Robust

Highest uptime: > 99%

10 ppb N_2O

Air, water and soil samples

No radioactive source

Greenhouse gas analysers

Greenhouse gas analyser A - ECD / FID

Analyser type A is configured with 2 analytical channels (see figure 1). The first channel separates CH_4 and CO_2 from air, while water is backflushed to vent. CO_2 is converted to methane by a methaniser, for sub ppm detection by FID (see figure 2). An optional TCD is available, placed in series with methaniser-FID, in case of high level of CO_2.

N_2O is measured by ECD (Electron Capture Detector) on the second channel, after separation from Air and CO_2 (figure 3). Water is backflused to vent. SF_6 can be measured as well on this channel, with sub-ppt level detection limit.

Results

All component are analysed with repeatability < 1 % RSD. Figure 4 shows statistical result for N_2O at 330 ppb concentration level in air. The minimum detectability is < 50 ppb for CH_4, < 100 ppb for CO_2 and < 10 ppb for N_2O. SF_6 is analysed in the sub-ppt range.
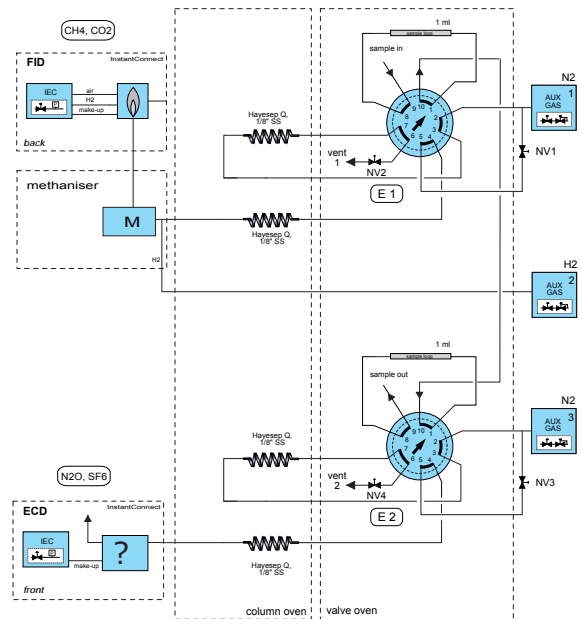

Figure 1. Diagram greenhouse gas analyser using ECD/methaniser-FID

TRACE 1300 GC-C...	N2O
Sample ID	Area
niowag_N2O_067	4713403.00
niowag_N2O_068	4695494.00
niowag_N2O_069	4689598.00
niowag_N2O_070	4779851.00
niowag_N2O_071	4731030.00
niowag_N2O_072	4706694.00
niowag_N2O_073	4780556.00
niowag_N2O_074	4778467.00
niowag_N2O_075	4748329.00
niowag_N2O_076	4784289.00
Min:	4689598.00
Max	4784289.00
Mean:	4740771.10
Std Dev:	38232.97
%RSD:	0.81

Figure 4. Repeatability for N_2O in air at 330 ppb

Figure 2. Channel 1 with methaniser-FID

LOD 10 ppb for N_2O
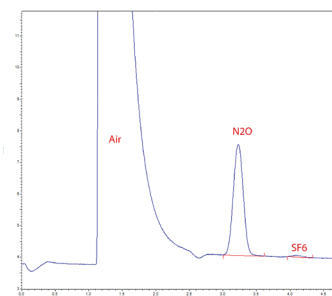
Figure 3. Channel 2 using ECD (330 ppb N_2O)

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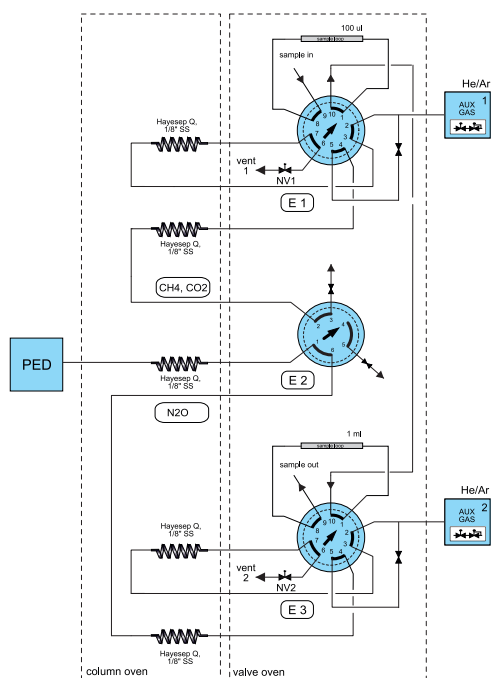
Figure 4. Greenhouse gas analyser with Plasma Emission Detector
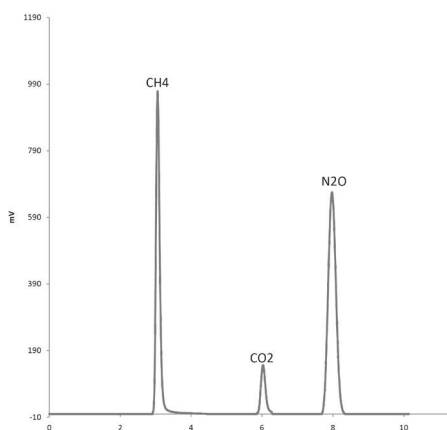
Figure 5. 8 ppm CH_4, 50 ppm CO_2, 10 ppm N_2O in He (PED)

CO$_2$ on Detector Output #1

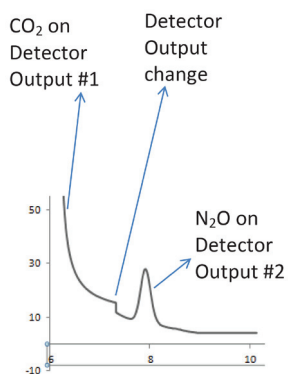Detector Output change

N_2O on Detector Output #2

Figure 6. 30 ppb N_2O in air (PED)

Greenhouse gas analyser B - PED

Analyser type B uses Plasma Emission Detector (PED) for the analysis of greenhouse gases. This detector only requires Argon or Helium (no FID detector gases needed), and avoids the uses of a radioactive source (like ECD). See our application note for HPA (High Purity Analyser) for further explanation. Two analysis channels are combined on a single PED using selection valve E2 (see figure 4), with figure 5 and 6 as a result. Levels of detection are <100 ppb CO_2, <10 ppb CH_4, and < 10 ppb N_2O.

Instruments

Figure 6. Greenhouse gas analyser based on Trace 1310GC with ECD/methaniser-FID or PED

Figure 7. CompactGC[4.0] with PED for greenhouse gas analysis

Figure 8. Greenhouse gas analyser with Head Space sampler for water, soil or organic material samples. Sample trays for up to 1 liter vials are optional available.

Specifications

Application: Analysis of greenhouse gases in air, water, soil or organic material samples

Configuration: Dual channel instrument based on Thermo Trace 1300 GC or CompactGC[4.0] with
(A) Methaniser-FID and ECD detection (TCD optional for high CO_2 levels) (Trace 1300GC)
(B) Plasma Emission Detector (Trace 1300GC or CompactCC[4.0])

Injection: GSV (Gas Sampling Valve) or Head Space (Autosampler using syringe and SSL injector)

Optional: Head Space sampling using GSV (closed loop sampling)

Analytes: CH_4, CO_2, N_2O, SF_6 ; chlorofluorohydrocarbons on request

Analysis Time: Type A (methaniser-FID): 5 minutes
Type B (PED): 10 minutes

Minimum Detectability: Type A: CH_4 < 50 ppb, CO_2 < 100 ppb; N_2O < 10 ppb (Ar/CH_4 as ECD make-up gas); SF_6: sub-ppt range
Type B: CH_4 <10 ppb; CO_2 <100 ppb, N_2O < 10 ppb; SF_6 < 10 ppb

Repeatability: 1% RSD (n=10) or better (N_2O @ 330 ppb; CH_4 @ 2 ppm; CO_2 @ 10 ppm; Gas Sampling Valve)

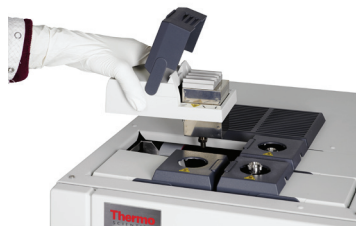**Data systems** Chromeleon, OpenLab, EZChrom

Figure 9. InstantConnect detector technology for high uptime and high flexibility

Figure 10. Diaphragm valve with internal purge for extreme low leak rate (mandatory for ECD and PED)

Figure 11. Plasma Emission Detector