

Insight on Color

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Temperature Compensation Using the SpectraProbe XE

The temperature of a product can affect its color. Thermochromism, a change in product color resulting from a change in product temperature, affects many industries, particularly coil coating. By incorporating data from a temperature-sensing device installed at the process, color data obtained from the SpectraProbe XE can be automatically adjusted to compensate for changes due to temperature. These corrected values can then be displayed and stored in EasyMatch OnLine software.

An infrared pyrometer is used to measure the product temperature. The pyrometer and its electronics are mounted inside the SpectraProbe XE sensor enclosure, in line with the z-axis. This means that the same sample area is viewed by both the pyrometer and the SpectraProbe XE. The RS-485 input from the pyrometer is transferred to EasyMatch OnLine as a process variable using dynamic data exchange (DDE).

Configuration	X
Label : Variable X-Axis Label : Time DDE Name : Temperature Server Name-Topic Name-Variable Name	Туре © DD <u>E</u> © Colorime <u>t</u> ric Data

In order to use the temperature compensation feature, you must first quantify how product color changes with temperature *for each product*. Do so as follows:

1. Open EasyMatch OL and check Enable Temperature Compensation on the **Options** tab in the System Setup.



tt Sensor Configuration Rail Positions Calibration Measurements Options Logging Seam Detectors Detector1 Motion Alarm Detector2 Motion Alarm Detector2 Delay(Sec) Delay(Sec) Use Linear Counter Analog Outputs Automatic UV Filter Alarm Relays I Enable Temperature Compensation	syMatch OL	Motion	Run Options	Analog OutPut	Tile Holder
Calibration Measurements Options Logging mSetup2 Seam Detectors Motion Alarm Enable Detector1 Detector2 Detector2 Delay(Sec) Delay(Sec) Use Linear Counter Analog Outputs Automatic UV Filter Alarm Relays Image: Enable Temperature Compensation	Default	Sens	or Configuration	R	ail Positions
Seam Detectors Motion Alarm Detector1 Enable Detector2 Detector2 Use Linear Counter Analog Outputs Automatic UV Filter Alarm Relays Enable Temperature Compensation Image: Compensation	temSetup1 temSetun2	Calibration	Measureme	ents Option:	S Logging
 Use Linear Counter Analog Outputs Automatic UV Filter Alarm Relays Enable Temperature Compensation 		Seam Detecto	or1 or2	Motion Alarm Enable Duration(Sec) Delay(Sec)	0
Enable Temperature Compensation		🔲 Use Lir 🔲 Automa	near Counter atic UV Filter	🥅 Analog O 🥅 Alarm Re	utputs lays
		🔽 Enable	Temperature Comp	ensation	

2. On Page 6 of the Product Setup for the first product, click the radio button next to the temperature measurement units you wish to use.

EasyMatch OL	Page1 Page2 Page3 Page4 Page5 Page6
Build 8 Peltier Build 8 Peltier Manual	Temp. Compensation Data Collection
- Build 8 Process	- Temperature Measurment Units
Build 9	Degrees Celsius (°C)
	C Degrees Fahrenheit (*F)
Build 5 Pekker Man Build8 default	Configure Data Collection Method
EasyMatch OL Produ Product setup1	Collect Temp. Compensation Data
- Product setup2 - Product setup3	Temp. Compensation Graph
 Product setup4 Product setup5 Product setup6 Product setup7 Product setup8 	Temperature Setpoint 18.2 (*C) Show Standard at reference temperature
Product setun9	

3. On the same tab, click Configure Data Collection Method. The following screen appears.

O F	lacess	
	100033	
C E	xternal Heating/Cooling Device	



Applications Note

4. Choose the method you wish to use for data collection and then click **Next**. The software walks you through configuring the data collection method using a wizard and then returns you to the Product Setup.

Manual Entry applies when you have already quantified the relationship between temperature and color for this product type or can reference pre-existing tables, such as published thermochromic correction data.

Process applies when you can use your own equipment to heat samples to different temperature setpoints as the product is processed on the range. This would require fairly precise control of oven temperatures and steam pressures to drying can stacks. The product temperature would then be captured from the system's infrared pyrometer and could be correlated with the corresponding color data either by DDE or direct input.

External Heating/Cooling Device applies when standard product can be heated to different temperature setpoints in the laboratory and then read with the SpectraProbe XE. At the same time, temperature data would be collected from the infrared pyrometer either by DDE or direct input. This method consumes less product and does not require range down-time.

5. Click **Collect Temp. Compensation Data**. Collect or enter data using the data collection method you chose in Step 4. Please note that the more data points you enter, the better your temperature correction will be. Click **OK** to return to the Product Setup.

	Product Temperature	X	Y	Z 🔺	Pond
1	14.8000	50.8060	53,7550	52.1150	neau
2	23.2000	50.8440	53.7790	52.1140	
3	31.2000	50.8820	53.8020	52.1100	Remove Da
4	35.2000	50.8920	53.8020	52.0960	
5	39.2000	50.9200	53.8220	52.1060	
6	40.7000	50.9100	53.8100	52.0870	
7	42.2000	50.9310	53.8260	52.0970	Print
8	44.1000	50.9200	53.8150	52.1060	
9	45.7000	50.9330	53.8220	52.0810	
10	47.2000	50.9410	53.8270	52.0790	
11	51.1000	50.9570	53.8330	52.0670	
12	55.0000	50.9920	53.8600	52.0750	
13	59.0000	51.1650	54.0300	52.2170	
14	63.2000	51.2240	54.0850	52.2440	
15	71.1000	51.3400	54.1800	52.3050	

- 6. Enter the temperature setpoint to which all color data for this product should be corrected.
- 7. Repeat Steps 2-6 for each type of product.

EasyMatch OL does the rest. Data obtained using this product setup is then automatically corrected to the temperature setpoint selected. The real-time process temperature, as well as the adjusted color data (indicated with "Adj." in front of each parameter name), may be shown in the Color Data Table (if selected in the Color Data Table Configuration) and stored in both the database and the job file.





	Pass/Fail	Temperature(*C)	Adj. X	Adj. Y	Adj. Z	Adj. dE*	
Sample 747	Pass	23.85	23.74	22.89	13.62	0.06	
Sample 748	Pass	23.85	23.73	22.88	13.61	0.07	
Sample 749	Pass	23.85	23.74	22.88	13.61	0.07	
Sample 750	Pass	23.75	23.74	22.89	13.62	0.07	
Sample 751	Pass	23.80	23.74	22.88	13.61	0.07	
Sample 752	Pass	23.80	23.75	22.89	13.62	0.06	
Sample 753	Pass	23.75	23.74	22.89	13.62	0.06	
Sample 754	Pass	23.75	23.74	22.89	13.62	0.06	
Sample 755	Pass	23.75	23.74	22.88	13.62	0.08	
Sample 756	Pass	23.75	23.73	22.87	13.61	0.08	
Sample 757	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 758	Pass	23.80	23.74	22.89	13.62	0.06	
Sample 759	Pass	23.75	23.73	22.88	13.61	0.07	
Sample 760	Pass	23.75	23.73	22.87	13.61	0.08	
Sample 761	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 762	Pass	23.80	23.73	22.88	13.61	0.07	
Sample 763	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 764	Pass	23.80	23.74	22.88	13.61	0.07	

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