

# MA-5 QC Spectrophotometer

TOP-Spectrophotometer

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User Guide





## Compliance Information

To view E label Compliance information for WiFi devices, choose **Settings > Device Information > Device Label**

### CE Declaration



Hereby, X-Rite, Incorporated, declares that this model is in compliance with the essential requirements and other relevant provisions of Directive(s) EMC Directive 2014/30/EU, LVD 2014/35/EU and RoHS EU 2015/863.

#### Models with WiFi:

CE Mark: Radio Equipment Directive (2014/53/EU) CE 1177

EN 300 328 V2.1.1

EMC : EN 301 489-1 V2.1.1, EN 301 489-17 V.3.1.1,

EN 55022:2010/AC:2011, EN 55024:2010

Health : EN 62311: 2008

Safety : EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

### Federal Communications Commission Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### Models with WiFi:

FCC ID: LSV-TOPAZ

NOTICE:

Changes or modifications made to this equipment not expressly approved by X-Rite, Incorporated may void the FCC authorization to operate this equipment.

### Industry Canada Compliance Statement

CAN ICES-3 (A) / NMB-3 (A)

#### Models with WiFi:

IC ID: 20894-TOPAZ

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#### Modèles avec Wi-Fi :

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### Japanese Ministry of Internal Affairs and Communications (MIC)



R 201-150256

### SRRC (State Radio Regulation of China) Certification

CMIIT ID: 2018DJ1800

**TOP-Spectrophotometer**



**Brazil**



10993-20-13091

**Modelo: TOP-Spectrophotometer**

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**Mexico**



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**South Africa**



**India**

ETA - SD - 20200301921

## Russia



## Korean Battery Application

Korean battery safety standard KC 62133(2015-07), Application No. XU101195-18004A

## Equipment Information

Use of this equipment in a manner other than that specified by X-Rite, Incorporated may compromise design integrity and become unsafe.

To avoid discomfort, do not look directly into the measurement optics when the instrument is on.

No user serviceable parts in this product.

**WARNING:** This instrument is not for use in explosive environments.

Do not immerse the instrument in liquid.

**Transportation:** This product contains a lithium-ion battery. Should you need to ship this device, you may wish to consult published guidance documents by one or more of these organizations for advice on how to comply with the regulations: IATA, ICAO, IMDG & PHMSA. The battery contained in this device is 46g in weight, 3.6V, 2.15 Ah, and complies with the UN 38.3 tests in effect the year it was originally shipped.

The instrument is a sensitive measurement instrument. If the instrument experiences a drop, a calibration should be performed followed by a self test before any measurements are taken to ensure the instrument is working properly. Refer to the Calibration section for information on performing a Calibration.



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## INTRODUCTION AND SETUP

The multi-angle spectrophotometer is designed for consistent, precise color measurement of metallic, pearlescent, and other complex special effect finishes.

This manual covers the installation, operation and maintenance of the instrument. Specific instructions for using the instrument with your software application can be found in the software documentation.

Key features of the instrument are:

- Color display with touch screen operation
- Power on/off and measure button
- Three contact sensors located on the bottom of the instrument to aid in proper positioning



### Packaging

Your instrument packaging should contain all the items listed below. If any of these items are missing or damaged, contact X-Rite or your Authorized Representative.

- |                         |                              |   |
|-------------------------|------------------------------|---|
| • MA-5 QC instrument    | • Spare light seal           | • MA-3 and MA-5 Spectrophotometer Safety/ Compliance Information and Getting Started document |
| • USB interface cabling | • Targeting shoe             | • Carrying case   |
| • Calibration reference | • Stylus                     |   |
| • Safety strap          | • Certificate of Performance |   |
| • Screen protector      |                              |   |

### Powering On

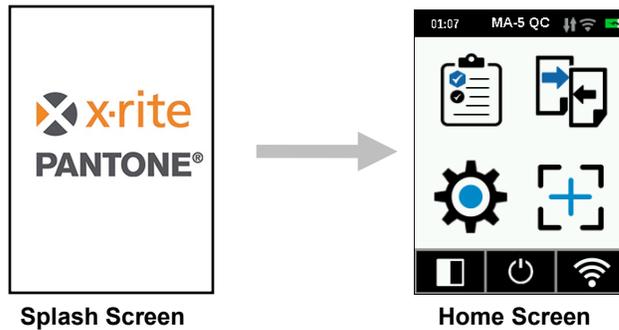
The power/measure button is used to initiate the instrument from a power off state. Simply press the button (1) for about one second to turn on the instrument. If the instrument does not power up after pressing the power button, the battery may require charging. Refer to Charging the Battery section. The instrument is also powered on by plugging the USB cable into your computer's USB port.



### Powering Off

The instrument turns off automatically after two hours of nonuse. It is not required to turn off the instrument manually. If you want to manually power off, tap the power icon at the bottom of the Home screen and then tap **Power Off** to confirm.

When first powered up, the instrument goes through a startup procedure and displays a splash screen before the Home screen appears.



**Charging the Battery**

**General**

The battery for your new instrument comes in a low to medium charge state and should be charged before use. Connect the USB cable to the instrument and your computer’s USB port.

Make sure that the USB cable is connected directly to the computer. A connection to a USB port of a keyboard or PC monitor or a bus-powered USB hub is not recommended. PC monitor or keyboard USB ports are low power USB ports.

**NOTE:** If a powered USB hub is used, make sure the power supply is rated for no more than 5V.



During charging, the instrument switches on and indicates charging with a “lightning bolt” in the battery icon. The instrument will not power off while plugged into the computer USB port, however, it will go into standby mode. This is indicated by a blue pulsing LED.

A full charge from empty will take 6 hours connected to a computer USB port. Alternatively a standard USB charger can be used.

The charging time will not be reduced with a standard USB charger.

A USB charger with at least 500 mA is required. A standard charger with 1 A will not charge any faster.

**Battery Icon Information**



This icon at the top of the screen would indicate the battery is fully charged.



This icon at the top of the screen would indicate the battery has a sufficient charge for a substantial number of measurements.



This icon at the top of the screen would indicate the battery pack is low, but measurements are still possible. Battery should be charged soon.



The “lightning bolt” in the center of the icon at the top of the screen indicates the battery is charging.

Battery status is also reported in the Device Information menu item of the Settings window.

## USER INTERFACE

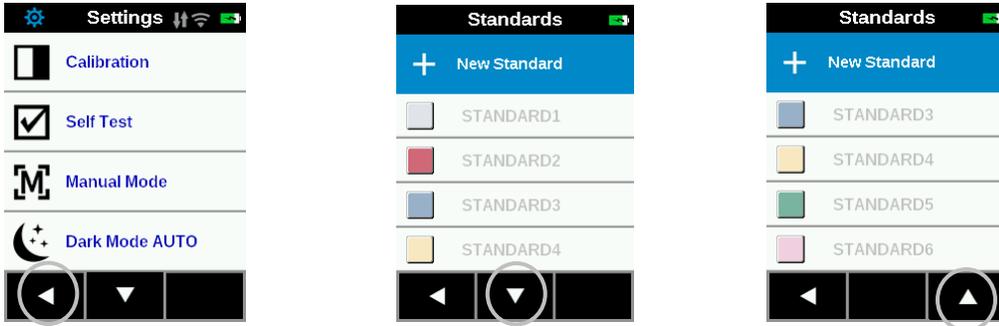
### Navigating the Screen

The instrument features a graphical touch screen display. All functionality is accessed directly through the screen.

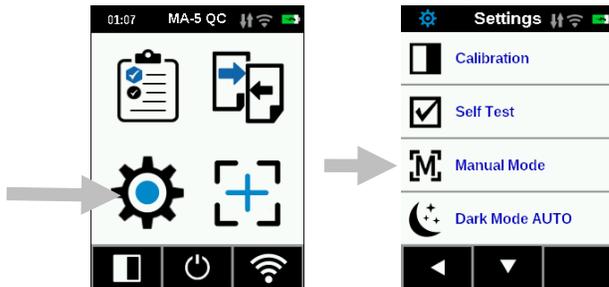
#### Scrolling through Settings and Jobs

The Up (▲) and Down (▼) arrows appears on screens when some settings, standards, etc. cannot be accessed from the main view. You can also swipe the screen up or down to view the additional settings, etc.

The Left (◀) arrow at the bottom of the screen is used to return the screen to the previous view.



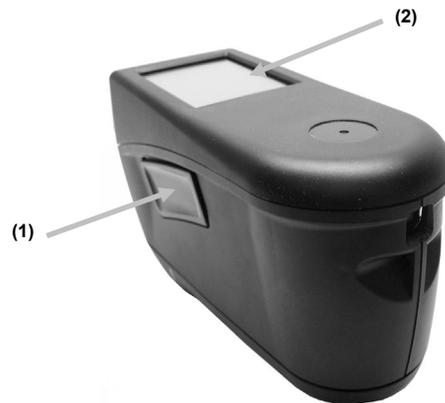
Settings and jobs are accessed by tapping the corresponding icon on the Home screen. For this example, the Settings icon was tapped to open the Settings screen.



### Measure Button

The measure button (1) is located on the side of the instrument. This is the same button that is used to power on and off the instrument. You can also tap the screen (2) to initiate a measurement.

**NOTE:** In case of a firmware crash, this button acts as a RESET button. Remove the USB cable, press and hold the button for 10 seconds and then release. The instrument will turn off. Refer to the Troubleshooting section for additional information.

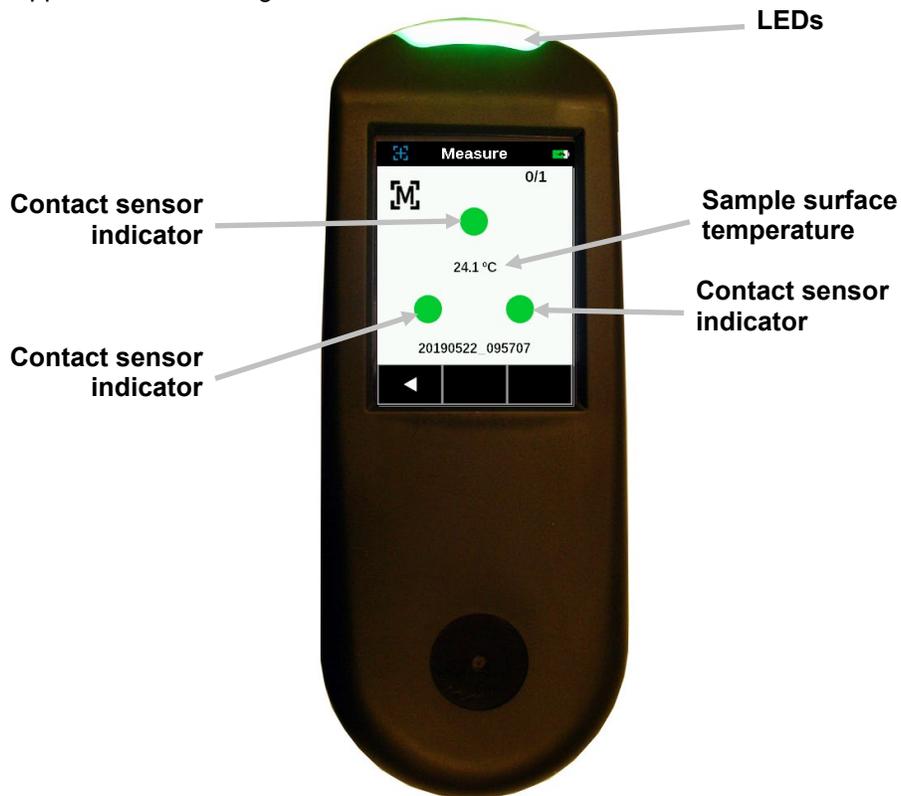


**Contact Sensors, Indicators and LEDs**

To aid in proper positioning and ensure repeatability of sample measurements, the instrument incorporates three contact sensors that are arranged around the measurement port. These sensors require an even amount of contact to be applied across all three sensors before a measurement is triggered.

Three contact sensor indicators that appear in the screen as well as the indicator LEDs on the top of the instrument provide positioning feedback. The indicators in the screen are arranged in the same pattern (top, and back) as the contact sensors located around the measurement port.

- **Green Indicator:** ideal contact is being applied to the corresponding sensor. A measurement can be taken when all three indicators illuminate green. If the required contact is not maintained for the duration of the measurement, an error message will appear on the display and the measurement must be retaken.
- **Red Indicator:** the required contact is not being applied to the corresponding sensor. Correct contact must be applied to achieve a green indicator condition.

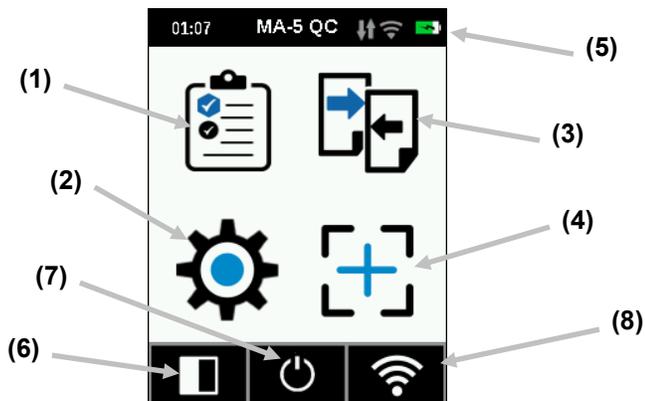


The multi-color LED located on the front of instrument provides visual feedback on the status of a measurement and contact sensor.

- **Green LED:** Indicates all three contact sensors are activated properly and a measurement can now be triggered.
- **Red LED:** Indicates one or more of the contact sensors is not properly activated or an error has occurred during a measurement.
- **Blue Pulsing LED:** Indicates the instrument is in standby mode with the USB cable plugged into the computer and charging.
- **Green Pulsing LED in standby** (screen turned off): Indicates device is being connected to the WiFi Network.
- **Off:** Indicates the instrument is off and not ready to measure.

## Home Screen

When the instrument is powered-up, the home (top level) screen appears after the startup procedure is complete. Select the modes by tapping the icons located on the display screen.



### Job Templates (1)

This mode is used to access current job templates downloaded from the application. Refer to Using Job Templates section for more information.

### Settings Mode (2)

The settings mode is used to set and edit the instruments configuration options, and to enter the calibration mode. The settings options should be reviewed before you use your instrument for the first time. Refer to the Settings Mode section for information.

### Quick Compare (3)

The Quick Compare mode is used to compare standards with measured samples. Standards are either downloaded from the software application or created on the instrument. Refer to Quick Compare Mode section for more information.

### Basic Measurement (4)

This mode is used to take quick measurements with no standard comparison. Measurement data can be viewed and deleted as needed. Refer to Basic Measurement section for more information.

### Header Bar (5)

Displays the current mode, time, software connection status (green when connected), WiFi connection (where applicable), and battery charge status.

### Calibration mode (6)

This mode is used to access the calibration procedure. Refer to Calibration mode section for more information.

### Power off (7)

This option is used to power off the instrument. To access, tap the icon and then tap **Power Off** to confirm.

### WiFi Info/Connect (8)

The WiFi information screen displays for connection state and IP address.

If the WiFi is set to ON and a network is correctly configured in the settings menu, the device will always be connected to WLAN as soon as available. This is indicated by the WiFi icon in the header bar which turns from greyed-out to white.

If the WiFi is set to OFF in the settings menu, tapping this icon will connect the device once. The connection is terminated after exiting the WiFi Info/Connect screen.

Refer to WiFi mode section later in this manual for additional information.

## SETTINGS MODE

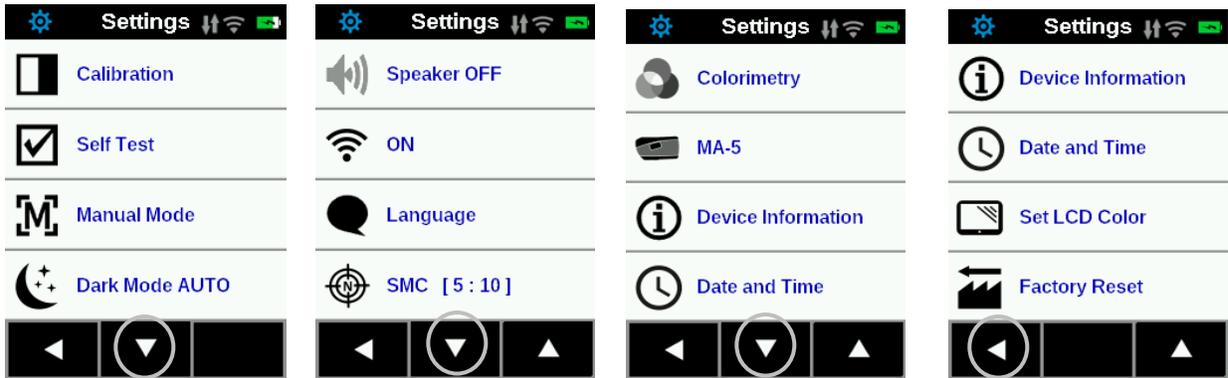
Settings mode is used to adjust and view the instrument's settings. You should review the current settings before using the instrument for the first time. However, you can go back and change these settings at any time.

### Entering Settings Mode

1. From the Home screen, tap the **Settings** icon to access the Setting screen.



2. Tap the Settings option you want to edit or activate. Down (▼) and Up (▲) arrow icons appear on the screen when some settings cannot be accessed from the main view. Tap the arrow icons to view the additional settings.



3. Tap the option required.
4. When finished with the options, tap the Left (◀) arrow at the bottom to return the screen to the Home view.
5. Refer below for information on configuring each Settings option.

### Calibration



This option is used to activate the calibration procedure. Calibration can also be accessed from the Home screen.

To access, tap **Calibration**. Refer to the Calibration mode section later in this manual for detailed information on performing a calibration. After a successfully calibration procedure, you are prompted to execute a self test to check the correct functionality of the instrument.

### Self Test



This option is used to run a self test of the instrument to check the correct functionality of the instrument.

1. To activate, tap **Self Test** and then place the instrument on the white calibration tile.
2. Tap the **Start** icon in the display. The self test goes through 10 steps.

**Operation Mode**



This option is used to set auto measure mode.

**Manual Measure:** When set to Manual, you must press the Measure button or tap the screen once all three contact sensor indicators turn green in the display to take a measurement.

**Automatic Measure:** When set to Automatic, this option allows the instrument to automatically take a measurement once all three contact sensor indicators turn green in the display. No measurement button press or screen tap is required. Once a measurement is taken, the instrument must be repositioned or the screen tapped for the next measurement.

**Dark Mode**



This option is used to help reduce measurement noise on very dark sample measurements. Measurement times increase from 2.7 to 4.2 seconds when activated.

**Off:** When set to off, the option is not utilized.

**Automatic:** When set to Automatic (default setting), the instrument automatically switches to dark mode after a dark sample is detected.

**Speaker Mode**



This option is used to turn the instrument speaker on or off. When set to on, the instrument beeps after a measurement and calibration.

**WiFi Mode**



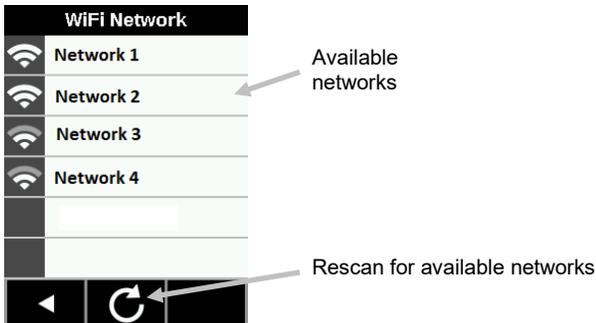
This option is used to turn WiFi on/off and setup the selected WiFi network.

**Off:** When set to off, WiFi is turned off (saving battery power). WiFi can still be activated by clicking the “WiFi Connect” icon on the Home screen.

**On:** When set to on, WiFi is turned on during normal operation and standby. WiFi is turned off during deep sleep mode.

**WiFi Setup:** Tapping the button will cause the instrument to scan for available network. After scanning the available networks are displayed on the screen. Tap a desired network and setup the password if required. When finished, tap OK to select the WiFi network.

**Reset WiFi:** Tapping the button will reset the WiFi to its default setting.



### Language



This option is used to set the language that is displayed on the instrument during operation. To set the language, tap **Language** and then tap the desired language.

### Data Mode



This option is used to select basic, averaging, or SMC measurement mode.

1. To access, tap Data Mode.
2. Tap the desired data mode on the screen to save and exit the option.

**One Shot:** This option only requires one measurement for a job.

**Average:** This option is used to set the number of measurements required for calculating an averaged job result. Measurements are taken at different locations recommended to average sample variations. However, the instrument allows you to measure multiple times on the same spot without having to lift the instrument, in case the sample variation averaging is not of interest.

**SMC m:n** (Statistical Measurement Control) is a method of performing a statistical analysis of several measurements to determine the quality of the measurements and/or the sample, before an average value is calculated. A statistical analysis of the measurements' mean and standard deviations eliminates outliers and determines the variability of the measurements. The number of required measurements (5) along with the maximum number of measurements (12) that can be taken to achieve an average value. These values are the default settings and cannot be changed. This method is recommended to limit the risks of using an incorrect measurement.

### Colorimetry



This option is used to select illumination , observer angle , data mode , and color space .

1. To access, tap Colorimetry.
2. Tap illumination, observer angle, data mode or color space icon.
3. Tap desired option on the screen to save and exit the option.

#### Illumination:

This option is used to select D65 (default) or D50 for the illumination.

#### Observer Angle:

This option is used to select 2° or 10° (default) as the observer angle.

#### Data Mode:

This option applies legacy profiling MA94 (default), MA-T, BYKmac, or No Legacy.

**WARNING:** The data mode should not be changed by an unexperienced user. It is strongly recommended that the administrator contact X-Rite application support before changing the data mode on the device. There is a risk of data inconsistency if the user accidentally selects the data mode on the device which is different from the data mode applied by the software.

To change the data mode if required:

1. Tap the lock  icon at the bottom of the screen Data Mode screen to access the Enable List screen.
2. Tap **Yes** to confirm that you want to unlock the data mode options or **No** if you do not want to unlock the options. After tapping Yes, the screen returns to the Data Mode screen showing an unlock  icon. This indicates that you can now change the data mode.
3. Tap the desired data mode option to access the Change Data Mode, Data inconsistent screen.
4. Tap **Yes** to confirm that you want to change the data mode option.

**Color Space:**

This option is used to select L\*a\*b\* or L\*C\*h data type that is displayed.

**Device Mode**



This option is used to set the instrument to emulate other X-Rite instruments.

To access, tap the **Device Mode** icon and then tap **MA-5 (default) or MA94**.

**Device Information**



This option is used to view important instrument information such as hardware version, calibration reference serial number, battery data, etc.

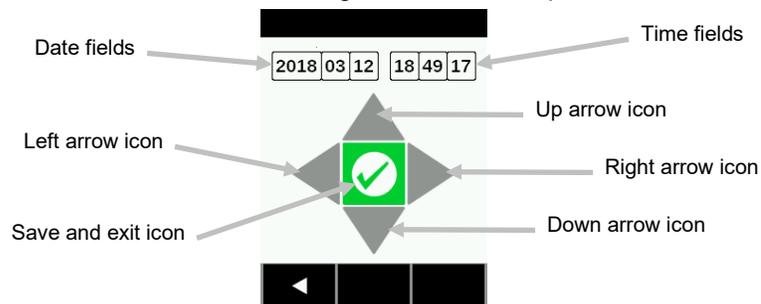
**Date and Time**



This option is used to adjust the timestamp clock for the instrument.

NOTE: It is more convenient to set the date and time using the corresponding function in the software or in the utility tool.

1. To access, tap **Date and Time**. The flashing value in the field is the current value that can be adjusted.
2. Tap the “**Up**” arrow icon to increase the value.
3. Tap the “**Down**” arrow icon to decrease the value.
4. Tap the “**Left**” arrow icon to move the flashing field to the next field to the left.
5. Tap the “**Right**” arrow icon to move the flashing field to the next field to the right.
6. Tap the “**Checkmark**” in the center to save changes and exit the option.



### Set LCD Color



This option is used to change the background color of the LCD screen slightly.

1. To access, tap **Set LCD Color**.
2. Tap the desired backlight color panel on the screen to save and exit the option.

### Factory Reset



This option is used to reset the instrument to its factory default settings. All stored samples and calibration data will also be lost with the factory reset.

Calibration on the clean calibration reference related to the instrument needs to be performed after the reset.

Select **Yes** to reset to the factory default settings or select **No** exit the setting without resetting. A factory reset will take approximately one minute to complete.

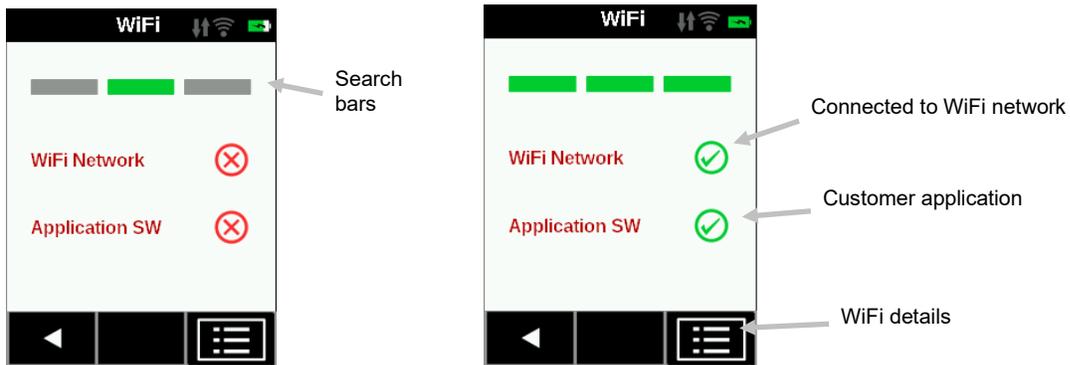
## WiFi MODE

The WiFi icon is used to connect to the configured network once if WiFi is set to OFF in the Settings mode. The connection is terminated after exiting the WiFi Info/Connect screen.

The WiFi screen shows the status and detailed information about the WiFi network.

If WiFi is set to ON and a network is correctly configured in the settings menu, the device always connects to WLAN as soon as available. This is indicated by the WiFi icon in the header bar which turns from greyed-out to white.

1. From the Home screen, tap the WiFi icon to access the WiFi screen.
2. The instrument will search for available networks. Available networks for connection appear with a green checkmark next to the name.



3. Tap the Details icon to view the WiFi Settings for the connected network.
4. Tap the Left (◀) arrow to return to the home screen.

## CALIBRATION MODE

The instrument must be calibrated on the white tile every 21 days. No measurements are possible with an expired calibration. A warning message appears at power up 3 days before the calibration is required. Refer to the Cleaning section in the Appendices for information on cleaning the calibration reference.

**NOTE:** Make sure to use the calibration reference supplied with the instrument for calibrating. Do not substitute this reference with a reference from another instrument. The serial number on the reference should match the reference serial number displayed on the instrument calibration screen.

### Calibration Notes

- Calibration should be performed at room temperature (best measurement performance when calibrated at 23°+/-1°C (73°+/-2°F) and 40-60% relative humidity).
- The **white tile in the calibration reference is severely affected by smudge marks, dust, and finger prints**. Refer to Appendices for calibration reference cleaning procedures.
- **Do not move instrument while taking a calibration measurement**. If motion is detected by the contact sensors, an error message will be displayed and calibration aborted.
- Make sure the USB cable is unplugged from the instrument before performing a calibration.

### Calibration Reference

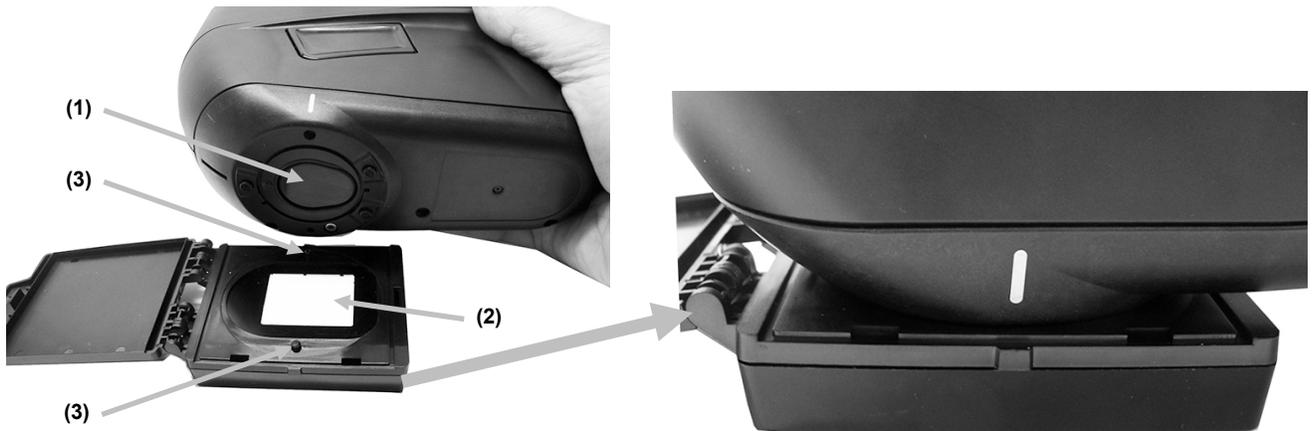
The calibration reference is designed to keep the white tile free of dust and debris.



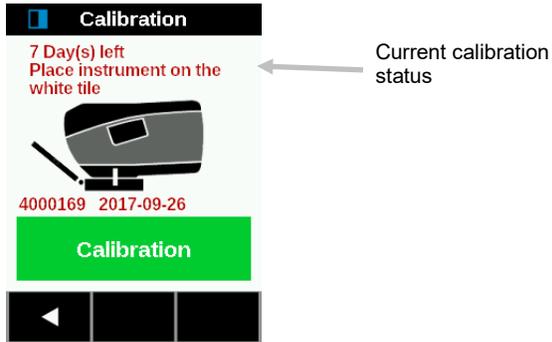
### Calibrating the Instrument

1. Select the **Calibration** option from the Settings menu as previously explained (see Entering Settings Mode). The message “Calibration expired” appears if the instrument needs to be calibrated. If calibration is not currently needed, the time remaining before the next calibration appears. To exit the calibration mode without calibrating, tap the Left (◀) arrow at the bottom of the screen.
2. Open the calibration reference and lay it flat. Position the instrument measurement port (1) over the white tile (2) by locating the two pins (3) in the calibration reference into the holes in the measurement base.

**NOTE:** The pins are keyed and will only insert in one direction.



- When ready, tap **Calibration** and then tap **Yes** to start calibration. Do not touch the instrument throughout the measurement sequence.



**NOTE:** If an error message appears after white calibration, try measuring the white tile again. If an error still occurs, clean the white calibration tile as explained in the Appendices. If the issue persists, perform Factory Reset in the Settings menu, turn the device off and on and repeat the calibration.

- After calibration is completed, remove the instrument from the calibration reference and close the reference case.

**NOTE:** It is recommended to perform a Self-Test after the Calibration Refer to the Settings screen.

## OPERATION

The section explains instrument positioning techniques, Basic Measurement, Quick Compare, and running jobs from Job Templates.

### Instrument Positioning

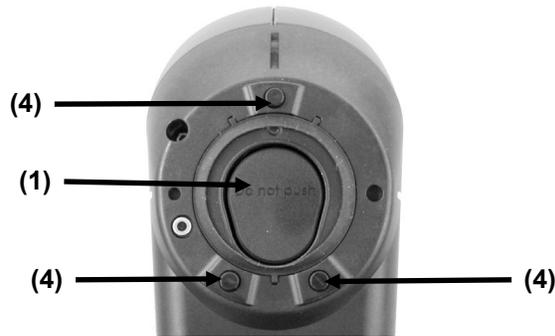
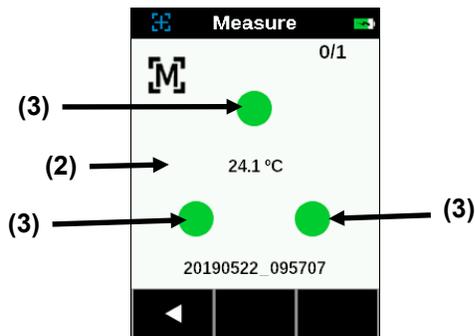
In order for the instrument to obtain accurate and repeatable measurements, the bottom of the measurement port must be flat with the sample surface to be measured. Any movement of the instrument can cause the measurement angles to vary, greatly affecting measurements on metallic and pearlescent paint finishes. The contact sensors ensure the integrity of the measurement data.

Below is an example of how to position the instrument correctly to perform measurements. Refer to the Basic Measurement, Quick Compare Mode, and Using Job Templates sections that follow for information on starting a measurement sequence.

**IMPORTANT:**

- To avoid discomfort, do not look directly into the measurement optics when the instrument is on and measuring.
- Do not move instrument while taking a sample measurement. If motion is detected by the contact sensors, an error message will be displayed and the measurement aborted.
- Measurement performance may decline under certain condensing conditions.
- It is recommended to keep the sample around 23°C (73°F) as temperature could have influence on the color measurement.
- Do not move the instrument on the sample surface with pressure. This may cause scratches to the sample surface.

1. Locate the measurement port (1) in the bottom of the instrument over the first measurement area while viewing the screen (2).
2. Gently rock the instrument until all three positioning indicators (3) in the screen turn green. This indicates that all three contact sensors (4) are activated.



3. Hold the instrument steady and press the Measure button or tap the screen to initiate a measurement in case the instrument is configured in Manual Mode. If the instrument is configured in Automatic Mode, the measurement will be triggered as soon as (with a one-second delay) the instrument is correctly positioned on the sample and all pins are in contact (green indicators on UI). You can also initiate a measurement by tapping the screen in Automatic Mode if desired. Continue to hold the instrument steady until the progress bar in the screen reaches 100%.

**NOTE:** If an error occurs after the measurement, tap **OK** on the screen and try measuring again.

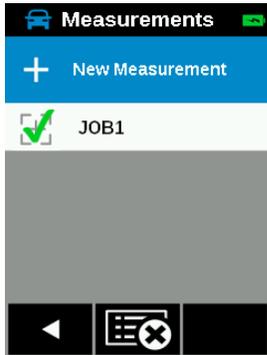
4. Continue with the remaining area measurements as required.
5. Refer to the Basic Measurement, Quick Compare Mode, and Using Job Templates sections that follow.

**Basic Measurement**

The Basic Measurement mode is used to take quick measurements with no standard comparison. Measurement data can be viewed and deleted as needed.

The following procedures explain the steps for operating the instrument in Basic Measurement mode.

1. From the **Home** screen, tap **Basic Measurement** .
2. Tap the Plus icon  at the top of the screen to start a new measurement.



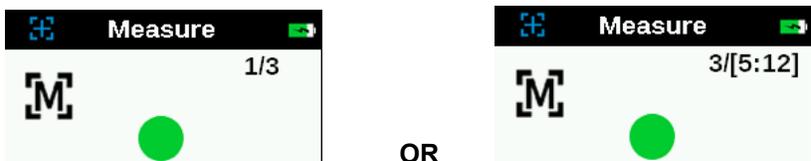
3. The Sample Name screen appears with a default sample name. **Delete the entire entry by pressing the [x] icon for 2 seconds.** Enter a sample name using the virtual keyboard. Click the Enter icon to save the sample name.



4. The instrument goes into measure mode. Position the instrument on the first sample area to measure as explained in Instrument Positioning.
5. Hold the instrument steady and press the Measure button or tap the screen to initiate a measurement in case the instrument is configured in Manual Mode. Continue to hold the instrument steady until the progress bar in the screen reaches 100%.

**NOTE:** If an error occurs after the measurement, tap **OK** on the screen and try measuring again.

The top of the screen now shows the first measurement as completed and asks you to take the second measurement if averaging is used. If SMC is activated, the screen shows the current number of measurements measured so far.



6. Position the instrument on the second sample area as explained in Instrument Positioning. Hold the instrument steady and press a Measure button or tap the screen.
7. Continue with the remaining sample area measurements as needed.

- After the measurement(s) is completed, the data results selected in the Setting menu are shown on the screen. Swipe the top of the screen to the left to alternate between  $L^*a^*b^*$  and  $L^*C^*h^*$  data. To exit the results screen, tap the Left ( $\blacktriangleleft$ ) arrow at the bottom of the screen. To start a new measurement, tap the Right ( $\blacktriangleright$ ) arrow at the bottom of the screen or press the Measure button.

Indicates the Data Mode that was selected when measured.

indicates Illumination/Observer Angle and sample temperature when measured.

#	L*	a*	b*
25	81.17	0.38	5.04
45	77.45	0.48	5.41
75	77.52	0.26	4.89

MA94

D65/10  
25.1 °C

### Viewing Measurement Data

Lab data can be viewed for each basic measurement.

- Tap the desired job from the list on the measurement screen.

Measurements

+ New Measurement

Sample 1

Sample 2

Sample 3

Sample 4

- Tap **Show Results** to view the data. Swipe the top of the screen to the left to switch between  $L^*a^*b^*$  and  $L^*C^*h^*$  data.

Job

Sample 2

Saved at 2019-06-15 01:20

Show Results

Delete Sample

Sample 2

#	L*	a*	b*
25	81.06	0.40	5.03
45	77.40	0.47	5.33
75	77.33	0.27	4.90

MA94

D65/10  
25.4 °C

Sample 2

#	L*	C*	h
25	81.06	5.05	85.45
45	77.40	5.35	84.93
75	77.33	4.91	86.89

MA94

D65/10  
25.4 °C

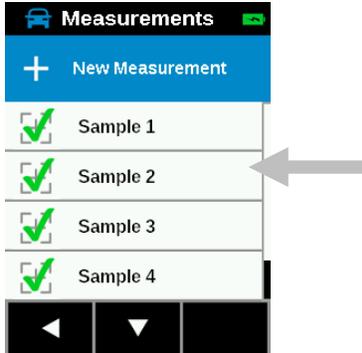
- Swipe the screen up or down to view previous or next measurement sample data.
- Tap the Left ( $\blacktriangleleft$ ) arrow at the bottom of the screen to return to the Measurements screen.

### Deleting Basic Jobs

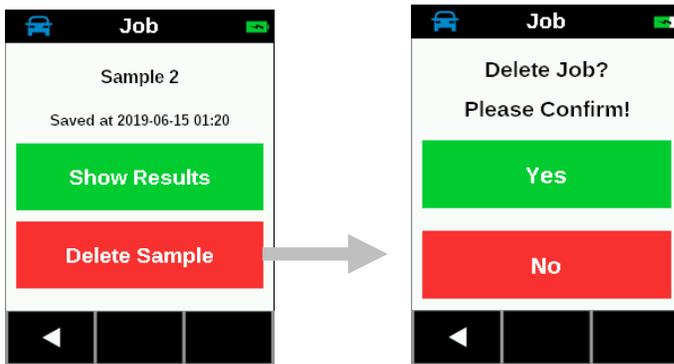
You can delete individual jobs or all jobs at once from the Measurements screen.

#### Single Job

1. Tap the desired job from the list on the measurement screen.



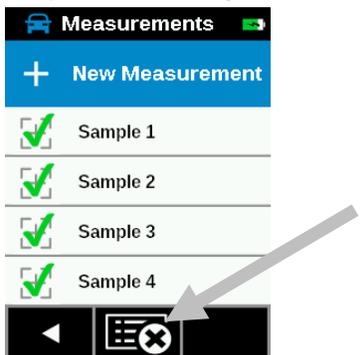
2. Tap **Delete Sample** and then **Yes** to confirm you want to delete the job. The screen returns to the Measurements screen.



#### All Job

1. Tap the desired job from the list on the measurement screen. If several jobs are available, press and hold the Down (▼) arrow icon for 2 seconds and release to advance to the end of the job list.

2. Tap the delete all jobs icon  at the bottom of the screen.



3. A message appears asking you to confirm that you want to delete all jobs. Tap **Yes** to confirm or **No** to return to the Measurements screen.

**Quick Compare Mode**

The Quick Compare mode is used to compare standards with measured samples. Standards are either downloaded from the software application or created on the instrument. Absolute or difference measurement data can be viewed for all angles.

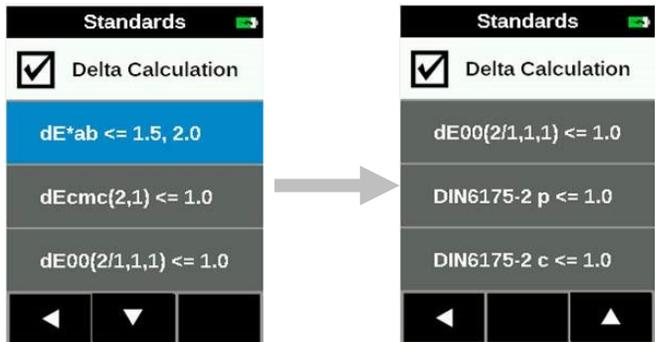
The following procedures explain the steps for operating the instrument in Quick Compare mode.

**Creating Standards**

1. From the **Home** screen, tap **Quick Compare** .
2. Tap the Plus icon  at the top of the screen to start a new standard measurement.
3. The Standard Name screen appears with a default standard name. **Delete the entire entry by pressing the [x] icon for 2 seconds.** Enter a standard name using the virtual keyboard. Click the Enter icon to save the standard name.



4. The Delta Calculation screen appears. Tap the desired delta calculation from the list. **NOTE:** Additional tolerance sets can be downloaded to the device from EFX QC software, allowing for customization.



**Standard Factory Settings:**

- dE\*ab <= 1.5, 2.0
- dEcmc(2,1) <= 1.0
- dE00(2/1,1,1) <= 1.0
- DIN6175-2 p <= 1.0
- DIN6175-2 c <= 1.0

**NOTE:** Additional settings may be shown that were downloaded from the software (e.g. EFX QC). Initiating a Factory Reset will delete these additional settings.

**Delta Calculations:**

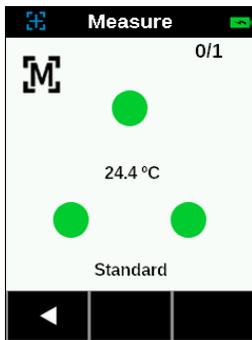
All differences are evaluated in CIELAB, observer used is 10° and illuminant is D65.

Available options and respective parameters are:

Option	r45as15	r45as25	r45as45	r45as75	r45as110
dE*ab					
dEcmc(2,1)	l=2, c=1				
dE00(2/1,1,1)	kL=2, kC=1, kH=1	kL=2, kC=1, kH=1	kL=1, kC=1, kH=1	kL=1, kC=1, kH=1	kL=2, kC=1, kH=1
DIN6175-2 p	DIN6175-2, section 5.3				
DIN6175-2 c	DIN6175-2, section 5.2				

NOTE 1: r45as15 is formally not required in DIN 6175-2.

- The instrument goes into measure mode. Position the instrument on the standard to measure as explained in Instrument Positioning.



- Hold the instrument steady and press the Measure button or tap the screen to initiate a measurement in case the instrument is configured in Manual Mode. Continue to hold the instrument steady until the progress bar in the screen reaches 100%.
- Continue with remaining measurement for the standard if required.
- After the measurement(s) is completed, the data results selected in the Setting menu are shown on the screen. Swipe the top of the screen to the left to switch between L\*a\*b\* and L\*C\*h data.

Standard 3			
#	L*	a*	b*
25	81.15	0.35	5.20
45	77.31	0.44	5.48
75	77.41	0.24	4.97
	MA94		
	D65/10		
	25.5 °C		

Angles can be highlighted or greyed-out.

- Tap the Left (◀) arrow at the bottom of the screen to access the Save Standard screen.

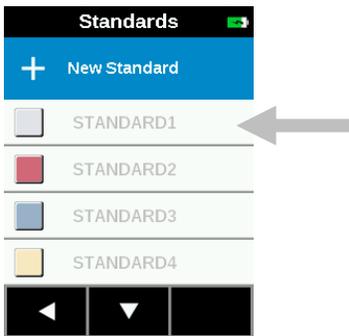


10. Tap **Yes** to confirm you want to save the standard. The display returns to the Standards screen

### Comparing Standards to Samples



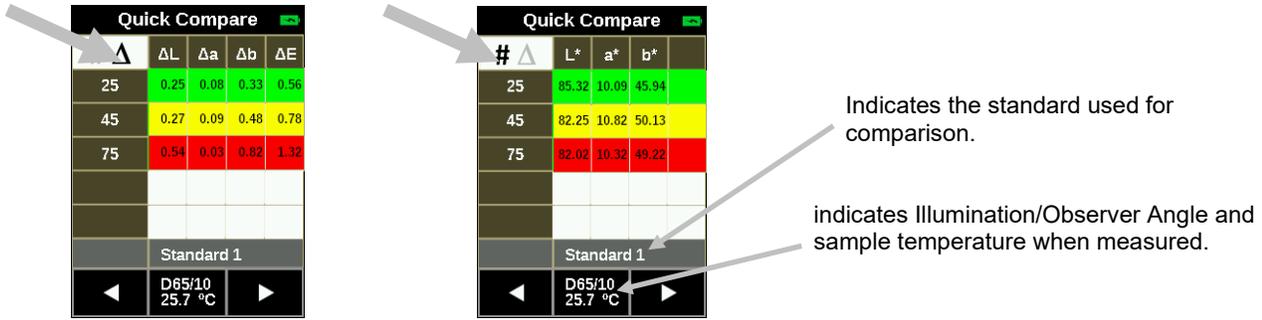
1. From the **Home** screen, tap **Quick Compare**.
2. Tap the standard in the list that you want to use for sample comparison. You can view standard data by pressing and holding the standard in the list for more than one second.



3. Tap **New Sample** at the top of the screen.



4. The Sample Name screen appears. Enter a sample name using the virtual keyboard. Click the Enter icon to save the sample name.
5. The instrument goes into measure mode. Position the instrument on the sample area to measure as explained in Instrument Positioning.
6. Hold the instrument steady and press the **Measure** button or tap the screen to initiate a measurement.
7. Continue with remaining measurements for the sample if required.
8. After the measurements are completed, the results are shown on the screen. Tap the # icon to view absolute data or tap the Δ icon to view difference data.



Data fields in tolerance appear green and red for out of tolerance. Data fields can also appear amber for a warning limit.

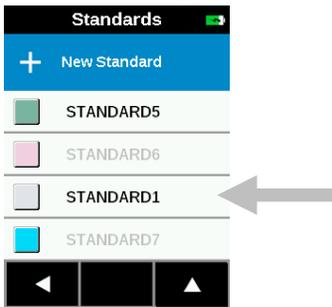
9. Swipe the screen up or down to view previous or next sample data.
10. Tap the Left (◀) arrow at the bottom of the screen to return to the sample measurement screen.
11. To start a new measurement, tap the Right (▶) arrow at the bottom of the screen or press the Measure button.

### Deleting Samples

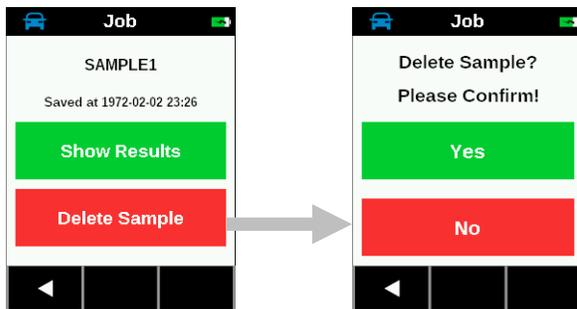
You can delete individual samples or all sample at once from a selected standard.

#### Single Sample

1. Tap the desired standard from the list on the Standards screen. **NOTE:** Standards that appear “grayed out” do not have any sample data.



2. Tap the desired sample to delete.
3. Tap **Delete Sample** and then **Yes** to confirm you want to delete the sample. The screen returns to the Standard screen.



#### All Samples

1. Tap the desired standard from the list on the Standards screen.
2. Tap the delete all samples icon  at the bottom of the screen.



3. A message appears asking you to confirm that you want to delete all samples. Tap **Yes** to confirm or **No** to return to the Standard screen.

## Using Job Templates

Job templates are created using a software application and then downloaded to the instrument.

Job templates can contain multiple jobs which each include standards, checkpoint titles, and tolerances. A typical job would display a list of checkpoints (measurements) required for the selected job. After all checkpoints are measured, the job data is uploaded to the software application for analysis.

Refer to the software application for specific information on creating job templates, downloading job templates, and uploading job data.

### Running a Job from a Job Template

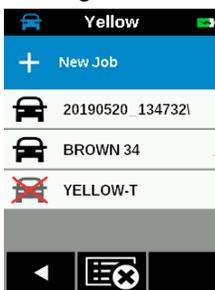
1. Send job template from the QC application (Nucleos EFX QC, X-RiteColor® Master Software, X-Color QC Software) to the instrument.



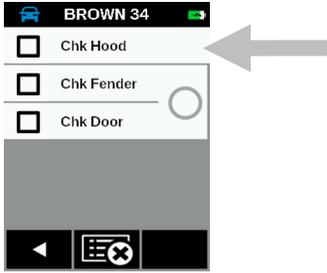
2. From the **Home** screen, tap **Job Templates**.
3. Tap the job template from the list that you want to use.



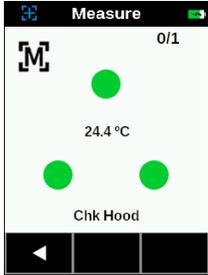
4. Jobs that are available in the selected job template are displayed in the list. Tap the job that you will be running. You can also create a new job if desired.



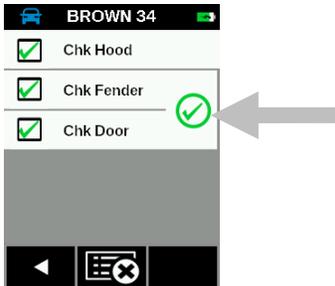
5. Measurement checkpoint information is displayed for the selected job. In this example, the hood, fender, and door of the car are to be measured. Tap **Hood** in the checkpoint list.



The instrument goes into measure mode. Position the instrument on the checkpoint area to measure as explained in Instrument Positioning.



6. Hold the instrument steady and press a **Measure** button or tap the screen to initiate a measurement.
7. Continue with remaining areas for the checkpoint as required.
8. After the checkpoint is finished the instrument displays the results on the screen with color code (white: unchecked, green: passed, yellow: narrow passed, red: failed). The indicator LED is lite for 2 seconds (green: passed, red: failed). Tap the Right (▶) arrow at the button of the screen or press the Measure button to go to next unmeasured checkpoint.
9. A successful measurement displays a  icon next to the checkpoint. An unsuccessful measurement displays a  icon next to the checkpoint. **NOTE:** If desired, you can redo an unsuccessful checkpoint measurement by taping the checkpoint and then tapping the “Remeasure” button. Measurement results can also be viewed from this screen. Refer to the end of this section for the procedure.
10. Position the instrument on the checkpoint area to measure as explained in Instrument Positioning and measure. Continue with remaining areas for the checkpoint as required.
11. Continue with remaining checkpoint measurements as required. After the checkpoint is finished the instrument displays the data screen. Tap the Left (◀) arrow at the bottom of the screen to return to the job checkpoint screen. A  icon appears on the screen indicating that the checkpoints Fender and Door are compared to each other per the job template.

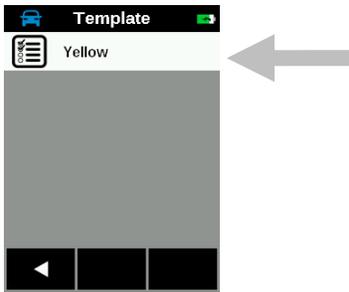


12. Continue with additional jobs or upload the job data to the software application for analysis.

### Deleting Jobs

You can delete jobs from the selected template.

1. From the **Home** screen, tap **Job Templates** .
2. Tap the job template from the list.



3. Tap the delete all jobs icon  at the bottom of the screen.

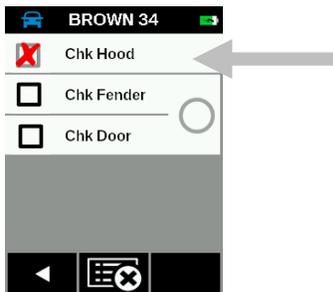


4. A message appears asking you to confirm that you want to delete all jobs. Tap **Yes** to confirm or **No** to return to the Job screen.



### Viewing Job Data

1. Tap the job to view.
2. Tap the checkpoint for the data to view.



3. Tap **Show Results** to view the job data for the select checkpoint on the screen. Tap the # icon to view absolute data or tap the  $\Delta$  icon to view difference data.

Tap **Remeasure** and then **Yes** if you would like to remeasure the checkpoint.



Data fields in tolerance appear green and red for out of tolerance. Data fields can also appear yellow for a close to limit pass.

4. Swipe the screen up or down to view previous or next checkpoint data.
5. Tap the Left (◀) arrow at the bottom of the screen to return to the checkpoint screen.

## APPENDICES

### Service Information

X-Rite provides repair service to their customers. Because of the complexity of the circuitry, all warranty and non warranty repairs should be referred to an authorized service center. For non warranty repairs, the customer shall pay shipping and repair cost to the authorized service center, and the instrument shall be submitted in the original carton, as a complete unaltered unit, along with all the supplied accessories.

X-Rite, Incorporated has offices around the world. You can contact us using one of the following methods:

- To identify the X-Rite service center nearest you, please visit our web site at [www.xrite.com](http://www.xrite.com).
- For online help, visit our web site and click the **Support** link.
- Send an e-mail to Technical Support ([casupport@xrite.com](mailto:casupport@xrite.com)) detailing your problem and listing your contact information.

### Cleaning the Instrument

The exterior of the instrument may be wiped clean with a cloth dampened in water or mild cleaner.



#### Important Notes:

- DO NOT use any solvents to clean the instrument, this will cause damage to the cover and internal electronic components.
- Compressed air should not be used to clean the instrument. Cleaning the instrument with blown air can cause dirt on the outside of the instrument to enter into the device, and contaminate optical components.

#### Cleaning the Calibration Reference

The white tile in the calibration reference should be cleaned using a mild soap and warm water solution, thoroughly rinsed with warm water, and wiped dry with a clean, lint-free cloth. You must let the reference dry completely before taking a calibration measurement.

### Replacing the Battery Pack



Use on Li-ion battery pack provided by X-Rite (P/N TPZ-27313); other types may burst causing personal injury.

**NOTE:** Time and date are lost when the battery is disconnected. It is not possible to set the clock in the Setting menu.

**IMPORTANT:** Before replacing the Li-ion battery pack, make sure that the device is in a clean environment and on a flat, and non-slippery surface.

**WARNING:** Any accidental damage done to internal parts of the device (optics, mechanics, electronics) will void the warranty of the device.

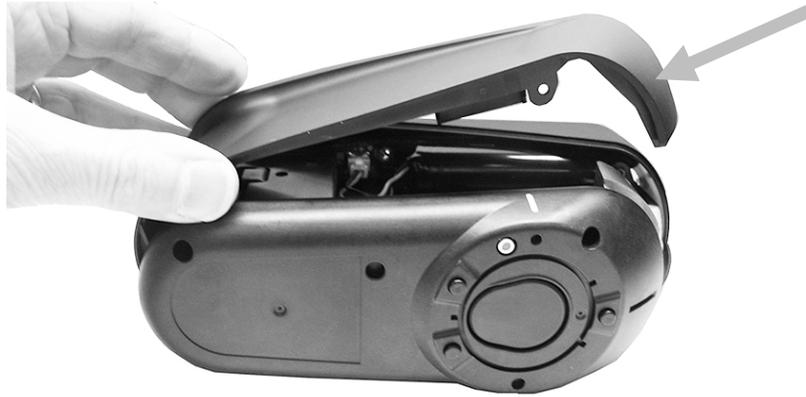
Connect the instrument to the PC and use the utility software or the application software to set time and date.

This information is used for identification of the measurements.

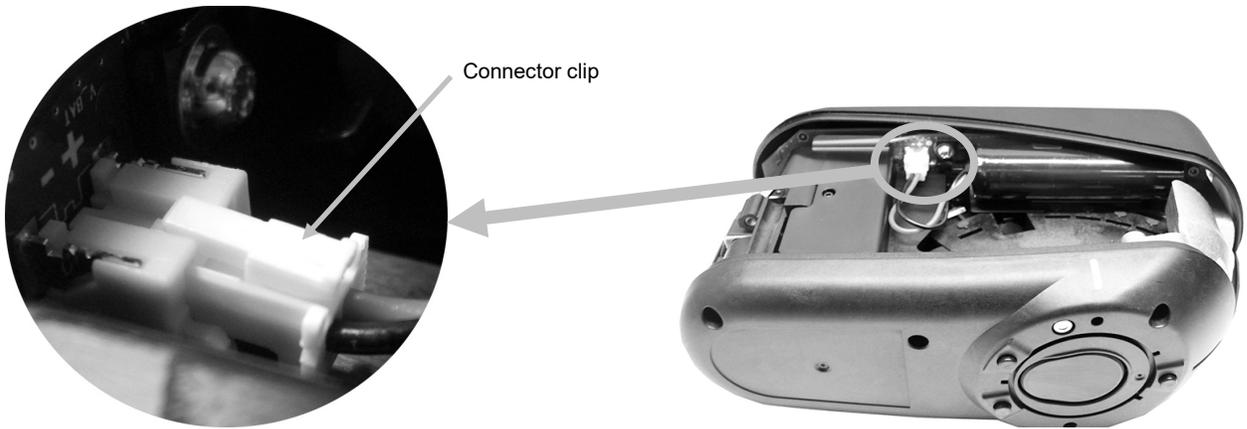
1. Carefully position the instrument on the left side and remove the 2 screws in the base plate using a 2 mm allen key). Compress the cover slightly if the screws do not fall out.



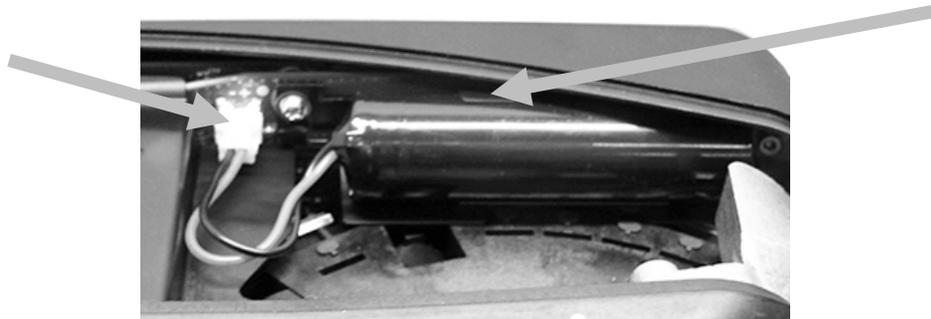
2. Lift up on the right side panel and remove.



3. Press downward on the clip at the top of the battery connector. Slowly pull battery connector outward and remove the old battery pack.



4. Insert the new battery pack into the clip and plug in the battery connector.



5. Reattach the side panel and insert the long screw in the back hole and the short screw in the front hole. Carefully tighten the 2 screws in the base plate with very little torque.



**Troubleshooting**

Prior to contacting X-Rite support department for instrument problems, try the applicable solution(s) described below. If the condition persists, contact us using one of the methods listed in the Service Information section.

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Instrument screen remains dark.	Instrument is turned off.	Turn instrument on by pressing the power/measure button.
	Instrument is in power down mode.	Touch the screen or lift the instrument.
	Battery is very low.	Charge the battery min. 1 hour. After max. 5 minutes the screen will turn on.
	Battery is defective.	Charge the battery. If the screen does not turn on after max. 5 minutes check if the USB cable is correctly connected to the computer or power supply (USB ports on computer monitors and keyboards do not deliver enough power). If it still does not work the battery needs to be replaced.
Screen is instable (turns on and off periodically) when the instrument is connected to a computer or power supply.	Battery is defective.	Battery needs to be replaced.
Screen is frozen.	Firmware is locked up.	Disconnect USB cable. Press and hold the power/measure button for 10 seconds and then release. Instrument turns off. Instrument can be started normally.
Measurement error or results appear inaccurate.	Material being measured is damaged (e.g. scratched).	Repeat measurement.
	Calibration was performed on a dirty calibration reference.	Clean the calibration reference and repeat the calibration per procedure in the Calibration section.
	Instrument requires calibration.	Perform calibration on calibration reference followed by a self test. If calibration and self test fails, the instrument is defective. Contact technical support.
	Instrument is defective.	Perform a self test in the Settings menu. If the self test fails the instrument is defective. Contact technical support.
Calibration procedure fails.	Instrument movement, dirty calibration tile, etc.	Try measuring the white tile again. If an error still occurs, clean the white calibration tile as explained in the Appendices. If the issue persists, check battery status (Device Information in Settings menu), perform a Factory Reset in the Settings menu, turn the device off and on, and repeat the calibration.
	Instrument defective.	Contact technical support.
Instrument and software not communicating (USB connection).	USB cable not connected.	Connect the USB cable between the computer and the instrument.
	USB cable is defective.	Exchange USB cable.

	Communication crashed between application software and the instrument.	Unplug the USB cable, wait 1 second and connect the cable again. If the communication still does not work, close and restart the software application. Restart the instrument. If the communication still does not work, reboot the computer.
Instrument will not measure or calibrate.	Contact sensor(s) do not properly contact the sample surface.	Lift the instrument and place it properly on the sample. Make sure that all 3 sensor indicators on the screen turn green.
	Contact sensor(s) are not working correctly. Sensors may be stuck due to dirt or paint; or they are defective.	Open a new job to show the 3 sensor indicators on the screen and place the instrument on a flat surface and then lift it. If one or more of the sensor indicators in the screen do not change color when lifted, there may be a problem with the contact sensor(s). Contact technical support.
Instrument will not measure or calibrate.	Sensor indicators in the display do not change color.	Contact sensors are not working correctly. Put the instrument into measure mode and place the instrument on a flat surface and then lift. If one or more of the sensor indicators in the display do not change color when lifted, there may be a problem with the contact sensor. Contact technical support.
WiFi not connected.	WiFi turned off.	Turn on WiFi in Settings menu or tap "Connect" in home screen to connect once.
	WiFi signal too weak or not available.	Approach the WiFi access point; optimally closer than 5 meters.
WiFi not connecting.	Network not correctly set.	Perform the WiFi setup procedure in WiFi Option, located in the Settings menu by scanning the available networks. Select the desired network and enter the password.
WiFi network cannot be configured.	Wrong password entered.	Repeat the WiFi setup procedure in WiFi Option, located in the Settings menu by scanning the available networks, selecting the desired network and enter the password. Make sure the password is entered correctly. This can be checked by switching the password entry to human readable (eye symbol above password entry).
	WiFi signal too weak.	Approach the WiFi access point; optimally closer than 5 meters. Repeat the WiFi setup procedure in WiFi Option, located in the Settings menu by scanning the available networks. Select the desired network and enter the password.
Shutter error.	Instrument defective.	Contact technical support.
Multiple error messages.	Instrument encountered a cascade of errors.	Press OK button in error message for 2 seconds.
Date and time wrong.	Incorrect setting.	Set the correct date and time. Date and time can be set in the setting menu or by using the corresponding function in the software.

## Instrument Specifications

### General

Spectro Measurement:	Detection 45° Illumination 15°, 25°, 45°, 75°, 110°
Positioning:	Three pressure sensors
Measurement Spot Size:	12 mm
Measurement Time:	2.7 sec
Short Term Repeatability on White:	0.02 $\Delta E^*$
Reproducibility on BCRA Tiles:	All BCRA tiles: avg $\Delta E^* < 0.1$
Inter-Instrument Agreement:	Avg. 0.18 $\Delta E^*$ BCRA tile set
Wave Length Range:	400-700 nm
Wave Length Resolution:	10 nm
Measurement Range:	0 to 600% reflectance
Battery Life Time:	2,000 measurements
Memory:	500 jobs
Weight:	1.32 lb. (0.6 kg)
Size:	L 7.08" x W 2.75" x H 3.74" (L 180 mm x W 70 mm x H 95 mm)
Calibration	Internal, external white
Calibration Interval:	21 days
Connectivity:	USB, WiFi
Software Compatibility Mode:	Native MA-5 QC and MA94 emulation mode

### Environmental

Operating Temp:	50°F to 104°F (10°C to 40°C)
Humidity Max:	85% RH max (non condensing)
Storage Temp:	-4°F to 122°F (-20°C to 50°C)

### Battery

Type:	Lithium Ion Battery
Cell Size:	18650
Nominal Voltage:	3.6V
Capacity:	2.15 Ah
Max. discharge current:	4A
Max. charge current:	2.15A
Inner resistance:	$\leq 120$ m $\Omega$
Compliance:	UN38.3, IEC62133B, CE
Protection:	over current, over charge, over discharge



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