

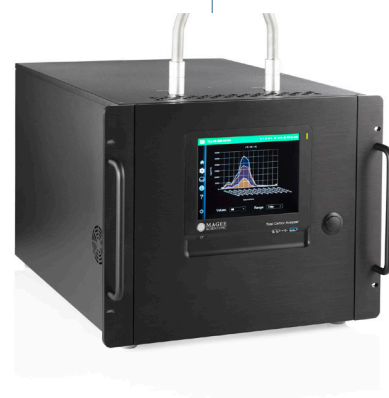
TOTAL CARBON ANALYSER

MAGEE MODEL TCA-08

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Carbonaceous aerosols are a large and often dominant fraction of fine particulate matter. The carbonaceous fractions are frequently separated into organic carbon (OC) and elemental carbon (EC) using thermal-optical methods. While the results for OC and especially EC concentrations vary significantly for different thermal evolution protocols, the total carbon (TC) concentration is very consistent between methods.

This instrument analyses Total Carbon concentration in real-time and at high time resolution. Combination of the optical method for measuring black carbon (BC) by the Aethalometer AE-33 and a thermal method for TC determination by newly developed TCA-08 is a new method (TC-BC) which we show to be equivalent to the standardized OC/EC analysis (EN 16909:2017)¹.

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MEASUREMENT PRINCIPLES

Two identical flow channels are used for sampling and analysis of air flow. Sample is collected on 47-mm quartz fiber filter in stainless-steel combustion chamber*. At end of sampling timebase, collection flow is switched to second channel while first channel is analyzed. Collected sample is flash-heated to convert all Carbon to CO₂. Ambient air is used as "analytical" carrier gas at low flow rate. The baseline level of CO₂ in ambient air is determined before and after the heating cycle. Large pulse of CO₂ in analytical flow is integrated over ambient baseline to determine Total Carbon content of sample.

¹ M. Rigler, L. Drinovec, A. Vlachou, A. S. H. Prévôt, C. Hüglin, J.-L. Jaffrezo, A. D. A. Hansen and G. Močnik. Offline Validation of the New 'Total Carbon Analyzer'. European Aerosol Conference, August 27 – September 1, 2017. University of Zurich, Switzerland.

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BENEFITS

- + Continuous analysis of Total Carbon content of aerosol
- + Sampling time 20 min to 24 hours
- + Combine with Aethalometer® to derive OC/EC
- + Uses ambient air as carrier gas
- + Rugged instrument, all-steel construction
- + Easy installation, operation and maintenance



SAMPLING

Standard flow rate of 16.7 SLPM (1 m³ /h) is provided by closed-loop stabilized internal pump. Standard PM_{2.5} inlet is included. Sampled air stream must be non-condensing (RH < 90% at instrument temperature). Ambient meteorological sensor (P, T, RH) is included to control sampling flow to ambient volumetric conditions.



ANALYTICAL PERFORMANCE

Time resolution	Timebase for sampling and analysis is adjustable from 20 minutes to 24 hours. Default setting is 1 hour.
Limit of detection	300 ng C/m ³ (1-h timebase, 16.7 LPM flow)
Range	300 ng/m ³ to 300.000 ng/m ³ of Total Carbon

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TECHNICAL SPECIFICATIONS

Dimensions (HxW xD)	42 x 48 x 60 cm (17" x 19" x 24")
Height required for inlet assembly	120 cm (4 feet)
Weight	35 Kg
Electrical supply	100~240 VAC, 50/60 Hz
Power consumption (maximum)	100 W sampling, 600 W analysis (typical 1-minute duration)
Recommended ambient temperature	10 to 35 °C, non-condensing
Recommended use	Indoor or laboratory use, rack or benchtop
Sampling support	47-mm. quartz fiber filters
User interface	21-cm color touch-screen with status indicator LED's
internal sampling pump	Dual diaphragm, brushless speedcontrolled DC motor, stabilized flow.



ACCESSORIES

- PM_{2.5} inlet
- Shockproof and waterproof transit case
- Air flow calibrator (BGI TetraCal)
- Sample line system and Filter Cartridge



ECOMESURE

TCA-08 VEN-20200911