



Process, Quality Control, Online Analysis



PR 2100 & PR 1250 GAS CHROMATOGRAPHS

Sensitivity & Flexibility



PR 2100

> Gas Chromatography & Fast GC

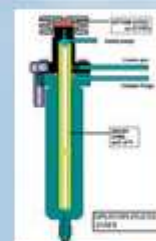
Performance, Flexibility & Sensitivity

- **Compact dual channel system**
- **Front opening oven**
 - Large capacity
 - Front double door for safety
 - Fan circulated air for reliable temperature regulation
- **Modular configuration:** large selection of injectors and detectors
- **Separate power supply for the electronics**
 - Protection against power failure and spikes with a small UPS



Injectors (up to 2 simultaneously)

- **Split-Splitless injector**
 - Constant pressure or programmable pressure gradients
 - Use with capillary column and wide-bore columns
- **Multi-injector** combining all injection modes :
 - Classical, Programmable Temperature Vaporizing (PTV), split or split-splitless
 - Injection volume up to 250 μL
 - Direct thermodesorption of solid samples (temperature up to 650 $^{\circ}\text{C}$)
- **Gas sampling valve for on-line or off-line injection**
- **Electronic Pneumatic Control (EPC)**
 - Up to 10 EPC for gas regulation, or fast GC module monitoring
 - High performance and reproducibility
- **Packed column injector with wide-bore column adapter**



Split-Splitless



Multi-injector

Rapid On-Line Sampler-Injector: ROLSI™

- Liquid or gas samples
- Connection to an autoclave, a chemical reactor or a process line
- Adjustable sampling from 1 μg to a few mg
- Sampling temperature up to 350 $^{\circ}\text{C}$
- Sampling pressure adjustable up to 60 MPa
- Applications: process monitoring, petrochemicals analysis, other.



ROLSI™

Detectors: FID, TCD, FPD, ECD (up to 2 simultaneously)

- **Flame Ionization Detector (FID)**
 - Unique design allowing very low limits of detection
 - Capillary mode without make-up gas
- **Thermal Conductivity Detector (TCD)**
 - Non-destructive detector
 - Dual cell (one reference)
- **Flame Photometric Detector (FPD) – Dual Flame**
 - Selective detection & trace amount analysis of sulfur & phosphorous compounds
 - Dual-flame design to avoid limitations such as quenching effects due to hydrocarbons
- **Electron Capture Detector (ECD)**
 - Selective detector for halogenated compounds
 - Mainly used for chlorinated pesticides analysis
 - Frequency modulation to linearize signal (wider linear dynamic range)

UNIQUE

PR 1250

> online gas analyzer

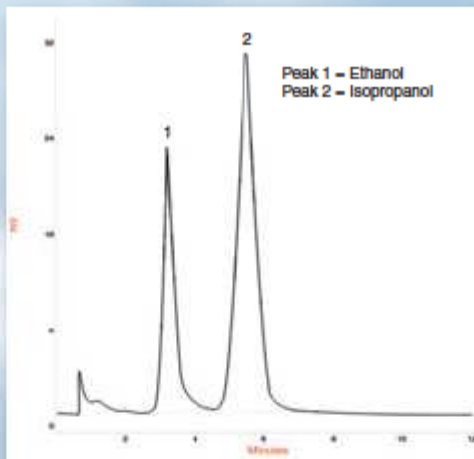
Routine online analysis

- Robust, easy to use
- Thermal Conductivity Detector (TCD) in standard configuration
- PC control (USB link) and user-friendly software
- Valve injection: one or two valves (6 or 10 ports)
- Specific for gas analysis with backflush capabilities and additional valve if needed
- Additional choice of detectors: FID, TCD, FPD

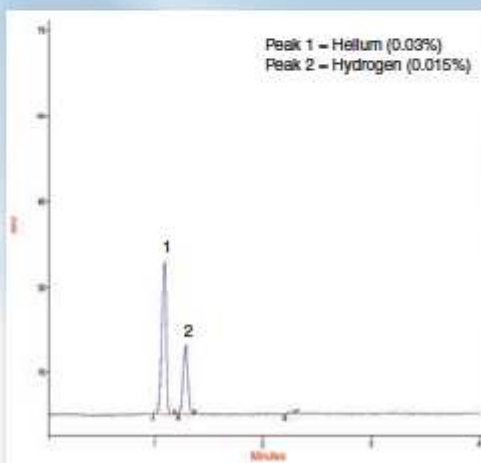


Process control, pilot units, reaction follow-up

Fast analysis and separation of light products with PR1250

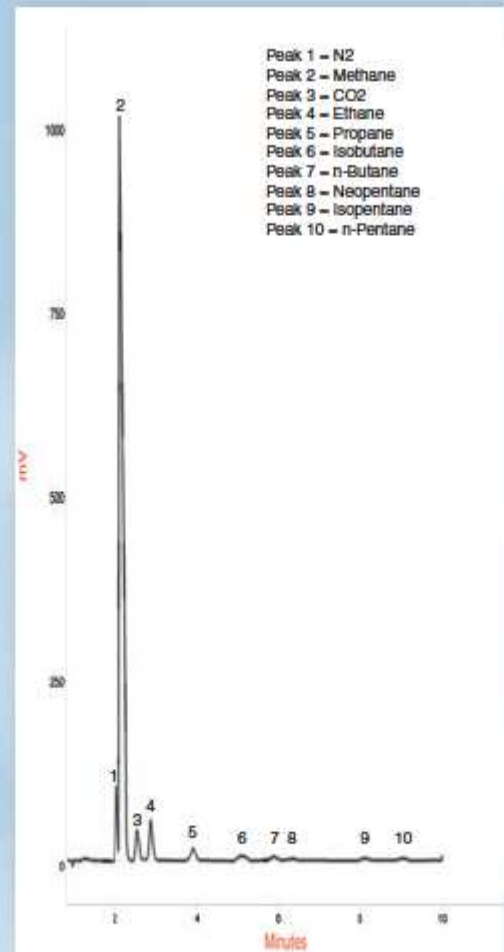


Analysis and separation of He & H2 with PR1250



Analysis of natural gas with PR1250 (based on ISO standard)

Possibility to calculate calorific values and generate reports automatically

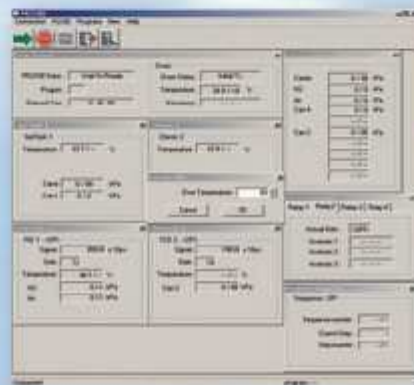


Software & Applications

> Gas Analyzer

User-friendly software

- **Easy to use and intuitive**
 - Wizards, ultra fast browsing, context menus and help, customized environment
- **Automatic or easy manual integration of chromatograms**
- **Reliable identification of peaks**
- **Automated calibration set-up for compounds quantification**
- **Customizable analysis reports**

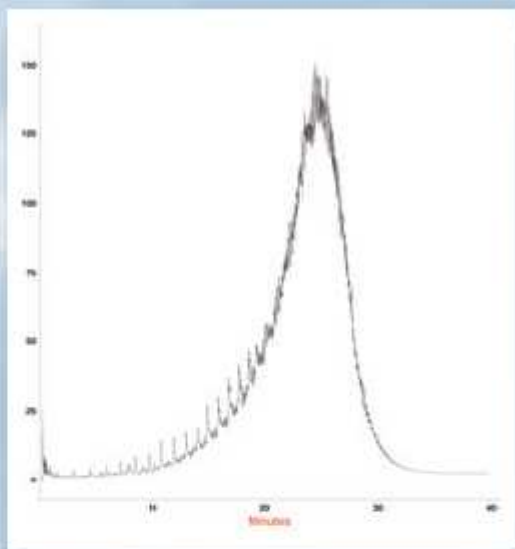


System monitoring interface

Applications

Simulated distillation with GC & multi-injector

Raw oil analysis from light to heavy products
Specific software designed for simulated distillation, with automated report on boiling points



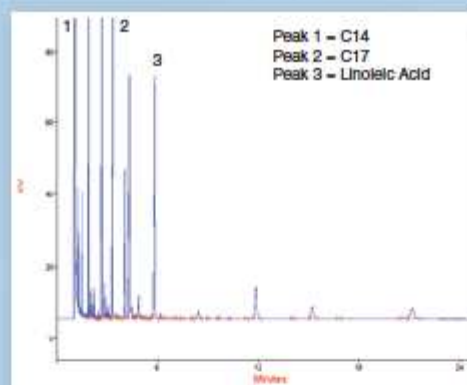
PETDIS REPORT

Boiling Point - Mass Distribution

	% off BP	% off BP	% off BP	% off BP	% off BP	% off BP					
IBP	216	17	472	34	455	51	473	68	491	85	509
1	254	18	415	35	452	52	474	69	492	86	510
2	296	19	417	36	453	53	475	70	493	87	512
3	330	20	420	37	456	54	476	71	494	88	513
4	337	21	423	38	456	55	477	72	495	89	515
5	349	22	425	39	458	56	478	73	496	90	517
6	358	23	428	40	459	57	479	74	497	91	519
7	367	24	430	41	460	58	480	75	498	92	521
8	373	25	432	42	462	59	481	76	499	93	523
9	379	26	435	43	463	60	482	77	500	94	524
10	384	27	437	44	464	61	483	78	501	95	526
11	389	28	439	45	465	62	484	79	502	96	532
12	393	29	441	46	467	63	485	80	504	97	538
13	397	30	443	47	468	64	486	81	505	98	551
14	401	31	445	48	469	65	487	82	506	99	569
15	405	32	447	49	470	66	488	83	507	FSP	614
16	408	33	449	50	471	67	490	84	508		

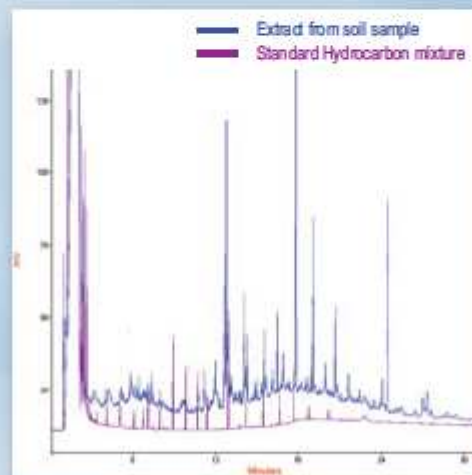
Biodiesel: FAME Analysis

based on standard methods
using the PR2100 - Split/Splitless - FID



Analysis of contaminants in soil

80µL Injection of hydrocarbon extract using the PR2100



Application Range

> R&D, Process Monitoring, Quality Control, Online analysis



Reference customers

Major companies in Food & Beverages, Petrochemical, Pharmaceutical, Research Institutions, Regulatory Agencies & Laboratories

Gas Chromatographs

> Technical Specifications

Chromatograph PR 2100

PR 2100 oven

- ▶ Up to 6 ramps of temperature program (0.1°C to 120°C/min) and 7 isothermal levels
- ▶ Oven temperature: 5°C above ambient to 450°C (-100°C to 450°C with optional cryogenic system)
- ▶ Cool down from 450°C to 50°C in less than 7 minutes
- ▶ 4 independent heated zones for individual control of injectors, detectors or auxiliary zones
- ▶ Keypad with fluorescent display (4 x 20 characters, 32 keys) – 6 programmable memories
- ▶ External communication: RS 232, 4 external events control, 2 logic inputs & 2 logic outputs
- ▶ Column oven size : 29 x 28 x 17 cm (13.8 L)
- ▶ Consumption: 2700 VA max.
- ▶ Overall dimensions: 45 x 51.5 x 48 cm - Weight: 30 kg

Pneumatic Control

- ▶ 1 or 2 modules with 5 Electronic Pressure Controllers each (carrier gas, split adjustment, combustion gases for flame detectors)
- ▶ 2 pressure ranges: 0-400 or 0-100 kPa (0-900 for fast GC option)
- ▶ Adjustment in increments of 1 kPa
- ▶ Direct flow adjustment on the split line
- ▶ Gas-saving features

Detectors

Flame Ionisation Detector (FID)

- ▶ Vertical assembly - Gas tight system
- ▶ Operating temp.: ambient to 450 °C
- ▶ Polarization: ± 250V
- ▶ Sensitivity: 10⁻⁹ to 10⁻¹² A/mV
- ▶ Detection limit: 10⁻¹² g/s
- ▶ Dynamic linearity > 10⁸
- ▶ Make-up gas not required

Thermal Conductivity Detector (TCD)

- ▶ Choice of 600 µl or 140 µl cell volume
- ▶ 4 WX filaments (W2X, AuW, Ni, Pt-Ir)
- ▶ Operating temperature up to 360°C
- ▶ Detection limit: 10⁻⁹ g/ml of nC₁₀

Flame Photometric Detector (FPD)

- ▶ Double flame for selective detection of sulfur and phosphorous compounds
- ▶ High voltage (photomultiplier, monitor supply)
- ▶ Sensitivity: 10⁻⁹ to 10⁻¹² A/mV
- ▶ Dynamic range: 10⁷P
- ▶ Logarithmic program for sulfur calibration

Electron Capture Detector (ECD)

- ▶ Nickel 63 source in sealed cylindrical chamber
- ▶ Central electrode
- ▶ Frequency modulation to linearize signal
- ▶ Dynamic linearity: 5.10⁴
- ▶ Detection limit: > 4.10⁻¹⁵ g/s of lindane



Chromatograph PR 1250

Isothermal oven

- ▶ Temp. range: ambient to 180°C
- ▶ Temp. stability: > 0.1 °C
- ▶ Internal dimensions: 13 x 11 x 10 cm

Thermal Conductivity Detector (TCD WX7)

- ▶ Cylinder : L 58 mm, diam. 22 mm
- ▶ 4 filaments Re-W bridge mounted
- ▶ Cell volume: 70 µL x 2
- ▶ Max current: 180 mA (He at 100°C)

Valve for injection, backflush or column isolation

- ▶ Electric motor 24V
- ▶ Teflon Rotor
- ▶ 1 or 2 rotary valves: 6 / 10-port, 2 positions
- ▶ Valve dimensions: 66 x 46 x 110 mm

Electronic Pressure Regulation (up to 5 EPC)

- ▶ PID regulation
- ▶ Pressure range: 0-400 kPa
- ▶ Increment: 1 kPa
- ▶ Precision: 0.1 kPa

Options : other detectors (FID, FPD, ...)

General

- ▶ Supplies: 220/110V or 24V
- ▶ Consumption : 200 W
- ▶ L x l x H: 38 x 29 x 22 cm
- ▶ Weight: 9 kg



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