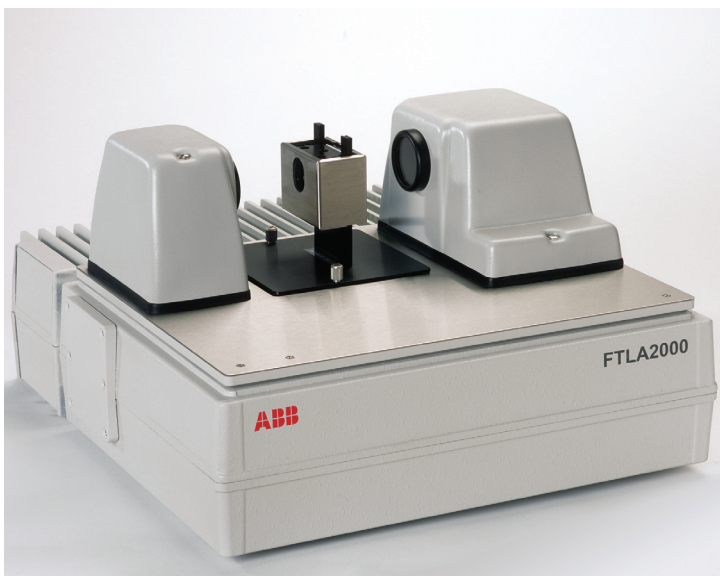


## Oleochemir



### Configuration

#### Analyzer System

The Analyzer is based on the laboratory FT-NIR model FTLA2000-160 spectrometer. It includes a PC preloaded with ABB's AIRS analysis software pre-configured for the analysis of Iodine Value (IV) and %Trans in oils and fats, including calibrations usable for all oil and fat types. The analyzer also includes an 8 mm vial holder accessory and temperature controller as well as a supply of 1000 disposable vials.

#### Spectrometer

- FT-NIR (Fourier Transform Near-Infrared) covering the range from 3800  $\text{cm}^{-1}$  to 14000  $\text{cm}^{-1}$
- NIR (BK7 optics) with quartz halogen light source
- DTGS detector
- Ethernet link to PC
- Overall dimensions: 20 in. W x 22 1/4 in. D x 12 in. H (50.8 cm x 56.5 cm x 30.4 cm)
- Weight: 96 lb. (44 kg)
- Arid-Zone sample compartment with BK7 windows

#### Preloaded Software

- GRAMS/LT
- Advance IR QA/QC Software Version 2.2 (AIRSQA-2K). This software is preconfigured for the routine analysis of oils for Iodine Value (IV) and %Trans. The software includes calibrations for IV and %Trans that applies to all types of oils and fats.

#### Sampling Interface

- 8 mm vial holder accessory with 1000 disposable glass vials
  - Dimensional variation in commercial vials is  $\pm 0.25$  mm i.d. and  $\pm 0.4$  mm o.d.
- Temperature controller for vial holder
  - Sample temperature: from ambient up to 130°C

#### Performance

- Spectrometer
  - Wavenumber reproducibility: 0.04  $\text{cm}^{-1}$  ( $\pm 2\sigma$ ) at 7300  $\text{cm}^{-1}$
  - Calibration transferability guarantee: FT-NIR models will reproduce the absorbance spectrum of toluene (4100-6000  $\text{cm}^{-1}$ ) in a 0.5 mm cell at 28°C  $\pm$  1°C to within 0.002 A when compared with any other ABB FT-NIR unit. (This insures that analysis performance for IV and %Trans will be the same from instrument to instrument without any calibration adjustment).
  - Wavenumber repeatability  $\pm$  0.002  $\text{cm}^{-1}$  ( $\pm 2\sigma$ )
  - Near IR RMS-noise absorbance at peak response is typically 4 micro-A for 1 min scan time, 16  $\text{cm}^{-1}$  resolution, open beam
  - 100% line reproducibility is within 0.1% in the 8000 to 4500  $\text{cm}^{-1}$  range for FT-NIR models, for 2 consecutive measurements. (These performances specifications insure the repeatability of analysis).

# Specifications

- Interferometer
  - Patented Michelson-type interferometer with 2 cube-corner retro-reflectors mounted on a “wishbone” swing arm.
  - Factory pre-aligned interferometer and input/output optics; does not require adjustment by user.

## Calibrations

- The analyzer is supplied pre-calibrated for Iodine Value (IV) and %Trans.
- The calibration spectra are acquired at a resolution of 16 cm<sup>-1</sup> and 128 co-added scans (56s acquisition time).
- Global calibration for IV measured over the range of 0 to 190. Uses accepted AOCS procedure Cd 1e\_01.

Iodine Value range	0 - 10	10 - 30	30 - 60	60 - 90	90 - 120	120 - 190
SEP Uncertainty (1 sigma)	0.25	0.44	0.30	0.40	0.76	0.82
Repeatability (1 sigma)	0.08	0.10	0.08	0.10	0.12	0.15

- Global calibration for % Trans applicable to the same wide range of oils as for IV.

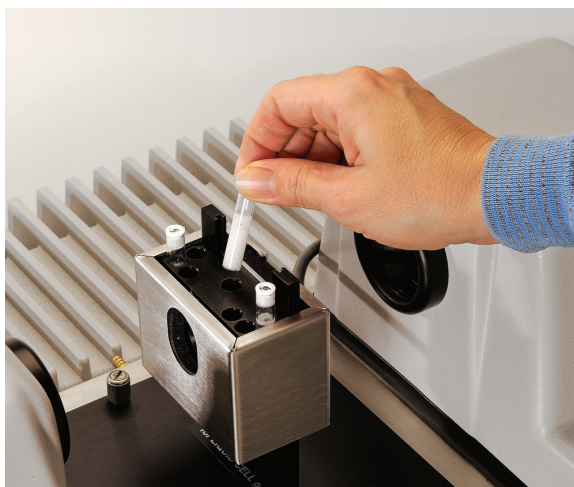
% Trans range	0 - 15	15 - 60
SEP Uncertainty (1 sigma)	0.7	1.6
Repeatability (1 sigma)	0.1	0.6

## Installation

- Power requirement: 100-120 or 220-240 Vac at 50-60 Hz. independent circuit
- Ambient temperature: -15° to 50°C non-operating
- 0° to 30°C operating
- Relative Humidity (operating): up to 95% non-condensing
- Communication access: independent analog phone line or internet network connection for remote access to computer with modem for validation and service support

## Sampling Requirements

- 8 mm o.d. (6.6 mm i.d.) disposable vials (HPLC autosampler vials); 1 ml capacity glass vials
- Sample volume required; 0.35 ml
- Analysis temperature: 75°C±1°C
- Preheat time; 2 min
- Measurement time; 1 min



- Liquid samples are mixed and transferred to 8 mm vials using disposable pipettes.
- Solid samples must be heated beyond their melting point, stirred and transferred to 8 mm vials using disposable pipettes. Note: Microwave heating may produce localized over heating, therefore, water bath heating is recommended.
- For small extracted amounts of oil sample with volume below 0.35 ml, ABB can provide %Trans determination by means of the official AOCS method consisting of a heated ATR crystal accessory using a spectrometer operating in the mid IR. Note: Disposable vial sampling is more convenient and quicker than sampling with a heated ATR.

## Validation

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- Even though the FTLA2000-CH10 Oleochem<sup>ir</sup> Analyzer is pre-calibrated for Iodine Value and % Trans parameters, it requires validation to insure that the system provides reliable equivalent analysis to the chemical method it replaces.
- AOCS Validation for IV
  - IV validation consists of predicting 10 AOCS IV standards provided with the analyzer composed of different types of oils ranging from 0.2 to 140 IV.
- Validation for %Trans
  - %Trans validation consists of predicting 8 %Trans standards provided with the analyzer composed of different types of oils ranging from 0.4 to 46 %Trans.
- It is prudent to also validate the analyzer using local oil or fat samples and cross-checking the results with the local Wijs method for IV and GC for %Trans. For this, the reproducibility of the official Wijs method for IV and GC for %Trans must be evaluated by duplicate analysis. Slope and bias may be adjusted in accordance with validation samples to provide closer agreement with local chemical methods of analysis if desired.
- Note: The software of the analyzer is provided with simple diagnostic and outlier detection protocols that will prevent invalid results from being displayed. This can occur due to a spectrometer problem or due to an outlier sample. An outlier sample may be a sample that is highly contaminated or one that is not an oil or a fat.
- The repeatability of the calibration should be evaluated using duplicate sample testing across the entire range of the calibration. The precision results should be comparable to the statistical results reported for the Global IV and %Trans.
- Check samples can be used to evaluate the long-term stability of the analyzer. These must be chemically stable when stored and sampled. At least three check samples representing the low, medium and high regions of the calibration are recommended for analysis. After analysis, check samples should be discarded as repetitive heating of some samples may induce oxidative effects. It is recommended to prepare a series of disposable vials, for example, for weekly verification for a period of a year. These should be prepared from the same material lot and stored in a refrigerator.

## Analysis of additional properties can be provided upon special request

These parameters are not included in the basic analyzer configuration. Examples of other properties are Moisture content, Melting Point, Cloud Point, Saponification Number, Acid Value and Free Fatty Acid (FFA) content. It is also possible to provide on special request oil degradation parameters such as Peroxide Value or Anisidine Value.



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