

# Cocoa/Chocolate Analyzer

## Near-Infrared Analysis (NIRA™)



Unity designs at-line analyzers that are easy to operate and provide fast answers so you can run your process more efficiently.

### BENEFITS

- Complete analysis package
- Calibration included
- Network ready
- Easy to use and customize
- Low maintenance
- Designed for at-line analysis
- Superior accuracy, precision, and stability
- Easy NIR database transfer from older equipment

Fast, accurate analysis is critical for both cocoa processors and chocolate manufacturers to optimize their process and insure quality. Optimizing the process will save the plant time and money and provide very rapid payback. Near Infrared (NIR) analysis is a proven technique designed to provide fast, accurate, and reliable results for the cocoa industry.

In the process, cocoa beans are roasted in an oven and undergo a winnowing process, where the shells are removed. The resulting de-shelled beans, called nibs, are ground into cocoa liquor, which at slightly elevated temperatures is a thick liquid. Two potential processes can be undertaken with the cocoa liquor. In one process, the cocoa liquor is pressed into cocoa butter and pressed cake. The pressed cake can be ground into cocoa powder. In the other process, sugar, cocoa butter, and milk powder or other ingredients are added to the cocoa liquor to produce chocolate.

At every step in the process, there is a necessity to make analytical measurements. Incoming cocoa beans can be analyzed for moisture to determine the quality. Moisture can be measured during the roasting process to determine when the process is complete. The nibs can be analyzed for moisture and fat content to predict the quality of the resulting cocoa liquor. The cocoa liquor, which is sold by fat content, can be analyzed for fat and moisture to optimize the process.

After the cocoa liquor is pressed, the resulting cocoa butter can be analyzed for free fatty acids and iodine value. These properties relate to the melting characteristics of the butter. The other by-products of the pressing of cocoa liquor, cake and cocoa powder can be analyzed for moisture and fat. Since cocoa powder is routinely sold based on its fat content, it is critical to have accurate and timely measurements to optimize the process.

During the chocolate making process, at-line analysis for fat, moisture and sugar are critical. Since Chocolate is typically sold based upon its fat content, this becomes a critical analysis point. The fat content is raised by the addition of cocoa butter, which is quite expensive. Controlling the addition of cocoa butter will save money and provide measurable economic benefit to the plant. Another important ingredient that is measured is the sugar content. Measuring the sugar content will reflect the amount of cacao in the chocolate, which will be critical to insure label claims. techniques, but each is time consuming and are done in the lab. Analyzing at-line allows for immediate adjustments to be made to control the process in real time.

**InfraStar™**

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## Near Infrared Analysis (NIRA™)

### The Cocoa/Chocolate Analyzer Package includes the following:

- InfraStar 1400 RTW (built in touchscreen, prediction software, multi-cup adapter, powder cup adapter, Unity check cell)
- Adapter Ring for 60mm Petri Dish
- Calibrations for Cocoa Powder, Cocoa Bean, Liquor, Milk Chocolate, Dark Chocolate, and/or cocoa butter

NIR is a valuable technique that can analyze for fat, moisture, sugar, FFA, and Iodine Value in every step of the cocoa process. It can also be used to analyze ingredients, such as milk powder. NIR analyzers can be placed directly next to the process to analyze multiple lines and control points. This is advantageous over traditional lab instruments and techniques such as NMR, Soxhlet, and Karl Fischer titrations, which are relegated to the lab and are time consuming.

The Unity Scientific InfraStar (Top Window system) gives the ultimate in sampling flexibility and allows the customer to make measurements of all cocoa products and ingredients. The InfraStar's quick analysis time provides real-time feedback that allows the process to be controlled, optimizing the process and providing rapid payback.

Unity currently has calibration available for milk chocolate, dark chocolate, cocoa liquor, cocoa powder, cake, cocoa beans, nibs, and cocoa butter. Calibrations for ingredients such as milk powder are also available.

### SPECIFICATIONS

#### Technology

Pre-dispersive Scanning Monochromator with nominal bandwidth of 10 nm (FWHH)

<b>Wavelength Range</b>	1400-2400nm
<b>Light Source</b>	Tungsten halogen lamp with MTBF rating of 10,000 hours (User changeable)
<b>Grating</b>	Holographic NIR for use from 1400-2500 nm
<b>Detector</b>	InGaAs (temperature stabilized)
<b>Scan Time</b>	Less than 0.8 seconds/scan
<b>Analysis Time</b>	10-30 seconds
<b>Data Interval</b>	1 nm
<b>Photometric Noise</b>	<20 micro AU at 1640 nm

#### User Interface

<b>Operating System</b>	Windows 2000
<b>Display</b>	14.5 inch VGA with touch screen
<b>Software</b>	InfoStar prediction and data management package
<b>Optional</b>	Keyboard and mouse

#### Dimensions and Power Requirements

<b>Size</b>	W 330 mm x H 381 mm x D 381 mm (W 13" x H 14.5" x D 15")
<b>Weight</b>	13.6 kg, 30 lbs.
<b>Power Voltage</b>	100-240 V ac, 50/60 Hz

#### Network Capabilities

OPC compliant
LIMS compatible
3 USB ports
1 Ethernet (RJ45) connector interfaces



#### Unity Scientific

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