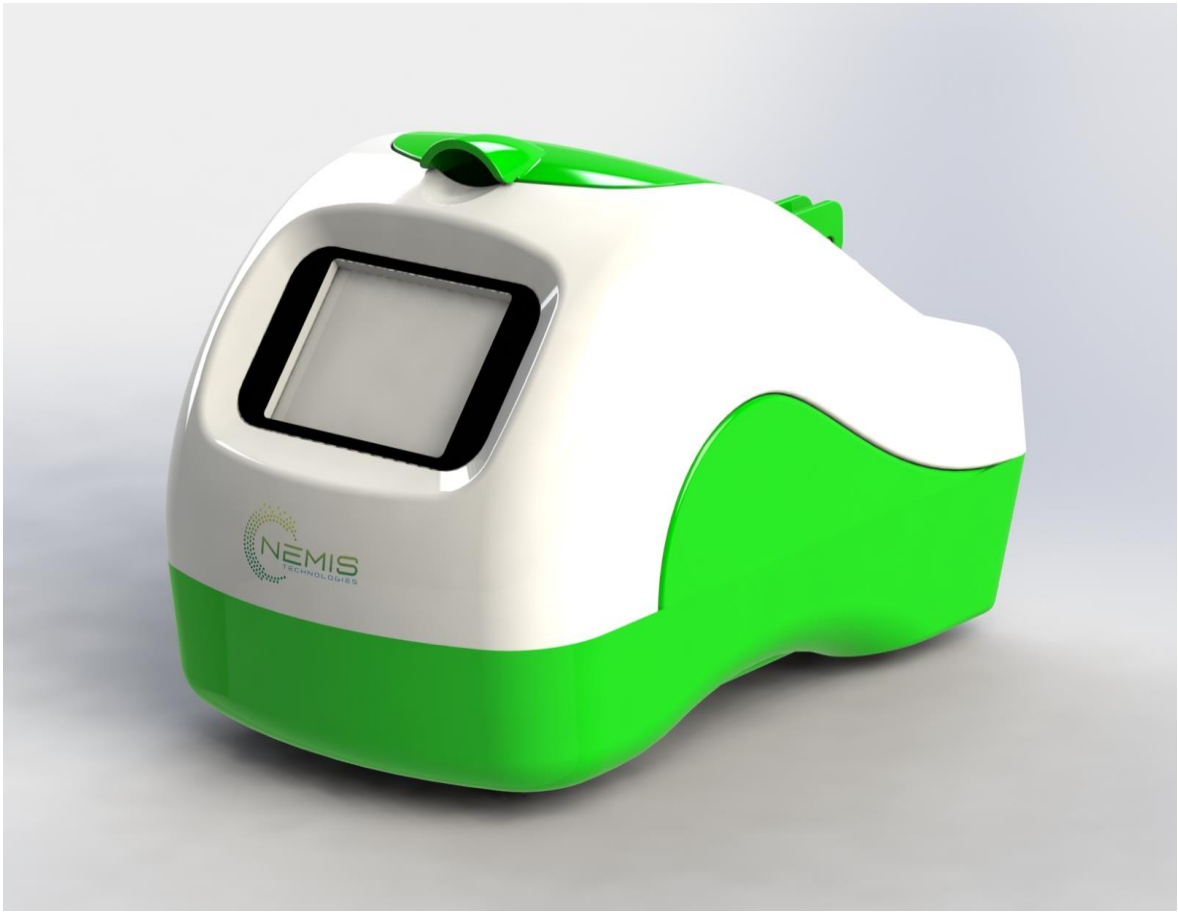
Nemis Luminometer
BTL1



Instructions for Use

NEMIS
TECHNOLOGIES

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WARNING

Please ensure that you have read and fully understood the **Safety Precautions and Limitations of Use** in Section 2 of this manual before attempting to install or operate this product.

Failure to do so could result in severe injury or may damage the unit and invalidate the product warranty.

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1 Symbols Used in this Instruction Manual

The following advisory symbols are used in this manual.

Table 1: Advisory Symbol Meanings	
 **DANGER**	Indicates a Risk of Electric Shock which could, if not avoided, result in severe injury or death.
 **DANGER**	Indicates a Risk of Explosion which could, if not avoided, result in severe injury or death.
 **WARNING**	Indicates a hazardous situation which could, if not avoided, result in severe injury or death; or severely damage the unit.
 **CAUTION**	Indicates a hazardous situation which could, if not avoided, result in minor or moderate injury; or degrade or impair the functionality of the unit.
 **CAUTION**	Indicates an Electrostatic-Sensitive Device for which care should be taken not to touch the exposed electrical contacts as this could degrade or impair the functionality of the unit.
 **CAUTION**	Indicates a possible crush hazard due to moving parts which could, if not avoided, result in minor or moderate injury.
	Advisory or other useful information.
	Refer to the Nemis Data App advanced features.
⇨ ***NN***	Refer to “Section NN” for more details.

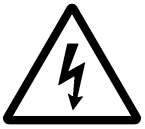
2 Safety Precautions and Limitations of Use

It is essential that all users of this equipment have fully read and understood the following safety precautions and limitations of use before installing or operating the Luminometer unit.

IMPORTANT	
 **WARNING**	The protection provided by this equipment may be impaired if it is not used in a manner described in this manual.
 **WARNING**	It is essential that the user of this equipment is aware of the potential hazards associated with the unit and its accessories. All operators should be familiar with the safety precautions and warnings given in these instructions before attempting to operate the unit. Improper use of this unit or its accessories may impair their functionality and invalidate the manufacturer's warranty.

Unit Handling Precautions	
 **CAUTION**	Care should be taken not to drop the unit or subject it to rough physical handling, both during normal use and during installation, transportation and storage. Do not use the unit if it shows any signs of damage or wear.
 **WARNING**	The unit should be held and supported in both hands when lifting or moving. Do not lift the unit by the lid. Care should be taken to avoid trapping fingers under the unit when placing it down on a solid surface.
 **CAUTION**	Care should be taken not to knock the LCD display. Do not use excessive force when pressing the touchscreen buttons or when cleaning it.

Unit Installation and Operating Environment	
 **DANGER**  **WARNING**	The Luminometer unit is designed for indoor laboratory use only. The acceptable operating temperature range is 18ºC to 38ºC, with a relative humidity of 20% to 85% non-condensing, at a maximum altitude of 2000m above sea level. If the unit is stored in conditions outside of these ranges, it must be left to stand unpowered until it has acclimatised to within these environmental limits before being powered.
 **DANGER**	Use the USB power adaptor provided with the unit. Care should be taken when powering the unit from a computer USB port or alternative USB power source.
 **WARNING**	Always ensure that the USB power cord is securely inserted into the rear of the unit. Ensure that any excess power cord does not pose a potential trip or pull hazard.
 **DANGER**	Do not operate the unit in any area which is, or has been, or is thought to have been exposed to explosive or flammable gases, vapours or liquids.
 **WARNING**	The unit must be installed and operated on a solid, stable, vibration-free and level working surface.
 **CAUTION**	For best results, the unit should be installed and operated in a stable thermal environment, out of direct sunlight and away from sources of heat or draught.

General Operating Precautions	
 **DANGER**	Ensure that the power is switched off at the mains outlet before inserting or removing the USB power cord. If a spillage occurs in or over the unit, switch the power off and unplug the USB cord at the power adaptor before attempting to deal with the spill.
 **DANGER**	The unit is intended for use with aqueous solutions only. Never use the unit with any explosive, volatile or highly reactive substances or chemicals.
 **WARNING**	To avoid liquid spills and possible cross-contamination of samples, use only the capped prescribed by Nemis Technologies. Always follow prescribed laboratory procedures and use appropriate personal protective equipment (PPE - such as gloves, clothing, goggles, etc.) when handling samples.
 **CAUTION**	The unit lid poses a possible finger crush hazard. Take care when opening and closing the lid to ensure hands, fingers and protective gloves do not get trapped. Do not insert your finger into the sample read chamber.
 **CAUTION**	The unit lid catch contains a small magnet. Avoid direct contact with any magnetic-sensitive devices or assays.
 **CAUTION**	Avoid touching the contacts of the USB port on the rear of the unit as an Electrostatic Discharge (ESD) could degrade or impair the functionality of the unit.

Unit Maintenance and Serviceability	
 **WARNING**	There are no user or operator serviceable parts inside the unit. Do not remove the unit casework. Removal of the unit's casework will void the manufacturer’s warranty.
 **DANGER**	Always disconnect the USB power cord from the unit before performing any cleaning or decontamination procedure. If liquid is spilt into or over the unit, switch off and disconnect the USB from the source before attempting to deal with the spillage.
 **CAUTION**	The use of harsh chemicals and cleaning agents may damage the unit and degrade its performance. Always follow the cleaning and decontamination procedures specified in Sections 9.1 and 9.2 of this instruction manual.

3 Regulatory Limitations of Use

Declaration of Conformity

Integrated Technologies Limited affirm that this product fulfils the essential requirements of the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU, when installed and operated in accordance with the instructions in this manual.

ELECTRICAL SAFETY
E113628

Safety Standards

- EN 61010-1:2010+A1:2019
- UL 61010-1:2012 3rd Edition (CAN/CSA C22.2 61010-1)
- MET Labs NRTL Electrical Safety – Listing No E113628

EMC Standards

- EN 61326:2013, Class A
- FCC CFR 47 Parts 15.107 and 15.109, Class A

RoHS and WEEE Directive Compliance

This product complies with the requirements of the RoHS2 Directive 2011/65/EU + Amendment EU 2015/863 for Electrical and Electronic Equipment and in accordance with BSEN 50581:2012.

Where applicable, the Luminometer unit should be disposed of in accordance with the European Union WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment.

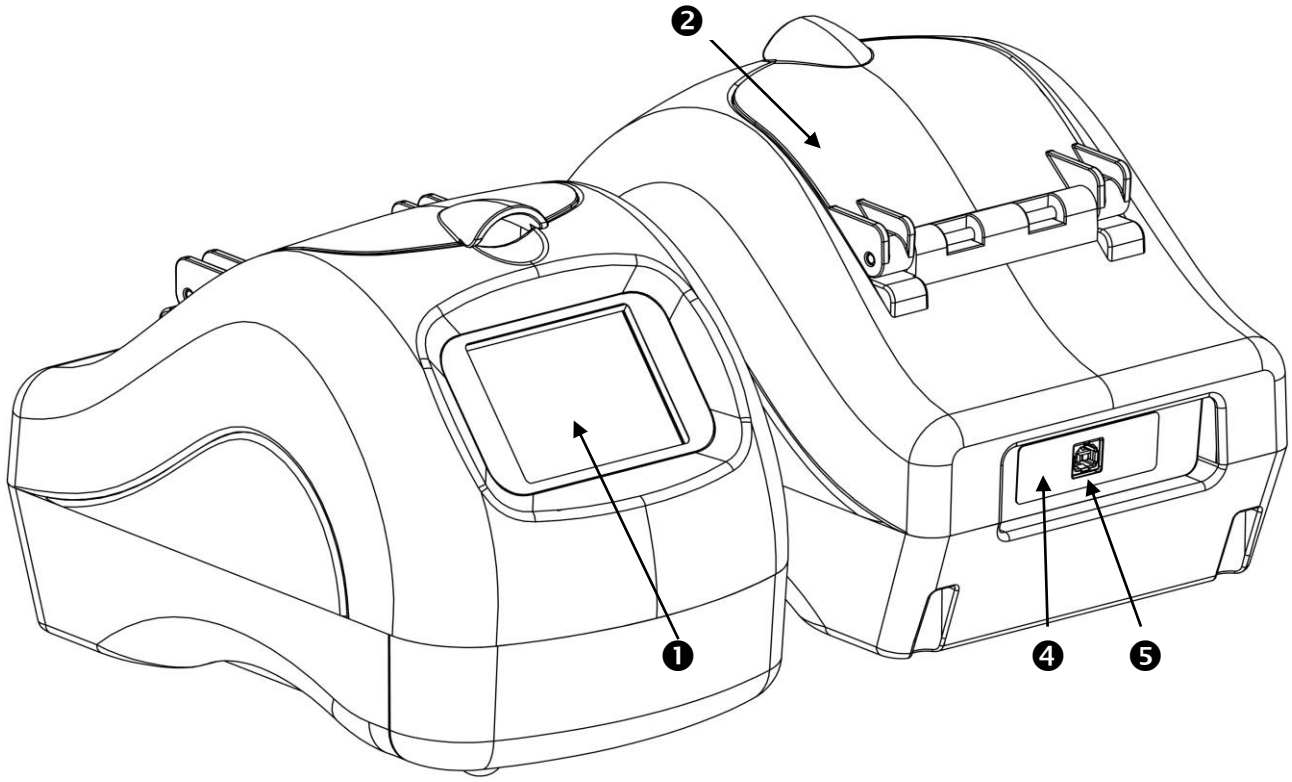
Do not dispose of this product into unsorted municipal waste or public landfill. Please refer to Section 9.4 for details of how to correctly dispose of this product.

The Luminometer unit is designed and manufactured exclusively for Nemis Technologies AG under ISO 9001 by:

Integrated Technologies Limited
Viking House, Ellingham Way, Ashford, Kent, TN23 6NF
United Kingdom

4 Luminometer Unit Description

The Nemis Technologies BTL1 is a Benchtop Luminometer Unit, and has the following external and internal features:



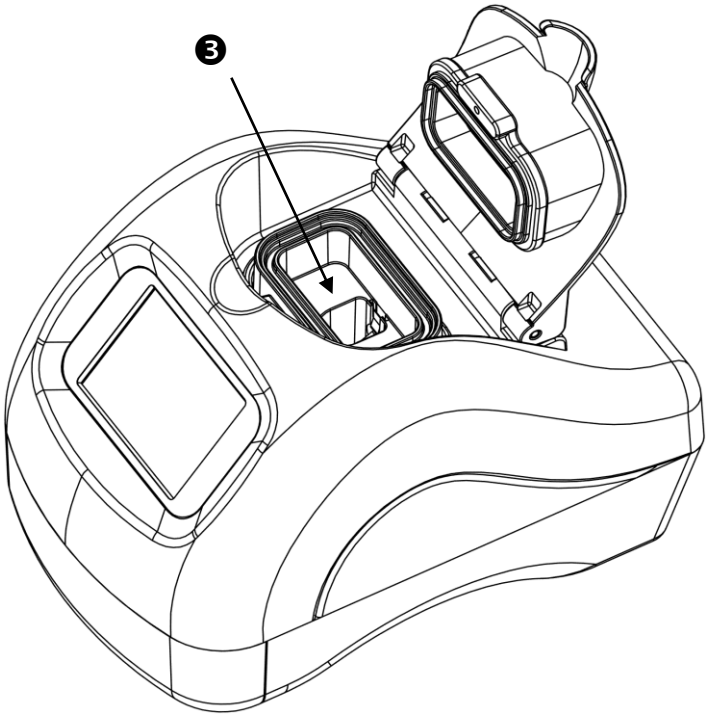
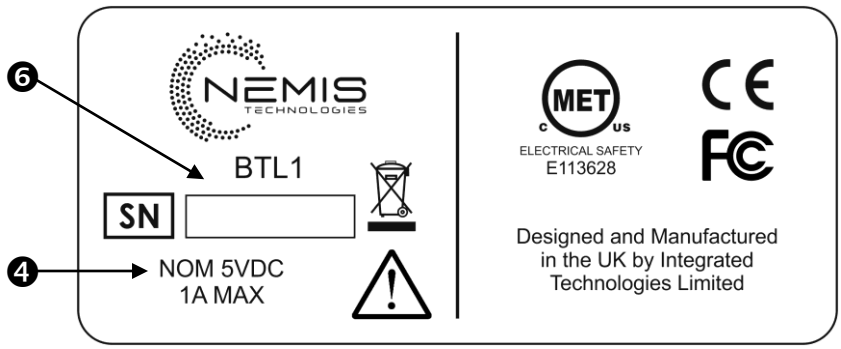
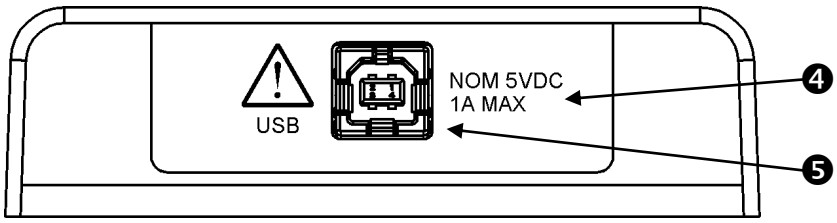


Table 2: Unit Features		
❶	LCD Touchscreen User Interface	⇨ *6.1*
❷	Unit Lid	⇨ *6.4*
❸	Sample Read Chamber	⇨ *6.4.3*
❹	Voltage and Power Ratings	⇨ *11*
❺	USB Power Inlet	⇨ *5*
❻	Unit Label and Serial Number	⇨ *Below*

The unit label is located on the underside of the unit and provides the unit serial number, and voltage and power ratings.

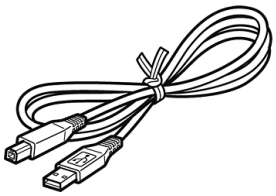


There is also a label surrounding the USB Power Inlet at the rear of the unit which provides the voltage and power ratings.



Refer to Section 11 for Luminometer Technical Specification.

The unit is supplied with the following accessories:

Table 3: Unit Accessories		
	AC/DC USB Power Adaptor	⇨ *6.2*
	USB Power Cable	⇨ *6.2* ⇨ *11*
	**Nemis Data App** Installation Flash Drive	⇨ *7*
	BTL1 Instructions for Use	⇨ *1*

5 Luminometer Unit Installation

Before installing the Luminometer unit, please check that the delivery is complete (see Table 3) and that the unit and all accessory parts are intact and free from any signs of transportation damage. Also ensure that all external and internal packaging has been removed from the unit before installation.

Please retain all packaging for future transportation and storage of the unit and its accessories.

The Luminometer unit should be installed in a location which meets the following requirements:

- Safe and suitable operating environment (see Section 2)
- Solid, stable, vibration-free and level working surface
- At least 10cm clearance around the unit to adjacent objects and walls
- Out of direct sunlight and away from sources of heat or draught

WARNING

Please also observe and abide by the **Unit Installation and Operating Environment** safety precautions and preconditions listed in Section 2 of this manual.

Note: When the unit is initially powered, or if it has been left in storage or unpowered for several months, the internal real-time clock battery will need recharging.

Please leave the unit powered for at least 2 hours (preferably 8 hours) to recharge the battery.

Please refer to Section 7.1 for details on installing the associated Luminometer Windows Application.

6 Basic Unit Operation

WARNING

Please ensure that you have read and fully understood all of the **Safety Precautions and Limitations of Use** listed in Section 2 before attempting to operate the Luminometer unit.

6.1 User Display and Controls

The unit's user interface consists of a colour LCD touch screen display. The menu structure is divided into two sections as shown below.



Function and Option buttons

The above screen shows the **Home** screen menu buttons, which provide the following functionality.

Table 4: Home Menu Button Functions		
	Select active **User ID**	⇨ *6.3*
	Select **Protocol** and perform **Reading**	⇨ *6.4*
	View the Test Results **Database**	⇨ *6.6*
	Enter unit **Settings** menu	⇨ *6.7*
	Unit **Standby** and **Wakeup** modes	⇨ *6.8*

Below is a list of other menu and data list navigation buttons and their functions.

Table 5: Navigation Button Functions		
	**Accept** or **Cancel** option	⇨ *6.7*
	Return to **Home** screen menu	⇨ *6.1*
	Return to **Protocols** list	⇨ *6.4.1*
	**Edit** Sample ID	⇨ *6.4*
	**Start** Test	⇨ *6.4.4*
	Next Test	⇨ *6.4.4*
	Open test result **Details**	⇨ *6.6*
	Jump to **Top** or **Bottom** of data list	⇨ *6.6*
	Move **Up** and **Down** data list or **Increase** and **Decrease** settings value	⇨ *6.6*
	Exit to **Previous** menu	⇨
	Move to **Next** value	⇨ *6.7*

Other function-specific button icons are explained in Sections 6.3 to 6.8.

There are also various status and prompt symbols that may appear in the main screen area, as detailed in Table 6 below.

Table 6: Status and Prompt Symbols		
	Prompt: **Open Lid**	⇨ *6.4.3*
	Prompt: **Insert** sample tube	⇨ *6.4.3*
	Status: **Tube Inserted** correctly	⇨ *6.4.3*
	Prompt: **Close Lid**	⇨ *6.4.3*
	Status: Ready to **Start**	⇨ *6.4.3*
	Prompt: **Remove** sample tube	⇨ *6.4.3*

When the lid is open, the unit also periodically beeps to prompt the user to close the lid as soon as possible.

Note: For optimum reader performance, the lid should always be kept closed when not inserting or removing a sample tube.

Please refer to Section 7 for additional buttons and symbols which relate to specific Nemis Data App features.

6.2 Powering-up the Luminometer Unit

The Luminometer unit is powered via a standard USB cable, from the supplied AC/DC USB Power Adaptor, or from a USB port on a desktop or laptop computer.

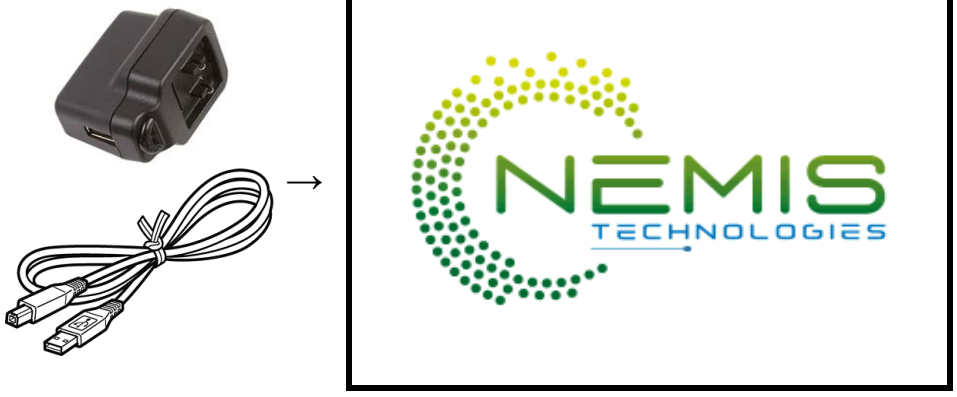


AC/DC USB Adaptor (Supplied) **Computer USB Port or Powered Hub**

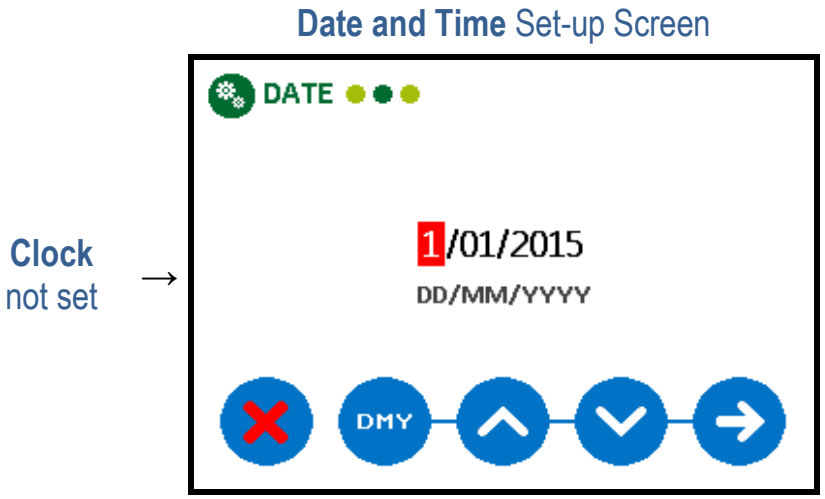
Plug the supplied USB Cable into the Luminometer Unit and then into the power source, and (if necessary) switch on the power source.

The Luminometer unit LCD will light-up and display the power-up progress screen whilst the internal data memory is checked and the reader initialised.

Power-up Screen



Once complete, if the real-time Clock requires setting, the Date and Time set-up screen will be displayed. Refer to Section 6.7.1 for details of how to set the date and time.

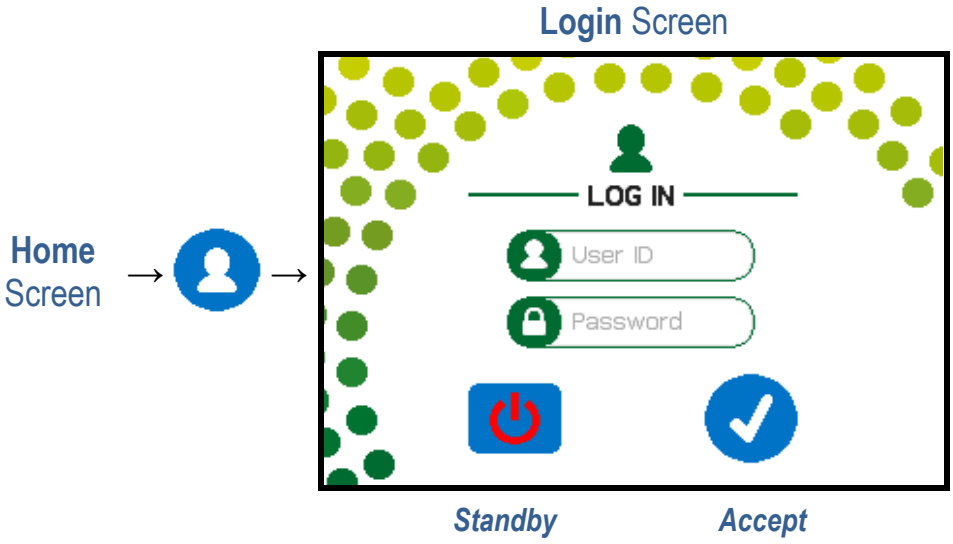


Next the User Login screen will appear, as detailed in Section 6.3 below.

Forced User Login after Power-up can be disabled; in which case the Home screen will be displayed instead (see Section 6.5). Please refer to Section 7.8.2 of the Nemis Data App for User Login options.

6.3 User Login

The **User ID** function allows Test Results to be logged against a specific user. To change the User ID, press the **Login** button on the **Home** screen.



To change User ID, press the **User ID** input box and the QWERTY keyboard will appear. Enter the User ID and press the **Accept** button.



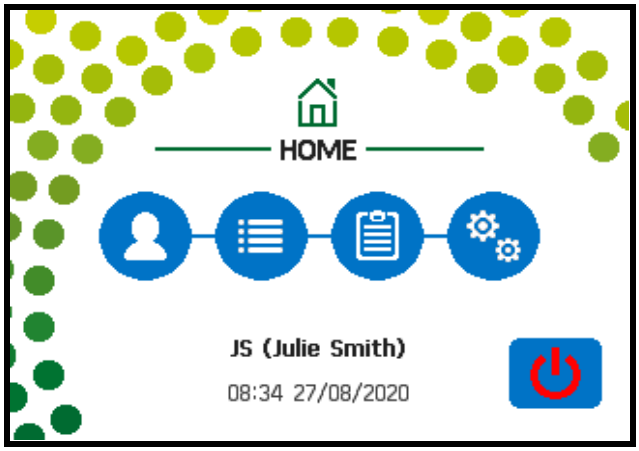
If the User ID is password protected (see Section 7.6), press the **Password** input box, enter the password and press **Accept**.



The unit remembers the most recently logged-in User ID and selects this user when the unit is next powered up, automatically bringing up the **Login** screen if a password is required.

Additional User IDs can only be added and edited via the Nemis Data App. See Section 7.6 for details.

The active **User ID** and **Name** are displayed on the **Home** screen.



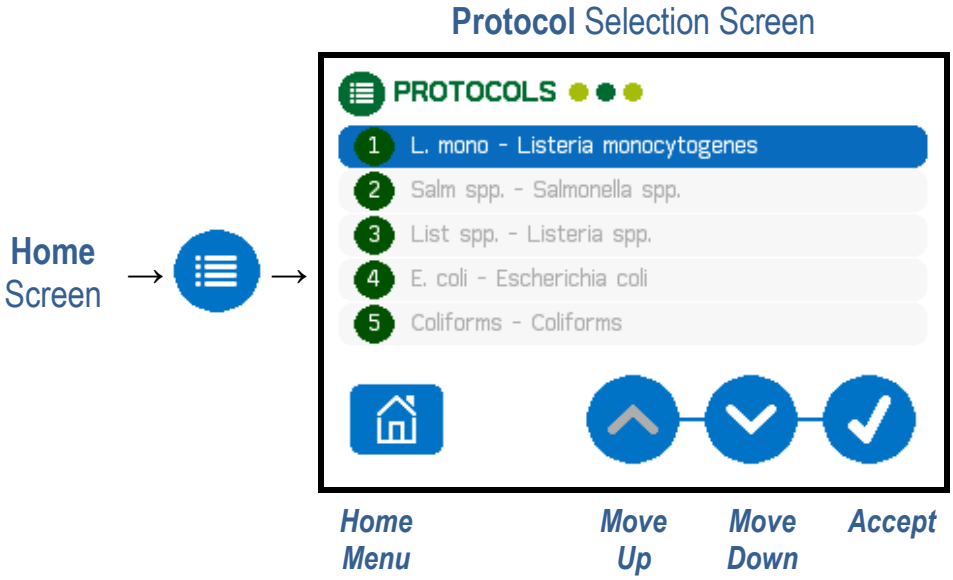
Note: By default, the unit is set-up to automatically logout the user after 15 minutes of inactivity. This timeout period can be changed or disabled via the Nemis Data App. See Section 7.8.2 for details.

6.4 Selecting a Protocol and Performing a Reading

Once the **User ID** has been selected, the sample measurement **Protocol** can be selected so that a sample test can be performed.

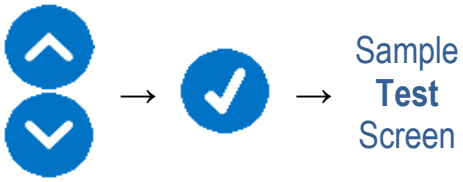
6.4.1 Selecting a Protocol

The Protocol function allows the user to select the appropriate measurement protocol for the test about to be performed. To select the measurement Protocol, press the **Protocols** button from the **Home** screen.



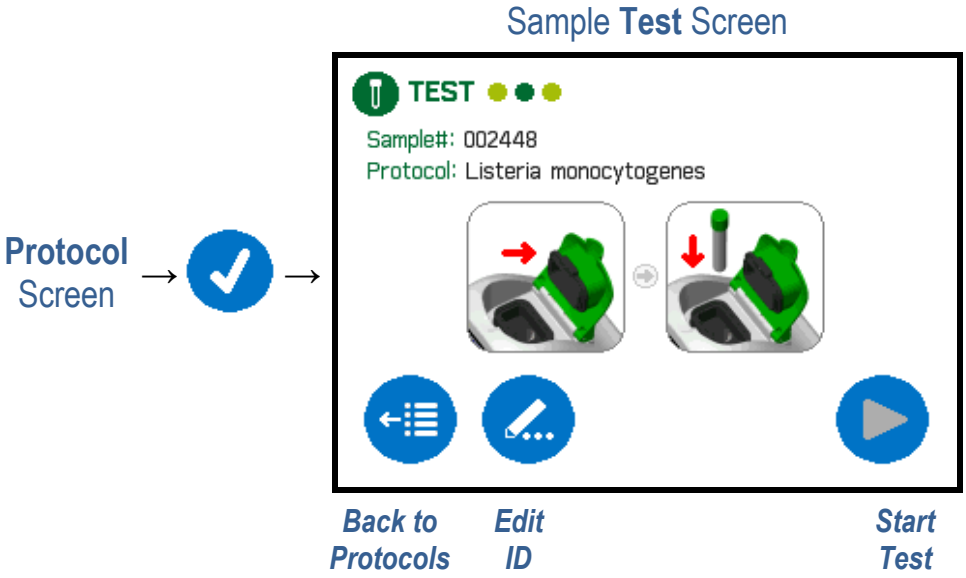
The **Protocols** screen contains a list of the range of Nemis Technologies' bacteria detection tests and protocols. Some protocols may not yet be available and are therefore greyed-out and disabled.

Use the **Up** and **Down** buttons to select the required Protocol, then press the **Accept** button to start the testing procedure.



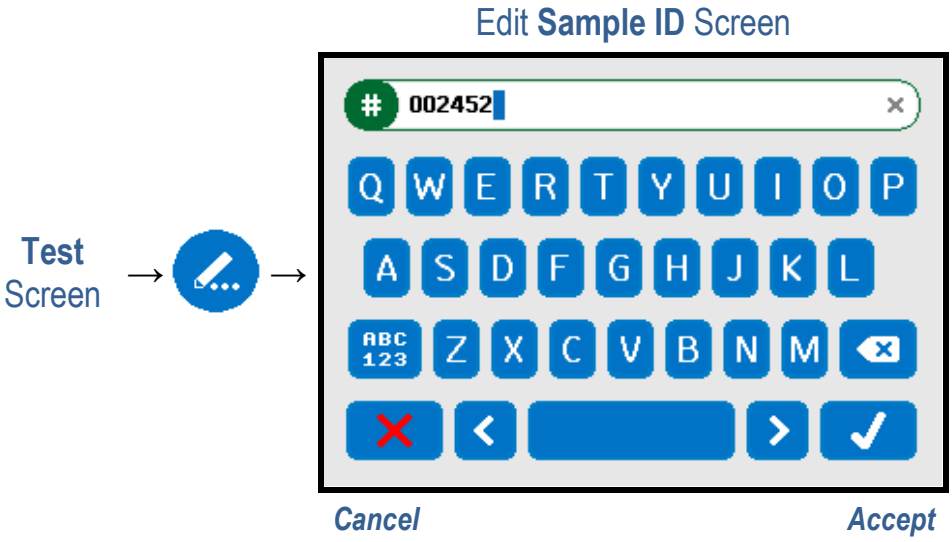
6.4.2 Editing the Sample ID

The **Sample#** at the top of the **Test** screen shows the unique **Sample ID** assigned to the test result. The selected **Protocol** is displayed below this.



The default Sample ID allocation is a sequential numerical ID, however other Sample ID options can be selected from the unit **Settings** menu (see Section 6.7.3 for details).

If required, the Sample ID can be edited by pressing the **Edit** button.



Using the keyboard, the Sample ID can be entered or edited. Once the desired ID has been entered, press the **Accept** button to continue or the **Cancel** button to undo and return to the **Test** screen.

Edit **Sample ID** Screen → *Edit Sample ID* → ✓ → Sample **Test** Screen

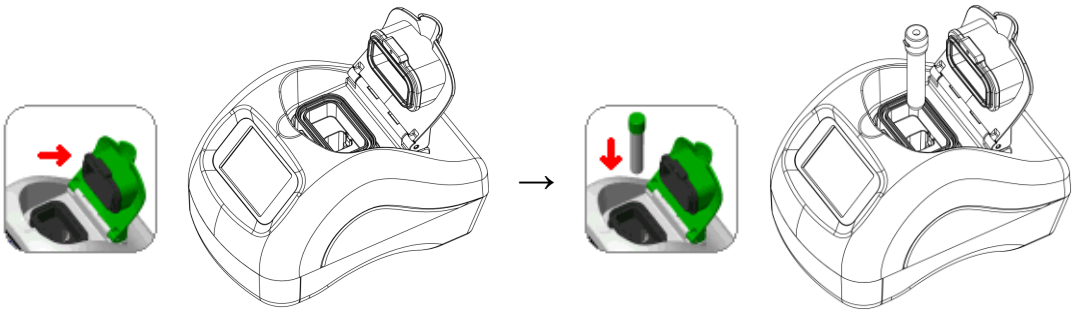
→ *No edit required* → ✗ → Sample **Test** Screen

If the unit has been set-up to have no automatic Sample ID (see Section 6.7.3) the QWERTY keyboard will automatically appear as soon as the procedure test begins.

A barcode scanner can also be used to enter the Sample ID. Refer to Section 7.5 for details on the **Barcode Pass-through Function** of the Lu-mini App.

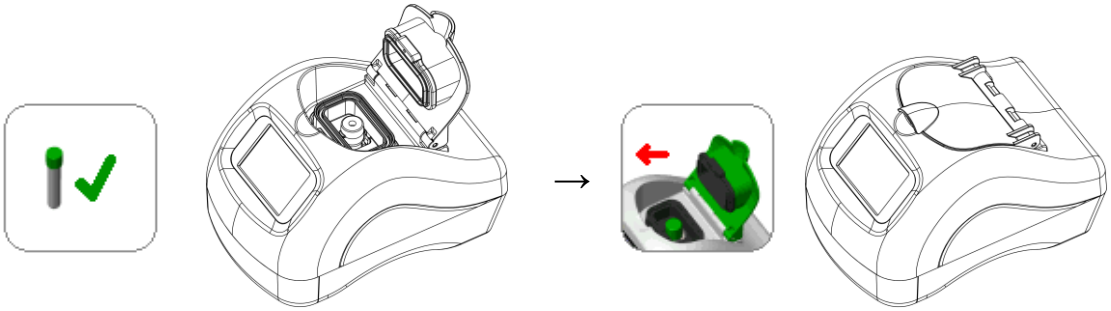
6.4.3 Sample Tube Insertion

Once the **Sample ID** has been set (see Section 6.4.2), insert the test sample tube into the sample read chamber, as detailed below.



Open Lid Insert Sample Tube

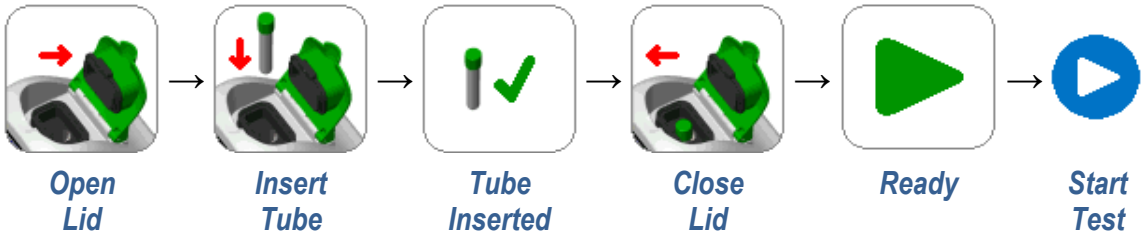
Ensure that the sample tube is fully pushed down into sample chamber so that the bottom of the tube is touching the bottom of the read chamber.



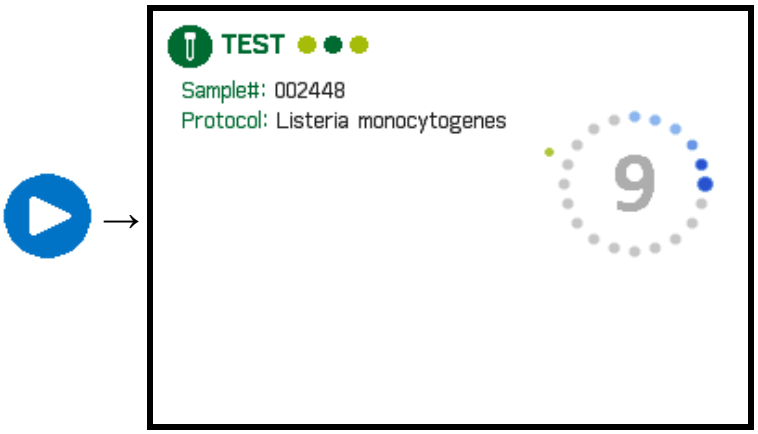
Ensure Tube Fully Inserted Close Lid

6.4.4 Performing a Sample Reading

Once the sample tube has been inserted into the unit and the lid closed (see Section 6.4.3 above), press the **Start** button to start the reading.

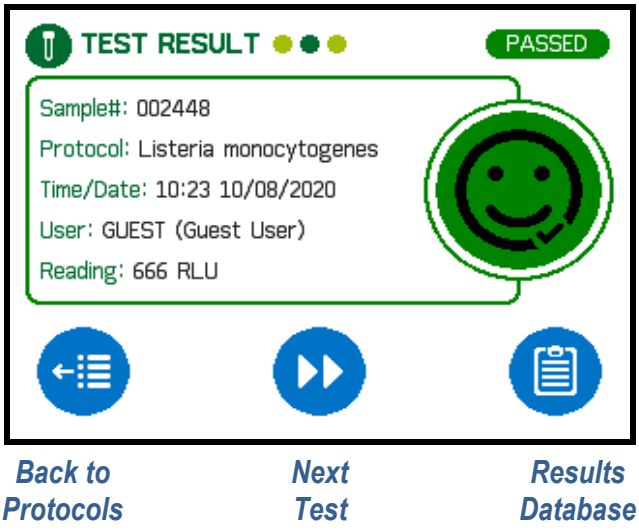


The measurement countdown begins.



At the end of the countdown period the test result is displayed on the **Test Result** screen.

Test Result Screen



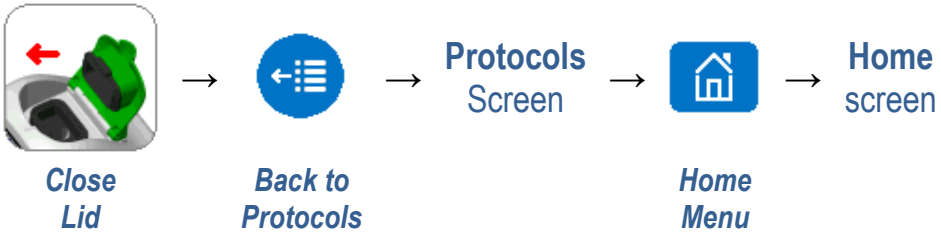
The user can now either remove the tube and perform another sample test, or view the Test Results Database (Section 6.6)

To perform another sample test or return to the **Home** menu screen, open the unit lid and remove the sample tube.



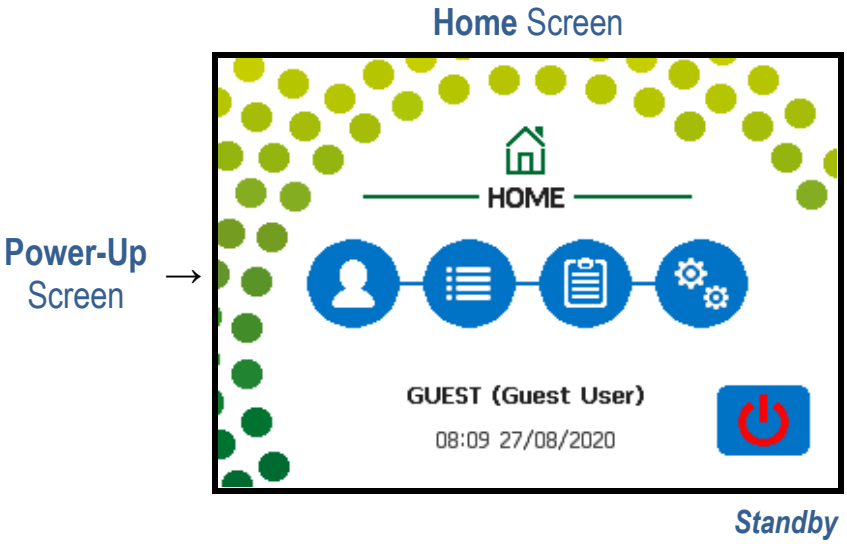
The sample **Test** screen will then appear. To perform another test, follow the visual prompts in the middle of the screen as detailed in Sections 6.4.2 thru 6.4.4 above.

Otherwise, to return to the **Home** screen, remove the tube and press the **Exit** button to return to the **Protocol** screen, and then press the **Home** button.



6.5 Home Screen Menu Options

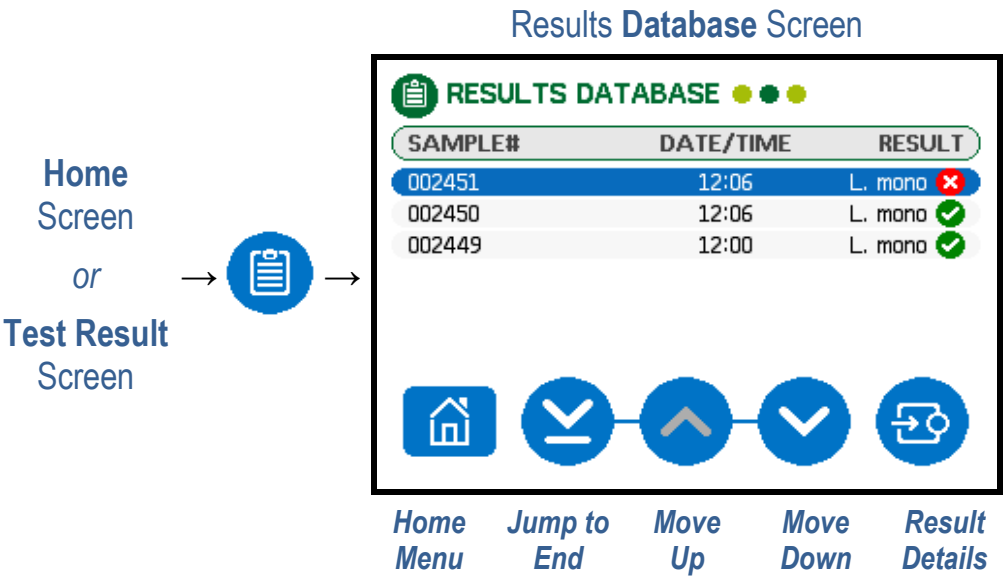
The **Home** screen provides the main menu options, as described in Section 6.1 above.



The current time and date are displayed on the **Home** screen as a visual check that they are correctly set. This is important as the time and date are required for the **Read** and **Results** options to function correctly.

6.6 Viewing the Test Results Database

The test results **Database** is where all the test results are stored and can be accessed either from the **Home** screen or **Test Result** screen. To view the database, press the **Results** button.



The **Database** screen displays a list of all the test results that have been completed. Results are listed in date/time order with the most recent result at the top of the list. For tests performed today, the test time is shown; otherwise the test date is displayed.

The **Up** and **Down** buttons can be used to scroll up and down the list one test at a time or alternatively use the **Top** or **End** button to quickly jump to the top or bottom of a long list of results.

When a result is highlighted, the **Details** button can be used to view the full-size Result screen for that specific result.

Database Screen → → **Test Result** Screen *(for highlighted result)*

Press the **Results** button to return to the Database screen.

Test Result Screen → → **Database** Screen

6.6.1 Deleting Test Results from the Luminometer Database

Test results cannot be directly deleted from the Luminometer's Results **Database**. When the database is full, the oldest result is automatically overwritten.

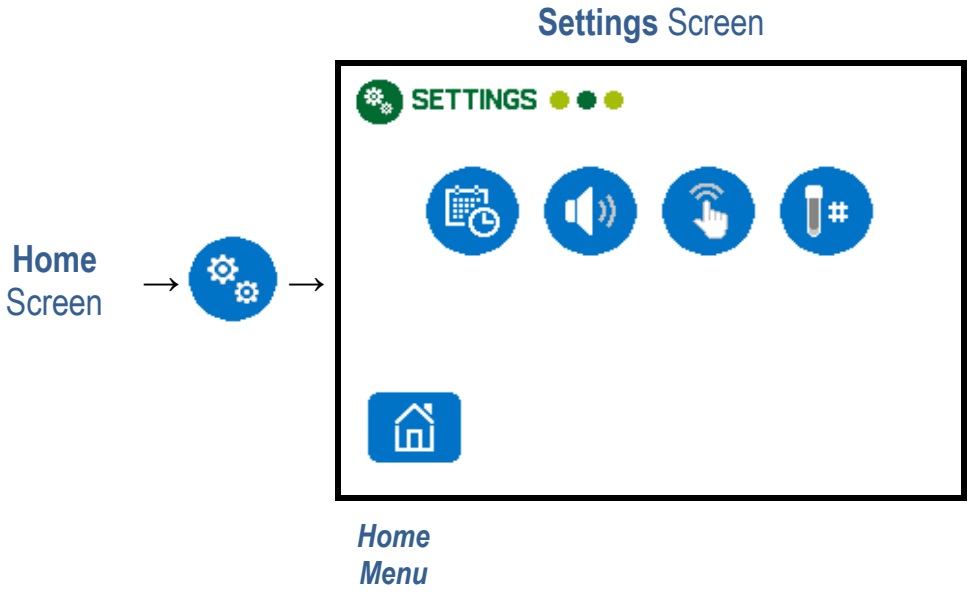


Results can only be deleted from the unit via the Nemis Data App. See Section 7.4.1 for details.

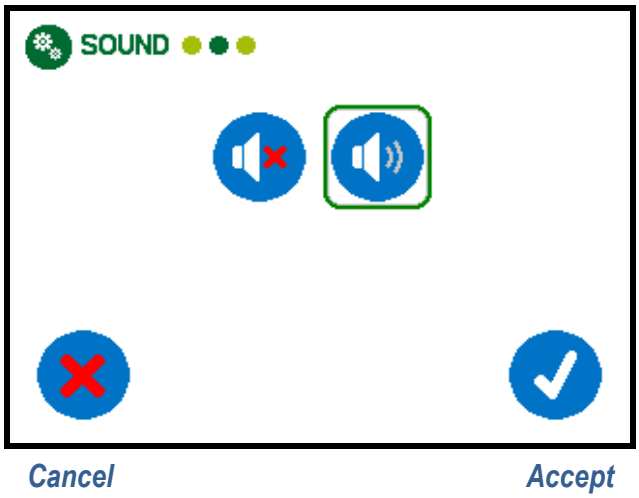
6.7 Unit Set-up Options

The unit **Settings** menu provides options for customising the unit's behaviour, and shows the current state of the settings.

Press the **Settings** button from the **Home** screen to view the **Settings** menu.



To change a setting, press the associated option button in the middle of the screen, then select a new value (designated by the green ring) and press the **Accept** button to save the new setting.

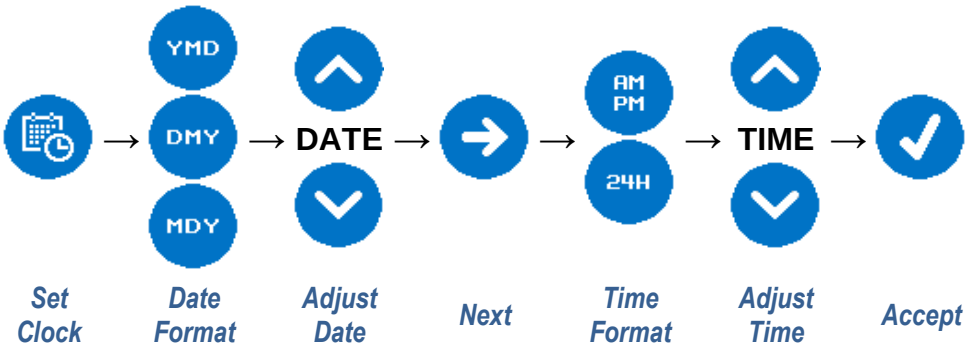


The available options are summarised in Table 7 and described in the more detail in the following sub-sections.

Table 7: Unit Set-up Options				
Set clock and Date/Time formats	 *Year/Month/Day*	 *Day/Month/Year*	 *Month/Day/Year*	⇨ *6.7.1*
	 *AM/PM*	 *24 Hour*		
Beeper volume	 *No Sound*	 *Sound*		⇨ *6.7.2*
Touchscreen button click volume	 *No Click*	 *Click*		⇨ *6.7.2*
Sample ID auto-text	 *Edit Prefix*			⇨ *6.7.3*
	 *None*	 *Auto Number*	 *Daily Number*	

6.7.1 Setting the Clock and Date/Time Formats

The clock option allows the unit date and time to be changed, as well as the date and time formats (as listed in Table 7).



If using the Nemis Data App, the date and time can be automatically set and synchronised with the computer's clock. This will also set the date and time formats. See Section 7.8.3 for details.

Note: The Luminometer Unit does not automatically handle Daylight Saving changes. This must be done manually by the users, or by the Nemis Data App (as per Section 7.8.3).

6.7.2 Beeper and Button Click Volume

The unit beeper sounds at the end of each sample measurement. This can be muted if required.

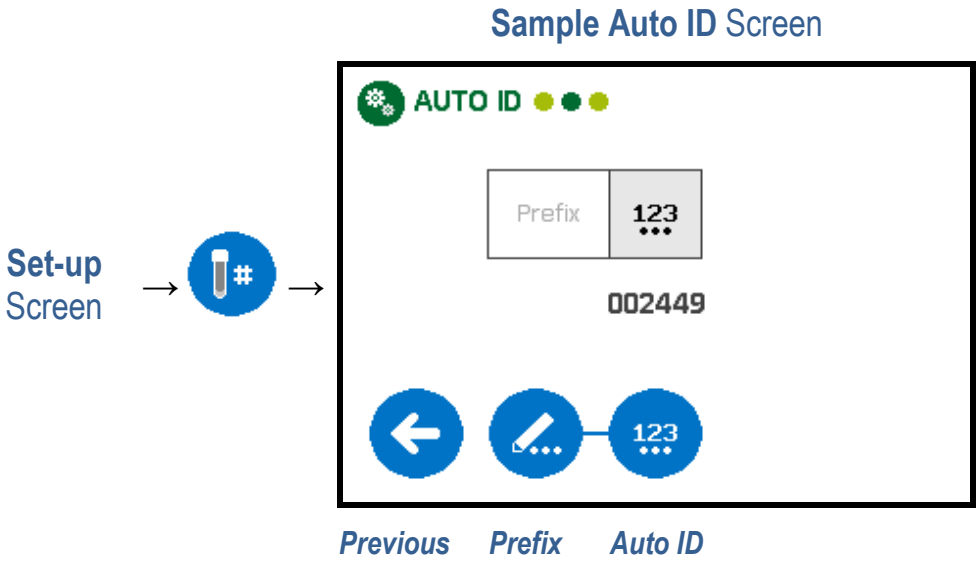


Likewise, the LCD touch screen button click can be independently set to silent if desired.



6.7.3 Defining the Automatic Sample ID Text Format

The Sample ID text format can be edited as required using the sample ID editor function. From the **Set-up** menu select the sample **Auto ID** button.

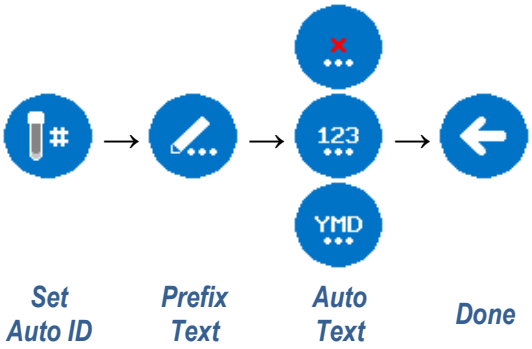


By default, the Sample ID is set to sequential numeric ID with no prefix. All the available options for ID editing are detailed in Table 8.

Table 8: Automatic Sample ID Buttons		
	Edit **Prefix** Text (0 to 6 characters)	*ABCDEF*
	No **Automatic ID**	
	Sequential **Numeric** ID (6 digits)	*123456*
	Daily Sequential ID (10 digits)	*YYMMDD-123*

The Sample ID can be a maximum of 16 characters long i.e. if set to Daily Sequential ID with a 6-character prefix.

Press the appropriate buttons to set the sample ID as required.



Note: It is possible to have no automatic ID and no prefix set. In this case, when a sample Test is performed, the unit automatically prompts to user to manually enter the Sample ID by displaying the QWERTY keyboard. A sample ID must be given to the sample before a test can be performed.

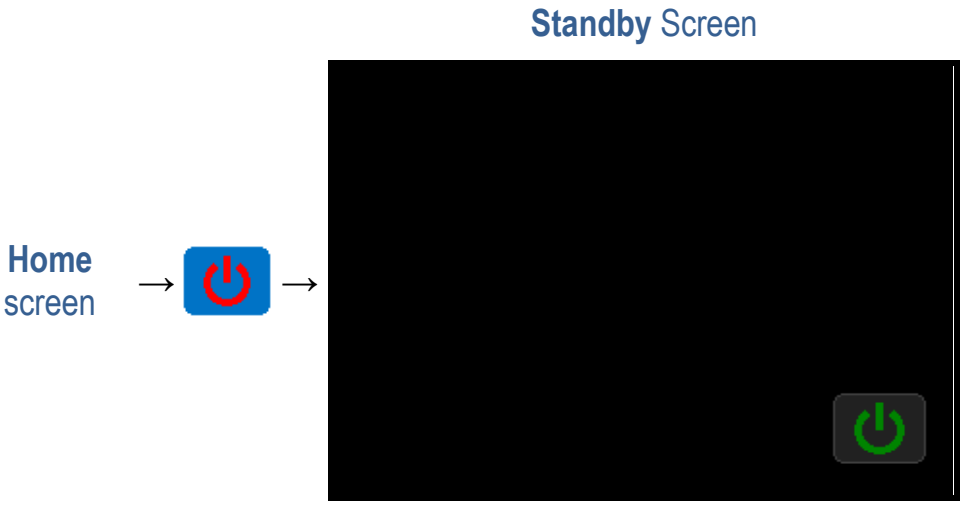
6.8 Standby Mode and Unit Shutdown Procedure

After use, and before switching off the power to the unit, it is recommended to put it in standby mode.

Firstly, remove any sample tube that may be present in the unit, and close the unit lid.



Then, on the **Home** screen, press the **Standby** button to activate the standby mode.



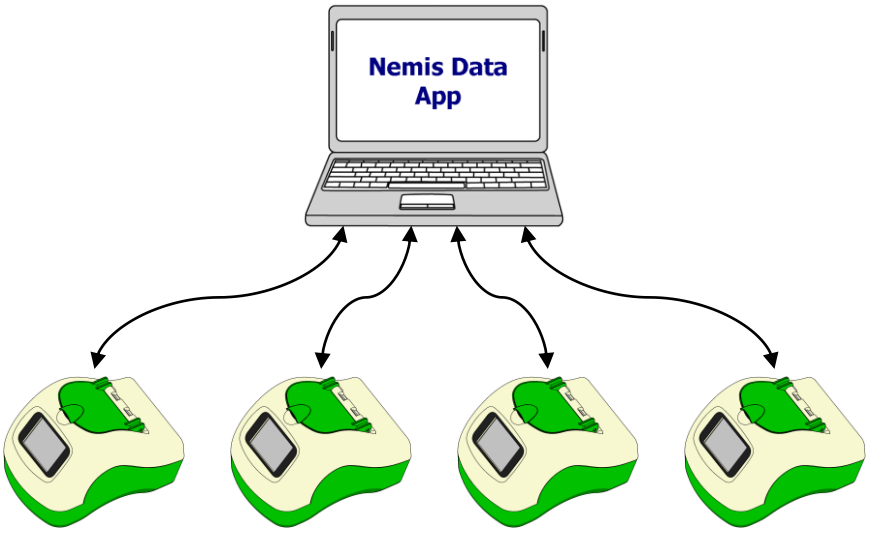
Once the unit is in standby mode, the power can be safely removed.

To wake-up the unit from standby mode, press the **Wake-up** button on the standby screen.

7 Nemis Data App and Advanced Unit Configuration

The Luminometer Windows App provides the following additional settings and features on the Luminometer Unit:

- Uploading of Test Results to a common results Database
- Export of Test Results to an Excel compatible CSV file
- Creation of User IDs with optional passwords
- Creation of custom Protocols and Assays
- Management of multiple Luminometer units to ensure common settings



Multiple Luminometer units can be connected to a single computer using several USB ports or a powered USB hub.

7.1 Installing the Luminometer Windows App and USB Driver

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BY INSTALLING OR USING THIS SOFTWARE YOU ARE AGREEING TO BE BOUND BY THE CONDITIONS OF THIS AGREEMENT.

To install the Nemis Data App, run the **Install**.msi file from the Installation Drive to initiate the install procedure. Then follow the on-screen prompts.

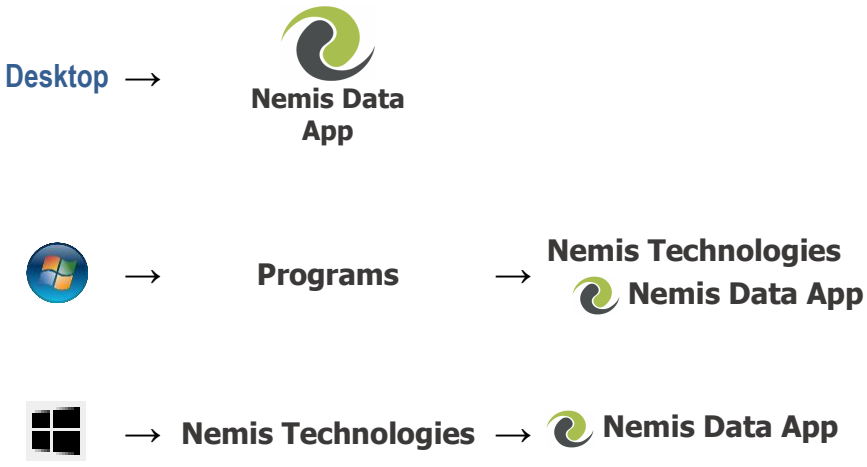
> The Nemis Data App is designed to run on 32-bit and 64-bit versions of Windows 7, 8 and 10. To install the software you may require additional administrator access rights from your **IT Administrator**.

Next the USB Driver must be installed. This is done by running the appropriate driver install program from the **CP210x_Driver** sub-folder on the Installation Drive and following the onscreen prompts:

- For 64-bit Windows: Run **CP210xVCPInstaller_x64**.exe
- For 32-bit Windows: Run **CP210xVCPInstaller_x86**.exe

Alternatively, this can also be done by selecting the **Install USB Driver** option from the **Help** menu in the Nemis Data App (see Section 7.2.3 from details).

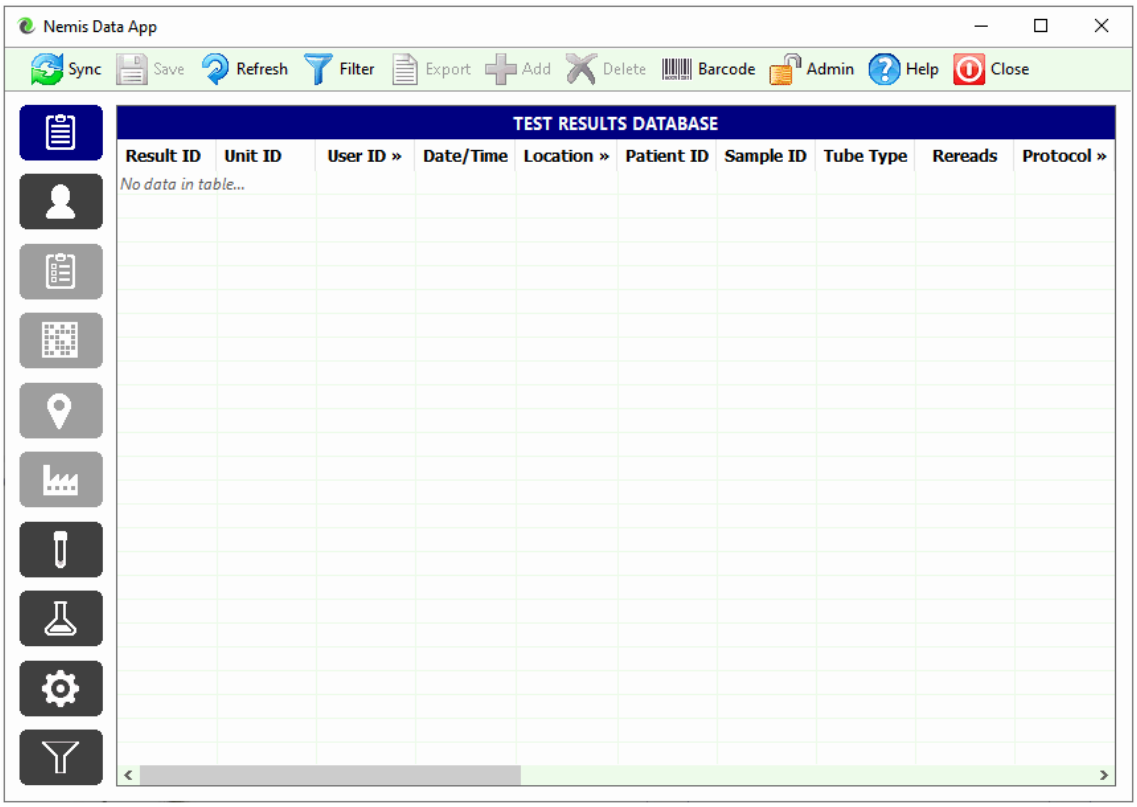
To run the Nemis Data App, click on the **Nemis Data App** icon on the desktop, or in the **Nemis Technologies** section of the programs **Start** menu.



7.2 Nemis Data App Basic Functionality

The Nemis Data App enables data to be transferred to and from the Luminometer unit and a Windows computer, making it easy to add User IDs and customise the unit with specific sample measurement Protocols.

The application display format consists of a spreadsheet-style layout, with **Table** selection buttons down the left-hand side of the screen and a **Toolbar** across the top.



7.2.1 Table Selection Buttons

The Nemis Data App features numerous spreadsheet-style **Tables**, which are selected by clicking the associated **Table** select button down the left-hand side of the application Window.

Table 9: Nemis Data App Table Select Buttons		
	Test Results Database	⇨ *7.4*
	User IDs	⇨ *7.6*
	*Future Feature: Scheduled Test Sample Work List*	
	*Future Feature: Test Plans*	
	*Future Feature: Sample Testing Locations*	
	*Future Feature: Sites*	
	Sample Measurement Protocols	⇨ *7.9*
	Reagent Assays	⇨ *7.10*
	Unit Settings	⇨ *7.7*
	Test Results Filters	⇨ *7.4.4*

Please refer to the subsequent Sections for more details.

7.2.2 Toolbar Options

The toolbar provides the basic data functions as follows:

Table 10: Nemis Data App Toolbar Options		
 **Sync**	Synchronise Luminometer Unit to the Nemis Data App	⇨ *7.3*
 **Save**	Save table data changes to disk	⇨ *7.2.4*
 **Refresh**	Reload table data from disk	⇨ *7.2.4*
 **Filter**	Sort and Filter table data	⇨ *46*
 **Export**	Export data to Excel compatible CSV file	⇨ *7.4.2*
 **Add**	Create new User, Protocol, etc	⇨ *7.2.4*
 **Delete**	Delete existing data within App	⇨ *7.2.4*
 **Barcode**	Barcode Pass-through Function	⇨ *7.5*
 **Admin**	Application and Unit Administrator Settings	⇨ *7.8*
 **Help**	Help menu	⇨ *7.2.3*
 **Close**	Close Nemis Data App	

Please refer to the specific Sections for more details.

7.2.3 Help Menu Options

The **Help Menu** is accessed by clicking on the **Help** button in the toolbar, and provides the following options:

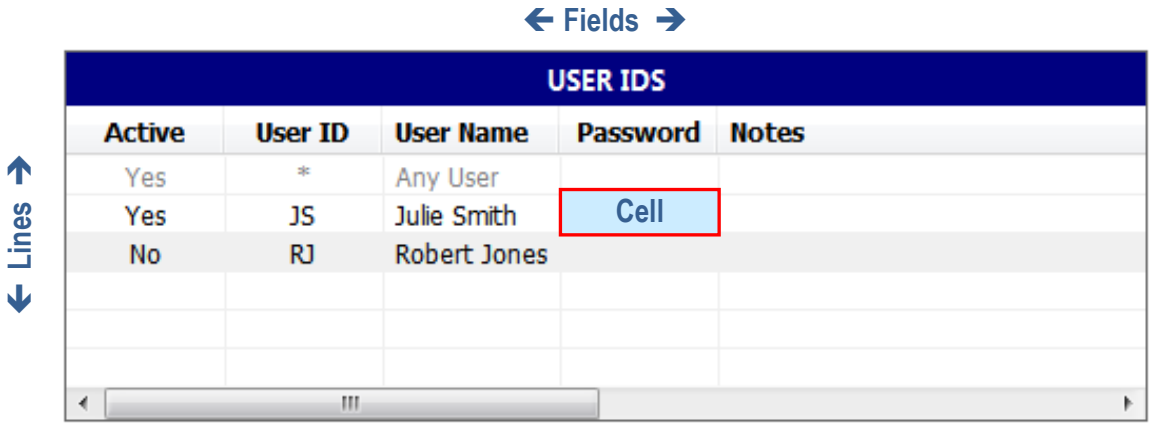
Table 11: Nemis Data App Help Menu Options	
Instructions for Use	Open Luminometer User's Manual
Capture Unit Screenshot	Capture Luminometer screen image
Install USB Driver	Install appropriate USB Driver
Check online for App Updates	*Future Feature*
Recover Unit Software Update	*Future Feature*
Support…	Open Support web page
About Nemis Data App	Nemis Data App software details

The **Install USB Driver** option can be used the install the Windows USB Driver for the Luminometer Unit. Using this method, the application automatically detects the Windows version and loads the appropriate driver.

> The **Capture Unit Screenshot** option can be useful for taking snapshots of the current display on the Luminometer Unit, so they can be pasted into your own Standard Operating Procedures.

7.2.4 Data Table Editing and Context Menu

Each **Table** displays a specific spreadsheet, consisting of a matrix of data **Cells**, organised in **Lines** (running down the sheet in rows) of related data **Fields** (arranged across the sheet in columns).



Lines or **Cells** which are greyed-out cannot be changed. All other cells in the table can be edited in following ways:

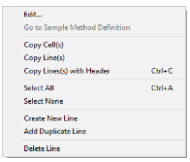
(a) Double-clicking on the **Cell** text:



Cell → *Edit **cell** value* → **Enter** or **Tab**

(b) Right-clicking on the **Cell** and selecting the **Edit** option from the Context Menu:



Cell → 

Edit… → *Edit **cell** value* → **Enter** or **Tab**

After changing the Cell text, press the **Enter** key to accept the new value; or press the **Esc**ape key to cancel editing; or press the **Tab** key to accept the new value and move to the next cell to be editd.

> **WARNING**: There is no **Undo** button; hence any changes made to the table data cannot be easily reversed. The only way to restore the table values is to **Exit** the application without saving, or to use the **Refresh** button to reload the data (see below for details).

When a data cell value has been changed, the line text colour changes to **Blue** to signify that it has been modified but has not yet been saved to disk.

To save any changes to disk, simply click the **Save** button in the Toolbar. The modified lines will then turn black again.

Modified **lines** →  → *Data saved*

If changes have been made to the data, but you have changed your mind, there is no **Undo** option. However, the entire data table can be reloaded from disk to the state it was when last saved by clicking the **Refresh** button.

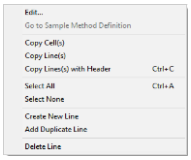
Modified **lines** →  → *Data reloaded*

New data **Lines** can be added to the end of the table in the following ways:

(a) Clicking the **Add** button in the Toolbar:

 → *New line added* → *Edit first **cell** value* → **Enter** or **Tab**

(b) Right-clicking on a **Line** and then selecting the **Add Duplicate Line** option from the Context Menu:

 **Line** → 

Add Duplicate Line → *New line added*

One or more data **Lines** can also be deleted in the following ways:

(a) Selecting the **Lines** to be deleted and then clicking the **Delete** button in the Toolbar:



(b) Selecting the **Lines** to be deleted and then right-clicking on a **Lines** and then selecting the **Delete Line** option from the Context Menu:



The full list of right-click Context Menu options are listed in Table 12 below.

Table 12: Data Cell Context Menu Options		
Edit…	Edit cell value	⇨ *Above*
Go to Definition	Jump to cell data definition	⇨ *Below*
Copy Cell(s)	Copy cell value to paste clipboard	⇨ *7.4.2*
Copy Line(s)	Copy selected line(s) to clipboard	⇨ *7.4.2*
Copy Line(s) with Header	Copy Header and Selected line(s)	⇨ *7.4.2*
Select All	Select all lines	
Select None	Select no lines	
Create New Line	Insert a new data line	⇨ *Above*
Add Duplicate Line	Duplicate entire line contents	⇨ *Above*
Delete Line	Delete selected line(s)	⇨ *Above*

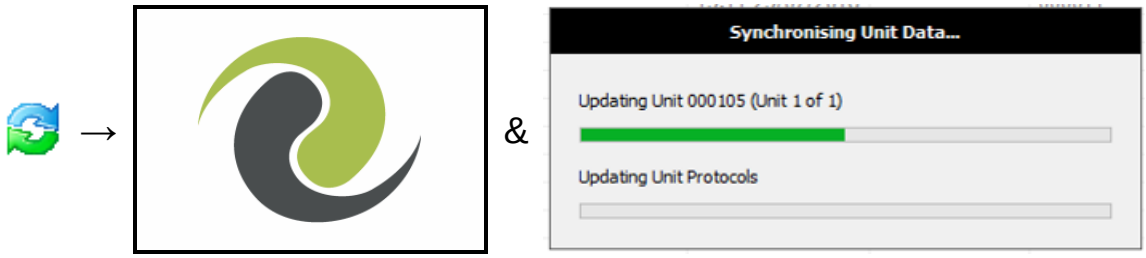
Some cells may refer to definitions on other tables, such as the **Assay** in the **Protocols** table. These are denoted by a "**»**" symbol in the field heading (e.g. **Assay »**). Right-clicking on the cell and selecting the **Go to Definition** option will jump to the definition for that cell in the associated table.

7.3 Data Synchronisation

The toolbar **Sync** button is used to transfer data between the Nemis Data App and all attached Luminometer Units, by performing the following tasks:

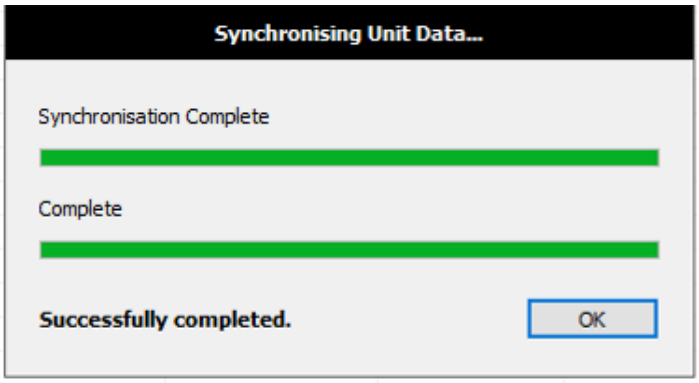
- Discover and add New Unit details ⇨ *7.7.1*
- Upload test results from Unit ⇨ *7.4*
- Delete test results from Unit's database ⇨ *7.4*
- Check for Unit Software updates
- Update Unit's time and date settings [Optional] ⇨ *7.7*
- Update Unit's User IDs list ⇨ *7.6*
- Update Unit's Protocols list ⇨ *7.9*

Click the **Sync** button on toolbar to initiate the data transfer. The Luminometer Unit will display the Download screen until the process is complete.



Sync Unit **Download** Screen App **Synchronisation** Progress Window

When synchronisation is completed, the Luminometer Unit will restart. Click the **OK** button to close the progress window.



Once restarted, the attached Units will have any new User and Protocol data loaded on to them from the Nemis Data App, and the App will contain all the test results data from the Units.

Note: Uploading the test results removes them from the Luminometer Unit and permanently stores them in the Nemis Data App **Test Results Database** table (see Section 7.4).

7.4 Test Results Database Table

The Test Results Database table stores all the test results that have ever been uploaded from the Luminometer Units.

The Test Results Database table data fields are listed in Table 13 below.

Table 13: Test Results Database Data Fields

Results ID	Unit test result unique ID within the database	
Unit ID	Unit serial number and name	⇨ *7.7.1*
User ID	User ID	⇨ *7.6*
Date/Time	Date and Time when sample test performed	⇨ *7.8*
Location	*Future Use: Sample location name*	
Patient ID	*Future Use: Patient ID from Worklist*	
Sample ID	Test Sample ID	⇨ *6.4.2*
Tube Type	Sample tube type (S, C, 1, 2, 3, 4, 5 or 6)	⇨ *7.9.3*
Rereads	Number of times the tube was re-read	⇨ *7.9.4*
Protocol	Protocol name	⇨ *7.9.2*
Measurement Type	Measurement type	⇨ *7.9.5*
Tube Reading	Sample tube reading	⇨ *7.9.6*
Reading Units	Tube reading Units-of-measurement	⇨ *7.9.6*
Percentage	Tube percentage reading relative to Control tube	⇨ *7.9.6*
Test Result	Test Result	⇨ *7.9.6*
Results Units	Result Units-of-measurement	⇨ *7.9.6*
Status	Overall test result Status tag	⇨ *7.9.6*
Band	Banded result Name	⇨ *7.9.6*
Lower Limit	Banded result lower limit	⇨ *7.9.6*
Upper Limit	Banded result upper limit	⇨ *7.9.6*
Kinetic Rate	Number of seconds per a kinetic data point	⇨ *7.9.5*
Kinetic Data	Kinetic data points	⇨ *7.9.5*
Notes	Optional: Additional notes	⇨ *7.2.4*

None of these data field values can be edited except for the **Notes** field.

7.4.1 Uploading Test Results Data

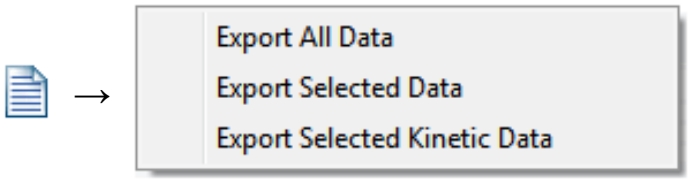
Each time the Nemis Data App synchronises with a Luminometer Unit any new test results are uploaded and stored in the Test Results Database table.



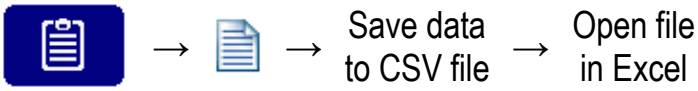
Once the results have been uploaded and saved in the Nemis Data App they are automatically deleted from the Luminometer Unit.

7.4.2 Exporting Test Results Data

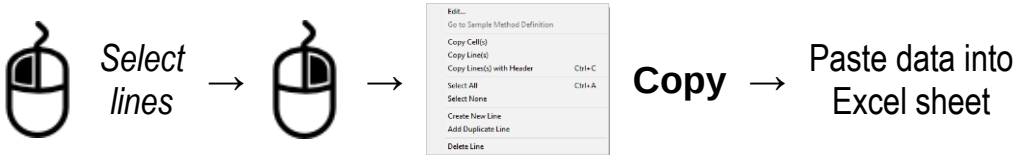
Test results data can be exported to an Excel compatible CSV file by clicking the **Export** button on the toolbar.



This can either be all of the data in the table, or just the selected lines.



Alternatively, the data can be Copied and Pasted into an existing Excel sheet. This is achieved by selecting the **Lines** to be copied and then right-clicking on a **Line** and clicking the **Copy Line(s)** option in the Context Menu.



To export Kinetic Data (see Section 7.9.5 for protocol setting), select the required results data lines then click the **Export** button and select the **Export Selected Kinetic Data** option.



In addition, the **Filter** feature can be used to first narrow-down the data and reduce the number of lines and fields before exporting them. See Section 7.4.4 for details.

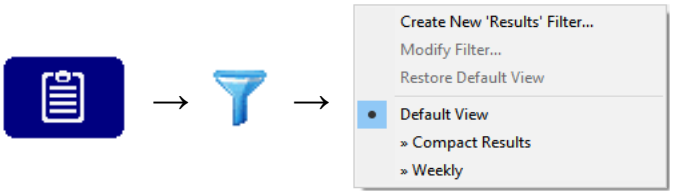
7.4.3 Deleting Test Results Data

Results are automatically deleted from the unit when they are uploaded to the Nemis Data App during the synchronisation process. All results data from the unit is stored in the application database until it is deleted by the user.

To delete results data from the application's Test Results Database, refer to Section 7.2.4 for details.

7.4.4 Sorting and Filtering Test Results Data

The Test Results data can be sorted and filtered using the toolbar **Filter** function of the Nemis Data App.

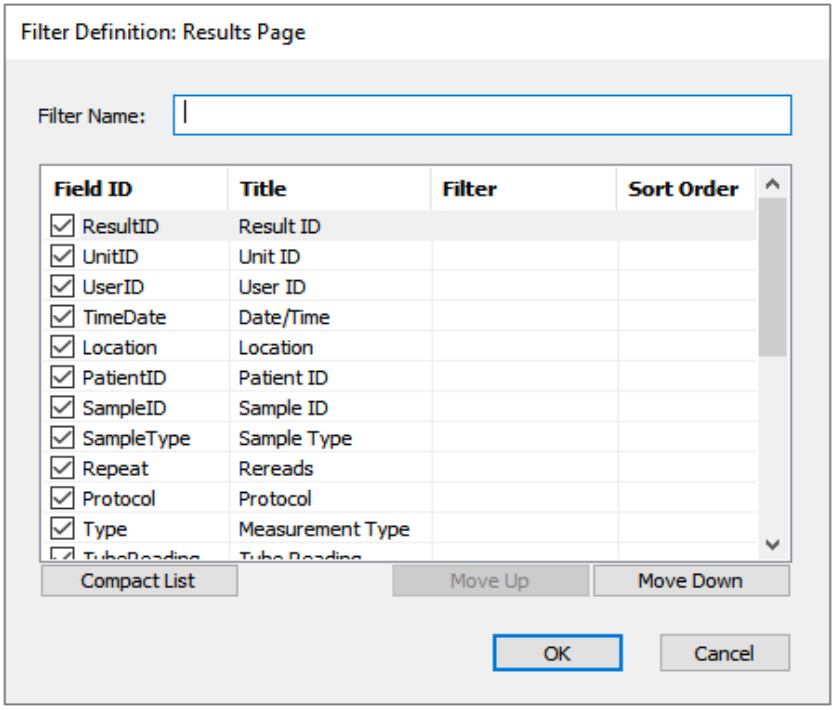


The toolbar **Filter** menu has the following options:

Table 14: Nemis Data App Filter Menu Options	
Create New Filter…	Create a new filter
Modify Filter…	Modify the currently active filter
Restore Default View	Close filter and restore normal view
Default View	Filter: Default View
» Custom Filters	Filters: more user-defined filters

User-defined filters can be selected from the list at the bottom of the menu. The dot indicates the currently active filter.

To create a new filter, select the **Create New Filter** option, which brings up the Filter Definition box. Enter a new **Filter Name** and specify the filter as described below.

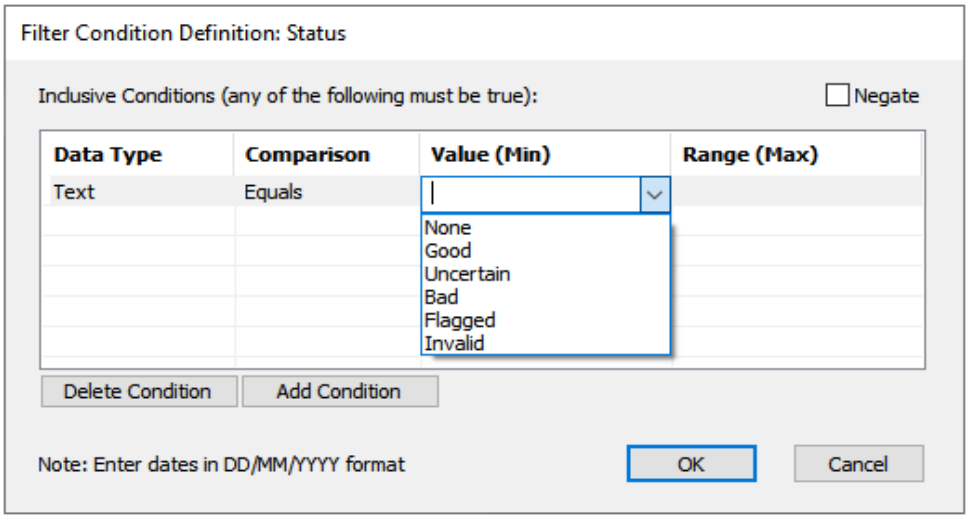


The number of visual fields can be reduced by unticking the check boxes next to the **Field ID**. Fields can also be reordered by selecting the field line and then using the **Move Up** and **Move Down** buttons.

The displayed field **Title** can be changed by double-clicking on the name.

The **Sort Order** can be set to **None**, **A-Z** (ascending) or **Z-A** (descending). If more than one field has sorting enabled, priority is given to the top-most field in the list. This can be altered by moving the fields **Up** or **Down**.

Double-clicking on the **Filter** cell brings up the condition definition box:



One or more lines can be added to the field filter condition. The available condition options are:

Table 15: Nemis Data App Filter Definition Options		
Negate	**Unticked**	Inclusive conditions (any conditions must be true)
	Ticked	Exclusive conditions (all conditions must be false)
Data Type	**Text**	Compare text (case insensitive)
	Number	Compare numerically
	Date	Compare dates
Comparison	**Equals**	Exactly equals **Value**
	Range	Is within the range **Value (Min)** to **Range (Max)**
	Contains	Contains the text **Value**
Value (Min)	***Value***	Value or range minimum
Range (Max)	***Value***	Range maximum

For **Range** comparisons, the **Min** or **Max** value can be left empty to indicate an open range, for example:

Value (Min)	Range (Max)	Condition
1200	30000	Values between 1200 and 30000
1200		Values of 1200 and over
	30000	Values of 30000 and under

Note: Dates must be entered in the format shown at the bottom of the definition window – which is as specified by the global **Time and Date Format** settings in the **Admin** menu (see Section 7.8.3).

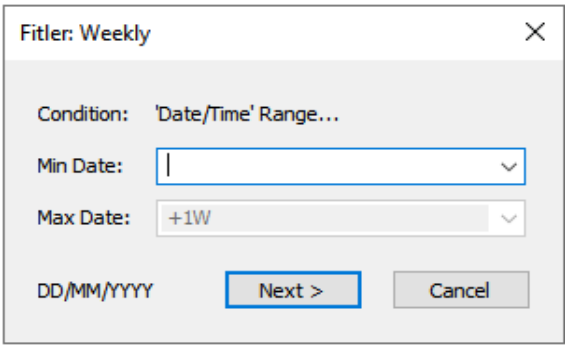
For date ranges, the **Max** value can be specified relative to the **Min** value, for example:

Range (Max)	Maximum Date Calculation	Total Days
+1D	Minimum date plus 1 day	1
+3D	Minimum date plus 3 days	3
+1W	Minimum date plus 1 week	7
+4W	Minimum date plus 4 weeks	28
+1M	Minimum date plus 1 calendar month	28 to 31
+12M	Minimum date plus 1 calendar year	365 or 366
+1Q	Minimum date plus 1 quarter year	90 to 92
+1Y	Minimum date plus 1 calendar year	365 or 366

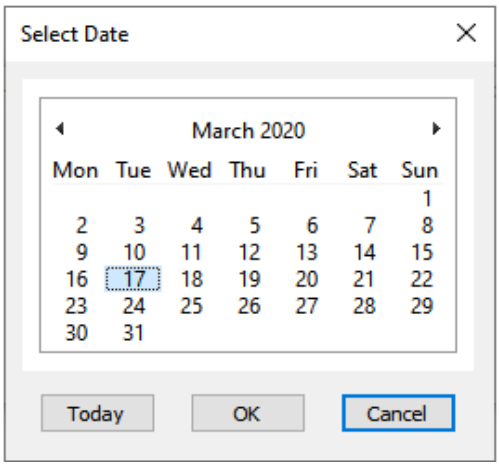
User-specified values can also be selected by entering a Question Mark in the **Value** or **Range** cells instead of a fixed value. For example:

Data Type	Comparison	Value (Min)	Range (Max)
Date	Range	?	+1W

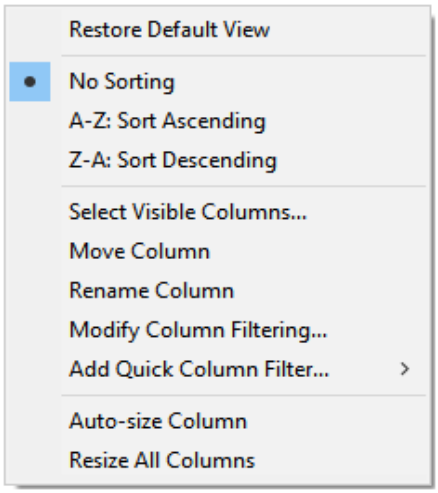
This will prompt the user to enter the missing value when the filter is selected from the **Filter** menu.



Values can be typed-in or selected from the dropdown list. For dates, they can be entered in the format shown or selected from the calendar by clicking to dropdown arrow:



The currently active filter definition can changed be selecting the **Modify Filter** option from the **Filter** menu, or by clicking on the field heading in the data table and selecting from the available options:



To return to the normal data view, select the **Restore Default View** option.

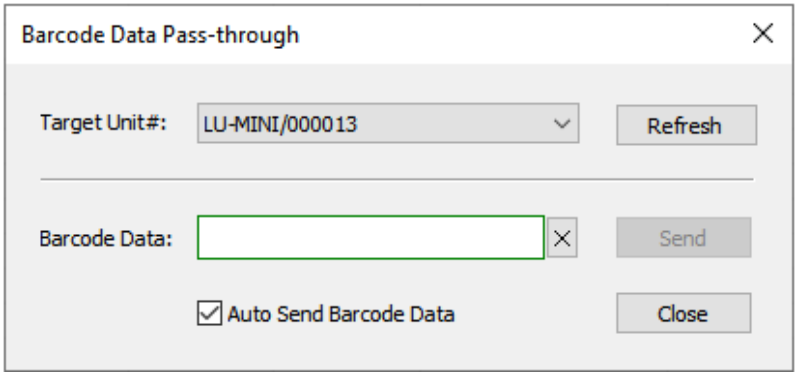
To rename or delete a filter definition, select the **Filters** table and then perform the required action:

 → Rename **Filter Name** or delete filter line

7.5 Barcode Pass-through Function

The Nemis Data App can be used to pass barcode data to a Luminometer Unit, for use when entering a Sample ID.

First connect a USB or Bluetooth **HID Keyboard** compatible barcode scanner to your computer, then click on the **Barcode** option in the Nemis Data App toolbar to open the following window.



Next select the **Target Unit#** from the dropdown list. Then, whilst in this window and the **Barcode Data** edit box is green (as shown above), whenever barcode data is received by the Nemis Data App it will be sent to the Luminometer Unit.

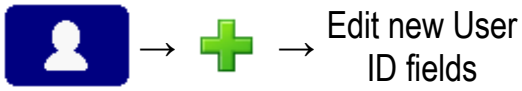
For the unit to accept the barcode data it must be in one of the following operating states:

- Waiting for Keyboard input – such as Sample ID entry
- Results Database – to find associated sample test result
- Protocol Work List – to find the associated sample entry

7.6 User IDs Table

By default, the Luminometer unit has only a single generic **Any User** profile. The User IDs table allows more User profiles to be created, for both the unit and the application as required.

New users are created by adding a new line to the User IDs table (see Section 7.2.4).



The available User IDs table data field options are listed in Table 16 below.

Table 16: User IDs Data Fields		
Active	Selects whether the User ID is downloaded to the unit	⇨ *Below*
User ID	Unique User ID (1 to 5 characters)	⇨ *6.3*
User Name	Name associated with the User ID	⇨ *6.3*
Password	Optional password	⇨ *6.3*
App User	Allow User to Login to Nemis Data App	⇨ *Below*
Notes	Optional: Additional notes	⇨ *7.2.4*

New User IDs will appear on the Luminometer unit when the **Sync** button is next clicked.



User IDs are created with the **Active** field set to **Yes**, meaning the User ID will be loaded onto the Luminometer unit when it is next synchronised with the application.

There is no limit to the number of User IDs that can be created in the Nemis Data App, however only 50 active Users IDs can be stored in the Luminometer Unit. Hence, to limit the size of this list to 50 users, the **Active** field may need to be changed from **Yes** to **No** for some Users IDs.

The optional **Password** is used on both the Luminometer Unit and the Nemis Data App when logging in.

The **App User** field specifies whether the user is permitted to login to the Nemis Data App (if this feature is enabled - see to Section 7.8.1 for details), irrespective of the state of the **Active** field.

7.7 Unit Settings Table

The Unit Settings table stores a list of all the Luminometer units which have been synchronised with the Nemis Data App.



The available Unit Settings table data fields are listed in Table 17 below.

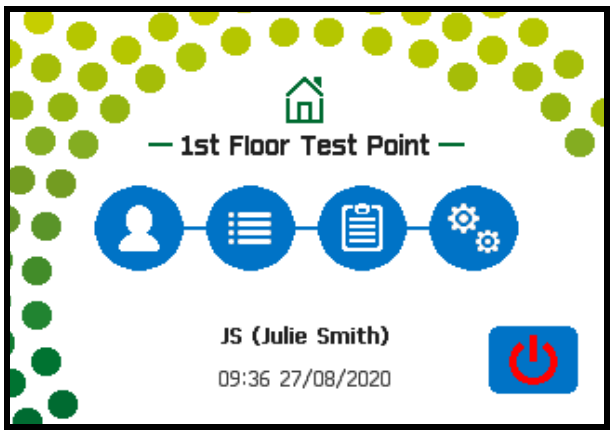
Table 17: Unit Settings Data Fields		
Unit Number	Fixed: Unique Luminometer Unit serial number	
Unit Name	Optional: Name that appears on the unit's Home screen	⇨ *7.7.1*
Last Synced	Fixed: The date and time when unit was last synchronised	
Notes	Optional: Additional notes	⇨ *7.2.4*

For other global **Unit Configuration Settings** refer to Section 7.8.3.

7.7.1 Adding a New Luminometer Unit

New Luminometer units are automatically added to the **Unit Settings** table whenever a **Sync** is performed.

The **Unit Name** field can be set to a short description which will appear on the unit's Home screen when it is next synchronised.



7.8 Global Application and Unit Administrator Settings

The **Admin** option on the Nemis Data App toolbar gives access to global Application and Unit settings:

Table 18: Nemis Data App Admin Menu Options		
Administrator Login	Login as Administrator	⇨ *Below*
Application Administrator Settings	Global Application settings	⇨ *7.8.1*
Unit Configuration Settings	Global Unit settings	⇨ *7.8.2*
Time and Date Formats	Global Time and Date settings	⇨ *7.8.3*

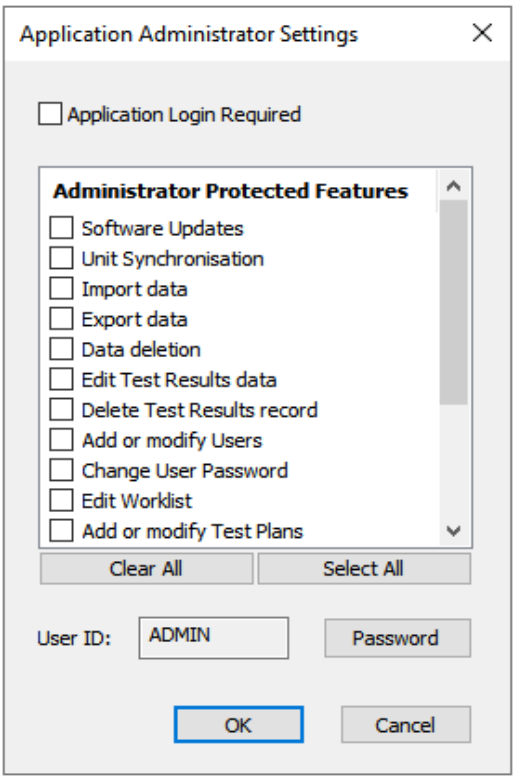
These **Admin** menu options are protected and require **Administrator Login** to be accessed.

Note: Administrator Login is only possible if an **ADMIN** User is defined in the User IDs table (see Section 7.6).

If predefined, the default ADMIN Password is "**admin**".

7.8.1 Application Administrator Settings

The **Application Administrator Settings** option from the **Admin** menu provides global Application settings for protecting the application data and features from unauthorised users.



Tick the **Application Login Required** check box to force authorised users to login to the Nemis Data App. See Section 7.6 for details of how to add application users.

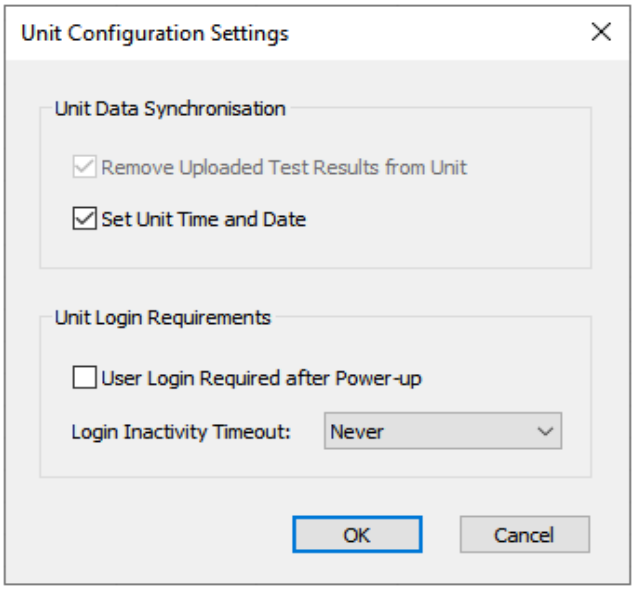
Various features of the Nemis Data App can be protected against accidental or unauthorised access:

Table 19: Nemis Data App Protected Features	
Software Updates	Luminometer Unit software updates
Unit Synchronisation	Data synchronisation via the Sync button
Import data	*Future feature*
Export data	Exporting of data to a CSV file
Data deletion	General deletion of any data from any table
Edit Test Results data	Editing data in the Test Results table
Delete Test Results record	Deletion of a record from the Test Results table
Add or modify Users	Add or change data in the User IDs table
Change User Password	Changing a password in the User IDs table
Edit Worklist	*Future feature*
Add or modify Test Plans	*Future feature*
Add or modify Locations	*Future feature*
Add or modify Sites	*Future feature*
Add or modify Protocols	Add or change data in the Protocols table
Add or modify Assays	Add or change data in the Assays table
Modify Unit Settings	Change data in the Unit Settings table
Create or Modify Data Filters	Add or change data in the Filters table

To access any of the selected protected features, the **ADMIN** user must login to unlock the feature (see Section 7.8 above).

7.8.2 Unit Configuration Settings

This option of the **Admin** menu changes the global Unit Settings.



When the Luminometer Unit synchronises with the Nemis Data App (see Section 7.3), the Test Results data is uploaded and stored in the Nemis Data App, and then deleted from the Luminometer Unit. Currently the **Remove Uploaded Test Results** feature cannot be disabled.

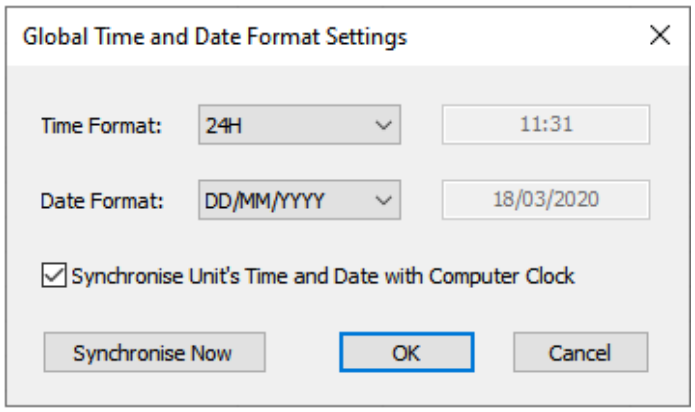
Ticking the **Set Time and Date** option will set the Luminometer Unit clock to the computer's local time and date when the unit is synchronised. Refer to Section 7.8.3 for more details.

Ticking the **User Login Required after Power** option will force Luminometer Unit users to login before they can perform any reading or use other unit functions.

The **Login Inactivity Timeout** specifies how long a user may leave the unit unused before they are automatically logged out. This can be set to **Never** if not required.

7.8.3 Time and Date Formats

The **Time** and **Date** formats used by the **Test Results Database** table are defined via the **Time and Date Formats** option of the **Admin** menu:



Time and Date Format options are listed in Table 20 below.

Table 20: Time and Date Format Options

Time Format	AM/PM	12-hour clock
	24H	24-hour clock
Date Format	YYYY/MM/DD	Year/Month/Day
	DD/MM/YYYY	Day/Month/Year
	MM/DD/YYYY	Month/Day/Year

Ticking the **Synchronise with Computer Clock** option with set all connected Luminometer Unit's clocks and formats to the computer's local time and date whenever the **Sync** button is pressed.

The **Synchronise Now** button can be clicked to set the clocks of all the connected Luminometer Units to the current time and date. This can be useful after daylight saving changes as the unit does not handle this automatically.

7.9 Sample Measurement Protocols Table

The Protocols table allows custom sample measurement protocols to be created and developed as required.

> **CAUTION: Protocols and Assays are created and validated by Nemis Technologies. Please do not modify without consulting Nemis Technologies.**

When the Luminometer unit measures a test sample, it performs the following automated steps, as defined by the selected **Protocol**:

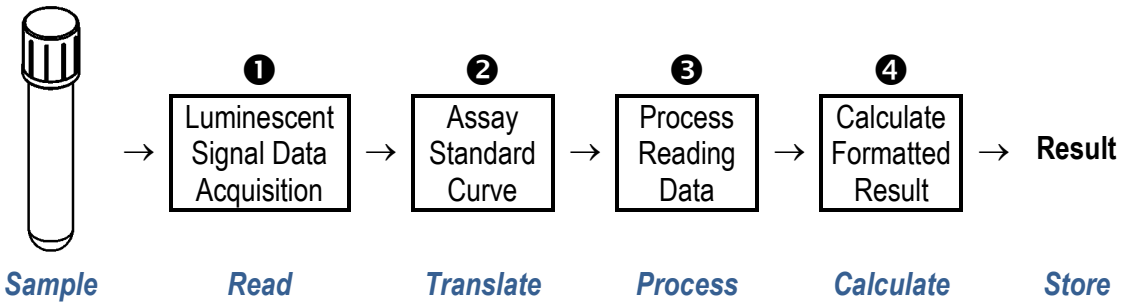
❶ Acquire measurement data
- → Optional: Pre-zero phase ⇨ *7.9.5*
- → Open internal shutter
- → Initial 10-second reading
- → Optional: Additional 1 to 600-second data collection ⇨ *7.9.5*
- → Close internal shutter

❷ Translate reading data according to **Assay** curve ⇨ *7.10*

❸ Process reading data (as per **Protocol** definition) ⇨ *7.9.5*

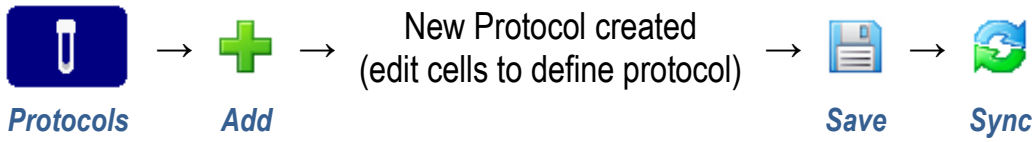
❹ Calculate final test result value ⇨ *7.9.6*

Hence the measurement sequence is:

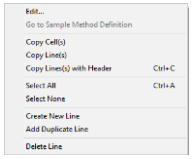


7.9.1 Creating a New Measurement Protocol

To create a new Protocol, click the toolbar **Add** button and then enter all the appropriate data field values.



Alternatively, an existing Protocol can be copied and modified by right-clicking on the existing protocol **Line** and then selecting the **Add Duplicate Line** option from the Context Menu and editing the required data field values.

 **Line** → 

Add Duplicate Line → *New protocol added* → *Edit protocol fields*

The available Sample Measurement Protocols table data fields are listed in Table 21 below.

Table 21: Protocols Table Data Fields		
Active	Selects whether protocol is downloaded to unit	⇨ *Below*
Protocol Name	Unique name for this protocol	⇨ *7.9.2*
Description	Description of the protocol	⇨ *7.9.2*
Assay	Assay name from Reagent Assay Table	⇨ *7.9.2*
Scaling Factor	Assay reading scaling factor	⇨ *7.9.2*
Sample Method	Sample method (S, C, C+1 to C+6)	⇨ *7.9.3*
Rereads	Sample re-read method	⇨ *7.9.4*
Measurement Type	Sample measurement type	⇨ *7.9.5*
T1	Result analysis start time t1 in seconds	⇨ *7.9.5*
T2	Result analysis end time t2 in seconds	⇨ *7.9.5*
Window	Result analysis window size in seconds	⇨ *7.9.5*
Threshold	Percentage change threshold limit	⇨ *7.9.5*
Show Graph	Show data progress graph for long measurements	⇨ *7.9.5*
Result DPs	Result display number of decimal-places	⇨ *7.9.6*
Result Units	Result Units-of-measurement	⇨ *7.9.6*
Limit Result	Limit result value to maximum/minimum bands	⇨ *7.9.6*
Result Banding	Result status and colour banding data	⇨ *7.9.6*
Lock Status	Prevent user from changing the result status	⇨ *7.9.6*
Comparison Bands	Comparative result acceptance range data	⇨ *7.9.6*
Show Relative	Show comparative result as relative percent	⇨ *7.9.6*
Notes	Optional: Additional notes	⇨ *7.2.4*

The **Active** field can be used to specify which Protocols are downloaded to the Luminometer units. This is handy when developing new or experimental Protocols to select which definitions appear on the Luminometer unit.

Table 22: Protocol Activation States	
No	Protocol is not downloaded to the unit
Yes	Protocol downloaded and appears on the unit
Disabled	Protocol downloaded to the unit but appears as greyed-out
Hidden	Protocol downloaded to the unit but is not visible

Please refer to the relevant Sections for specific details on other field usage.

7.9.2 Protocol Name and Reagent Assay

The first group of Protocol definition fields define the protocol name and associated Assay (see Section 7.10).

Protocol Name	Unique name for this protocol
Description	Description of the protocol
Assay	Assay name from Reagent Assay Table
Scaling Factor	Scale assay reading to allow for different units of measurement (0.000001 to 1000000.0 but normally 1.0)

The **Protocol Name** and **Description** appear on the Luminometer Unit in the Protocol selection screen (see Section 6.4.1).

The **Assay** is the name of the **Reagent Assay** (see Section 7.10) being used for this protocol. Usually multiple protocols will use the same Assay.

The assay **Scaling Factor** can be used to convert the **Assay** output reading into different units of measurement (for instance) or to correct for calibration rescaling. See Section 7.9.6 for additional details.

7.9.3 Sample Test Methods

The **Sample Method** field defines how many related tests will be performed on an individual donor sample.

Table 23: Sample Method Options	
Single Tube	One standard test per sample volume (1 tube required)
Control Only	One control test per sample (such as a QC check)
Control + 1 Tube	One baseline control test plus one comparative test per sample (2 tubes required)
Control + 2 Tubes	One baseline control test plus up to two comparative tests per sample (3 tubes required)
etc	*Etc*
Control + 6 Tubes	One baseline control test plus up to six comparative tests per sample (7 tubes required)

This setting determines how the Luminometer Unit processes the sample tube readings and displays the result to the user, as detailed below.



Note: Only **Single Tube** measurements are supported by this version of the Luminometer software.

For the **Single Tube** and **Control Only** options, the Luminometer Unit measures a single test tube and presents the result in the specified numerical format with optional result Banding (see Section 7.9.6).

7.9.4 Sample Tube Re-read Methods

Depending on the value of the **Rereads** field, an individual sample tube can be re-read several times, at the user's discretion (up to a maximum of 15 times); and the resultant reading stored in the Results Database.

The **Rereads** option determines how each re-reading is processed:

Table 24: Tube Re-read Method Options	
No	Tube re-reads not allowed – store first reading only
Yes	Tube re-reads allowed – store final reading
Minimum	Tube re-reads allowed – store minimum reading
Average	Tube re-reads allowed – store averaged reading
Maximum	Tube re-reads allowed – store maximum reading
Multiple	Tube re-reads allowed – store all readings individually

Note: The **Rereads** option is not supported by this version of the Luminometer software and should be set to **No**.

7.9.5 Measurement Types

The next group of Protocol definition fields relate to how the sample tube is measured by the Luminometer Unit to produce a test result value.

The associated measurement parameters fields are:

Measurement Type	Sample measurement type
T1	Result analysis start time t1 in seconds (usually 0)
T2	Result analysis end time t2 in seconds
Window	Result analysis window size in seconds
Threshold	Percentage change threshold limit (for peak detection)
Show Graph	Show data collection progress graph for long measurements

The **Measurement Type** defines how the measurement data is acquired and processed by the Luminometer unit:

Table 25: Sample Measurement Types

Standard	Simple reading with additional averaging window (**T2**)
Dual Point (T2-T1)	Difference Reading between readings at **T1** and **T2**
Reaction Rate	As Dual Point but result expressed as *per second*
Peak Detect	Peak detection between **T1** and **T2**, with moving-window average and detection threshold
Kinetic Data	Captures real time readings data for offline analysis. Refer to Section 7.4.2 for data export options
Discrete Maximum	Peak detection using a series of discrete measurements and detection threshold
Fast Kinetic	Captures fast real time readings data for offline analysis. Refer to Section 7.4.2 for export options

Hence, the **Measurement Type** determines the function of the other four measurement parameters:

Table 26: Sample Measurement Parameters

Measurement Type	T1 (seconds)	T2 (seconds)	Window (seconds)	Threshold (%)	Total Time (seconds)	Numeric Result
Standard	Averaging Window Start	Averaging Window End	0	0	10 + T2	Average
Dual Point (T2-T1)	Start Time	Maximum Time	Averaging Window Size	0	10 + T2	T2Average – T1Average
Reaction Rate	Start Time	Maximum Time	Averaging Window Size	0	10 + T2	(T2Avg – T1Avg) / (1 + T2 - T1)
Peak Detect	Start Time	Maximum Time	Averaging Window Size	Percentage Drop	$\leq$ 10 + T2	Peak Reading
Kinetic Data	0	Total Data Points	Data Sub-rate	0	10 + (T2 * Window)	Last Reading
Discrete Maximum	Start Reading	Total Readings	Reading Window Size	Percentage Drop	$\leq$ 10 + (T2 * Window)	Maximum Reading
Fast Kinetic	Analysis Start Time	Total Data Points	Fast Data Sub-rate	0	3 + (T2 * 0.1 * Window)	Max Reading – Min Reading

For **Kinetic Data** capture, the **Window** value defines the number of 1-second reading to be averaged per outputted data point and **T2** defines to total number of data points; thus, the total capture time is **T2** * **Window** seconds plus the initial 10-second reading time. The numeric result is the last reading.

The **Fast Kinetic** data capture uses a maximum output data rate of 10 readings per second; hence, the **Window** value defines the number of 0.1-second reading to be averaged per outputted data point and **T2** defines to total number of data points. The numeric result is a difference between the maximum and minimum readings.

The **Show Graph** option is mainly intended for use when developing a new Protocol so that the reaction data can be observed in real time. Then, once the protocol parameters have been finalised, this option can be set to **No** to hide the graph from the normal end-user.

7.9.6 Test Result Formatting and Banding Options

Once the final test result value has been calculated by the Luminometer Unit, there are two further steps that determine how the result is displayed on the unit.

The first set of options control how the numeric result is formatted:

Result DPs	Number of decimal-places displayed (0 to 3)
Result Units	Units of measurement (e.g. RLU)

The **Result DPs** is intended for use in conjunction with the **Scaling Factor** (Section 7.9.2) to convert a reading to specific **Result Units** of measurement.

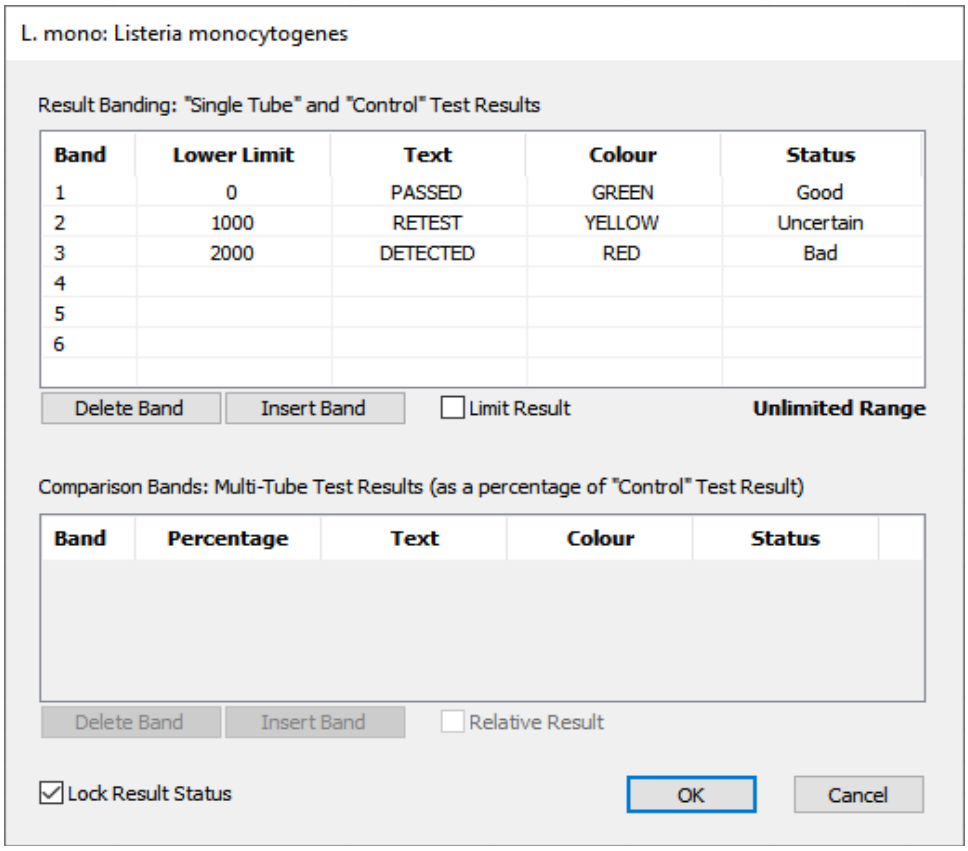
The second set of options control how the result is qualified:

Limit Result	Limit result value to within overall Banding limits
Result Banding	Qualify result using individual Banding limits
Lock Status	Prevent user from changing pre-assigned Status value
Comparison Bands	Qualify multi-tube result using comparison Banding
Show Relative	Show comparison result as relative percentage

If enabled, **Result Banding** is applied to all **Sample Method** types (Section 7.9.3): individual **Single Tube** or **Control Only** samples; or multi-tube **Control + Tube**.

However, **Comparison Bands** only relate to the **Control + Tube** method.

Double-clicking on (or **Edit**ing) either the **Result Banding** or **Comparison Bands** fields opens the following configuration window. For example:



The **Lower Limit** and **Percentage** specify the starting value of the band. See Sections 7.9.6.1 and 7.9.6.2 for an explanation of the above example.

The **Colour** defines the colour of the displayed band, as follows:

NONE	BLACK	GREY	BLUE	GREEN	YELLOW	ORANGE	RED

If the colour is set to **NONE**, the result band is not displayed on the Luminometer Unit, however it will still appear in the test results database when the result is uploaded to the Nemis Data App.

The **Status** indicates the overall result status, as illustrated below.

None	Good	Uncertain	Bad	Flagged	Invalid
					

Note: The **Lock Result Status** has no effect in this version of the Luminometer software.

7.9.6.1 Single Tube Result Banding

For **Single Tube** and **Control Only** readings, the quantitative result value can be qualified by checking it against up to six **Result Bands**.

For instance, the above example translates as:

Band 1:	0 RLU ≤ Result < 1000 RLU	PASS
Band 2:	1000 RLU ≤ Result < 2000 RLU	RETEST
Band 3:	2000 RLU ≤ Result	DETECTED

Ticking the **Limit Result** check box will restrict the test result value to within the minimum and maximum bands limits; in this example, 0 to 2000 RLU.

Note: Only single-tube measurements are supported by this version of the Luminometer software.

7.9.6.2 Multiple Tube Comparison Bands

For multi-tube tests (**Control + 1 Tube** thru **Control + 6 Tube**) the **Tube** readings can be compared against the baseline **Control** reading and qualified by checking it against up to four **Comparison Bands**.

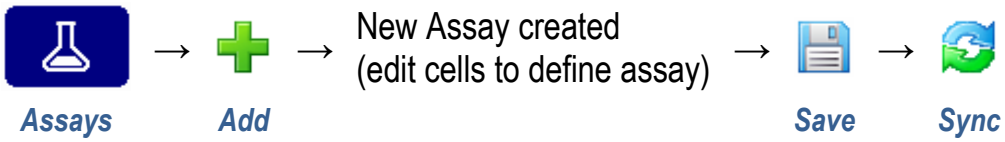
Note: Multi-tube measurements are not supported by this version of the Luminometer software.

7.10 Reagent Assays Table

The **Reagent Assay** table allows standardised assays to be defined. In general, one assay will be used by several Protocols with different measurement and result parameters.

> **CAUTION: Protocols and Assays are created and validated by Nemis Technologies. Please do not modify without consulting Nemis Technologies.**

To create a new Assay, click the toolbar **Add** button and then enter all the appropriate data field values.



Alternative, an existing Assay can be copied and modified by right-clicking on the existing assay **Line** and then selecting the **Add Duplicate Line** option from the Context Menu and editing the required data field values.



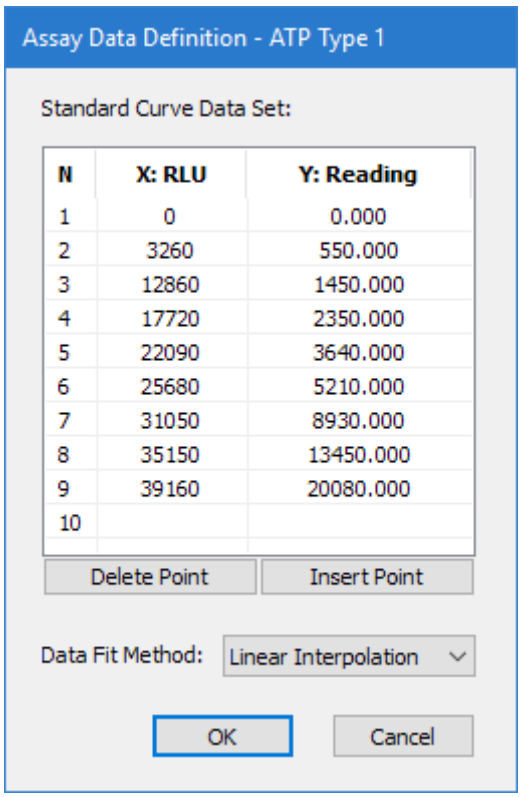
The available **Reagent Assay** data fields are listed in Table 27 below.

Table 27: Reagent Assay Data Fields		
Assay Name	Unique name of Assay	⇨ *7.9.2*
Detection Type	Method of assay output quantitative detection	⇨ *7.10*
Curve X-Data	Standard calibration curve x-axis data	⇨ *7.10*
Curve Y-Data	Standard calibration curve y-axis data	⇨ *7.10*
Curve Fit	Curve fit method	⇨ *7.10*
Notes	Optional: Additional notes	⇨ *7.2.4*

The **Assay Name** is the unique name used to identify and select the Assay in the associated Protocols table (see Section 7.9.2).

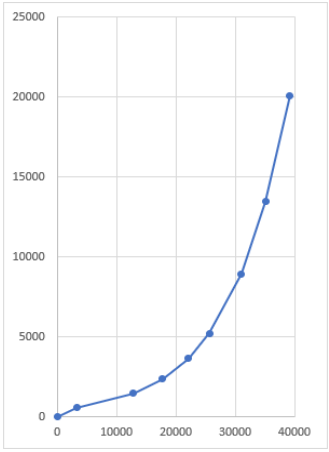
The **Detection Type** defines the quantitative method of detection used by the assay. Currently the Luminometer only supports **Luminescence**, but future versions will support alternative methods.

The remainder of the parameter fields allows a standard calibration curve to be implemented. Double-clicking on either of the **Curve X-Data**, **Curve Y-Data** or **Curve Fit** fields opens the following definition window.



→

Y = Fn(X)



For example:

when X = 35150 RLU
Y = 13450

This provides a transfer function between **Standard Luminometer RLU**s (X-input) and the required **Assay Reading** (Y-output) to implement a Standard Curve, as illustrated above.

However, this can be as simple as offsetting the reading by a fixed amount. For instance, to subtract 200 RLU from all readings, the Curve Data Set would be defined as:

N	X: RLU	Y: Reading
1	200	0
2		

→ *Y = X - 200*

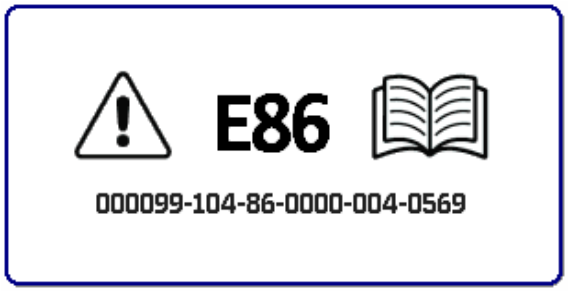
Currently the only **Data Fit Method** available is **Linear Interpolation** between the data points (with Linear Extrapolation at the extremes).

8 Troubleshooting

For technical enquiries, please contact your local distributor or Nemis Technologies at the address given on Page 2 of this manual.

Table 28: Troubleshooting Suggestions	
Unit will not turn on	
• No power → *Check power is switched on at wall outlet socket*	⇨ *6.2*
• Bad USB connection → *Ensure power connector fully inserted into rear of unit*	⇨ *6.2*
Unit spuriously resets or restarts automatically	
• Power connecter loose → *Ensure USB connecter fully inserted at rear of unit*	⇨ *6.2*
• Bad USB cable → *Use good quality USB 2.0 cable, as supplied with the unit*	⇨ *6.2*
• Supply brown-outs or black-outs → *Power unit from a stable AC mains supply*	⇨ *11*
Unit does not recognise sample tube insertion	
• Tube too small → *Use only specified tube type*	
Measurement result lower than expected	
• Tube poorly inserted → *Ensure tube is pushed fully down in tube holder*	
• Low sample volume → *Ensure sample greater than minimum operating volume*	
• Wrong protocol selected → *Ensure using correct measurement protocol*	⇨ *6.4*
• Dirty chamber → *Check that dirt not built up in sample read chamber*	⇨ *9.1*
Measurement result higher than expected	
• Wrong protocol selected → *Ensure using correct measurement protocol*	⇨ *6.4*
• Light ingress → *Do not use unit in direct sunshine or under infrared lighting*	⇨ *5*
Nemis Data App reports No Units Attached	
• USB Driver → *Ensure that the USB Driver is installed*	⇨ *7.1*

If the software detects a problem with the unit, it displays the following error popup showing one of the error codes listed in Table 29.



If the problem persists, please contact your distributor or Nemis Technologies for assistance, quoting the error code and the 22-digit report code.

A copy of the unit screen image can be captured using the **Capture Unit Screenshot** option in the Nemis Data App **Help** menu (see Section 7.2.3).

Table 29: Luminometer Unit Error Codes

Code	Meaning	Suggested Remedy	
E10	User Settings not set	Review option settings and adjust as required	⇨ *6.7*
E86	Real-Time Clock battery flat	Leave the unit plugged in for at least two hours to recharge clock battery	⇨ *6.7.1*
All others	Internal unit fault	Contact distributor for further assistance	⇨ *10*

9 Maintenance and Servicing

Although the Luminometer unit does not require any scheduled servicing, the operator should regularly clean and inspect the unit for defects, as described in Section 9.1 below.



DANGER

Please observe and comply with all of the **Unit Maintenance and Serviceability** safety precautions listed in Section 2.

Always unplug the unit before performing any cleaning or disinfecting tasks.



WARNING

Never remove the unit casework. There are no user or operator serviceable parts inside the unit.

Never use alcohol-based cleaners on the black surfaces inside the lid as it will remove the coating and significantly degrade the unit's performance.



CAUTION

Practise anti-static precautions by avoiding directly touching the exposed electrical contacts or using statically charged cleaning cloths.

For technical and service-related enquiries, please contact your distributor or Nemis Technologies at the address given on Page 2 of this manual.

9.1 Routine Cleaning and Inspection

The unit casework should be cleaned and inspected at regular intervals, and whenever contamination or spillage occurs, as follows:

1. Disconnect the USB power cord from the unit before performing any inspection checks or cleaning.
2. Wearing suitable PPE, clean the casework using a damp cloth or cotton bud soaked with a suitable disinfectant solution (such as Virkon). Do not over wet.
3. Clean around the LCD fascia and touchscreen, taking care to avoid over wetting or pushing debris into the bezel gap.
4. Clean inside the lid, taking particular care not to rub away the black coating.
5. If necessary, carefully clean the sample chamber using a damp long-stick cotton bud only. Do not push anything else into the cavity as it may get caught on the tube alignment string and damage the unit.



WARNING

After cleaning, ensure that the unit is thoroughly dry before reconnecting the power cord to the unit.

9.2 Decontamination Procedure

The unit and accessories should be decontaminated using the following procedure before being stored or transported, as per Section 9.1.

Certificate of Decontamination

We respect the health and safety of our clients and employees, and request that any products or accessories being returned are decontaminated in accordance with the procedure below.

1. Decontamination Procedure

Thoroughly clean all outside surfaces of the product (including any accessories, power cords, manuals, packaging, etc) with a damp cloth soaked with suitable disinfectant solution (such as Virkon).

Allow to dry fully before packing.

2. Decontamination Declaration

Company Name: _____

Address: _____

Product Code: BTL1 Luminometer

Serial Number: _____

Reason For Return: _____

Where Product Used: _____

Please tick the appropriate option(s) below:

☐ I certify that I have decontaminated the product as per the above procedure.

Decontaminant Used: _____

☐ I certify that the product has not been exposed to any chemical or biological materials.

Title: _____ Name: _____

Signature: _____ Date: _____

Telephone: _____ Email: _____

9.3 Transportation and Storage

The Luminometer unit and its accessories should be thoroughly decontaminated using the procedure detailed in Section 9.2 before being placed in its original packaging for transportation or storage.

WARNING

Refer to Section 11 for the acceptable range of Storage and Transportation environmental conditions.

Always ensure that the unit and accessories are completely dry and free of any condensation before being packed.

9.4 Product Disposal

At end-of-life, this product must be disposed of in accordance with your local authority regulations for the disposal of potentially hazardous waste and electronic equipment.

The unit and its accessories should be decontaminated using the procedure detailed in Section 9.2 before disposal or shipping.



Do not dispose of this product into unsorted municipal waste or public landfill.

Please contact your distributor (or Nemis Technologies at the address on Page 2 of this manual) for details of how to correctly dispose of this product.

China RoHS	This table has been prepared in accordance with SJ/T 11364 此表格表明符合SJ/T 11364标准						
Part Name 部件名称	**Toxic and Hazardous Substances and Elements** 有毒有害物质或元素						
	Pb 铅	**Hg** 汞	**Cd** 镉	**Cr6** 六价铬	**PBB** 多溴联苯	**PBDE** 多溴二苯醚	**EFUP** 环保使用期限
CASEWORK	O	O	O	O	O	O	e
CONTROL PCB	X	O	O	O	O	O	50
READER MODULE	X	O	O	O	O	O	25
TUBE DETECTOR CABLE	O	O	O	O	O	O	25
	EFUP No (Overall) 环保使用期限						

O: Indicates that the part contains hazardous a substance below the level listed in GB/T 26572
表示料件所包含有害物质低于在GB/T 26572中列出的标准。
X: Indicates that the part contains hazardous a substance above the level listed in GB/T 26572
表示料件所包含有害物质超过在GB/T 26572中列出的标准。

10 Warranty and Returns

Integrated Technologies Limited (ITL) warrants the Luminometer product, when purchased new and installed and operated in accordance with the instructions of this manual, to be free from defects in materials and workmanship, and will repair or replace, at their discretion, any unit or accessory which exhibits such defects.

In no event will ITL be liable for any indirect, incidental or consequential damages resulting from any defect or warranty claim.



NOTE

Unspecified use or unauthorised modification of any part of the Luminometer unit or its accessories or the use or attachment of any adaptor or peripheral not supplied, specified or sanctioned by ITL will invalidate this warranty.

This warranty is provided to the original purchaser of the product for one year from the date of purchase.

Under the terms of this warranty, the product must be returned in its original packaging, transportation prepaid by the sender, with a copy of the Proof of Purchase and a detailed description of the problem.



WARNING

The product must be decontaminated using the procedure detailed in Section 9.2 and a Certificate of Decontamination supplied with any return. If the product is considered too hazardous to be shipped, please contact Nemis Technologies on the number given on Page 2 of this manual for further instructions.

Please contact your distributor (or Nemis Technologies on the number given on Page 2 of this manual) to receive authorisation to return the product.

11 Technical Specification

Physical Unit Properties

Dimensions (W x D x H)	160 mm x 235 mm x 180 mm
Weight	2.5 kg

Power Supply

Power Adaptor Input Voltage	100 to 240V AC ±10%, 50/60 Hz ±5%
Power Adaptor Consumption	25W max
Power Adaptor Output	5.0V DC ±5%, 1.0A max
Unit Input Voltage and Current	USB-B: 5.0V DC ±5%, 1.0A max
Overvoltage Category	II (Building wiring up to 300V)

Operating Environment

Temperature Range	+15 to +35 °C
Relative Humidity Range	20% to 85% non-condensing
Maximum Operating Altitude	2000 m above sea-level
Pollution Degree	2 (Non-conductive pollution)

Storage and Transportation

Temperature Range	-10 to +50 °C
Relative Humidity Range	20% to 95% non-condensing

Measurement Range

Standard RLU Protocol	0 to $8x10^6$ RLU
Standard Linear Range	0 to $5x10^6$ RLU

Unit Data Storage Capacity

Users	50
Test Protocols	100
Test Results	1000 (up to 30000 kinetic data points)

Nemis Data App Storage Capacity

Users	Unlimited (50 Active)
User ID Length	1 to 5 characters
User Name Length	1 to 20 characters
User Password Length	20 characters maximum
Test Protocols	Unlimited (100 Active)
Protocol Name Length	1 to 12 characters
Protocol Description Length	1 to 40 characters
Test Results	Unlimited
Sample ID	1 to 16 characters
Result Decimal Places	0 to 3 digits
Units of Measurement	1 to 7 characters
Test Result Bands	
Band Name	1 to 12 characters
Result Bands	6 bands maximum
Comparison Bands	4 bands maximum
Comparison Range	0 to 10000%
Reagent Assays	Unlimited
Assay Name	1 to 20 characters
Assay Curve Points	10 points maximum
Unit Settings	
Unit Name	30 characters maximum

12 Glossary of Terms and Abbreviations

CSV (file)	Comma Separated Values
EMC	Electro-Magnetic Compatibility
Incubate	Keeping an organism, cell or cell culture at the optimum temperature for growth and development
PPE	Personal Protective Equipment
RLU	Relative Light Units. An arbitrary unit of light measurement



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