

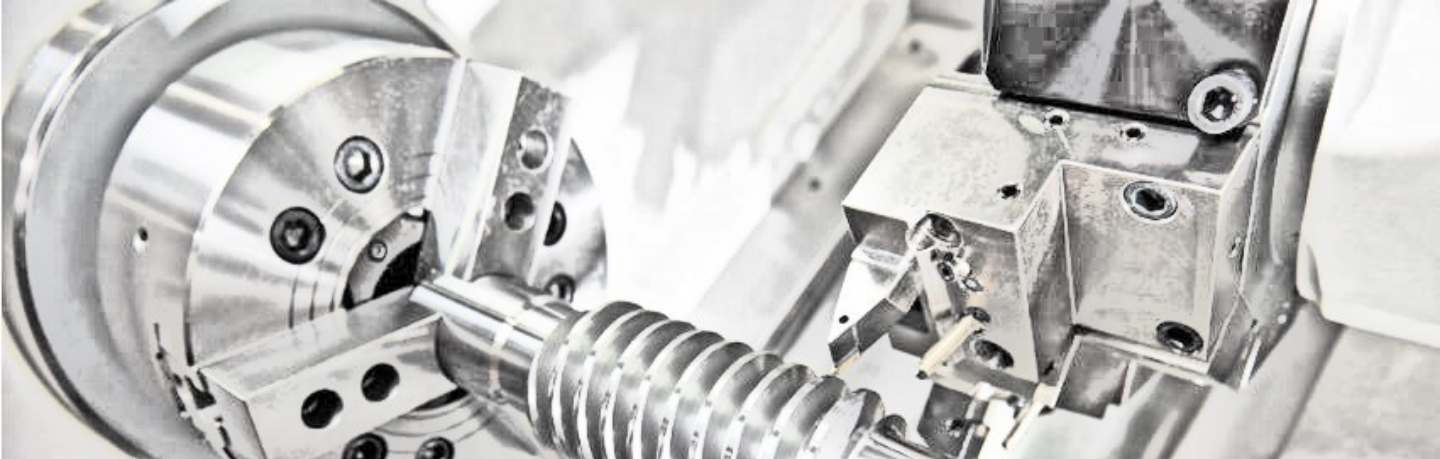
SINPAR FTC-M2 Combination Research and Motor Method Octane Rating Unit



Shanghai Sinpar Scientific Instrument Co., Ltd

Professional Manufacturer of Fuel Rating Engines

www.sh-sinpar.com



SINPAR specializes in fuel rating engines

Located in Shanghai China, SINPAR is a high-tech company specializing in the Research, Manufacturing and Service of Fuel Rating Engines.

Since the establishment of SINPAR, we have been focusing on R&D high-quality fuel rating equipment, and are committed to providing our customers with perfect fuel testing solutions.

SINPAR has set up an R&D center in Shanghai, the R&D team is composed of senior experts from the National Petroleum Research Institute and technical engineers with deep expertise in the industry. The R&D center utilizes advanced technology and professional experience to provide strong technical support for the continuous product innovation and development.

SINPAR FTC-M2 Combination Octane Rating Unit, with its own intellectual property rights, is fully compliant with ASTM D2699 (ISO 5164) and ASTM D2700 (ISO 5163) standard methods. Over the years since its introduction to the market, the FTC-M2 engine has been regularly updated with new features to improve the accuracy and efficiency of fuel rating.

SINPAR FTC-M2 Engine is widely used and accepted by many users in different countries and regions for its reliable performance and standard test procedures.

SINPAR offers world-class products and world-wide services focused on building long-term satisfaction and commitment to customers and partners.



SINPAR FTC-M2 Engine offers standardized octane test methods in full compliance with ASTM D2699 and ASTM D2700.

The FTC-M2 Engine original design was based on compliance with all the technical parameters and test procedures specified in the ASTM D2699&D2700 standards, which are the globally recognized standard test methods for determining octane number of motor fuels. After more than a decade of worldwide use, the FTC-M2 engine has been demonstrated to be fully compliant with ASTM D2699&D2700.

Customers deserve more than one choice.

We are working to provide our customers with more efficient, economical and versatile solutions for octane testing.



Combination Octane Rating Unit Model FTC-M2

(classic, reliable, cost-effective)

"Classics never go out of style. With nearly 30 years of experience with CFR engines, the FTC-M2 engine is as familiar to me as an old friend. Over previous engine models, it has some amazing improvements that make operation much easier. I like its reliable design and cost-effective price."

--from a senior lab technician



Combination Octane Rating Unit Model FTC-M2 with SXCP System

(modern, automated, easy-to-use)

"I like something modern and automated that makes my work easier and more efficient. The FTC-M2's SXCP octane rating system is excellent, with a clear, easy-to-use touchscreen interface and automated data functions at my fingertips."

--from a young lab technician

Combination (Research and Motor Method) Octane Rating Unit FTC-M2



Standards are conformed to:

ASTM D2699 (Research Method)
ASTM D2700 (Motor Method)

ISO 5164 (Research Method)
ISO 5163 (Motor Method)

IP 237 (Research Method)
IP 236 (Motor Method)

Combination (Research & Motor Method) Octane Rating Unit FTC-M2

is used as a complete system for determining octane number of motor fuels, conforming to ASTM D2699 (ISO 5164) and ASTM D2700 (ISO 5163) standard test methods.

RON&MON in One Engine

The FTC-M2 Combo RON&MON Engine provides a **quick and easy** conversion between Research and Motor Methods. The conversion requires only one button switching of engine speeds and changing of carburetor jets, **all in less than two minutes**, with no further actions required.

Two methods are accomplished in one engine within a short time, it is a huge **cost saving**.

classic, reliable, economical



FTC-M2 Octane Engine – a standardized single cylinder, four-stroke, variable compression ratio, carbureted engine runs octane rating in accordance with a defined set of operating conditions in ASTM D2699 & ASTM D2700.

The FTC-M2 Engine is applicable to users who have requirements for a wide range of fuel samples, large test amounts, long continuous test times, performing to ASTM standard test procedures.

It is widely used and accepted by fuel test labs for its reliable performance and proven cost-effectiveness.

FTC-M2 Engine Technical Specifications:

Standard Operating Conditions	
Test Engine	FTC-M2 Combo RON&MON Engine
Test Methods	ASTM D2699(ROn) & ASTM D2700(MON)
Test Range	40-120 Octane Number
Engine Speed	600 RPM $\pm 1\%$ (RON) & 900 RPM $\pm 1\%$ (MON)
Ignition Timing (RON)	Constant 13° BTDC
Ignition Timing (MON)	Variable as Cylinder Height (C.R.) is Changed
Intake Air Temperature (RON)	Tuning Based on Barometric Pressure Conditions
Intake Air Temperature (MON)	38°C $\pm 2.8^{\circ}\text{C}$
Intake Mixture Temperature (MON)	Standard 149°C $\pm 1^{\circ}\text{C}$; Tunable Range: 141-163°C
Cylinder Jacket Coolant Temperature	100°C $\pm 1.5^{\circ}\text{C}$
Crankcase Oil Temperature	57°C $\pm 8^{\circ}\text{C}$
Crankcase Oil Pressure	172 kPa-207 kPa (25 psi-30 psi)
Crankcase Vacuum	25-150 mm H ₂ O (1-6 in. H ₂ O)
Intake Air Humidity	25-50 Grains of Water per lb. of Dry Air
Engine Basic Information	
Cylinder Type	Standardized Single Cylinder (Four-Stroke Cycle)
Compression Ratio (C.R.)	Adjustable 4:1-18:1
Cylinder Bore (Diameter)	Standard 82.55 mm (3.25 in.)
Stroke	114.30 mm (4.50 in.)
Displacement	611.73 cc (37.33 cu in.)
Carburetor	Four-Bowl (with Cooling Function)
Carburetor Venturi	9/16 in.(RON); MON Depending on Lab Elevation
Intake/Exhaust Valve Clearance	0.20 mm ± 0.025 mm
System Function Information	
Cylinder Height Measuring&Adjusting	Sensor-Measuring & Motor-Driven Control System
Cylinder Height Display	Dual Digital Counter
Engine Speed Conversion	Dual-Speed Motor (with RON/MON Quick Switch)
Ignition Timing Display&Setting	Digital (Auto-Setting)
Crankcase Oil Heating System	Auto-Control
Oil Pressure Control&Display	Yes
Water Pressure Control System	Yes
Air Humidity Control System	Yes
Unit Safety System	Yes (Engine Auto-Stop with Fault Indications)

FTC-M2 Engine Features

Research & Motor Methods Conversion

Conversion is quick and easy using a dual-speed motor supplied with the FTC-M2 Combo Engine. The engine speed is switched to RON or MON method with a simple push of a button.



Synchronous Dual-Speed Motor

A dual-speed motor mounted on the slide base, provides consistent engine speed during octane testing in accordance with ASTM D2699 and ASTM D2700 standard test methods.



Engine Crankcase

The heavy-duty cast iron box design crankcase offers high strength and rigidity for octane testing of various fuels, and its long-lasting sealing system ensures long service life, trouble-free operation and maintenance. Removable side doors allow for easy inspection, maintenance and access to internal components.

Variable Compression Cylinder and Sleeve Assembly

The cylinder assembly allows the compression ratio to be changed by adjusting the cylinder height during engine running. Available in a range of 4:1 to 18:1, a wide variety of fuels can be tested. Cylinder Height is expressed as a C.R. Digital Counter reading, which is directly correlated to a specific octane value according to guide tables in ASTM D2699 and ASTM D2700.



Motorized Compression Ratio Changer

Cylinder Height adjustment is realized by a dedicated motor driving a worm shaft & worm wheel assembly.

A high-precision sensor is mounted to accurately measure the cylinder height value. The measuring system is stable and long-lasting, and is not affected by engine temperature and vibration.



The C.R. Digital Counter and Ignition Timing Values are displayed directly on the control panel for easy reference and recording.

The C.R. Digital Counter has two indicating counters to establish the difference between compensated and uncompensated readings based on barometric pressure.

The Ignition Timing System is a SINPAR-developed, laser-sensed positioning & timing system with automatic setting function that complies with ASTM MON & RON test methods. No manual setting is required.

The Knock Measurement Instrumentation Group is mounted on the octane operating panel, and is connected to a knock pickup assembly mounted directly in the cylinder combustion chamber.

The Digital Detonation Meter converts changes in combustion knock to a stable and accurate digital signal. A reading of 0 to 100 K.I. is displayed on the knock meter.

Digital conditioning instrumentation improves the accuracy and efficiency of octane testing.



The Four-Bowl Carburetor is available in a variety of jet and venturi sizes for a wide range of applications. A fuel flow control system is used to adjust the fuel-air ratio. The fuel level range to produce maximum Knock Intensity is 0.7 in. to 1.7 in. The carburetor is equipped with a cooling system connected to the air control unit.

The Falling Level Mode (*configured on the unit model FTC-M2 with SXCP System*) provides more sensitive fuel flow adjustment for obtaining more accurate result, and delivers an efficient and accurate falling level test. It allows determining maximum knock intensity without manual adjusting fuel level. Operators can perform accurate octane testing with Procedure B (Bracketing-Dynamic Fuel Level) in ASTM D2699 & ASTM D2700.

The Safety System provides engine auto-shutdown with the fault indications to protect the unit, when any of follow conditions occurs on the octane engine unit: abnormal oil pressure, abnormal cooling water pressure, abnormal temperature of coolant, electrical power loss or electrical system overload.



All The Sensors Assemblies are safely, securely and easily connected to the control unit through waterproof aviation connectors.

Each sensor is clearly labeled on the connection panel for easy replacement and maintenance.

The armored cables have high tensile strength and corrosion resistance for maximum service life.



The Water-Cooled Exhaust Surge Tank System

can eliminate resonance pulses and back pressure during engine running. Eliminating variable interference makes the test result more consistent and accurate. Meanwhile, the system can effectively reduce noise and air pollution. The surge tank assembly is rust-proofed inside & outside to ensure its durability.

The Engine Air Humidity Control System

standard on the FTC-M2 Octane Rating Unit, with an adjustable refrigeration system, is supplied to regulate the moisture content of intake air into octane engine at a constant 25-50 grains of moisture prescribed of dry air as specified by ASTM D2699 and D2700.

The cooling circulation system can be connected to the carburetor for chilling the fuel bowl.

The auto-control system with default settings is power-on ready for use under normal conditions.



FTC-M2 Engine Configuration

Standard Configuration of FTC-M2 Combination Octane Rating Unit:

- FTC-M2 Engine with instrumentation cabinet mounted to rigid base
- Unit power distribution box built into the cabinet
- Combo RON&MON methods octane rating system
- Synchronous dual-speed motor mounted to slide base
- Octane operation panel integrated with knock meter, digital counters, temperature controllers, detonation meter, fault indicator and operating buttons
- Heavy-duty cast crankcase assembly
- Variable compression ratio cylinder assembly
- Compression ratio change motor assembly
- Cylinder height sensor-measuring system
- Cylinder jacket cooling system
- Four-bowl carburetor assembly
- Mixture heater manifold
- Intake air heater system
- Cooling water pressure control system
- Oil pressure control system
- Ignition timing auto-control system
- Unit safety system
- Water-cooled exhaust manifold
- Water-cooled exhaust surge tank system
- Engine air humidity control system

Power Supply:

- Combination Octane Rating Unit: 380V / 440V, 50/60 Hz, 3 Ph;
- Engine Air Humidity Refrigeration Unit: 220V 50/60 Hz, 1 Ph;

Dimensions & Weight:

- Octane Engine Unit:
185x95x160cm (LxWxH), 950kg;
- Unit installed including engine air
system & exhaust surge tank:
250x200x200cm (LxDxH), 1200kg

(The above figures are approximate and subject to actual conditions.)



Combination (Research and Motor Method) Octane Rating Unit FTC-M2 with SXCP System



modern, automated, easy-to-use

Combination Octane Rating Unit FTC-M2 with SXCP™ System

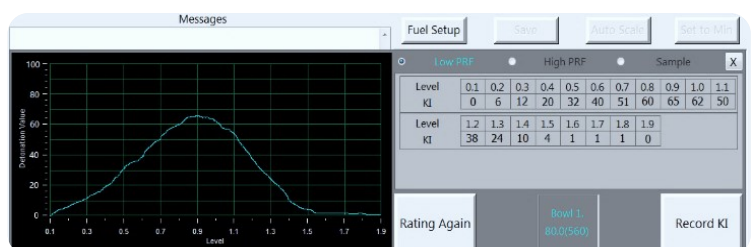
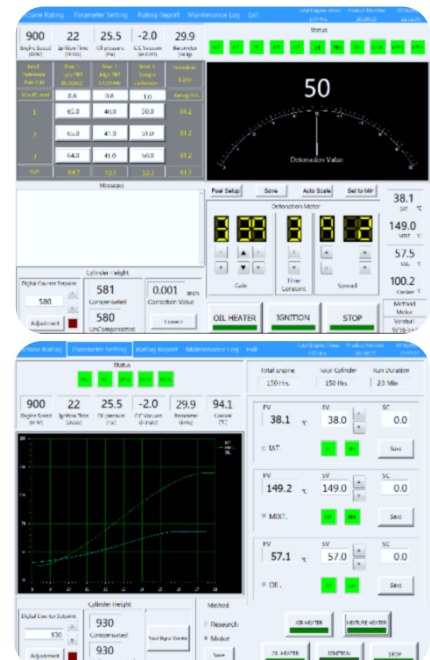
is the latest generation of octane rating unit with many easy-to-use features including automatic functions and enhanced documentation capabilities, conforming to the latest ASTM D2699 (RON) and ASTM D2700 (MON) Standard Methods.

SXCP™ Octane Rating System

delivers consistent and reliable test results, with standard features including on-screen operation, on-screen reports, falling level program, automated data recording, auto-set & auto-calculation system, integrated maintenance logs, and comprehensive safety system.

Features and Benefits:

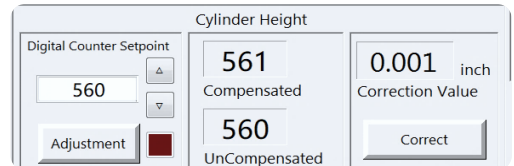
- ☑ **Easy-To-Use** touch-screen octane rating panel simplifies operating process.
- ☑ **Auto-Settings** for Intake Temperatures, Ignition Timing and C.R. Digital Counter.
- ☑ **Specialized Operating Software** developed by SINPAR R&D team, provides a user-friendly interface and clear fuel rating procedures for ASTM RON and MON test methods.
- ☑ **Automatic Calculation&Optimization Program** minimizes human errors and other malfunctions.
- ☑ **Falling Level Program** is used with a four-bowl variable-level carburetor, that allows determining maximum knock intensity without manual adjustment of fuel level. The operator can efficiently and accurately run a falling level test by PROCEDURE B (Bracketing-Dynamic Fuel Level) in ASTM D2699 and D2700.



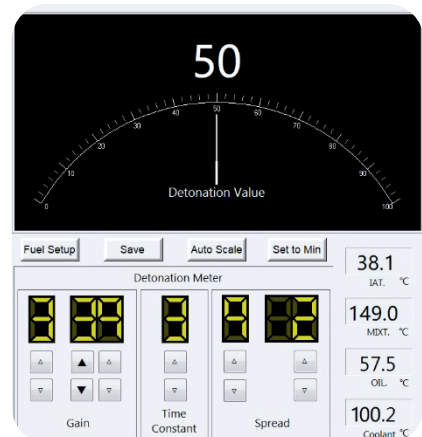
☑ **On-Board Electronic Barometer** displaying barometric pressure value, is used for Digital Counter Automatic Correction as per ASTM methods specifications.



☑ **Exact Cylinder Height** is measured and adjusted by a specialized sensor-measuring and motor-driven control system. It's displayed on-screen as dual values (compensated reading and uncompensated reading), as well as a Correction Value auto based on the current barometric pressure.



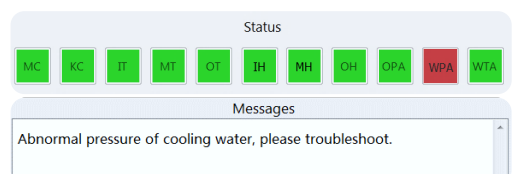
☑ **Digital Knock Meter** displays actual and accurate knock intensity value as well as real-time waveform, thus realizes more consistent and reliable test result. The software eliminates the need to center on 50 KI or be limited to 0-100 KI. The data and calculation results are recorded automatically to generate octane rating report.



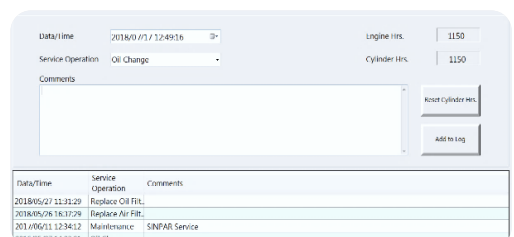
☑ **Automated Data Records** with octane rating reports including test methods & procedures, results, sample, operator name, reference fuels, KI values, fuel level values, temperatures data, and other operating parameters, are automatically captured and presented in a PDF file. This eliminates human recording and calculation errors. Reports are easy to view and print.

Time	Sample name	Operator	Sample Rating	Method	Standard	Procedure
2018/09/17 11:06:07	SINPAR_001	Operator_01	81.2	MON	ASTM D2700	CR
2018/09/17 10:29:17	SINPAR_001	Operator_01	81.2	MON	ASTM D2700	FL
2018/09/17 09:47:24	SINPAR_001	Operator_01	81.2	MON	ASTM D2700	FQ
2018/09/17 09:09:17	TSF	Operator_01	81.6	MON	ASTM D2700	FL
2018/09/17 08:47:06	TSF	Operator_01	81.7	MON	ASTM D2700	FQ
2018/09/17 08:10:15	TSF	Operator_01	81.6	MON	ASTM D2700	CR
2018/09/17 07:28:45	TSF	Operator_01	89.4	RON	ASTM D2700	FQ
2018/09/17 06:30:58	TSF	Operator_01	89.3	RON	ASTM D2029	CR
2018/09/17 05:10:29	TSF	Operator_01	89.4	RON	ASTM D2029	FL

☑ **Comprehensive Safety System** provides protection for octane engine unit, including Engine Status Monitoring, Warning Messages and E-STOP, which ensure long engine life and worry-free operation.



☑ **Integrated Maintenance Logs** including records of engine hours, cylinder hours, oil-change intervals and maintenance/service notes, are displayed on the screen for easy access and prompting.



FTC-M2 with SXCP System Technical Specifications:

Standard Operating Conditions	
Test Engine	FTC-M2 Combo RON&MON Engine with SXCP System
Test Methods	ASTM D2699(RON) & ASTM D2700(MON)
Test Range	40-120 Octane Number
Engine Speed	600 RPM $\pm 1\%$ (RON) & 900 RPM $\pm 1\%$ (MON)
Ignition Timing (RON)	Constant 13° BTDC
Ignition Timing (MON)	Variable as Cylinder Height (C.R.) is Changed
Intake Air Temperature (RON)	Tuning Based on Barometric Pressure Conditions
Intake Air Temperature (MON)	38°C $\pm 2.8^\circ\text{C}$
Mixture Temperature (MON)	Standard 149°C $\pm 1^\circ\text{C}$; Tunable Range: 141-163°C
Jacket Coolant Temperature	100°C $\pm 1.5^\circ\text{C}$
Crankcase Oil Temperature	57°C $\pm 8^\circ\text{C}$
Crankcase Oil Pressure	172 kPa-207 kPa (25 psi-30 psi)
Crankcase Vacuum	25-150 mm H ₂ O (1-6 in. H ₂ O)
Intake Air Humidity	25-50 Grains of Water per lb. of Dry Air
System Function Information	
Operation Panel	SXCP Digital Control Panel
Knock Meter	Automated Digital Knock Meter
Engine Speed Conversion	Dual-Speed Motor (with RON/MON Quick Switching)
Cylinder Height Measuring&Setting	Sensor-Measuring&Motor-Driven Auto-Control System
Cylinder Height Display	Dual Digital Counter with Correction Value
Ignition Timing Display&Setting	Digital & Auto-Setting
Crankcase Oil Heating System	Auto-Control
Intake Air/Mixture Temperature	Auto-Set
Falling Level Program	Yes
Electronic On-Board Barometer	Yes
Octane Rating Report	Yes (Automatic Generation)
Oil Pressure Control&Display	Yes
Water Pressure Control System	Yes
Water-Cooled Exhaust System	Yes
Air Humidity Control System	Yes
Unit Safety System	Yes (with Unit Status Monitoring, Warning Messages)
Maintenance Logs	Yes

FTC-M2 with SXCP System Configuration

Standard Configuration of FTC-M2 with SXCP System:

- FTC-M2 Engine with instrumentation cabinet mounted to rigid base
- Unit power distribution box built into the cabinet
- Synchronous dual-speed motor mounted to slide base
- Combo RON&MON methods octane rating system
- Built-in SXCP octane rating touchscreen panel PC
- Heavy-duty cast crankcase assembly
- Variable compression ratio cylinder assembly
- Compression ratio change motor assembly
- Cylinder height sensor-measuring & auto-setting system
- Electronic on-board barometer
- Cylinder jacket cooling system
- Falling Level four-bowl carburetor assembly
- Mixture heater manifold
- Intake air heater system
- Cooling water pressure control system
- Oil pressure control system
- Ignition timing auto-control system
- Water-cooled exhaust manifold
- Water-cooled exhaust surge tank system
- Engine air humidity refrigeration unit
- Unit safety system
- Desk with keyboard and mouse

Power Supply:

- Combination Octane Rating Unit: 380V / 440V, 50/60 Hz, 3 Ph;
- Engine Air Humidity Refrigeration Unit: 220V 50/60 Hz, 1 Ph;

Dimensions & Weight:

- Octane Engine Unit:
185x95x160cm (LxWxH), 950kg;
- Unit installed including engine air system & exhaust surge tank:
250x200x200cm (LxDxH), 1200kg

(The above figures are approximate and subject to actual conditions.)

Automatic Reference Fuel Blending System

FTC-AD1 Automatic Reference Fuel Blending Unit equipped with a modern computerized automatic control system, is used for automated blending of reference and standardization fuels for octane and cetane number determination according to ASTM D2699, ASTM D2700 and ASTM D613 standard test methods.

The FTC-AD1 system was developed based on SINPAR's many years of technical expertise and practical experience in the field of fuel rating technology, with the aim to design an automated blending system with optimal accuracy, efficiency and economy to serve fuel rating operations.

Automatic Reference Fuel Blending System is an Essential Device for Octane/Cetane Testing

The accuracy of the reference fuel blend directly affects the cetane/octane rating results, because the rating error is proportional to the blending error.

Therefore, a device that can **accurately** make fuel blends is **effective** in ensuring and improving fuel rating accuracy.

The FTC-AD1 Automatic Reference Fuel Blending System makes fuel blending **more accurate, faster, free of human error, and saves you a lot of time.**

It is increasingly becoming a **must-have** for octane laboratories.

Features & Benefits

■ Standards

ASTM D2699, ASTM D2700, ASTM D2885, and ASTM D613

■ High Precision

An electronic balance with the high precision of *0.01g* is used for gravimetric measurement to ensure the accuracy of blending.

■ Simple Operation

A built-in touch-screen computer panel with *easy-to-use* installed software simplifies the blending operation.

■ Accuracy and Efficiency

The automatic calculation program controls the entire blending process, thus *eliminating human error* and improving the efficiency of fuel rating.

■ Safety and Real-Time Monitoring

The unit is equipped with electrical protection & real-time monitoring systems to meet labs safety requirements. Real-time Monitoring for full-system operating status and ambient temperature. And *fuel low and overfill warnings* are issued.

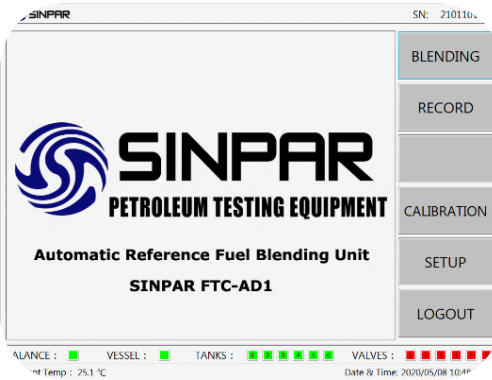
■ Cost Savings with Automation and Efficiency

Saving money by saving time and eliminating materials wastage caused by manual errors.



Automatic Blending By Weight

The blending unit blends reference fuels by weight (using a precision electronic balance) according to ASTM test methods. With the automatic calculation & control program, it provides precise and reliable fuel blends with the fuel rating accuracy of 0.01 ON/CN.

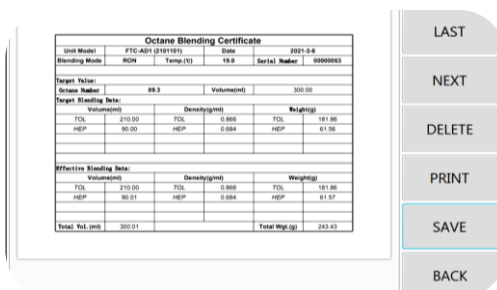


Specialized Operating Software

The software was developed by SINPAR R&D team specifically for fuel blending. It is simple, clear, easy to use and requires no training. From the main screen can access octane or cetane "BLENDING" operation, view blending "RECORD", perform pumps "CALIBRATION" and necessary "SETUP". Status indicators for balance, vessel, tanks and valves are displayed in real time.

Octane/Cetane Blending Operation

The operator only needs to select the Blending Mode, enter the target blending parameters, and then press the "START" button to begin blending. The automatic calculation control system controls the entire blending process. An accurate blend is automatically delivered to the vessel. The Free Blending Mode is provided for special fuels blending.



Blending Records/Certificates

After the blending process is complete, the blending record is automatically saved in the computer.

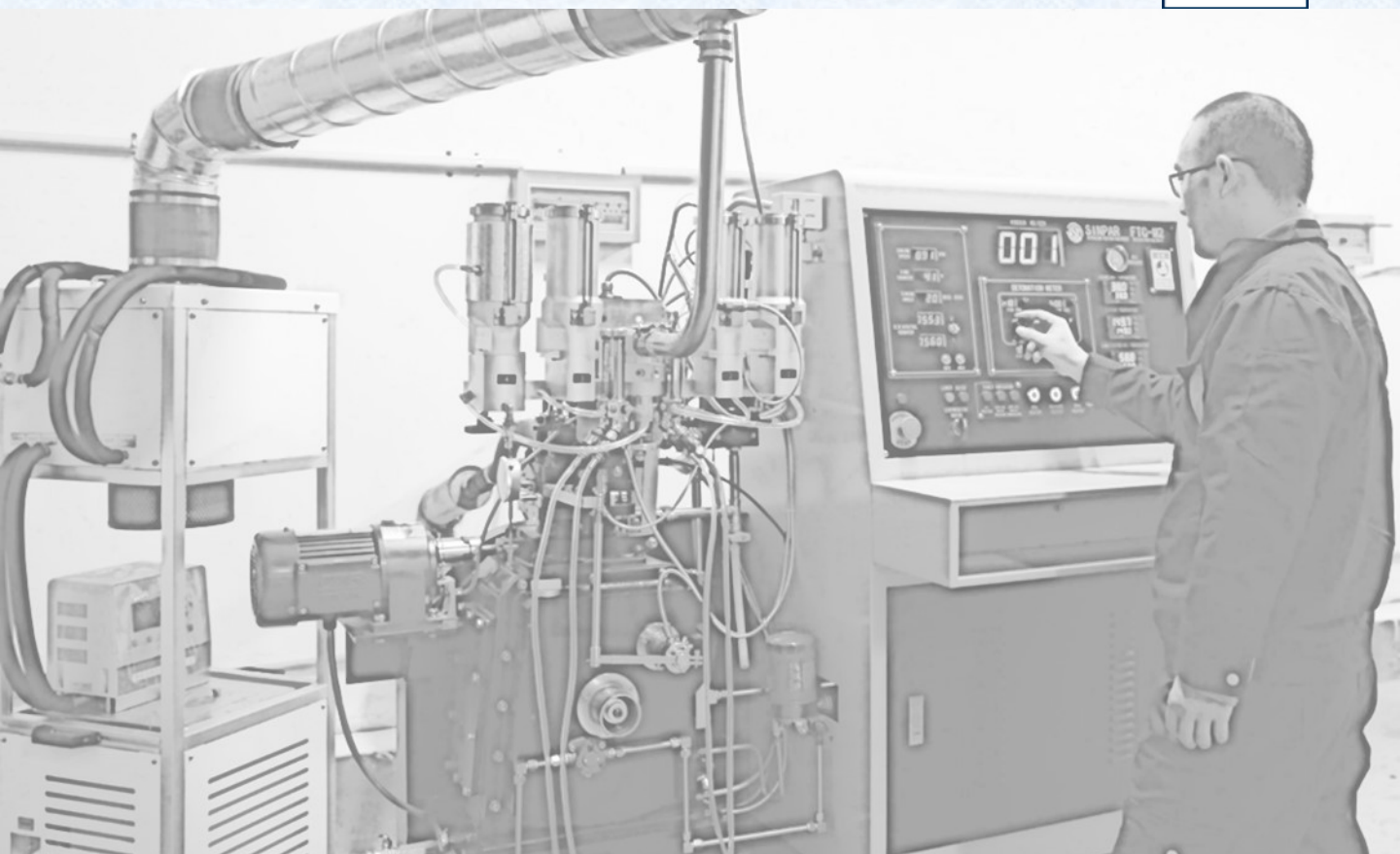
The blending certificate containing all necessary data can be printed or saved to a mobile storage device.

FTC-AD1 System Technical Specifications

System Model	FTC-AD1 Automatic Reference Fuel Blending Unit
Standards	ASTM D2699, ASTM D2700, ASTM D613
Application	For Octane and Cetane Number Determination
Measurement Mode	Gravimetric Measurement by Precision Balance
Fuel Blending Mode	Automatic Fuel Blending System with Software
Fuel Dosing System	Integrated Dosing Pump & Pump Controller
Operating Mode	Built-in Touch Screen Panel PC
Tank Quantity	Standard with 6 Tanks with 10 L. Each (Quantity Optional)
Blend Accuracy	±0.01 ON/CN
Blending Speed	1~2 min/500 ml
External Refilling System	Automatic Refueling System under Nitrogen Pressure (Option)
Monitoring System	Real-time Monitoring for Full-System Operating Status and Ambient Temperature; Fuel Low & Overfilling Warnings
Calibration Function	Precision Electronic Balance and Dosing Pumps
Blend Data	Auto-Saved Blending Certificate
Safety System	Electrical Protection & System Status Monitoring
Ventilation System	Available to Connect with Aspirator or Ventilation Duct
Power Supply	100~240VAC 50Hz/60Hz with Single Phase
Weight	200.00 kg (with six empty tanks)
Dimension	85.0x65.0x168.0 cm



**Due to continuing products development, all the illustrations used may differ from actual products, and specifications are subject to change.*



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