Thermo Scientific Gas Chromatograph Analyzers

Greenhouse Gas (GHG) Analyzer

Overview

Greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), play a critical role in climate change. Monitoring their concentrations along with additional greenhouse gases like hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) is essential across environmental research, regulatory compliance, and agricultural impact studies.

The Thermo Scientific™ TRACE™ 1610 GC Greenhouse Gas GC Analyzer is engineered to quantitatively detect CH_4, CO_2, N_2O, and SF_6 through a single-injection solution ideal for gaseous samples like ambient air, or soil and water headspace when combined with the Thermo Scientific™ TriPlus™ RSH SMART Autosampler. The system typically integrates a methanizer + flame ionization detector (FID) for CO_2 and CH_4, and an electron capture detector (ECD) for trace-level N_2O and SF_6, enabling multi-gas analysis with excellent sensitivity and repeatability (RSD <2%).

In case of high concentration of CO_2, the thermal conductivity detector (TCD) is used in place of a methanizer-FID within an alternative three-detector configuration (ECD, TCD, and FID).

Key features and benefits

- **Multiple GHGs via one injection:** Simultaneously detect methane, carbon dioxide, and nitrous oxide with dual detection channels: methanizer-FID for CO_2/CH_4 and ECD for N_2O, minimizing analysis time and maximizing throughput.
- **Flexible and rugged design:** An alternative three-detector configuration offers the optional TCD detector for high-concentration CO_2 and O_2 and backflush capability for water elimination. The optional headspace autosampler for soil or water matrices ensures adaptability for diverse sample types.
- **Turnkey and easy operation:** With factory-configured systems, the analyzers are delivered fully tested and include a complete documentation package with method, plumbing diagram, setup, and troubleshooting guide for reduced setup time and consistent performance.
- **Ease of maintenance and reliability:** The innovative Thermo Scientific™ iConnect™ modularity of the GC, along with the spacious and easily accessible auxiliary oven, minimize downtime and maintenance efforts. The robust design ensures reliable performance, reducing the need for frequent interventions.

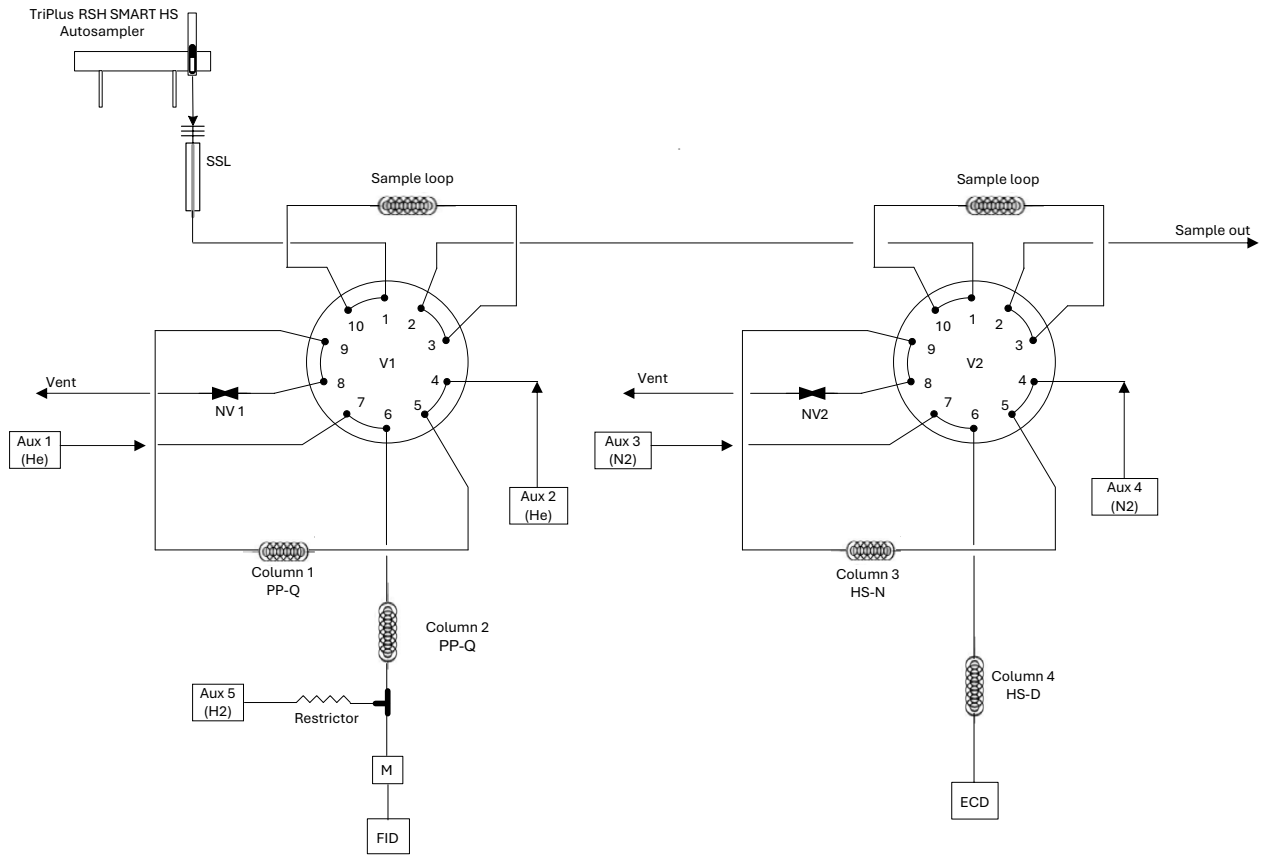


Figure 1. GHG Analyzer dual-detector configuration for low levels of CO_2.

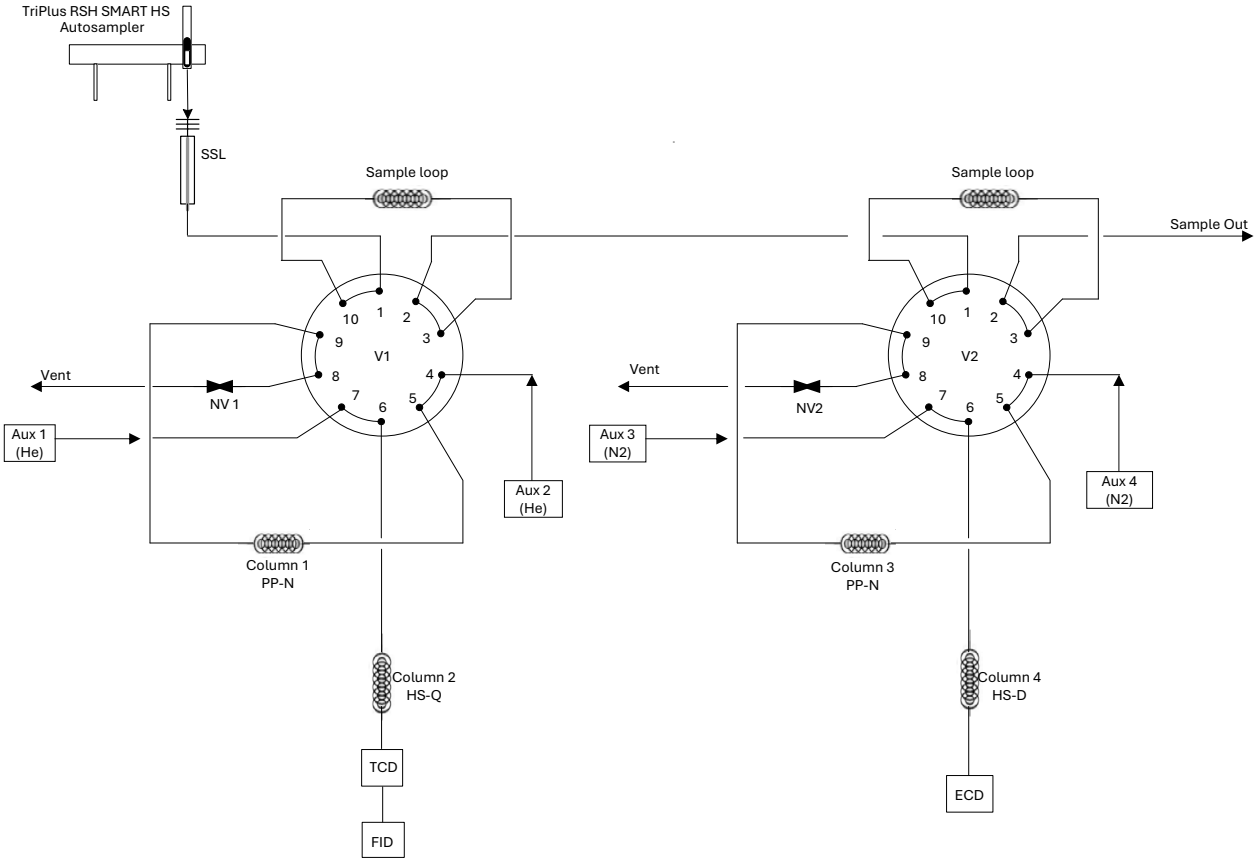
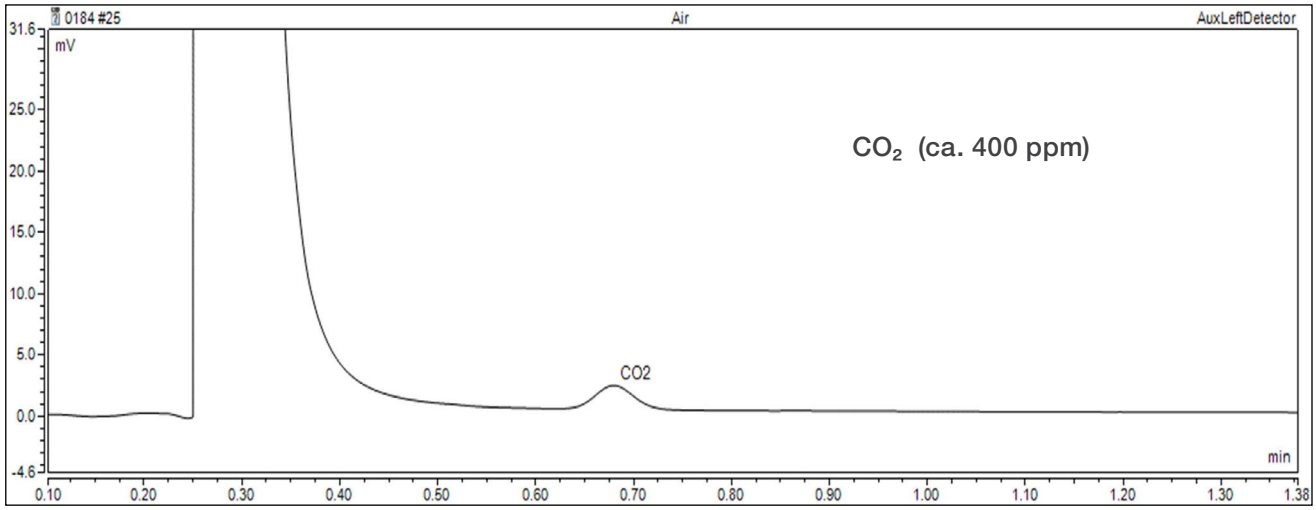


Figure 2. GHG Analyzer three-detector configuration for high levels of CO_2.

A



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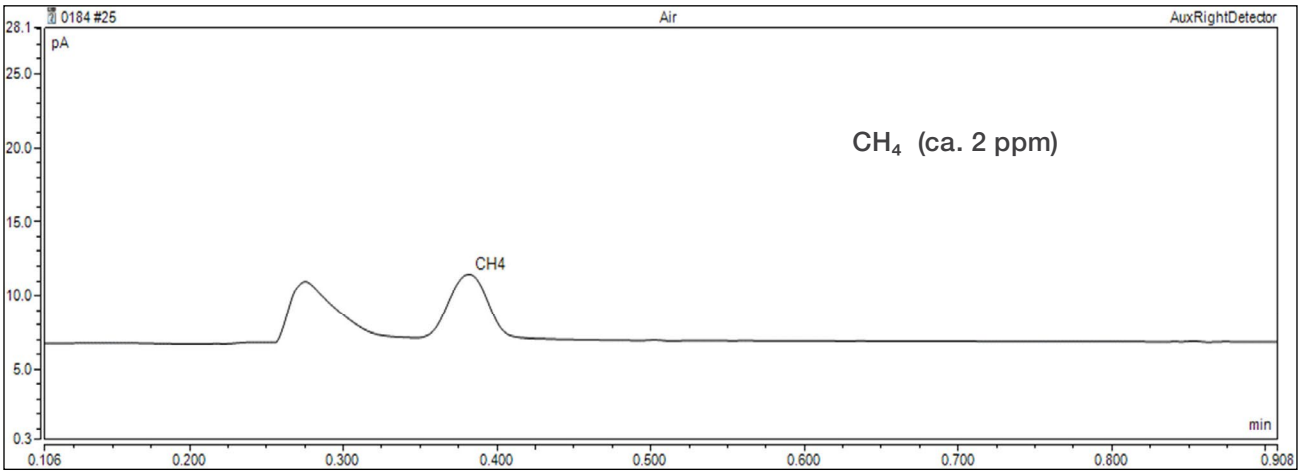

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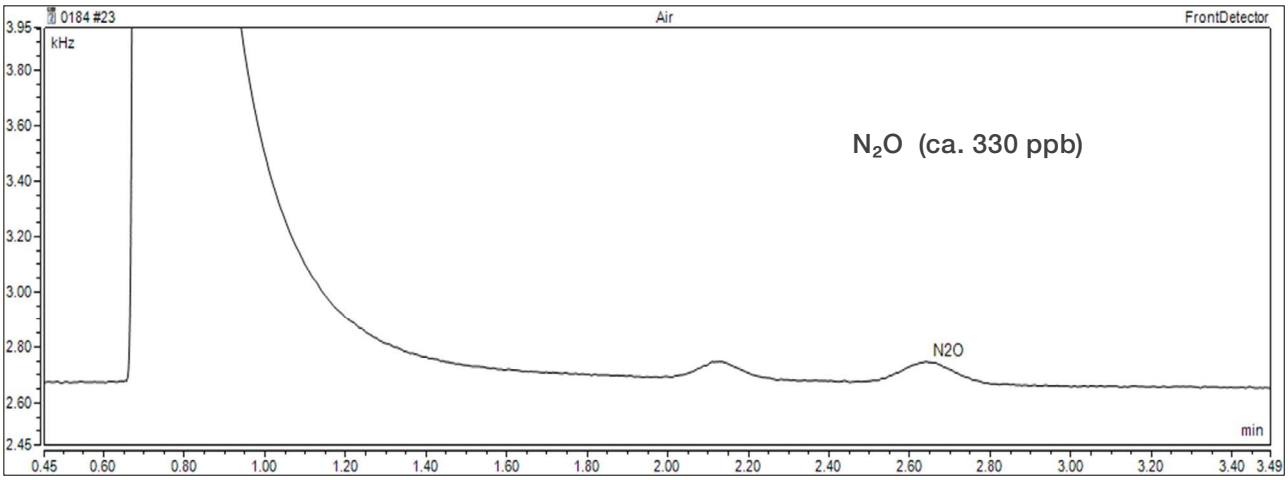

Figure 3. Example of chromatograms from the GHG 3-detector configuration: CO_2 (TCD), CH_4 (FID), N_2O (ECD) in air.

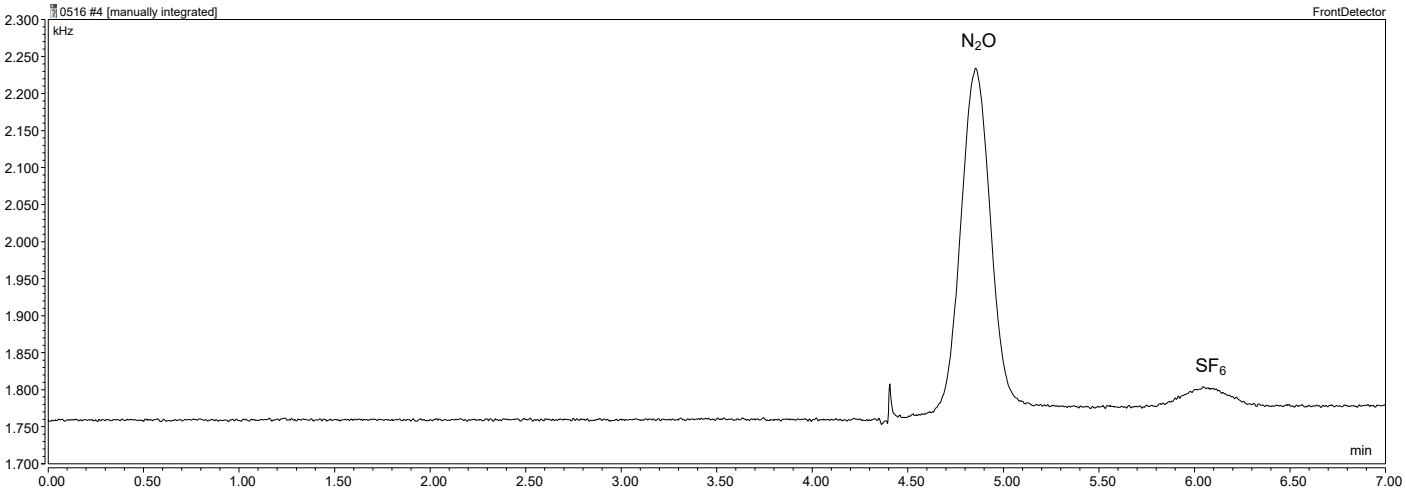

Figure 4. Example of chromatogram for SF_6 at 30 ppt.

Table 1. TRACE 1610 GHG Analyzers.

Cat. No.	Description	Channels	Analytes	Detection limit	Working range
GHA160010011	GHG Analyzer 2-detectors	Ch 1 – Methanizer FID Ch 2 – ECD	Ch 1 – CH_4, low CO_2 Ch 2 – N_2O, SF_6	CH_4 0.1 ppm CO_2 0.2 ppm N_2O 0.1 ppm SF_6 0.3 ppb	Ch 1: up to % Ch 2: N_2O up to 100 ppm SF_6 up to 10 ppm
GHA160010021	GHG Analyzer 3-detectors	Ch 1 – FID Ch 2 – ECD Ch 3 – TCD	Ch 1 – CH_4 Ch 2 – N_2O, SF_6 Ch 3 – High CO_2	CH_4 0.1 ppm N_2O 0.1 ppm SF_6 0.3 ppb CO_2 10 ppm	Ch 1: up to % Ch 2: N_2O up to 100 ppm SF_6 up to 10 ppm Ch 3: up to % level

Conclusions

The TRACE 1610 Greenhouse Gas GC Analyzer delivers a turnkey, reliable, and sensitive solution for CH_4, CO_2, and N_2O analysis. With dual detection or three detection channels, these solutions enable multi-analyte detection in a single injection and the flexibility to handle different sample types (air, soil, water). Whether deployed for long-term environmental monitoring, agricultural studies, or emission mapping, these analyzers provide the precision and simplicity needed for effective greenhouse gas analysis.

Learn more at **thermofisher.com/ghg**