

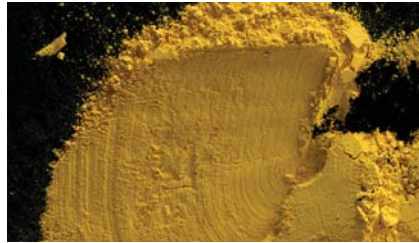


**SpectraStar™**  
the new benchmark in next generation NIR analyzers



## Innovation

Unity Scientific's innovative new SpectraStar™ instruments are full spectrum scanning analyzers designed to provide maximum accuracy, productivity and ease of use for a broad range of industries. The SpectraStar family completely covers the NIR wavelength range, yielding accurate results for even the most challenging applications. While SpectraStar has been designed for rapid, routine analysis, it is powerful enough also to be used as a research instrument. Each SpectraStar analyzer is reliable and rugged enough for in-process (at-line) analysis on the process floor, and its built-in computer reduces its footprint making SpectraStar the ideal instrument for the QC lab where bench space is at a premium.



## Expertise

Calibration databases can be created using UCal™ software, or they can be transferred from any other brand NIR system. They also can be outsourced from Unity's network of value added service providers. Calibrations that are developed on Unity Scientific's powerful research model, the 2500x, are easily transferable to other SpectraStar models that can be located on the plant floor.

A variety of sampling techniques can be used with either the SpectraStar rotating drawer (RD) or rotating top window (RTW) to give the ultimate in sampling flexibility. The system can analyze unground samples, powders, liquids, gels, and pastes in a variety of sample cups, Petri dishes, beakers, vials, and bags.



## Support

To support these top-of-the-line instruments, Unity boasts some of the finest technical specialists in the world. Unity employees have an average of 20 years of experience implementing NIR technology on most NIR brand models. Our global support staff can provide consulting, installation, training, applications support, calibration development, database management, software support, and hardware repair. Unity Scientific understands the various issues that can make implementing and managing NIR a difficult, time consuming task. Our experience can overcome these issues and make implementing and managing the SpectraStar a simple and efficient process.

***The system has the sampling flexibility to analyze unground samples, powders, liquids, gels, and pastes in a variety of sample cups, Petri dishes, beakers, vials, and bags. And calibrations that are developed on the powerful research model are easily transferable to other SpectraStar models that are located on the plant floor.***





## Flexible Sample Handling

The SpectraStar can work with a variety of sample cups to measure unground materials, powders, liquids, gels, and pastes. The SpectraStar system can be configured as a drawer-based or top window system for additional sampling flexibility. Both the drawer and top window models provide automatic, internal referencing that eliminates the need to have operators use external standards for referencing.

The drawer model features rotation to measure unground or partially ground materials through a variety of sample cups and accessories. Samples are simply loaded into a cup and the drawer is closed to analyze.

The top window design provides total flexibility for sample handling. The rotating sample platter provides accurate analysis of unground or partially ground materials by simply filling a cup and placing it on the window. Samples can also be analyzed through a variety of sample cups, Petri dishes, beakers, or bags.



## Easy Data Management

Each SpectraStar system features a built-in Windows®-based computer. All results and raw data are stored to the hard drive with date and time stamps. Results are stored in Excel format for quick review by plant managers. All information can be

transferred easily via email to aid in the support process.

The SpectraStar provides full network capability and is LIMS compatible and OPC compliant. The system can be accessed remotely via the Internet or modem for data transfer, calibration transfer, configuration, or diagnostics.

The SpectraStar can be configured for a variety of different languages such as English, French, Spanish, German, Japanese, Chinese, Russian and more.

## Easy Maintenance

The SpectraStar is a state-of-the-art, next generation, NIR system that is guaranteed to be reliable. Each SpectraStar undergoes a standardization procedure in the factory, tied to a NIST-traceable standard. This procedure insures that instruments are matched in the factory, making it easier to transfer calibrations between instruments. No customer standardization procedure is required.

The monochromator has a patented design that prolongs the life of the instrument. Maintenance is simplified as there is no air filter or fan on the system. The SpectraStar lamp carries a 10,000 hour rating and can be changed by the customer.

The UniStar™ software suite is a next generation software package for maintaining instrument performance, calibrations, and networks of instruments. UCal provides a powerful, yet easy calibration development and maintenance tool for building the most accurate calibrations. With a single screen calibration interface, a compact file

structure where a single calibration equation file is used for all constituents, and single push button operation, UCal makes creating calibrations easy.

UniStar allows a company to easily maintain a single instrument or a complete network of instruments located around the world through the internet or within a their firewall. UniStar can be used in conjunction with any NIR platform in the market, making this software a key component for maintaining instruments.



*The unique hatch shell design of the SpectraStar RTW allows for easy, quick and complete access to the instrument for maintenance and repairs.*

# Working with Databases/Calibrations



For calibrating an NIR instrument, a series of standard samples of known concentration is scanned on the SpectraStar to measure the absorbance values at wavelengths throughout the NIR region. A calibration is then developed by using one of various mathematical models to correlate the reference lab values to the amount of absorbed NIR energy. The calibration can then be used to predict the constituent concentration of unknown samples.

For those customers who wish to develop their own calibrations, the UCal software provides an easy tool for calibration development and database management. The UCal software is an intuitive Windows™ based program. Its logical data file structure allows for sets of data to be reviewed and combined with ease. Spectra files can easily be imported and exported along with constituent information to simplify the file management process. A graphical interface allows for quick and easy viewing of spectral data. Spectral graphs, calibration graphs, and text data can all be exported to other Windows™ programs for use in building reports and presentations.

The UCal software contains a powerful file conversion section that converts spectral data from multiple vendor instruments into the UCal format. This means that UCal can be used on multiple vendor platforms. Data can be imported to and exported



from UCal using Unity .svf format, j-camp (.dx, .jdx), Grams (.spc), NIRSystems (.nir and .cal), and other formats. Spectral data can be truncated and interpolated to match wavelength ranges when transferring a database.

UCal provides standardization to match a network of instruments to a “Master” instrument. This standardization feature can even accommodate instruments from different vendors. UCal also provides features to transfer an existing calibration database to the SpectraStar, while then be able to add new samples to the transferred database.

The SpectraStar is also capable of using calibrations or databases transferred from any brand NIR system in the market. NIR databases and calibrations are valuable and do not have to be recreated when using our new NIR platform. Transferring them to the SpectraStar can preserve many year’s worth of data and save valuable time and money.

The Unity Scientific TransStar™ software allows data that was collected on any scanning NIR instrument to appear as if it were collected on a SpectraStar by using advanced mathematical matching techniques. Once the transfer has been completed, the database can then be expanded with additional SpectraStar data. This means that the calibration database is not lost by transferring to a new platform, but can continue to grow over time on the SpectraStar.

Databases from NIR scanning instruments such as NIRSystems, Foss, Bran+Luebbe, Bruker, and Nicolet to name a few, can be easily transferred to the SpectraStar. With a wavelength range that most closely matches these instruments, the

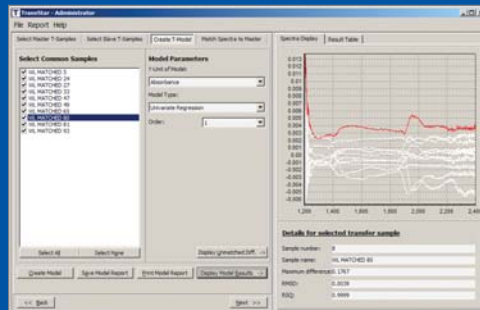
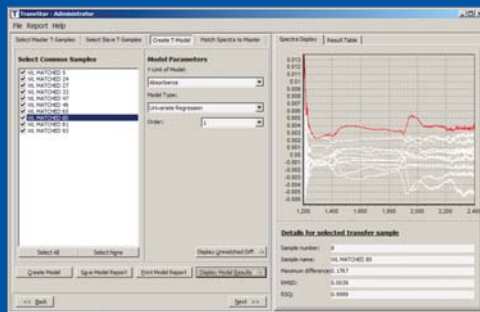
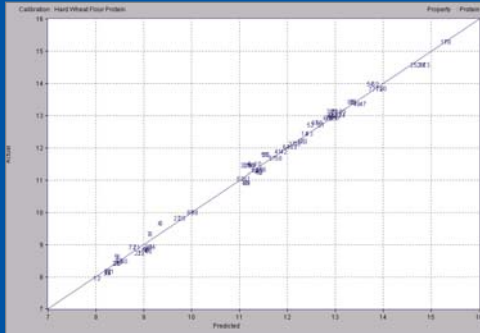
SpectraStar 2500 will provide the best transfer and yield the most accurate performance match.

MLR calibrations of old filter NIR technology from Technicon, Bran+Luebbe, Perten, and DICKEY-john can also easily be transferred to the SpectraStar. This process is simple and can be performed in less than 30 minutes. Both the SpectraStar 2500 and the SpectraStar 2400 cover the wavelength range of these older filter instrument and can easily accept MLR calibrations for immediate implementation.

Unity also works with industry and academic experts who provide calibrations and databases for the SpectraStar. These value added service providers (VASP) provide specific expertise in their markets to enhance the value of the SpectraStar.

By creating calibrations using the CalStar software, transferring database or calibrations using the TransStar software, or using calibrations from our expert network of value added service providers, Unity gives customers the power to choose the calibration scenario that works best for them.

# Specifications



## Technology

Pre-dispersive Scanning Monochromator with nominal bandwidth of 10 nm (FWHH)	
Light Source	Tungsten Halogen Lamp with MTBF rating of 10,000 hours. User changeable via pre-aligned assembly
Grating	Holographic NIR for use from 650-2500 nm
Detector	InGaAs (temperature stabilized)
Scan Time	Less than 0.8 seconds/scan
Analysis Time	10-60 seconds
Data Interval	1 nm (improves data smoothing)
Photometric Range	3.0 Abs @ 650-2500 nm
Photometric Noise	20 micro AU at 1640 nm

## User Interface

Operating System	Windows 2000
Display	10 inch plus VGA with touch screen
Software	InfoStar prediction and data management package
Optional	Keyboard and mouse

## Network Capabilities

- OPC compliant
- LIMS compatible
- 2 USB ports,
- 1 Ethernet (RJ45) connector interfaces

## Dimensions

Drawer Version Size	W 336 mm x H 343 mm x D 406 mm (W 13" x H 14.5" x 16")
Drawer Version Weight	15.9 kg, 35 lbs.
Top Window Version Size	W 330 mm x H 368 mm x D 381 mm (W 13" x H 14.5" x 15")
Top Window Version Weight	13.6 kg, 30 lbs.

## How to Order

Simply choose the wavelength range and sampling configuration that fits your application.

SpectraStar Model	Wavelength Range	Sampling Configuration
2500x	650 - 2500nm	Top Window
2500	1100 - 2500 nm	Top Window
2400	1200 - 2400 nm	Top Window or Drawer
2200	1100 - 2200 nm	Top Window or Drawer

# Conclusion

The SpectraStar family of instruments represents the best NIR solution for the food, feed, agricultural, tobacco, industrial, and pharmaceutical markets. The SpectraStar delivers extensive wavelength range coverage to accurately measure even the toughest applications. Calibration databases can be created using the UCal software, can be transferred from any other brand NIR system, or can be outsourced from Unity's network of value added

service providers. A variety of sampling techniques can be used with either the SpectraStar rotating drawer or rotating top window to give the ultimate in sampling flexibility. The rugged design and small footprint of the SpectraStar make it ideal for both the process floor and the QC lab. With the SpectraStar family of instruments, there is an ideal solution available for every NIR need.

# Unity offers you the power of choice



The SpectraStar is a full scanning monochromator system that can be ordered with four distinct wavelength configurations so you can select the optimum wavelength range for your application.

All SpectraStar models scan in 1 nm increments and cover the optimum region of the NIR spectrum found above 1900 nm. The wavelengths found above 1900 nm encompass the primary combination bands for the C-H, N-H, and O-H bonds affected by NIR. These wavelengths are the most sensitive and are critical for developing accurate calibrations. By having more wavelengths and having these data points cover the optimum wavelength range, the SpectraStar family of instruments provide superior accuracy and flexibility. Simply said, more wavelengths equal better accuracy.



**The SpectraStar 2500x** is the top of the line, research quality instrument. It scans the wavelength range of 650nm – 2500nm in 1 nm steps. This vast wavelength range makes even the most challenging applications possible.

**The SpectraStar 2500** is a workhorse instrument that scans the wavelength range of 1100-2500 nm. Historically, this wavelength range has been utilized for all NIR applications of the last 50 years and yields the best accuracy. Covering this wavelength range makes it possible to transfer calibrations and databases from any NIR platform in the market, saving Unity Scientific customers the time and money required to create new calibrations.

**The SpectraStar 2400** is a workhorse instrument that scans the wavelength range of 1200-2400 nm. This range encompasses most of the critical wavelengths in the NIR spectrum, including the primary combination bands above 1900 nm. This wavelength range covers the same range used by older NIR filter instruments from Technicon, Bran+Luebbe, Perten, and DICKEY-john, meaning that calibrations from these systems can be easily transferred to the SpectraStar 2400.

**The SpectraStar 2200** scans the wavelength range of 1100-2200 nm. This instrument is an entry-level offering and is great for customers where the loss of accuracy caused by not scanning to 2500 nm is not critical to the analysis.

# About NIR



Near Infrared (NIR) analysis is safe, fast, requires minimal sample handling and is non-destructive. Developed as a technique for predicting the chemical composition of a variety of unknown samples, NIR uses diffusely reflected light in the 800 to 2500 nanometer (nm) region to make a determination. Specifically, NIR light affects the C-H, N-H, and O-H molecular bonds. These bonds are directly related to the sample constituents of interest, such as fat, protein, moisture, fiber, starch, sugar, hydroxyl, iodine value, and amino acids, to name a few. Responses to these bonds can be found throughout the NIR spectrum, but the primary combination bands for all of these properties, found above 1900 nm, are the most sensitive and generally provide the most accurate calibrations.

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## About Unity Scientific, LLC

We are a leading global provider of near-infrared (NIR) bench-top analyzers, process analyzers and other spectroscopic solutions. Unity is a multinational, privately held corporation committed to delivering NIR analyzer and general spectroscopy innovation and superior customer support. We approach business from the perspective of creating value. Unity designs, manufactures, and markets a full line of NIR testing and monitoring solutions for our customers and value-added solution providers.

Unity's offering includes near-infrared bench-top and at-line process analyzers, for agricultural, food, beverage, meat, dairy, tobacco, pharmaceutical, and industrial samples; process near infrared diode array spectrometers, photometers, automated wet chemistry analyzers and a variety of sample preparation equipment for digestions and distillations. In addition, our software suite includes packages to transfer an NIR database from other major brand instruments that include Foss, Perstorp, Bran+Luebbe and more to complete calibration development and management tools in our new UniStar product.

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