602.734	0.0	0.0
Location 002	1	1602.734	0.0	0.0
Location 003	1	1602.734	0.0	0.0
Location 004	1	1602.734	0.0	0.0
Location 008	1	1602.734	184.0	114.8
ISO M (29; 5.0 µm); LSAPC				

Unable to classify:

- Selected standard and class does not support this particle size.

Figure 6-18 Sample ISO 14644-1 Report, 2015 Revision, Class 5 with M Descriptor enabled

British Standard 5295 Report

To display the BS-5295 report, follow these steps:

1. Click on the Home button and then Particle Standard Reports on the Home view's menu.
2. Click on New to create a new report.
3. On the Setup Particle Standard Report window, enter a name for the report, on the cleanroom tab select BS-5295.
4. Select which Class Level to report. The default for the British Standard report is G.
5. Enter the area of the cleanroom and select units of either ft² or m².
6. Select air flow and status values.
7. Select which Locations and Channel Sizes you want to analyze.

The British Standard 5295 Report only addresses the following channel sizes: 0.3µm, 0.5µm, 5.0µm, 10.0µm and 25.0µm. All other channels are not supported by this standard. When building the report, select only select the channels that are pertinent to the instrument from which you will download data.

The number of locations required for a report to successfully run depends in part on the cleanroom area for which the report is being generated.

8. Select a data range Start and End date/time.
9. Click OK to build report.

British Standard 5295			
Targeted Class Level: K			
Created By: Administrator			
Created On: 6/13/2016 11:17:54			
5/2/2016 14:00:00 to 5/2/2016 14:50:00			
Particle Counter(s) Used			
ApexRS (01) (Serial #1402100007)			
Cleanroom Information			
Floor Area: 11.148 m ²			
Air Flow: Unidirectional			
State: Unmanned			
Classification: Pass			
Particle Size: 0.5 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.4
Location 002	1	1602.734	0.0
Location 003	1	1602.734	0.0
Location 004	1	1602.734	1.2
Mean			0.4
Maximum			1.2
Minimum			0.0
Standard Deviation			0.6
Class Limit			3500000.0
Min Sample Volume Limit (L)			28.317
Classification			Pass
Particle Size: 5.0 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.0
Location 002	1	1602.734	0.0
Location 003	1	1602.734	0.0
Location 004	1	1602.734	0.0
Mean			0.0
Maximum			0.0
Minimum			0.0
Standard Deviation			0.0
Class Limit			20000.0
Min Sample Volume Limit (L)			28.317
Classification			Pass

Figure 6-19 Sample British Standard 5295 Report

EU GMP Annex 1 Report

To display a EU GMP Annex 1 report, follow these steps:

1. Click on the Home button and then Particle Standard Reports on the Home view's menu.
2. Click on New to create a new report.
3. On the Setup Particle Standard Report window, enter a name for the report, on the cleanroom tab select EU GMP Annex 1. Select the 2009 revision unless required to report based on the 2003 revision.
4. Select which Class Level to report. The default for the EU GMP Standard report is D.

When the Cleanroom State is "Operational", Class D is not defined. Class D is only applicable when the Cleanroom is "At Rest".

5. Enter the area of the cleanroom and select units of either ft² or m².
6. Select air flow and status values.
7. Select which Locations and Channel Sizes you want to analyze. This standard accepts all particle sizes.

The EU GMP Annex 1 standard requires both 0.5 and 5.0 particle sizes. In the Particle Sizes list, only select these 2 channels. Other channel sizes are not supported by this standard.

EU GMP Annex 1 requires a minimum total sample volume of at least 1 m³ for grades A and B.

Note: EU GMP Annex 1 2009 revises the current ISO 14644 – 1 (2015 revision) Table A.1 "Sampling Locations Related to Cleanroom Area".

The number of locations required for a report to run depends in part on the cleanroom area that is being reported on.

8. Select a data range Start and End date/time.
9. Click OK to build report.

EU GMP Annex 1 (2009)			
Targeted Grade: C			
Created By: Administrator			
Created On: 6/13/2016 11:24:12			
5/2/2016 14:00:00 to 5/2/2016 14:50:00			
Particle Counter(s) Used			
ApexR5 (01) (Serial #1402100007)			
Cleanroom Information			
Floor Area: 5.000 m ²			
Air Flow: Unidirectional			
State: Operational			
Classification: Pass			
Particle Size: 0.5 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.4
Location 002	1	1602.734	0.0
Location 003	1	1602.734	0.0
Mean			0.1
Maximum			0.4
Minimum			0.0
Standard Deviation			0.2
Standard Error			0.1
95% UCL			0.5
Grade Limit			3520000.0
Min Sample Volume Limit (L)			2.000
Classification			Pass
Particle Size: 5.0 micron			
Location	Samples	Min Volume (L)	Average p/m ³
Location 001	5	1602.734	0.0
Location 002	1	1602.734	0.0
Location 003	1	1602.734	0.0
Mean			0.0
Maximum			0.0
Minimum			0.0
Standard Deviation			0.0
Standard Error			0.0
95% UCL			0.0
Grade Limit			29000.0
Min Sample Volume Limit (L)			2.000
Classification			Pass

Figure 6-20 Sample EU GMP Annex 1 2009 Revision Report

Printing Standard Report

When the Standard Report is viewed you can print it by clicking on the Print button on the toolbar.

1. Display the Standard Report.
2. Click the Print button.
3. On the default print window that appears, select a printer and click OK.

Exporting Standard Reports

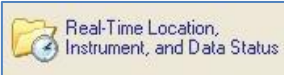
A Standard report can be saved to a Microsoft Excel or a comma separated file by following these steps,

1. Display the Standard Report.
2. Click on the Save As button.
3. On the Save As window that appears, select the file type to save to: Excel (*.xls) or CSV (*.csv).
4. Use the navigation tools at the top of the dialog box to select the directory into which to save the file.
5. Enter a name in the "File Name" field.
6. Click Save.

Once saved the report is saved to a Microsoft Excel or comma separated value file, the data can be formatted using the standard Microsoft Excel functions.

Please refer to the Microsoft Excel manual for further information.

Chapter 7 Status and Alarms



Real Time Status

This chapter describes how LMS Express displays the status of all real time data and allows users to configure, view and acknowledge alarms and warnings.

To quickly see the status of the system, LMS Express users can check the real time location, instrument and/or data status windows.

To see the status windows, click the Home button and under the Data Visualization section of the Home view, click Real-Time Data Status and Alarm Logging.

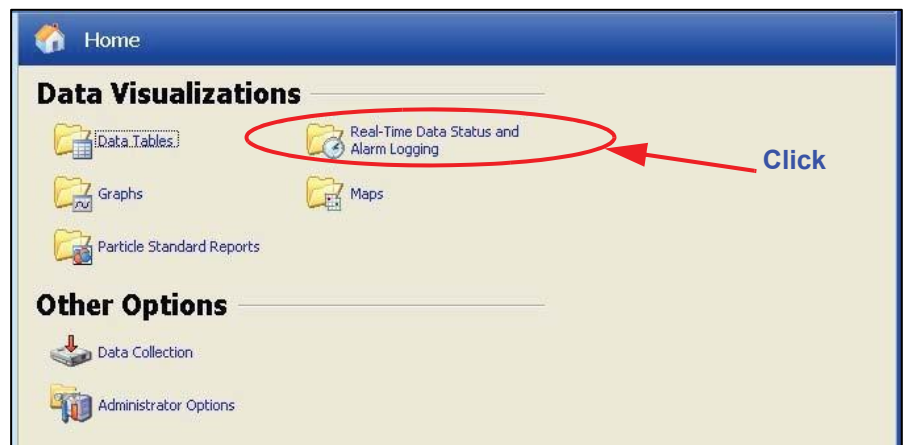


Figure 7-1 Real-Time Data Status & Alarm Logging



Figure 7-2 Real Time Status Options

The following sections describe the available status windows.

For information on the alarm options listed on the Real Time Status Options menu, see the section on alarms later in this chapter.

Real Time Data Status

The Real Time Data Status view displays the current or last known value for each dataset in the system. The user can see this data as a grid or a list of detailed rows.

Real Time Data Status Grid

Clicking the Real Time Data Status option displays the following screen. Each known data set appears in this grid. If there are enabled alarm triggers, then data sets that have exceeded the alarm or warning limits are colored red or yellow respectively.

Note: The number of cells in the grid scales to the number of data sets in the system. The more data sets there are, the smaller the cells will be.

Note: The “Real Time Data Status” window shows Disabled status (dark grey) if data collection has stopped. If data collection has stopped due to an error, then that Data Set is shown in blue.

Real-Time Data Status					
					View Mode: Grid
HANDHELD 3016 (01) Packaging - 02 0.3 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.3 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 0.7 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.7 micron (Normalized)
HANDHELD 3016 (01) Packaging - 02 1.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 1.0 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 2.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 2.0 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 5.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 5.0 micron (Normalized)
HANDHELD 3016 (01) Packaging - 02 Analog 1 Temperature	HANDHELD 3016 (01) Packaging - 02 Analog 2 Relative Humidity	HANDHELD 3016 (01) Packaging - 02 Sample Time	HANDHELD 3016 (01) Packaging - 02 Sample Volume	HANDHELD 3016 (02) Packaging - 02 0.3 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 0.3 micron (Normalized)
HANDHELD 3016 (02) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 0.5 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Normalized)
HANDHELD 3016 (02) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 3.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 Analog 1 Temperature	HANDHELD 3016 (02) Packaging - 02 Analog 2 Relative Humidity

Figure 7-3 Real Time Data Status Window - Grid

The user can click on a cell and ‘expand’ it so that its text is enlarged for easier reading. Clicking on the expanded cell will shrink back to its original size.

Note: The “Real Time Data Status” window only shows data sets collected in real-time. It does not show data sets collected from download or data sets belonging to deleted real-time instruments.

Real-Time Data Status					
					View Mode: Grid
HANDHELD 3016 (01) Packaging - 02 0.3 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.3 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 0.7 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.7 micron (Normalized)
HANDHELD 3016 (01) Packaging - 02 1.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 1.0 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 2.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 2.0 micron (Normalized)	HANDHELD 3016 (01) Packaging - 02 5.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 5.0 micron (Normalized)
HANDHELD 3016 (01) Packaging - 02 Analog 2 Relative Humidity					
HANDHELD 3016 (02) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 0.5 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Normalized)
HANDHELD 3016 (02) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 3.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Normalized)	HANDHELD 3016 (02) Packaging - 02 Analog 1 Temperature	HANDHELD 3016 (02) Packaging - 02 Analog 2 Relative Humidity

Figure 7-4 Real Time Data Status Window – Expanded

Alternatively, the user can select “Details” from the View Mode pull down field and display the data sets as detailed rows.

Real-Time Data Status

View Mode : Details

Name	Alarm Status	Value	Units	Date Time	Sampling Status
ApexZ3 (02):Location 001:0.3 micron (Counts)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.3 micron (Normalized)	Unknown		p/ft^3	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.3 micron (Differential)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.3 micron (IAQ)	Unknown		µg/m^3	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.3 micron (Summation)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.5 micron (Counts)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.5 micron (Normalized)	Unknown		p/ft^3	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.5 micron (Differential)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.5 micron (IAQ)	Unknown		µg/m^3	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:0.5 micron (Summation)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:1.0 micron (Counts)	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:1.0 micron (Normalized)	Unknown		p/ft^3	4/11/2018 16:26:42	Instrument timeout!
ApexZ3 (02):Location 001:1.0 micron	Unknown		Counts	4/11/2018 16:26:42	Instrument timeout!

Note: Click on a column heading to sort the Data Status window by that column.

Figure 7-5 Real Time Data Status Window – Details

Note: See the section on alarms, later in this chapter for more information about

Real Time Alarm Group Status

Double-clicking a Real Time Alarm Group icon on a map will display the Real-Time Alarm Group Status screen. The screen displays all data sets associated with configured Alarm Groups. Data sets not linked to any Alarm Group are excluded from view.

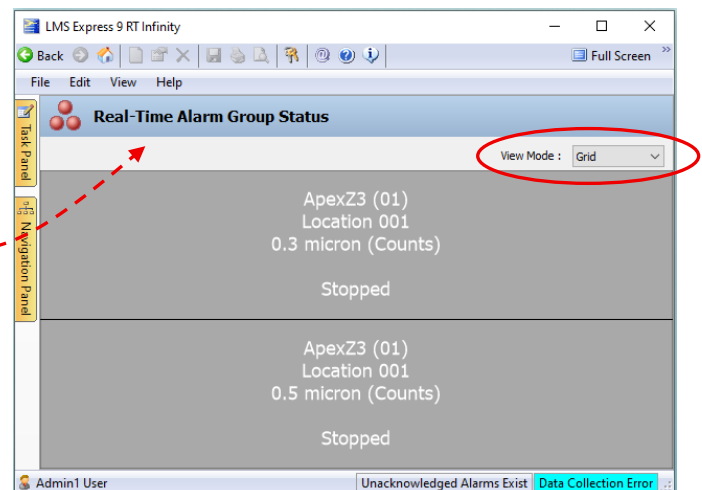
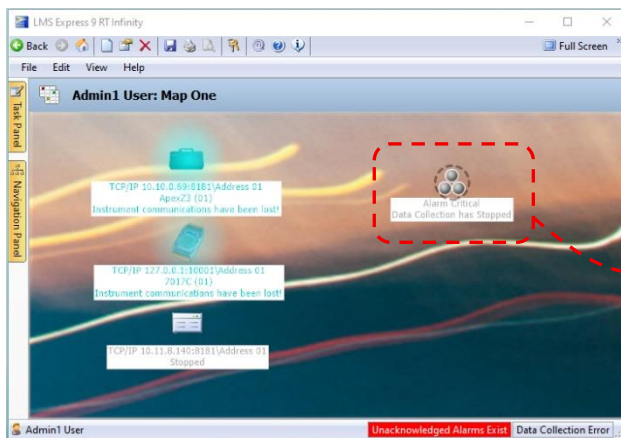


Figure 7-6 Real Time Alarm Group Status Window

Alarms Displayed

If there are enabled alarm or warning triggers, data sets that have exceeded the enabled alarm or warning conditions are colored red or yellow, respectively. Data sets will be colored gray if data collection has stopped. Data sets reporting data collection errors will be colored blue.

Task Panel Options

The Task Panel on the Real Time Data Status window allows the user to set up alarms and warnings (if they are an administrator), view the alarm log, and filter the view.

Users can use the View Filters available on the Task Panel to limit the number of data sets displayed. Four filters are available to limit which data sets are displayed - Alarm Group Location, Instrument, or Data Type. To use the filters, select a value (or "<ALL>") from the pull down list for one or more of the listed filters.

For example, selecting "Location 001", "HANDHELD 3016 (01)" and "Particle (Counts)" from the Location, Instrument and Data Type filters, respectively, limit the data sets displayed on the Data Status window to particle counts downloaded from this Handheld recorded at Location 001.

Alarms



Besides collecting and displaying data Real Time, LMS Express allows users to configure alarms and warnings; view the current alarm status of each location, instrument and data set; and acknowledge alarms and warnings.

This section describes how LMS Express displays and allows configuration and acknowledgement of alarms and warnings.

When LMS Express is configured to collect data Real Time from instruments, LMS Express will compare data collected against any set limits to alert users when alarm or warning conditions occur.

The alarms and warnings that occur are logged in an alarm log. Users can acknowledge alarms and warnings on the alarm log view, or view and acknowledge alarms only on the additional Unacknowledged Alarms Log.

All users can view alarms and warnings. Only power users and administrators can acknowledge alarms and warnings. Only

administrators are allowed to configure alarm and warning limits.

Adding and Modifying Alarm Triggers

Alarm and warning conditions are set up via alarm triggers.

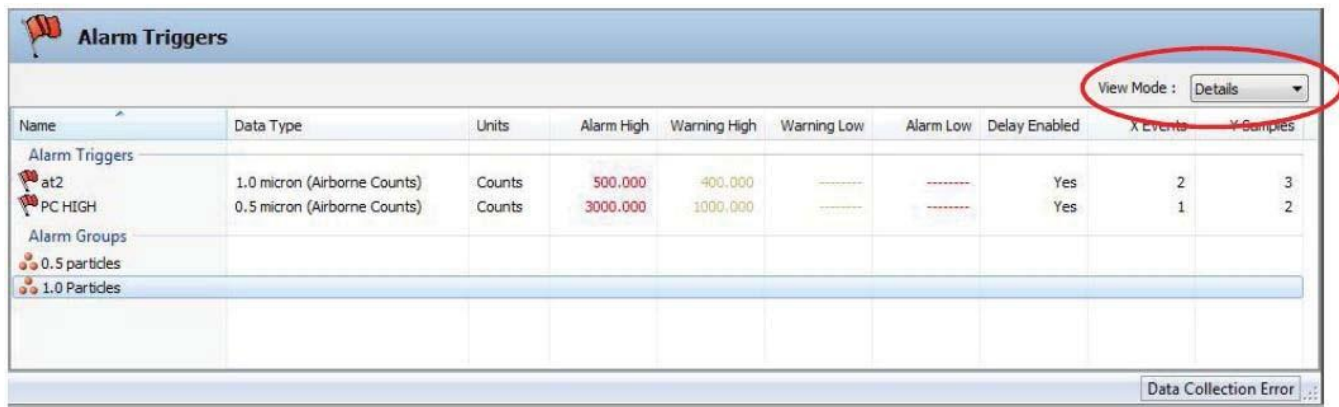
Note: Only Administrator users can configure alarm triggers.

Alarms can be configured to report on data set types (like particle counts, temperature, relative humidity), all or individual locations.

Multiple alarm triggers can be applied to the same data set. For example, if an administrator has set up an alarm trigger for all particle values at all locations, the administrator can also configure an alarm trigger for a particle alarm for a specific channel size or location. When LMS Express receives new data and evaluates enabled alarm triggers against it, each data set is assigned the worst status of all triggers associated with the data set.

To set up alarms and warning triggers, log into LMS Express as an administrator. Click the Home button, on the Home menu, click Administrator Options and then click on Setup Alarms and Warnings.

The following Alarm Triggers view appears. This view displays all existing alarms triggers.



Name	Data Type	Units	Alarm High	Warning High	Warning Low	Alarm Low	Delay Enabled	X Events	Y Samples
Alarm Triggers									
at2	1.0 micron (Airborne Counts)	Counts	500,000	400,000			Yes	2	3
PC HIGH	0.5 micron (Airborne Counts)	Counts	3000,000	1000,000			Yes	1	2
Alarm Groups									
0.5 particles									
1.0 Particles									

Figure 7-7 Alarm Triggers - Detail Mode

By default, the Alarm Triggers' view appears in detail mode. To see alarm triggers displayed as icons, select Icons from the View Mode field.

Alarm Trigger Task Panel

Using the Task Panel on the Alarm Triggers window, users can add,



update, or delete alarm triggers and alarm groups, as well as enable or disable alarm acknowledgements, system wide.

Figure 7-8 Alarm Trigger Task Panel

Creating a New Alarm Trigger

To create an alarm trigger, click “Create a New Configuration” on the task panel, right click anywhere on the Alarm Triggers view and select Add, or click the New button on the Toolbar. The following window displays.

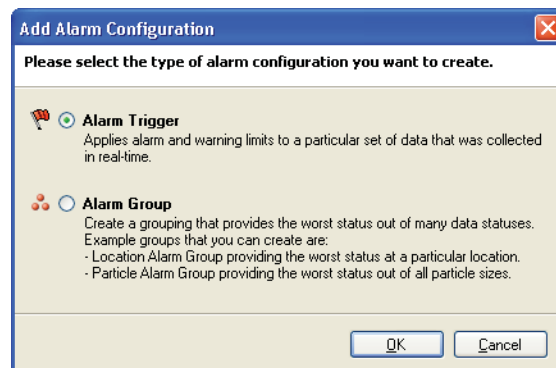


Figure 7-9 Add Alarm Configuration window

Select Alarm Trigger and click Ok. The following Setup Alarm Trigger window displays.

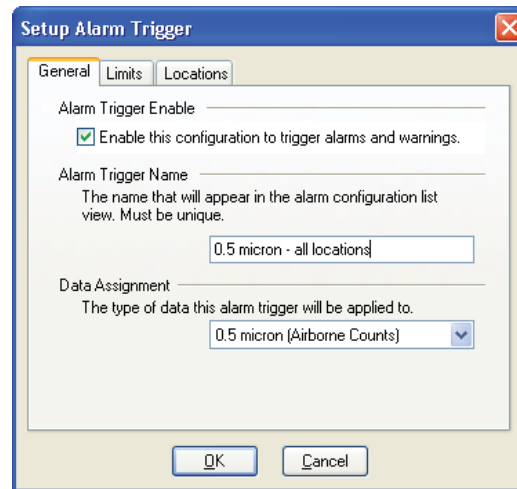
The image shows a software window titled "Setup Alarm Trigger" with a close button (X) in the top right corner. It has three tabs: "General", "Limits", and "Locations". The "General" tab is selected. Inside the "General" tab, there are three sections: "Alarm Trigger Enable" with a checked checkbox and the text "Enable this configuration to trigger alarms and warnings."; "Alarm Trigger Name" with a text box containing "0.5 micron - all locations" and a note "The name that will appear in the alarm configuration list view. Must be unique."; and "Data Assignment" with a dropdown menu showing "0.5 micron (Airborne Counts)" and a note "The type of data this alarm trigger will be applied to.". At the bottom are "OK" and "Cancel" buttons.

Figure 7-10 Setup Alarm Trigger - General Information

To create an alarm trigger, select or enter the following information.

- Check Enable to enable the trigger. To disable a trigger, but keep its configuration, un-check this box.
- Enter a name for the Alarm trigger.
- Select the type of data the trigger applies to.

Next, to enter the alarm and warning limits, click the Limits tab to display the window shown in Figure 7-11.

The image shows the "Limits" tab of the "Setup Alarm Trigger" window. It has three tabs: "General", "Limits", and "Locations". The "Limits" tab is selected. Inside the "Limits" tab, there are three sections: "Limit Units" with a dropdown menu showing "Counts" and a note "The units of the below limits. It does not have to match the data's units."; "Alarm and Warning Limits" with four rows of checkboxes and text boxes: "Alarm High" (0.000, red icon), "Warning High" (0.000, yellow icon), "Warning Low" (0.000, yellow icon), and "Alarm Low" (0.000, red icon); and "Alarm Delay" with an "Enabled" checkbox, a note "This alarm will not trigger until X Events are found in a rolling window of Y samples.", and two text boxes for "X Events" and "Y Samples". At the bottom are "OK" and "Cancel" buttons.

Figure 7-11 Setup Alarm Trigger - Limit Information

At this screen, the user selects the units for the alarm and sets up alarm and warning limits for the trigger.

- Select a unit of measure for the trigger from the pull down list.
- Four alarm limits are available - Alarm High, Warning High, Warning Low and Alarm Low. To configure an alarm limit, check the box next to the desired alarm limit and then enter the value in the limit field.

If the alarm trigger applies to only one, or a set of locations, click the Location's tab (Figure 7-12).

- Alarm Delay - Alarm delay has three settings, and they are the Enabled check box, X Events as threshold, and Y Samples to monitor as a window.

To configure a delay, check the "Enabled" box and enter the values for X Events and Y Samples.

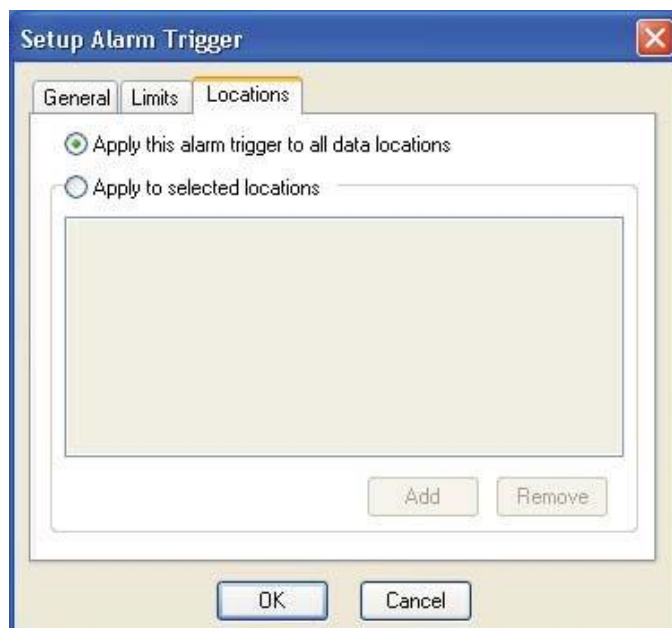


Figure 7-12 Setup Alarm Trigger - Location Information

Note: The Location list's sort order can be changed by clicking the column headers.

Alarm Triggers can apply to one location, a set of locations or all locations. By default, a trigger applies to all locations (Figure 7-12). Users can assign the trigger to apply to one or more specific location(s) by choosing the “Apply to selected locations” (Figure 7-13). Click the Add button to display the Select Locations window. Choose the location(s) and click OK to complete.

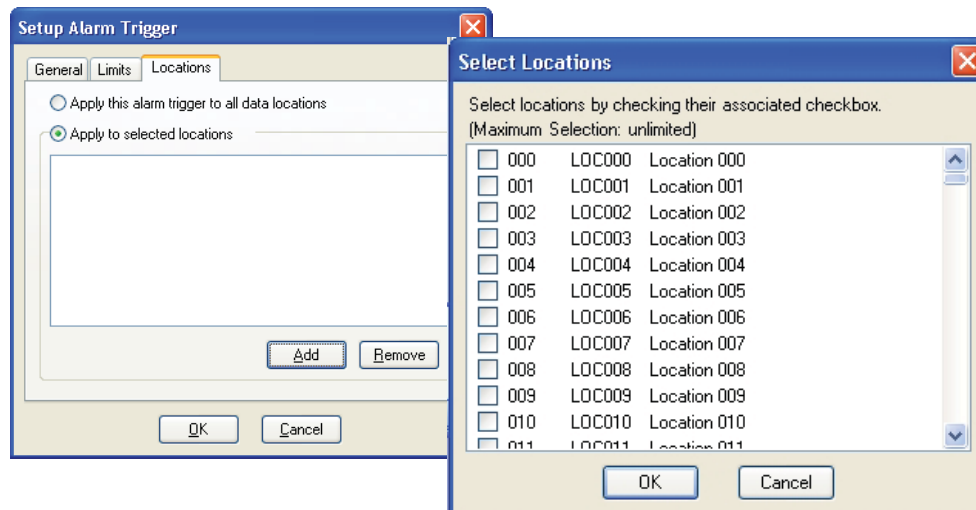


Figure 7-13 Select Locations

The Locations window will update and display the selected locations.

When finished, click OK to save the information.

If the new alarm trigger is enabled, its alarm limits take effect on the next data cycle. Multiple alarm triggers can be applied to the same data set. For each data set LMS Express reports and records the worst status of all alarm triggers that apply to the given data set.

Modifying an Alarm Trigger

Note: There may be a delay after a trigger is modified, and the Real Time data status windows update to reflect the changes.

Modify an alarm trigger by selecting it in the Alarm Triggers view and double clicking on it; select it and right click to pick Setup; or select it and click on the Setup button on the toolbar. Alternatively highlight it on the Alarm Triggers view and then click “Modify Alarm Trigger”. The Setup Alarm Trigger window displays, displaying the trigger’s configuration information.

After the user has made changes and clicked OK to accept the changes, the Real Time Locations, Instruments and Data Status windows updates to reflect the changes the next time data is collected for each data set.

Deleting an Alarm Trigger

Delete an alarm trigger by selecting it and then clicking “Delete Alarm Trigger” on the Task Panel, the delete button on the toolbar, or right click and select Delete. The trigger is deleted from the list and the status windows updates to reflect the change.

When the users delete an alarm, the previous data that was in an alarm and all alarm and warning acknowledgements remain in the database.

Alarm Groups

Alarm Groups allows users to see the worst status of all data sets assigned to a group of data sets. Users can tie alarm groups to an instrument’s relays to display the status of a particular area. Alarm groups can also be used to display the status of a group of data sets on Maps and on the Real-Time Alarm Group Status window so that these windows will only display information on data sets the user is most interested in.

Data sets can be assigned to an Alarm Group by location and/or data type. For example, alarm groups could contain:

Note: It is okay to assign the same data set to multiple alarm groups.

- All data sets in a particular location. This alarm group will display the worst status of all data collected from that locations in the facility.
- All particle data sets in the system. This alarm group will display the worst status of all particle data collected on the system.

Creating a New Alarm Group

To create an alarm group, click “Create a New Configuration” on the task panel, right-click anywhere on the Alarm Triggers view and select Add or click the New button on the Toolbar (Figure 7-14).



Figure 7-14 Add Alarm Configuration window

Select Alarm Group and click OK. The following Setup Alarm Group window displays.

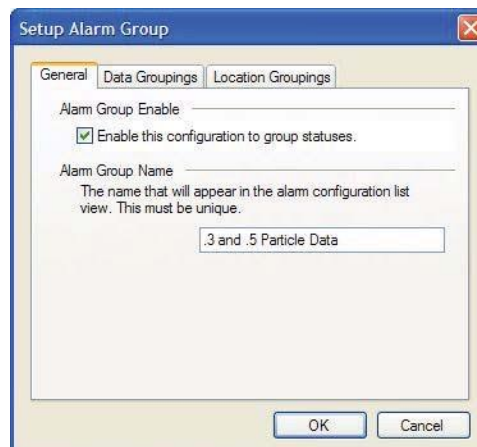


Figure 7-15 Setup Alarm Group window

To create an alarm group, select or enter the following information.

- Check Enable to enable the alarm group. To disable an alarm group, but keep its configuration, un-check this box.
- Enter a name for the alarm group.

If the alarm group applies to only one, or a specific list of data types, click the Data Groupings tab to display the following window.

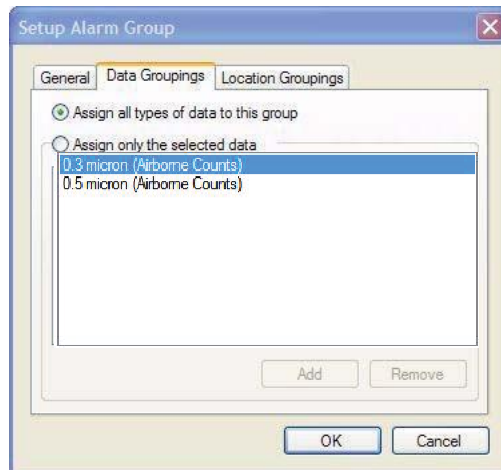


Figure 7-16 Setup Alarm Group - Data Groupings

All data types in all locations in the system will be assigned to the alarm group by default on the Data Grouping's tab. Select one or more specific data types by selecting "Assign only the selected data" then click Add. Pick the specific data types you want to add to the alarm group.

If the alarm group applies to only one location, or a set of locations, click the Location Grouping tab (Figure 7-17).

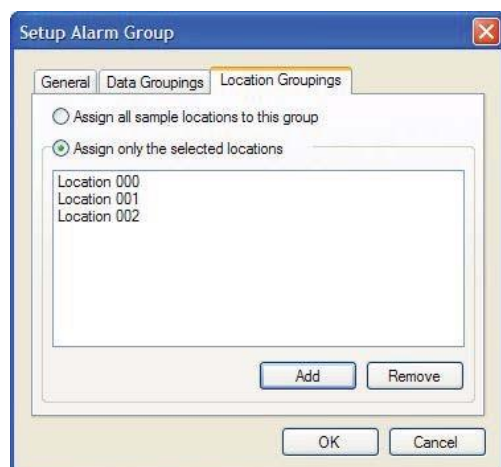


Figure 7-17 Setup Alarm Group, Location Grouping

Alarm Groups can apply to one location, a set of locations, or all

locations. Users can assign specific locations to an alarm group. To do so, click the Add button to display the Select Locations window.

Note: Alternatively, double click on the desired alarm group to modify it.

After selecting the locations for the alarm group, click OK to close the Setup Alarm Group window.

Modifying an Alarm Group

To modify an alarm group, select an alarm group and either click “Change Selection’s Settings” on the task panel, click the Setup button on the Toolbar, or right click and select Setup from the menu that pops up. The Alarm Group Setup window described above displays.

Once all modifications have been made, click OK to close the Alarm Group Setup window.

Deleting an Alarm Group

Note: When a user deletes an alarm group, the data sets & data remain in the database.

To delete an alarm group, select an alarm group and click “Delete the Selection” on the task panel, right click and select Delete from the pop up menu, or click Delete on the Toolbar.

Deleting an alarm group will automatically remove the alarm group from maps and relays used in real time data collection.

Alarms and Warnings Log

LMS Express provides an Alarm Log so users can view alarms, warnings and acknowledgements.

Alarm triggers apply to both Real Time data and manually downloaded data. LMS Express tracks normal, warning and alarm transitions - that is, when a data set goes from normal to warning or alarm, an alarm log record is generated. When a data set returns to warning from alarm, or returns to normal from either warning or alarm, the change is also logged in the alarm log.

To view the log, click the Home button, then the “Real-Time Data Status and Alarm Logging” button and then the Alarms and Warnings Log button (Figure 7-18).

Note: Deleting data in the Database view deletes their associated alarm log entries.

ID	Date Time	From Status	To Status	Data Set	Message
1	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:0.3 micron (Counts)	12448 Counts exceeded Alarm High limit 70 Cou
2	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
3	6/16/2005 16:07:59	None	Warning	HANDHELD 3016 (01)Location 000:Analog 2:Relative Humidity	40.5 % exceeded Warning High limit 39 %.
4	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	12557 Counts exceeded Alarm High limit 70 Cou
5	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
6	6/16/2005 16:16:32	None	Warning	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	40.2 % exceeded Warning High limit 39 %.
7	6/16/2005 16:23:32	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
8	6/16/2005 16:33:02	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
9	6/16/2005 16:58:32	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
10	6/17/2005 10:00:23	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	11888 Counts exceeded Alarm High limit 70 Cou
11	6/17/2005 10:00:23	None	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
12	6/17/2005 10:00:23	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	42.9 % exceeded Alarm High limit 41 %.
13	6/17/2005 10:37:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
14	6/17/2005 10:37:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
15	6/17/2005 10:39:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
16	6/17/2005 10:39:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
17	6/17/2005 10:45:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
18	6/17/2005 10:45:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
19	6/17/2005 10:46:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
20	6/17/2005 11:12:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
21	6/17/2005 11:13:14	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
22	6/17/2005 11:22:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
23	6/17/2005 11:26:44	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
24	6/17/2005 11:27:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
25	6/17/2005 11:28:44	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
26	6/17/2005 11:29:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.

Figure 7-18 Alarms and Warnings Log

Each log record contains the date and time of the alarm, the alarm or warning transition (normal to warning, normal to alarm, alarm to normal, etc.), the name of the data set, a message and (if a note is added) a note about the data or alarm acknowledgement.

Task Panel

When the Alarms and Warnings Log view is displayed, the following options are available on the Task Panel.

Set up Alarms and Warnings

To quickly switch to the Alarm Triggers view, click the “Setup Alarms and Warnings” item on the Task Panel.

Change Log's Time Period

By default the last 7 days of alarm and warning log entries are displayed on the Alarms and Warnings Log View. To display a different range of alarm and warning log records, click "Change Log's Time Period" on the Alarms and Warnings Log Task Panel or select the Setup button on the toolbar (Figure 7-19).



Figure 7-19 Setup Alarm Log window

On the Setup Alarm Log window, the user can select the range of alarm and warning records that are displayed in two ways.

- Select "Rolling time range" and enter a specific duration.
- Select a Fixed time range, entering a specific start date and time and end date and time.

Clicking OK updates, the Alarms and Warnings View to display only those records that fall in the selected time range.

Save Alarm Log to File

To save the currently displayed alarm log to a file, select "Save to File" from the Task Panel or click the "Save As" button on the toolbar.

On the "Save As" window that appears, select a folder and filename to save the log to and what type of file to create Excel (.xls) or CSV (*.csv). Clicking OK saves the log to the selected filename.

Unacknowledged Alarms

To quickly see all the currently unacknowledged alarms, click the “Unacknowledged Alarms” item on the Task Panel. A list of all unacknowledged alarms displays.

Alarms can be acknowledged from the Unacknowledged Alarms view. See the section on Acknowledging alarms later in this chapter.

Print Log

To print the currently displayed log entries, select Print Log from the Task Panel or click the print toolbar button. On the Print setup window that appears, select the printer to print to and click OK.

Acknowledge Selection

LMS Express allows users to acknowledge alarms and add notes to alarm and warning log records.

To add a note or acknowledgement to an alarm log row, select the row and double click on it. See the section on acknowledging alarms later in this chapter for more details.

Viewing Alarm Status

LMS Express provides several ways to view alarm, warning and normal status.

Status Window

When alarm or warning limits are exceeded for enabled alarm triggers, the results appear on the Data Status view.

Note: Data sets that do not have enabled alarm triggers and are collecting data are displayed in white with a status of “None”.

Data Status View - Alarms

If an administrator has set up and enabled alarm triggers, the Real Time Data Status view shows the last known alarm status for each data set along with its value.

Note: The “Real-Time View” window shows Disabled status (dark grey) if data collection has stopped. If data collection has stopped due to a Data Collection error, then that data set is shown in blue.

Data sets that have exceeded alarm limits are highlighted red, data sets that have exceeded warning limits are highlighted yellow and normal values are colored green. A status of “None” is assigned to data sets that are not affected by one or more alarm triggers.

Real-Time Data Status					
View Mode: Grid					
HANDHELD 3016 (01) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Normalised)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Normalised)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 0.5 micron (Normalised)
HANDHELD 3016 (01) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 3.0 micron (Normalised)	HANDHELD 3016 (01) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 3.0 micron (Normalised)	HANDHELD 3016 (01) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (01) Packaging - 02 3.0 micron (Normalised)
HANDHELD 3016 (01) Packaging - 02 Analogue 1 Temperature	HANDHELD 3016 (01) Packaging - 02 Analogue 2 Relative Humidity	HANDHELD 3016 (01) Packaging - 02 Sample Time	HANDHELD 3016 (01) Packaging - 02 Sample Volume	HANDHELD 3016 (02) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 0.5 micron (Normalised)
HANDHELD 3016 (02) Packaging - 02 0.5 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 0.5 micron (Normalised)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 1.0 micron (Normalised)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 10.0 micron (Normalised)
HANDHELD 3016 (02) Packaging - 02 3.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 3.0 micron (Normalised)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Counts)	HANDHELD 3016 (02) Packaging - 02 5.0 micron (Normalised)	HANDHELD 3016 (02) Packaging - 02 Temperature	HANDHELD 3016 (02) Packaging - 02 Relative Humidity
HANDHELD 3016 (02) Packaging - 02 Sample Time	HANDHELD 3016 (02) Packaging - 02 Sample Volume	REMOTE 3016P (01) Packaging - 02 0.5 micron (Counts) 10000 (Counts)	REMOTE 3016P (01) Packaging - 02 0.5 micron (Normalised) 1000000 (pct%)	REMOTE 3016P (01) Packaging - 02 0.5 micron (Counts) 10000 (Counts)	REMOTE 3016P (01) Packaging - 02 0.5 micron (Normalised) 1000000 (pct%)
REMOTE 3016P (01) Packaging - 02 1.0 micron (Counts) 10000 (Counts)	REMOTE 3016P (01) Packaging - 02 1.0 micron (Normalised) 1000000 (pct%)	REMOTE 3016P (01) Packaging - 02 3.0 micron (Counts) 25 (Counts)	REMOTE 3016P (01) Packaging - 02 3.0 micron (Normalised) 8000 (pct%)	REMOTE 3016P (01) Packaging - 02 Sample Time	REMOTE 3016P (01) Packaging - 02 Sample Volume

Figure 7-20 Data Status view - Status of Enabled Alarm Triggers

Status Bar – Alarm Status

Besides viewing the Data Status view, to give users a quick, overall summary of all alarm triggers, LMS Express displays the overall system alarm status in the lower right corner of the application window.

The status displayed is the aggregate of all currently enabled triggers.

- If all enabled triggers are reporting normal, a green “Normal” displays in the lower right portion of the status bar.
- If one or more enabled triggers report that a warning limit has been exceeded, but no alarm limits have been exceeded in the system, then a yellow “Warning” appears in the lower right portion of the status bar.
- If one or more triggers report that an alarm limit has been exceeded, then a red, flashing “Alarm” appears in the lower right corner of the application’s status bar.

Note: Fault takes priority over all other statuses (Alarm, Warning or Normal) and appears cyan (Blue).

- If one or more instrument reports a fault condition, “Fault” will appear and flash on and off in the lower right portion of the status bar. Instruments can be both in fault and alarm, warning, or normal. If such is the case, the status bar will report and alternatively flash “Alarm/Fault” or “Warning/Fault” or “Normal/Fault” respectively.
- If one or more instruments receives errors while collecting data, “Data Collection Error” will appear and flash on and off in the lower right portion of the status bar. Instruments can be both in data collection error and alarm, warning, or normal. In such a case, the status bar will alternatively flash “Data Collection Error”/”Alarm”, or “Data Collection Error”/”Warning” or “Data Collection Error”/”Normal.” respectively.



Figure 7-21 Normal, Warning and Alarms Reported on Status Bar

- When there are unacknowledged alarms, the words “Unacknowledged Alarms Exist” will flash in the lower right corner of the application’s status bar. This text will disappear when all alarm entries have been acknowledged. Clicking on this text will display the Unacknowledged Alarms view.



Figure 7-22 Unacknowledged Alarms Reported on Status Bar

Alarm Status Bar Navigation

Besides displaying the current overall system status, the Alarm Status section of the Status Bar gives the user a quick way to switch views.

- Clicking on the Alarm Status of the status bar displays the “Real-Time Data Status and Alarm Logging” view.
- Clicking the Unacknowledged Alarms Exist section of the status bar displays the “Unacknowledged Alarms” view.

Acknowledging Alarms

Besides displaying alarm and warning conditions, LMS Express allows users to acknowledge alarm and warning log records.

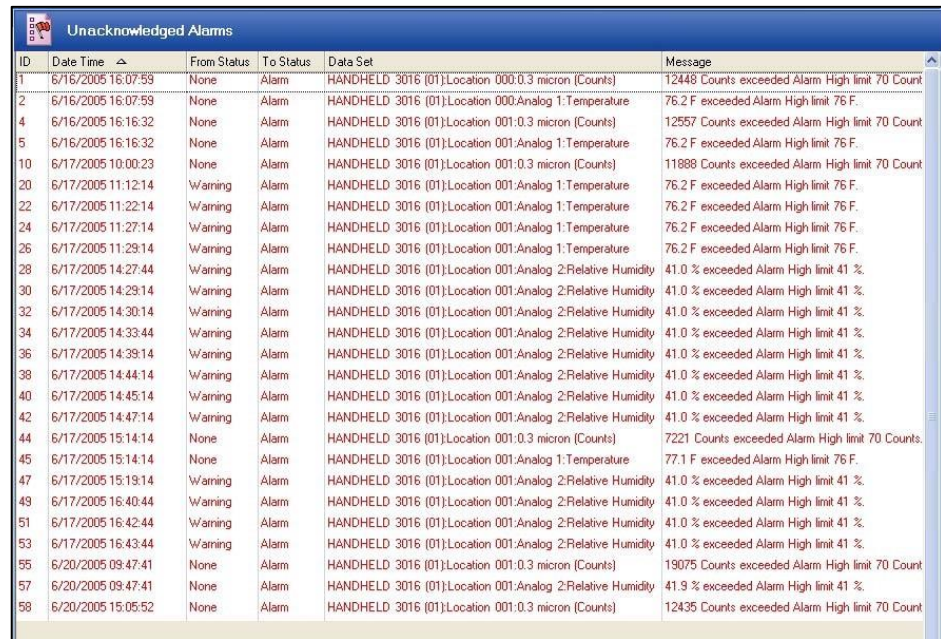
There are two views on which users can acknowledge alarms and/or warnings - the Alarms and Warning Log view and the Unacknowledged Alarms view.

To display the Alarms and Warnings Log view, click on the Home button, then click on Real-Time Data Status and Alarm Logging and then click Alarms and Warnings Log.

ID	Date Time	From Status	To Status	Data Set	Message
1	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:0.3 micron (Counts)	12448 Counts exceeded Alarm High limit 70 Cou
2	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
3	6/16/2005 16:07:59	None	Warning	HANDHELD 3016 (01)Location 000:Analog 2:Relative Humidity	40.5 % exceeded Warning High limit 39 %
4	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	12557 Counts exceeded Alarm High limit 70 Cou
5	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
6	6/16/2005 16:16:32	None	Warning	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	40.2 % exceeded Warning High limit 39 %
7	6/16/2005 16:23:32	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
8	6/16/2005 16:33:02	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
9	6/16/2005 16:58:32	Alarm	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.7 F exceeded Warning High limit 75 F.
10	6/17/2005 10:00:23	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	11888 Counts exceeded Alarm High limit 70 Cou
11	6/17/2005 10:00:23	None	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
12	6/17/2005 10:00:23	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	42.9 % exceeded Alarm High limit 41 %
13	6/17/2005 10:37:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
14	6/17/2005 10:37:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
15	6/17/2005 10:39:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
16	6/17/2005 10:39:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
17	6/17/2005 10:45:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
18	6/17/2005 10:45:44	Warning	Normal	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	Returned to Normal.
19	6/17/2005 10:46:14	Normal	Warning	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	75.2 F exceeded Warning High limit 75 F.
20	6/17/2005 11:12:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.

Figure 7-23 Alarms and Warnings Log

To display the Unacknowledged Alarms view, click on the Home button, then click on Real Time Location, Instrument and Data Status and then click Unacknowledged Alarms (refer to Figure 7-24).

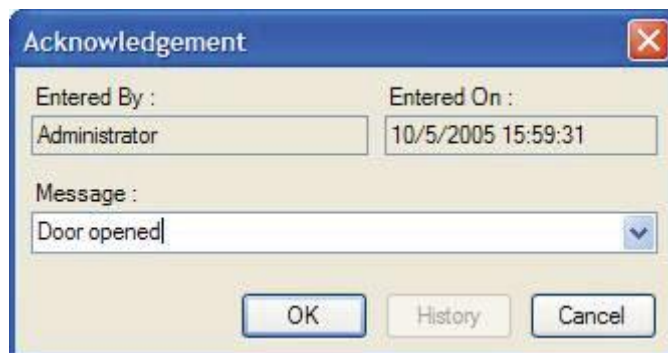


ID	Date Time	From Status	To Status	Data Set	Message
1	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:0.3 micron (Counts)	12448 Counts exceeded Alarm High limit 70 Count
2	6/16/2005 16:07:59	None	Alarm	HANDHELD 3016 (01)Location 000:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
4	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	12557 Counts exceeded Alarm High limit 70 Count
5	6/16/2005 16:16:32	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
10	6/17/2005 10:00:23	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	11888 Counts exceeded Alarm High limit 70 Count
20	6/17/2005 11:12:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
22	6/17/2005 11:22:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
24	6/17/2005 11:27:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
26	6/17/2005 11:29:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	76.2 F exceeded Alarm High limit 76 F.
28	6/17/2005 14:27:44	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
30	6/17/2005 14:29:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
32	6/17/2005 14:30:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
34	6/17/2005 14:33:44	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
36	6/17/2005 14:39:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
38	6/17/2005 14:44:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
40	6/17/2005 14:45:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
42	6/17/2005 14:47:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
44	6/17/2005 15:14:14	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	7221 Counts exceeded Alarm High limit 70 Counts.
45	6/17/2005 15:14:14	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 1:Temperature	77.1 F exceeded Alarm High limit 76 F.
47	6/17/2005 15:19:14	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
49	6/17/2005 16:40:44	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
51	6/17/2005 16:42:44	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
53	6/17/2005 16:43:44	Warning	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.0 % exceeded Alarm High limit 41 %
55	6/20/2005 09:47:41	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	19075 Counts exceeded Alarm High limit 70 Count
57	6/20/2005 09:47:41	None	Alarm	HANDHELD 3016 (01)Location 001:Analog 2:Relative Humidity	41.9 % exceeded Alarm High limit 41 %
58	6/20/2005 15:05:52	None	Alarm	HANDHELD 3016 (01)Location 001:0.3 micron (Counts)	12435 Counts exceeded Alarm High limit 70 Count

Figure 7-24 Unacknowledged Alarms view

To acknowledge an alarm on either the Alarms and Warnings Log or the Unacknowledged Alarms view, select the desired record and double click on it.

The Acknowledgement window displays the selected record.



Acknowledgement

Entered By : Administrator

Entered On : 10/5/2005 15:59:31

Message : Door opened

OK History Cancel

Figure 7-25 Acknowledgement Window

Note: The only way to delete acknowledgements and messages is to delete the data they are associated with.

On the Acknowledgement window,

- Enter a message and click OK or select a predefined message by selecting from the Message field pulldown list.

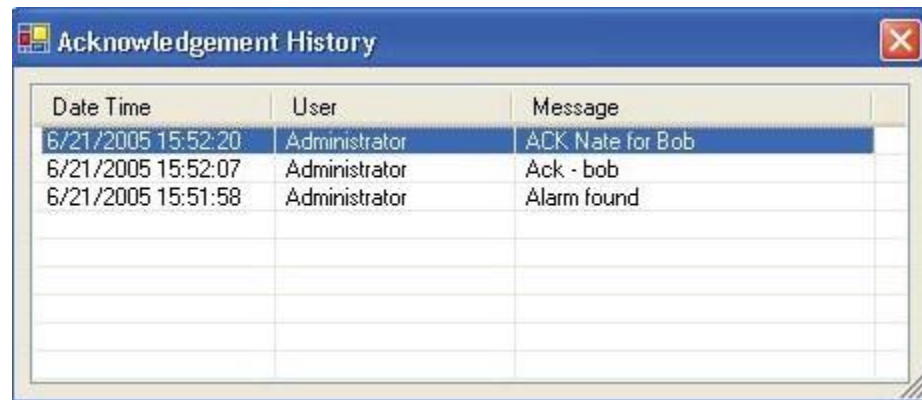
- To add a predefined message, select “Setup Predefined Acknowledgements” from the Message pull-down list.

Note: After an alarm is acknowledged on the Unacknowledged Alarms view, the view refreshes and the record no longer appears because it has been acknowledged. View it instead on the Alarms and Warnings Log.

Acknowledgements and messages cannot be deleted directly. Only by deleting the data they are assigned to, does LMS Express delete the associated acknowledgements and messages.

In addition, acknowledgements and messages cannot be overwritten. Modifying an existing message saves the old message, as it was and adds a new message for the updates or changes the user made.

To see the history of who added which messages when, click the History button on the Acknowledge window. Messages and their modifications are listed on the Acknowledgement History window.



Date Time	User	Message
6/21/2005 15:52:20	Administrator	ACK Nate for Bob
6/21/2005 15:52:07	Administrator	Ack - bob
6/21/2005 15:51:58	Administrator	Alarm found

Figure 7-26 Acknowledgement Window - History

Enable/Disable Alarm Acknowledgement

On the “Acknowledgements” box on the Alarm Triggers screen’s Task Panel, users can set up predefined acknowledgement messages and enable/disable the Unacknowledged Alarms Exist alert

To enable or disable requiring alarms to be acknowledged, click on the Configure button on the Alerts Enabled section of the Task panel. On the Setup Acknowledgement Options window that appears, select Enable or Disable and click OK.

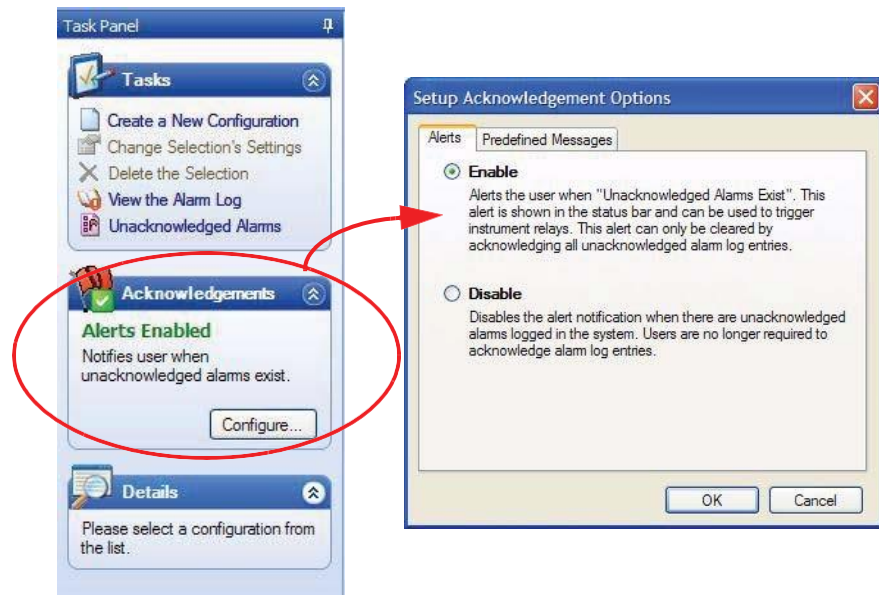


Figure 7-27 Setup Acknowledgement Options Screen

Users will be warned that all current unacknowledged alerts will be lost if they choose to disable Alert Acknowledgements.

Predefined Acknowledgement Messages

Users can set up pre-defined messages to be used when acknowledging alerts.

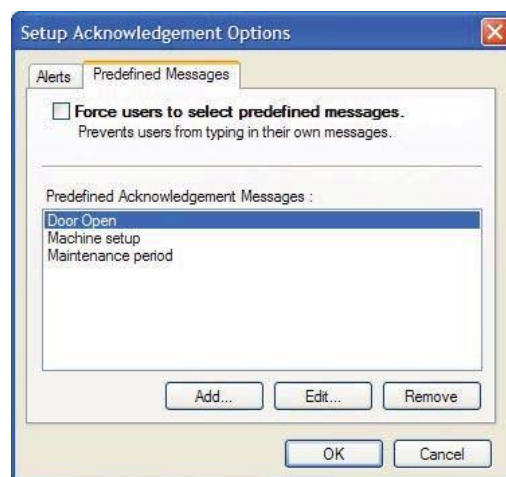


Figure 7-28 Predefined Acknowledgement messages

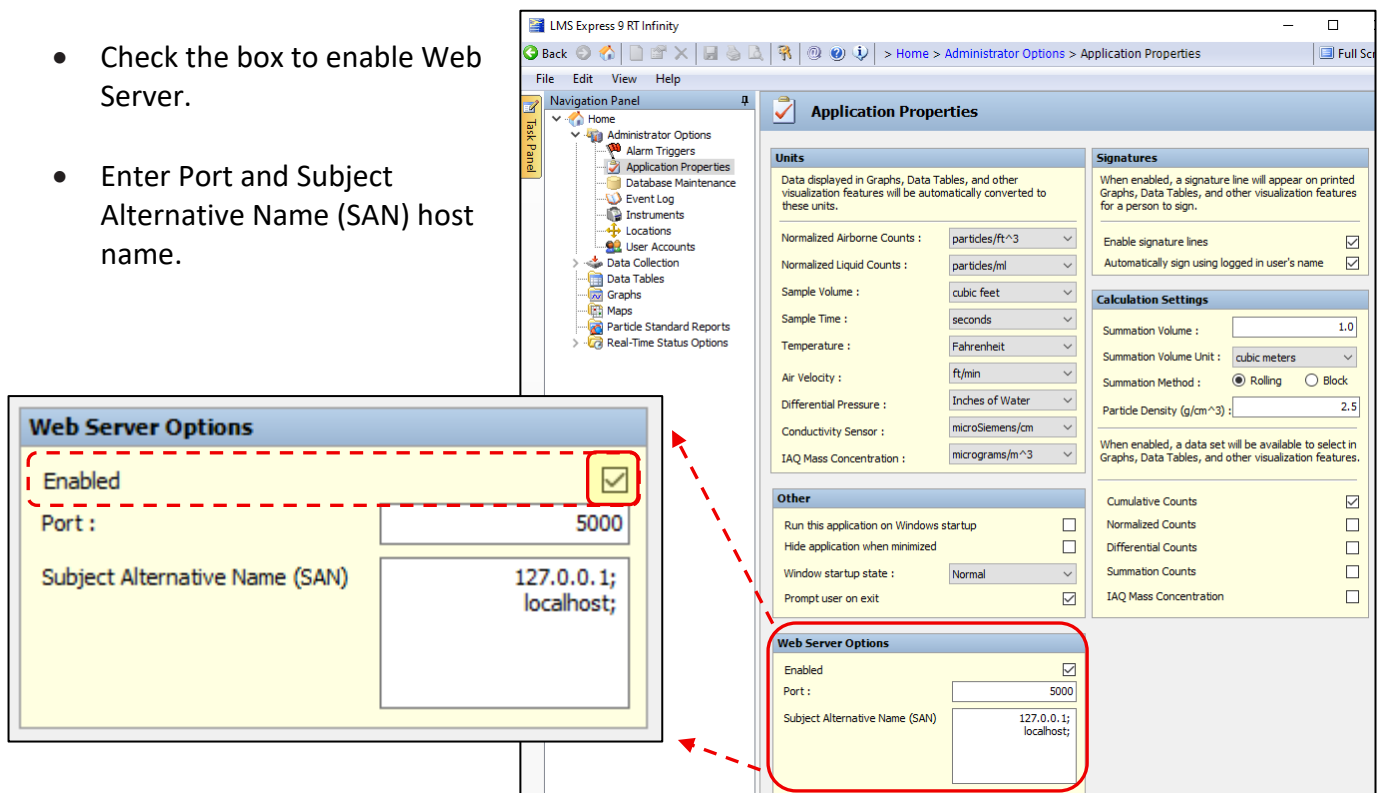
Blank Page

Chapter 8 LMS Express Web Client

Note: The LMS Express Web Client uses the TCP port 5000 to communicate. You may have to ask the IT department to open (allow) port 5000 to be active on your network.

LMS Express includes a thin web client called LMS Express Web Client. Users can view status, run reports and acknowledge alarms via supported web browsers including Google Chrome, Microsoft Edge, and Mozilla Firefox. Safari has only limited support and is not recommended. Internet Explorer is not supported. The LMS Express Web Client must first be enabled from the LMS Express software, Application Properties, and Web Server Options screen. The Web Client will open up initially as an unsecure website. You can still navigate to the Webclient by selecting *Advanced* and proceed anyways. If you would like to avoid this warning, contact your IT department to configure the SSL certificate for LMS Express. Contact LWS Support for instructions how.

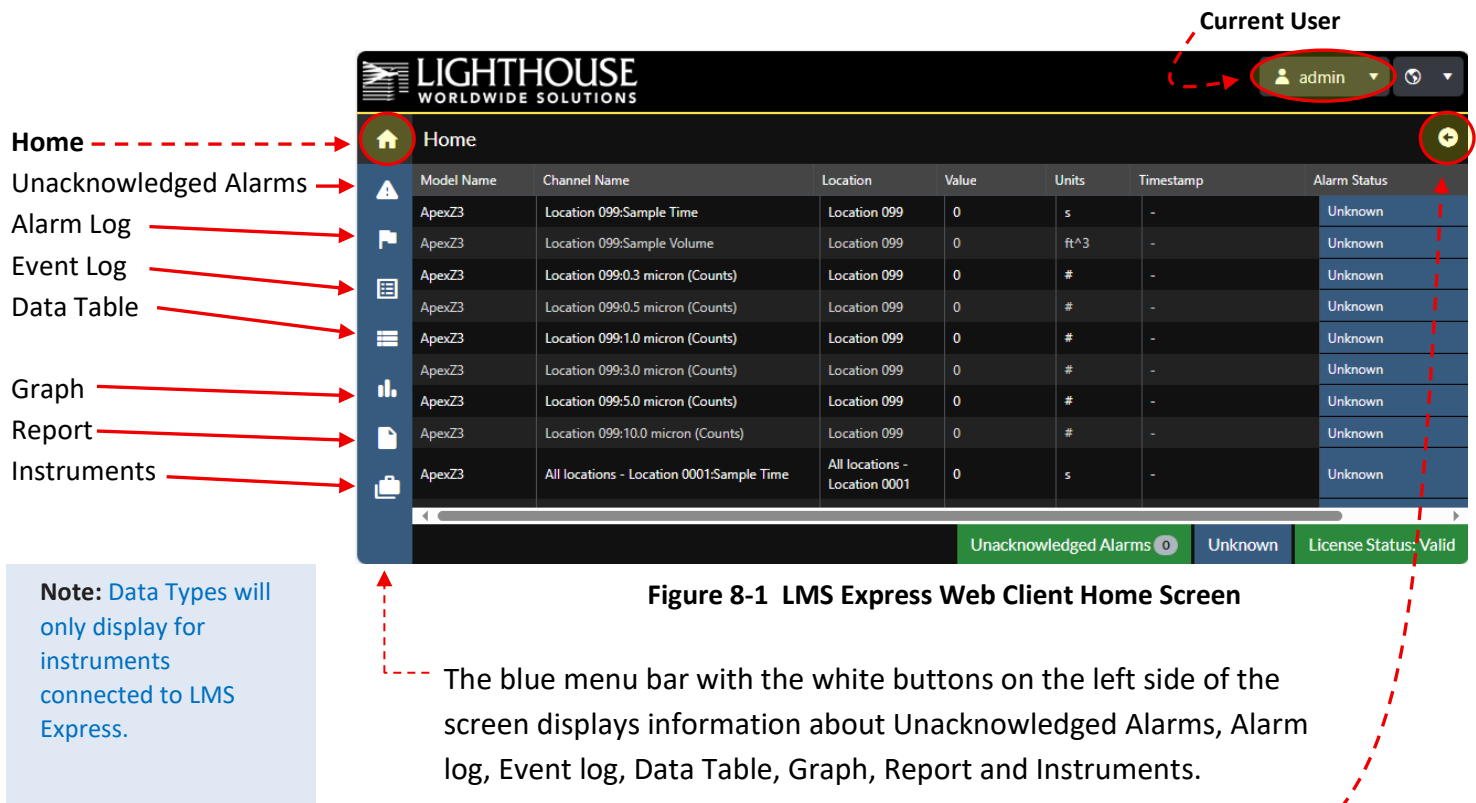
- Check the box to enable Web Server.
- Enter Port and Subject Alternative Name (SAN) host name.



To View the LMS Express Web Client, enter <https://localhost:5000> in your browser window, where localhost is the IP address of the LMS Express Server. If users are enabled in LMS Express, then a Password Protection screen will prompt the user to enter valid credentials to access the Web Client.

Home Screen

The web client Home screen displays the model's name, channel name, location, value, units, timestamp and alarm status of all real time instrument channels connected to LMS Express.



Channel Status Filter

Press the Navigation arrow  located on the top right-corner of the screen to display the 'Channel Status Filter'.

Select Location(s) to filter data channels.

Select Data Type(s) to filter; Particle channel count, Relative Humidity, Temperature, or Sample Time to filter data channels.

The white oval on the Apply button will display the total filtered number of data channels connected in real-time.

Press the green Apply button to apply the selected filters.

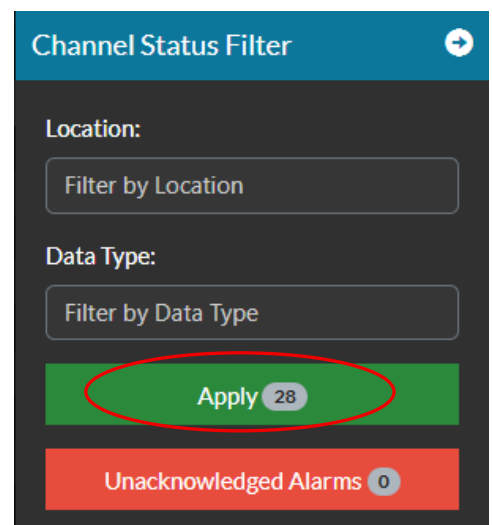


Figure 8-2 Channel Status Filter

Filter Home Page Datasets

Press the Apply button to filter the Home page data sets. Only those Locations and Data Types included in the filter will be displayed. When no filters are in place pressing the Apply button will display the unfiltered total number of connected real-time data channels in the database.

The screenshot shows the Lighthouse Home screen. The 'Home' button in the left sidebar is circled in red. The main table displays data for various locations, including 'Location 001' and 'Location 002'. The 'Channel Status Filter' panel on the right is open, showing 'Location' and 'Data Type' filters. The 'Apply' button is highlighted with a red dashed box and labeled 'No Filters Selected'. The 'Unacknowledged Alarms' count is 12721.

All Locations, All Types are displayed.

Model Name	Channel Name	Location	Value	Units	Timestamp
Apex23	Apex23 (01)Location 001:Sample Time	Location 001	0	s	-
Apex23	Apex23 (01)Location 001:Sample Volume	Location 001	0	ft^3	-
Apex23	Apex23 (01)Location 001:0.3 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:0.5 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:1.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:3.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:5.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:10.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:Temperature	Location 001	0	F	-
Apex23	Apex23 (01)Location 001:Relative Humidity	Location 001	0	%	-
REMOTE 3014	REMOTE 3014 (01)Location 002:Sample Time	Location 002	0	s	-
REMOTE 3014	REMOTE 3014 (01)Location 002:Sample Volume	Location 002	0	ft^3	-

Figure 8-3a Home Screen No Filters

The screenshot shows the Lighthouse Home screen with filters applied. The 'Home' button in the left sidebar is circled in red. The main table displays data only for 'Location 001'. The 'Channel Status Filter' panel on the right shows 'Location' set to 'Location 001' and 'Data Type' set to 'Filter by Data Type'. The 'Apply' button is highlighted with a red dashed box and labeled 'Filtered on Location 001'. The 'Unacknowledged Alarms' count is 12721.

Only data for Filtered Location 001 is displayed.

Model Name	Channel Name	Location	Value	Units	Timestamp
Apex23	Apex23 (01)Location 001:Sample Time	Location 001	0	s	-
Apex23	Apex23 (01)Location 001:Sample Volume	Location 001	0	ft^3	-
Apex23	Apex23 (01)Location 001:0.3 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:0.5 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:1.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:3.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:5.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:10.0 micron (Counts)	Location 001	0	#	-
Apex23	Apex23 (01)Location 001:Temperature	Location 001	0	F	-
Apex23	Apex23 (01)Location 001:Relative Humidity	Location 001	0	%	-

Figure 8-3b Home Screen Filtered on "Location 001"

Unacknowledged Alarms

The LMS Express Web Client Unacknowledged Alarms screen displays the ID, Date & Time, From Status, To Status, Data Set and Message for all unacknowledged alarms recorded in the database.

ID	Timestamp	From Status	To Status	Data Set	Message
111997	2025-07-03 3:50:15 PM	Unknown	Alarm	Apex23 (01):Location 001:0.3 micron (Counts)	48 Counts exceeded Alarm Low limit 60 Counts.
111988	2025-07-03 3:45:37 PM	Warning	Alarm	7017C (01):Location 012:Analog 8:Temperature	87.259 F exceeded Alarm High limit 85 F.
111994	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (01):Location 002:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.
111992	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (02):Location 003:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.
111987	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (03):Location 004:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.
111986	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 2014P (01):Location 011:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.
111993	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 5014 (01):Location 008:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.
111985	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 3014 (04):Location 005:0.3 micron (Counts)	50 Counts exceeded Alarm Low limit 60 Counts.

Figure 8-6 Unacknowledged Alarms

Press the Navigation arrow  located on the top right-corner of the screen to display the 'Unacknowledged Alarm Filter' option.

ID	Timestamp	From Status	To Status	Data Set	Message
111994	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (01):Location 002:0.3 micron (Counts)	50 Counts e
111992	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (02):Location 003:0.3 micron (Counts)	50 Counts e
111987	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 3014 (03):Location 004:0.3 micron (Counts)	50 Counts e
111986	2025-07-03 3:45:24 PM	Normal	Alarm	REMOTE 2014P (01):Location 011:0.3 micron (Counts)	50 Counts e
111993	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 5014 (01):Location 008:0.3 micron (Counts)	50 Counts e
111985	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 3014 (04):Location 005:0.3 micron (Counts)	50 Counts e
111984	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 2014 (01):Location 006:0.3 micron (Counts)	50 Counts e
111983	2025-07-03 3:45:23 PM	Normal	Alarm	REMOTE 3014 (05):Location 007:0.3 micron (Counts)	50 Counts e
111982	2025-07-03 3:45:22 PM	Normal	Alarm	REMOTE 5104 (01):Location 009:0.3 micron (Counts)	50 Counts e

Figure 8-7 Unacknowledged Alarms Filter

Filter Unacknowledged Alarms List

Live Updates ON: removes the date filter and includes all Unacknowledged alarms regardless of date recorded.

In addition, new alarms will update and display in real time.

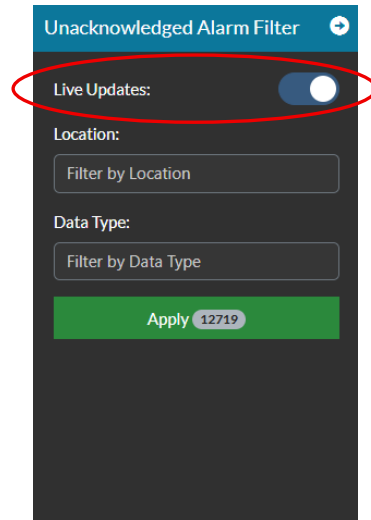


Figure 8-8a Live Updates ON

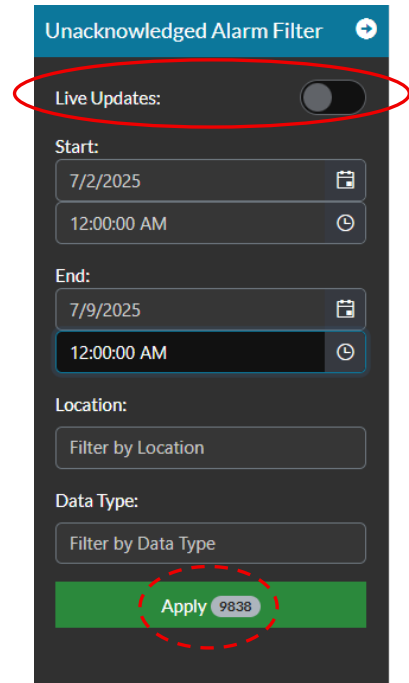


Figure 8-8b Live Updates OFF

Live Updates OFF: will only display unacknowledged alarms for the date/time range specified. Location and Data Type filters are selectable.

- Enter the Start and End date and time for the filter
- Press the green Apply button.
- Select locations to filter
- Select data types to filter
- Press Apply.
- The white oval on the green Apply button will display the total number of unacknowledged alarms applied by the filter.

Alarm Log

The LMS Express Web Client Alarm Log screen displays the Date & Time, From Status, To Status, Data Set, Message, Acknowledged On, Acknowledged By, and Acknowledge Message.

Date & Time	From Status	To Status	Data Set	Message	Acknowledged On	Acknowledged By	Acknowledge Message
2025-08-14 12:35:55 PM	Warning	Alarm	REMOTE 5104V (01):Location 003:Analog 2:Relative Humidity	81.000 % exceeded Alarm High limit 75 %.	-	-	-
2025-08-14 12:35:45 PM	Alarm	Normal	REMOTE 3014 (01):Location 002:Analog 2:Relative Humidity	Returned to Normal.	-	-	-
2025-08-14 12:35:45 PM	Normal	Warning	REMOTE 3014 (01):Location 002:0.5 micron (Counts)	75 Counts exceeded Warning High limit 74 Counts.	-	-	-
2025-08-14 12:35:15 PM	Normal	Alarm	REMOTE 3014 (01):Location 002:Analog 2:Relative Humidity	89.000 % exceeded Alarm High limit 75 %.	-	-	-
2025-08-14 12:35:15 PM	Warning	Normal	REMOTE 3014 (01):Location 002:0.5 micron (Counts)	Returned to Normal.	-	-	-
2025-08-14 12:35:15 PM	Warning	Alarm	REMOTE 5104V (01):Location 003:0.5 micron (Counts)	104 Counts exceeded Alarm High limit 99 Counts.	-	-	-
2025-08-14 12:35:11 PM	Alarm	Warning	7017C (01):Location 010:Analog 6:Relative Humidity	73.022 % exceeded Warning High limit 50 %.	-	-	-
2025-08-14 12:34:45 PM	Alarm	Normal	REMOTE 3014 (01):Location 002:Analog 2:Relative Humidity	Returned to Normal.	-	-	-
2025-08-14 12:34:45 PM	Alarm	Warning	REMOTE 3014 (01):Location 002:0.5 micron (Counts)	75 Counts exceeded Warning High limit 74 Counts.	-	-	-
2025-08-14 12:34:45 PM	Normal	Warning	REMOTE 5104V (01):Location 003:Analog 2:Relative Humidity	21.000 % exceeded Warning Low limit 25 %.	-	-	-
2025-08-14 12:34:45 PM	Alarm	Warning	REMOTE 5104V (01):Location 003:0.5 micron (Counts)	98 Counts exceeded Warning High limit 74 Counts.	-	-	-
2025-08-14 12:34:25 PM	Warning	Normal	REMOTE 5104V (01):Location 003:Analog 2:Relative Humidity	Returned to Normal.	-	-	-
2025-08-14 12:34:15 PM	Normal	Alarm	REMOTE 3014 (01):Location 002:Analog 2:Relative Humidity	78.000 % exceeded Alarm High limit 75 %.	-	-	-
2025-08-14 12:34:15 PM	Alarm	Warning	REMOTE 5104V (01):Location 003:Analog 2:Relative Humidity	55.000 % exceeded Warning High limit 50 %.	-	-	-
2025-08-14 12:34:12 PM	Unknown	None	7017C (02):Location 004:Analog 4:Temperature		-	-	-
2025-08-14 12:33:55 PM	Warning	Alarm	REMOTE 5104V (01):Location 003:Analog 2:Relative Humidity	79.000 % exceeded Alarm High limit 75 %.	-	-	-
2025-08-14 12:33:45 PM	Warning	Normal	REMOTE 3014 (01):Location 002:Analog 2:Relative Humidity	Returned to Normal.	-	-	-

Navigation: 1 2 3 4 5 6 7 8 9 10 ... 25 items per page 1 - 25 of 3220 items

Status: Unacknowledged Alarms 918 Data Collection Error Alarm/Fault License Status: Valid

Figure 8-9 Alarm List

Press the Navigation arrow  located on the top right-corner of the screen to display the Alarm Filter options.

Filter Alarm Log

Live Updates ON: removes the date filter and includes all Alarm events regardless of date recorded.

In addition, new alarms will update and display in real time.

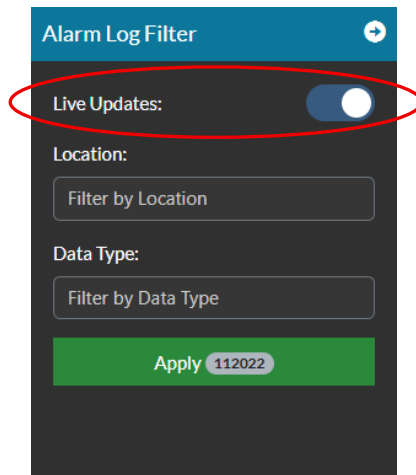


Figure 8-10a Live Updates ON

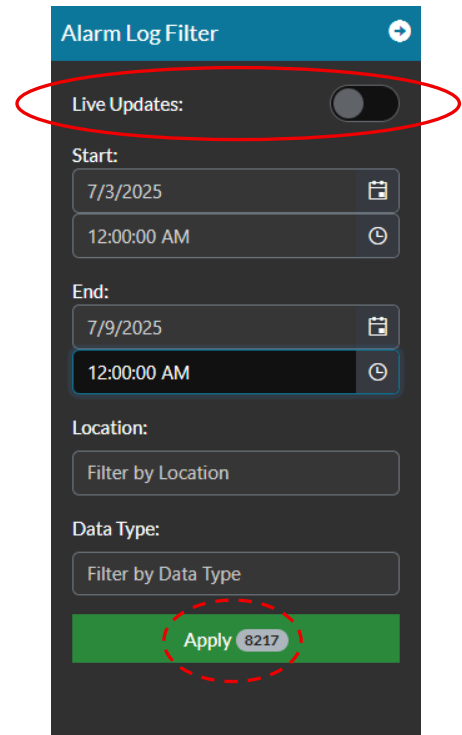


Figure 8-10b Live Updates OFF

Live Updates OFF: will only display alarms within the start and end date range specified. Location and Data Type filters are selectable.

- Select a Start date/time, End date/time to filter alarms.
- Select locations to filter alarms.
- Select data types to filter alarms.
- Press the green Apply button to apply filters.
- The white oval on the green Apply button will display the total number of alarms applied by the filter.

Event Log

The LMS Express Web Client Event Log screen displays Date & Time, Type, User and Message for every LMS Express action/event.

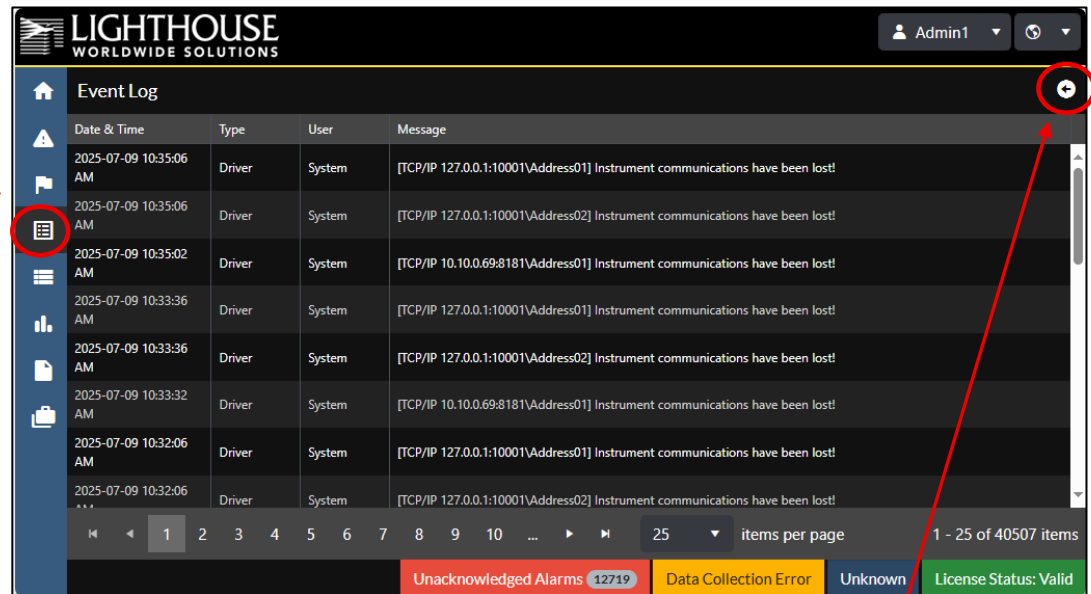


Figure 8-11 Event Log

Press the Navigation arrow  located on the top right-corner of the screen to display the Alarm Filter option.

Filter Event Log

Live Updates ON: will always display all events regardless of date.

In addition, new Events will update and display in real time.

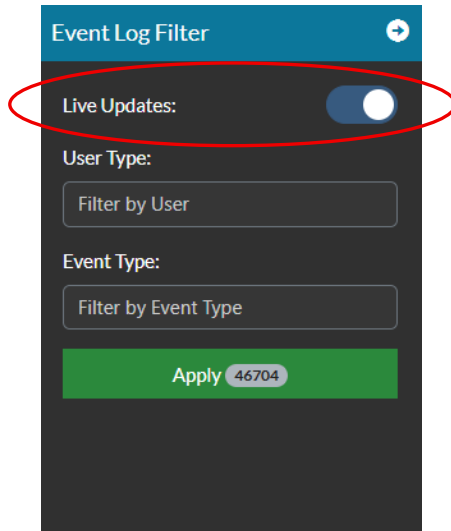


Figure 8-12a Live Updates: ON

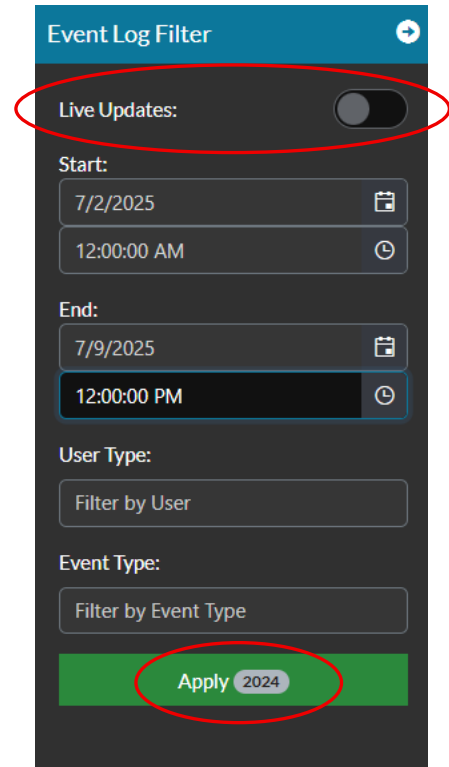


Figure 8-12b Live Updates: OFF

Live Updates OFF: will only display alarms for the date range specified. User and Event Type filters are selectable.

- Select a Start date/time, End date/time to filter events.
- Select Users to filter.
- Select Event Types to filter.
- Press the green Apply button to display the filtered Event Log.
- The white oval on the green Apply button will display the total number of events applied by the filter.

Data Table Screen

The Data Table view allows you to display data in a table format. Each data set displays statistics (Standard deviation, Average, Maximum data point, Minimum data point) calculated for the date and time range of data displayed. Data Tables can be exported to *.csv (comma separated values) files. Data tables can be rolling or fixed date and time.

Lighthouse WORLDWIDE SOLUTIONS							
Admin1							
Timestamp	ApexZ3 (01) Location 001 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (01) Location 002 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (02) Location 003 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (03) Location 004 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (04) Location 005 0.3 micron (Airborne Counts) (Counts)	REMOTE 2014 (01) Location 006 0.3 micron (Airborne Counts) (Counts)	REMOTE 2014 (02) Location 007 0.3 micron (Airborne Counts) (Counts)
2025-07-03 12:00:03 AM	48						
2025-07-03 12:00:09 AM	48						
2025-07-03 12:00:15 AM	48						
2025-07-03 12:00:21 AM	48						
2025-07-03 12:00:22 AM							50
2025-07-03 12:00:23 AM			50	50	50	50	
2025-07-03 12:00:24 AM		50					
2025-07-03 12:00:27 AM	48						
2025-07-03 12:00:33 AM	48						
2025-07-03 12:00:39 AM	48						
2025-07-03 12:00:45 AM	48						
2025-07-03 12:00:51 AM	48						
2025-07-03 12:00:57 AM	48						
2025-07-03 12:01:03 AM	48						
2025-07-03 12:01:09 AM	48						
2025-07-03 12:01:15 AM	48						
Average	48	80	80	80	80	80	80
Maximum	48	100	100	100	100	100	100
Minimum	48	50	50	50	50	50	50
Standard Deviation	0	18.734	18.734	18.734	18.734	18.734	18.734
Unacknowledged Alarms 12719 Data Collection Error Unknown License Status: Valid							

Data Table Screen

Lighthouse Worldwide Solutions

Data Table

Timestamp	ApexZ3 (01) Location 001 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (01) Location 002 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (02) Location 003 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (03) Location 004 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (04) Location 005 0.3 micron (Airborne Counts) (Counts)
2025-07-03 12:00:03 AM	48				
2025-07-03 12:00:09 AM	48				
2025-07-03 12:00:15 AM	48				
2025-07-03 12:00:21 AM	48				
2025-07-03 12:00:22 AM					
2025-07-03 12:00:23 AM			50	50	50
2025-07-03 12:00:24 AM		50			
2025-07-03 12:00:27 AM	48				
2025-07-03 12:00:33 AM	48				
2025-07-03 12:00:39 AM	48				
2025-07-03 12:00:45 AM	48				
2025-07-03 12:00:51 AM	48				
2025-07-03 12:00:57 AM	48				
2025-07-03 12:01:03 AM	48				
2025-07-03 12:01:09 AM	48				
2025-07-03 12:01:15 AM	48				
Average	48	80	80	80	80
Maximum	48	100	100	100	100
Minimum	48	50	50	50	50
Standard Deviation	0	18.734	18.734	18.734	18.734

Data Table Filter

Live Updates: ☐

Start: 7/3/2025 12:00:00 AM

End: 7/3/2025 06:00:00 AM

Location: Filter by Location

Data Type: Filter by Data Type

Apply 5030

Download

Unacknowledged Alarms 12719 Data Collection Error Unknown License Status: Valid

Filter Data Tables

- Data Tables can be filtered for Sample Start Date & Time, Sample End Date & Time, Location Name and Data Type.
- Data Table Filters will be limited to 150,000 data points or less. Users may be required to change the time range or other filters to meet this limit.
- Filters may be necessary to increase performance/usability depending on the client system.
- Data tables are not saved but instead generated with each load of the page. To save a specific data table view, apply a set of filters and bookmark the page.
- Data types will be limited to raw data, calculated/virtual data will not be supported (ex. Summation, Normalized etc. are not supported in the web client)
- Click the Download button to download Data File as .CSV file.



Lighthouse Worldwide Solutions

Admin1

Data Table

Timestamp	ApexZ3 (01) Location 001 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (01) Location 002 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (02) Location 003 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (03) Location 004 0.3 micron (Airborne Counts) (Counts)	REMOTE 3014 (04) Location 005 0.3 micron (Airborne Counts) (Counts)
2025-07-03 12:00:03 AM	48				
2025-07-03 12:00:09 AM	48				
2025-07-03 12:00:15 AM	48				
2025-07-03 12:00:21 AM	48				
2025-07-03 12:00:22 AM					
2025-07-03 12:00:23 AM			50	50	50
2025-07-03 12:00:24 AM		50			
2025-07-03 12:00:27 AM	48				
2025-07-03 12:00:33 AM	48				
2025-07-03 12:00:39 AM	48				
2025-07-03 12:00:45 AM	48				
2025-07-03 12:00:51 AM	48				
2025-07-03 12:00:57 AM	48				
2025-07-03 12:01:03 AM	48				
2025-07-03 12:01:09 AM	48				
2025-07-03 12:01:15 AM	48				
Average	48	80	80	80	80
Maximum	48	100	100	100	100
Minimum	48	50	50	50	50
Standard Deviation	0	18.734	18.734	18.734	18.734

Data Table Filter

Live Updates: ☒

Rolling Window

Days: 0

Time: 01:00:00

Location:

Filter by Location

Data Type:

Filter by Data Type

Apply

Unacknowledged Alarms 12719 Data Collection Error Unknown License Status: Valid

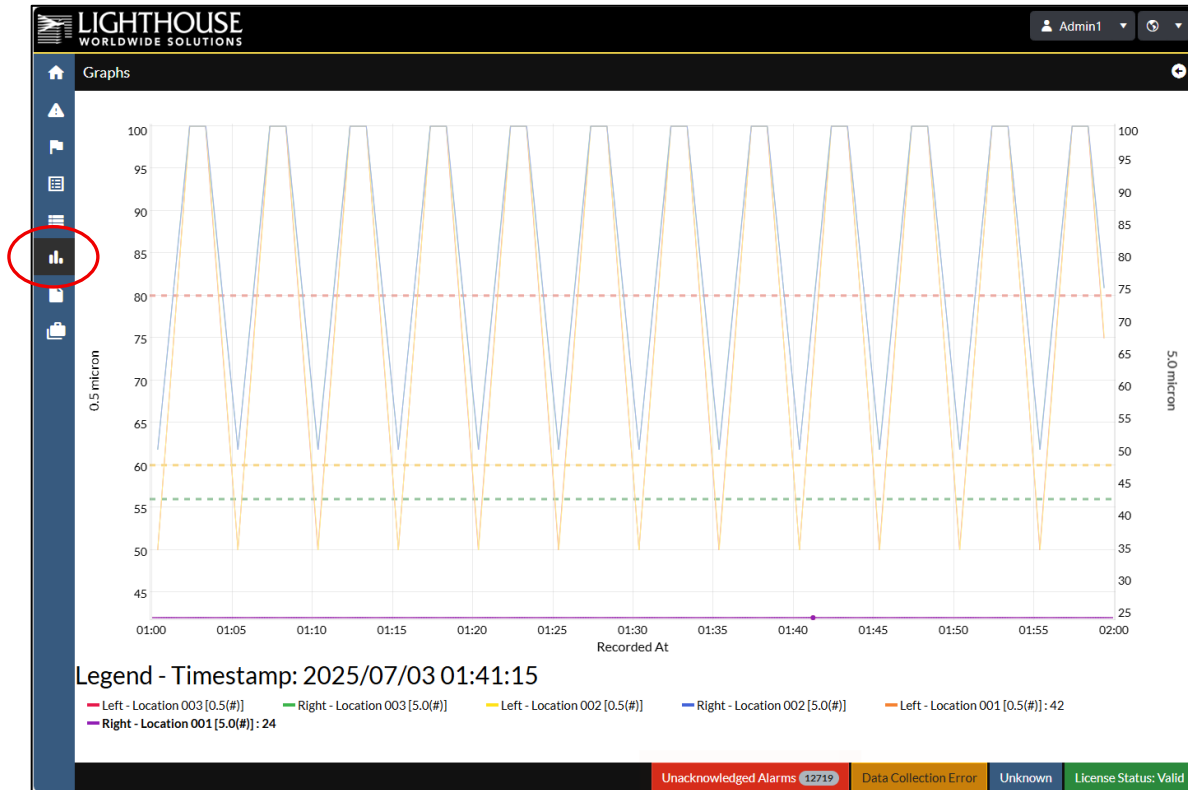
Data Table Live Updates and Rolling Window

- Slide the Live Updates button to the right to enable real time updates.
- Enter Rolling Window Days and Time.
- Select Locations to filter.
- Select Data Type to filter.
- Press the green Apply button.

Graphs Screen

The Graphs Screen view allows you to display data in a graph format.

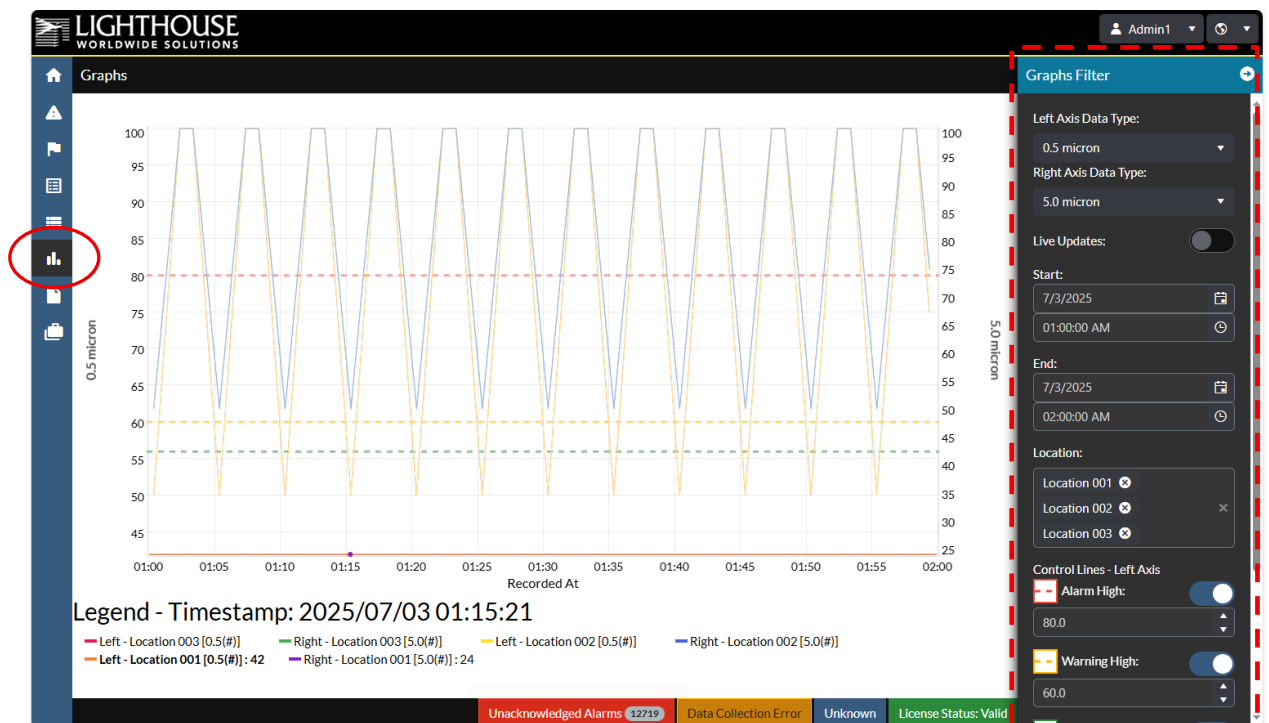
- Display different data types on Left and Right Axis.
- Select Live Updates or fixed time frame, start/end, dates/times.



- Add Control Lines for Alarm High, Warning High, Target, Warning Low, Alarm Low
- Data will be limited to 500,000 data points or less. Users may be required to change the time range or other filters to meet this limit. Filters may be necessary to increase performance/usability depending on the client system.
- Graphs are not saved but instead generated with each load of the page. To save a specific view, the user can apply a set of filters and then bookmark the page.
- Only linear scaling is available, no logarithmic scaling.
- **To export a graph**, select the graph, right mouse click on the graph display and select "Save image as". Name the graph file and save it in .png format to your desired computer drive location.

Filter Graph

- Select Data Type for Left and Right axis. Graph axis is limited to one data type per axis.
- Filter data for a fixed time frame or select Live Updates to display a rolling average window.
- Filter data by location.
- Select control lines to filter and set thresholds.
- Data types will be limited to raw data.
- Calculated/virtual data are not supported (ex. Summation, Normalized etc. are not supported in the web client)



Graph Filters

Reports

The LMS Express Web Client **Report Screen** filter displays options to select 3x different Report Types:

- Alarm
- Configuration
- Conformance.

Press the Navigation arrow  button located on the top right-corner of the screen to display the Report Filter options.

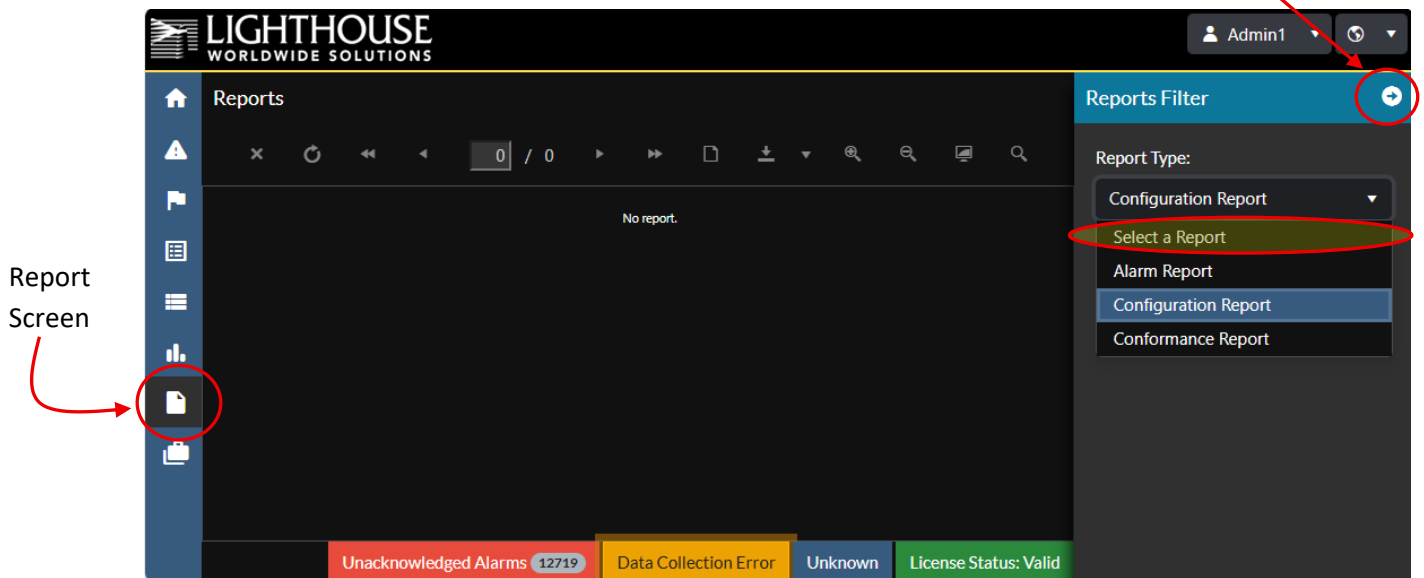


Figure 8-13 Reports

Alarm Report

- Select Report Type “Alarm Report”

The screenshot displays the Lighthouse Worldwide Solutions Reports interface. On the left sidebar, the 'Reports' icon is circled in red. The main area shows a preview of an 'Alarm and Acknowledgment Report' for the date range 7/1/2025 12:00:00 AM to 7/9/2025 2:00:00 PM. The report lists 19 locations and their corresponding data types. On the right, the 'Reports Filter' panel is visible. The 'Report Type' dropdown is set to 'Alarm Report' and is circled in red. Below it, the 'Start' date/time is set to 7/1/2025 12:00:00 AM, and the 'End' date/time is set to 7/9/2025 02:00:00 PM. The 'Location' filter is set to 'Filter by Location', and the 'Data Type' filter is set to 'Filter by Data Type'. A green 'Apply' button is at the bottom of the filter panel. At the bottom of the interface, there are four status bars: 'Unacknowledged Alarms 12719' (red), 'Data Collection Error' (yellow), 'Unknown' (blue), and 'License Status: Valid' (green).

Figure 8-14 Alarm Report

- Enter the Start date/time, End date/time to filter the report data.
- Select Locations to filter.
- Select Data Types to filter.
- Then press the green Apply button.

Configuration Report

- Select Report Type “Configuration Report”.
- Then press the green Apply button.

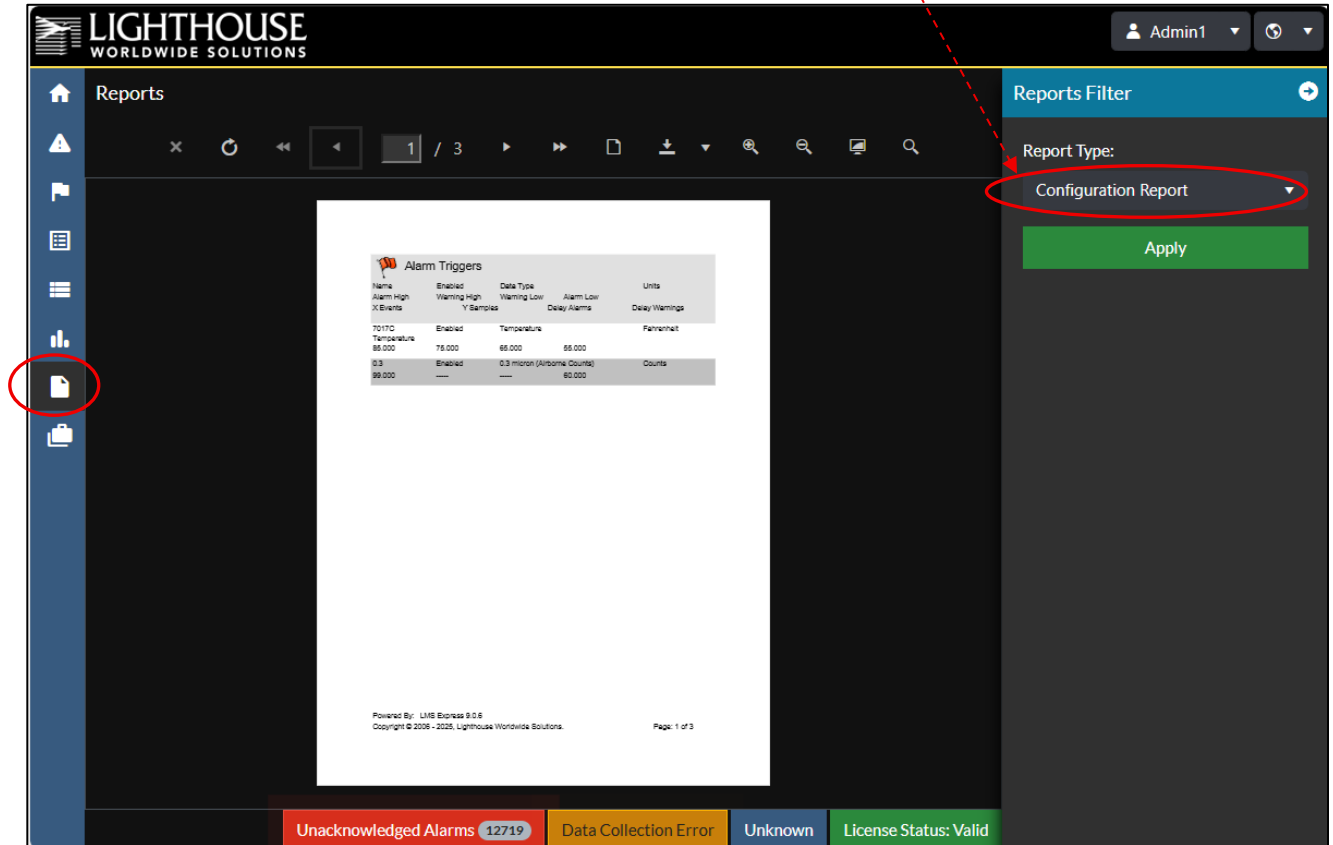


Figure 8-15 Configuration Report

The Configuration Report includes:

Alarm Triggers page displays:

- Name, Enabled, Data Type, Units, Alarm High/Warning/Low
- X Events, Y Samples, Delay Alarms, Delay Warnings

Users page displays

- Full Name, Login Name, Enabled, Authority, Description

Sensors page displays:

- Instrument Name, Model Name, Serial Number, Firmware Version
- Flow Rate, Last Contact, Calibration Due Date

Conformance Report

- Select Report Type “Conformance Report”

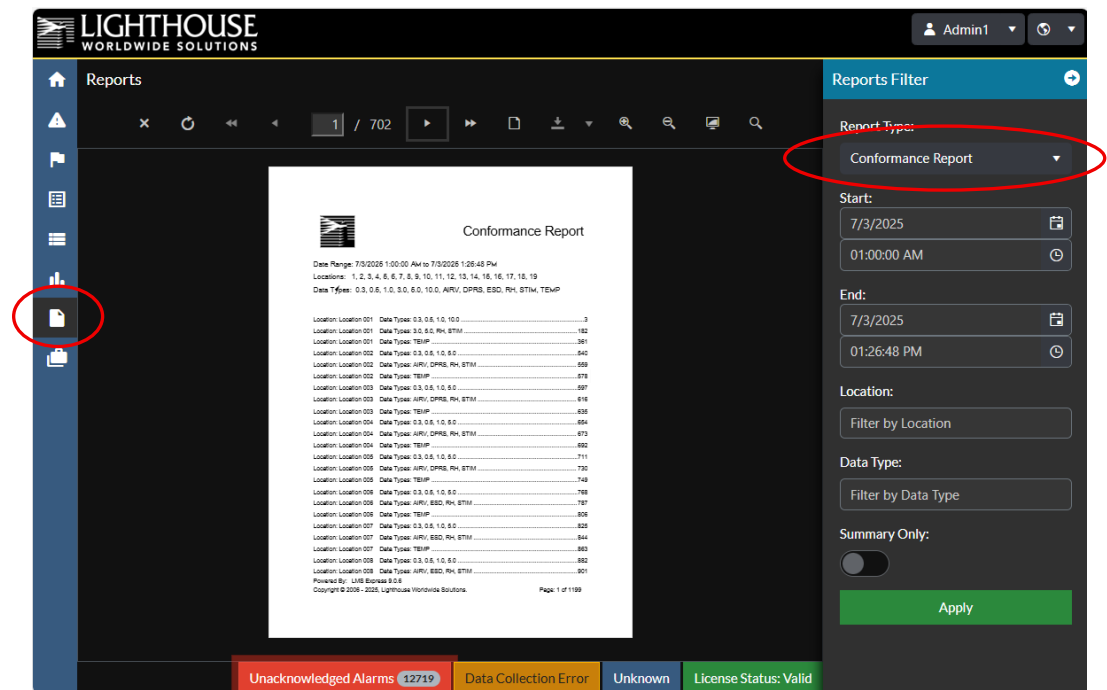


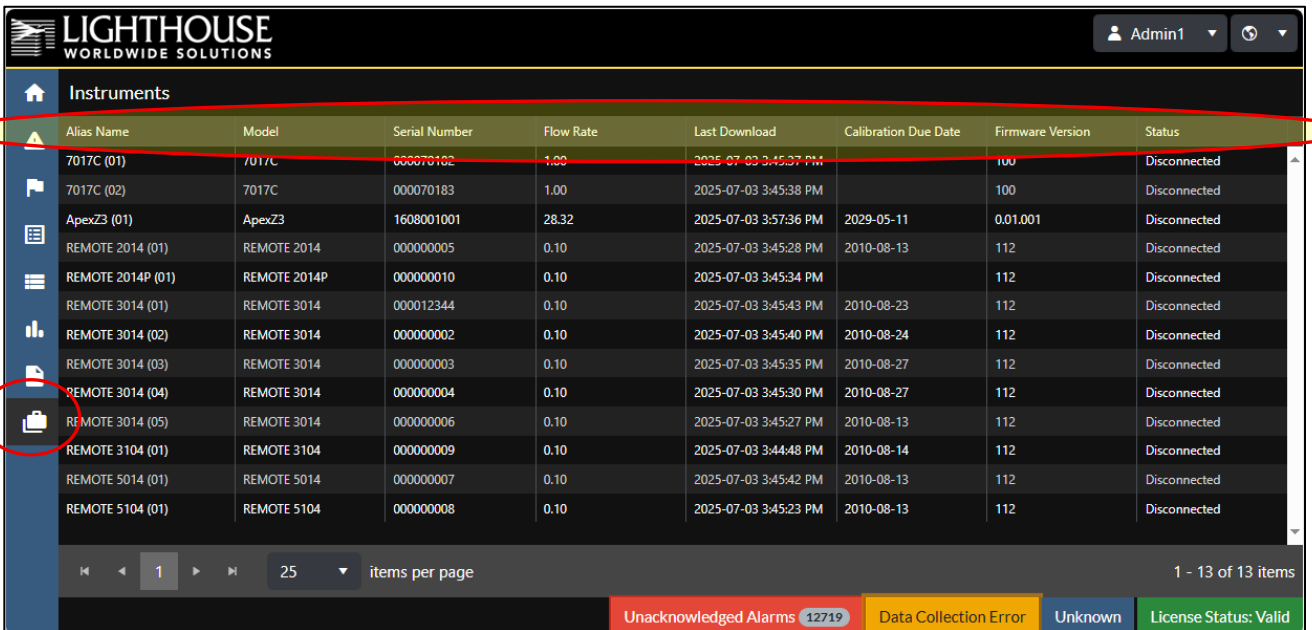
Figure 8-16 Conformance Report

- Select a Start date/time, End date/time to filter the data sets.
- Select locations to filter.
- Select data types to filter.
- Select Summary Only ON or OFF.
- Then press the green Apply button.
- The white oval on the green Apply button will display the total number of filtered channels.

Instrument Screen

The Instrument Screen displays a list of instruments that are currently connected or have been connected to LMS Express in the past. Data saved with each data record include:

- Alias Name
- Model
- Serial Number
- Flow Rate
- Last Download
- Calibration Due Date
- Firmware Version
- Status



Alias Name	Model	Serial Number	Flow Rate	Last Download	Calibration Due Date	Firmware Version	Status
7017C (01)	7017C	000070102	1.00	2025-07-03 3:45:37 PM		100	Disconnected
7017C (02)	7017C	000070183	1.00	2025-07-03 3:45:38 PM		100	Disconnected
ApexZ3 (01)	ApexZ3	1608001001	28.32	2025-07-03 3:57:36 PM	2029-05-11	0.01.001	Disconnected
REMOTE 2014 (01)	REMOTE 2014	000000005	0.10	2025-07-03 3:45:28 PM	2010-08-13	112	Disconnected
REMOTE 2014P (01)	REMOTE 2014P	000000010	0.10	2025-07-03 3:45:34 PM		112	Disconnected
REMOTE 3014 (01)	REMOTE 3014	000012344	0.10	2025-07-03 3:45:43 PM	2010-08-23	112	Disconnected
REMOTE 3014 (02)	REMOTE 3014	000000002	0.10	2025-07-03 3:45:40 PM	2010-08-24	112	Disconnected
REMOTE 3014 (03)	REMOTE 3014	000000003	0.10	2025-07-03 3:45:35 PM	2010-08-27	112	Disconnected
REMOTE 3014 (04)	REMOTE 3014	000000004	0.10	2025-07-03 3:45:30 PM	2010-08-27	112	Disconnected
REMOTE 3014 (05)	REMOTE 3014	000000006	0.10	2025-07-03 3:45:27 PM	2010-08-13	112	Disconnected
REMOTE 3104 (01)	REMOTE 3104	000000009	0.10	2025-07-03 3:44:48 PM	2010-08-14	112	Disconnected
REMOTE 5014 (01)	REMOTE 5014	000000007	0.10	2025-07-03 3:45:42 PM	2010-08-13	112	Disconnected
REMOTE 5104 (01)	REMOTE 5104	000000008	0.10	2025-07-03 3:45:23 PM	2010-08-13	112	Disconnected

1 - 13 of 13 items

Unacknowledged Alarms 12719 Data Collection Error Unknown License Status: Valid

To STOP a sensor counting particles

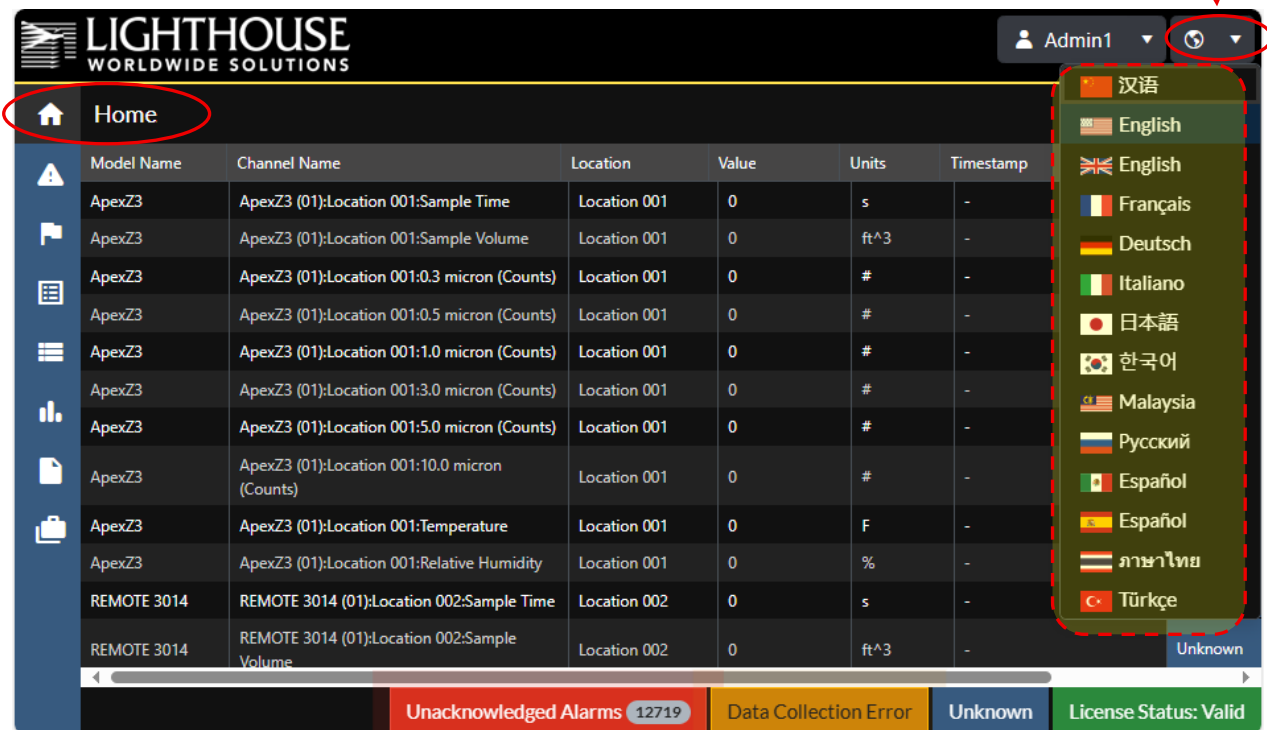
Right mouse click on sensor that is currently collecting data and a mouse-over message will display "STOP". Click on "STOP" and that sensor will stop collecting data.

To START a sensor that is stopped or disconnected

Right mouse click on a stopped sensor and a mouse-over message will display "START". Click on "START" and that sensor will start collecting data.

Languages Supported

Supported languages include Chinese, English (US), English (UK), French, German, Italian, Japanese, Korean, Malay, Russian, Spanish (Mexico), Spanish (Spain), Thai, and Turkish.



Languages supported from LMS Web Client

Chapter 9 System Setup

This chapter describes commands to set up the system, enable password protection and perform database maintenance.

Administrator Options



The following properties and system controls are available from the Home menu, under Administrator Options.

- **Alarm Triggers:** create, update, maintain alarm and warning conditions.
- **Application Properties:** setup properties for views, units and signatures.
- **Database Maintenance:** archive database, open archives, deleting data.
- **Event Log:** View and maintain event logs; post custom notes to log.
- **Instruments:** view instruments information; change instrument names.
- **Locations:** view locations; change location names.
- **User Accounts:** setup, update and delete user accounts and logins.

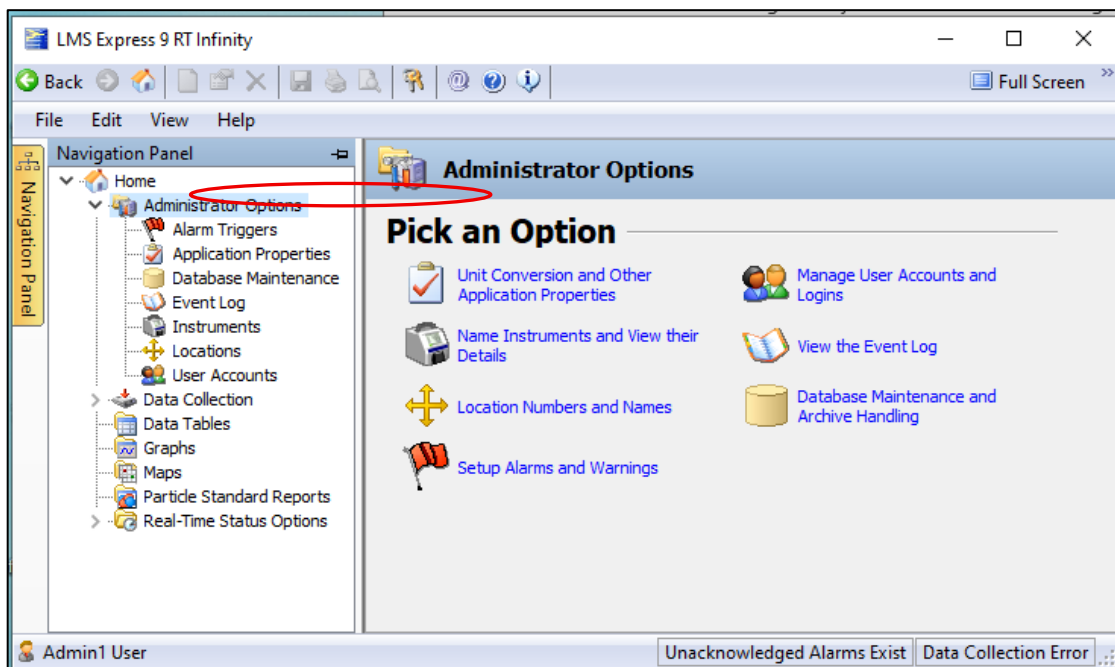


Figure 9-0 Administrator Options



Unit Conversion and Other Application Properties

To set LMS Express properties, click the **Home** button, **Administrator Options** then **Unit Conversion and Other Application Properties**. The view area updates to display the Application Properties view. On this view administrators set and maintain configuration for signatures, units of measure and other properties.

LMS Express 9 RT Infinity

Back Home > Administrator Options > Application Properties Full Screen

File Edit View Help

Task Panel

Navigation Panel

Details

These options affect most of the features in this application. Changing them usually has an immediate af...

Application Properties

Units

Data displayed in Graphs, Data Tables, and other visualization features will be automatically converted to these units.

Normalized Airborne Counts :

Normalized Liquid Counts :

Sample Volume :

Sample Time :

Temperature :

Air Velocity :

Differential Pressure :

Conductivity Sensor :

IAQ Mass Concentration :

Signatures

When enabled, a signature line will appear on printed Graphs, Data Tables, and other visualization features for a person to sign.

Enable signature lines ☒

Automatically sign using logged in user's name ☒

Calculation Settings

Summation Volume :

Summation Volume Unit :

Summation Method : ☒ Rolling ☐ Block

Particle Density (g/cm^3) :

When enabled, a data set will be available to select in Graphs, Data Tables, and other visualization features.

Other

Run this application on Windows startup ☐

Hide application when minimized ☐

Window startup state :

Prompt user on exit ☒

Web Server Options

Enabled ☒

Port :

Subject Alternative Name (SAN)

Cumulative Counts

Cumulative Counts ☒

Normalized Counts ☐

Differential Counts ☐

Summation Counts ☐

IAQ Mass Concentration ☐

Admin1 User Unacknowledged Alarms Exist Data Collection Error

Figure 9-1 Application Properties View

Units

On the **Units** section of the LMS Express Properties window users can set the units of measure displayed with the data on graphs, reports, data table and other data visualization features.

Units	
Data displayed in Graphs, Data Tables, and other visualization features will be automatically converted to these units.	
Normalized Airborne Counts :	particles/ft ³
Normalized Liquid Counts :	particles/ml
Sample Volume :	liters
Sample Time :	seconds
Temperature :	Fahrenheit
Air Velocity :	ft/min
Differential Pressure :	Inches of Water
Conductivity Sensor :	microSiemens/cm
IAQ Mass Concentration :	micrograms/m ³

Figure 9-2 Units of Measure, Application Properties

Set the display units for each type of data by selecting a value on the pull down list of possible units attached to each data type.

Normalized Counts

Set the units for displaying normalized counts by selecting a value from the pulldown menu on the Normalized Count's field. Units include "particles/ft³", "particles/m³", "particles/L" and "particles/ml".

Sample Volume

Set the units for displaying sample volume data by selecting a value from the pulldown menu on the Sample Volume's field. Units include "cubic feet", "cubic meters," "milliliters" and "liters".

Sample Time

Set the units for displaying sample time data by selecting a value from the pulldown menu on the Sample Time's field. Units include "seconds", "minutes" and "hours".

Temperature

Set the units for displaying temperature data by selecting a value from the pulldown menu on the Temperature's field. Units include "Fahrenheit", "Celsius" and "Kelvin".

Air Velocity

Set the units for displaying air velocity data by selecting a value from the pulldown menu on the Air Velocity's field. Units are "ft/min." and "m/sec.".

Diff. Pressure (Differential Pressure)

Set the units for displaying differential pressure data in by selecting a value from the pulldown menu on the Diff. Pressure's field. Units include ""H2O", ""Hg", "mmH2O", "mmHg", "cmHg", "Pa", "kPa", "Bar" and "mBar".

Conductivity Sensor

Set the units for displaying the conductivity sensor data by selecting a value from the pulldown menu on the Conductivity Sensor field. Units include "MicroSiemens/cm" and "MegaOhms-cm".

IAQ Mass Concentration

Set the units for displaying the IAQ Mass Concentration by selecting a value from the pulldown menu on the IAQ Mass Concentration field. Units include "micrograms/m³" and "micrograms/ft³".

Displaying Units

Changing the type of units displayed for a type of data causes the data to automatically be converted, if appropriate, to the new unit of measure.

Units of measure are displayed on graphs, data tables and standard reports as follows.

Graph

Units are displayed for each data set on the Graph's legend.

Location 000:0.5 micron (Normalized) (p/ft ³)	Location 000:0.3 micron (Counts)
Location 000:1.0 micron (Counts)	Location 000:1.0 micron (Normalized) (p/ft ³)
Location 000:Analog 1:Temperature (F)	Location 000:Analog 2:Relative Humidity (%)

Figure 9.3 Graph legend, displaying units in parenthesis

Data Table

Units are displayed for each data set in the header of the Data Table.

6/27/2005 10:38:00 to 6/28/2005 10:38:00				
Time Stamp	HANDHELD 3016 (01)	HANDHELD 3016 (01)	HANDHELD 3016 (01)	HANDHELD 3016 (01)
	Location 000	Location 000	Location 000	Location 000
	0.3 micron	0.5 micron	Analog 1	Analog 2
	(Counts)	(Counts)	Temperature (F)	Relative Humidity (%)

Figure 9-4 Data table, displaying units of measure

Standard Report

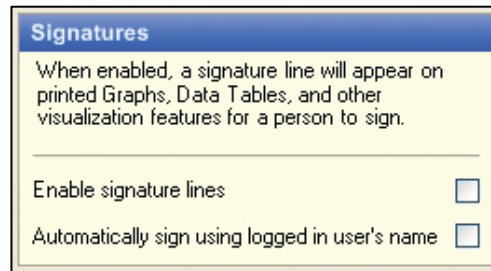
Units are displayed on the Standard Report; however, they are specified by the report standard. They cannot be set on the Properties page.

Particle Size: 0.3 micron			
Location	Samples	Min Volume (liters)	Average Particles/m ³
Cleanroom 1	10	28.3	374.3
Cleanroom 10	10	28.3	307.0
Cleanroom 2	10	28.3	378.1

Figure 9-5 Standard Report Units

Signatures

To print a signature line and/or username on the data table, graph, or standard report, set these parameters:



The dialog box is titled "Signatures" and contains the following text: "When enabled, a signature line will appear on printed Graphs, Data Tables, and other visualization features for a person to sign." Below this text are two checkboxes: "Enable signature lines" and "Automatically sign using logged in user's name". Both checkboxes are currently unchecked.

Figure 9-6 Signature Properties

Enable Signature Lines

To add a signature line to the bottom right corner of a graph, check the Enable Signature Line's check box in the Signatures section of the Application Properties view. If this check box is enabled, a blank signature line appears on printouts of the graph.

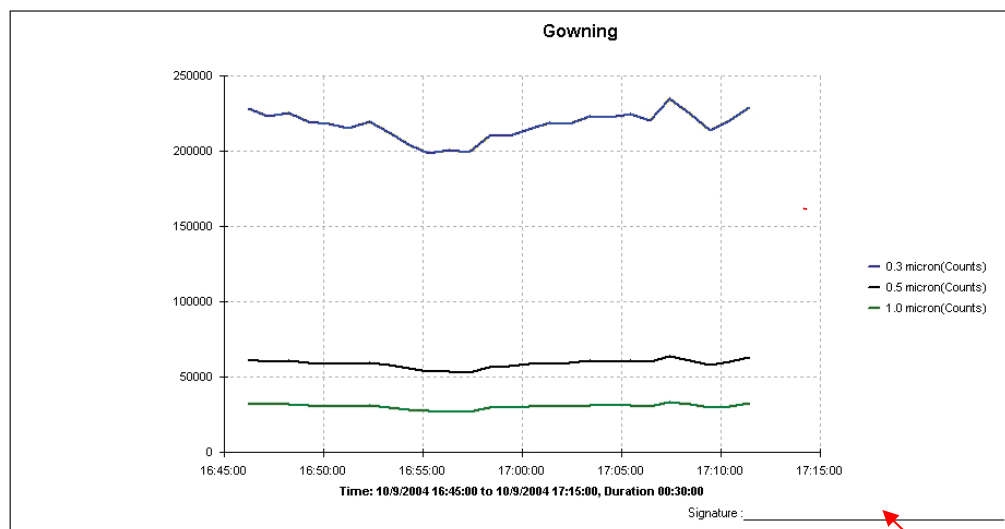


Figure 9-7 Signature Line, Graph Printout

Signature Line

Automatically Sign Using Logged in User's Name

To include the full name of the current user on the signature line of graph printouts, check both Enable Signature Lines and Automatically sign Logged in User's Name. See the following example.

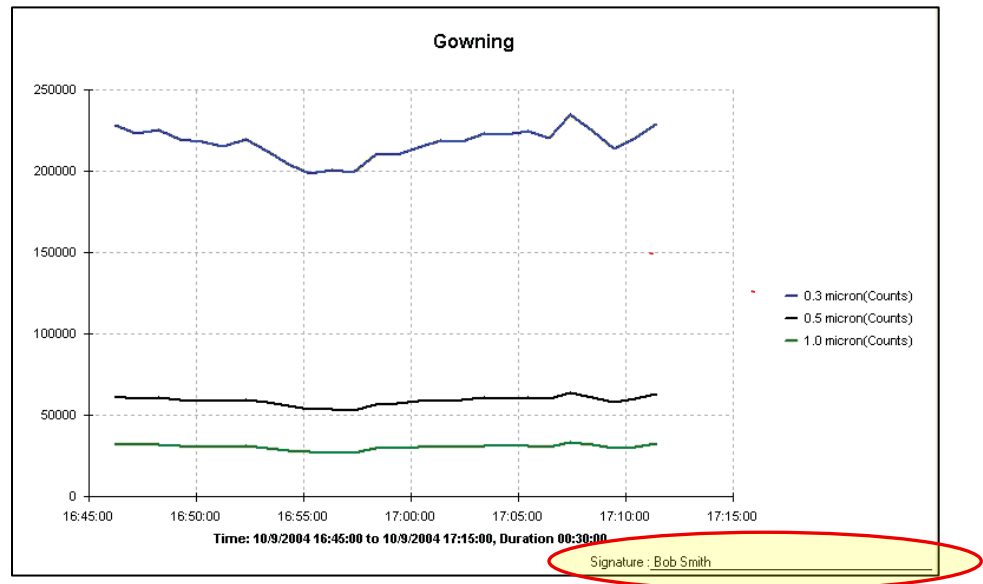


Figure 9-8 Graph Printout with Signature Line, User's Name

When both Enable Signatures and Automatically Sign are checked, the user's full name is included in the data table's header and printed on each page of the data table.

Signature: Bob Smith			
6/23/2003 11:35:09 to 6/23/2003 11:45:09			
	Location 0	Location 0	Location 0
	0.1 micron	0.15 micron	0.2 micron
Time Stamp	(#)	(#)	(#)
6/23/2003 11:35:20	31.000	27.000	22.000
6/23/2003 11:36:32	69.000	39.000	22.000

Full Name of Login

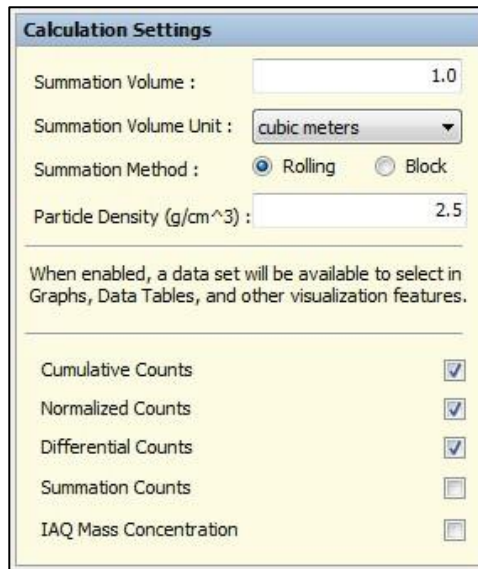
Figure 9-9 Data Table with Enable and Print Username enabled

For Standard Reports, if Enable Signatures and Automatically Sign are both checked enabled then:

- LMS Express includes the user's full name on the bottom of each page of the report, alarm log or map that is printed.

Calculation Settings

The Calculation Settings section of the Properties window allows administrators to configure the summation parameters for Summation and IAQ Mass Concentration Calculations. See Figure 9-10.



The screenshot shows a dialog box titled "Calculation Settings". It contains the following fields and options:

- Summation Volume : 1.0
- Summation Volume Unit : cubic meters (dropdown menu)
- Summation Method : ☒ Rolling ☐ Block
- Particle Density (g/cm³) : 2.5

Below these fields is a text box: "When enabled, a data set will be available to select in Graphs, Data Tables, and other visualization features."

At the bottom, there are five checkboxes:

- Cumulative Counts ☒
- Normalized Counts ☒
- Differential Counts ☒
- Summation Counts ☐
- IAQ Mass Concentration ☐

Figure 9-10 Calculation Settings

Summation Volume

Enter the volume of air to be sampled for the summation

Summation Volume Unit

Sets the unit for Summation Volume by selecting a volume from the pulldown. The units include "cubic feet", "cubic meters", "liters" and "milliliters".

Summation Method

The summation of particle counts can be calculated in two methods. The two methods are rolling and block (non-rolling). The method is set by selecting the radio button for the required method.

- The rolling method sums raw particle counts for one cubic meter as a data point. Subsequent data points are then calculated by replacing the earliest particle counts with the latest particle counts.

- The block method sums particle counts for one cubic meter as the first one data point. Subsequent data points are then calculated on every block of particle counts for one cubic meter.

Particle Density

The default value is 2.5 g/cm³. It is used in the IAQ Mass Concentration calculation.

Enable/Disable Data Sets

When enabled, a data set will be available to select in Graphs, Data Tables, and Other visualization features. Check the checkboxes against each data set to enable and uncheck to disable.

Other Properties

The Other Properties section of the Properties window allows administrators to configure the following additional system properties.

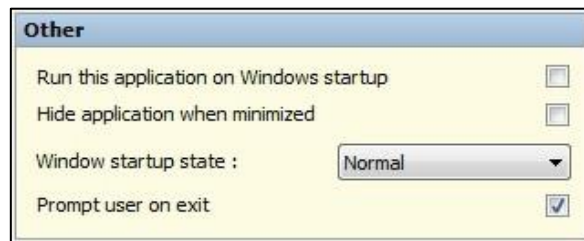


Figure 9-11 Other Properties

Run this application on Windows Startup

When “Run this application on Windows Startup” is checked, LMS Express automatically starts after the user logs onto Windows.

Hide application when minimized

When “Hide application when minimized” is checked, the application will be hidden from the desktop when minimized. It can be restored only by clicking the LMS Express system tray icon.

Windows startup state

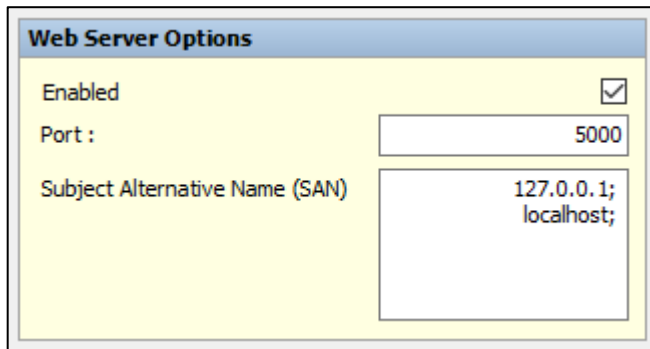
This property sets the state on the main LMS Express application to Normal, Minimized, Maximized or Full Screen during Windows' startup. If the application should be hidden at startup, select "Minimized" and check the "Hide application ..." property. The application's desktop shortcut will override the startup state only when the state is set to "Normal".

Prompt User on Exit

When Prompt User on Exit is checked, and the user tries to exit the application, a popup prompts the user that real-time data collection will stop and asks the user whether to proceed with the exit.

When it is unchecked, the popup prompt will not display even when real-time data collection is ongoing.

Web Server Options



The screenshot shows a dialog box titled "Web Server Options". It contains three settings:

- Enabled:** A checkbox that is checked.
- Port :** A text box containing the value "5000".
- Subject Alternative Name (SAN):** A text box containing the value "127.0.0.1; localhost;".

- Check the box to Enable Web Server Options, this is to enable the LMS Web Client.
- Enter the Port
- Enter the Subject Alternative Name SAN



User Accounts

The User Accounts section of LMS Express allows administrators to add, maintain and delete user accounts.

Click the Home button, Administrator Options then Manage User Accounts and Logins to view the current user accounts.

Figure 9-12 is an example of the User Accounts view.

Note: To add, modify, or delete user accounts, the user must be logged in as an administrator.

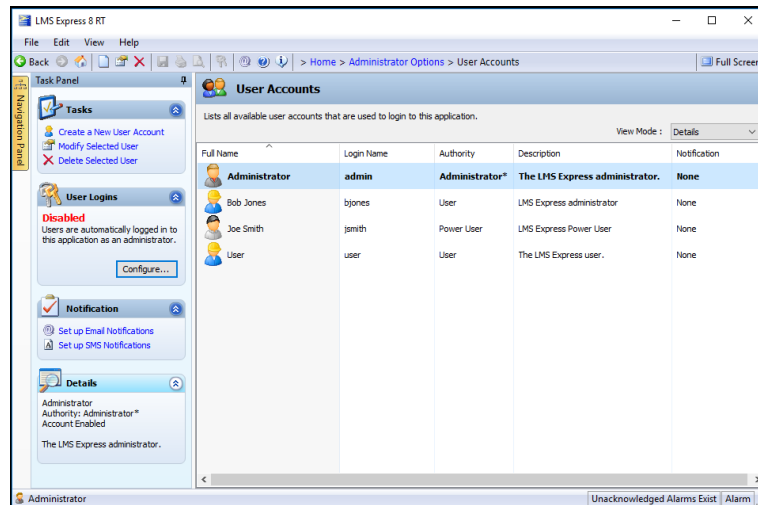


Figure 9-12 User Accounts view

The User Accounts Screen displays the Full Name, Login Name, Authority, Description and Notification of each user account.

The user account list can be sorted by clicking on any of the column headers, full name, login name, authority, description or notification.

Express provides 3 user access levels named User, Power User and Administrator. In addition, one super admin account named “**admin**” is available. The admin user is created when LMS Express is installed, and its indicated authority will be indicated as “Administrator*”. This account cannot be deleted and additional Administrator* accounts cannot be created.

When first installed LMS Express contained 2 pre-configured user accounts: Administrator (the Administrator* level account) and User (a User level account).

The following sections describe how to add, modify and delete additional LMS Express user accounts.

Task Panel

Administrators can access User Account options from the Task Panel and the toolbar.

When the list of user accounts is visible on the User Accounts view, a Task Panel appears on the left side of the LMS Express window.

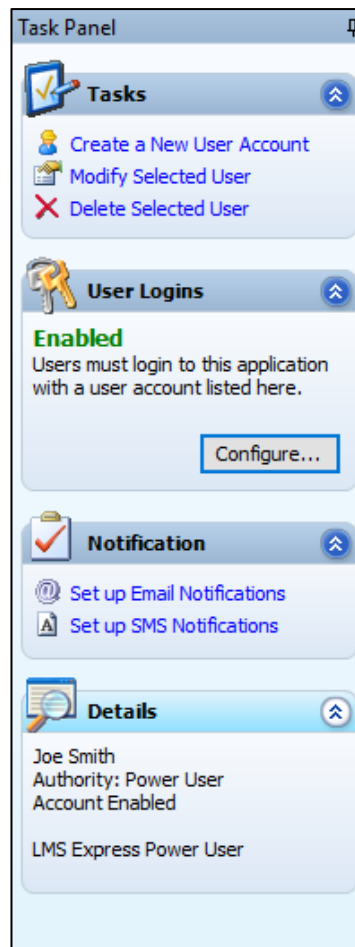


Figure 9-13 User Accounts Task Panel

The User Accounts Task Panel contains four sections: Tasks, User Logins Notifications and Details.

- Under the Tasks section users can create a new user account, modify a selected user account and/or delete a selected user account.
- Under the User Logins section, administrators can set system restrictions such as requiring users to log into LMS Express and requiring users and administrators to authenticate additions and modifications.
- Under the Notification section, administrators can set up email and SMS notifications for sensor alarm conditions and alerts.
- Under the Details section, users see details about the currently selected user account.

Tool Bar Buttons

When the User Accounts view is displayed the following toolbar buttons are enabled:

Button	Function
	New: Add a new user account.
	Setup: Modify a selected user account.
	Delete: Delete a selected user account.

Table 9-14 User Accounts Toolbar Buttons

Add a User

To add a new user account, while the User Accounts view is displayed, click on the New button on the toolbar and the User Setup window will pop up. Alternatively click on Create a New User Account on the User Accounts Tasks panel, or right click on the User Accounts view area and then click Add on the popup menu that appears:



Figure 9-15 Users View, Add Users Menu

A new User Setup window displays.

The screenshot shows the 'User Setup' window. It has a title bar with the text 'User Setup' and a close button. The window is divided into four sections: 'Account type', 'User Information', 'Notification', and 'Enable Password'. The 'Account type' section has a dropdown menu for 'Account Type' with 'Local' selected. The 'User Information' section has checkboxes for 'Enable User' and 'Auto-Logout', and text input fields for 'Login Name', 'Full Name', and 'User Description'. The 'Notification' section has checkboxes for 'Email Notification' and 'SMS Notification', and text input fields for 'Email Address' and 'Phone Number'. The 'Enable Password' section has a checkbox for 'Enable Password' which is checked, and a text input field for 'Login Password' with a placeholder 'Enter Password...'. There are also checkboxes for 'Change On Login' and a dropdown menu for 'Password Expires' with 'Never' selected.

Figure 9-16 Setup User, New User

To create a new user, enter (or select) values for the following fields:

Account Type: Can be set to either Local or Active Directory.

Enable User: Check this box to enable the user account. If Enable User is not checked, the user will not be able to log into LMS Express even though the user account exists.

Login Name: Enter a login name for the user. Login names must be between 3 and 32 characters in length. Login names must be unique and must contain only Western European letters, numbers and underscores. Login names are case insensitive.

Full Name: Enter the full name of the user. Full names must be between 3 and 64 characters in length.

User Description: Enter a description for the user or user account. User Descriptions can be up to 64 characters long and are optional.

Authority: Select an authority type for the user from the Authority drop down list. Available Authority types are User, Power User and Administrator. The default is User.

Users can create and display their own graphs, data tables, standard reports and view the system event and alarm logs.

Power Users are user accounts with the additional ability to acknowledge alarms, start and stop real time data collection and close the application.

Administrators are power user accounts that can also access the Administrator Options section; add, update, delete or view all configurations; perform database maintenance tasks and set up real time data collection.

The currently logged in user's account type (Admin, Power User or User) and name are displayed on the bottom left corner of the status bar.

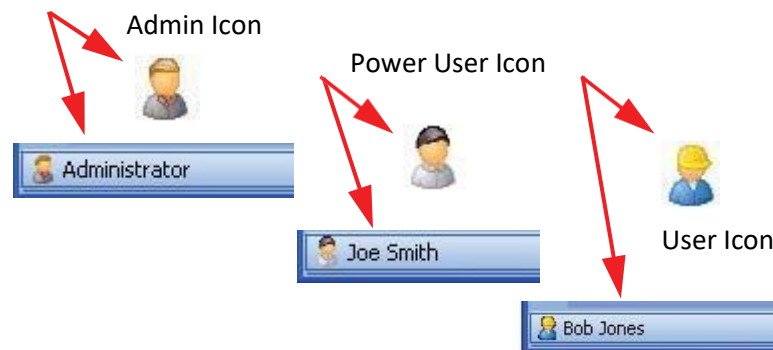


Figure 9-18 Auto-Logout Count Down

Note: Auto-logout is suspended while manually downloading data.

Note: If Enable Password is not checked users can start Express after only entering or selecting a login name on the Express login window.

Note: If Express auto-logs out the user, it notes the auto-logout event in its event log and returns to the Home view.

Note: The default admin account does not have a password when LMS Express is installed. For security, add a password after installation.

Auto-Logout: To have a user automatically logged out of LMS Express after a period of non-use, select an Auto-Logout duration from the Auto- Logout list box. Durations range from 1 minute to 1 hour. The default is 10 minutes. To never have the user automatically logged out, select “Never”.

LMS Express issues a 15 second warning before it automatically logs out a user. It warns the user that they are about to be logged out by flashing the application in the Window’s taskbar, playing a sound file and displaying the following count down window:



Figure 9-19 Auto-Logout Count Down

If the user clicks the “Don’t Logout” button before the 15 second count down finishes, LMS Express resets the auto-logout timer and does not log out the user.

Email Notification: Click on Enable Notification to enable email alerts to be sent to this user.

Email Address: Enter user email address for this user to receive email alerts.

SMS Notification: Click on SMS Notification to enable SMS alerts to be sent to this user’s phone number (third party SMS provider subscription required).

Phone Number: Enter the user phone number to receive SMS alerts.

Enable Password: Check Enable Password if users are required to enter a password when they login to LMS Express. Passwords are optional for User accounts, but Administrator and Power Users are required to have a password. Note if Account Type is set to Active Directory, then the password entry will be un-editable.

Login Password: Press the Enter Password... button to enter a password for this user network email account

Change on Login: If the administrator wants to force a user to change the password when they first log into LMS Express, check Change on Login.

If Change on Login is checked, when the user attempts to start LMS Express for the first time, the following Setup Password window appears. A user cannot login until the password is changed.



Figure 9-20 Change Password On Login

Password Expires: If the administrator wants a user's LMS Express password to expire after a certain period of time and force the user to change the password, select duration from the Password Expired pull down list.

When a password expires and the user next logs into LMS Express, the user will see the following Setup Password window:



Figure 9-21 Expired Password Login

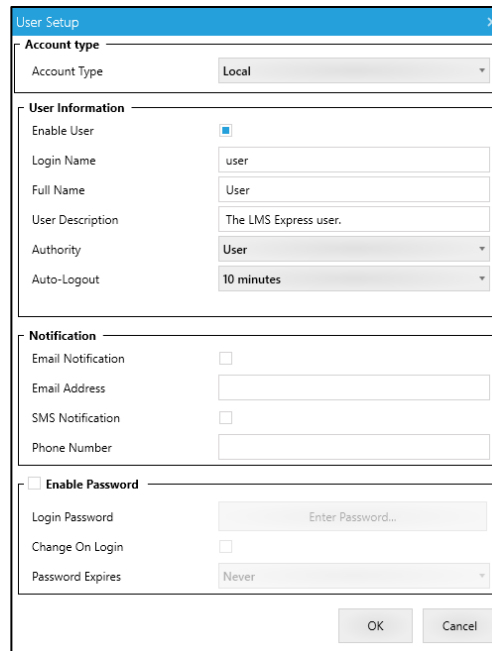
On the Setup Password window, the user must change their password to a different password to log in.

When all the user's information has been entered, click OK to create the new user or Cancel to close the window without creating the account.

Modify User

To modify an existing user account, double click on the user account row on the User Accounts view; right click on the user account and select Setup from the pop up menu; or select the user row and click “Modify Selected User” on the Task Panel, or click Setup on the Toolbar. The following window displays for the selected user.

Note: Select “Never” to have the password never expire.



The User Setup dialog box is divided into three main sections: Account type, User Information, and Notification. The Account type section has a dropdown menu set to 'Local'. The User Information section includes checkboxes for 'Enable User' (checked), 'Login Name' (user), 'Full Name' (User), 'User Description' (The LMS Express user.), 'Authority' (User), and 'Auto-Logout' (10 minutes). The Notification section includes checkboxes for 'Email Notification' and 'SMS Notification' (both unchecked), and text boxes for 'Email Address' and 'Phone Number'. The 'Enable Password' section is collapsed, showing 'Login Password' (Enter Password...), 'Change On Login' (unchecked), and 'Password Expires' (Never). At the bottom are 'OK' and 'Cancel' buttons.

Figure 9-22 Modify an existing user, Setup User Screen

When a password expires and the user next logs into LMS Express, the user will see the following Setup Password window:



The Setup Password dialog box has a title bar with a close button. The main text reads: 'Your password has expired. Please enter a new password.' Below this are two text boxes labeled 'Password :' and 'Confirm :'. At the bottom are 'OK' and 'Cancel' buttons.

Figure 9-23 Expired Password Login

On the Setup Password window, the user must change their password to a different password to log in.

When all the user’s information has been entered, click OK to create the new user or Cancel to close the window without creating the account.

Delete User

Note: The following accounts cannot be deleted: the Administrator* account and the account that is currently logged in.

To delete a user, power user, or administrator, right click on the user account and select Delete from the pop up menu, or select a user account in the User Accounts view and click the Delete button on the toolbar, or click “Delete Selected User” on the Task Panel.

When an account is deleted, all the graphs, reports, data tables and other visualization features, like maps, owned by the account are also deleted.

User Change Tracking

When an administrator adds, modifies or deletes a user account, a record documenting the change(s) is written into the Event Log. To view the Event Log, see the Event Log section of this chapter.

User Logins

The User Logins section of the User Accounts Task Panel allows Administrators to enable and disable logins and user authentication.

The status, if logins are enabled or disabled, is displayed on the User Logins section of the User Accounts Task Panel.



Figure 9-24 User Logins - Enabled or Disabled Indicators

Click on the Configure button to view and set the following user login options.

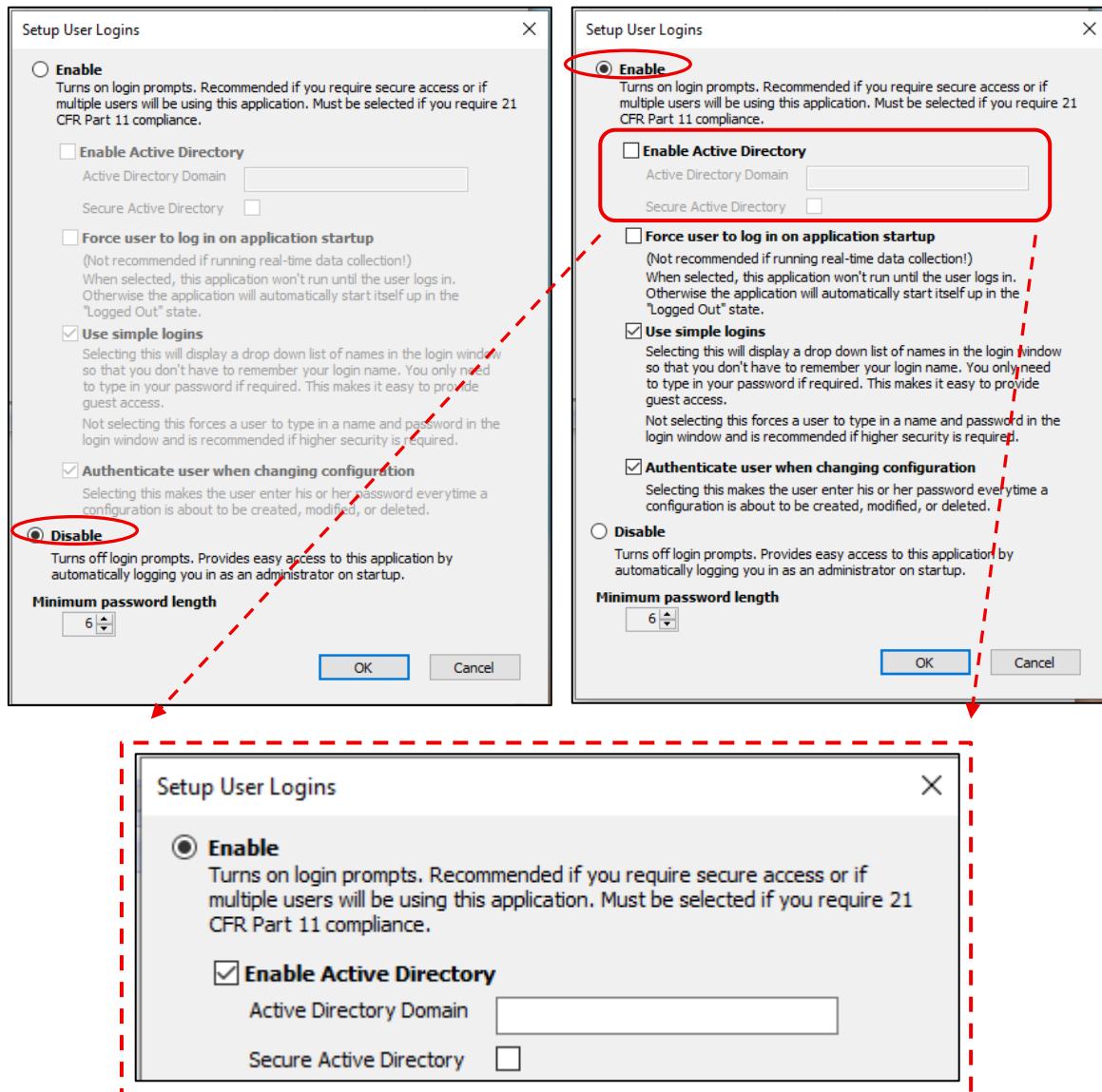


Figure 9-25 User Login Setup (Disabled vs Enabled)

Disable

If User Logins are disabled when LMS Express is started, the splash screen will display and then main screen window.

Enable User Logins

If Enable User Logins is selected and Enable Active Directory is selected, then a valid Active Directory Domain must be entered, and Secure Active Directory check box must be marked. If Enable User Logins is selected and none of the options under Enable User Logins are checked, then when LMS Express starts up it will display the splash screen and start collecting real time data without requesting a user login. In this state to display a private graph, data table, or standard report a user must log in.

Force User to Log in on Application Startup

When checked, LMS Express will not run and will not collect data real time (if applicable) until the user logs in.

WARNING:

Force User to Login on Application Startup is not recommended if the user is collecting data real time.

When LMS Express is started, it displays the splash screen and then a login window.



Figure 9-26 Login, Simple Logins

Use Simple Logins

Checking Use Simple Logins displays a drop-down list of names on the login window so that the user can just pick their name from the list.

If a password is required for the account, a password field will appear after the user account is selected. Not checking Use Simple Logins forces the user to type in the username (and password if it is also required). Not checking Use Simple Logins is recommended if a higher level of security is desired.

Note: Enable Login must be checked before "Required on Startup" can take effect.

Authenticate User when Changing Configuration

Note: The user gets three attempts to enter the correct password to authenticate changes to the system. If he/she fails, after the third time the window closes, and a message is written to the event log.

Checking this option forces the user to enter his or her password every time the user attempts to create, modify or delete configuration and configuration settings. Configuration and configuration settings include graphs, data tables, standard reports, systems options and real time data collection.



Figure 9-27 User Authentication Window

Minimum Password Length

The administrator can configure the minimum password length needed using this parameter.

Notifications

LMS Express can send email notifications to users when sensors in the system are in alarm. Users who are configured to receive notifications will receive emails and/or SMS messages on all alarms or warnings that are set up in the system when they occur. To set up notifications configure information for the email server and/or SMS server.

From the User Accounts screen select “Set up Email Notifications”.

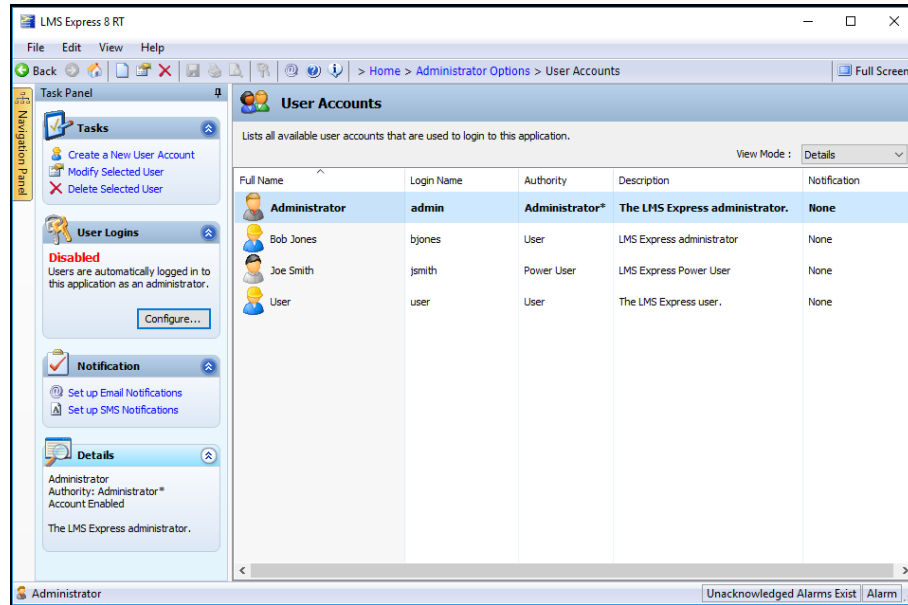


Figure 9-28 User Accounts

Set up Email Notifications

Click on the check box to Enable Email Notification

Enter Host Name
Enter Port Number
Enter Email Address

Enter Password

Press Test Server

Press OK

Figure 9-29 Email Notification Setup

Set up SMS Notifications

Click on the check box to Enable Twilio SMS Notification

- Requires a Twilio SMS provider subscription to use, not provided by Lighthouse Worldwide Solutions.

Enter Account SID

Enter Authorization Token

Enter Assigned Phone Number

Click OK to save SMS Notification Setup or Cancel to cancel.

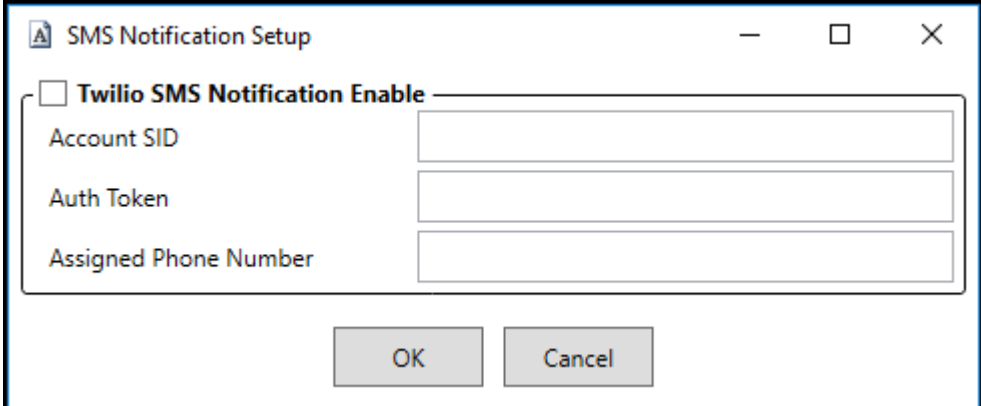
The image shows a Windows-style dialog box titled "SMS Notification Setup". It has a standard title bar with a minimize button, a maximize button (disabled), and a close button. Inside the dialog, there is a checkbox labeled "Twilio SMS Notification Enable". Below this checkbox, there are three text input fields: "Account SID", "Auth Token", and "Assigned Phone Number". At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

Figure 9-30 SMS Notification Setup

Instruments

When LMS Express downloads data from an instrument, it downloads the instrument's model name, serial number and firmware version as well. Information about all instruments from which data has been downloaded is displayed on the Instruments view.

Viewing Instruments

To display the list of instruments, click on “Name Instruments and View their Details” in the Administrator Options view.



The Instruments view displays.



Figure 9-31 Instruments View

The information on the Instruments view can be displayed in detail mode or in icon view. Select a view from the View Mode pull down list.

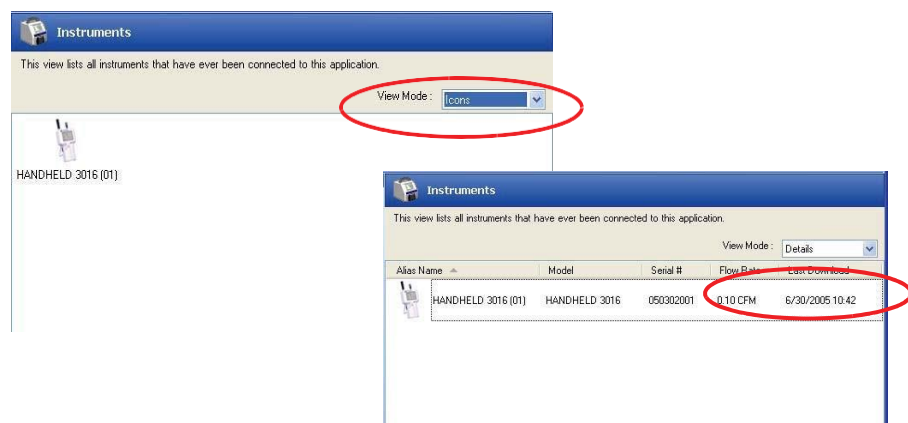


Figure 9-32 Detail and Icons View - Instrument View

Changing an Instrument's name

By default, the model number and name of the instrument is assigned as the "Name" of the instrument. To help users more easily identify each instrument, the instrument name can be changed to a different alias after the download is complete, or after data is collected real time.

To change the name of the instrument, select the instrument on the list of instruments displayed on the LMS Express Instruments page and double click on it, click the setup button on the toolbar, or click Rename Selected Instrument. on the Task Panel.

The Setup Instrument window appears.

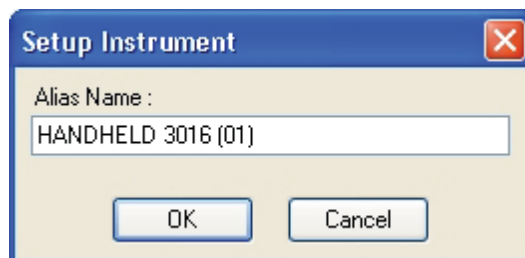


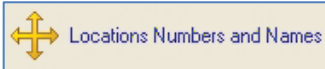
Figure 9-33 Setup Instrument Name

Enter a new name for the instrument in the Alias Name field and click the OK button.

The new name appears in LMS Express views, setup windows and where ever the user can select or display an instrument name.

Locations

Viewing Locations



To display information about Location(s) where the data was collected, click on “Location Numbers and Names” in the Administrator Options view.

Locations			
Valid for Portables	Number	Short Name	Long Name
☒	1	LOC001	Location 001
☒	2	LOC002	Location 002
☒	3	LOC003	Location 003
☒	4	LOC004	Location 004
☒	5	LOC005	Location 005
☒	6	LOC006	Location 006
☒	7	LOC007	Location 007
☒	8	LOC008	Location 008
☒	9	LOC009	Location 009
☒	10	LOC010	Location 010
☒	11	LOC011	Location 011
☒	12	LOC012	Location 012
☒	13	LOC013	Location 013
☒	14	LOC014	Location 014
☒	15	LOC015	Location 015
☐	16	LOC016	Location 016
☐	17	LOC017	Location 017
☐	18	LOC018	Location 018
☐	19	LOC019	Location 019
☐	20	LOC020	Location 020

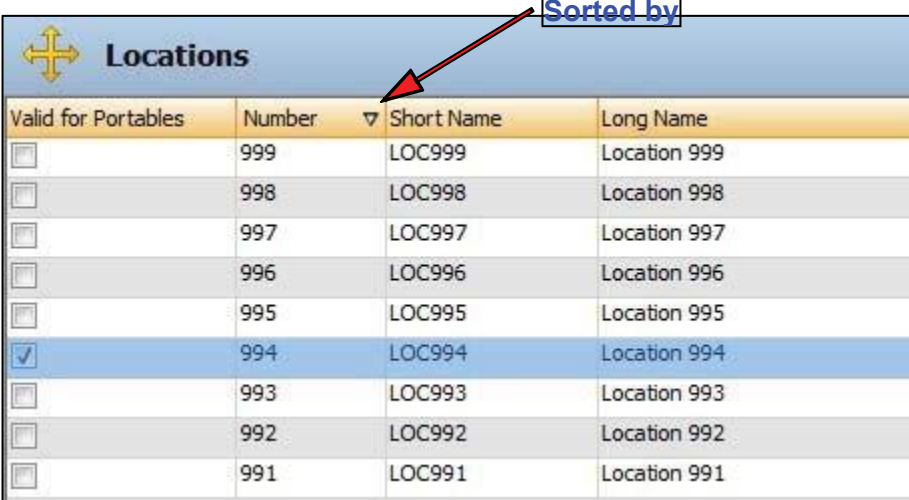
Figure 9-34 Locations View

Note: If the cleanroom has multiple Lighthouse instruments, it would be good to map out the locations to specific location numbers within each instrument before readings are taken. That way location can be properly associated with data in case more than one instrument is run in the same location.

Initially LMS Express assigns each location a default location name like “LOCXXX” where “XXX” is the location’s number.

LMS Express has up to 999 locations.

The Location view can be sorted in ascending or descending order by clicking on the Number, Short Name, or Long Name column headers. Clicking the same column header twice will cause the Location view to sort in the opposite direction. An arrow on the column heading will show which column is sorted and which direction it is sorted. To enable a location for portables when getting buffered data while sampling, select the checkbox for the location number.



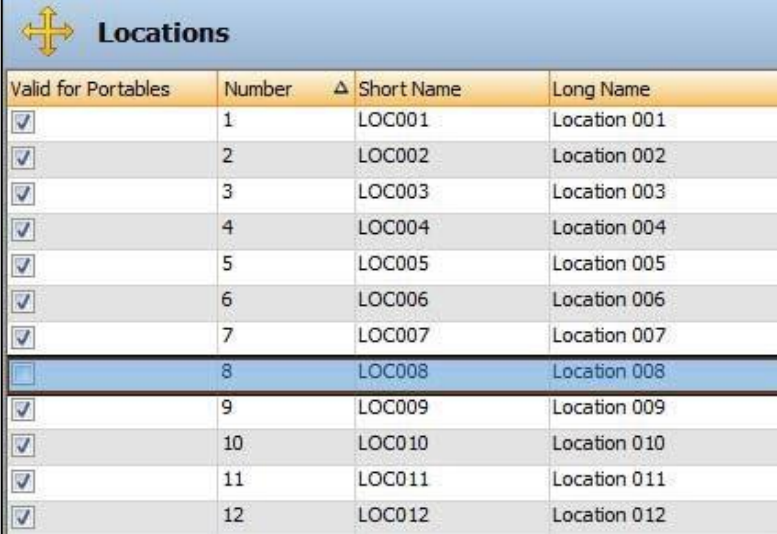
Sorted by

Valid for Portables	Number	Short Name	Long Name
☐	999	LOC999	Location 999
☐	998	LOC998	Location 998
☐	997	LOC997	Location 997
☐	996	LOC996	Location 996
☐	995	LOC995	Location 995
☒	994	LOC994	Location 994
☐	993	LOC993	Location 993
☐	992	LOC992	Location 992
☐	991	LOC991	Location 991

Figure 9-35 Locations, Sorted by Number, Descending Order

Changing Location Name

To change the name of the location, select the location.



Valid for Portables	Number	Short Name	Long Name
☒	1	LOC001	Location 001
☒	2	LOC002	Location 002
☒	3	LOC003	Location 003
☒	4	LOC004	Location 004
☒	5	LOC005	Location 005
☒	6	LOC006	Location 006
☒	7	LOC007	Location 007
☐	8	LOC008	Location 008
☒	9	LOC009	Location 009
☒	10	LOC010	Location 010
☒	11	LOC011	Location 011
☒	12	LOC012	Location 012

Figure 9-36 Changing Location Name - Select Row

Double click on the location, click on the setup button on the toolbar, or click “Edit Selected Location” on the Task Panel on the left side of the Locations view. The following Setup Location dialog box appears.

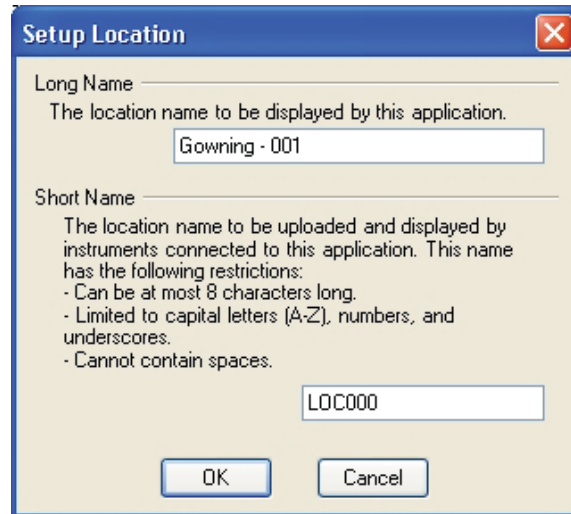


Figure 9-37 Setup Location Name

On the Setup Location window, enter a new long and short name for the location and click OK.

The long location name will be maintained and displayed by LMS Express only. The short name can be uploaded and displayed on the instrument(s) connected to LMS Express.

- Location Long and Short Names must be unique.
- Location Short Names have the following additional restrictions:
 - Cannot be greater than 8 characters long
 - Can only include capital letters (A-Z), numbers and underscores.
 - Cannot contain spaces or special characters (*, \$, !, @).

Saving Locations to File

Users can export the list of Locations to a Microsoft Excel file (*.xls) or comma separated file (*.csv). To export locations,

1. Display the Locations view.
2. Click on the Save As button on the tool bar or Save Locations to File on the Task Panel.
3. On the Save As window that appears, select the file type to save to (*.xls or *.csv).
4. Use the navigation tools at the top of the dialog box to select the

directory to save the file.

5. Enter a name in the “File Name” field
6. Press Save. The file created can be viewed using the appropriate application(s).

Printing Locations

Users can print the list of Location(s) as follows.

1. View Locations.
2. Print Preview
3. Click on the Print button on the toolbar or Print Locations on the Task Panel.
4. On the default print window that appears, select the desired printer and click OK.
- 5.

Upload Location Names to Instrument

Note: To upload location names to instrument(s), login as an administrator.

Users can upload location names from LMS Express to Lighthouse Worldwide Solutions instruments that support alphanumeric location names. To start uploading location names, click “Upload Location Names to Instrument” on the Task Panel when the Locations View is displayed.



Figure 9-38 Location Names Upload Wizard

Click Next to continue.

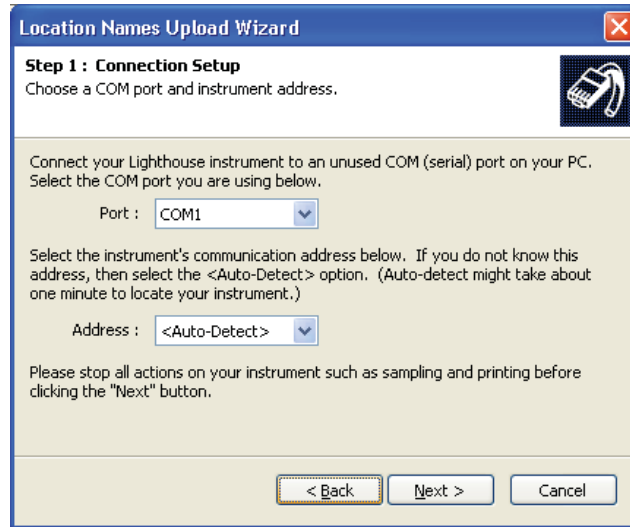


Figure 9-39 Upload Step 1

Note: By default, the last used COM Port and Address used to upload location names or download data will be selected.

Select the COM Port and Address to search for the instrument. Just like downloading data from an instrument, users can choose “Auto-Detect” as the address and have LMS Express automatically search for the instrument’s address.

Click Next to continue, or Prev to return to the previous Wizard step.

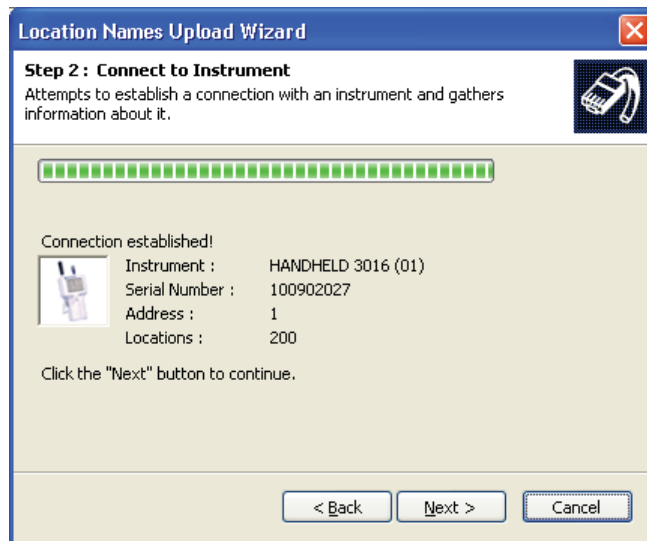


Figure 9-40 Upload Step 2

If LMS Express finds the instrument, the Wizard will display information about the instrument, its serial number, address and how many locations it currently has.

To select specific location names to upload, click Next.

Note: To change the list's sort order, click the column header.

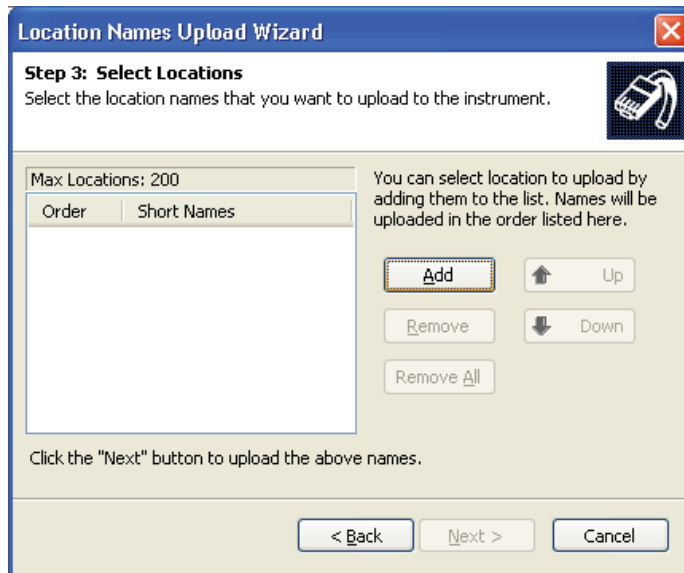


Figure 9-41 Upload Step 3

Click the Add button and select the location names from those shown (Figure 9-39). To sort the list, click the desired header (such as, sort by long name ascending or descending order).

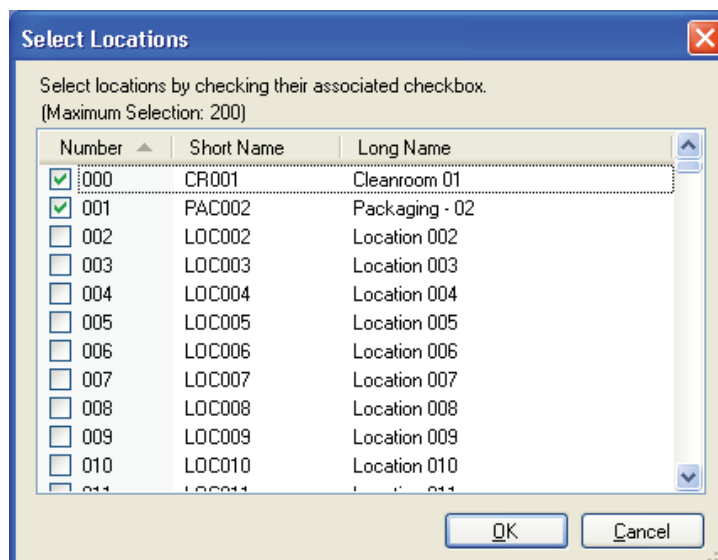


Figure 9-42 Add Locations Screen

Note: The maximum number of locations depends on the connected instrument.

LMS Express can upload up to the maximum number of alphanumeric names the connected instrument supports, which is typically 200. After selecting all the location names to upload, click the OK button.

WARNING: Uploading location names overwrites any existing location names on the instrument.

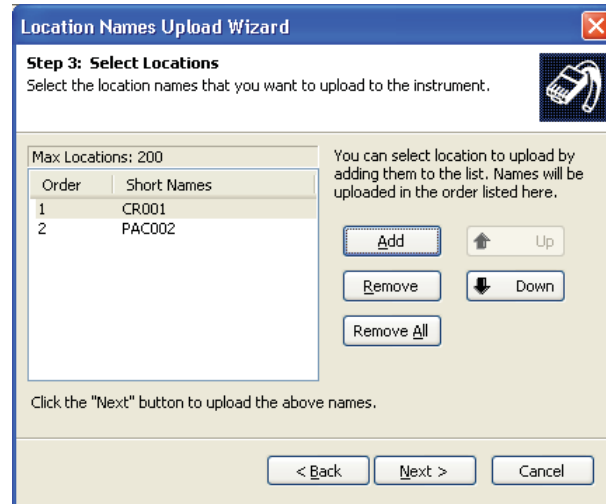


Figure 9-43 Upload Step 3 Continuing

To remove a location name, select it and click the Remove button. Click the Remove All button to remove all selected names.

To change the order of the location names, select a given name and click the up or down arrow button. Click the Next button and LMS Express begins uploading. Figure 9-44 shows the successful upload.

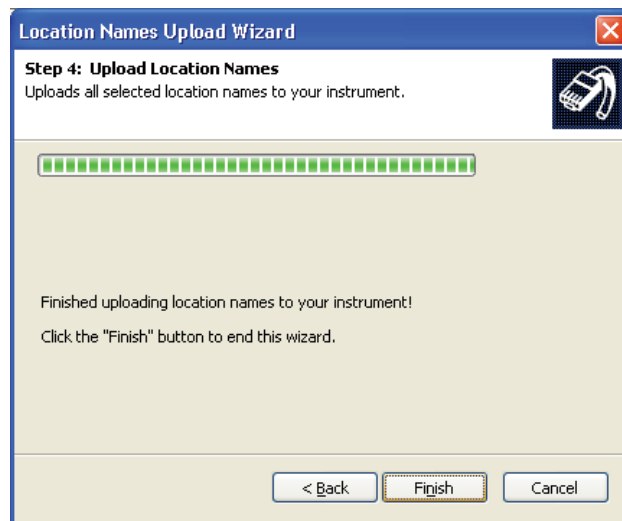


Figure 9-44 Upload Successful

When the upload is complete, click "Finish" to exit the Wizard.

Event Log



The event log keeps track of all changes and events that occur in LMS Express including the date and time the event occurred, the type of event, who triggered the event and possibly a detailed message.

The LMS Express event log fulfills the audit trail requirement of 21 CFR part 11.

Event Log			
Date Time	User	Event	Message
7/5/2005 11:04:41	Administrator	Logout	
7/5/2005 11:04:42	System	Shutdown	
7/5/2005 11:04:58	System	Startup	
7/5/2005 11:05:57	System	Shutdown	
7/5/2005 11:07:28	System	Startup	
7/5/2005 11:07:30	System	Shutdown	
7/5/2005 11:07:39	System	Startup	
7/5/2005 11:08:36	Administrator	Login	
7/5/2005 11:08:52	System	Driver	[Serial Port 1\Address02] Instrument communications has been lost!
7/5/2005 11:08:54	System	Driver	[Serial Port 1\Address03] Instrument communications has been lost!
7/5/2005 11:08:56	System	Driver	[Serial Port 1\Address01] Instrument communications has been lost!
7/5/2005 11:16:35	Administrator	Modify	Enabled simple logins.
7/5/2005 11:16:37	Administrator	Logout	
7/5/2005 11:16:38	System	Shutdown	
7/5/2005 11:16:53	System	Startup	
7/5/2005 11:35:31	Administrator	Login	
7/5/2005 11:35:57	System	Driver	[Serial Port 1\Address02] Instrument communications has been lost!
7/5/2005 11:36:00	System	Driver	[Serial Port 1\Address03] Instrument communications has been lost!
7/5/2005 11:36:01	System	Driver	[Serial Port 1\Address01] Instrument communications has been lost!
7/5/2005 12:52:54	Administrator	Modify	Disabled logins on application startup.
7/5/2005 12:52:54	Administrator	Modify	Disabled simple logins.
7/5/2005 12:52:54	Administrator	Modify	Enabled user authentications.

Figure 9-45 Event Log view

Event Log

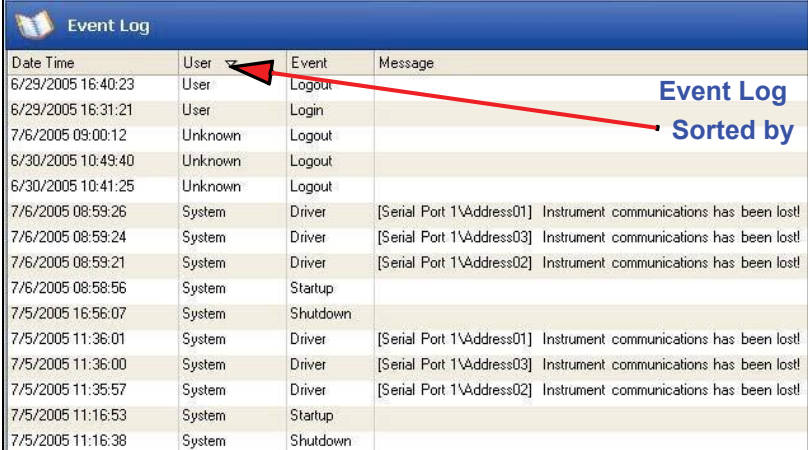
Note: When logins are enabled, the event log can only be accessed by administrators.

To view the event log, click the Administrator Options link in the Home view, then click "View the Event Log".

By default, the Event Log view displays all the log entries for the past week. When new log entries are added, LMS Express appends the new log entries to the existing log in real time.

Note: Event Log entries longer than 255 characters will be split into multiple log entries and ellipsis “...” will be attached to the split messages.

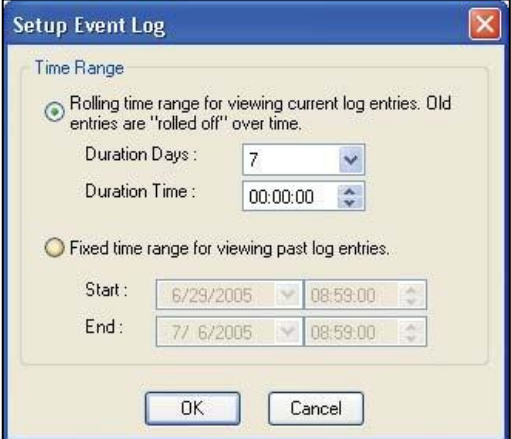
The list of log entries can be sorted by clicking on one of the Event Log view column headers. Clicking the same column header will cause the column to sort in the opposite direction. An arrow on the column heading indicates which column is sorted and which direction it is sorted.



Date Time	User	Event	Message
6/29/2005 16:40:23	User	Logout	
6/29/2005 16:31:21	User	Login	
7/6/2005 09:00:12	Unknown	Logout	
6/30/2005 10:49:40	Unknown	Logout	
6/30/2005 10:41:25	Unknown	Logout	
7/6/2005 08:59:26	System	Driver	[Serial Port 1\Address01] Instrument communications has been lost!
7/6/2005 08:59:24	System	Driver	[Serial Port 1\Address03] Instrument communications has been lost!
7/6/2005 08:59:21	System	Driver	[Serial Port 1\Address02] Instrument communications has been lost!
7/6/2005 08:58:56	System	Startup	
7/5/2005 16:56:07	System	Shutdown	
7/5/2005 11:36:01	System	Driver	[Serial Port 1\Address01] Instrument communications has been lost!
7/5/2005 11:36:00	System	Driver	[Serial Port 1\Address03] Instrument communications has been lost!
7/5/2005 11:35:57	System	Driver	[Serial Port 1\Address02] Instrument communications has been lost!
7/5/2005 11:16:53	System	Startup	
7/5/2005 11:16:38	System	Shutdown	

Figure 9-46 Log Window, Sorted by Column

To look at a particular portion of the Event Log, click on the Setup button on the toolbar or Change Log's Time Period on the Task Panel.



Setup Event Log

Time Range

☒ Rolling time range for viewing current log entries. Old entries are "rolled off" over time.

Duration Days : 7

Duration Time : 00:00:00

☐ Fixed time range for viewing past log entries.

Start : 6/29/2005 08:59:00

End : 7/ 6/2005 08:59:00

OK Cancel

Figure 9-47 Setup Event Log Window

On the Setup Log window, select a Time Range. If 'Rolling' is selected, enter a duration. The minimum duration is one minute, and the maximum is 7 days. If 'Fixed' is selected, enter start and end date/ times. After clicking OK. The event log view updates to reflect the new time range.

Exporting Event Log

Users can save the Event Log to a Microsoft Excel (*.xls) or comma separated (*.csv) file.

1. View Event Log.
2. Click on the Save As button on the toolbar or click Save to File on the Task Panel.
3. On the Save As window that appears, select the file type to save the event log to: *.xls or *.csv.
4. Use the navigation tools at the top of the dialog box to select a location to save the file to.
5. Enter a name in the "File Name" field.
6. Click Save.

The current Event Log view is saved to the specified file and can be viewed using the appropriate application(s).

Printing Event Log

Users can print the Event Log as follows.

1. View Event Log.
2. Print Preview: Users can preview the Event Log before printing the log.
3. Click on the Print button on the toolbar or click Print Log on the Task Panel.
4. On the Print window that appears, select the printer and click OK. The current Event Log view prints.

Posting to the Event Log

Note: Only Administrators can access the Event Log.

Administrators can write (or “Post”) their own message(s) to the event log. To post a message, do the following:

1. Login as an administrator.
2. Display the Event Log
3. Click the toolbar’s New button or Post a Custom Message on the Task Panel.

The following dialog appears:

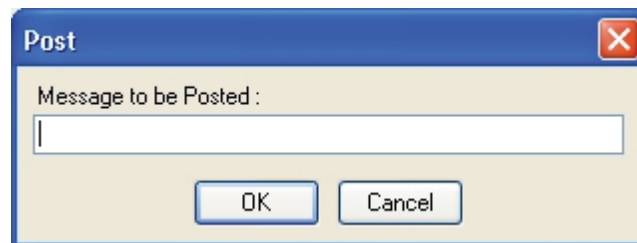


Figure 9-48 Event Log Post Message window

Note: The New button on the toolbar is enabled while the Log view is displayed.

Note: Click Cancel to disregard any changes.

Note: Individual log entries cannot be deleted!

4. Type in at least 1 character for each message. Messages can be up to 255 characters long. Enter the message.
5. Click OK to post it to the event log.

The timestamp for the new log entry is the current date and time. Its event type is “Post”.

Delete Old Log Entries

Administrators can delete old Event Log entries. To delete old Event Log entries:

1. Login as an administrator.
2. Display the Event Log
3. Click the Delete button on the toolbar or click Delete Old Log Entries on the Task Panel.

4. The following window displays:



Figure 9-49 Delete From Event Log

5. Two options become available:

"Delete entries older than" - If this option is selected, all entries before the specified date will be deleted.

"Delete all log entries in storage" - If this option is selected, all log entries will be deleted.

Note: Click [Cancel](#) to exit the Delete Setup dialog without deleting any event log records.

6. Select one option and a date, if applicable.
7. Click OK to delete the Log records.

After LMS Express has deleted the selected Event Log entries, it writes a new log entry stating, "Event Log entries have been deleted."

Database Maintenance



Database Maintenance and Archive Handling

Note: Ideally, backup all archives to USB key or CD's and store database off- site in the event of an emergency.

Without maintenance or attention, LMS Express database can continue to grow. As a result, database maintenance is an important part of running and managing LMS Express. For instance, for faster performance displaying historical data, regularly archive old data.

Administrators can perform database maintenance tasks on the Database view. To access this view, login as an administrator, click the Home button, click Administrator Options and then click Database Maintenance and Archive Handling.

The following Database maintenance view displays:

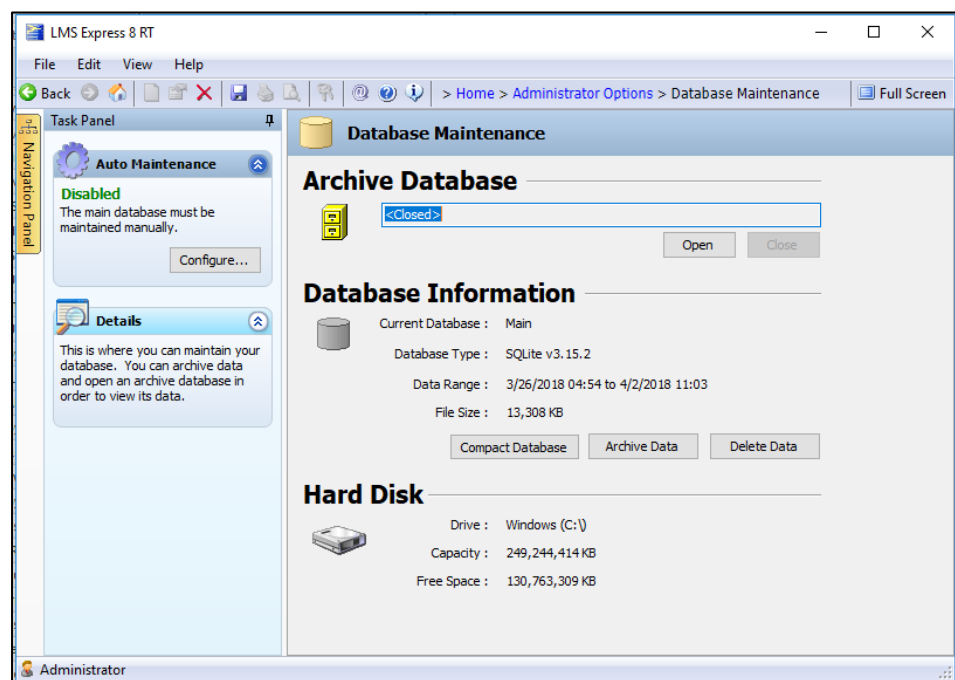


Figure 9-50 Database Maintenance

On the Database view administrators can see information about the available hard disk, the current database, as well as open archive databases, create archives and delete data.

Archive Database

Users can view historical data by opening previously saved archive database files. Once the user has opened an archive file, he or she can print graphs, data tables or standard reports on past data.

Note: New data will only be recorded into the Main database.

Note: For information on how to archive data, see the Database Information's Archive Data feature, later in this manual.

The Archive Database section of the Database view allows users to switch LMS Express from accessing data in LMS Express' Main database to accessing data that was previously archived.



Figure 9-51 Archive Database information

LMS Express archive files have extensions *.da3. They only contain data points and data set information; however, data set information is ignored by LMS Express and is only stored for recovery purposes.

Archive database files are dependent on the Main LMS Express database for user and password configuration and information about data sets, instruments and locations.

To open an LMS Express archive file, click the Open button underneath the Archive Database field.

The following Open window appears:

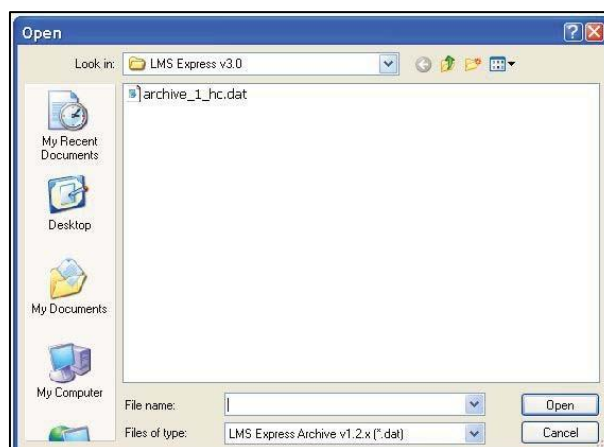


Figure 9-52 Open Archive file

Select an LMS Express archive file and click Open. After Opening the archive database, the Archive Database field will show the path and file

Note: Administrators can open previous Express version backup databases as archive files.

name of the archive.

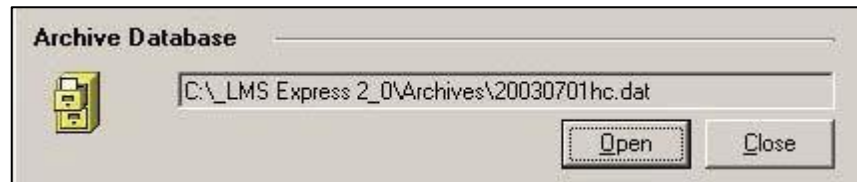


Figure 9-53 Open Archive database filename

And “Archive” appears on the status bar.



Figure 9-54 Archive Database open

Database Information

The Database Information section of the Database view gives the user information about the current database and buttons to compact database, archive data and delete data.

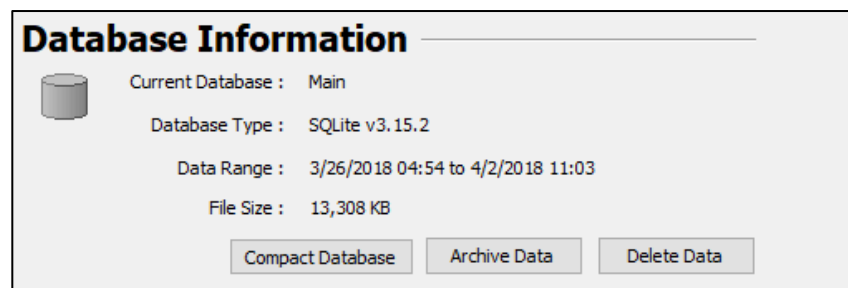


Figure 9-55 Database Information

Compacting Database

Compacting the database regularly is good database maintenance practice. When the Compact Database button is selected, a pop-up message is displayed asking whether to proceed or not. Selecting "Yes" will begin the compacting process. selecting "No" will cancel the action.

Archiving Data

To save data for historical data review, regularly archive data. It is recommended that users create a naming convention so that they can later easily identify what data is in each archive file. It is also recommended that users create a specific location to store all archive databases so that they are easy to locate.

To archive data, do the following:

1. Click on the Archive Data button.
2. When the Save As dialog box appears, go to the location to save the archive file.
3. Type a name for the archive file.
4. Click Save.

Note: The database file is password protected to prevent access any other software.

Suggested Naming Convention for Archive Files

To construct a naming convention for archive files, first determine the data ranges regularly archived. This could be every month or every week or every two weeks, etc., depending on the administrator's needs.

A simple and easy naming convention includes using part of the date range of the data to uniquely identify the archive files. Use a date range in the archive file name to ensure that the archive files remain in chronological order. This will make it easier to retrieve and review historical data.

For example, when archiving data for July 1 - 31, 2003, some possible archive file names include:

- 20030701 - to identify monthly data by first day of the month.
- 20030701-31 - to identify by the days in the month range.
- 20030701JL - to identify the first day of the month and include the initials of the user who ran the archive.

Note: After archiving data, it is recommended that the data that was just archived is deleted from the Main database. This will help keep the Main database at a manageable size (see the section on deleting data)

Delete Data

WARNING: Before deleting the data, run an archive to save the data for future use.

Once the data has been deleted, it cannot be retrieved.

Periodically administrators need to delete data from the database to prevent the system's hard disk from overflowing.

1. Go to the Database window on the Setup shortcut bar.
2. Click on Delete Data. The following dialog box opens:



Figure 9-56 Delete Data dialog box

3. Select an option:
 - The "Delete data older than...<date>" option will delete all data timestamped before the selected date.
 - The "Delete all data points in storage" option will remove all data points in the database.
4. Click OK.
5. The following warning displays:



Figure 9-57 Delete Warning

- Click Yes to delete the data or No to cancel the delete. If Yes was clicked, the selected data is deleted and afterwards the following message appears:



Figure 9-58 Successful Deletion of Data

- Click OK to close the message.

Automatic Database Maintenance

In addition to manual database maintenance, LMS Express includes an automatic maintenance feature that can be set up to clear the database on a periodic basis.

To access this feature, login as an administrator, click the Home button, click Administrator Options and then click Database Maintenance.

The following Database Maintenance view displays:

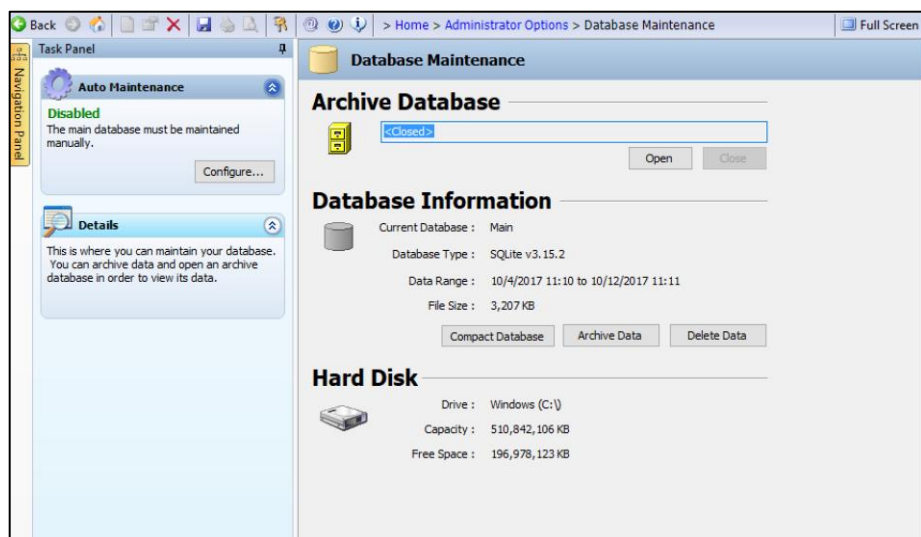


Figure 9-59 Database Maintenance

Click Configure in the Auto Maintenance portion of the screen. The following dialogue box appears:

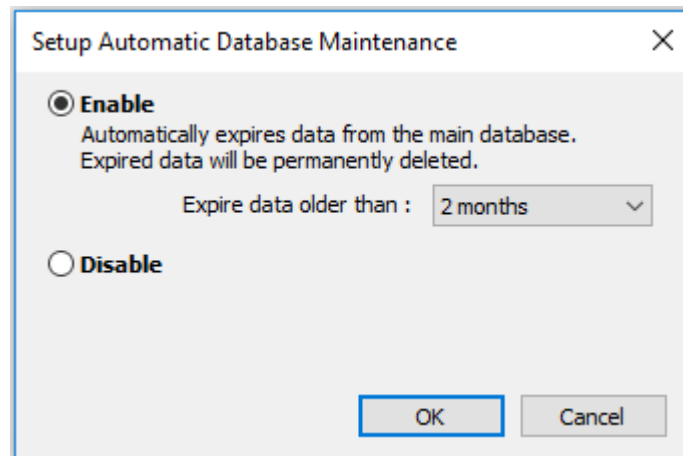


Figure 9-60 Setup Automatic Maintenance

The default setting is for Automatic Maintenance and Expire data older than 2 months. If you click the drop down list you can choose from different time frames as shown in Figure9-59.

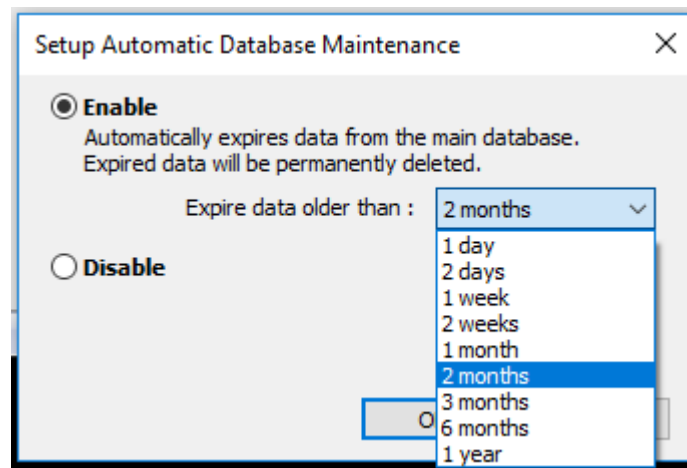


Figure 9-61 Drop Down List

The "Expire data older than" setting means that data older than this value will be removed from the database automatically.

Hard Disk

The Hard Disk section of the Database view gives the user information about the drive where the database is located. Specifics include the disk drive letter, capacity of the drive and amount of free space left on it. This helps the user monitor drive usage for the database and anticipate filling the available space on that drive.



Figure 9-62 Hard Disk information

Chapter 10 Data Collection

Downloading Data Manually

This chapter describes how to connect instruments and manually download their data. It also discusses configuration and how to set up LMS Express to collect real time data from connected instruments.

Each LMS Express version has an auto-detect feature enabling the software to find a Lighthouse ApexP, ApexR, ApexZ, Handheld, Remote, Solair or Vertex when the instrument is connected to a configured COM port via an RS-232 cable or connected to the network or through Wi-Fi.

Note: LMS Express automatically stops the instrument if it is counting when a user starts manually downloading data.

Download Data from ApexZ Instruments

From the Home screen click on the ApexZ Quick Links, Manual Download button.

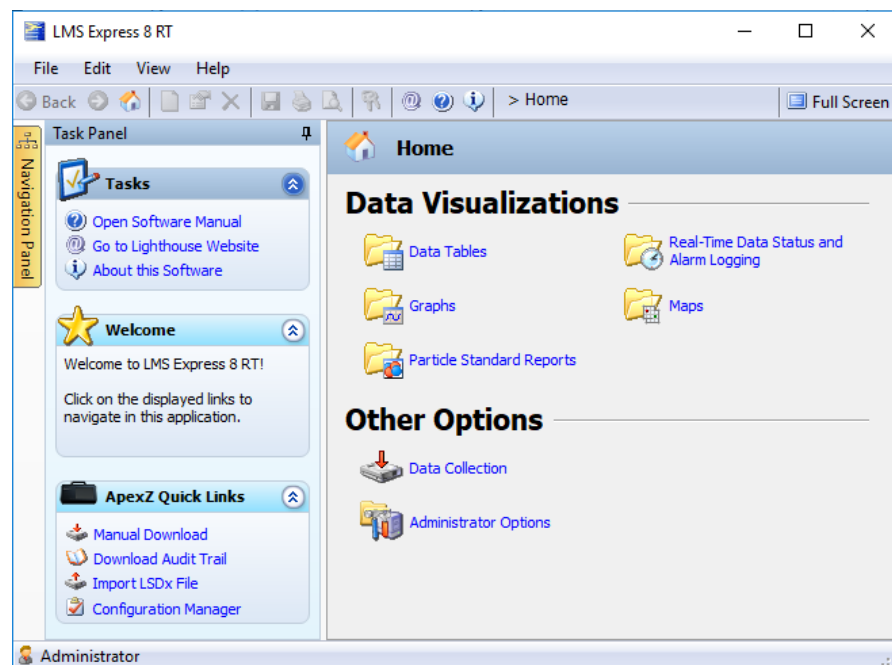
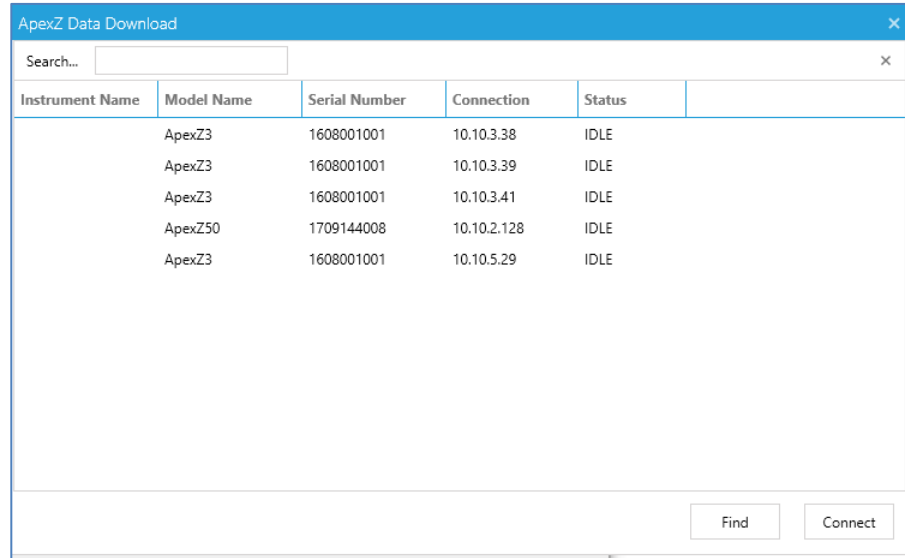


Figure 10-1 LMS Express Home Screen

LMS Express will auto discover ApexZ instruments present on the same Network that the LMS Express server is currently connected to and display a list. .

Note: Auto Discovery of ApexZ instruments require use of UDP port 8181.



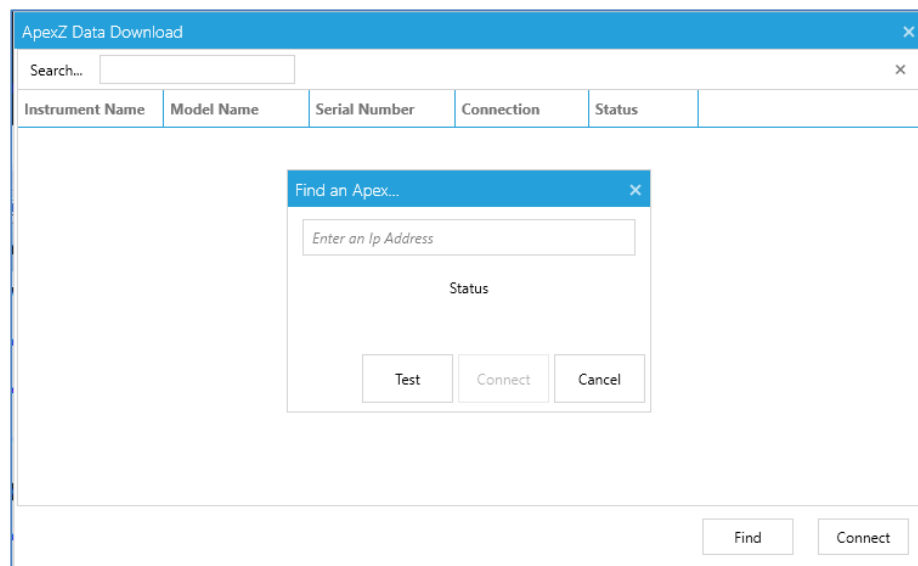
The screenshot shows the 'ApexZ Data Download' window. It has a search bar at the top and a table below. The table has columns for Instrument Name, Model Name, Serial Number, Connection, and Status. There are five rows of data, all with a status of 'IDLE'. At the bottom right, there are 'Find' and 'Connect' buttons.

Instrument Name	Model Name	Serial Number	Connection	Status
ApexZ3	ApexZ3	1608001001	10.10.3.38	IDLE
ApexZ3	ApexZ3	1608001001	10.10.3.39	IDLE
ApexZ3	ApexZ3	1608001001	10.10.3.41	IDLE
ApexZ50	ApexZ50	1709144008	10.10.2.128	IDLE
ApexZ3	ApexZ3	1608001001	10.10.5.29	IDLE

Figure 10-2 ApexZ instruments detected on Network

Select an ApexZ instrument and click the Connect button.

Alternatively, you may click on the Find button and enter an IP address to connect to an ApexZ instrument.



The screenshot shows the 'ApexZ Data Download' window with the 'Find an Apex...' dialog box open. The dialog box has a text input field labeled 'Enter an Ip Address', a 'Status' label, and three buttons: 'Test', 'Connect', and 'Cancel'. The 'Find' and 'Connect' buttons are also visible at the bottom right of the main window.

Figure 10-3 Enter IP address

After entering the IP address press the Test button to detect that the IP address is on the Network.

If your device is located at that IP address, then that device will be detected and displayed.

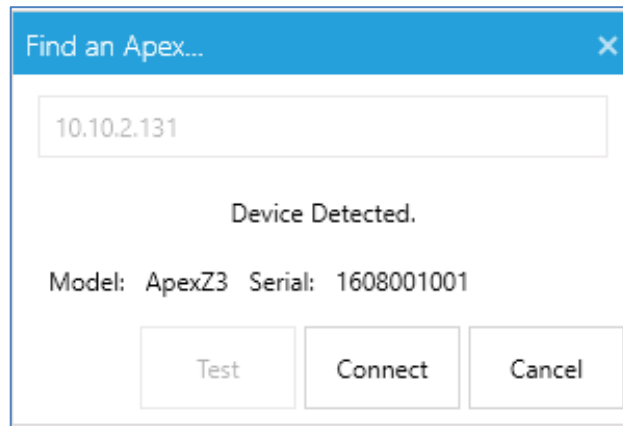


Figure 10-4 Device Detected Connect

Press the Connect button and LMS Express will retrieve data and display the Room, Location and Record Count.

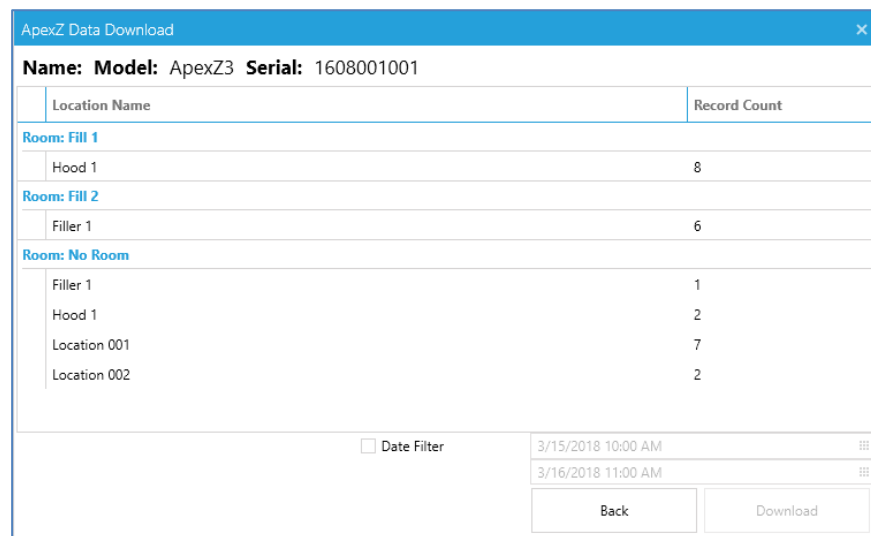


Figure 10-5 ApexZ data record display

Select and highlight the data records you wish to manually download and press the Download button. While LMS Express is downloading the selected data records on screen message will display "Downloading Data..." at the bottom of the window. After downloading press Close.



Download data from Lighthouse instruments.

From the Home screen press Data Collection button.

From the Data Collection screen press Manual Data Download.

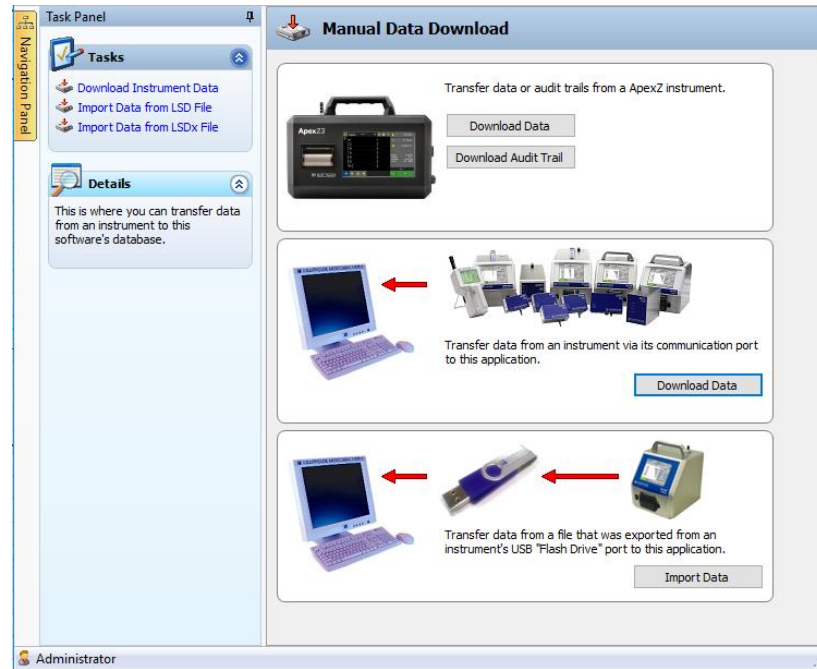


Figure 10-6 Manual Data Download Screen

Press Download Data button to begin Manual Data Download Wizard.

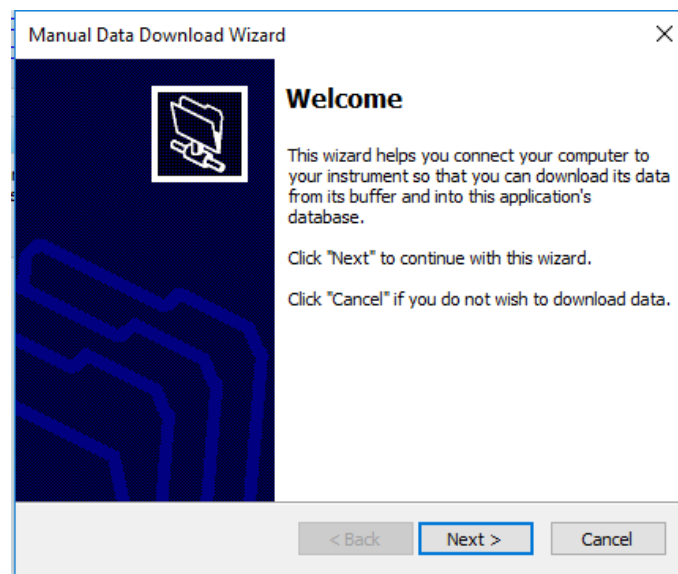


Figure 10-7 Data Download Wizard Welcome

Click Next to continue.

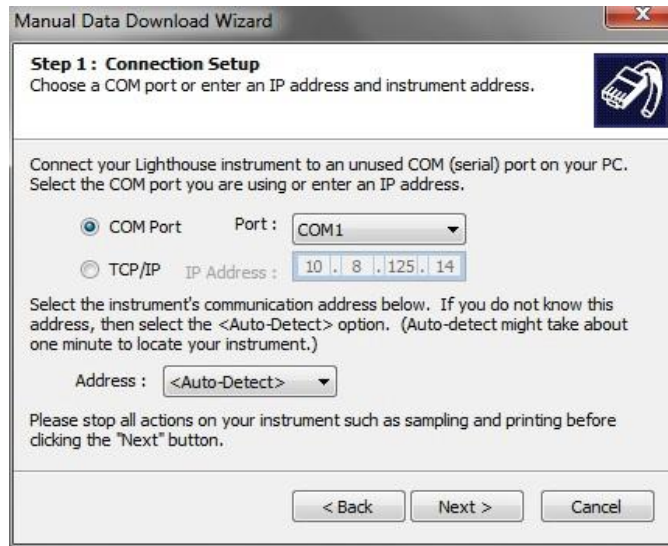


Figure 10-8 Data Download Wizard, Step 1

On Step 1, select information to connect to the instrument. By default, the COM1 and <Auto-Detect> are selected.

If the user has connected a Lighthouse instrument to a COM port other than COM1, change the COM Port number. If the user has connected a Lighthouse instrument directly to the network or via an Ethernet Adapter, select the TCP/IP option and enter the IP address.

To have LMS Express find the address automatically, leave the Address set to <Auto-Detect>. If the user knows the address of the instrument, it can be specified in the Address field to save time. Click Next to continue. If LMS Express finds the instrument, the following window appears:



Figure 10-9 Data Download Wizard, Instrument Found

After LMS Express has found the instrument, it displays information about the instrument, including the instrument's serial number, address and number of data records.

Note: Express does not download data from disconnected analog inputs such as TRH probes.

Click Next to begin downloading data.

While downloading data, Location Numbers are ignored on instruments that support Location Names. Instead, Location names on the instrument are matched with LMS Express' short Location names and assigned their location numbers.

If downloaded data comes from a location name that does not match a short location name in LMS Express, a Synchronization Issue dialog window appears. If the user chooses to synchronize the location's name, the location name on the instrument is overwritten

As LMS Express downloads data from the instrument, it updates the download window.

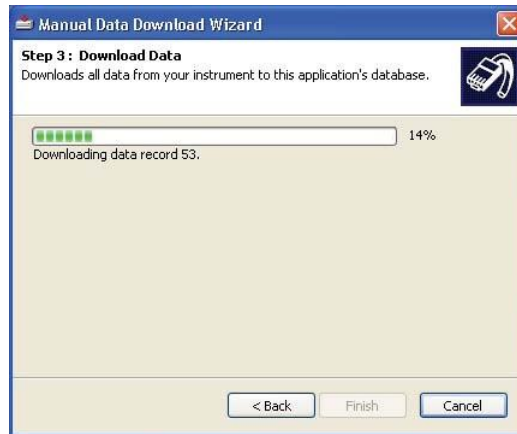


Figure 10-10 Manual Data Download In Progress

After the data is downloaded, LMS Express displays the following message:

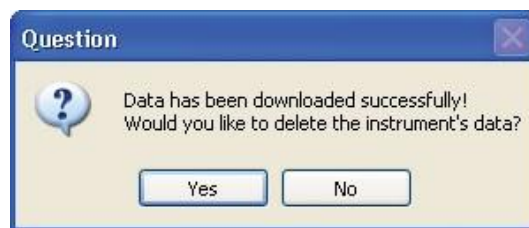


Figure 10-11 Clear Data Message

Select **Yes** to clear the data from the instrument or **No** to leave the data intact. Figure 9-7 shows the final window.



Figure 10-12 Manual Data Download - Finished

Click Finish to close the Manual Data Download window.

Trouble Shooting

If the manual download was not successful or if the connection was interrupted during the download, the user may see the following message:



Figure 10-13 Lost Connection Message Box

If the instrument is still attached and communication was lost, try one or more of the following actions to correct the issue.

- Attempt to reconnect using the download wizard (starting at Figure 9-1).
- Turn the instrument off, wait a few seconds, turn it on again and retry the download.
- Exit and re-boot the computer. Restart LMS Express.
- Unplug the connector from the instrument and reattach it. Try reconnecting and downloading data

Note: After downloading data, users are advised to customize the Instrument and Location data to their specific application. This makes it easier to access and interpret the data.

After LMS Express has successfully downloaded data from the instrument, LMS Express updates the instrument and location information under the Administrator Options. Users can access information about the new data set and all the data in graphs, data tables, maps, or standard reports as described in previous chapters of this manual.

Import Data

LMS Express can import records from **Lighthouse Secure Data** files stored on a Flash Drive (.LSD for ApexP and Solair, and .LSDX for ApexZ instruments). The data records are transferred securely to a Flash Drive, which is removed from the instrument and connected to a computer outside of the cleanroom.

These Flash Drive files contain secure binary records of the data recorded by the Lighthouse instrument. They can be imported only through LMS Express and cannot be altered without destroying the data or causing it to be rejected by the application during import, maintaining 21 CFR Part 11 compliance.

The Manual Data Download screen provides an interface to this feature shown in Figure 10-14



Figure 10-14 Import Data Feature

The data import can take place even while real-time data collection is active and notifies the user if data corruption has been detected in the LSD file. Corrupted data, which can be the result of tampering or bad sectors on the Flash Drive, is not imported. If the entire file is corrupt, the process will fail and return the user to the Data Import screen to restart the import.

Successful imports log the instrument name and import data time range to the Event log, providing data to the audit trail required by 21 CFR Part 11.

Data Import Wizard

The process starts when the Import Data button (Figure 9-9) is clicked.

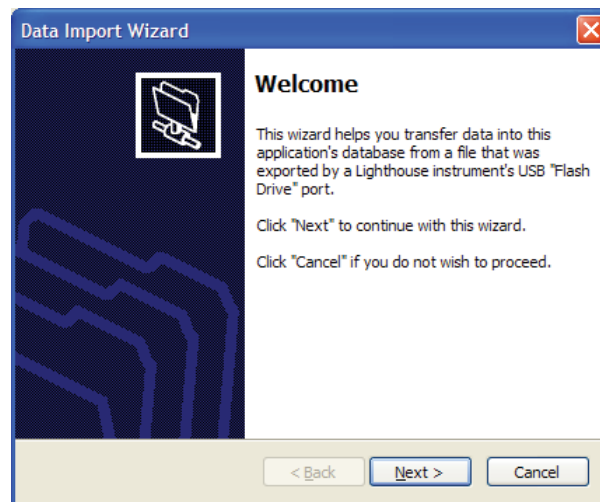


Figure 10-15 Data Import Wizard Start Screen

Click the Next button then **Browse...** for the data drive.

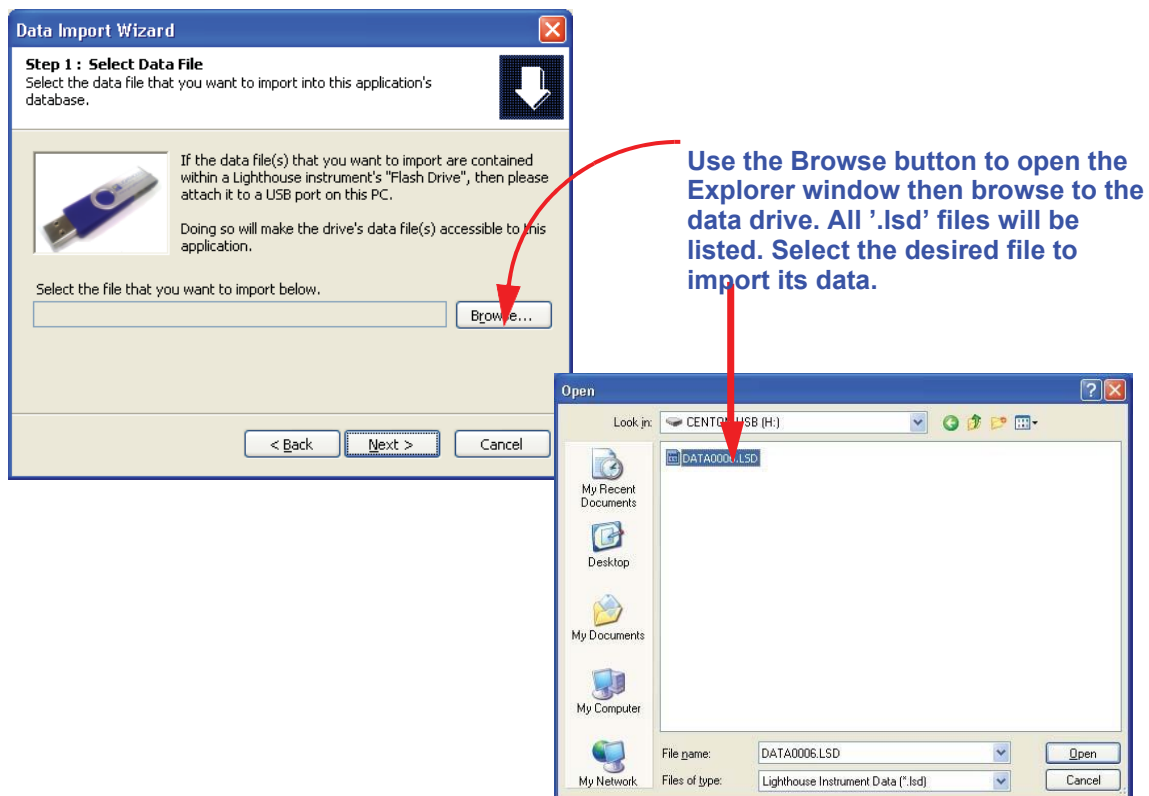


Figure 10-16 Use **Browse...** to Select Source and Data File

Choose the Flash Drive or system hard drive and if it contains data from an ApexP or a Solair download, the Wizard will show them and allow importing from one of those files. The import process can import from only one file at a time. Figure 10-17 shows a valid LSD data file.

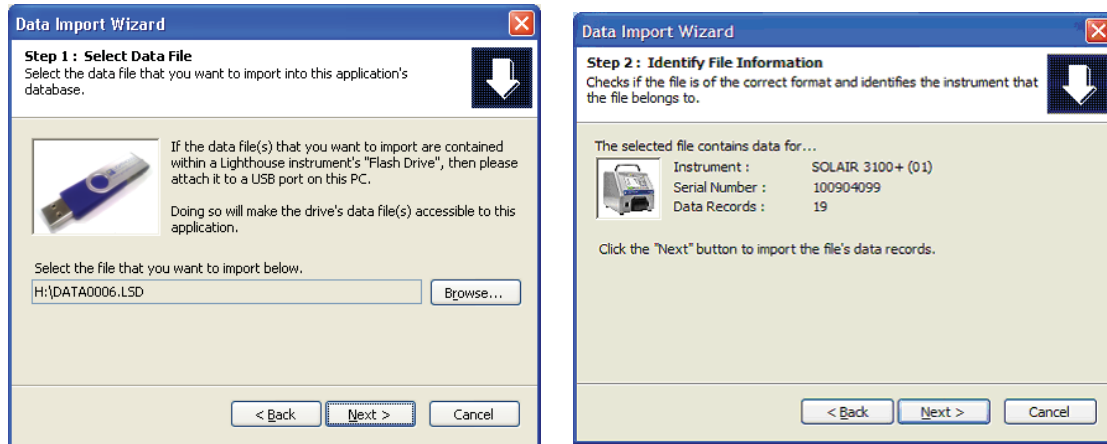


Figure 10-17 Confirm Valid Data File Chosen

If the data cannot be imported or the file was created for a newer version of LMS Express (Figure 10-18), the import wizard will halt and only allow the **< Back** button to be used.

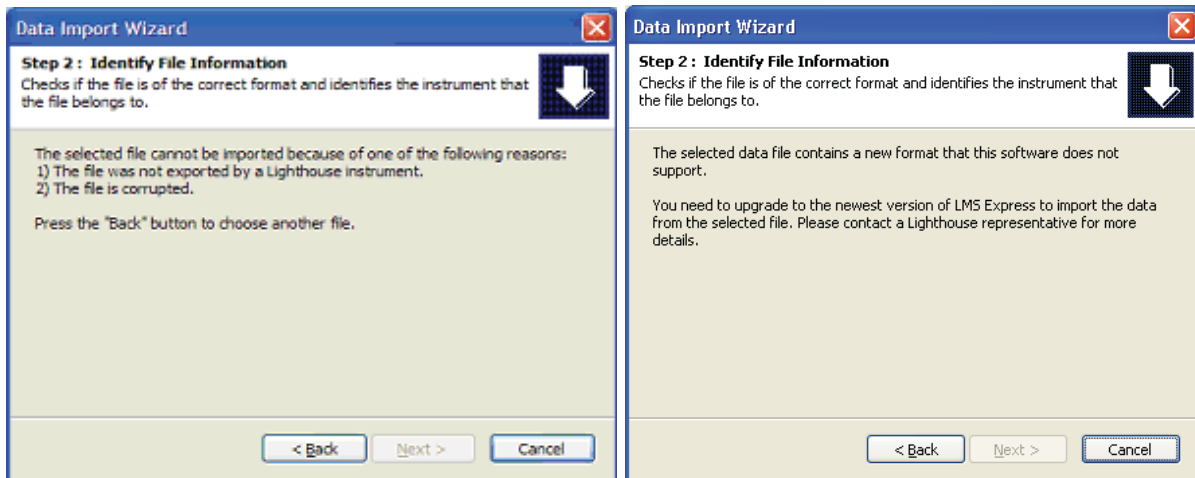


Figure 10-18 Error Screens For Data Import Halt

Figure 10-19 shows the resulting error screen when a file contains corrupted data records that cannot be imported.

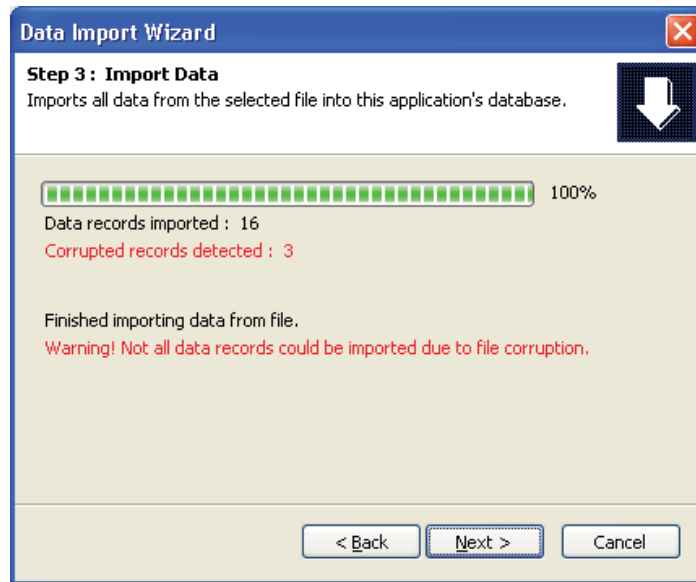


Figure 10-19 Corrupted Records Blocked From Import

When all the data records are successfully imported, the resulting screen (Figure 10-20) is shown to inform the user of the wizard success.

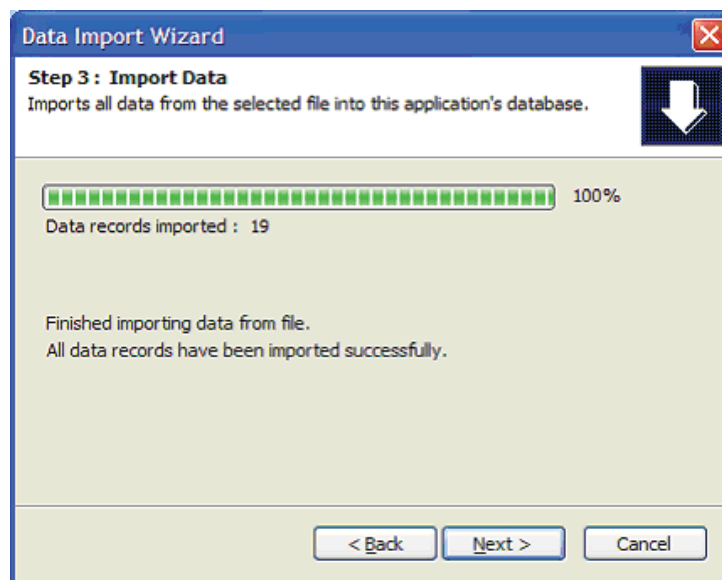


Figure 10-20 Successful Data Import Screen

Step 4 of the process requires the user to choose whether to delete the file from which the data was imported or to keep it on the drive (Figure 10-21).

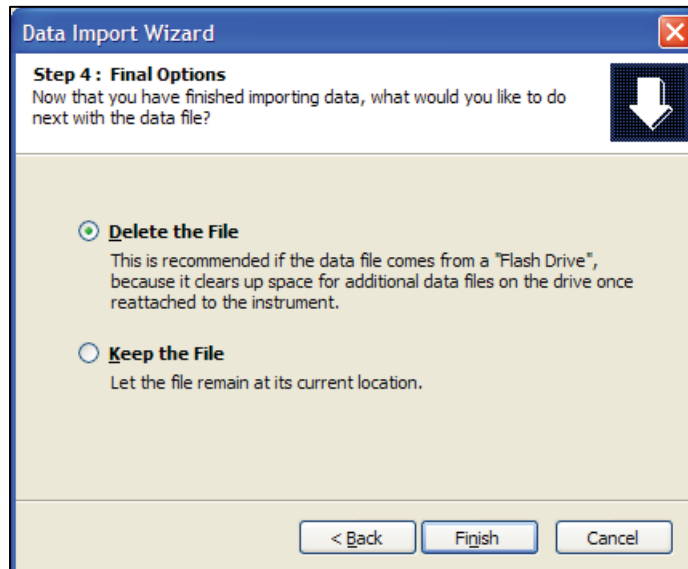


Figure 10-21 Data Import Step 4

If the .lsd or .lsdx file is stored on a Flash Drive, it is recommended that it be deleted to free up space on the drive. If the file was stored on a local drive, deletion of the file may not be as important to save space.

Real Time Data Collection

LMS Express can be configured to collect data in real time.

To set up instrument data collection, click on the Home button, Data Collection then on Real Time Data Collection.

Figure 10-22 is an example of the configuration screen layout.

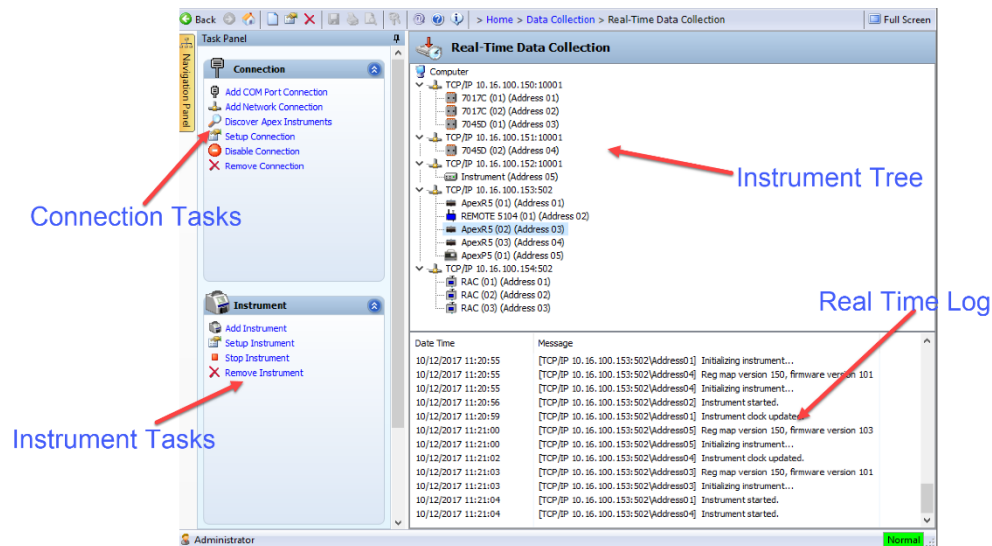


Figure 10-22 Real Time Configuration Screen Layout

Real Time Configuration

Note: LMS Express (standard version) cannot download data real time. To download data real time, upgrade to LMS Express.

LMS Express can be configured with up to 100 instruments of the following types:

- Airborne particle counters
- Liquid particle counters
- ICP DAS Modules
- Manifold Controllers
- Ultra Pure Water Instruments

Note: The “Real-Time Data Collection” window shows exclamation marks over instrument icons that have measurement errors such as Bad Flow, Instrument Service Required, and so on. Any measurement errors are displayed in red in the Real Time Log.

LMS Express supports all COM ports available to **Windows**, as well as supporting Ethernet and RS-485 networked devices

The Real Time Data Collection configuration window (Figure 10-22) displays the current configuration and allows users to add, modify, stop or delete instruments using actions found on the left side panel.

Instrument Tree

Configured ports and instruments are displayed as a tree (Figure 10-23).

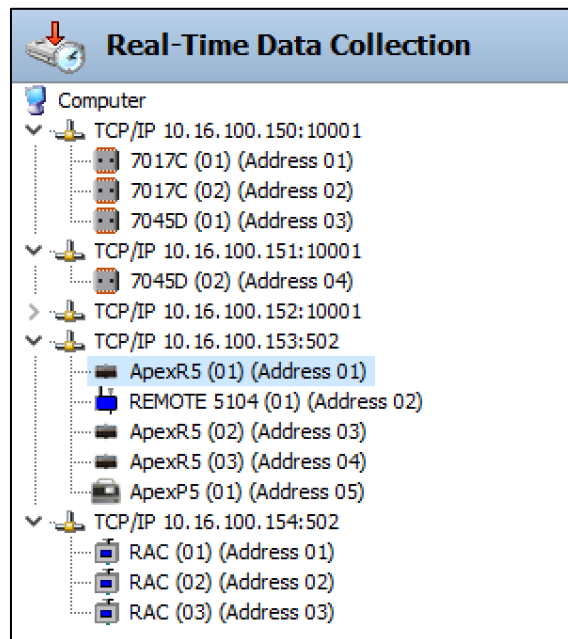


Figure 10-23 Instrument Tree Example

To the left of each instrument in the instrument tree is an icon depicting what type of instrument it is and the instrument’s status (OK, Error, or Disabled).

Setup and Status Menus

Selecting a Computer, COM Port or an Instrument changes the Setup and Status menus displayed on the left side of the Real Time Data Collection view.

To access the available menus, administrators can right-click an item in the Instrument Tree to access a context menu.

Real Time Log

The log at the bottom of the view shows the most recent real time log activity. Errors or time out messages are shown in red text. All normal messages or status messages are displayed in black text (Figure 10-24).

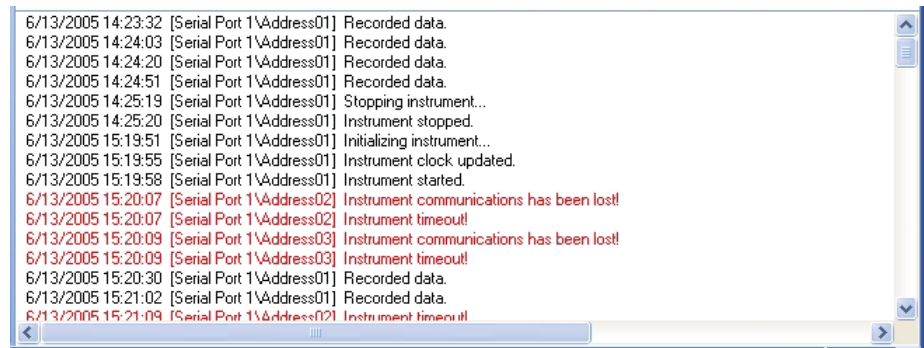


Figure 10-24 Sample - Real Time Log

Configuration Setup

LMS Express supports COM port and Network connections.

Adding an ApexZ connection

Click on **Discover Apex Instruments** on the Connection section of the Real Time Data Collection screen Task Panel. ApexZ must be connected to the Network through Ethernet or Wi-Fi.

Note: Auto Discover for ApexZ uses UDP (User Datagram Protocol). User IT Dept. must allow UDP, or auto discovery will not work for LMS Express.

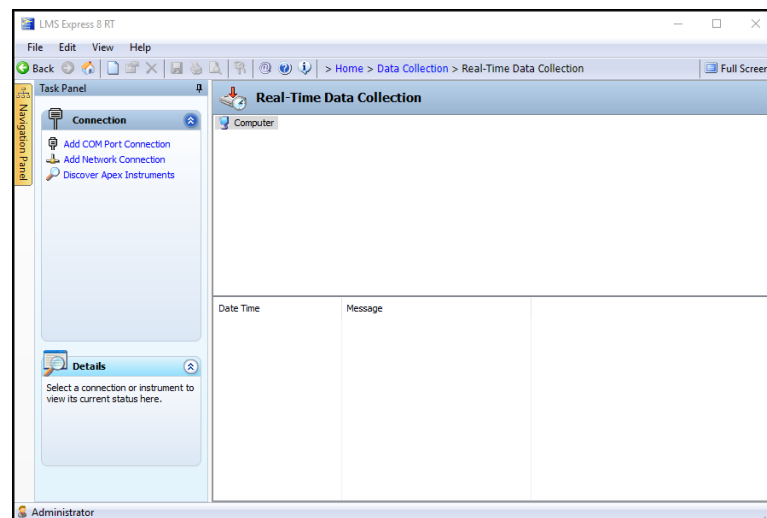


Figure 10-25 Real Time Data Collection

Express will display and search for ApexZ's on the Ethernet or Wi-Fi. Select the desired ApexZ instrument from the list and press Select.

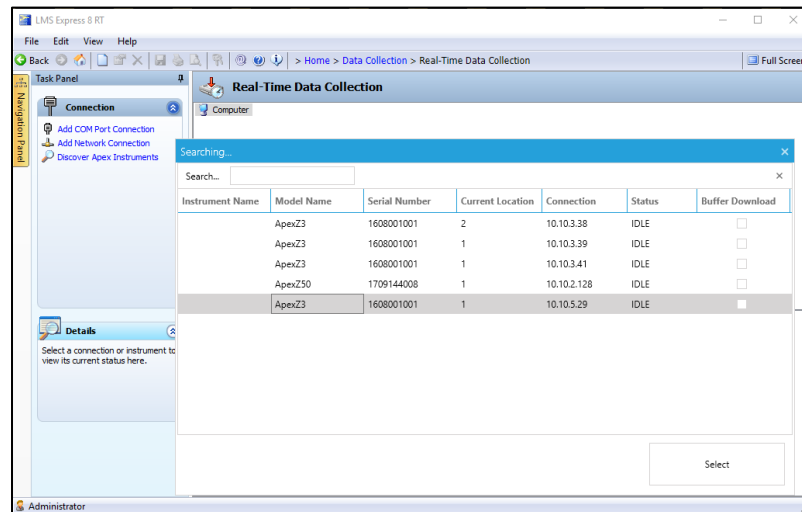


Figure 10-26 Discovering ApexZ instruments

Express will initialize the instrument; start a remote session; and start recording data in real-time from the ApexZ instrument.

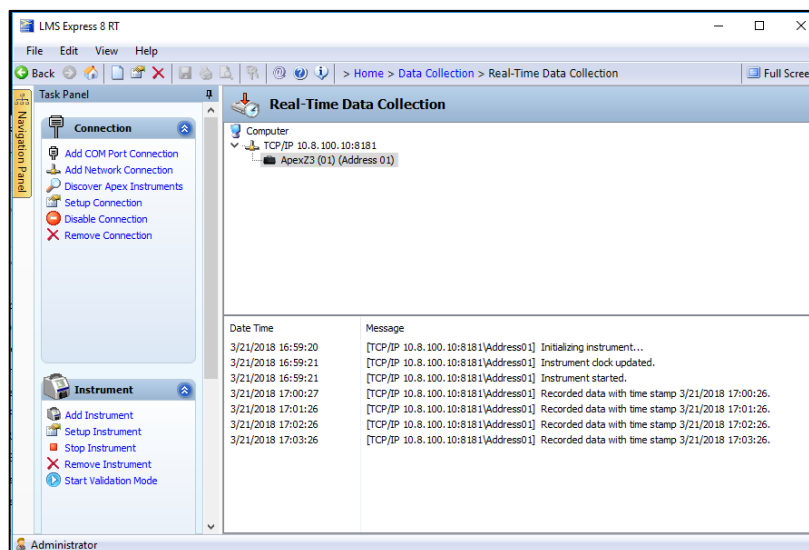


Figure 10-27 ApexZ Real Time Data Collection

- ApexZ instruments can also be added manually. See *Adding a Network Connection* and figure 10-30.

Adding a COM Port Connection

To add a new COM port, click on Add COM Port Connection on the Connection section of the Real Time Data Collection Task Panel to display the COM Port Setup window (Figure 10-28).

Enable

Select Enable COM port setup and then select Protocol Modbus from the pull down list.

Note: COM Ports that are already configured for other LMS Express devices do not appear in the list of available COM Ports.

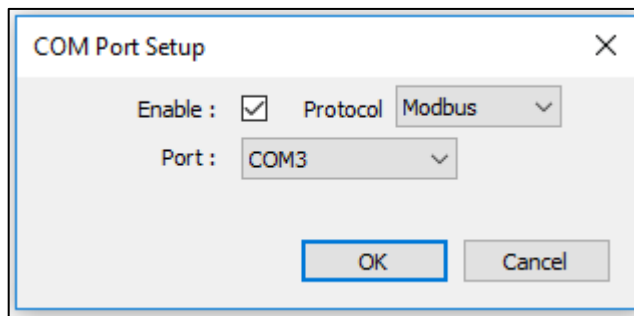


Figure 10-28 COM Port Setup window

COM Port

Select the COM Port number of the COM port the instrument(s) are connected to. Only ports currently available on the computer are displayed in the pull down list attached to the COM Port field.

OK/Cancel

Click OK to save the new COM Port or Cancel to exit the window without saving a new COM Port.

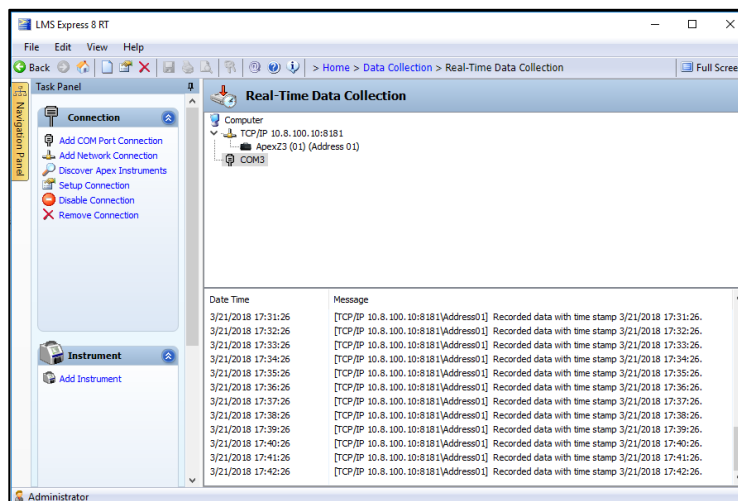


Figure 10-29 COM Port Connection

Adding a Network Connection

To add a new Network Connection, click on Add Network Connection on the Connection section of the Real Time Data Collection Task Panel and display its dialog box.

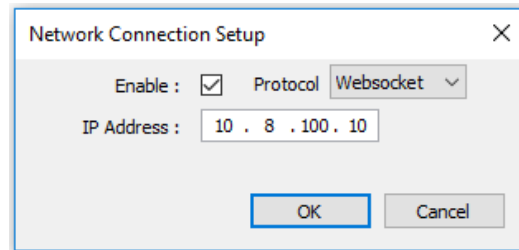


Figure 10-30 Network Connection WebSocket Setup Dialog Box

Enable

Select Enable to enable the network connection. Data cannot be collected from a disabled IP address.

Protocol

Select WebSocket for ApexZ instrument connection.
Select Modbus for all other Lighthouse sensors.

IP Address

Enter the IP address of the instrument or its network adapter.

OK/Cancel

Click OK to save the new Network Connection or Cancel to exit the window without saving.

Adding ICP DAS m7017c module connections.

To add a new ICP DAS 7017 Module Connection, click on Add Network Connection on the Connection section of the Real Time Data Collection Task Panel and display its dialog box.

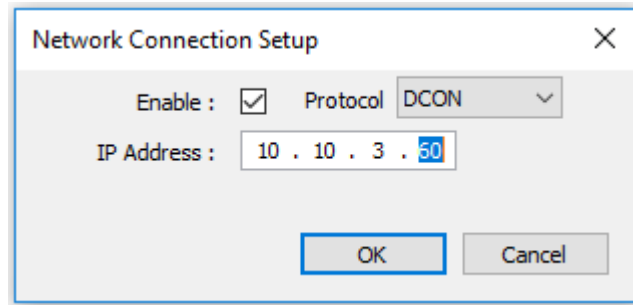


Figure 10-31 DCON Network Connection Setup

Enable

Select Enable to enable the network connection.

Protocol

Select DCON from the protocol pull down list.

IP Address

Enter the IP address of the instrument or its network adapter.

OK/Cancel

Click OK to save the new DCON Network Connection.

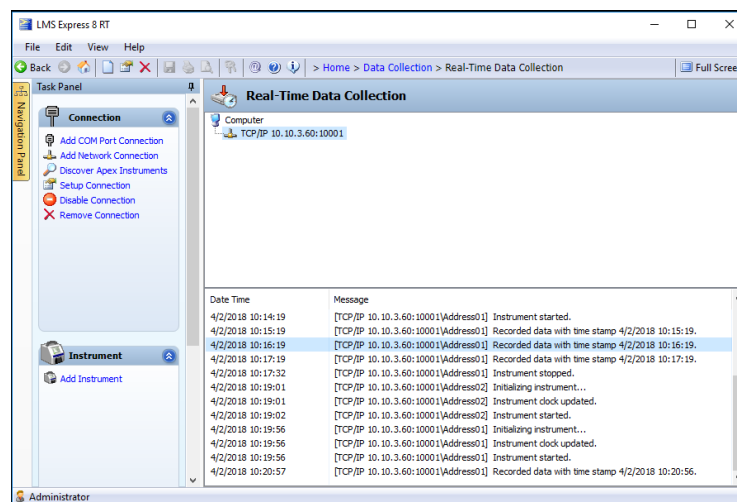


Figure 10-32 DCON Network Connection Setup

Adding ICP DAS m7017c module device

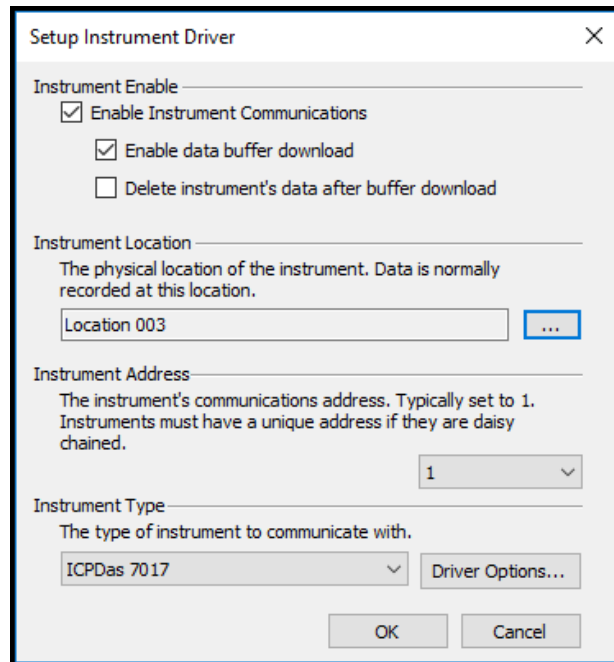


Figure 10-33 Setup Instrument Driver

Enable Instrument

When **Enable Instrument** is checked, LMS Express collects data from the instrument. If the Instrument is disabled, its icon in the Instrument Tree changes to a red X. Data is not collected from disabled instruments.

Enable Data Buffer Download

The **Enable Data Buffer Download** feature enables downloading the data records that were stored in the instrument buffer while the instrument was not connected to LMS Express (*not currently available with ICPCON devices*).

Delete Buffer Data

When **Delete instrument's data after buffer download** is checked, Express deletes the instrument buffer data after it has been downloaded. When unchecked, the data is not deleted after buffer download. This option is only available when Data Buffer Download feature is enabled.

Instrument Location

Select the **Instrument Location** by clicking the “...” button.
LMS Express supports up to 999 locations.

Instrument Address

Enter the **Instrument Address** by selecting one from the Instrument Address pull down list.

Instrument Type

The instrument type will default to “ICPDas 7017”.

Driver Options

Press the Driver Options... button to assign device channels.

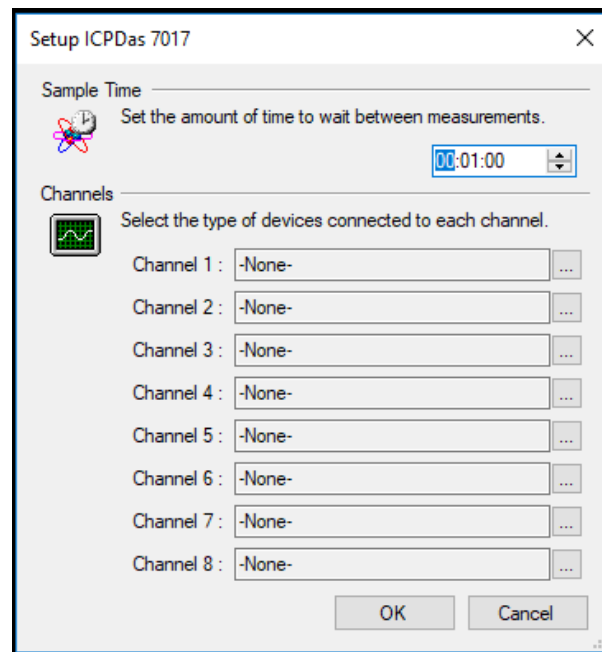
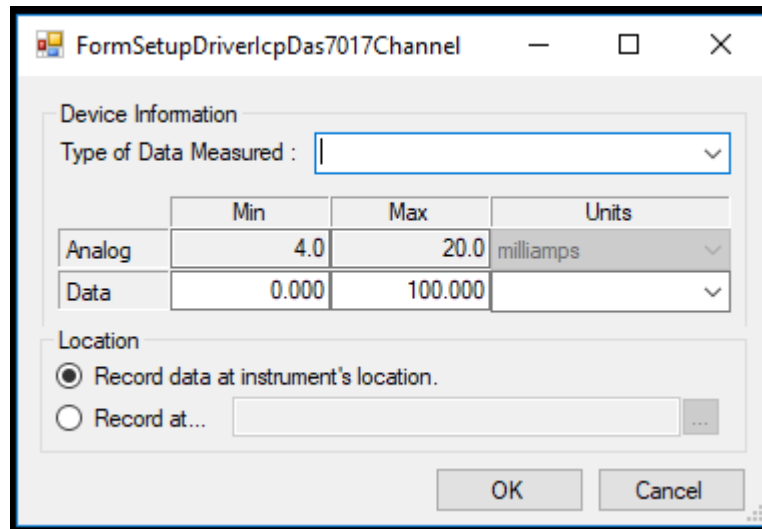


Figure 10-34 assign device channels

Press the  button to enter device information.

Setup Device Information



The screenshot shows a Windows-style dialog box titled "FormSetupDriverIcpDas7017Channel". It contains the following elements:

- Device Information** section:
 - A label "Type of Data Measured :" followed by a dropdown menu.
 - A table with columns: **Min**, **Max**, and **Units**.
- Location** section:
 - Two radio buttons: "Record data at instrument's location." (selected) and "Record at..." (unselected).
 - A text input field next to the "Record at..." radio button.
- Buttons**: "OK" and "Cancel" buttons at the bottom right.

	Min	Max	Units
Analog	4.0	20.0	milliamps
Data	0.000	100.000	

Figure 10-35 Setup Device Information

Setup 7017 attached devices

Select the type of data to be measured.

Select the range of the sensor in the data fields.

Select the units from the pull down list.

Select the location to record the data at.

Click the OK button to save the setup.

Adding ICP DAS m7045d module connections.

To add a new ICP DAS 7045 Module Connection, click on Add Network Connection on the Connection section of the Real Time Data Collection Task Panel and display its dialog box.

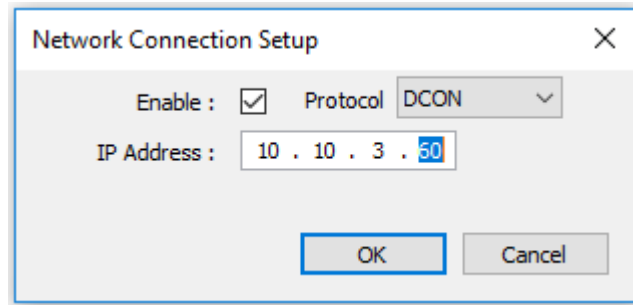


Figure 10-36 DCON Network Connection Setup

Enable

Select Enable to enable the network connection.

Protocol

Select DCON from the protocol pull down list.

IP Address

Enter the IP address of the instrument or its network adapter.

OK/Cancel

Click OK to save the new DCON Network Connection.

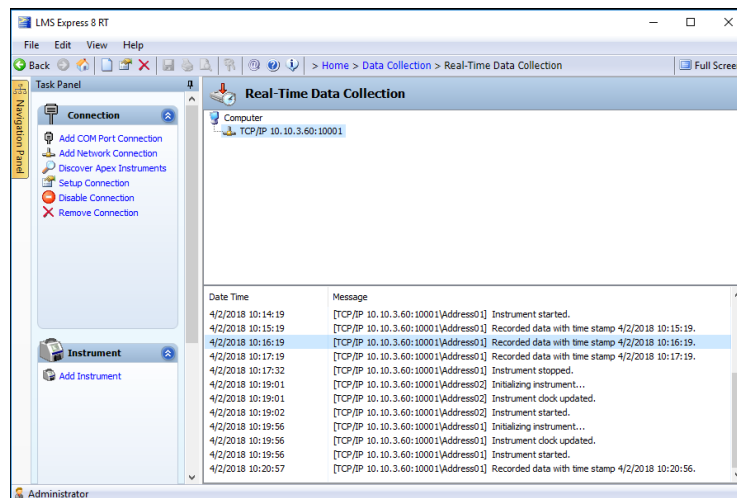


Figure 10-37 DCON Network Connection Setup

Adding a 7045 module device.

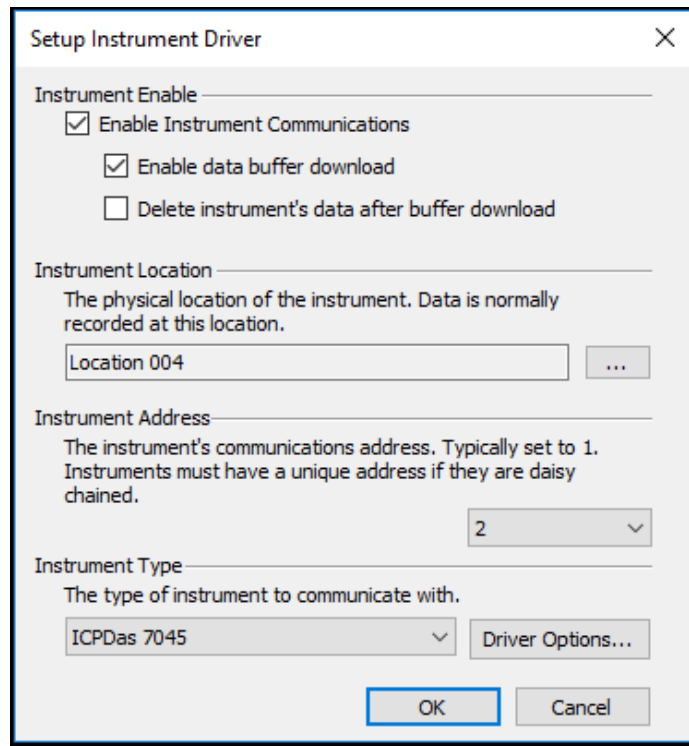


Figure 10-38 Setup Instrument Driver

Enable Instrument

When **Enable Instrument** is checked, LMS Express collects data from the instrument. If the Instrument is disabled, its icon in the Instrument Tree changes to a red X. Data is not collected from disabled instruments.

Enable Data Buffer Download

The **Enable Data Buffer Download** feature enables downloading the data records that were stored in the instrument buffer while the instrument was not connected to LMS Express.

Delete Buffer Data

When **Delete instrument's data after buffer download** is checked, Express deletes the instrument buffer data after it has been downloaded. When unchecked, the data is not deleted after buffer download. This option is only available when Data Buffer Download feature is enabled.

Instrument Location

Select the **Instrument Location** by clicking the “...” button.
LMS Express supports up to 999 locations.

Instrument Address

Enter the **Instrument Address** by selecting one from the Instrument Address pull down list.

Instrument Type

The instrument type will default to “ICPDas 7045”.

Driver Options

Press the Driver Options button to enter ICPDas 7045 device relays.

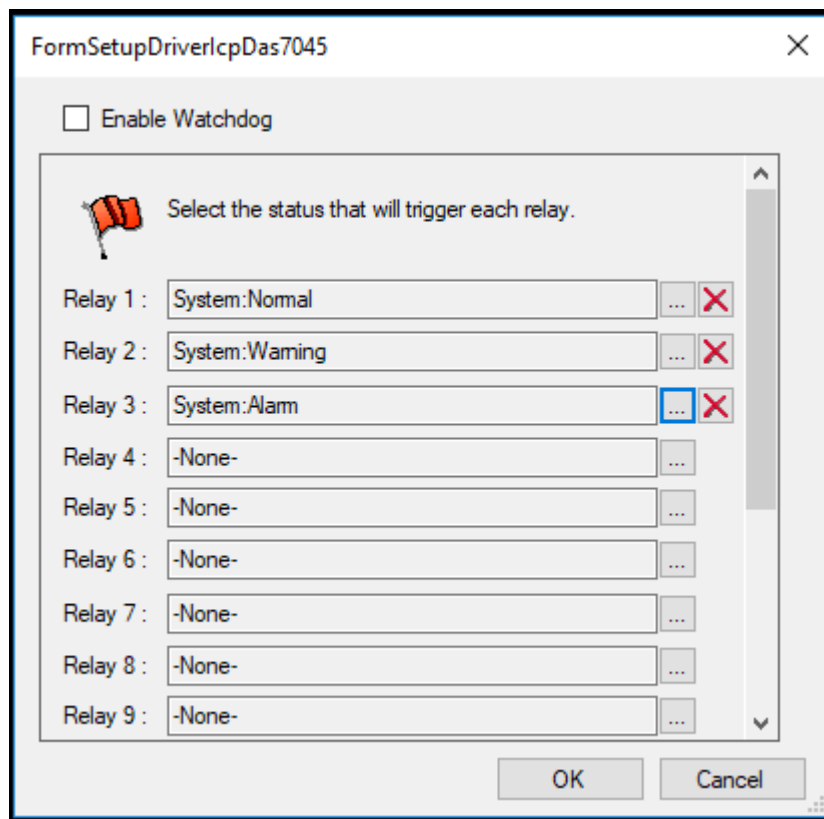


Figure 10-39 Setup Device Information

Press the  button to select the System Status.

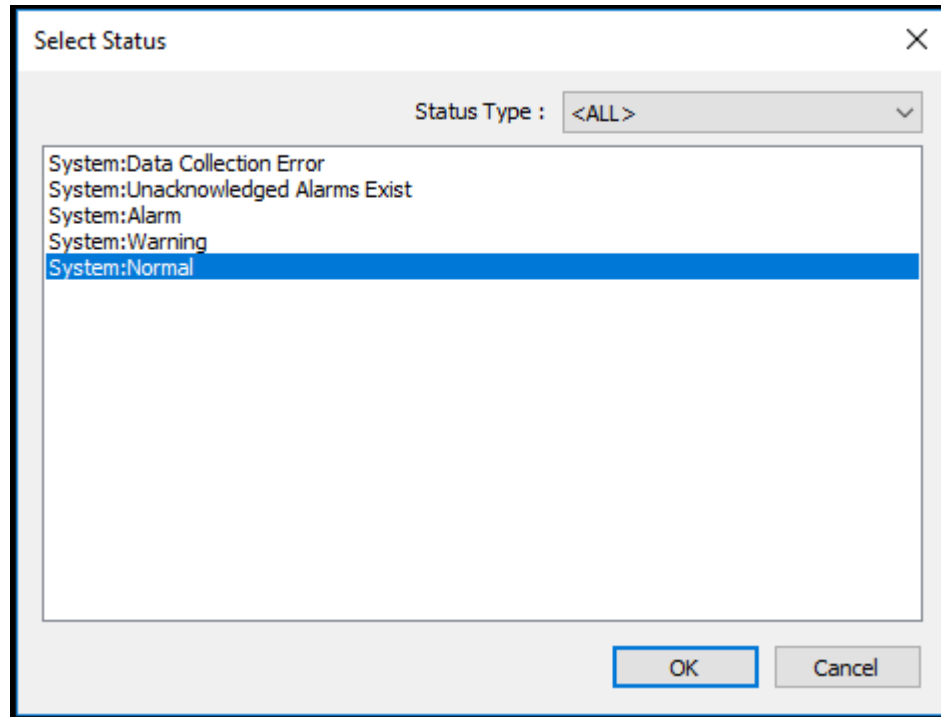


Figure 10-40 Select Status

Select Relay Status

Select the relay status and press OK to save to that relay.

Adding a Network or COM port instrument

To add a network connected instrument from the Real-Time Data Collection screen select a network connection or COM port and press “Add Instrument” from the Instrument section of the Task Panel.

In the Instrument section of the Real Time Data Collection Task Panel, click Add Instrument to display the **Setup Instrument Driver** dialog box:

Note: LMS Express overrides the sample and hold times set on the instrument.

Note: Administrators can give locations more descriptive titles than “Location 000” by renaming location(s) on the Locations View.

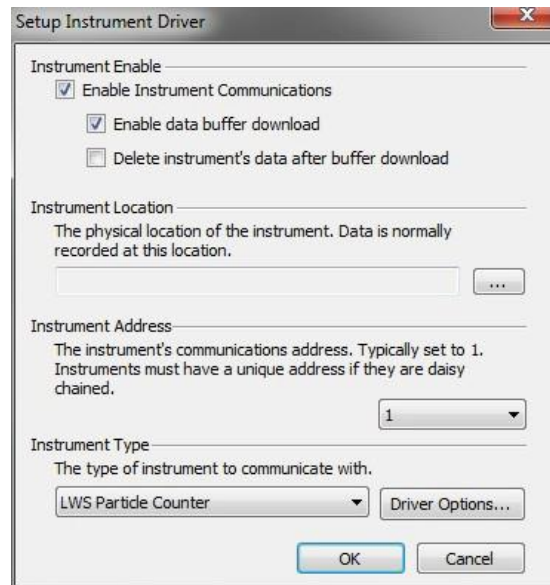


Figure 10-41 Set Up Instrument Driver

Enable Instrument

When **Enable Instrument** is checked, LMS Express collects data from the instrument. If the Instrument is disabled, its icon in the Instrument Tree changes to a red X. Data is not collected from disabled instruments.

Enable Data Buffer Download

The **Enable Data Buffer Download** feature enables downloading the data records that were stored in the instrument buffer while the instrument was not connected to LMS Express.

Delete Buffer Data

When **Delete instrument's data after buffer download** is checked, Express deletes the instrument buffer data after it has been downloaded. When unchecked, the data is not deleted after buffer download. This option is only available when Data Buffer Download feature is enabled and only for Lighthouse instruments.

Instrument Location

Select the **Instrument Location** by clicking the “...” button.
LMS Express supports up to 999 locations.

Instrument Address

Enter the **Instrument Address** by selecting one from the Instrument Address pull down list.

Instrument Type:

The instrument type will default to “ApexZ”.

Driver Options

Press the Driver Options button to enter default sample time and hold times for the instrument.

Note: The minimum sample time is 10 seconds on LWS Particle Counters drivers only, all other drivers remain at 30 seconds.

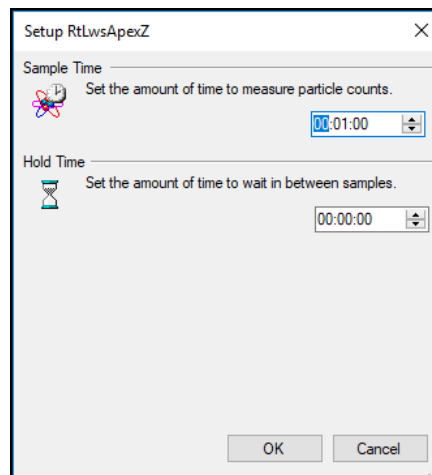


Figure 10-42 ApexZ Driver Options window

Sample Time

Enter the sample time desired. Sample time is of the format, HH:MM:SS. The default Sample Time is 1:00 (1 minute).

Hold Time

Enter the amount of time to hold between samples. The default is 00:00:00 (HH:MM:SS), i.e. not to hold between samples.

Usage Mode

LWS instruments record their location (as programmed into the instrument) with count and any optional environmental data. For example, an instrument has been set up as Location 019; all data will be "identified" with that location stamp as it is stored in the instrument's data buffer.

WARNING: Portable mode works with any particle counter and Validation mode only works with Apex particle counters.

The LMS Express software has two areas to select instrument locations that are valid for data buffer download: **Instrument Setup** window and **Admin Options, Locations**. In "default" mode, data is downloaded when the location of the data on the instrument matches the location set in the **Instrument Setup** window. When the "portable mode" is selected, the instrument's data that has been recorded using the same locations as set in **Admin Options, Locations** will be downloaded. **Admin Options, Locations** dictate which locations will be downloaded.

When an Apex is chosen and **Use the instrument as a portable or Apex** is checked, LMS Express places the instrument into portable/Apex mode. While in this mode, the software checks the **Admin Options, Locations** numbers and downloads the instrument buffer if the instrument's internal location matches any of the selected numbers in **Admin Options, Locations**. If the instrument's location does not match any location in the list, no download will take place. When the "Apex" mode is disabled, LMS Express matches the Instrument Location to the **Instrument Setup** number and downloads the data for that specific location.

Note: Validation feature works only with Apex instruments.

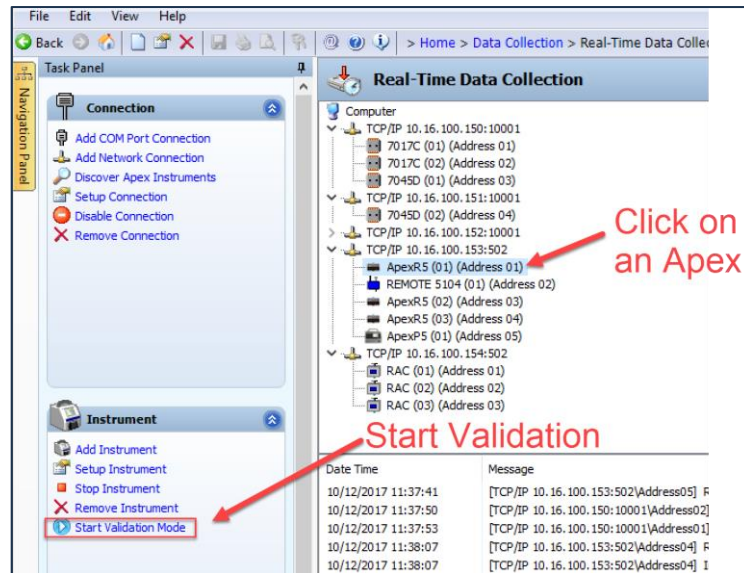


Figure 10-43 Start Validation Feature

Start Validation

Clicking an ApexR5 in the Instrument Tree followed by Start Validation (Figure 10-43), starts the feature, which flashes the Apex's Alarm LED blue and changes the Start Validation to Stop Validation. This feature helps identify the Apex with which the program is communicating and only works with Apex instruments.

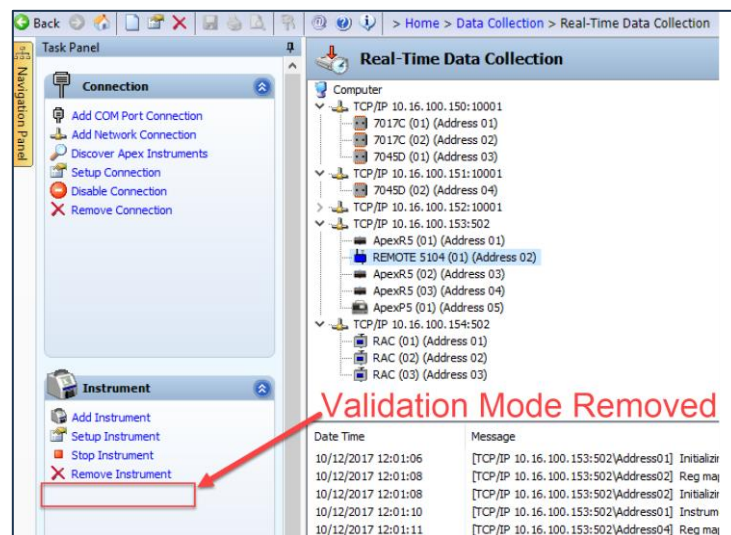


Figure 10-44 Validation Mode not Supported Screen

Validation Mode not supported

Selecting a non-Apex instrument causes the Validation Mode to be removed from view. Select an Apex counter, instead.

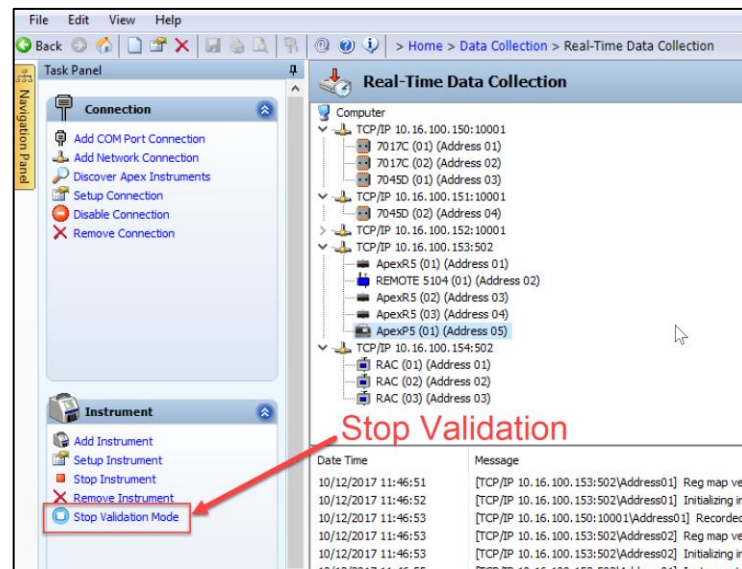


Figure 10-45 Stop Validation Feature

Stop Validation

Clicking Stop Validation (Figure 10-45) will stop the Alarm LED flashing.

One Second Data Update

Note: This feature is only supported on NanoCount, Remote 1104LD with firmware version 1.31 and greater, and Remote LPC 1.5 with firmware version 2.0 and greater instruments.

When One Second Data Update feature is checked, the software gets data from the instrument every second. Only one instrument per connection is allowed for One Second Data Update.

If there is more than one instrument that has this feature enabled, the error message shown in Figure 10-46 is displayed.



Figure 10-46 Configuration Error

LWS 32 Position Manifold Driver Options

- Select LWS 32 Position Manifold for the Instrument Type.
- Click on the Driver Options button.

Note: Sample Time, Purge Time and Manifold Sequence must be configured on the Manifold Controller itself. The Manifold Controller's Sample Time should be at least one minute.

Note: Location names are configured in LMS Express under Administrator Options.

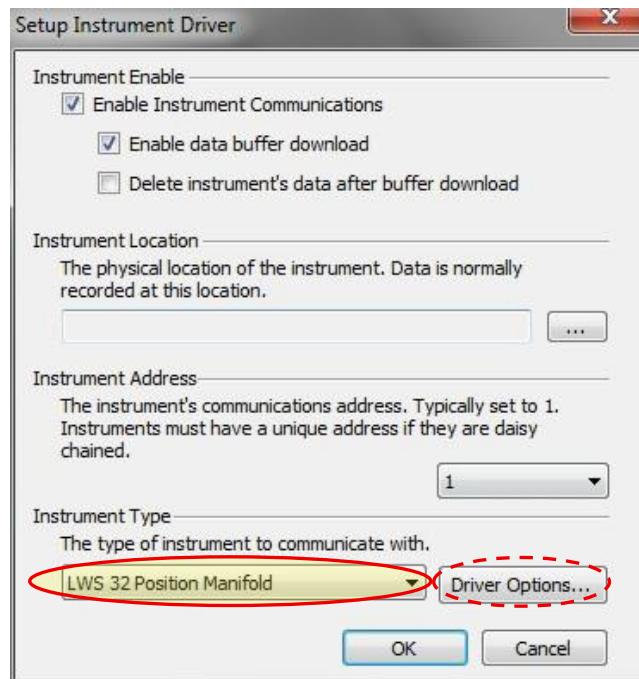


Figure 10-47 Setup 32-Position Manifold

To tie the Manifold Controller's position number to a location configured in LMS Express:

- **Select** a Position on the Setup Manifold Controller window.
- **Click** the Set Location button.
- **Select** a location for that position.
- **Click** OK to return to the Setup Manifold Controller window Figure 10-48.

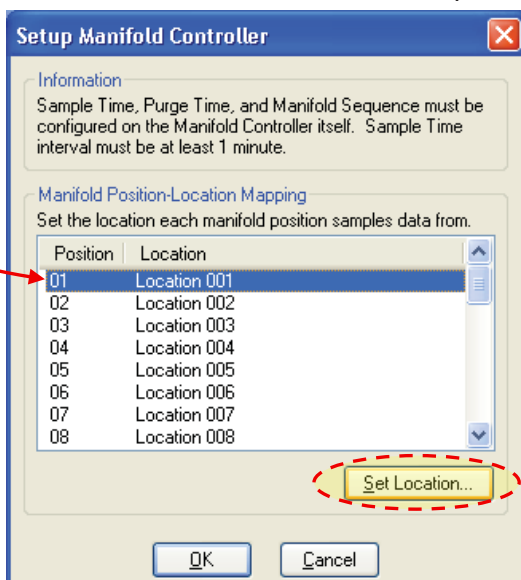


Figure 10-48 Setup Manifold Controller Position

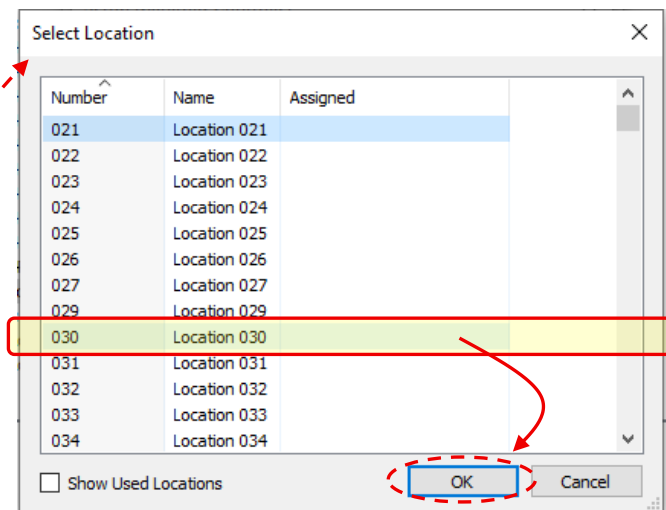


Figure 10-48b Select Location for Position

LWS Remote Active Count Driver Options

If the administrator has selected LWS Remote Active Count for instrument type, the window shown in Figure 10-60 appears when the Driver Options button is clicked.

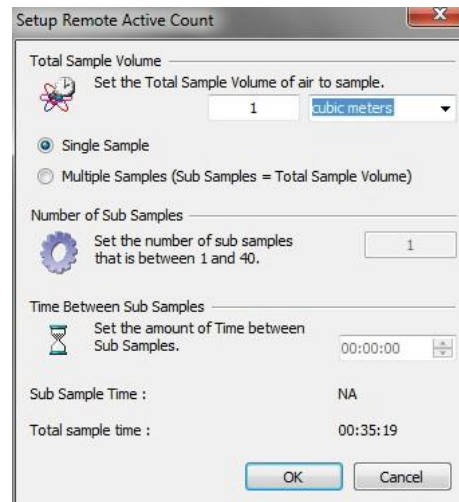


Figure 10-60 Setup Remote Active Count

On the Setup Remote Active Count window, enter the Total Sample Volume, Number of Sub Samples and Time Between Sub Samples, if Multiple Samples is selected.

- **Total Sample Volume:** Enter the total sample volume desired and select the appropriate units. The default total sample volume is 1 and units are m³.
- **Single Sample:** If single sample is selected, the options for Number of Samples and Time Between Samples are disabled.
- **Multiple Samples:** If multiple samples option is selected, the Number of Samples and Time Between Samples are enabled.
- **Time Between Sub Samples:** Enter the amount of time to hold between the samples. The default is 00:00:00 (HH:MM:SS), i.e. not to hold between the samples.
- **Number of Sub Samples:** Enter the number of cycles. The sample volume entered above will be equally shared between the number of cycles entered. The default is 1.
- **Sub Sample Time:** Software auto calculates based on the value entered in the Number of Sub Samples field. When Single Sample is selected, the sub sample time is NA.
- **Total Sample Time:** Software auto calculates based on the values entered in the Number of Sub Samples and Time Between Sub Samples fields. When Single Sample is selected, the Total Sample Time is 00:35:19.
- **OK/Cancel Buttons:** Click OK to accept the entered Sample and Hold time values or Cancel to close the Setup Remote Active Count window without saving the changes.

Modifying a COM Port, Network Connection, or Instrument

To modify existing COM Port, Network Connection, or Instrument, select the COM Port or Instrument in the Instrument Tree and click the Setup button on the toolbar. The appropriate setup window appears, allowing administrators to edit information about the COM Port, Network Connection, or Instrument.

When the administrator has finished reviewing or updating the COM Port, Network Connection or Instrument, clicking OK saves the changes and closes the window.

Disabling a COM Port, Network Connection, or Instrument

To disable a COM Port, Network Connection, or Instrument, select the COM Port or Instrument in the Instrument Tree and click Disable Connection or Stop Instrument (as appropriate) on the Real Time Data Task Panel.

After disabling a COM Port, Network Connection or Instrument, the Instrument Tree updates and the icon for the COM Port, Network Connection or Instrument includes a red X.

Deleting a COM Port, Network Connection, or Instrument

To delete a COM Port, Network Connection, or Instrument, select the item in the Instrument Tree and click the Delete toolbar button or “Remove Connection” or “Remove Instrument” from the Real Time Data Collection Task Panel.

The Instrument Tree updates, and the deleted COM Port, Network Connection, or Instrument are no longer displayed in the Instrument Tree.

Conclusion

This completes basic data Real Time Data Collection setup instructions for LMS Express. For additional information, please contact technical support at Lighthouse Worldwide Solutions.

Service and Support
Tel. 1-800-945-5905 (USA Toll Free)
Tel. 1-541-770-5905 (Outside of USA)
techsupport@golighthouse.com
www.golighthouse.com