

D25[®] NC User's Manual



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For Sensor Firmware Version 2.11 and Above



An ISO 9001 Certified Company

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SAFETY NOTES

For safety when using the color measurement equipment, pay particular attention to the following types of statements in the hardware section of this User's Manual. Each description is shown in its representative typeface.

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Chapter 1 - GETTING STARTED

What is the D25 NC?

The D25 NC is a continuous, automated, non-contact color measurement instrument with height detection and color compensation. For use in laboratory environments, the D25 NC uses LED illumination technology to measure samples and monitor color on a rotating tray. Pour, place and measure single or multiple samples on the tray, with easy cleanup and maintenance.

D25 NC makes real-time color measurements of products with irregular shapes, and in industries as diverse as paint, food, building products and industrial minerals. This instrument is designed to work as a stand-alone unit with an easy-to-read display or connected to EasyMatch QC software on a personal computer.

Unpacking Connecting the D25 NC

Unpack the Instrument and set stand and sensor on the bench top. The following items should be in the box:

Table 1. Shipping Contents

Item	Description	Part No.
1	Sensor head	D02-1016-442
2	Calibration Box	D02-1015-807
3	D25 NC Workstation	D02-1016-154
4	Sample Tray, 150mm (6-in)	D04-1016-493
5	Sample Tray, 300mm (12-in) with D04-1016-472 Hub	D02-1016-490
6	USB Adapter Cable (Standard-A receptacle to Standard B plug, 1 meter long) connects the A/B receptacle on the instrument to other peripherals such as a Personal Computer or the A13-1014-259 USB Printer.	A21-1014-375
7	AC Input Cord, 110V	A13-1002-655
8	AC Input Cord, 220V	A13-1002-656
Documents Package		
9	D25 NC Certificate of Traceability	CERT-TRACE
10	D25 NC Sensor Report	
11	D25 NC Standards Data Sheet	
12	D25 NC Inter-Connect Drawings	
CD Contents		
13	D25 NC Quick Start Guide on CD A60-1016-531	L02-1016-528
14	D25 NC User's Guide on CD A60-1016-487	

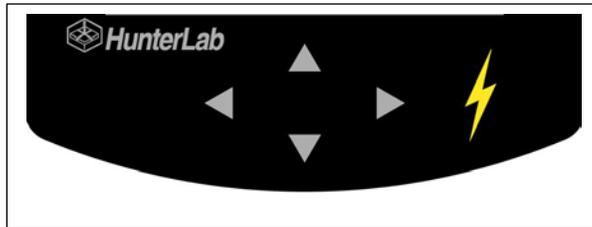
Connect the power cord to the back of the instrument and turn on the power using the switch on the back of the turntable. The instrument can be connect by USB to a computer for use with EasyMatch QC software, or to an optional HunterLab USB printer or barcode scanner. Use the switch below the USB connection to select either printer/scanner or computer. See Table 2 Optional Accessories.



Figure 1. Switches on the back of the Turntable

The Button Pad and LCD Display

The five buttons on the button pad can be loosely defined as the left, right, up, and down buttons, with the “GO” (lightning bolt) button located to the right of the arrows. These buttons perform different functions depending on the current operation. The “GO” button typically starts an action.



Standardization

Locate the slide-on-manual calibrator (stored on side of sensor support arm) and slide it onto the track under the sensor window. The calibrated values for the white tile and green tile, displayed in CIE X, Y, Z values using D65/10°, are recorded on the front of the calibrator as shown below in Figure 1-2. These tile values are traceable to reflectance standards held at the National Physical Laboratory [NPL] (UK) and the National Institute of Standards and Technology [N.I.S.T.] (U.S.A.).



Figure 2. Slide-On Calibrator with storage on stand



Figure 3. Calibrated Values for the Slide-On Calibrator

From the main menu, select **STANDARDIZE >**.

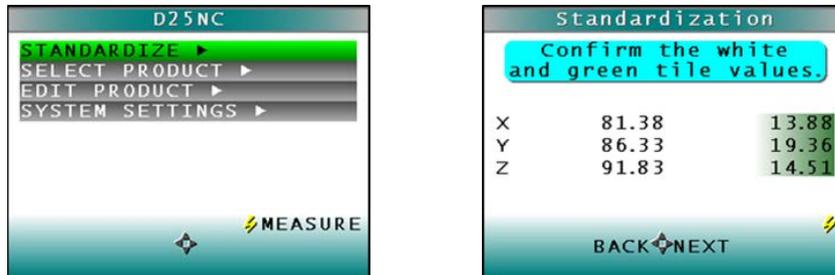


Figure 4. Standardize > Verify White and Green Tile Values on Calibrator

Slide the black glass into view and press **GO**.



Figure 5. Standardize > Black Glass Reading

Slide the white tile into view and press **GO**.



Figure 6. Standardize > White Tile Reading

Slide the diagnostic green tile into view and press **GO**.



Figure 7. Read Diagnostic Green Tile

The final results show a PASS or FAIL for the Green Tile, including differences read and acceptance tolerances.

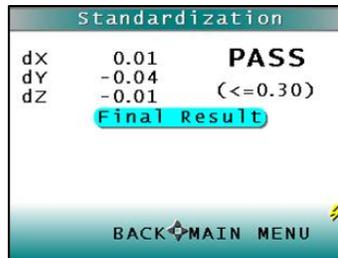


Figure 8. Standardization Completed

Taking a Sample Measurement

Select a sample tray to use with the turntable. Place the product in the tray and from the **MAIN MENU**, press **SELECT PRODUCT (GO)**.



Figure 9. Main Menu > Select Product

Select the product setup (can be custom named) that you want to use to measure your product.

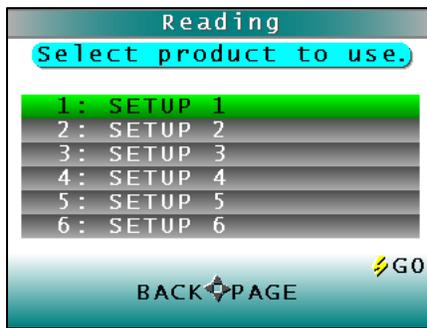
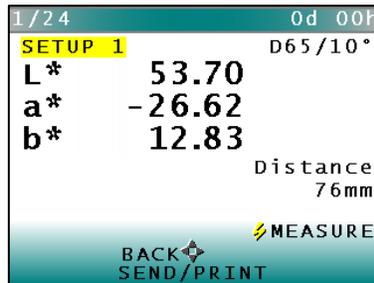


Figure 10. Press GO to select your Product Setup.

The measurement begins and the results are shown on the display.



To output the results to a USB printer or a USB device, press SEND/PRINT.

To continue to take sample measurements, press MEASURE.

For more information on verifying the Height, refer to SYSTEM SETTINGS > DIAGNOSTICS > DISTANCE SENSOR.

For more information on setting Height settings, refer to EDIT PRODUCT > Select Product Setup > RUN CONFIG > MIN DISTANCE, MAX DISTANCE, HEIGHT TRIGGER.

Additional Components and Accessories

There are also various optional components/add-ons available for purchase for use with your D25 NC. HunterLab part numbers are provided for each item listed below for your convenience in ordering.

Table 2. Optional Accessories

Description	Part No.
USB Printer	A13-1014-259
Printer Paper (5 rolls)	L02-1014-440
EasyMatch Quality Control Software	EZMQC-OPT
USB Barcode Scanner	A13-1014-254
USB Flexible Keyboard	A13-1014-294

CHAPTER 2 - EDIT PRODUCT/ PRODUCT SETUP

A product setup defines the operation of the system for a specific product. Up to 250 product setups may be saved in the sensor memory.

Parameters that need to be defined are the reporting color scale and corresponding illuminant and observer; standard or target color values for the product; and the acceptable tolerances applied to those standard values. In addition, operating parameters must be defined as described in the rest of this chapter.

Product setup is performed using the button pad and the LCD front panel display on the D25 NC Sensor Head. Product setups can be created and modified only when the system is in Edit Product mode. Color measurements cannot be made while you are working on a product setup.



Figure 12. Selecting the Product Setup

Configure each desired parameter by moving the cursor highlight to its position using the up and down arrow buttons. The product setup parameters that may be configured are as follows:

Table 3. Product Setup Parameters

Parameter	Selections
Standard	Physical, Working, Numeric, Hitch
AutoSearch	Yes, No
Views	Display, Ill/Obs, Color Scale, Color Index
Views: Display	Difference, Absolute, Spectral Data, Spectral Difference, Spectral Plot, Difference Plot, Color Plot
Views: Ill/Obs	D65/10, D75/10, F2/10, F7/10, F11/10, A/2, C/2, D50/2, D55/2, D65/2, D75/2, F2/2, F7/2, F11/2, A/10, C/10, D50/10, D55/10
Views: Color Scale	L*a*b*, L*C*h*, Lab, XYZ, Yxy, dLdCdH, None
Views: Color Index	Y, YID, YIE, WI€, Tint, Z%, 457B, BCU, SMA, SW, HCCI, SCAA, GSC, GSS, dE*, dEc, dE, dC*, dC, SSN, MI, None (...)
CMC Shade Sort	Enter CMC parameters, and Shade Blocks
Standard Values	Read or manually enter values
Tolerances	Set Color Tracking, Tolerance Limits
Run Configuration	Read Mode, Interval, Belt Distance, Min. Height, Max Height, Height Trigger

Run Config: Read Mode	Piece or Time
Run Config: Interval	0 to 60 seconds in increments of 5
Run Config: Min Distance	0 to 65 mm increments of 5 (0 to 3.8 in increments of 0.2)
Run Config: Max Distance	70 to 300 mm increments of 5 (0.4 to 12 in increments of 0.2)
Run Config: Height Trigger	Yes, No
HCCI Parameters	Enter slope and intercept for $y=mx + b$

Product Setup > Product Name Setup

Press the right arrow button to obtain the Product Name screen on which you may enter any descriptive name for the product setup. Up to 15 characters may be entered using all the letters and numbers, as well as the space character.

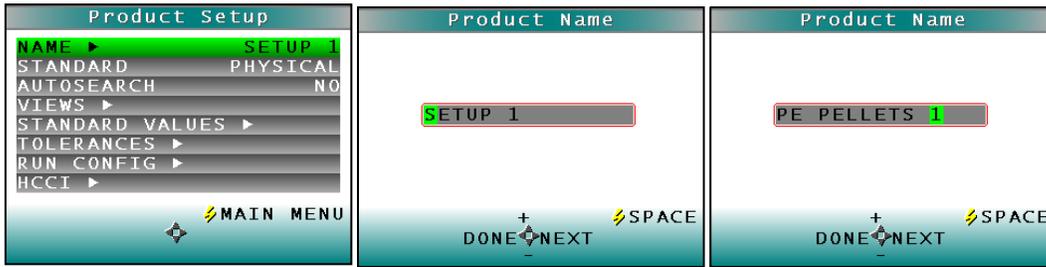


Figure 13. Name Product Setup

Use the **RIGHT** arrow button to obtain the Product Name screen on which you may enter any descriptive name for the product setup. Push the up and down arrow buttons to scroll up (+) and down (-) through the list of 15 available characters. Select **NEXT** using the right arrow button to enter the next character in the name. Press the **GO** button to add a space between characters. Select **DONE** using the left arrow button when finished. This will now take you back to the Product Setup Screen with the chosen Product Name displayed on the **NAME** line.

Note: There is no backspace command. In order to get rid of unwanted spaces return to the first position in the name field and re-enter the chosen name by pressing the right arrow button. To delete a character use the right arrow button to select (highlight) the desired character and then press the **GO** (SPACE) button. To scroll through the name field/box to go back to the beginning or the desired position, press the right arrow button.

Product Setup > Product Standards

You can work with product standards in four (4) different ways: Working, Numeric, Hitch, and Physical. To select your type of standard, press the right arrow key.

Choose **WORKING** when you wish to use the first measurement value as the product standard. This setting is useful if the standard values are unknown or you need the trending measurement values from the beginning of the Run. **Please note:** measurement values from the previous Run are overwritten/lost for each subsequent Run using this standard type.



Figure 14. Product Setup > Working Standard Type

Choose **NUMERIC** to manually enter the target color values for the standard. This is appropriate when you have been provided with color values measured with the same equipment.



Figure 15. Product Setup > Numeric Standard Type

Choose **HITCH** when you wish to alter the readings made on the D25 NC to better correlate to another color measurement instrument. A specific product standard with known color values from the reference instrument is measured with the D25 NC. The reading is stored in the product setup with the known color values from the reference instrument. In this way the instruments are “hitched” together such that the hitched D25 NC will read the product standard matching the color values of the reference instrument. The modified standard is stored in the product setup for as long as desired.

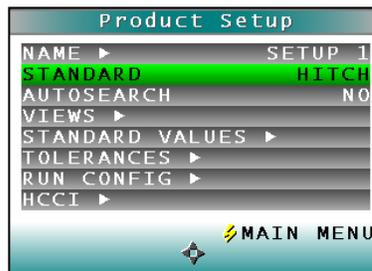


Figure 16. Product Setup > Hitch Standard Type

Choose **PHYSICAL** when a physical product specimen represents your target color and is available for measurement on the unit. Use the target color values of the product specimen to compare to the color values of your samples. A physical standard is measured and stored in the product setup for as long as desired.



Figure 17. Product Setup > Physical Standard Type

Product Setup > AutoSearch

AutoSearch allows you to read a sample and automatically search a number of pre-defined product color setups, and display the sample values in the product color setup nearest the sample color. The AutoSearch feature must be toggled ON in each product setup that you want to have included in the search.

Press the right arrow button to toggle between **YES** and **NO**.

Select **YES** if you wish to include this product setup to be used by this automatic standard searching feature in its search for nearest product color. Select **NO** if you do not want to include this product setup in automatic standard searching.



Figure 18. Automatic Standard Search

Press the **LEFT** arrow button (Back) to accept the parameters and select another Product Setup to configure or the **GO** button (Main Menu) to accept the parameters just set and return to the Main Menu for further actions.

Product Setup > Views

The **VIEWS** setting allows you to specify the type of data to display on the D25 NC's display screen after taking a measurement.



Figure 19. Product Setup > Views

Press the right arrow button to obtain the Data **VIEWS** screen. Up to eight (8) different views with different color scales and other optical information may be displayed for a single measurement.

Use the **UP** and **DOWN** arrow buttons to move to the View parameter, then toggle between **ENABLED** (view on) and **DISABLED** (view off) using the right arrow button. **NOTE:** View 1 is always automatically enabled and may not be disabled.



Figure 20. Data View Enabled

Display: Use the down arrow button to move down to the Display parameter, and then scroll through your choices using the right arrow button. In **RUN** Mode the display will only show the Absolute or Difference.

Display: Absolute displays color scale values (such as CIE L*, a*, b* or Hunter L, a, b values) for the most recent standard or sample read.

Display: Difference displays the most recent sample read in comparison to the product standard and displays the numerical color difference (such as dL*, da*, db*) between them.

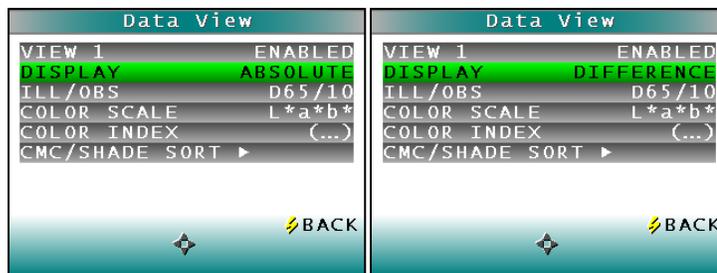


Figure 21. Data View Absolute Color Values and Color Differences

Display: Spectral Data displays the raw reflectance values for each wavelength interval read by the instrument for the most recent standard or sample.

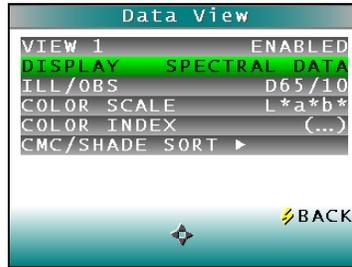


Figure 22. Spectral Data View

Display: Spectral Difference displays the difference between the product standard and the most recent sample read in raw reflectance values for each wavelength read by the instrument.

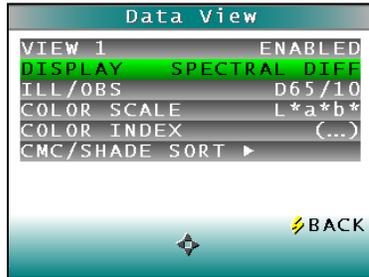


Figure 23. Spectral Difference View

Display: Spectral Plot displays a spectral plot of the raw reflectance values read at each wavelength interval for the most recent standard or sample.

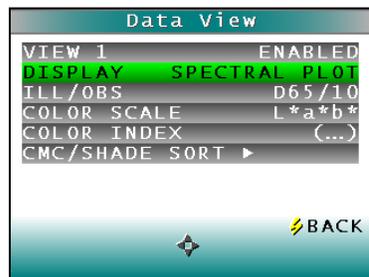


Figure 24. Spectral Plot View

Display: Diff Plot displays the difference between the standard and the most recent sample read to be plotted in raw reflectance values for each wavelength read by the instrument.

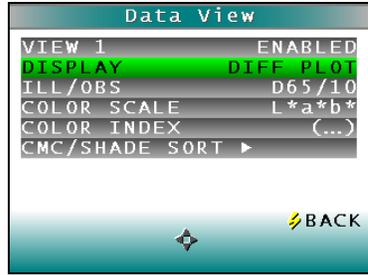


Figure 25. Difference Plot View

Display: Color Plot displays the sample's location in color space relative to the standard, plotted in the center of the $a^* \times b^*$ chromatic and L^* lightness plots.

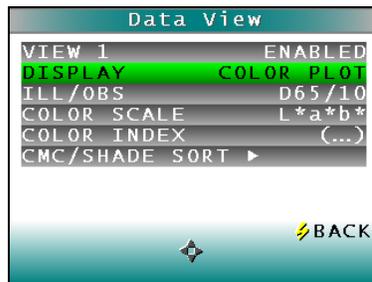


Figure 26. Color Plot View

Ill/Obs: Choose the illuminant/observer combination under which color values will be calculated. Use the **down arrow** button to move down to the **ILL/OBS** parameter, then scroll through your choices using the **right arrow** button.

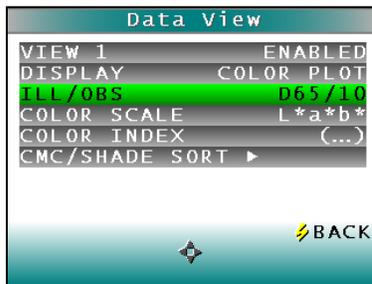


Figure 27. Illuminant/Observer Data View

Color Scale: Choose the color scale, such as CIE L^* , a^* , b^* or Hunter L , a , b values, you wish to see. Use the **down arrow** button to move down to the Color Scale parameter, then scroll through your choices using the **right arrow** button.

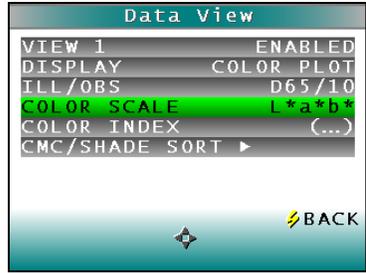


Figure 28. Color Scale Data View

Color Index: Choose the single number color index you wish to see such as Yellowness Index or Whiteness Index. Use the down arrow button to move down to the Color Index parameter, then scroll through your choices using the right arrow button. (...) is the setting for no color indices displayed and also indicates there are more choices here.

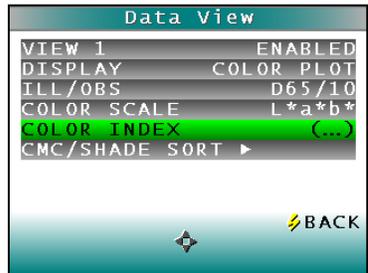


Figure 29. Color Index Data View

CMC/Shade Sort: The CMC/Shade Sort parameter applies only if the color index chosen is dEc or SSN. Use the down arrow button to move down to the CMC/Shade Sort parameter, then press the right arrow button to obtain the CMC/Shade Sort screen.

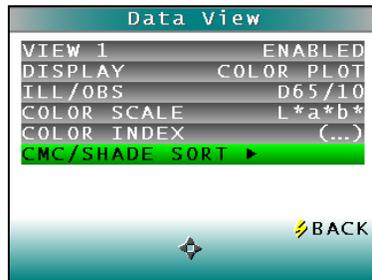


Figure 30. CMC/Shade Sort Data View

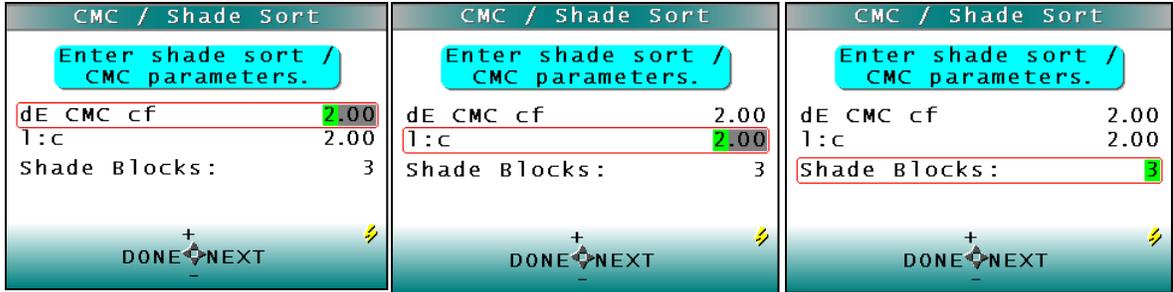


Figure 31. CMC Parameters Entry

Set the dEcmc commercial factor (default is 1.00); dEcmc l:c ratio (default is 2.00 for l:c = 2:1 ratio and # of Shade Blocks (3,5, 7 or 9). Press the LEFT arrow button (**BACK**) twice to return to the Product Setup screen.

Product Setup > Standard Values

The **STANDARD VALUES** parameter is only relevant when the Standard Type is Physical, Numeric, or Hitch where the product standard is measured in the setup mode. When the Standard Values parameter is highlighted, press the right arrow button to move to the Standard Values configuration screen.



Figure 32. Standard Values Setup

For a **PHYSICAL** standard, place the standard under the sensor window at a valid distance and press the **GO** button (READ) to read the product standard and place its measurement values (in the selected color scale) in the product setup. When complete, press the **LEFT** arrow button (**DONE**) to return to the product setup screen.

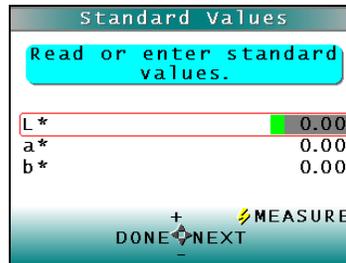


Figure 33. Entering Standard Values

For a **NUMERIC** standard where only reference color values have been provided, change the highlighted digit of the selected color scale value using the up and down arrow buttons.

Or, measure a product standard of similar color, then adjust the values to match NUMERIC target values (faster to set up). When the desired digit is displayed, press **NEXT** to move to the next digit. When all digits are entered, press **DONE** to return to the product setup screen.

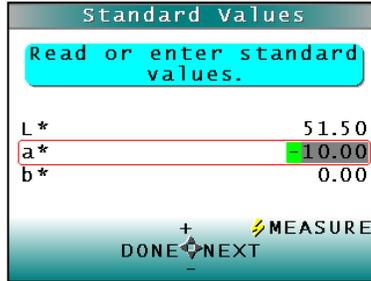


Figure 34. Reading Standard Values

For a **HITCH** standard, place the hitch standard (with known values from a reference instrument) at the sample port and press the **GO** button (READ) to read the standard and place its measurement values (in the selected color). Then adjust the color values to match the reference values. The reference values will display for this hitch standard when measured in the Measurement mode. If you measure the hitch standard as a sample after hitching, the displayed values should match those of the reference instrument.

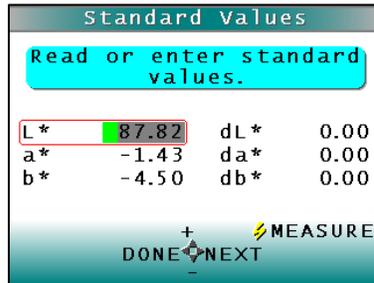


Figure 32. Offset Read Standard Values to match Reference Instrument

Product Setup > Tolerances

When Tolerances is highlighted, press the right arrow button to move to the Tolerances configuration screen, on which you may set acceptance tolerances in the chosen color scale and color index.



Figure 35. Tolerances Setup

There are 2 sets of Tolerances that may be selected: Color Tracking (if enabled) and Tolerance Limits.

Color Tolerances: Color Tracking. Choose whether color tracking is enabled by setting the tolerances. **When all tolerance values are set to zero, the color tracking feature is disabled.** When Color Tracking is enabled, (a non-zero value is set) product will only register as present if the measured color is within the preset range if display is in Absolute mode or within a tolerance band of the target color if the display is set to Difference mode. In this case, the number of valid color readings per sample measurement interval will be displayed in the upper left hand corner of the display for the current sample measurement. If the value of the valid samples per measurement is zero, no product is being measured.



Figure 36. Enter the Color Tracking Tolerances

Color Tolerances: Tolerance Limits. Use the **DOWN** arrow button to move down to the alarm limits parameter, then press the **RIGHT** arrow button to obtain the tolerance limits screen. The tolerance limit is a color value or color difference value beyond which values are considered out of tolerance. In tolerance values are reported in black.

Change the highlighted digit of the selected color scale tolerance value using the **UP (+)** and **DOWN** arrow buttons. When the desired digit is shown, press the **RIGHT** arrow button (**NEXT**) to move to the next digit. To scroll to the desired position, hold down the **RIGHT** arrow button. Tolerances can be symmetrical or asymmetrical for each difference parameter. When all digits are entered, press **LEFT** arrow button (**DONE**) to return to the tolerances screen. To disable this feature set all tolerance values to zero.

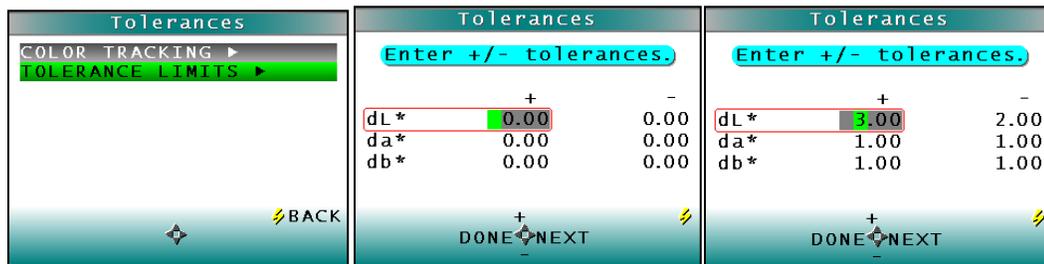


Figure 37. Entry of Tolerance Limits

Product Setup > Run Configuration

When the Run Config Setting is highlighted press the **RIGHT** arrow button to move to the configuration screen. You may set the following parameters by using the **UP** and **DOWN** buttons:



Figure 38. Product Setup > Run Configuration

Run Configuration: Read Mode. You may choose whether to read and present data averaged over a selectable time period (TIME) or averaged for each piece read (PIECE) by pressing the right arrow button. If **PIECE** is selected, the system turntable remains in place without turning; the sample is read for a period and the results reported. If **TIME** is selected, the D25 NC continuously measures and reports data over turntable rounds (one turn = 5 seconds).



Figure 39. Run Configuration > Time and Piece Mode

Run Configuration: Interval. If **TIME is selected**, set the measurement integration (averaging) time. The intervals are increased or decreased in 5 second steps by using the **RIGHT** (increase) and **LEFT** arrow key (decrease). The minimum interval is zero (maximum measurement output approximately 1 reading per second) and the maximum interval is 60 seconds.



Figure 40. Read Mode Interval

Run Configuration: Min Height. The Min Height distance is defined as a distance measured from the Belt Distance in the height units selected such that any product or background located beyond the Min Height distance will not be included in measurements. However, since the D25 NC measures height by detecting the angle of the light reflected to the sensor, height is not measured “absolutely,” and all heights are relative. Instead, perform the Min Height determination procedure using the Distance Sensor in the Diagnostic Menu and enter the value obtained as this parameter in the setup. The default value is 0 mm (0 inches). As a general rule, the Min Height distance can be set to half of the height of the product. Adjust the value by using the **RIGHT** arrow. Once the desired value is reached press the **DOWN** arrow to move to the next parameter.



Figure 41. Minimum Height from Belt

Run Configuration: Max Height: The Max Height distance is defined as a distance measured from the Belt Distance in the height units selected such that any product or background located beyond the Max Height distance will not be included in measurements. However, since the D25 NC measures height by detecting the angle of the light reflected to the sensor, height is not measured “absolutely,” and all heights are relative. Instead, perform the Max Height determination procedure using the DISTANCE SENSOR in the MAIN MENU > SYSTEM SETTINGS > DIAGNOSTICS and enter the value obtained as this parameter in the setup. Adjust the value by using either the **LEFT** or **RIGHT** arrow. Once the desired value is reached press the down arrow to move to the next parameter.



Figure 42. Maximum Height from Belt

Run Configuration: Height Trigger: When the Height Trigger is set to **YES**, the sensor will only flash when the sample is within in the selected range for Min and Max Height. If the sensor is outside this range, the sensor will not flash, and no readings are taken. When the Height Trigger is set to **NO**, the sensor will flash regardless of the Min/Max Height settings. Height triggering is most useful in **PIECE** mode, as the sensor will begin measurements when the leading edge is detected. Press the **RIGHT** arrow button to toggle between **YES** or **NO**.



Product Setup > HCCI

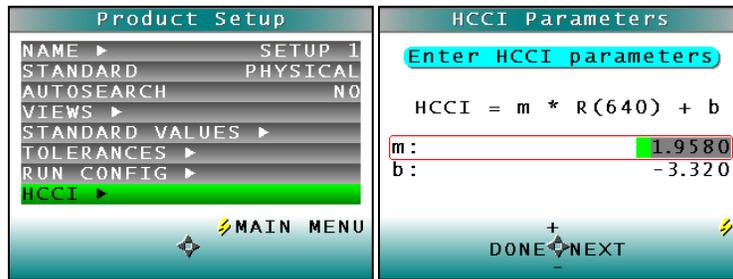


Figure 43. Product Setup > HCCI

HCCI HunterLab Coffee Color Index measures the reflectance at 640 nm as a correlation to the degree of roast in coffee bean and ground coffee.

HCCI has a user-editable offset and gain with typical industry values as default. These parameters can be adjusted to match systems if needed. Press the right arrow button to adjust.

CHAPTER 3 - SYSTEM SETTINGS > GLOBAL OPTIONS

From the System Settings selection, the following functions are available:



Figure 44. Systems Settings from Main Menu

Table 3. System Settings Functions

System Settings	Key Functions
Global Options	Language Lock Setups AutoSave Standardization Interval AutoSearch Measurement Settings Display Settings Date/Time
Diagnostics	White Repeatability Green Tile Check Signal Levels Distance Sensor Self Test
Saved Readings	Delete All Readings Print All Readings View Saved Readings Filter by Setup
Setup Maintenance	Reset All Setups Print All Setups Print One Setup
Password	Enter/Change Password
About	About Your Instrument

When the Global Options selection is highlighted in the D25 NC Main Menu, press the **GO** button to move to the configuration screen to review and change any of the settings above. Use the up/down arrows to select the System Settings to change.

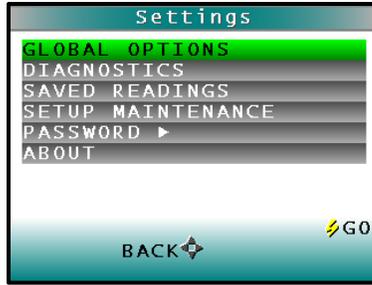


Figure 45. Global Options from the Main Menu

Global Options: Language

Select the language by using the RIGHT or LEFT arrow. Languages include English, French, German, Italian, Japanese, Spanish and Simplified Chinese.



Figure 46. Display Settings

Global Options: Setups Locked.

This parameter will toggle between YES to Lock and NO to Unlock the Setups. When **YES** is selected, the user will be unable to change any product setup without specifically coming back to this option and changing SETUPS LOCKED to NO. This parameter is helpful in maintaining consistency of readings by protecting the system from accidental product setup change. For further password protection of setups, see System Settings/Password.

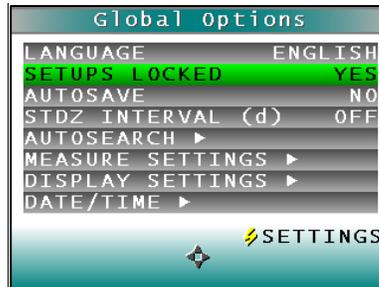


Figure 47. Setups Locked

Global Options: STDZ Interval

To automate the notification interval between standardizations in days (d), select this option (ON) and the interval desired. The default value for this option is 1 day.



Figure 48. Standardization Interval

Global Options: AutoSearch

AutoSearch displays nearest suitable standard (AutoSearch in individual setups must be ON) based on color difference or average color difference if Average is selected. To initiate this option, press the **RIGHT** arrow and then choose the color difference metric for the AutoSearch. The standard will only function in READ mode.

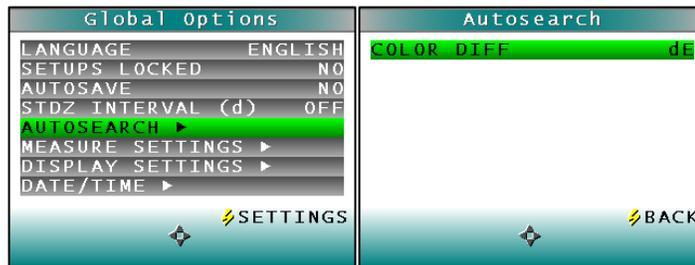


Figure 49. AutoSearch

Global Options: Measurement Settings

To set the **Measurement Settings** press the **RIGHT** arrow. When the **Range Metric** is set to **Distance**, the distance from the sensor window to the top of the product will be displayed. When **Range Metric** is set to **Height**, the distance from the Base to the top of the product will be displayed. Please note, that the base distance will need to be set for accurate height readings. See Product Setup/Run Configuration

When the Distance is set to **AUTO** (default) the distance sensor will calculate the height to use for color compensation. When the distance is set to a number, a single fixed measurement is used for color compensation. The height units for the fixed measurements are displayed in millimeters (mm) or inches (in) and the distance is from 50 – 150 mm, or 2 – 6 inches.

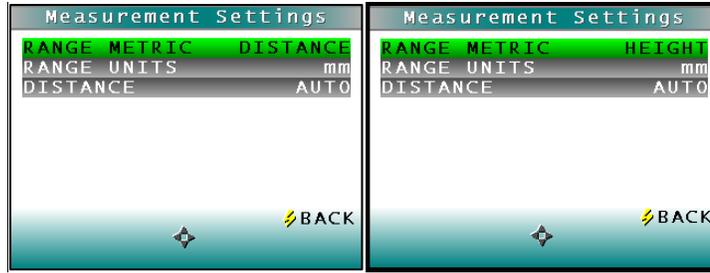


Figure 50. Measure Settings

Press the **GO (Back)** button to return to the Global Options Menu.

Global Options: Display Settings

Choose the display settings by pressing the **RIGHT** arrow.

- Screen Angle can be user-set from 0 or 180-degrees to allow the screen to be displayed up or down to a production line.
- Backlight can be user-set from 0 to 100 in increments of 5. Zero would be dark and 100 would be the lightest. A value of 70 is default.
- Contrast can be user-set from 0 to 100 in increments of 5. A value of 30 is default.

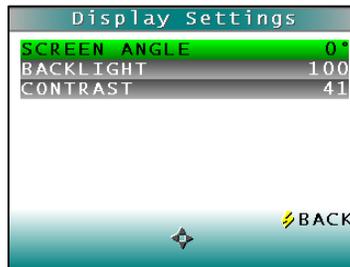


Figure 51. Display Settings Menu

When done, press the **GO** button.

Global Options: Date/Time

To set the **DATE/TIME** press the **RIGHT** arrow. The numbers can be changed using the right and left arrow to select and the up/down arrows to change between date and time. When finished press the **GO** button to SET the time and then again to return to the **MAIN MENU**.

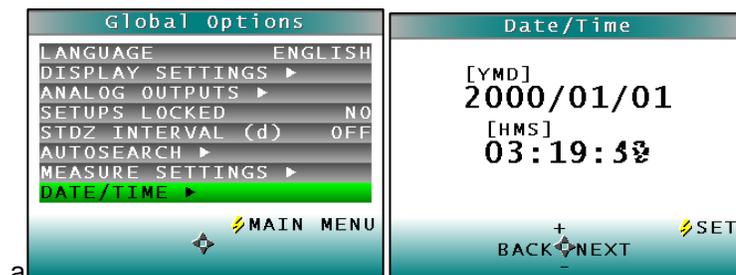


Figure 52. Date/Time

CHAPTER 4 – SYSTEM SETTINGS > DIAGNOSTICS

To initiate, select Diagnostics from the Main Menu and select the GO button to obtain the menu of available tests. Choose the desired function using the UP and DOWN arrow keys and then press the RIGHT arrow button. The various functions perform as described below:

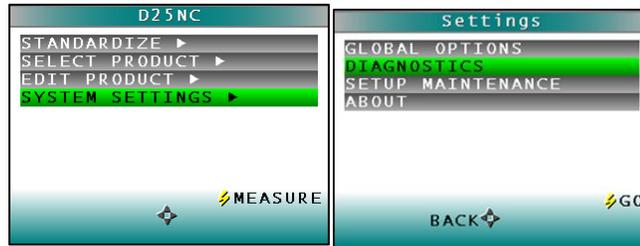


Figure 53. Main Menu > Diagnostics

Diagnostics > White Tile Repeatability

Select the White Repeatability to verify short term instrument repeatability by using the RIGHT arrow key.

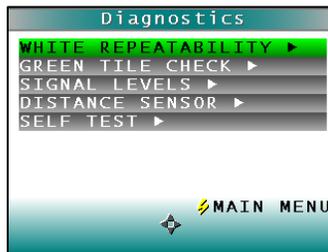


Figure 54. White Tile Repeatability Test

The instrument then prompts the user to standardize the instrument, first with the black glass and then with the white tile.



Figure 55. Standardization for White Tile Repeatability

When standardization is complete, the white tile is left at the port for a series of 20 readings.

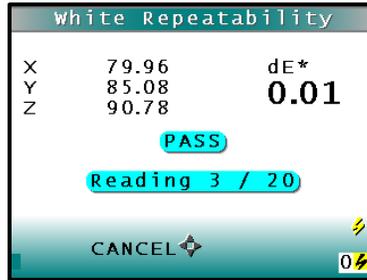


Figure 56. White Tile Repeatability test in progress

Readings are taken in X, Y, Z and the dE* is reported at the end and compared to a dE* tolerance of ≤ 0.05 .

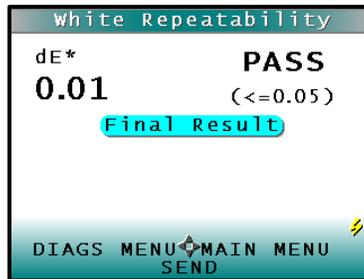


Figure 57. PASS Results for Repeatability Test

To return to the Diagnostics Menu select the LEFT arrow. To return to the Main Menu select the RIGHT arrow.

Diagnostics > Green Tile Check

The Green Tile Check provides a way to determine if the instrument can read color.

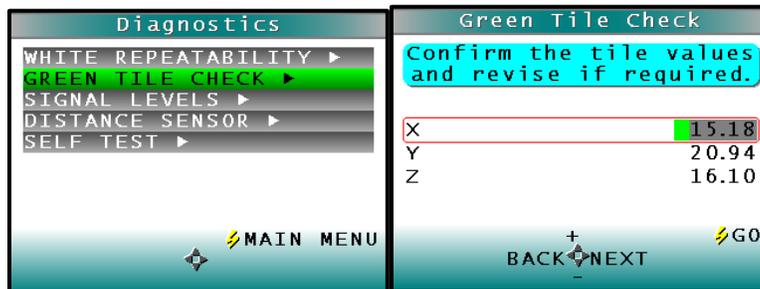


Figure 58. Green Tile Check

To begin, the software prompts the user to confirm the values for the green tile stored in memory. The values stored should match the values printed on the slide-on calibrator. If the values match, press the GO button to continue. If the values in the instrument's

memory require revision, change the selected color scale value using the up and down arrow buttons.

The instrument then prompts the user to standardize; first with the black glass and then with the white tile. Once standardization is complete, the instrument prompts for the green tile.



Figure 59. Standardization and Green Tile Check

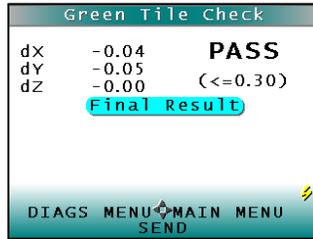


Figure 60. Results of Green Tile Check

Readings are taken in X, Y, Z and the dX, dY, dZ values are reported at the end and compared to an individual tolerance of ≤ 0.30 . To return to the Diagnostics Menu select the **LEFT** arrow.

Diagnostics > Signal Levels

To examine the spectral signal levels for a sample, select the Signal Levels by pressing the **RIGHT** arrow. Place the sample of interest at the port and press **GO** when ready. **Normally this will be the white tile**, but HunterLab's Technical Support staff may instruct differently. Place the sample and press **GO**.

The sample and monitor channels are plotted on a graph for examination by HunterLab's Technical Support staff.

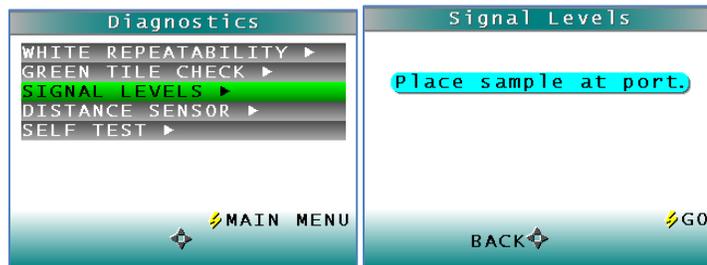


Figure 61. Diagnostics > Signal Levels

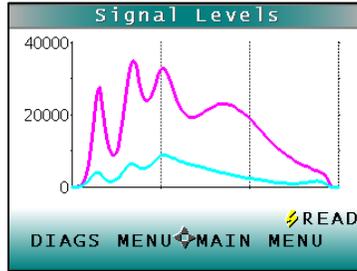


Figure 62. Spectral Plot of Signal Levels

Diagnostics > Distance Sensor

To set the distance sensor, press the RIGHT arrow to initiate. A sample should be available for measurement.



Figure 63. Diagnostics > Distance Sensor

The raw data for measuring the distance between the sample and the bottom of the sensor is displayed along with the calculated distance in millimeters.

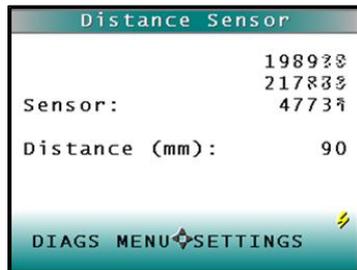


Figure 64. Sensor Count

To continue measuring, press the GO button. To return to the Diagnostics Menu, press the LEFT arrow and to return to the Main Menu, press the RIGHT arrow.

Diagnostics > Self Test

The DIAGNOSTICS MENU contains a fourth function named **SELF TEST**. When this function is selected, communication tests between the D25's subsystems are run. If successful, the versions of the firmware are displayed. Also shown is the value of the

checksum of the instrument's calibration data in hexadecimal. Press the **RIGHT** arrow to begin.

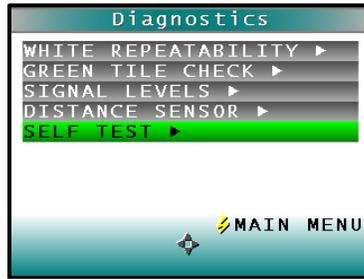


Figure 65. Diagnostics > Self Test

The value of the checksum of the calibration data should remain constant unless the white tile's assigned reflectance is updated or the instrument is serviced. You should keep a record of the checksum's value. If it changes for unexplained reasons then the instrument may not function correctly.

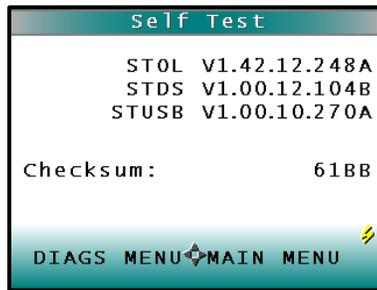


Figure 66. Firmware Versions and Check Sum Values

CHAPTER 5 - SYSTEM SETTINGS > SAVED READINGS, SETUP MAINTENANCE, ABOUT YOUR INSTRUMENT

System Settings > Saved Readings

Readings stored in the D25 NC's memory during the read process may be viewed, printed, and deleted later, if desired. To work with saved readings, select Saved Readings from the System Settings Menu by moving the cursor highlight to its position using the up and down arrow buttons and then pressing the center Go button.



Figure 67. Saved Readings Menu

SAVED READINGS > DELETE ALL READINGS

Delete All Saved Readings displays confirmation message to proceed. When Go is pressed, all of the measurements stored in memory of the D25 NC are erased. When complete, a confirmation message is shown and the user is returned to the Saved Readings menu.

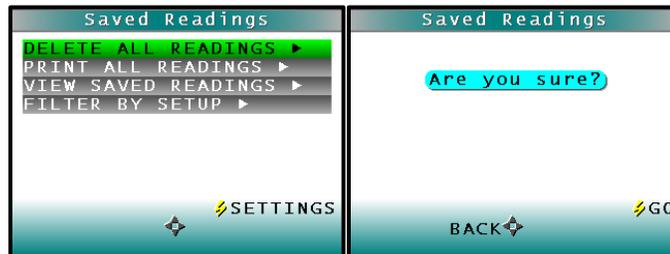


Figure 68. Delete All Readings

SAVED READINGS > PRINT ALL READINGS

Print All Readings causes all the measurements stored in the D25 NC's memory to output to a device such as a computer or printer connected to the D25 NC's USB port. When complete, return to the Saved Readings menu.



Figure 69. Print All Saved Readings

SAVED READINGS > VIEW SAVED READINGS

View Saved Readings allows the user to view and scroll through the readings saved in the D25 NC's memory. The first reading stored in memory (which was assigned an ID of 0001 by default) will be shown first.



Figure 70. View Saved Readings

SAVED READINGS > FILTER BY SETUP

Filter By Setup views the readings by choosing the product setup. The Saved Readings screen is shown first.

Scroll through the setups using the up and down arrow buttons until the selected setup is highlighted, then press Go (center button). Scroll through the list of setups by advancing a page at a time using the Page (right arrow) button.

System Settings > Setup Maintenance

Setup Maintenance is selected from the main menu by moving the cursor highlight to its position using the up and down arrow buttons and then pressing the Go button. The available commands are described below.

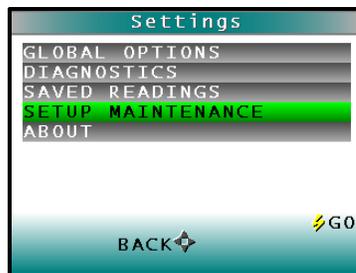


Figure 71. Setup Maintenance

SETUP MAINTENANCE > RESET ALL SETUPS ▶

Reset All Setups first presents a confirmation message then, if Go is selected, returns all product setups to their default (factory) values.

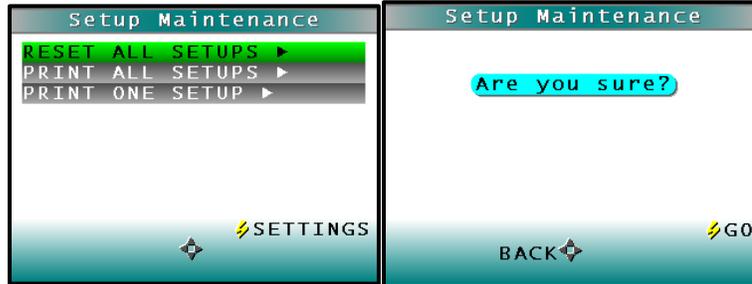


Figure 72. Reset All Setups

SETUP MAINTENANCE > PRINT ALL SETUPS ▶

This command causes the product setup parameters to output through the USB port for all the product setups. If the USB cable is connected to a printer, the parameters will be printed. If the cable is connected to a computer or other device, it will be sent there.

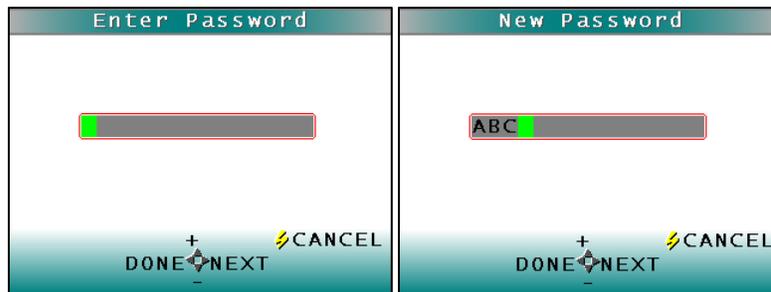
SETUP MAINTENANCE > PRINT ONE SETUP ▶

Print One Setup first gives a screen to select the product setup to print. Select the desired setup from the list by moving the cursor highlight to its position using the up and down arrow buttons and then pressing the Go (Print) button. The product setup's parameters are then output through the USB port. If the USB cable is connected to a printer, the parameters will be printed. If the cable is connected to a computer or other device, it will be sent there

System Settings > Password ▶

Setting a password adds protection before product setups may be modified, reset, or recalled. The instrument is shipped with Menu/Global Potions/Setups Locked = "NO" and the default password is left blank. These settings disable the need to enter a password when changing product setups.

To enable password protection, the "New Password" field must be changed to a non-blank entry and the Global Options/Setups Locked must be set to "YES".



System Settings > About ▶

Information specific to the instrument may be viewed on the About Your Instrument screen, which can be obtained by choosing SYSTM SETTING > ABOUT from the main menu. The instrument model, serial number, firmware version, and total flash count for this instrument lamp are displayed.

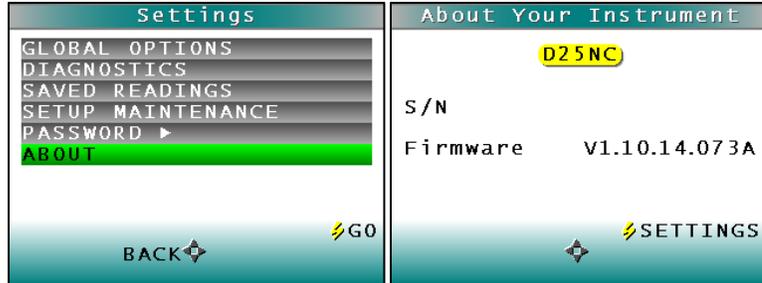


Figure 73. About Your Instrument

CHAPTER 6 – MAINTENANCE

This chapter describes routine maintenance functions to be performed regularly on the D25 NC system. Consistent system performance is enhanced by a consistent maintenance program. The D25 NC requires very little maintenance other than regular standardization and surface cleaning.

If it becomes necessary to disconnect the sensor or support unit cables for maintenance, always turn power to the support unit off before disconnecting cables and turn it back on only after reconnecting all cables.

Notice: Do not disassemble the instrument and attempt to clean the optical components. Do not open the instrument or remove any covers except using the instructions given in this User's Manual or under the direction of HunterLab Technical Support.

Routine Maintenance Schedule

The following schedule outlines recommended maintenance procedures for the D25 NC. The actual frequency of maintenance required will be determined by the measurement application and plant operating conditions.

Daily (or once per shift) Check and wipe the sensor viewing window clean with mild cleaning solution and then a dry soft cloth.

Weekly Clean the exterior of the sensor and mounting. Standardize the sensor.

Monthly Clean the standards (slide-on calibrator and sensor window monitor) using a laboratory-grade detergent and a nylon brush. Wipe dry with a lint-free paper towel containing no FWAs. If a Hitch Standard has been used, then compare hitch standard values for the D25 NC to those of the off-line colorimeter. Rehitch the D25 NC if necessary or desired.

As Needed Replace the sensor window.
Replace the fuses.
Perform the diagnostics.

System Warm-Up

If power to any of the system components has been turned off, it must be restored to all components before operation can resume. If power to the support unit has been turned off, a 30-minute warm-up period is required for sensor temperature stabilization. If power to the support unit has been turned off for more than an hour, a two-hour warm-up period is required.

When restoring power to system components,

- Restore power to the support unit and computer (if included).
- Allow at least thirty minutes of warm-up time.
- Standardize.
- Select the desired product setup and begin operation.

Cleaning the Sensor

To ensure proper operation of the sensor it is recommended that the abrasion-resistant LUCITE[®] viewing window of the sensor be wiped clean with household glass cleaner on a soft lens tissue or lintless cloth at the start of each shift. The exterior of the sensor and mount should be cleaned weekly. The system cleaning should always be followed by standardization using the calibrator.

Cleaning the Instrument Standards

It is extremely important that the standard tile (the slide-on calibrator) be treated with great care. It should be protected from physical damage and dirt at all times.

Be sure the standards are clean before using it for standardization. Once a month, use a soft nylon brush and a Sparkleen (Fisher Scientific Catalog Number 4-320-4) in water solution (1 tablespoon per gallon), followed by a running hot water rinse. Wipe dry with a clean, lint-free paper towel manufactured without fluorescent whitening agents (FWAs) to remove water marks.

Replacing the Fuses

If unusual electrical line activity should ever cause the fuse in the D25 NC Workstation to fail, it can be replaced.

To replace a fuse:

- Turn off the power and disconnect it from the power source.
- The fuse is a pair of 2 Amp Slow Blow fuses (HL# S2338) supplied by HunterLab or equivalent.
- Flip up the plastic fuse holder and open the cover panel.



Figure 74 Fuse is located beside I/O rocker switch.

- Using a fuse removal tool, lift the faulty fuse out of its fuse holder and discard it.
- Snap a replacement fuse into the operational fuse holder.
- *Notice: Use only the fuse specified above for your instrument or one which is identical in type, voltage rating, and current rating. Otherwise, there may be a risk of fire.*
- Replace the plastic cover panel and flip the fuse holder back into the original position.
- Close the support unit cover.
- Restore power to the support unit.
- Allow the sensor and support unit to warm up for five minutes.
- Standardize the instrument and proceed with measurements.
- Order additional spare fuses for potential future use.

CHAPTER 7 - SPECIFICATIONS

Physical Characteristics

Operating ambient temperature:	10 to 50 degrees Celsius (50-122°F)
Storage temperature:	-5 to 70 degrees Celsius (50-122°F)
Operating ambient relative humidity:	5% to 95% (non-condensing)
D25 NC Sensor size:	23.5 cm (9.3 in) x 20 cm (7.8 in) x 11 cm (4.3 in), 4.5 kg (10 lbs)
D25 NC Workstation size:	19 in (48.3 cm) x 30.5 cm (12 in) x 11.1 cm (4 in)
Dimensions of standard tiles:	5.72 cm (2-1/4 in) round

Environmental

Sensor unit is sealed to NEMA 4/IP65 standards.

Shock and vibration per MIL-STD 810:

Shipping/Transport:

Shock: 4 foot drop testing per MIL-STD 810

Vibration: 10-50 Hz at 1 Hz/sec at 2 g

Operation:

Vibration: Minimum integrity test

Electrical Characteristics

Input power*:	100-240 VAC, 47-63 Hz, <5 amp typical
Fuses:	Fuse 5 X 20Mm, 2A, Slo-Blow, (Pair) (HL# S2338)
Power conditioning:	Spike/sag/surge protection to permit stable operation
Installation category:	II (Over Voltage)

*(See note under "Regulatory Notice.")

illumination

Light source:	Full Spectrum LED 400-700nm
LED Life:	Unlimited
Area of illumination:	18 to 30 mm
illumination:	Monodirectional illumination at 0°

Viewing

Distance to Product	From 2.5 to 5.5 in from the front surface of the sensor window
Viewing area:	20 mm diameter

CHAPTER 8 - INSTRUMENT REPLACEMENT, REPAIR, PROBLEMS AND QUESTIONS

The following HunterLab policies are described in this chapter:

- Warranty
- Claims
- Returns/Service
- Technical Assistance

Warranty

HunterLab warrants that all instruments it manufactures will be free from defects in material and workmanship under normal use and service. HunterLab's obligation under this warranty is limited to repairing or replacing any defective parts which our examination determines to be factory defective when returned to us by prepaid transportation. The time limit on this warranty is one year from date of shipment of new instruments and two months from the date of shipment of repaired instruments. The printer and computer are covered under the original manufacturer's warranty.

HunterLab warranty does not cover expendable items such as lamps, fuses, batteries, diskettes, etc. The warranty is void if the user has made unauthorized repairs, performed improper installation, or has incorrectly used the instrument.

An instrument registration card is shipped with major pieces of HunterLab equipment. It is important that you return this card promptly upon receipt of equipment. The registration card is kept on file with the HunterLab Service Department with complete information on the exact equipment purchased. Questions concerning operation, maintenance, or repair of your equipment directed to the Service Department can then be knowledgeably handled.

Shipping Claims

All materials are sold F.O.B. from Reston, Virginia (unless otherwise specified) and HunterLab responsibility ends upon delivery to the first carrier. All claims for loss or damage must be rendered by the consignee against the carrier within fifteen days of receipt of goods. A copy of this notice must also be forwarded to HunterLab within five days of its receipt.

Breakage or Damage

According to the contract terms and conditions of the carrier, the responsibility of the shipper ends at the time and place of shipment. The carrier then assumes full responsibility. Perform the following procedures if your instrument arrives broken or damaged.

Freight or Express

Notify your local carrier. Hold the damaged goods with their container and packaging for inspection by the examining agent. Do not return any goods to HunterLab prior to inspection and authorization of the carrier.

File a claim against the carrier. Substantiate this claim with the examining agent's report. A certified copy of our invoice is available upon request. The original B/L is attached to our original invoice. If the shipment is prepaid, write for a receipted transportation bill.

Advise HunterLab regarding replacement.

Parcel Post Shipment

Notify HunterLab at once in writing, giving details of the loss or damage. This information is required for filing a claim. Hold the damaged goods with their container and packaging for possible inspection by postal authorities. Advise HunterLab regarding replacement.

United Parcel Service

Contact your local UPS office regarding damage and insurance claim. Each UPS office has a different method of handling these occurrences and yours will advise you of its procedures.

Retain the container and packaging.

Notify HunterLab at once for replacement.

Shortage

Perform the following procedure if your order appears to be missing items. Check the packing list notations. The apparent shortage may be a back ordered item and may be marked as an intentional short-ship.

Re-inspect the container and packing material, particularly to locate smaller items. Ascertain that the item was not removed by unauthorized personnel prior to complete unpacking and checking. Notify HunterLab immediately of the shortage in writing.

Incorrect Shipment

Perform the following procedure if material received does not correspond with your order.

Notify HunterLab immediately, referencing order number and item.

Hold incorrect items until return shipping instructions are received.

Returns

A Service Return Order (SRO) number is required before any items can be returned to HunterLab. Contact HunterLab's [Order Processing Department](#) to obtain an SRO for damaged or incorrect parts, or [Technical Support](#) to obtain an RMA to return an instrument for service.

Do not return any damaged or incorrect items to HunterLab until all shipping instructions are received. *Note: HunterLab must be notified within fifteen days or we cannot accept responsibility for damaged or incorrect items.*

HunterLab offers complete repair service for all instruments it manufactures. Call HunterLab for the service facility nearest your location. If your equipment is not functioning properly, contact HunterLab Technical Support for maintenance or repair instructions. Many times, this on-the-spot diagnosis is all that is required.

If repair is required, HunterLab offers two means of servicing. Instrument may be returned to a HunterLab service facility for repair or a HunterLab Service Department technician can come to your location to perform on-site repair. For scheduling and terms by trained service technicians, call HunterLab Technical Support. Please read "When You Need Assistance" prior to contacting HunterLab.

The customer is responsible for incoming and outgoing freight charges for instruments being returned to HunterLab for all repairs, including warranty repairs.

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