



DS-11 FX+ Spectrophotometer / Fluorometer Series

Quick User Manual

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1. Product Technology

DeNovix Spectrophotometers / Fluorometers are compact instruments with an integrated processor and a high-resolution touchscreen. The software utilizes application specific icons along with the Android™ operating system to provide an intuitive, easy-to-use instrument for both absorbance and fluorescence measurements.

The SmartPath® technology automatically adjusts the microvolume mode pathlengths to enable measurements of samples with absorbances that range between 0.015 to 750 AU (1 cm pathlength equivalent).

FX models include a fluorescence mode while the DS-11+ and DS-11 FX+ instruments also enable cuvette-based measurements for low concentration samples and basic absorbance kinetic studies.

Installation and Safety

1. Remove all packing materials including the protective cover on the screen.
2. Plug the unit into a 100-240 VAC, 50-60/Hz receptacle using the grounded power supply (CUI MPN: ETSA120330U-P5P-SZ, Transformer Dest Top 12V 40W, Lead free / RoHS Compliant) included with each unit.
3. Turn on the power switch located in the back of the instrument. The Android-based operating system will boot up in less than a minute.
4. Use the Shut Down icon (accessed from within each app or on the Home screen) to do a soft power down. Toggle the power switch to restart the instrument.

Cautions

DO NOT REMOVE COVER

No operator serviceable components inside. Refer servicing to qualified personnel.

The DS-11 is designed for indoor use under the following conditions:

Temperature: 15° to 35° C

Humidity: 35 to 65 %

Use only the power supply provided with the instrument. Use of the instrument in any manner not specified by the manufacturer may impair the protection provided by the supplied power cord and power supply.

2. Basic Operation

Microvolume Measurements

1. Ensure both top and bottom sample surfaces are clean.
2. Pipette 1 μl of the blank solution onto the lower sample surface. Lower the top arm and tap the **Blank** button.
3. Remove the solution from both sample surfaces using a clean, dry lab wipe.
4. Pipette 1 μl of the sample solution onto the lower sample surface.
5. Lower the arm and tap the **Measure** button.

The Microvolume mode uses 1.0 μL samples pipetted onto the sample surface. The microvolume Short Path mode requires just 0.5 μL samples. The 0.5 mm pathlength is not used when the Short Path mode is selected.

Auto Measurements

1. Perform a Blank measurement as described above and then select the **Auto** checkbox on the app Run screen. Pipette 1 μl of the sample solution onto the lower sample surface.
2. Lower the arm for automatic measurements. Deselect the feature to perform new Blank measurements.

Cuvette Measurements

1. Insert a cuvette pre-filled with the Blank solution. Tap the **Blank** button.
2. Insert a cuvette pre-filled with the sample solution. Tap the **Measure** button.

Width 12.5mm, length 12.5 mm, Height 45 mm, Z heights of 8.5 mm. Use the light path arrow as a guide when inserting a cuvette.

Fluorescence Measurements

1. Insert the standard (200 μL in a thin walled PCR tube) into the sample holder and lower the cover.
2. Measure at least one replicate for a minimum of 2 standard concentrations for standard assays.
3. Tap the **Samples** radio button and quantitate a sample using the **Measure** button.

Screen Saver Mode













The backlight for the screen will automatically turn off after 10 minutes of inactivity. Tap anywhere on the screen to resume the last function.

Mechanism Busy Indicator

A progress bar will be displayed on the screen when the mechanism is busy. It is normal for the bar to stop and start during mechanism operations. Please do not lift the arm or push software buttons when a spinner is displayed.

3. Software Quick Guides

Software Icons

	Add		Select All		Export
	Delete		Deselect All		Sort
	Edit		Copy		Info
	Undo		Paste		Shut Down



The **Overflow** (top action bar) is used to access secondary features such as Select Units, Screen Capture, User Guide and Exit.



Progress bars or busy indicators are used to indicate the instrument is in the process of making a measurement. Please wait until the icon has disappeared before tapping the screen to perform any additional actions.



The **Quick Print** icon is only displayed on Report or Graph screens when a DYMO label printer is connected to the instrument.



The **USB Flash Drive Eject** icon appears in the bottom notification bar when a drive is detected. The software will automatically safely unmount the flash drive after a screen capture or a report is exported to the drive. Tap the icon to remove a flash drive when nothing was exported or saved.



Auto Export status icons are displayed at the top right of a Run screen. Ensure WiFi is connected prior to making a measurement.

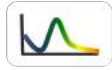


Lock icons are used in the absorbance Colorimetrics and Std Curve Methods apps to indicate whether a saved curve is in an editable state. Tap the icon change the status.

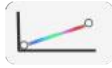
Software Buttons



The absorbance apps **Blank** button is used to establish a reference absorbance within each measurement app. The graph will not display a spectrum for a Blank measurement.



The absorbance apps **Measure** button is used for sample measurements. It is inactive until at least one Blank measurement is complete.



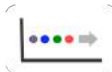
The fluorescence apps **Standards Measure** button is used to measure standards when building a standard curve.



The **Samples Measure** button is used to quantitate samples.



The fluorescence apps **Replicates On/Off** button is used to define if the standards curve enables one or up to three replicates.



The fluorescence apps **Basic Measure** button is used to make single measurements not being read from a standard curve.



Fields with **Drop-Down Menus** are indicated by black or white triangles located on the bottom.



Fields with black underlines are editable by the user. Tapping on the field will enable a keyboard, a numeric keypad or a dialog box.



Application specific editor options can be accessed using the **List Add/Edit** button found to the right of some drop-down menus. Examples include the Dye, Sample Type and the Colorimetrics Standard Curve lists. Tap the icon to access the list or save new user defined entries.



Options buttons are used for such purposes as change units or trend line analysis parameters in the fluorescence apps.



The **Quick Print** button is visible on the Run screen when a DYMO printer is connected.

Software Navigation

Home Screen Apps



Applications are launched using **Home Screen** icons. Swipe the Home page to the left for additional icons.

Up and Back Button



The bottom bar **Back** button is generally used to navigate to the main level of the current app. If accessed from the main level of an app, the button will bring up an Exit app dialog box.

Home Button



The bottom bar **Home** button is used to navigate to the Home screen without closing the app.

Recents Button



The bottom bar **Recents** button is used to as a means of displaying recently used apps. Swiping an app to the left from the Recents lists will close the app.

Collapse Button



The bottom bar **Collapse** button is used in place of the Up and Back button whenever a keyboard is enabled. Use this button to dismiss the keyboard.

Top Level Screens



The Application **Run**, **Report** and **Graph** screens are accessed either by the tabs on the top bar or by dragging the screens left or right.

4. General Screen Features

Run Screen

- **Blank or Measure:** Use these buttons to perform Blank and Sample measurements.
- **Sample Name and Sample Number:** Tap the input box to enable a keyboard or use a DeNovix approved barcode scanner to enter sample names.
- **Sample Type and Factor Fields:** Displays current sample type and associated factors used for concentration calculations.
- **Assay or Method Selections:** Use the associated drop-down menus to select an assay or method on the Run screen of an app.
- **Absorbance App Graph:** The spectral plot displays data for the current sample normalized to a 10 mm pathlength for microvolume measurements.
- **Florescence App Graph:** The sample RFU is plotted on the standard curve trend line for standard curve based fluorescence apps.

Report / Graph Screens

- Tap rows to highlight and select data for export. The **Select All** icon can be used to quickly highlight all data rows.
- Erase highlighted sample records from both the Report and Graph screens using the **Delete** icon. The cleared data will be available using the Data app.
- Tap a sample name and then tap the **Edit** icon to add or modify a sample name. The change will be applied to the Report and Graph screen rows.
- Tap rows on the Graph screen to highlight and select data to display the spectra. Up to 24 sample spectra may be overlaid on the graph.
- Color blocks are used as a legend convention.
- Highlighted sample data may be exported or printed using the Overflow Screen Capture or Export functions. Screen captures may be emailed, saved to a USB device, sent to a network folder and printed to either a network printer or supported DYMO USB printers.
- Exported data are saved as .csv files. Absorbance app files include all absorbance vs wavelength data for the full measurement wavelength range as well as the calculated data displayed on the app Report screen. Fluorescence app files include standard curve information as well as the calculated data displayed on the app Report screen.

5. Absorbance Measurement Apps

Nucleic Acid Apps



The nucleic acid apps are optimized to use the sample type specific concentration calculation factors. The ssDNA and Microarray apps enable user-defined factors for calculating oligo concentrations.

Protein Apps



Use the Protein A280 app for purified proteins. The Peptide app is used for low concentration samples that do not have aromatic residues such as Trp, Tyr or Cys-Cys disulphide bonds. The Protein A280 app is recommended when the sample does contain aromatic rings.

Note: For accurate calculated concentrations, use the Run screen drop-down list to select the optimal sample type for the specific protein measured.

Colorimetric assays are generally recommended for whole cell extracts.

Custom Method Apps



These applications are used to create, save and access user-defined methods.

Additional Apps








The UV-Vis app is used to monitor up to 6 specific analysis wavelengths. The Kinetics application is a cuvette mode only application and is available for the DS-11+ model. The OD 600 application is generally used to determine the optical density of microbial cell cultures at 600 nm.

6. Fluorescence Measurement Apps

Standard Curve Based Apps

The five apps listed below are designed using the same basic architecture. Each app (except the Custom Std Curves app) includes preconfigured assays designed to accommodate commonly used commercially available reagent kits.

	Fluoro dsDNA	DeNovix dsDNA Broad Range DeNovix dsDNA High Sensitivity DeNovix dsDNA Ultra High Sensitivity Quant-iT™ PicoGreen Quant-iT™ dsDNA HS	Quant-iT™ dsDNA BR Qubit™ dsDNA HS Qubit™ dsDNA BR Quantifluor dsDNA Quantifluor One dsDNA
	Fluoro RNA	Quant-iT™ RiboGreen Quant-iT™ RNA HS Quant-iT™ RNA BR Qubit™ RNA HS	Qubit™ RNA BR Quantifluor RNA Quant-iT™ microRNA Qubit™ microRNA
	Fluoro ssDNA	Quant-iT™ OliGreen Qubit™ ssDNA Quantifluor ssDNA	
	Fluoro Protein	Quant-iT™ Protein Qubit™ Protein	
	Custom Fluoro Standard Curves	All entries to be defined by the user	

Basic Fluorometer App



This app enables the DS-11 FX series of instruments to be used as a versatile fluorometer for applications such as dye QC checks and assay development. The app is especially useful for fluorophores with significant Stoke shifts as it allows the user to excite a sample with one LED and get RFU results from multiple emission channels.

7. Utility and Lab Tool Apps



Accounts

Accounts are used to manage default settings within specific apps or delete saved sample and dye types, wavelength lists and user methods created within the account. The Overflow Address Book function in this app is used to add frequently used recipient email addresses.

Account Types

- **Primary Administrator:** This account is used to manage instrument settings. It is not used within the measurement applications.
- **User Added Administrator Accounts:** Any administrator may create a password protected administrator level account.
- **General Account:** This account is used as the default selection for all apps each time an app is opened.
- **Standard Accounts:** Any user may add a password protected standard level account.

Data App

This app allows the user to search for past data using either a **Quick Search** or an **Advanced Search** mode. Data is automatically filtered based upon the Account selected using the tab on the top action bar.

Diagnostics App

Although the DS-11's propriety SmartPath™ technology enables accurate microvolume pathlength control and eliminates the need for routine recalibration, labs may choose to run the Diagnostics app to verify that the instrument is working within specifications.

Updater App

This app is used to update all apps to the most current available versions. The latest updates are available at www.denovix.com.

Settings App

Administrator accounts may access and change the following:

- **Back-up and Restore:** Exports a copy of all user-defined app settings, methods, dyes, sample types, email addresses, shared folder paths, user accounts and sample results to either a USB thumb drive or a network folder.
- **Language:** The language selected determines The DS-11 number format.
- Date/Time
- Network Information and Permissions
- WiFi and Ethernet

Calculator App

Three convenient calculators are included within the app. Use the tabs in the top action bar to navigate between the scientific, oligo and dilution options.

Timer App

This app is a lab tool that allows a user to set two independent timers.

8. Data Export and Print Options

Export Options

The data associated with highlighted samples on a Report or Graph screen may be exported via email, sent to a network folder or saved to USB flash drives as .csv files. To open an exported .csv file on a computer, the DeNovix instrument and the computer must **both** be set to use either period or comma number formats. The language selected using the Settings app determines the number format.

Export Formats

- The default .csv file format for each absorbance measurement app includes all absorbance vs wavelength data for the app specific measurement wavelength range as well as the calculated data displayed on the app Report screen.
- User specific formats may be defined using the **Export Formats** option accessed from the Report screen Overflow menu.
- Selected sample results exported from an absorbance app Graph screen follow the same format as when exported for the Report screen. Graphs are not exported as part of the .csv file.
- Use the Screen Capture option to export the current graph via email or to save the .jpg image to a network folder or a FAT32 formatted USB flash drive.

Export Via Email

- Screen captures as well as data .csv files may be exported via email.
- Use the Account app Overflow **Address Book** function to save frequently used recipient email addresses.
- It is recommended that a new, dedicated **Gmail** account be used for all outgoing email from the DS-11 (except for instruments used in China).

Export Via USB

- Compatible with FAT32 formatted flash drives only.
- The **USB Flash Drive Eject** icon appears in the bottom notification bar when a drive is detected. The software will automatically safely unmount the flash drive after anything is written to the drive. If not removed, the software will automatically remount the flash drive when another write operation is performed.
- Please wait for the "OK to remove" toast message to appear before removing the drive. Tap the icon to safely remove a flash drive when nothing was exported or saved.

Print Options

The DS-11 FX software supports printing to networked printers or to supported DYMO USB printers. All Dymo labels are printed in black and white.

WiFi and Networked Printers

Screen shots as well as selected sample data and graphs may be printed to both WiFi enabled and networked printers.

DYMO Printers

The software enables the use of three DYMO paper or label sizes including an 1 x 0.5 inch option suitable for 2.0 ml microfuge tubes.

9. Quick Help

Cleaning

Routine	1. Pipette 3-4 μL of dH ₂ O onto the bottom sample surface. Lower the upper arm. Wait 1-2 minutes. 2. Wipe away the water from both the upper and lower sample surfaces with a dry, lint-free lab wipe.
Between Measurements	Use a dry, lint-free lab wipe to remove samples from both the lower and upper sample surfaces.

Troubleshooting

Most issues concerning **accuracy, reproducibility, negative spectra** and **low nucleic acid purity ratios** are sample or technique related and are resolved by following the suggestions below:

- Establish a new Blank using the appropriate buffer.
- Ensure that the sample isolation procedure is optimized and that samples are purified when required prior to making absorbance measurements.
- Ensure all solutions are homogenous and well mixed prior to sampling.
- Ensure sample concentrations fall within the absorbance limits of the instrument. In the case of fluorescence assays, ensure sample concentrations fall within the reagent limits as described by the assay manufacturer.

Microvolume Mode

- Ensure both top and bottom microvolume measurement surfaces are clean prior to making the Blank measurement. Remove sample solutions from both the top and bottom measurement surfaces using dry, lint-free wipe immediately after each measurement is complete.
- Use calibrated pipettors and properly fitting tips to ensure a full 1 μL aliquot is delivered to the sample measurement surface. Protein samples sometimes wick up on the outside of the tip and may not be properly dispensed.
- Use a clean pipette tip and a new aliquot of sample for each measurement.

Cuvette Mode

- Use cuvettes with Z heights of 8.5 mm.

- Use quartz or UV transparent cuvettes for UV range measurements.
- Ensure cuvettes are clean prior to use.
- Fill cuvettes to manufacturer's specifications.
- Confirm the mode selection has been changed on the Run screen to the proper cuvette pathlength prior to a measurement.
- Ensure cuvettes are properly inserted following the etched arrow light path.
- Refer to a reagent kit manufacturer for troubleshooting colorimetric assays.

Fluorescence Mode

- Use 200 µL volumes in a clear thin walled PCR tube
- Avoid introducing air bubbles into the sample solution when mixing samples.
- Ensure all sample concentrations in the thin walled assay tubes fall within the limits of the assay or reagent kit for accurate results.
- Follow assay reagent manufacturers' recommendations regarding temperature, incubation time, and protection from ambient light.
- Follow assay reagent manufacturers' recommendations regarding suggested standard curve concentrations and data analysis.
- Confirm that the correct LED excitation source was used for all user-defined assays and methods.
- Confirm that standard concentrations and dilutions were performed correctly.
- Confirm that the correct concentration units for the standard curve and the unknown samples were used to calculate the stock concentrations.

Software Errors

Pop-up messages will provide explanations for software-based errors or invalid user actions.

10. Customer Support

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Please include the serial number of your instrument when contacting Customer Support by email. If sending Customer Support a Screen Capture or a report .csv file using the DS-11 email feature include your name, institute/company, phone number and return email address. **Responses will not be sent directly to the email account used by the instrument.**

Outside of the US, please contact your local distributor for assistance.

Warranty

All product(s) and accessories sold by DeNovix Inc. are under warranty against manufacturing defects in parts for a 36-month period from the date of delivery.

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