

Palintest

Turbidity Expert User Manual



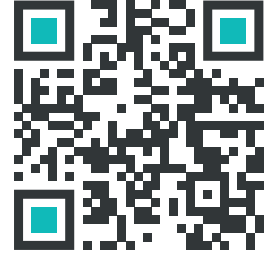
Registration and technical support

Thank you for choosing a Palintest Turbidity Expert. If you haven't done so already, please register your instrument to access calibration certificates and product warranty information.

There are two ways to register your product, firstly you must register an account with Palintest Connect here: <https://palintestconnect.com/>

Once your Turbidity Expert is registered you will have access to:

- Calibration certificates
- Updated product manuals
- Product compliance certificates,
- New features through latest firmware updates, and
- Access to your measurement data



Intended Use

Turbidity is a critical parameter for water utilities as it directly impacts water quality and safety, influencing the effectiveness of disinfection processes and the overall aesthetic of drinking water. Achieve accurate turbidity measurements with our cutting-edge Turbidity Expert, designed for exceptional usability, durability, and reliability.

Ideal for municipal water analysis, distribution network monitoring and sampling teams, our turbidity meter is your trusted companion in achieving compliance and ensuring water safety.

Turbidity Expert offers:

- Reliable, highly precise measurements
- User friendly interface to minimize operator variability
- Field replaceable optical cartridge to ensure uninterrupted testing
- Real time data management with wireless connectivity
- IP67 certified, shock proof suited for harsh field condition

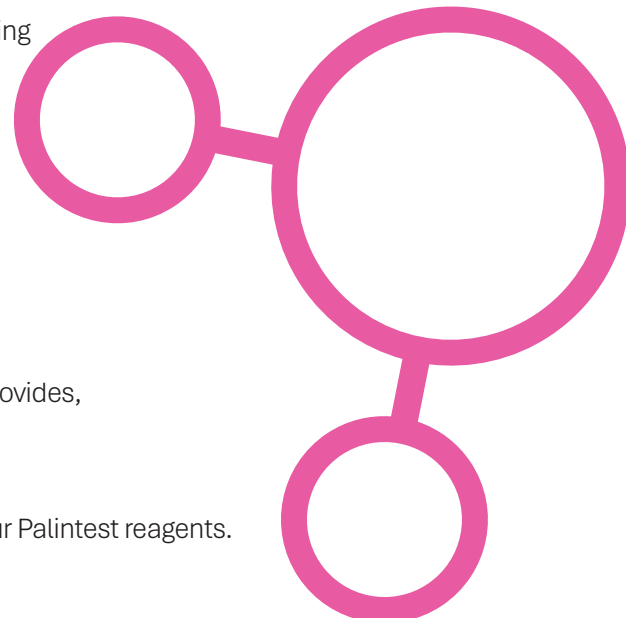
Important Safety Information

Please take time to read and follow the advice in this manual.

If this instrument is used in ways not specified, the protection it provides, and its accuracy may be impaired.

Avoid replacing batteries in wet or humidity condensing locations.

Please read and follow all the safety information supplied with your Palintest reagents.



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Instrument layout



The Home Screen

From powering up, the home screen appears and provides access to all functions.

A selected button on the home screen will change colour (see below where the measure button is selected).

Measure the turbidity of your water sample!

(button shown selected)

Check Standards

- Use regularly to verify the calibration

Calibrate your device

- SDVB & Formazine
- Replace optical cartridge



- Add users, and
- Add labels to identify different measurement locations with Pass/Fail limits.

- Access your history of measurements

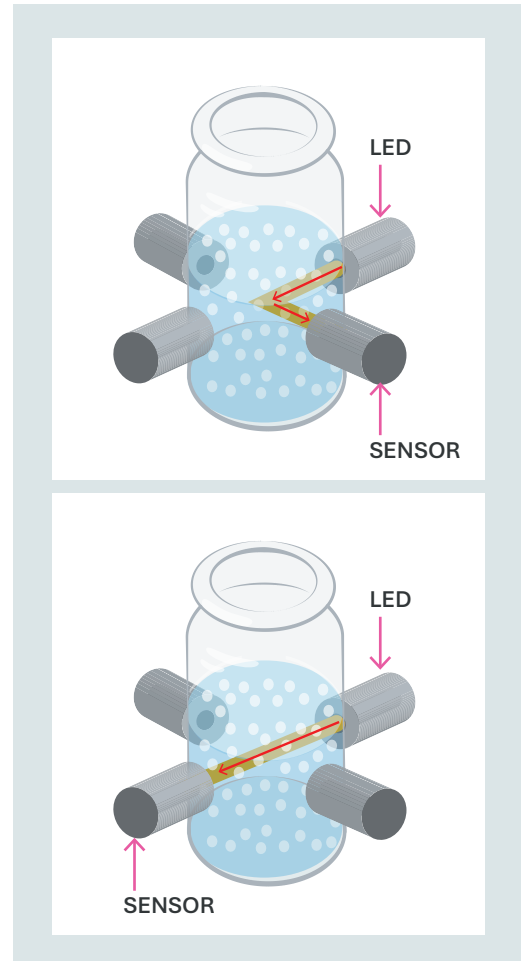
- Set up and customize your device (including Wi-Fi connectivity and Palintest Connect)

Basic principles of nephelometric and attenuated turbidity measurements:

Low level Turbidity is measured using nephelometry – this established technique is performed by detecting the intensity of light scattered by suspended particles in a liquid. A light source is directed through the sample, and a photodetector placed at a 90-degree angle to the incident beam measures the scattered light from suspended particles in the solution.

The amount of scattering is directly proportional to the turbidity, with higher particle concentrations resulting in more scattered light. Results are expressed in Nephelometric Turbidity Units (NTU) or, Formazine Turbidity Units (FTU) .

At higher levels of turbidity, it can be beneficial to use attenuated turbidity measurements. This is due to the increasingly dense population of suspended particles in the sample that cause the scattered light to become trapped within the sample. Attenuated measurements would result in a reduction in the amount of light being able to pass through the sample as Turbidity increases, results for these measurements are expressed in Formazine Attenuation Units (FAU).



Generic outline of the test procedure

Below is an outline of the basic procedure for the majority of tests. For specific test details please refer to the specific test instructions. These are available on the instrument here.

1

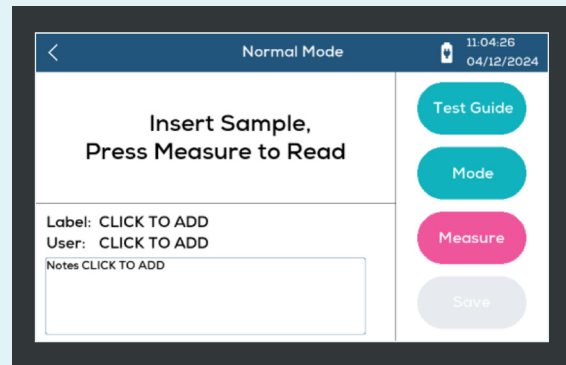
Insert the sample into the measurement chamber and close the light cap.

Ensure the best practices sample handling is followed (details on page xx).



2

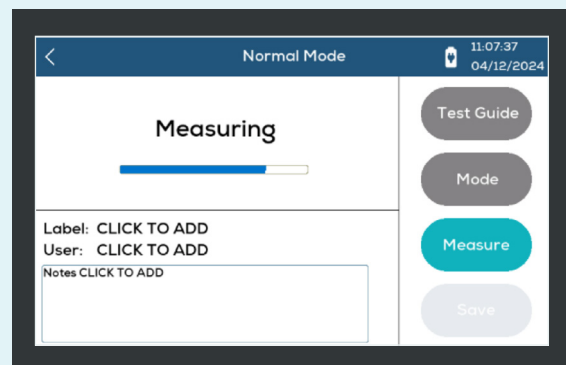
With your sample in the measurement chamber and the light cap closed, access the measure screen and press the measure button.



3

Your Turbidity Expert will begin measuring.

It will automatically detect the optimum measurement range.

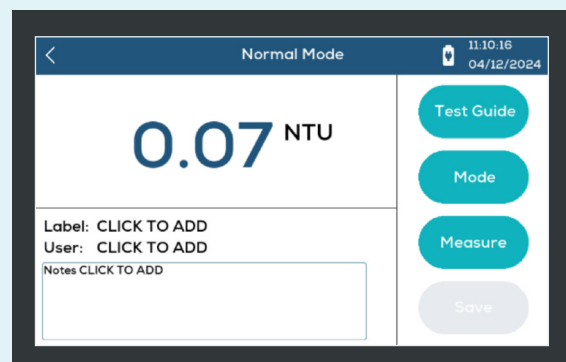


4

The result will be presented on screen.

You can still add label, user and notes.

The result will save to the log before next measurement or when exiting the screen.



Mode

There are three modes of operation:

Normal Mode:

A single measurement, as discussed in the previous test procedure.

Average Mode:

Present in the same way as single measurement, however the result is the average of three sequential “single” measurements

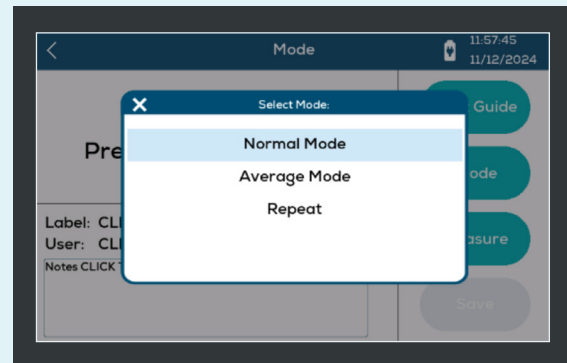
Repeat:

Repeat mode will continuously measure the sample until the “Save” button is pressed. Only the result that is active when the “Save” button is pressed is saved to the log. This mode can be useful if you want the measurement sample to settle prior measuring the residual suspended particulate – i.e. lowest turbidity.

1

To Select the measurement Mode, select the “mode” button from the measure screen.

From the pop-up list presented select the desired mode of operation.

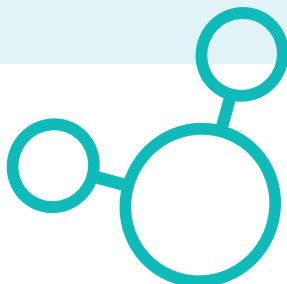
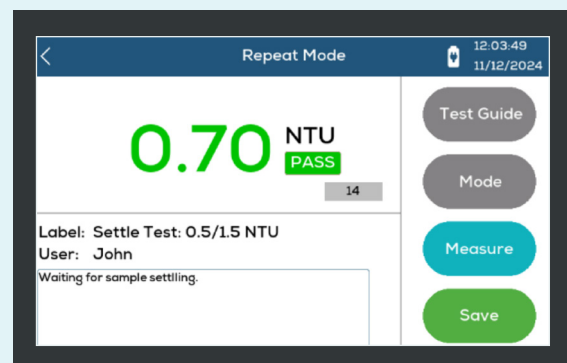


2

The mode is shown on the info panel.

In “Repeat” mode, the number of tests completed is shown.

Press “Save” to save the result – the next measurement then restarts the counter.



Best practice – achieving best results

1

Use only clean sample tubes and rinse with sample before use.



2

Remove all marks and fingerprints from the sample tube before measuring



3

Ensure the sample tube cap is in place during measurement.



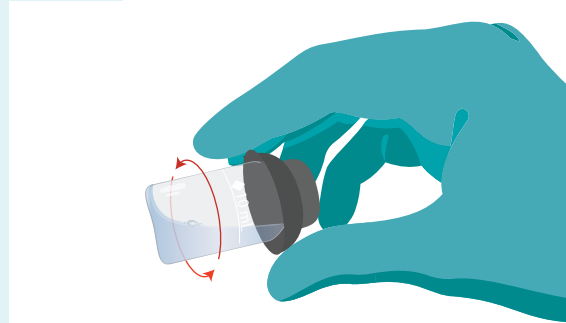
4

To reduce the effect of scratches on the glass, place a drop of Silicone oil onto the tube and wipe using the lint free polishing cloth.



5

Remove bubbles from sample tube wall. Hold the capped tube at an angle and rotate.



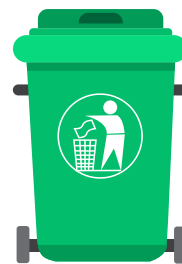
6

Place the sample tube in the instrument in the same orientation for all readings.



7

Heavily scratched or contaminated sample tubes should be discarded



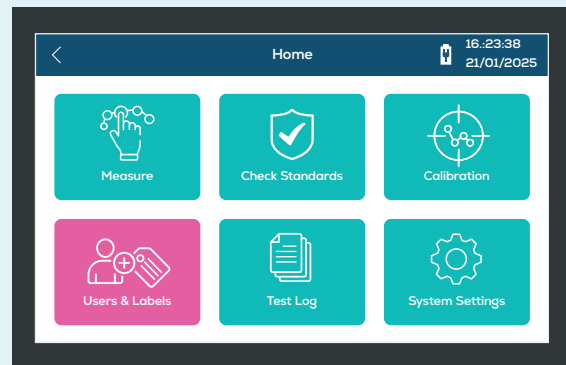
Adding Labels and Assigning Test Limits

Labels are used to identify tests. Often the tests are identified by measurement location. You can also apply limits to your label, indicating if the results are acceptable.

Data viewed using Palintest connect can be grouped by label, i.e. all measurements made at a location can be viewed together as a time series of results.

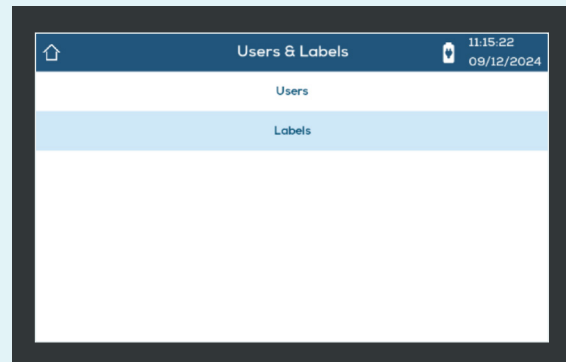
1

Firstly, select the Users & Labels option from the home screen



2

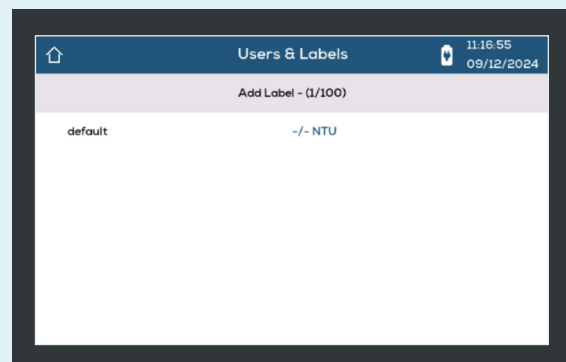
Select the Users option from the Menu



3

A list of existing labels will be shown, a "default" label will be used when there is no label selected.

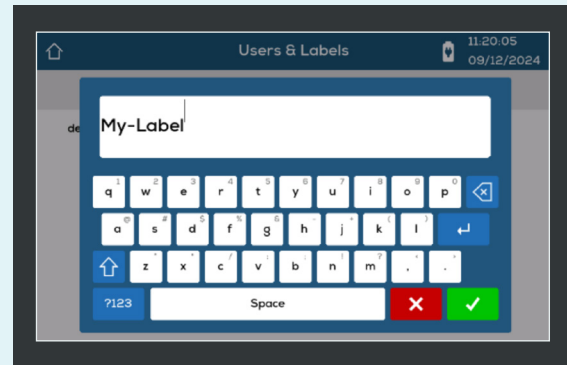
To add a custom label select "Add Label".



4

Type in the name identifier for your new label, the text is limited to 27 characters (max).

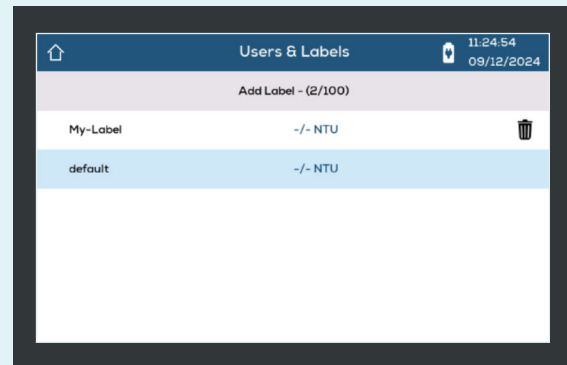
Press the green tick button to save the label.



5

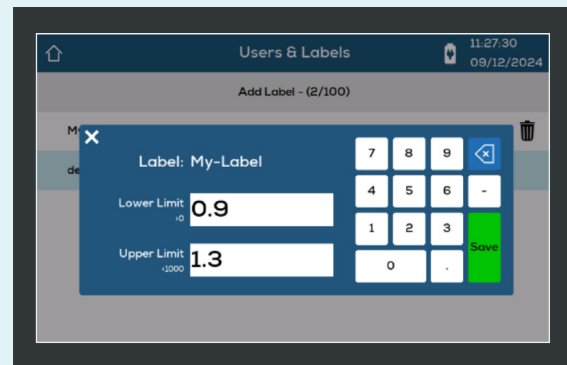
Your label now appears in the label list.

To add test limits, select the +/- NTU text



6

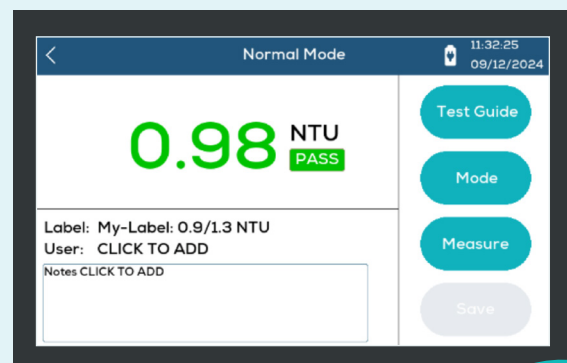
Enter the upper and lower limits for your label and press "Save"



7

Assign the Label when measuring.

If limits have been set, they will be applied to the result indicating PASS for in-range measurements and FAIL for results outside of the defined range.

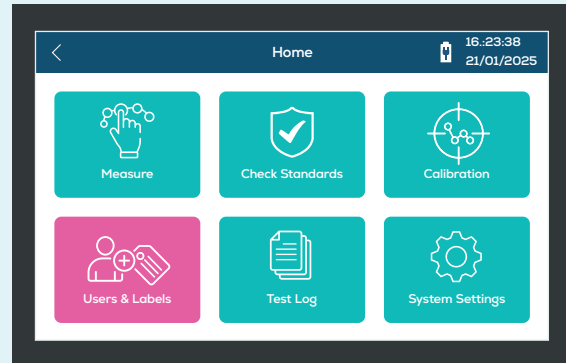


Adding Users:

You can assign a User to identify who has performed the measurement.

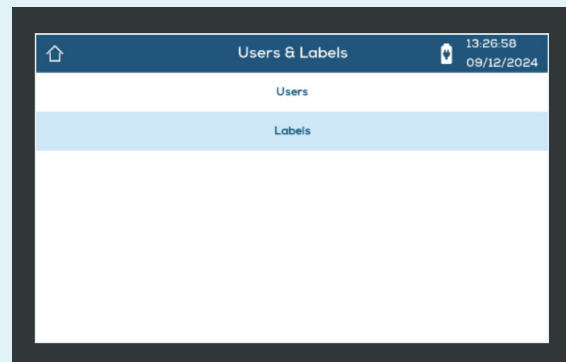
1

Firstly, select the Users & Labels option from the home screen



2

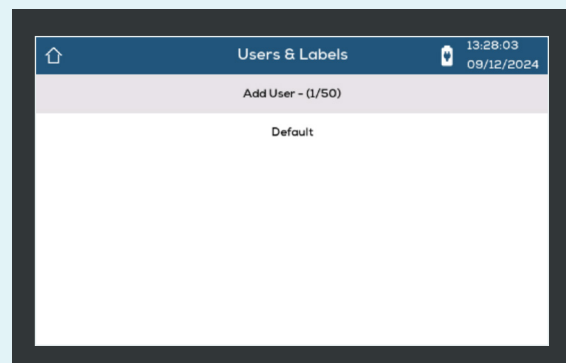
Select "Users" for the menu.



3

A list of Users is presented – if you do not assign a user to the measurement result, the "Default" user will be used.

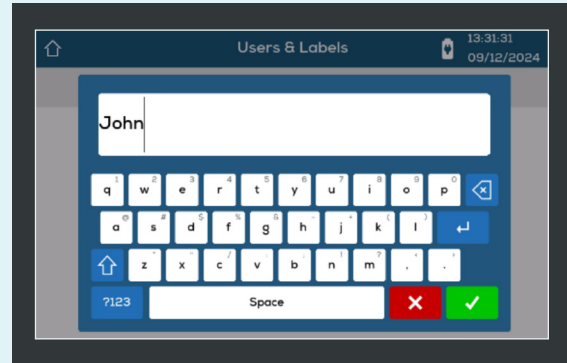
To add a new User select "Add User".



4

Type in the User Name, The message text is limited to 255 characters (max).

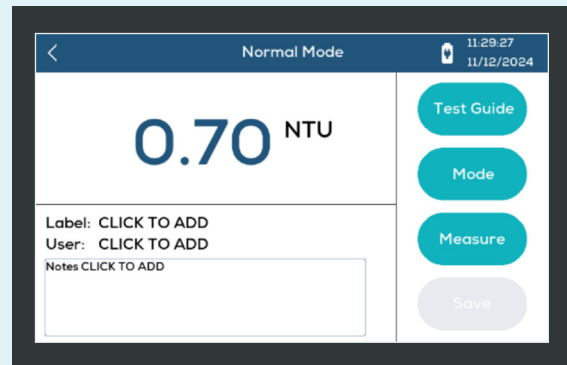
Press the green button to save the new User.



5

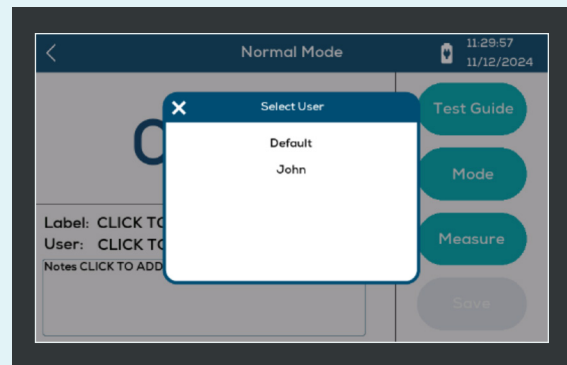
You can add "user" data to each test before or after completing a measurement.

Select "CLICK TO ADD"



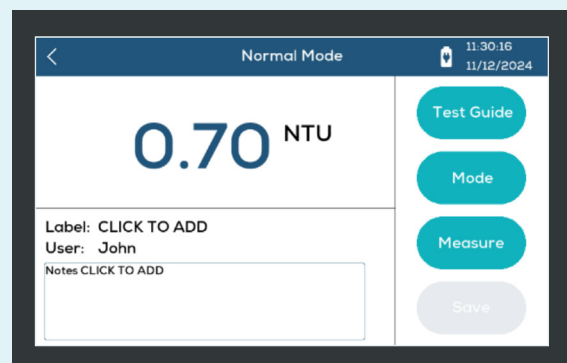
6

Select the User from the list presented



7

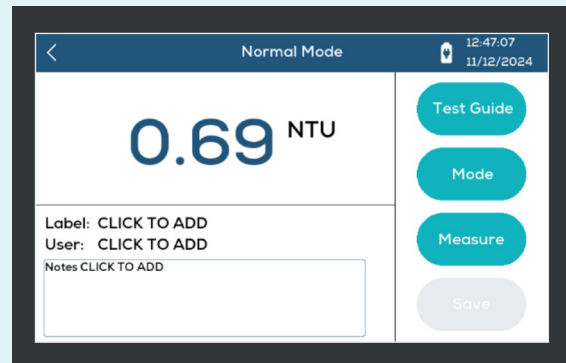
The selected USER will be shown



Adding Notes:

1

On the measure screen, click the Notes field where it says “CLICK TO ADD”.

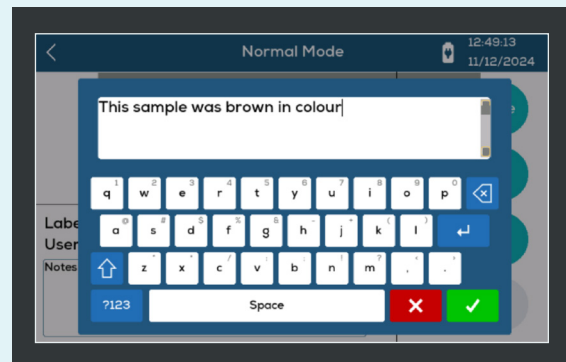


2

A pop-up window to add the “Note” text will appear.

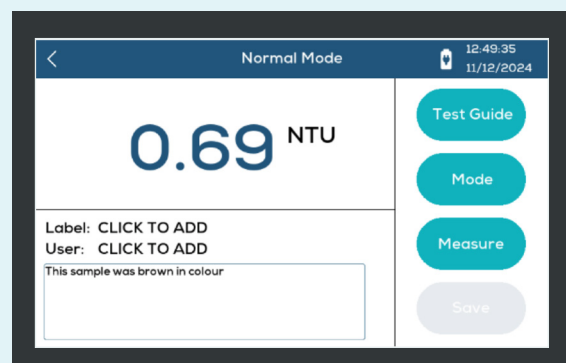
Add your note message using the keyboard input. The message text is limited to 255 characters (max).

Press the green tick to add to the test information.



3

The note will be added to the test information and saved in the log of results with the rest of the measurement information.



Calibration Mode

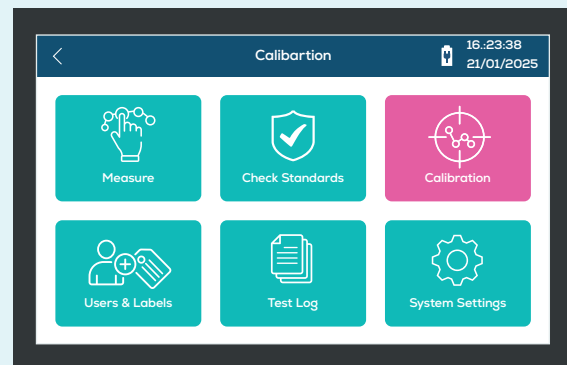
The Palintest Turbidity Expert is calibrated on reference Formazine standards during manufacture. This reference calibration is stored within the instrument.

It is possible that in use, exposure to environmental contaminants can cause the performance of your instrument to deviate from the optimum.

There are several options in the calibration menu to ensure your product continues to give accurate results.

1

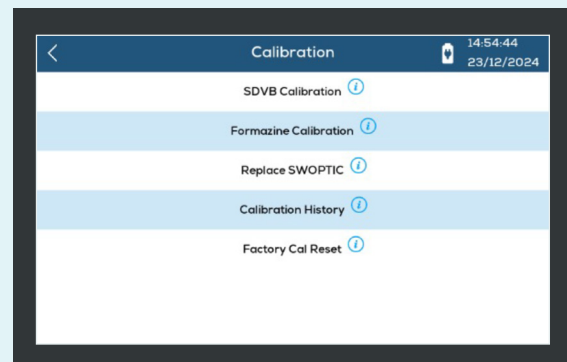
To access the calibration menu, select the Calibration mode tile from the main menu



2

The calibration options list presents several options:

- SDVB Calibration
- Formazine Calibration
- Replace Optics
- Calibration History
- Factory Calibration Reset



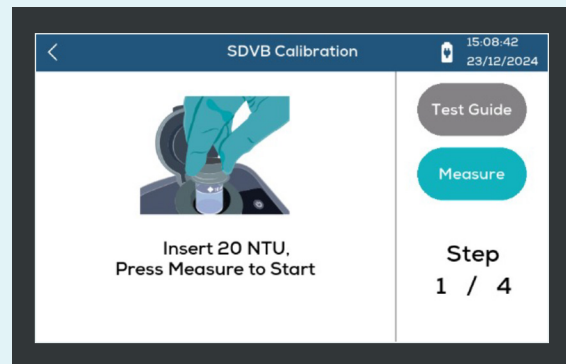
SDVB Calibration

The SDVB standards provided as part of your Turbidity Expert kit can be used to calibrate your instrument. You must have a valid set of SDVB standards to be able to calibrate. Ensure you have entered the assignment code for your standards in the “check standards” function ([described in detail on page 22 – Check Standards Mode](#)). Standards are valid for 12 months after manufacture, new standards can be purchased from Palintest if required.

To begin calibrating with SDVB, select the “SDVB Calibration” option from the list.

1

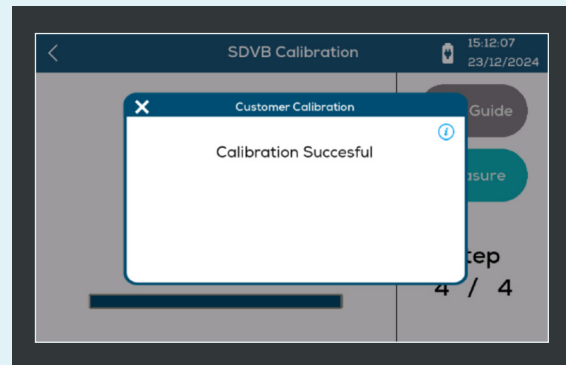
Follow the on screen instruction, Insert the required standard and press the “Measure” button to complete each of the calibration steps.



2

Note that on step #4, the instrument must have nothing in the measurement chamber and the light cap must be closed.

Once complete, the calibration will be saved in the instrument.



Formazine Calibration

Formazine calibration must only be done in a controlled laboratory environment.

To perform a Formazine calibration, you must make dilutions to base Formazine solutions with an assumed starting value of 4000NTU - Make dilutions to the base solution to achieve target values of 20, 100 and 400 NTU.

Note the assumption that the dilutions are made correctly and therefore no adjustment to the assigned values are possible.

As with SDVB, follow the on-screen instructions and complete the 4x calibration steps.

Once complete the calibration will be stored in the instrument.

Replace the SWOPTIC

The Palintest Turbidity Expert included groundbreaking new feature to protect the primary optical system from environmental contaminants that are common in turbidity measurement.

The field replaceable optic system can be easily swapped out. SWOPTIC unit kits are available for purchase from Palintest and can be changed to keep your product in service.

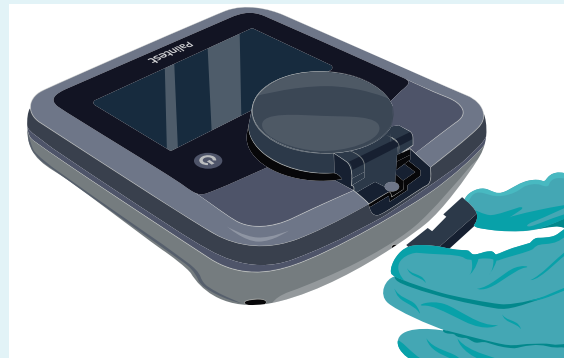
1

Remove any glassware from the measurement chamber



2

Remove the optic lock cover to access the fastener



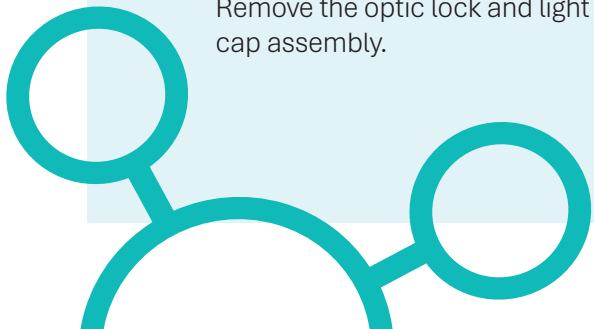
3

Use a pozi driver to remove the fastener



4

Remove the optic lock and light cap assembly.



5

Use the pry tool to loosen break the SWOPTIC seal IP67 seal.



6

Remove the old SWOPTIC



7

Align the arrow with the top of the instrument and fit the new SWOPTIC.

Note: SWOPTIC can only fit in one orientation - the arrow will guide you to ensure this is a simple task.



8

Fit the new SWOPTIC component, push gently to ensure the IP67 seal.



9

Replace the optic cover.
Use the retaining lio to pivot the
component into position.



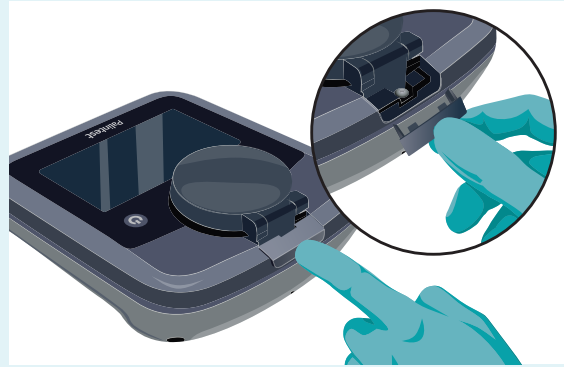
10

Replace the Posi-Drive fastener to
secure the assembly –
This should only be hand tight.



11

Replace the optic lock cover –
push the clip back in to place .



12

Please ensure THERE IS
NOTHING IN THE CHMABER
before you press update.



Factory Calibration Restore

To ensure that any mistakes can be resolved easily, the instrument can be restored back to its base factory calibration at any time.

You may need to repeat a user calibration (SDVB or Formazine) after factory calibration restore.

Always validate your product by running check standards to confirm operation.

Check Standards

Check standards are manufactured to precise values/tolerances and provided in sealed sample tube. Do not remove the sealed cap from the check standard.

Check standards have two applications:

1. They are used to verify the performance of the instrument
2. They can be used to perform customer calibration of the instrument

Each set of check standards are supplied with a certificate of authenticity. The certificate includes:

- The Serial Number (which matches the serial number and index on the label of each check standard vial),
- The assigned value (in NTU) of each vial
- The expiry date
- A one-time code for programming the above information into the instrument.

Check Standards are valid for 12 months after manufacture, after which time new Check Standards must be purchased from Palintest.

Check Standards Mode

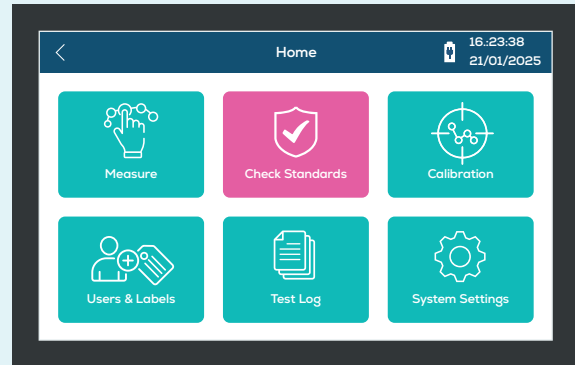
Check standards mode allow th performance of the instrument to be verified by evaluating the response of the instrument and comparing them to the assign value (in NTU).

First Use:

1

Select the Check Standard option from the “home” screen.

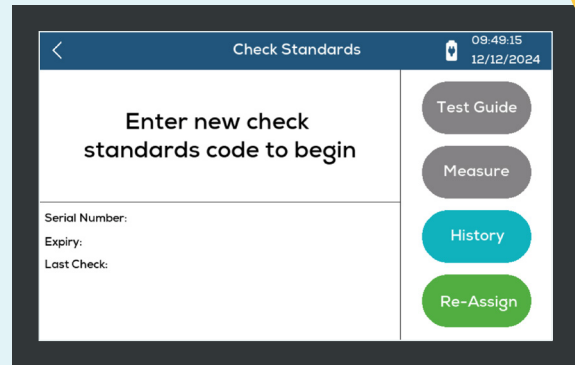
(Button shown selected)



2

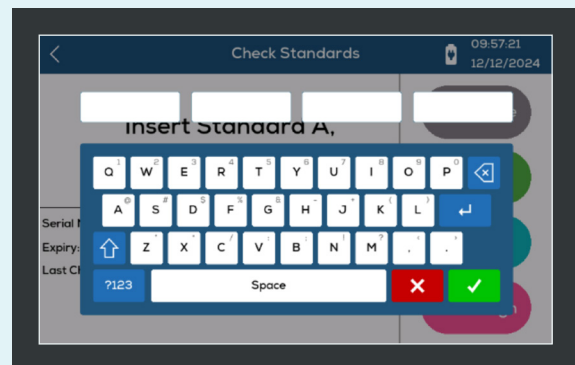
When you enter Check Standards for the first time, you must start by assigning the “one-time” validation code for your check standards.

Select the “Re-Assign” button to continue.



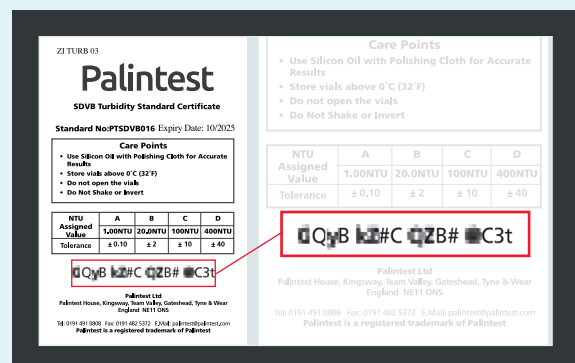
3

You will be presented with an input screen, here you need to type in the code that is found on your check standard certificate.



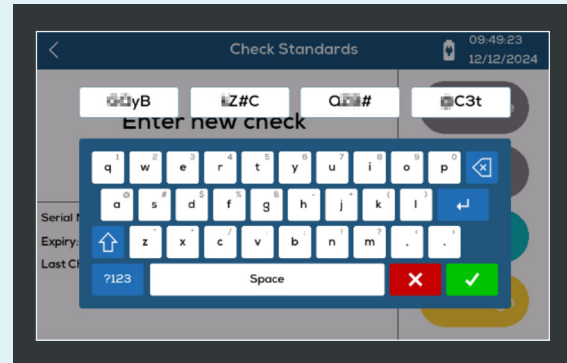
4

The code is shown on your check standard certificate, it will program your instrument with the check standard serial number, expiry date and standard assignments.



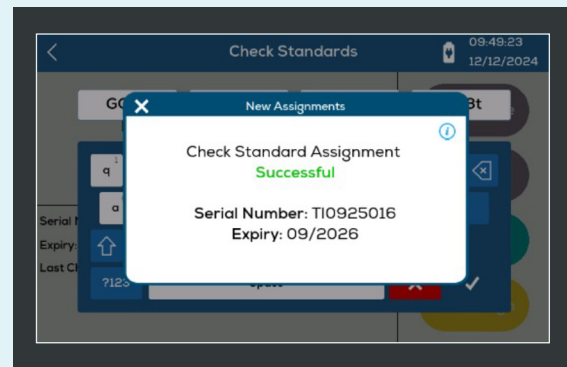
5

Type in the code, press the green tick button to confirm and save the validation code



6

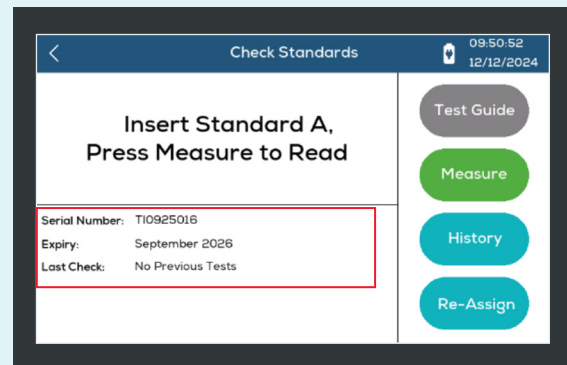
If the code is entered correctly, a summary pop-up will appear.



7

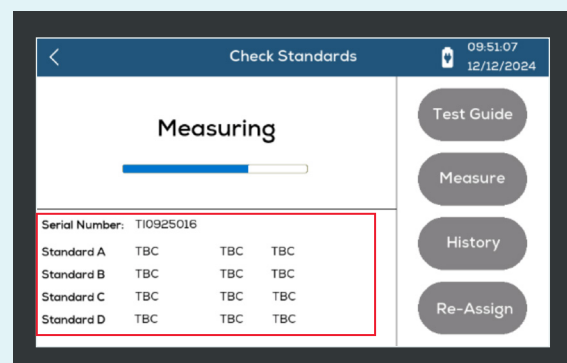
The information window is populated with the serial number, expiry date (and if completed) the result of the last check standard measurements.

To begin, follow the on screen instruction.



8

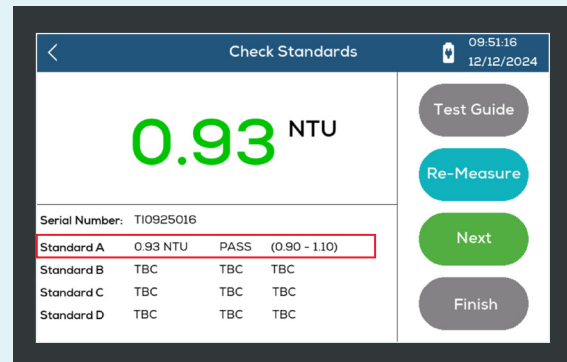
When the measurement begins, the information window will show the results of the "in-process" check standard validation.



9

When the measurement is complete, you can choose to re-measure the standard, or press “Next” to save the result and progress.

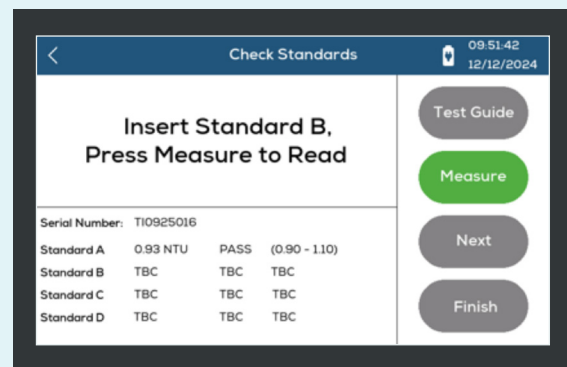
The info panel will be updated with the result summary.



10

When progressing, the on-screen instruction will update –

The expected action will always be indicated by the button with the “green” progress colour.

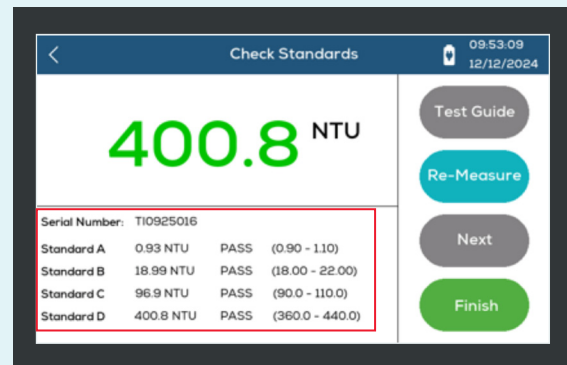


11

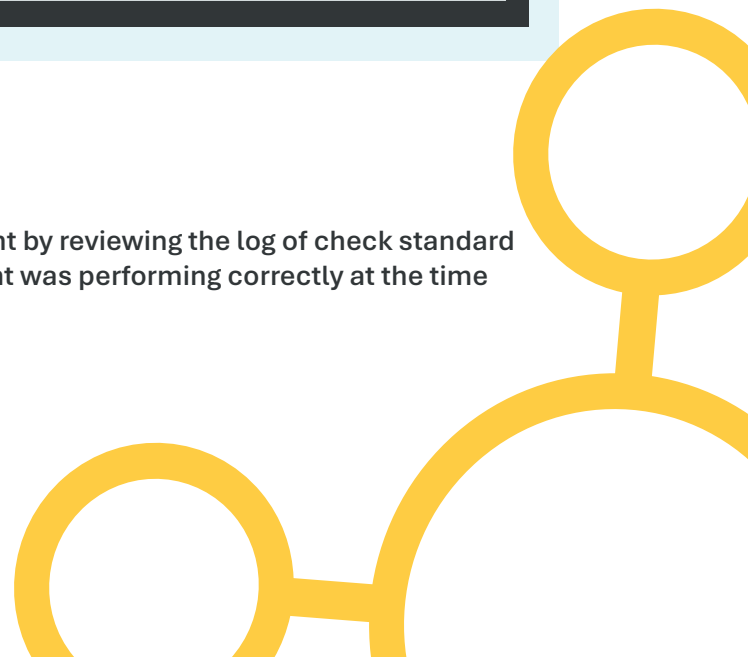
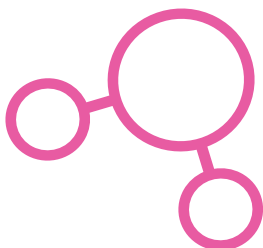
Follow all of the on-screen instructions to complete the process.

The results of all measurements should report a PASS result.

Once complete, press “Finish” to save.



You can always review the status of your instrument by reviewing the log of check standard results. This helps you to show that your instrument was performing correctly at the time and date of a given measurement.



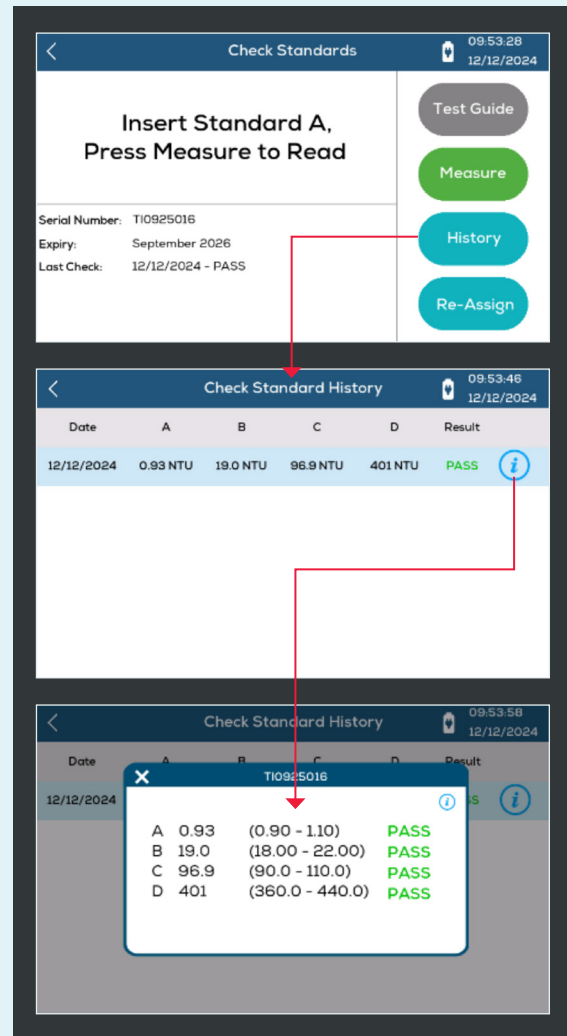
Palintest recommend that the instrument is regularly verified using check standards.

12

To access the history, access the check standard area and select the “history” button.

This will present a Summary of the last 100 check standard measurements.

Selecting the “i” information icon will give the details of each check standard measurement relative to the expected result for each check standard.



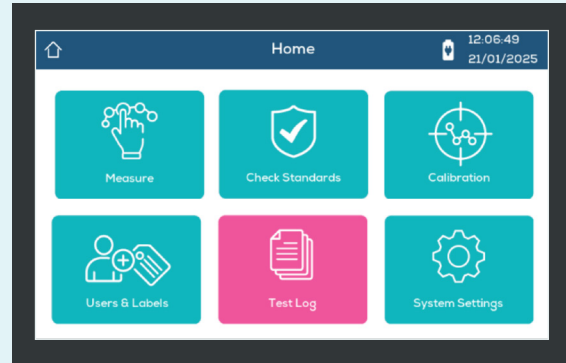
This enables viewing of all the test results in memory.

First Use:

1

Select the Test Log option from the “home” screen.

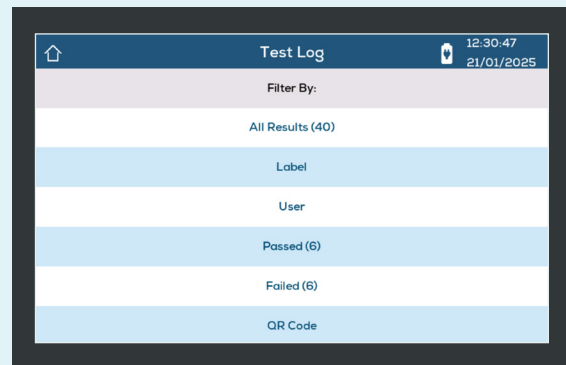
(Button shown selected)



2

The list presented allows your result history to be filtered: -

View all results, or view only the tests that are completed by a specific user, or by sample location.



3

Selecting the option will show a summary of results.

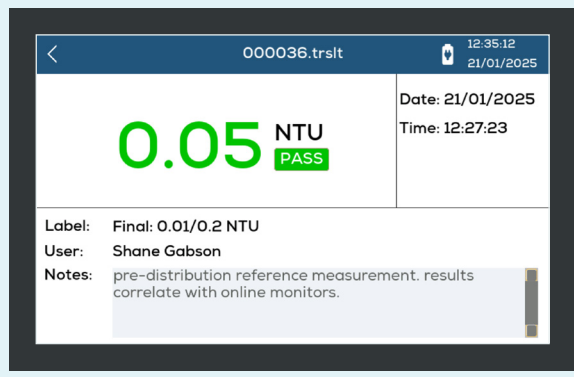
Select an individual result to view the key details.

The screenshot shows the All Results screen. At the top, it says 'All Results' and shows the time '12:32:42' and date '21/01/2025'. Below the header is a table with the following columns: Date and Time, Result, Unit, PASS/FAIL, Label, and Result File ID.

Date and Time	Result	Unit	PASS/FAIL	Label	Result File ID
12:29:31 21/01/2025	9.73	NTU	N/A	Default	000040.trslt
12:29:14 21/01/2025	1.00	NTU	PASS	AQC	000039.trslt
12:28:50 21/01/2025	0.12	NTU	FAIL	AQC	000038.trslt
12:28:20 21/01/2025	1.16	NTU	FAIL	AQC	000037.trslt
12:27:23 21/01/2025	0.05	NTU	PASS	Final	000036.trslt
12:25:54 21/01/2025	48.5	NTU	FAIL	Raw	000035.trslt

4

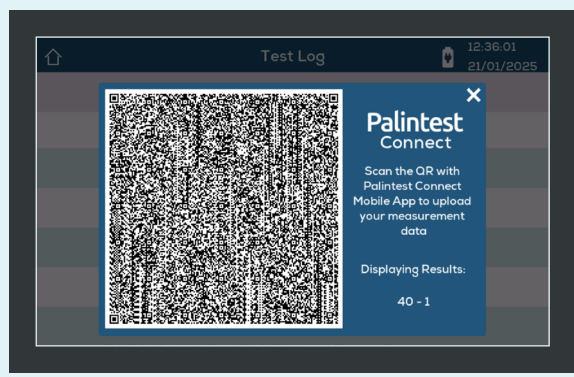
Each individual results will allow access to any test notes and test limits.



5

You can upload your results to Palintest Connect by scanning a QR Code with the Palintest Connect mobile application.

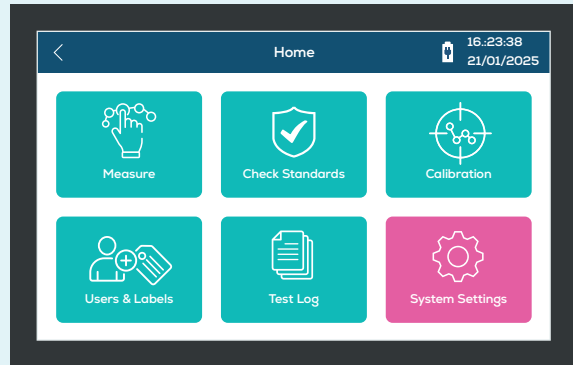
Access the QR code from the option in the Test Log menu.



System Settings

1

Select “System Settings” from the main menu to access the device configuration options:



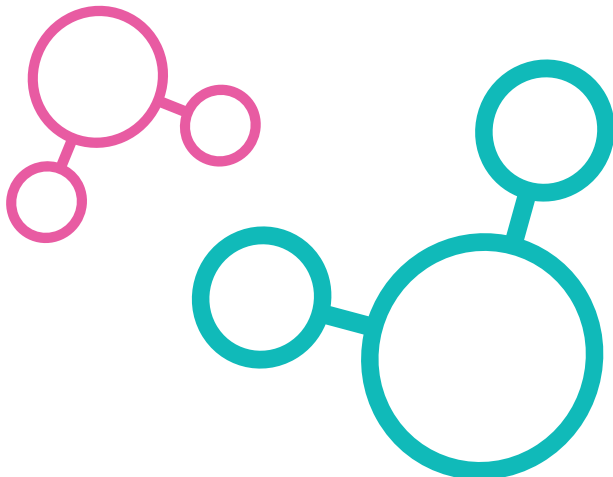
2

Select each option from the list and configure as you desire.



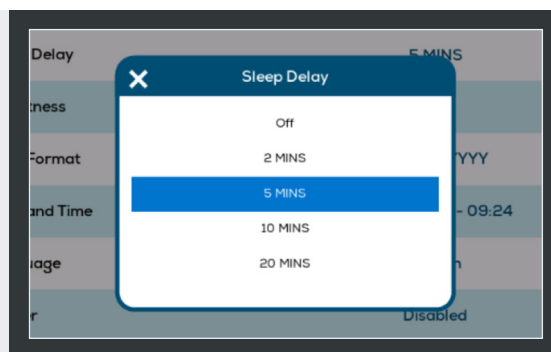
Please use the LUM7219-EN Manual as a guide here. All operation is the same but we may update screen shots.

Sleep Delay, Brightness, Date Format, Date and Time, Language, Buzzer, Labels, Users, Units, Temperature, Wi-Fi, Paintest Connect & Device Info



Sleep Delay

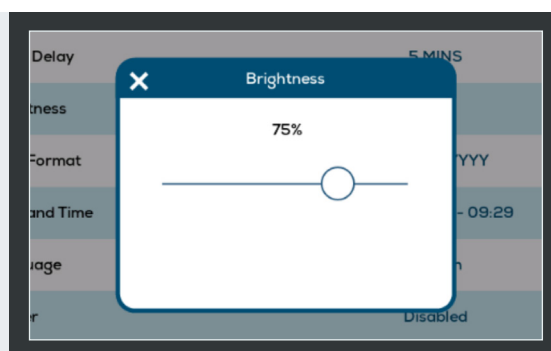
The Turbidity Expert can be set so that it after a period of inactivity it will go on to a low power usage mode including shutting off the screen. The period can be set from 2 minutes to 20 minutes. Sleep can also be disabled completely. Turbidity Expert will not go in to sleep mode when powered by USB.



Brightness

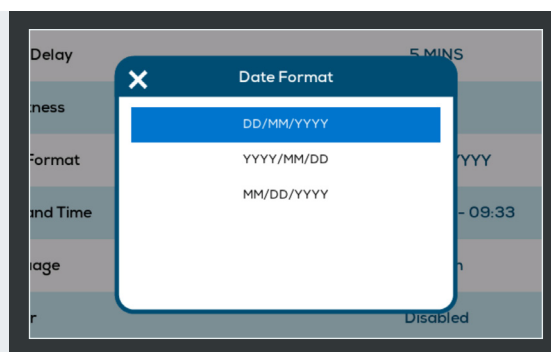
Screen brightness can be set from 0-100%. Reducing the screen brightness can improve the life of the battery.

After 1 minute of inactivity, the screen brightness will auto-dim to save power and prolong battery life.



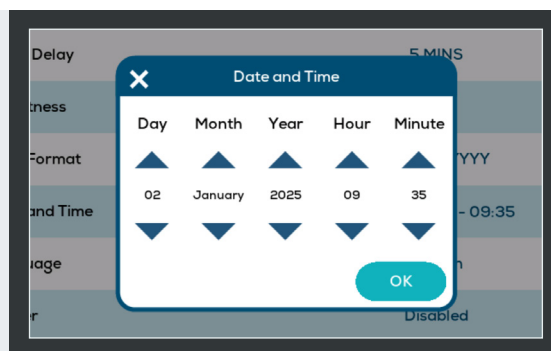
Date Format

The Day(D), Month(M) or Year(Y) can be set to one of three format options.



Date and Time

Use up and down arrows to set correct date and year. Time is set using 24 hour format.



Language

Selectable in English, French, Spanish and Chinese (Simplified).

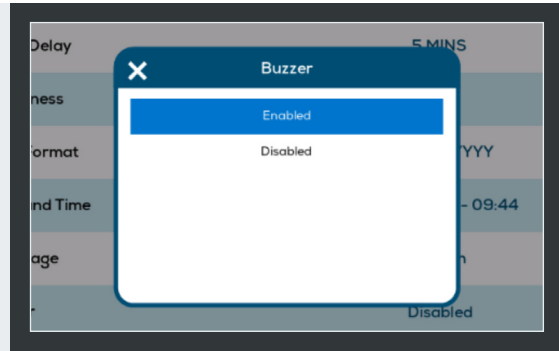




Buzzer

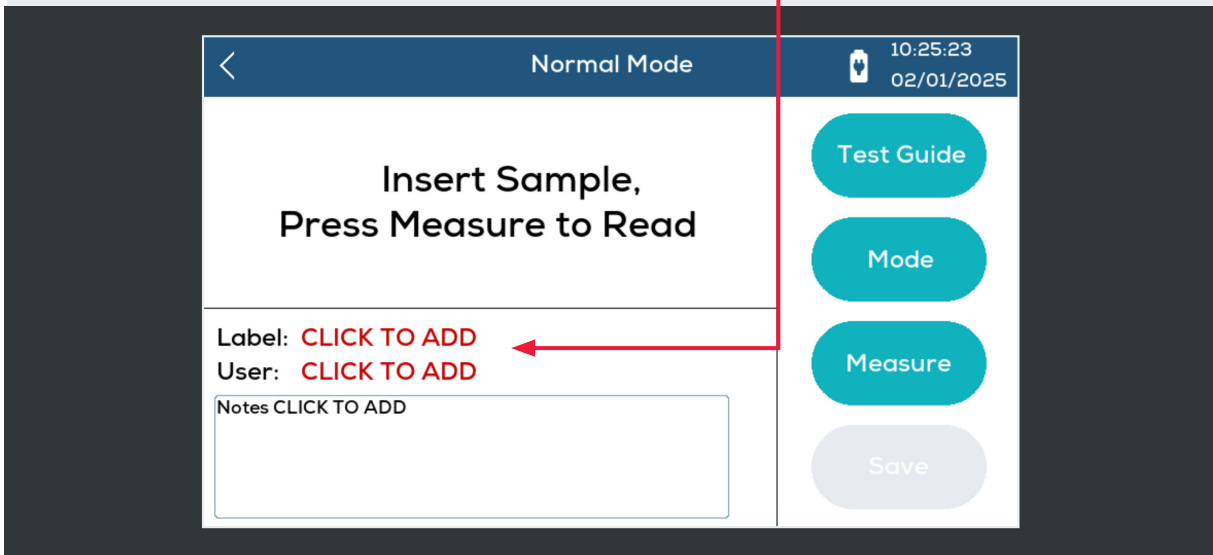
The buzzer will sound to indicate when a test is complete.

It is enabled by default but can be disabled.



Labels

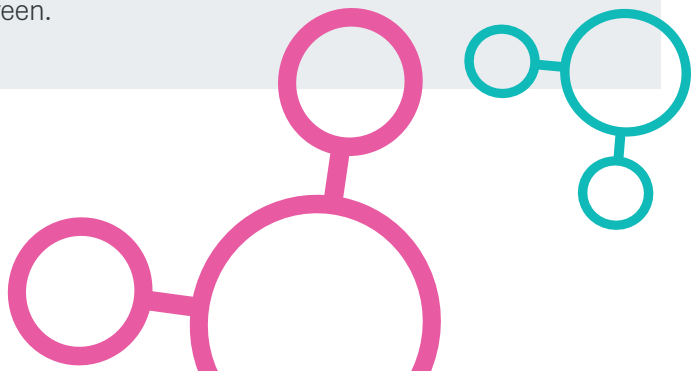
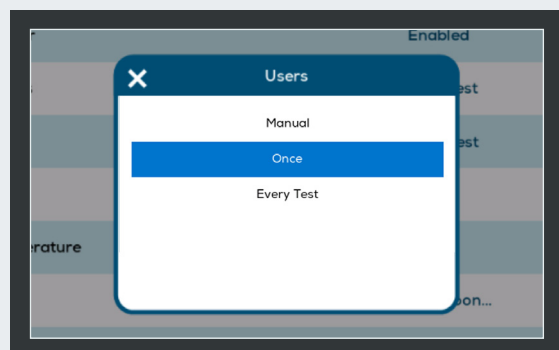
If no label is selected the test result screen will show: **CLICK TO ADD**.



This option sets when and how often the user is prompted to add a label to a test result after a water test is carried out.

Manual - There will be no prompting and results can be saved to the log without any label.

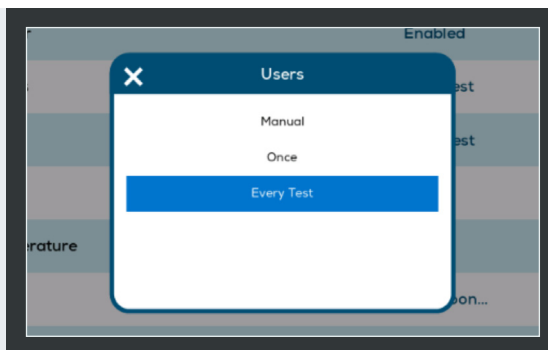
- **Once** – The tests results screen cannot be exited. This prevents the result being saved without a label being selected. Once a label has been selected, there will be no further prompts, and that same label will be used for all future tests until the instrument is turned off.
- **Every Test** – There will be a prompt for a label every time a test is carried out. Any previously selected label will not appear on the test screen.





Users

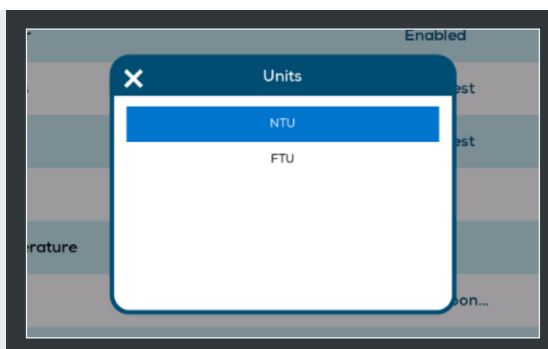
This functions identically to the above prompt settings for labels but is applied to Users.



Units

This enables the default units to be switched from NTU (Nephelometric Turbidity Units) to FTU (Formazine Turbidity Units).

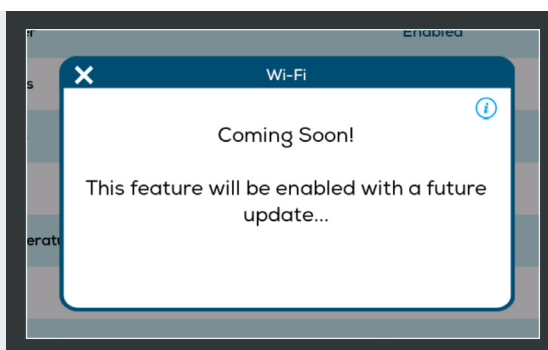
These are equivalent units, and it is a personal choice which is used.



WiFi & Palintest Connect

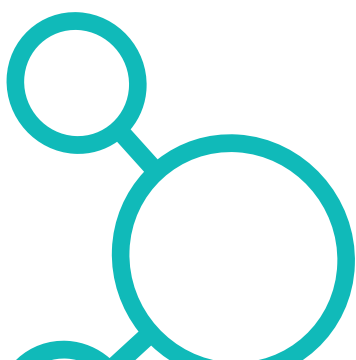
Upload your data directly to Palintest Connect via a Wi-Fi connection.

These features will be activated via a firmware update after launch.



Device Info

Access the key information about your Turbidity Expert including the serial number, installed firmware revision and number of completed test the device has performed.



Check Standards and Calibration

Palintest recommend that all products are serviced yearly by an approved Palintest service centre.

Check standards should be used regularly to validate the accuracy of the instrument.

If Check standards result in a failure, the device can be recalibrated with SDVB or Formazine through the correct menu selection (see page/sectionXXX).

If measurement accuracy is effected by environmanetal contamination, Palintest recommend that the field replaceable optic chamber is replaced. Check standards should then be re-measured to confirm the correct response of the product.

Updating Firmware

To update the firmware, connect your Turbidity Expert to a Windows PC using a USB Type A to C cable (Supplied).

If a new Firmware file has been downloaded or sent electronically, drag and drop that file in to this drive.

Alternatively, Palintest Connect will automatically update firmware if the instrument is registered.



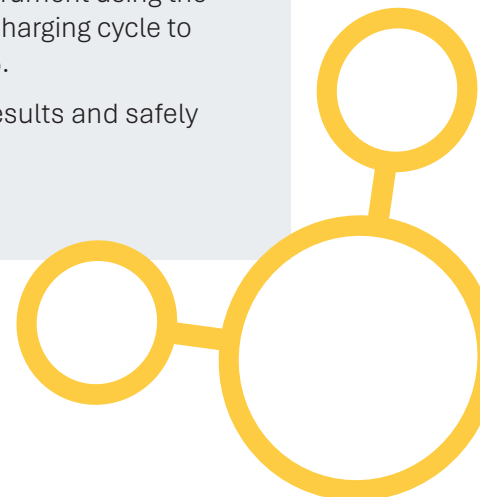
Battery Charging

The Palintest Turbidity Expert is supplied with a Lithium Ion battery that will deliver in excess of 2500 sequential tests from a full charge.

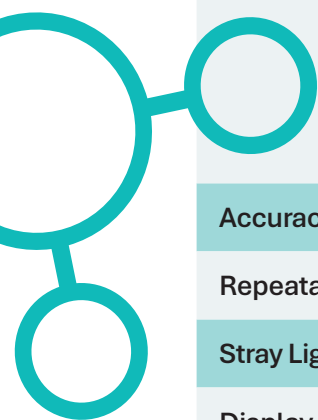
To charge your instrument, connect to a suitable power source to the instrument using the supplied USB Type A to C cable. Palintest recommend completing a full charging cycle to ensure that the battery always reports correctly – i.e. charge fully to 100%.

If the battery becomes too low, the device will automatically save any results and safely shut down.

The battery can only be replaced by qualied service centres.



Model	LT090														
Light Source	IR LED (860nm)														
Regulatory Compliance	ISO 7027														
Measuring Principle	Nephelometric & Attenuated														
Measuring Range	0.01 - 1000 NTU/FTU/ FAU														
Resolution	Auto Ranging: <table border="1"> <thead> <tr> <th colspan="2">range</th> <th>resolution</th> </tr> </thead> <tbody> <tr> <td>0.01</td> <td>9.99</td> <td>0.01</td> </tr> <tr> <td>10</td> <td>99.9</td> <td>0.1</td> </tr> <tr> <td>100</td> <td>1000</td> <td>1</td> </tr> </tbody> </table>			range		resolution	0.01	9.99	0.01	10	99.9	0.1	100	1000	1
range		resolution													
0.01	9.99	0.01													
10	99.9	0.1													
100	1000	1													
Accuracy	+/-2% + Stray light														
Repeatability	< 1 % or ± 0.01 NTU														
Stray Light	<0.02 NTU														
Display Units	NTU, FNU, FAU,														
Response Time	< 7 seconds														
Reading modes	Single, Signal Averaging and Repeat														
Calibration Options	Full calibration with SDVB, or Formazine														
Detector	Silicon Photodiode														
Sample Required	10mL														
Display	Full Color TFT with Projective Capacitive Touch (for use with Wet and Gloved hands)														
Interfaces	USB - C Wi-Fi Bluetooth														
Data Logger	1k (min) Detailed Results 10k (min) .txt file only results														
Data Transfer	Direct transfer with Palintest Connect for registered instruments Data accessible in .txt file via USB														



Technical Specifications continued

Power Save Modes	Auto Dimming.
Auto Off	User Selectable (2mins, 5 mins, 10 mins) Auto power down without user interaction.
Power Supply	Battery powered by a Rechargeable 5000mAh Lithium Ion Cell Powered through USB input 5V DC, 1500mA (Max input Supply)
Battery Life	75% capacity (after 500 charge cycles (min)
Tests per Charge	2500 test per full charge cycle.
Usage	Suitable for Indoor and Outdoor use
Wet location	Suitable for Wet locations
Protection Class	IP67
Environmental Conditions	Temperature: 0 - 40 °C (32 - 104 °F) Humidity: 0 - 90 % at 30 °C, noncondensing Humidity: 0 - 80 % at 40 °C, noncondensing
Permitted Altitude	2000m
Pollution Degree	2
Compliance	< 7 seconds
Languages (UI)	English & Spanish
Dimensions	195mm x 166mm x 72mm
Weight	650g

The Turbidity Expert is manufactured in the UK by Palintest Ltd, please see the technical support contacts by region below

UK:

Palintest Ltd
Palintest House,
Kingsway,
Team Valley,
Gateshead,
Tyne and Wear,
NE11 0NS,
UK
<http://www.palintest.com>
sales@palintest.com

Authorised Representative in the EU:

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J. Keplerweg 14,
2048AC Alphen aan den Rijn,
Netherlands

USA:

Palintest USA
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Golden
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Peakhurst
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