

AGTRON M-BASIC/II

COFFEE ROAST ANALYZER OPERATION MANUAL

**Special Application
Abridged Spectrophotometer**

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MEASURING ROAST CLASSIFICATION

How Does the AGTRON M-BASIC II Evaluate Roast Development?

The M-BASIC II does not look at the color of the coffee or the lightness or darkness of a sample, it measures the inverse of a known amount of specific wavelengths of near-infrared energy absorbed by the sample surface. The wavelengths selected relate to compounds that directly correlate to the development of soluble organic chemistry (what ends up in the cup). The entire aroma and flavor of coffee is related to organic volatiles. By ignoring color, the old school method, measuring the development of selected organic constituents, the M-BASIC II is capable of identifying subtle changes introduced by various roasting strategies and developments providing a highly accurate and repeatable method for controlling roast consistency.

ABOUT AGTRON ROAST DEVELOPMENT ANALYZERS

There are two Agtron scales used by the coffee industry, the Gourmet Scale and the Commercial Scale. The M-BASIC II uses the Gourmet Scale. The E20CP-II defaults to the Commercial Scale but can be configured to read either scale. The Gourmet Scale offers higher resolution, (shows a greater difference in scores between two roast classifications), than the Commercial Scale. Refer to the GROUND COFFEE ROAST DEVELOPMENT CLASSIFICATIONS / AGTRON READINGS chart on page 11.

AGTRON MODEL M-BASI II COFFEE ROAST ANALYZER

OPERATION MANUAL

06/15/2018

I. INITIAL SET-UP

- Carefully remove the analyzer from the shipping box.
- Inspect the analyzer for any sign of shipping damage.

Contact Agtron immediately if any damage is apparent. A shipping claim for damage will need to be filed as soon as possible.

IMPORTANT: Keep the box and all packing material. Any unit returned to Agtron for service must be shipped in the original packaging or Agtron will not accept the shipment

The carton contains the following items:

- M-BASIC II Analyzer
 - Power Cord
 - Rectangular Metal Sample Dish Tray
 - Two Plastic Sample Dishes
 - One Two-Sided Calibration Dish-Set (Disk is Red on One Side/Black on One Side)
 - One Life Disk (Large Diameter / Yellow on Both Sides)
 - This Manual
- Place the Analyzer on a clean level surface
 - Keep the cooling fan vent on the back of the unit free of obstruction
 - Avoid placing the unit where it will be in direct sunlight
 - Fully open the sample drawer by pulling it straight out until it hits the bumper stop
 - Install the large diameter yellow color LIFE DISK in place under the drawer on the raised platform so that it sits flat between the four posts located on the corners of the platform.

NOTE: *The life disk is a reflectance target used for verifying / adjusting the high calibration value each time the drawer is opened prior to taking a product reading.*

- Place the rectangular metal sample dish tray into the cutout on the sample drawer top by first placing the front of the tray with the thinnest edge facing forward against the rubber locating bumpers, then push the back edge of the tray down into the opening so that the tray recesses fully into the cutout and the side flanges of the tray sit flat on the drawer surface

NOTE: Always keep the sample drawer in the fully closed position when not in use. Always keep the sample dish tray installed in the sample drawer

- Fully close the sample drawer
- Connect the AC power cord to its mating socket on the back of the unit

- Make certain that the plug is firmly seated
- Connect the unit to AC mains power. The M-Basic II automatically adjusts to the following single phase mains voltages and frequencies:

100 to 240Vac / 50 to 60Hz

NOTE: *The M-BASIC II main power switch is on the back panel to the side of the power cord connector. The unit is designed for continuous duty and can be left on 24/7. It should only be turned off when not in use for extended periods, such as over an extended holiday. The Analyzer uses very little power, about as much power as a 20-watt light bulb. The unit is ready to use within 30-minutes of powering-up and will require fewer calibration adjustments when it has been on for more than 4-hours*

- The LED numeric display should illuminate
- Contact Agtron immediately if the Display does not illuminate

II. CALIBRATION PROCEDURES

There are two calibration procedures, one for full calibration, and one for interim calibration used in production. The **Full Calibration Procedure** should be performed every 4 hour to maintain highest accuracy. The **Interim Calibration Procedure** should always be performed prior to testing each sample.

A. FULL CALIBRATION PROCEDURE

Performed every 4 hours to maintain highest accuracy:

- Remove the two-sided Calibration Reference Disk / Dish set from its storage box.

NOTE: *The two-sided Calibration Reference Disk-set supplied with the analyzer is your permanent calibration reference. Disk sets are matched by serial number to a specific analyzer and can only be used with that unit. Both the analyzer and its calibration disks should be re-certified periodically. See the recertification procedure on page 9.*

- There is a calibration label on the side of the Calibration Reference Disk dish
- Note the Reference Scores that appear on the dish calibration label for both the black and red sides of the disk. These will be used during calibration.

NOTE: *Avoid touching the surface of the disks. Periodically clean the disk surfaces with a soft cotton cloth using very light pressure and a dilute solution of alcohol and distilled water. Keep the disk set stored in the box provided and away from direct sunlight or heat. Never leave the calibration disk set in the analyzer. Never use the dish supplied with the Calibration Reference disk set for coffee samples.*

IMPORTANT: Always place the calibration disk into the shallow side of the dish, the disk top surface should be very close to flush with the top edge of the dish.

- ① Fully open the sample drawer.
- ② Place the Calibration Reference Disk into the shallow side of the dish with the **red-side** facing up. Place the dish / disk into the sample tray in the drawer. Make certain that the dish sits flat and fully into the recess in the tray.
- ③ Fully close the sample drawer.
- ④ Adjust the SET HIGH calibration knob so that the value on the display corresponds with the Red Score value from the calibration label. This adjustment knob is a 10-turn potentiometer: **Do not force the knob past the clockwise or counter-clockwise stop positions or the potentiometer will be damaged.**
- ⑤ Fully open the sample drawer.
- ⑥ Turn the Calibration Reference Disk over into the shallow side of the dish so that the **black-side** is facing up.

⑦ Place the Calibration Reference Dish / Disk back into the sample tray.

⑧ Fully close the sample drawer.

⑨ Adjust the SET LOW calibration knob so that the value on the display corresponds with the Black Score value on the calibration label. This adjustment knob is a single-turn potentiometer: **Do not force the knob past the clockwise or counter-clockwise stop positions or the potentiometer will be damaged.**

⑩ Repeat steps ① through ⑨ until the calibration disk reference scores and the scores displayed by the analyzer agree with the values on the calibration label without the need for adjustment.

Fully open the sample drawer and note the number that appears on the display. This number will be used during production as the calibration reference for the interim calibration procedure. The reference is a reading of the LIFE DISK inside the analyzer under the optic assembly.

Place the two-sided disk set into its storage box and close the cover

THE M-BASIC II IS NOW READY TO READ PRODUCT!

B. INTERIM PRODUCTION CALIBRATION PROCEDURE

Interim calibration should always be performed prior to testing each product sample:

① Fully open the sample drawer and adjust the SET HIGH knob for the value established during the prior full calibration procedure when the drawer was fully opened.

- Do not adjust the SET LOW knob; that should only be adjusted during a full calibration.

Each time you open the drawer to insert a sample for analysis, if the meter reading is not the same as noted following the full calibration, you only need to adjust the SET HIGH knob to the reading noted following full calibration. The low disk setting will be re-aligned when the high setting is re-established.

Place the two-sided disk set into its storage box and close the cover

Again, THE M-BASIC II IS NOW READY TO READ PRODUCT!

III. SAMPLE PREPARATION

Ground Coffee Sample Preparation

NOTE: The ground sample represents an integration of the developed chemistry of the entire bean from the outside to core. Ultimately it is the ground roast score that should be the focus of controlling product consistency.

- Grind the coffee sample into a container and thoroughly stir/mix it to obtain homogeneity.
- Place the ground sample into the shallow side of the sample dish. Overfill the dish and use a straightedge (a wood ruler with a metal edge insert works very well) to level the surface. Hold the straight edge perpendicular to the top surface, rest the straightedge against the rim of the dish and make a sweeping motion to the opposite side. Repeat this motion starting at the opposite side.
- Avoid compressing or overworking the sample. The surface of the coffee should be flat and uniform with no voids or irregularities from the center to the dish circumference. Make certain that the sample covers the entire area of the dish.

IV. IT'S TIME TO TAKE A READING OF THE COFFEE SAMPLE!

- ① Check the calibration. The high and low reference values should be within 0.2 points of the provided calibration disk values.
- ② Place the prepared sample to be evaluated into the drawer sample tray. Use the shallow side of the sample dish for ground and the deep side of the dish for whole bean.
- ③ Fully close the sample drawer. Take care to avoid moving the drawer quickly or abruptly to avoid disturbing the sample. Once the reading settles, record the sample reading.

Option: Whole Bean Coffee Sample Preparation

NOTE: The whole bean measurement is only as an approximate indicator of roast uniformity, as the analyzer sees only a small section of the beans' outer surface which represents a very small percentage of the integrated development of the entire bean.

- Pour the whole bean sample into the deep side of the sample dish. Put enough coffee into the dish to form a flat surface that is level with the edge of the dish. Use your hand or a straight edge to pat the surface until it is flat. Then follow steps in IV above to measure Coffee Samples.

Option: CONVERTING GOURMET SCORES TO COMMERCIAL SCORES

M-BASIC II product readings can be converted to Commercial (E20-CP/III) Scores as follows:

$$\text{Commercial Score} = (\text{Gourmet Score} + 1.528) \times (0.7429)$$

V. FACTORS AFFECTING ANALYTICAL ACCURACY

As with any piece of analytical equipment, good sample preparation is important if meaningful and repeatable results are to be achieved.

Sample Temperature

Samples should always be analyzed at room temperature. Never evaluate a hot or warm product, as this will affect accuracy.

Grind Specification

The coarseness /fineness of the grind will determine the amount of effective analytical surface area. It is important to have a grind similar to the CBC standard for auto-drip. A screen specification is included for reference below. If you do not have access to screens, you can adjust the grind by observing the surface of the coffee during sample preparation. When particles form waves during a final pass, the grind is too coarse. If the surface compacts, compresses and cakes, the grind is too fine.

AGTRON ROAST ANALYZER SAMPLE GRIND SPECIFICATION

*WEIGHT OF COFFEE RETAINED ON SCREEN #10 & #14: 3.5%
(0.0% - 3.5%)*

*WEIGHT OF COFFEE RETAINED ON SCREEN #20 & #28: 71.5%
(65.0% - 75.0%)*

*WEIGHT OF COFFEE PASSING THROUGH SCREEN #28: 25.0%
(25.0% - 35.0%)*

Time from Roasting / Cooling / Grinding to Analysis

Once coffee is roasted and cools, it begins to decompose. Since the M-BASIC II bases the development analysis on chemistry, it will see the change in chemistry due to decomposition much in the same way you would taste it in the cup. Decomposition can lower a sample's score by as much as 3 score points in 24 hours and the score will continue to drop, at a slower rate and by a lesser amount, until the coffee is fully oxidized. To eliminate this measurement variable, it is important to analyze samples as soon as possible after roasting /cooling; within 30 minutes is preferable.

Of interest, the rate of Agtron score change that occurs for a specific sample over a fixed time period may be useful indicators of consistency in roasting methodology and the effectiveness of packaging strategies.

Roast Classification, Whole Bean and Ground

The M-BASIC II can be used to evaluate both whole bean and ground samples. A sample is first analyzed as whole bean and then as ground. The difference between the two scores approximates how uniformly or non-uniformly the sample is roasted. The character of the cup changes with different roast uniformity. **While both measurements may be included in a comprehensive QC program, it is the ground score that determines cup development (roast classification). as it represents the integration of the developed chemistry of the entire bean from outside to core. Ultimately it is the ground roast score that should be the focus of controlling product consistency.**

VI. CALIBRATION PROBLEMS

While the emitters that provide the near-infrared energy used for analysis have an expected useful life exceeding 10-years, they do gradually lose output over time. If during a full calibration procedure the SET HIGH knob is turned fully-clockwise and the number on the display is below the reference number for the red-side of the calibration disk, the analyzer may be telling you that the electronics need adjustment to compensate for lost output. In most cases you will be able to effect the required internal adjustment without the need to return the unit for service. Please contact Agtron Technical Service for assistance.

VII. PERIODIC MAINTENANCE

A. CLEANING THE FAN FILTER MEDIA

The fan filter media should be cleaned with a mild soap and warm water solution or replaced periodically. If the analyzer is used in a clean laboratory environment, it may require attention every six months. If the analyzer is used in the production environment, it may require cleaning as frequently as once a week.

CAUTION: DO NOT REMOVE THE FOUR SCREWS ON THE CORNERS OF THE FAN FRAME

The screws hold the entire fan assembly in place and do not need to be removed to remove the fan filter media. A snap-in web-like retaining frame holds the media in place. Grab the center of the web and pull out the frame holding the media. Remove the media and clean it with the warm water/soap solution. Rinse thoroughly, dry it, align it in the fan frame, and snap the retaining frame back into place.

B. CLEANING THE DISKS

Agtron calibration disk surfaces should be kept clean and free of contaminants. Clean disk surfaces periodically with a 20% solution of alcohol / distilled water and a soft lint-free cloth. Use gentle pressure and be careful not to scratch the disk surfaces.

C. STORING THE TWO-SIDED CALIBRATION DISK & DISH SET

Keep the two-sided calibration disk & dish set in its box and away from direct sunlight whenever it is not in use. Never leave it in the analyzer.

D. CLEANING THE ANALYZER INTERIOR

Unplug the analyzer. Remove the LIFE DISK from under the sample drawer. Remove the rectangular sample tray. Use a vacuum to clean out any product that may have collected on the inside of the unit.

E. CLEANING THE PANEL METER & ANALYZER EXTERIOR SURFACES

Use a soft cloth moistened with a 20% solution of water and Windex with light pressure to clean the panel meter display window. Use Windex at full strength or alcohol and a soft cloth to clean all other analyzer exterior surfaces.

F. CALIBRATION DISK-SET RE-CERTIFICATION PROCEDURE

NORMAL WEAR SUCH AS SURFACE SCRATCHES AND OIL ABSORBED BY THE DISKS FROM BOTH THE COFFEE AND FROM FINGERS WILL AFFECT ACCURACY. PERIODICALLY CORRELATING THE DISK VALUES TO STABILIZED AND RECENTLY CERTIFIED COFFEE SAMPLES WILL COMPENSATE FOR CHANGES THAT OCCUR TO THE DISKS OVER TIME AND RE-ESTABLISH ANALYZER ACCURACY.

ITEMS REQUIRED

- PRODUCTION CALIBRATION DISK SET AND DISH: CLEAN THE CALIBRATION DISKS WITH A DILUTE ALCOHOL SOLUTION AND A SOFT LINT-FREE CLOTH BEFORE RE-CERTIFYING
- TWO CLEAN SAMPLE DISHES
- RECENTLY AGTRON CERTIFIED STABILIZED LIGHTER ROAST SAMPLE (Contact Agtron for Sample)
- RECENTLY AGTRON CERTIFIED STABILIZED DARKER ROAST SAMPLE (Contract Agtron for Sample)

TURN THE AGTRON ANALYZER ON A MINIMUM OF 4-HOURS BEFORE PROCEEDING WITH CALIBRATION DISK RE-CERTIFICATION

ONCE PREPARED HANDLE THE CERTIFIED SAMPLES CAREFULLY AS NOT TO DISTURB THE ANALYTICAL SURFACE DURING THE PROCEDURE

- 1) PREPARE THE CERTIFIED LIGHT SAMPLE IN THE SHALLOW SIDE OF ONE OF THE CLEAN SAMPLE DISHES (Petri Dish for Older Bottom Viewing M-Basic)
- 2) PREPARE THE CERTIFIED DARK SAMPLE IN THE SHALLOW SIDE OF THE OTHER CLEAN SAMPLE DISH (Petri Dish for Older Bottom Viewing M-Basic)
- 3) CAREFULLY PLACE THE LIGHT SAMPLE INTO THE ANALYZER SAMPLE DRAWER AND FULLY CLOSE THE DRAWER
- 4) ADJUST THE ANALYZER '**SET HIGH**' KNOB ON THE FRONT PANEL UNTIL THE METER READING COINCIDES WITH THE LIGHTER CERTIFIED SAMPLE SCORE
- 5) CAREFULLY PLACE THE DARK SAMPLE INTO THE ANALYZER SAMPLE DRAWER AND FULLY CLOSE THE DRAWER
- 6) ADJUST THE ANALYZER '**SET LOW**' KNOB ON THE FRONT PANEL UNTIL THE METER READING COINCIDES WITH THE DARKER CERTIFIED SAMPLE SCORE
- 7) REPEAT STEPS (3) THROUGH (6) UNTIL THE CERTIFIED SCORES FOR EACH SAMPLE ARE ACHIEVED WITHOUT THE NEED TO MAKE ADJUSTMENT
- 8) PLACE THE CALIBRATION DISK IN THE SAMPLE POSITION WITH THE RED-SIDE (GRAY-SIDE) FACING UP, FULLY CLOSE THE DRAWER, AND RECORD THE METER READING.

DO NOT TOUCH THE ADJUSTMENTS KNOBS

RED-SIDE SCORE: _____ DATE: _____

- 9) PLACE THE CALIBRATION DISK IN THE SAMPLE POSITION WITH THE BLACK-SIDE FACING UP, FULLY CLOSE THE DRAWER, AND RECORD THE METER READING.

DO NOT TOUCH THE ADJUSTMENTS KNOBS

BLACK-SIDE SCORE: _____ DATE: _____

THE TWO SCORES RECORDER ABOVE ARE THE NEW CERTIFIED CALIBRATION NUMBERS FOR YOUR CALIBRATION DISKS. USE THESE NEW VALUES IN PLACE OF THE ORIGINAL VALUES SUPPLIED WITH YOUR CALIBRATION DISK-SET FOR CALIBRATION.

GROUND COFFEE ROAST DEVELOPMENT CLASSIFICATIONS / AGTRON READINGS

<u>CLASSIFICATION</u>	<u>GOURMET</u>	<u>COMMERCIAL</u>	<u>SCA COLOR TILE</u>	<u>GOURMET PERCEPTION Δ</u>
Coffee-Like	133	100.0	-NO TILE-	NA
Under-Developed	100	75.4	-NO TILE-	NA
Extremely Light	95	71.7	#95	(+1.5/-2.0)
Very Light	90	68.0	-NO TILE-	
	85	64.3	#85	(+2.0/-2.0)
	80	60.6	-NO TILE-	
Light	75	56.9	#75	(+2.5/-2.0)
	70	53.1	-NO TILE-	
Medium Light	65	49.4	#65	(+2.5/-2.5)
	60	45.7	-NO TILE-	
Medium	55	42.0	#55	(+3.0/-3.0)
	50	38.3	-NO TILE-	
	45	34.6	#45	(+3.0/-2.5)
Medium Dark	40	30.8	-NO TILE-	
	35	27.1	#35	(+2.0/-2.0)
Dark	30	23.4	-NO TILE-	
	25	19.7	#25	(+1.5/-1.5)
Extremely Dark	20	16.0	-NO TILE-	NA
Over Developed	20	16.0	-NO TILE-	NA
Lacking Coffee Volatiles	0.0	01.1	-NO TILE-	NA

Reference Roast Classifications:

- ① Agtron 85-90 Gourmet Scale Reading range is similar to a Cinnamon Roast Classification
- ② Agtron 60 Gourmet Scale Reading represents a Nominal value for Medium Roast
- ③ Agtron 30-35 Gourmet Scale Reading represents a range for Italian / French Roast Classification

Optimum achievable Color Tile visual resolution vs. Agtron Analytical Reading Accuracy:

- ±6.0 Agtron Reading points for medium roast
- ±4.0 Agtron Reading points for medium dark and medium light roast
- ±2.5 Agtron Reading points for very dark and very light roast

Note: Perception Δ; Agtron analyzer gourmet scale reading thresholds where an expert can repeatedly determine when cup volatiles represent a lighter or darker roast development

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LIMITED WARRANTY

Agtron Incorporated warrants this product to be free of defects in material and workmanship for a period of one year from the date of the original invoice. This warranty is only valid to the original purchaser.

This warranty does not extend to Agtron equipment used for any application other than its intended application, to external appearance, to damage resulting from improper installation, to damage caused by line voltage irregularities, if the equipment is altered, misused, or abused.

RETURN FOR REPAIR INSTRUCTIONS

Contact Agtron for a Return for Repair authorization number (RFR) before sending equipment to Agtron for service. Analyzers returned without an RFR will not be received.

Repack the equipment in the original shipping box and packing materials. Include the power cord, the life disk, two-sided calibration disk & dish set, and the disk sample tray enclosed in their original boxes.

Warranty repairs must be accompanied by a copy of the original sales invoice as proof of date of purchase.

The customer is responsible for freight and insurance coverage from their facility to Agtron. Insure the unit for full value. Agtron will not assume responsibility for shipping damage.

Agtron will pay return freight and insurance to the customer during the warranty period.



CERTIFICATE & DECLARATION OF CONFORMITY FOR CE MARKING

Company contact details:

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AGTRON INCORPORATED declares that their:

Tabletop Abridged Spectrophotometers
listed as the following models
E20CP-II, E30FP-II, M-SERIES II, S-SERIES II and M-BASIC II

comply with the Essential Requirements of the following EU Directives:

Low Voltage Directive 2006/95/EC
Electromagnetic Compatibility Directive 2004/108/EC

and further conform with the following EU Harmonized Standards:

EN 61326-1:2006
EN 61010-1:2010

Dated: 27 November 2012

Position of signatory: President / CEO

Name of Signatory: Carl A. Staub

Signed below:

on behalf of AGTRON INCORPORATED