

# soli TOC cube

*The versatile instrument for temperature-dependent differentiation of carbon in solids*



High sensitivity



High data quality



Great flexibility



Extreme durability

soli TOC  cube

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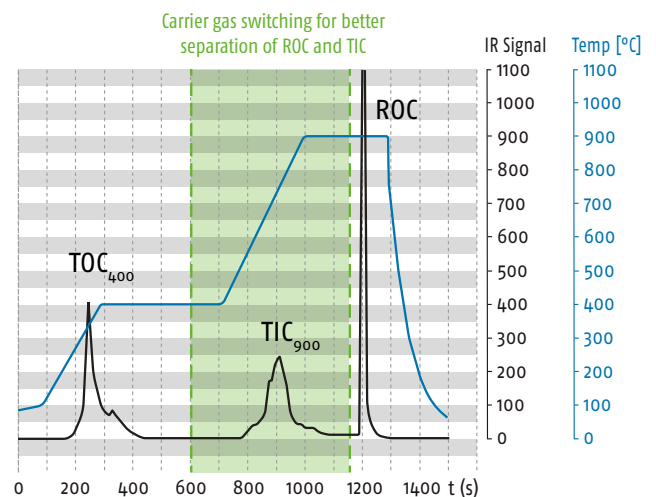
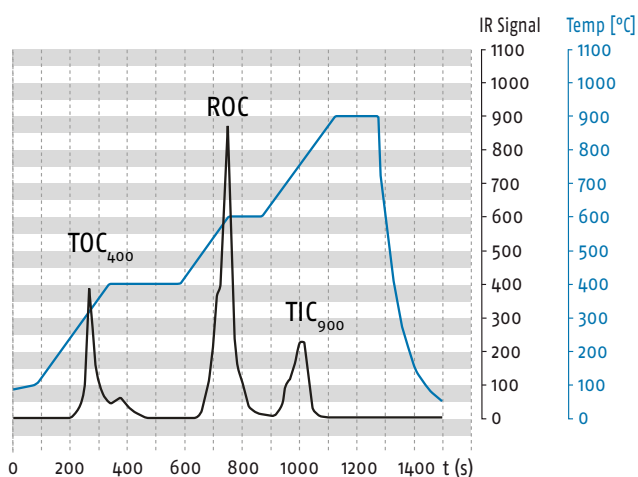
*Dependable  
and versatile*

## KEY FEATURES

- Measurement range of 0.001–100%
- Fully automated analysis with 89 position autosampler
- Temperature programming with fast heating rates
- Optional carrier gas switching for better separation of ROC and TIC
- Option to determine nitrogen simultaneously
- Advanced crucible technology with automatic ash removal
- Conforms to new (DIN 19539) as well as old (DIN 15936) standards for TOC determination in solids

The determination of TOC in solids has recently become ever more important. Not just for evaluating wastes, TOC-content measurement is also an important aspect of assessing soils. The new soli TOC cube offers users the option of measuring not only total organic and total inorganic carbon, but also

determining the total elemental carbon (ROC). In addition to the classical TOC determination by direct and subtraction acidification methods, temperature programming can also be employed, which requires neither sample preparation nor the use of acids.



Soil samples (Cambisol B Horizon, 150 mg each)



- ⊕ The soli TOC cube can operate with three-step (left) as well as two-step temperature programming with gas switching (right). The soli TOC cube as a single elemental analyzer can therefore perform all of the measurement protocols outlined in DIN 19539 and DIN 15936.

## *Unmatched analytical performance*

In temperature programming, a precise, adjustable temperature is required for reproducible measurements. Thus in the soli TOC cube, the temperature is measured where it matters, directly at the crucible. This eliminates all possible thermal interferences. Additionally, the use of a post-combustion catalyst ensures that even samples with a high carbon content are quantitatively oxidized and achieve equally high measurement quality.

### INNOVATIVE GAS SWITCHING



The separation of ROC and TIC can be improved by the use of an inert carrier gas. After the 400 °C temperature step, the carrier gas is switched from oxygen to nitrogen and the sample is directly pyrolyzed at 900 °C. Under these conditions, the ROC remains in the sample container while the TIC is converted to CO<sub>2</sub>. After the TIC is determined, the system is given oxygen again, whereby the ROC is oxidized. In most cases, this technique results in a better separation of TIC and ROC.

## *Simplified sample preparation*

With the soli TOC cube, larger samples on the order of grams can be reliably analyzed: just weigh the solid samples in the reusable crucibles, place them on the autosampler, and start the sequence. This makes the soli TOC cube the perfect instrument for the precise analysis of inhomogeneous samples. Measurement of TOC according to DIN 15936 is also remarkably simple. The sample is acidified directly in the ceramic crucible and after drying delivered immediately to the instrument – simple, fast, and reliable.

## *Reliable analysis*

The software allows for implementing predefined methods in addition to custom programming of the heating rate and hold times. Peak integration is executed automatically and can be manually checked. This ensures that even the most difficult analyses can produce precise measurement of each individual component.

## *Unsurpassed flexibility*

The soli TOC cube is capable of distinguishing between the different forms of carbon by either temperature programming or a combined temperature program with gas switching. In a single program, the TOC, ROC, and TIC can all be determined. Alternatively, the classical method of acidification, drying, and TOC measurement at constant temperature is also possible. Furthermore, the nitrogen concentration of the sample can be analyzed at the same time as carbon by using an additional EC detector.

### TOC<sub>400</sub>, ROC AND TIC<sub>900</sub>



When determining the carbon content of solids, often it is not enough just to differentiate between TIC and TOC. When evaluating wastes, for example, elemental carbon (ROC) should be determined separately, since this form of carbon is not bioavailable. For this purpose, a temperature ramping program is used: TOC is determined at 400 °C, ROC between 400 °C and 600 °C, and TIC between 600 °C and 900 °C. The sample is heated at a rate of 70 °C per minute to the designated temperature, and then maintained for the given hold time. The CO<sub>2</sub> produced at the different temperatures represents the various carbon fractions. With the temperature programming of the soli TOC cube, one can determine the TOC<sub>400</sub>, ROC, and TIC<sub>900</sub> simply and reliably, in compliance with the DIN 19539 standard.

# Carbon determination has never been easier!

| SUBSTANCE                              | TOC <sub>400</sub> [%] | ROC [%] | TIC <sub>900</sub> [%] |
|--|------------------------|---------|------------------------|
| FLUVISOL                               | 3.63                   | 0.25    | 0.041                  |
| ARENOSOL                               | 1.65                   | 0.087   | 0.008                  |
| SOIL WITH SLUDGE                       | 2.06                   | 0.12    | 0.033                  |
| EXCAVATED SOIL                         | 0.23                   | 0.15    | 0.42                   |
| COAL MINE TAILINGS                     | 17.21                  | 18.93   | 11.55                  |
| FOUNDRY SAND                           | 1.21                   | 1.93    | 1.27                   |
| WASTE INCINERATOR ASH                  | 0.51                   | 0.52    | 0.19                   |
| SLAG                                   | 0.024                  | 0.098   | 0.16                   |
| CONTROL MIXTURE ACCORDING TO DIN 19539 | 2.14                   | 1.73    | 2.08                   |

Sample weight: 200 mg

## EASE OF USE

The soli TOC cube is optimized to significantly simplify daily routine operation. Clearly arranged, easily accessible system components minimize maintenance efforts. The tool-free clamp connection system ensures a reliably leak-tight instrument at any time. Thus, customers can enjoy smooth analyses and confidence in their results.

## QUALITY YOU CAN TRUST

Our consumables and spare parts are designed to meet the highest quality standards and reliability. They are certified and validated in accordance with international norms and standards. We do not compromise on quality of our parts and chemicals – this is the prerequisite of a guaranteed long lifetime of our instruments.

## IN ACCORDANCE WITH THE OFFICIAL STANDARDS

The soli TOC cube operates in full compliance with all relevant national and international norms or standards such as DIN 19539, DIN 15936, and DIN 13137.

## IDEAL SOLUTION FOR

- Environmental laboratories
- Cement plants
- Quality control laboratories
- Academic research groups

## SAMPLE TYPES ANALYZED

- Soil samples
- Waste
- Construction materials and wastes
- Lime
- Sand



### High sensitivity

Outstanding sensitivity thanks to high performance, state-of-the-art technology.



### High data quality

Outstanding precision and accuracy through high performance combustion. Matrix-independent results. Long-term stability of calibration.



### Great flexibility

Wide range of optional conversion kits available for special applications. Upgradeable at any time.



### Extreme durability

Outstanding robustness and longevity thanks to state-of-the-art technology.

## Elementar – your partner for elemental analysis

Elementar is the world leader in high performance analysis of organic elements. Continuous innovation, creative solutions and comprehensive support form the foundation of the Elementar brand, ensuring our products continue to advance science across agriculture, chemical, environmental, energy, materials and forensics markets in more than 80 countries.

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