

# 500 Series

SPECTRODENSITOMETER

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**Getting Started**





500 SERIES  
SPECTRODENSITOMETER

The Manufacturer: X-Rite, Incorporated  
Der Hersteller: 4300 44th Street, S.E.  
El fabricante: Grand Rapids, Michigan 49512  
Le fabricant:  
Il fabbricante:

Declares that: Spectrodensitometer  
gibt bekannt: 500 Series  
advierit que:  
avvertit che:



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non deve essere connesso a reti di telecomunicazioni pubblici.

## CE DECLARATION

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Model Name: Spectrodensitometer

Model No.: 500 Series

Directive(s) Conformance: EMC 89/336/EEC LVD 73/23/EEC

### **Warning:**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## RoHS/WEEE

X-Rite products meet the **R**estriction of **H**azardous **S**ubstances (RoHS) Directive 2002/95/EC and European Union – **W**aste **E**lectrical and **E**lectronic **E**quipment (WEEE) Directive 2002/96/EC. Please refer to [www.xrite.com](http://www.xrite.com) for more information on X-Rite's compliance with the RoHS/WEEE directives.

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This instrument may be covered by one or more patents. Refer to the instrument for actual patent numbers.

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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.

## Industry Canada Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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**NOTE:** Shielded interface cables must be used in order to maintain compliance with the desired FCC and European emission requirements.

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

**CAUTION:** Operational hazard exists if battery charger other than SE30-177 (100-240V) is used. Use only X-Rite battery pack SE15-26, other types may burst causing personal injury.

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# Getting Started

This document is designed to get you familiarized with your X-Rite 500 Series Spectrodensitometer. If you need any further instructions or information, you can find a complete Operator's Manual in a Portable Document Format (PDF) file on the CD that was shipped with your instrument.

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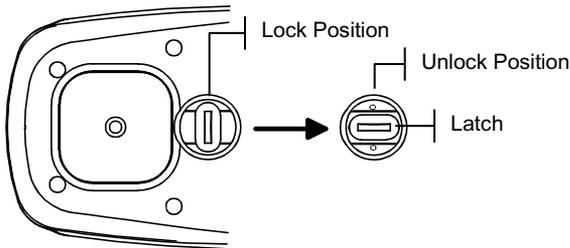
# What to do first...

## Unpack and Inspect

- Remove the instrument from the shipping carton. Be sure to keep the original carton. If shipment is necessary, the instrument should be packaged in the original carton. Contact X-Rite if you need a new shipping carton.
- Inspect the instrument for any damage. If any damage occurred during shipment, immediately contact the transportation company. Do not proceed with installation until the carrier's agent has inspected the damage.
- Check your packaging contents against your packing list and original order. A detailed packaging drawing and a parts list can be found in the instrument's Operator's Manual.

## Unlock the Shoe

The instrument shoe must be unlocked to take measurements. (The instrument is shipped with the shoe locked.) When the instrument is not in use, the shoe should be re-locked to protect the instrument optics. A rotating latch on the bottom of the instrument locks the shoe closed.



### To unlock the shoe:

1. Hold the shoe against the instrument and rotate the latch.
2. Align the latch so that it fits through the cut-out in the shoe.
3. Carefully release the shoe to open.

## Charge the Battery

Only use the AC Adapter supplied or the optional battery charger (X-Rite P/N 500CHG). The battery pack must remain in the instrument at all times to operate.

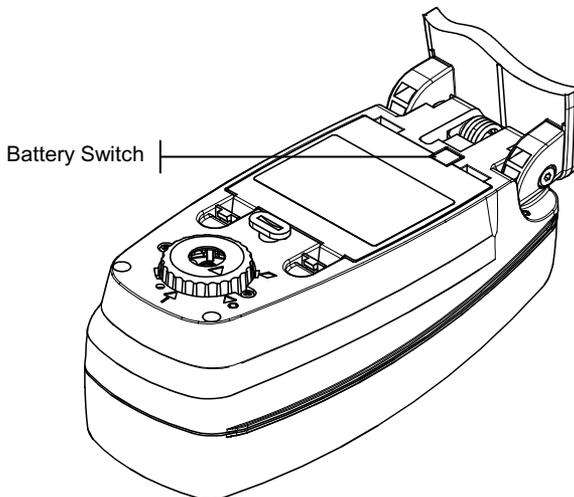
Before initial “remote” use of the instrument, charge the battery pack for approximately three hours. However, if immediate use is required, the instrument can be operated “tethered” to the AC adapter during battery charging.

### To attach the AC adapter:

1. Verify that the voltage indicated on the adapter complies with the AC line voltage in your area. If not, contact X-Rite or an authorized representative.
2. Insert the small plug from the adapter into the power-input connector on the instrument. (If you are using serial cable SE108-92, you may insert the small plug into the power connector at the end of the cable.)
3. Plug the adapter into an AC wall receptacle.

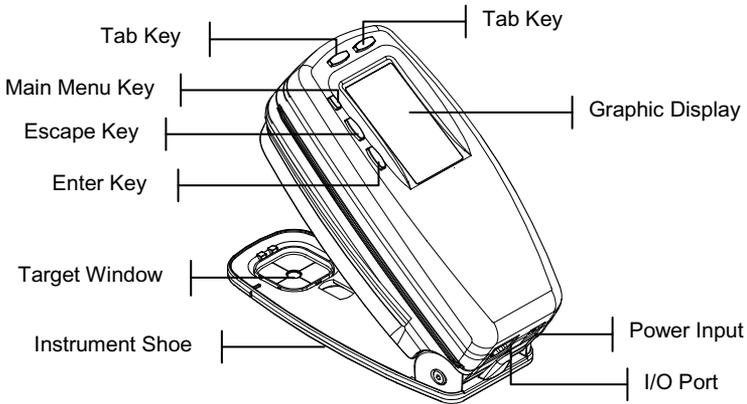
## Apply Power

The Battery switch—located on the bottom of the instrument—turns the instrument off and on during battery operation. When the AC adapter is attached, the instrument remains on and the battery switch has no affect.



## Instrument Description & Features

The X-Rite 500 Series Spectrodensitometer relies on an integrated spectrophotometric engine, allowing accurate and precise measurements. This instrument has intuitive keys and a high-contrast graphic display.



### The Main Menu

When the instrument is first powered-up, the main (top level) screen appears. The main screen consists of two areas, Main Menu and Instrument/Option Data. The left side of the screen lists all available functions. The right side of the screen lists instrument information when the Main Menu title is highlighted and specific option information when a function is highlighted.

### The Keys

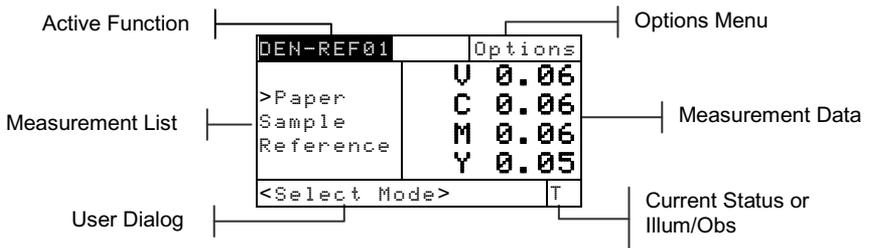
Perform menu and option navigation with the five keys arranged around the display screen. Each key has a unique symbol for performing a specific operation.

- ↓ **Tab Down key** – advances the highlighted bar (reverse video) to the next available “tab stop.” A “tab stop” indicates an item that can be acted on further, such as a measurement or a setting option. Tab stops generally follow a left-to-right or top-to-bottom sequence. When the last tab stop is reached, the next key press returns to the first tab stop in that menu's list.

- ↑ **Tab Up key** – performs the same function as the Tab Down key except in reverse order. Tab stops follow a right-to-left or bottom-to-top sequence.
- ← **Enter key** – activates the highlighted item. If the function is a menu, such as Options, then the Option menu items appear. If the item is a value, such as cal alert time, then the value will increment to the next choice. When entering an active function from the main menu, the active function is displayed with the highlight on the first required operation in the measurement list (typically paper or sample).
- ↶ **Escape key** – backs-up the instrument screen one menu level. For example, if an option or value is being modified at the time the key is pressed, the edits are aborted and the previous screen or menu appears.
- ✕ **Main Menu key** – returns the instrument screen to the main menu with **Main Menu** highlighted. This is a quick exit out of any function. If any option or value is being modified at the time the key is pressed, the edits are aborted and the previous setting reinstated.

## Function Screens

The instrument function screen consists of six main areas: Active Function, Options Menu, Measurement List, Measurement Data, User Dialog, and Current Status or Illum/Obs.



- **Active Function** – This area displays the current measurement mode. Pressing the Enter key ← when the mode is highlighted toggles through additional modes (for example, Density and Density –Ref#).

- **Options Menu** – Each active function contains an Option Menu, which has one or more changeable settings. Pressing the Enter key  $\leftarrow$  when the menu is highlighted opens a list of available options (for example, Color and Mode).
- **Measurement List** – This portion of the screen displays the measurement items available for the active function. When the highlight is located on an item outside the measurement list, an arrow ( $>$ ) appears to the left of the active measurement item. The corresponding data is represented in the measurement data portion of the screen. In the example above, the displayed data represents paper values.
- **Measurement Data** – This portion of the screen instantaneously displays measurement data for the active function. Measurement data that is out-of-range or unable to display in the space provided appears as  $\times\times\times$ .
- **User Dialog** – This portion (bottom line, not including the status or illum/obs) indicates the current mode or condition of the instrument. For example, this area would indicate that a measurement is required when a step is highlighted in the measurement list. Any error condition encountered during a measurement is also displayed in this area. *See User Dialog Error Messages for more information about error messages.*
- **Current Status or Illum/Obs** – This portion of the screen indicates the current status or illuminant observer. For the colorimetric functions, pressing the Enter key  $\leftarrow$  toggles through the available illuminants. Instrument status is changed through configuration. *See Configuring the Instrument.*

# Using the Instrument

## Operational Steps: The Basics

There are four basic techniques used to navigate through the instrument screens, select functions and settings, and determine values.

### Opening a Menu or Function

Opening a menu or a function gives you access to additional items related to the menu or specific information for a function. Below are examples of a typical menu and function screens.

Menu	CONFIGURATION				
	Language :English				
	Active Functions...				
	Density Opt :T				
	Color Option:CIE				
Cal Options :24 hrs					
	DEN-REF01	Options			
	>Paper	U 0.06			
	Sample	C 0.06			
	Reference	M 0.06			
		Y 0.05			
	<Select Mode>			T	

#### To open a menu or function:

1. Use the Tab Up key ↑ or Tab Down key ↓ to highlight the desired menu or function.
2. Press the Enter ↵ key.

### Opening an Editor

Opening an editor allows you to select items and/or edit values for a selection or function. Below is an example of an editor.

CONFIGURATION		
Lan	Language	sh
Act	English	*
Col	Deutsch	
Den	Français	
Cal	-	s

#### To open an editor:

1. Use the Tab keys ⇅ to highlight the desired selection or function.
2. Press the Enter ↵ key to access the editor.

## Selecting from a List

Many settings and functions allow you to select specific items from a list. Lists can be found in every type of screen: menus, editor, function screens, etc.

### To select an item from a list:

1. Use the Tab keys **↑↓** to highlight the desired item in the list.
2. Press the Enter key **↵** to save your selection (and return to the previous screen).

## Editing a Value

Many settings and functions allow you to edit specific values. Values are typically edited in editor screens.

### To edit a value:

1. Use the Tab keys **↑↓** to highlighted the desired value.
2. Press the Enter key **↵** to access the menu.
3. Use the Tab keys **↑↓** to choose the desired digit (arrows above and below designated selection). Press the Enter key **↵** to access the editor.

**NOTE:** If the editor menu includes letters and symbols (such as the standard name editor), you can press the Enter key **↵** again to quickly page through groups of letters, symbols, and numbers.

4. Use the Tab keys **↑↓** to highlight the desired number and press the Enter key **↵** to exit the editor.
5. When editing is completed, use the Tab keys **↑↓** to highlight **Save & Exit** and press Enter key **↵**.

## Important Measurement Techniques

In order for the instrument to obtain accurate and repeatable measurements, the bottom of the shoe must be flat with the surface to be measured. When measuring curved items where a flat surface is not available, a fixture should be used. A fixture allows accurate positioning of the sample tangent to the measurement plane. If the item to be measured is smaller than the shoe, you may want to make a platform—at same height as the item—for the rest of the instrument to sit on.

## Taking a Measurement

When required to take a measurement, the user dialog displays a measure prompt. Be sure to use the previously discussed proper measurement techniques.

### To take a measurement:

1. Wait for a `<Measure>` prompt to appear in the user dialog.
2. Center the instrument target window over a sample of the paper.
3. Lower and hold the instrument down to take a reading.
4. When `<Completed>` is displayed in the user dialog, release the instrument. The measurement data appears.

# Calibrating the Instrument

Under normal circumstances, the instrument should be calibrated at least once a day. Calibrating the instrument every day ensures the best measurement accuracy and stability.

## White Calibration

**IMPORTANT:** Every white calibration reference has a set of reflectance values that are unique. Use the calibration reference only if the reflectance values match those of the instrument you are calibrating. The calibration reference shipped with an instrument is marked with a matching serial number. If a different calibration reference is used, the reflectance values for that reference must be entered in the instrument. Refer to the Operator's Manual if the values need to be modified.

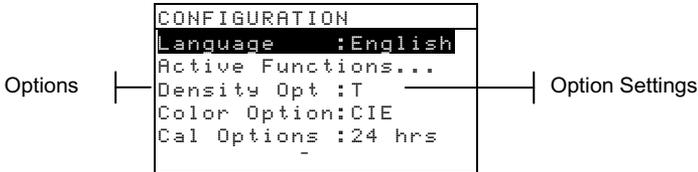
The White Calibration function is used to update the white calibration point in the instrument.

**NOTE:** If an `Optics Change?` message appears during the white calibration, select `No` and re-measure the calibration reference. If the instrument optics was changed, a full calibration must be performed. See the *Operator's Manual*.

1. Make sure the calibration reference is clean before use. Carefully clean the reference and white ceramic disk with a dry, lint-free cloth. Do not use solvents or cleaners of any kind.
2. Press Tab Up ↑ or Tab Down ↓ to highlight `Calibration`. Press Enter key ↵ to access the white calibration function.
3. Place the instrument onto the calibration reference. The instrument fits snugly with the target window opening centered over the white ceramic disk.
4. Lower the instrument to the shoe; hold steady until the user dialog indicates the calibration is completed.
5. Store the calibration reference in a dry, dust free area, away from direct exposure to light.

## Configuring the Instrument

You may set up your instrument according to your specific needs. This is done through the Configuration menu. The Configuration menu has more options than what can be displayed in one screen. Use the Tab keys  $\updownarrow$  to scroll through all the options.



**NOTE:** Most configuration option settings are displayed to the right of the option.

### Configuration Settings

Use the Operational Steps described in *Using the Instrument* to set your configuration settings.

#### Language

The Language configuration allows you to select the language you want to display on your instrument: English, Deutsch, Español, Français, Italiano, Português, Chinese, Japanese.

#### Active Functions

The Active Functions configuration allows you to select the functions that are available in the main menu. An > indicates the function is active.

**NOTE:** Use the Enter key  $\rightarrow$  to toggle functions on and off. Then use the Escape key  $\leftarrow$  to return to the previous menu.

#### Density Options

The Density Options configuration allows you to determine the following settings:

- **Status** – Select the status used for density functions. Status is dependent upon the filters applied to the density data obtained from a measurement. Available status: Status T, Status A, Status G, Status E, Ax, Tx, Ex, Status I, HIFI.

- **Precision** – Determine whether you want to use high or normal precision when displaying density values. Two display formats are available; high precision and normal precision (the default). Normal precision simply removes one decimal place of resolution from the displayed data values.
- **Gray Set** - allows you to EXPAND the region that the instrument considers to be neutral in shade. For example: this can be especially helpful on newsprint in the printing of ‘yellow’ pages.

### Color Option (520, 528, 530 only)

The Color Option configuration allows you to determine the following settings:

- **Lab Method** – Choose to calculate  $L^*a^*b^*$  values using the CIE method or the Hunter method.
- **LCh Method** (528, 530 only) – Choose to calculate  $L^*C^*h^\circ$  values using either the  $L^*C^*h^\circ(ab)$  method or the  $L^*C^*h^\circ(uv)$  method.
- **CMC Tolerancing** (528, 530 only) – Set a series of constants to be used in the calculation of  $DE_{CMC}$ .
- **CIE94 Tolerancing** (528, 530 only) – Set a series of constants to be used in the calculation of  $DE_{CIE94}$ .
- **Precision** – Determine whether you want to use high (default) or normal precision when displaying color values. High precision simply adds another decimal place of resolution to the displayed data values.

### Calibration

The Calibration configuration allows you to determine the following settings:

- **Full Calibration** – *Required only for special circumstances. See the Operator's Manual.*
- **Enter Reflectances** – Manually enter reflectance values for white calibration.
- **Cal Alert** – Enable a calibration alert and set how often the instrument will alert you to perform a calibration.

## Serial Port

The Serial Port configuration allows you to determine the following settings:

- **Baud Rate** – Choose the correct baud rate.
- **Hand Shake** – Set the method of hand shaking between the instrument and your computer. There are four hand shake methods: Off, CTS, BUSY, or XON.
- **Auto XMT** – Enabled with status <00> returned, enabled with no status returned, enabled with no status return or attribute designation (Spreadsheet), or disable (off) automatic transmission of measured data.
- **Separator** – Determine the character that separates the data components of a measurement: Space, Comma, Tab, CR (carriage return), CRLF (carriage return, line feed).
- **Delimiter** – Determine the character that terminates the string of measured data: Space, Comma, Tab, CR (carriage return), CRLF (carriage return, line feed).
- **Protocol** – Select the desired protocol, RCI or ICP.
- **Emulation** - Determines the output characteristics of the instrument: Normal or 400 Series.

## Power Down

The Power Down configuration allows you to adjust the amount of time the unit remains on without any use before turning itself off. This configuration only affects the instrument when the charger is *not* connected. This value can range from 10 to 120 seconds.

## Speed Read

The Speed Read configuration allows you to set the time duration the reading motor remains on after a measurement. The time setting can range from 0 to 9 seconds (3 being the default value). This feature is useful when quick measurement of consecutive patches is desired.

## Display

The Display configuration allows you to determine the following settings:

- **Contrast** – Set the contrast of the display for optimal viewing. The setting value can vary from -9 to +9.

- **Orientation** – Determine whether you want the display viewable for right-handed (right) or left-handed (left) use.
- **Security** – Enable (on) or disable (off) the entire Configuration options menu. *See steps below to access the Configuration menu when Security is enabled.*
- **Unit ID** – This unique number identifies the instrument. This number is only used for upgrading your instrument. *This number cannot be changed.*
- **Battery Status** – Lists various voltage conditions and temperature of the battery. This information would mainly be used by X-Rite's Technical Support staff for diagnostic purposes.
- **Error Log** – Used by X-Rite's Technical Support to identify where an error condition occurred in the instrument.

**To gain access to the Configuration menu if Security is enabled:**

1. Remove the AC adapter and turn off the instrument with the battery switch.
2. Press and hold the read switch (located in front of the optics) as you turn the instrument on with the battery switch.
3. When the main menu appears, release the read switch. The Configuration item appears in the main menu.

**NOTE:** You must set the Security to **Off** if you want the Configuration item to automatically appear the next time you turn the instrument on.

## **Beeper**

The Beeper configuration allows you to turn the instrument's beeper On or Off.

## **Patch Smarts**

The Patch Smarts configuration allows you to set the auto recognition of a patch to On or Off within the Dot, Trap, and Print Contrast functions.

## **User Configuration**

The User Configuration allows you to quickly configure dot and density options with minimal set up time.

# Instrument Functions

The 528 and 530 instruments contain both densitometric and colorimetric functionality. Your instrument may have fewer functions available. Refer to the chart below for specific instrument functions.

Functions	504	508	518	520	528	530
Density	X	X	X	X	X	X
Color				X	X	X*
Match					X	X*
Dot		X	X	X	X	X
Trap			X		X	X
Print Contrast			X		X	X
Hue/Grayness			X		X	X
Paper Indices					X	X
Compare				X	X	X
EFS			X		X	X

\* Includes reflectance data and reflectance graph feature. For detailed instructions and more information about a specific function, see the *Operator's Manual*.

## Selecting a Function

All functions are available from the Main Menu.

-MAIN MENU-	
Density	
Color	All
Match	Absolute
EFS	Stat T
Dot	
↓	

To select a function:

1. Use the Tab keys ↑ ↓ to highlight the desired function.
2. Press the Enter key ←. This opens the function screen.

## Selecting a Measurement Mode

Measurement modes typically determine how the instrument evaluates the data that it measures, for example, DENSITY and DEN-REF#.

DENSITY	↔	DEN-REF01	Options
Measurement Mode			U 0.006
			> Paper 0.006
			Sample 0.006
			Reference 0.006
			Y 0.006
		<Select Mode>	T

**To select a measurement mode:**

1. Use the Tab keys  $\uparrow\downarrow$  to highlight the mode.
2. Press the Enter key  $\leftarrow$  to alternate between the available modes.

**Accessing Options**

Many functions have one or more options that further specify how the instrument interprets and uses data.

DEN-REF01		Options	Color, Mode, Reference
>Paper	U	0.006	
Sample	V	0.006	
Reference	Y	0.006	
<Select Options>		T	

**To access an option:**

1. Use the Tab keys  $\uparrow\downarrow$  to highlight the Options item.
2. Press the Enter key  $\leftarrow$  to open the Options menu.
3. Use the Operational Steps described in *Using the Instrument* to set/change any option settings.

**Selecting an Illuminant (528, 530 only)**

Color measurement data can be viewed under different illuminant conditions. (Status must be changed through the Configuration options. *For more information, see Configuring the Instrument or the Operator's Manual.*)

COLOR-REF01		Options	A, C, D50, D55, D65, D75, F2, F7, F11, F12
Sample	L*	31.06	
>Refer	a*	-0.05	
	b*	-33.12	
<Select Illum>		D50/2	

**To select an illuminant:**

1. Use the Tab keys  $\uparrow\downarrow$  to highlight the current illuminant.
2. Repeatedly press the Enter key  $\leftarrow$  until the desired illuminant is shown. The measurement data immediately changes to reflect the selected illuminant.

## User Dialog Error Messages

Errors encountered during a measurement are displayed in the User Dialog. All errors are accompanied by a long beep. Any errors (except <Battery Low>) encountered during a measurement cancel that measurement; and the data displayed is from the prior measurement.

<b>User Dialog Errors:</b>	
<Measure Aborted>	Displays with an incomplete measurement. Instrument was released too soon.
<Invalid Measure>	Measure did not complete successfully. Try again. Could be a hardware failure if it occurs again.
<Needs Cal!>	Displays when calibration is required.
<Cal Failed!>	Calibration failed. Make sure the instrument is properly positioned on the reference.
<Cal Aborted!>	Displays with an incomplete cal measurement. Instrument was released too soon.
<Battery Low>	This warning appears when the battery falls below approximately 25% of full charge. Measurements are still possible, but the battery should be charged soon.
<CHARGE BATTERY>	Displays when not enough battery power remains to take measurement. The current measurement is aborted.
<CHECK BATTERY>	Battery not installed, disconnected, or dead. Unit will not allow any measurements.
<50% Dot Fail>	Did not measure a true 50% dot tint in 50% Dot Cal procedure.
<WRONG CHARGER>	Wrong charger connected to unit.
MP Failure	This error "pops up" instead of appearing in the User Dialog. It is generated when trying to change the configuration, but the unit cannot make the change permanent. Try again.





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