

TBM300 SMOKEMETER INFO-PAK



TBM300 Description

The SAE J1667 compliant TBM300 Opacimeter measures the absorption of light due to the presence of smoke aerosols discharged as a byproduct of diesel engine combustion. Measurement is accomplished by passing a collimated, pulsed light beam through the exhaust stream and detecting the loss in transmitted light intensity. The measured loss of light energy is translated into both OPACITY (%) and SMOKE DENSITY (K), which is displayed on the LCD panel of the control unit.

The TBM300 consists of two basic units connected by a signal cable:

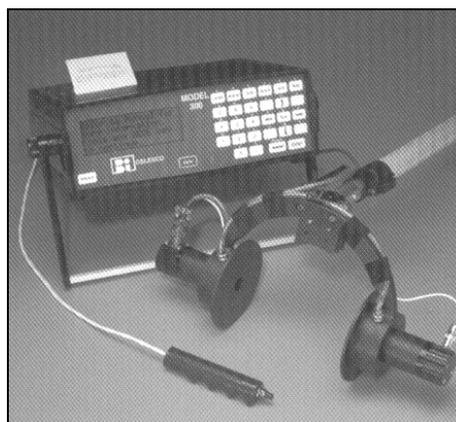
- A) The SENSOR UNIT contains the optics, which are comprised of finely aligned light source and photodetector modules.
- B) The CONTROL UNIT contains the LCD display, keypad for data entry, printer and various rear panel connectors for additional options and outputs.

The instrument set consists of the following major components:

- Sensor Unit (either Closed Head or Open Head)
- Control Unit
- Optics (Emitter and Detector)
- Sensor Cable
- AC Charger
- Remote Switch
- Calibration Lens
- Exhaust Adapters for the Closed Head
- User's Manual



TBM300 with Closed Sensor Head and remote switch



TBM300 with Open Sensor Head (attached to extension pole) and remote switch.

TBM300 Smokemeter Configurations

Control Unit

The Control Unit consists of a durable ABS plastic enclosure that contains the microprocessor circuitry, internal memory, thermal printer, 20 hour lead sealed battery, large LCD display, and a 30 key membrane keypad. The Control Unit is capable of storing 40 SAE J1667 Snap Acceleration Tests in memory that may be recalled at any time. Transmission of current or stored test results to an external printer or computer link is realized via the RS-232 port. Ease of operation is achieved with software-generated prompts assisting the user throughout the test process.

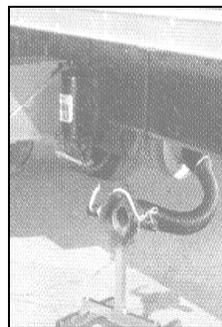
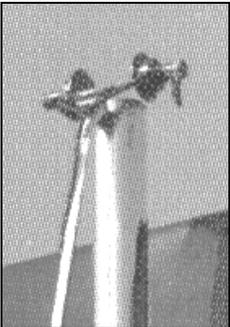
Standard features:

- Automatic calibration (zero/span)
- Dirty optics warning
- Dual analog 10V recorder outputs (0 – 100%, 0 – 20% Opacity)
- Printer
- User selected Pass/Fail limits
- One-man operation
- Real time clock
- Ambient temperature
- RS-232 link

Additional options include a remote switch, ambient corrections, temperature correction of smoke density (K), barometric pressure, oil temperature measurement, RPM measurement, and raw data or 1 second Bessel filtering at the recorder output. Linear accuracy is maintained through the use of Neutral Density calibration filters.

Sensor Unit

The Sensor Unit provides a rugged, stable housing for the Optics (Emitter and Detector modules). The TBM300 is offered with either an Open Sensor Head with an adjustable swivel mechanism or a Closed Sensor Head and Adapters, depending on your application. The Closed Sensor Head may be supplied with exhaust pipe boots and/or extension hoses. Three examples of different applications of the sensor heads are shown below.



The Sensor Heads are also equipped with purge air fittings on each of the optic ports, in the event that purge air is required to prevent excess soot from forming on the optics. In addition, an optional gas temperature probe fitting can be mounted on the head if needed.

TBM300 Specifications

Performance Specifications

Opacity Scale:	
Range	0 to 99.9%
Resolution	0.1%
Accuracy	Better than $\pm 1\%$ of full-scale opacity due to non-linearity
Smoke Density K Scale:	
Range	0 to 30.00 m^{-1}
Resolution	0.01 m^{-1}
Display:	LCD 80 character, 20 characters per line, 4 lines
Keypad:	30 key membrane switch
Printer:	40 character, thermal, 3" wide paper
Recorder Outputs:	0V to 10V, 0-100% and 0-20% Opacity
Light Source: Light Emitting Diode (Green)	
Angle of Projection	99% within 3 degrees, half angle
Spectral Output	Peak = 565 nm (Green)
Pulse Rate	600 Hz
Receiver: Silicon Photo detector	
Angle of View	99% within 3 degrees, half angle
Spectral Response	400 to 1100 nm

Performance Specifications (Continued)

Operating Temperature:	
Control Unit	-5° C to 50° C
Sensor Unit (Calibrated operation)	25° C to 45° C
Power:	
Internal 12 volt, 7 AH, lead acid battery, AC charger 110 VAC or 220 VAC	
Exhaust Diameter:	Up to 6 ½ "
Control Unit Dimensions:	12.52" (38.1 cm) wide x 4.51" (11.45 cm) high x 11.84" (30.07 cm) deep

Options

Linearity Calibration Lenses:	Neutral density filters with nominal values of 10%, 20% or 40%
RPM Sensor:	Optical sensor (± 100 RPM accuracy)
Gas Temp. Probe:	Corrects readings to 100° C exhaust gas temperature ($\pm 20^\circ$ C accuracy)
Barometric Pressure Sensor:	Measures barometric pressure in kPa (± 0.3 kPa accuracy)
Oil Temp. Probe:	5' Oil Temp. Probe (requires special software) ($\pm 5^\circ$ C accuracy)
Recorder Outputs:	Raw data or 1 second Bessel Filtering

Accessories

Cart:	Contains Control Unit and Sensor Unit
Stand:	
Extension Poles:	Allows for lifting of the Sensor Unit to exhaust stack
Carrying Cases:	Choice of 2 types for Control Unit or Adapters
Closed Motorcycle Sensor Head:	1 ¾" diameter
Exhaust Hoses:	2", 3", 4" and 5" diameters. Flexible.
Exhaust Adapters:	3" to 6", 4" to 6", and 5" to 5.5"
Inline Exhaust Cans:	2" to 28" diameter