

Clarus 400

Gas Chromatograph

The PerkinElmer® Clarus® 400 Gas Chromatograph (GC) provides the proven dependable performance and analytical capabilities of the Clarus GC family. It is available with manual pneumatic control, single-channel or dual-channel configurations and optional integral liquid autosampler for diverse application needs.

Oven

The Clarus 400 GC oven provides easy access to columns. The oven gives excellent temperature control for maximum productivity.

Volume:	10,600 cm	
Temperature range:	10 °C above ambient to 450 °C	
Column overheat protect:	User settable up to 450 °C	
Temperature program:	3 ramp, 4 plateaus	
	Minimum Range	Increment
Oven temperature:	10 °C above ambient to 450 °C	1 °C
Initial time:	0 to 999 min	0.1 min
Rate:	0.1 to 45 °C/min	0.1 °C
Plateau time:	0 to 999 min	0.1 min
Cool-down times:	250 °C to 50 °C:	4.8 min
	200 °C to 50 °C:	3.8 min

Carrier gas pneumatics

- Carrier gas pneumatics are included with the Clarus 400 GC injectors
- Manual pneumatics are available for all injectors
- Two carrier zones
- Split-vent pneumatics are included with the Clarus 400 GC split/splitless capillary injector

Detector pneumatics

- Manual pneumatics are available for all detectors

Autosampler

The Clarus 400 GC offers an optional, built-in syringe autosampler for maximum sampling capabilities. All control is accomplished through the keypad or by a data system such as TotalChrom® CDS.

Injection speed:	Normal, fast, slow
Program mode:	Two methods may be programmed
Number of sample positions:	82, plus one priority
Vial size:	2-mL (0.25 mL with insert) crimp-top caps 2-mL screw-top caps
Number of waste and wash vials:	4 waste and 4 wash
Waste and wash vial size:	4 mL
Syringe size:	0.5 µL, 5.0 µL or 50.0 µL
Sampling volume:	0.1 µL to 0.5 µL from the 0.5-µL syringe in 0.1-µL increments 0.5 µL to 5.0 µL from the 5.0-µL syringe in 0.5-µL increments 5.0 µL to 50.0 µL from the 50.0-µL syringe in 5.0-µL increments

Viscosity settings:	0-15
Max number of injections/vial:	15
Max number of solvent postwashes:	15
Max number of sample pumps:	15
Max number of sample prewashes:	15
Min sample volume required:	5 μ L when used with the 0.25-mL vial insert; 350 μ L when used with the 2-mL vial
Reproducibility:	< 0.5% RSD for packed columns 1% C ₉ in C ₇ , 1 μ L injected

Injectors

The Clarus 400 GC supports split/splitless capillary and packed column injectors that provide accuracy and precision to all of your sampling applications. Up to two injectors may be installed and operated simultaneously with independent temperature control. Every injector is available with manual pneumatics.

Split/splitless capillary injector

- Split ratio easily adjustable for a wide range of analysis conditions
- Charcoal trap in split vent prevents contamination of split valve and lab air
- Two choices of liner: 2-mm and 4-mm internal diameter
- 50 °C to 450 °C in 1 °C increments
- 1/16-inch fitting
- Manual pneumatics – pressure regulator (0-60 psig) for digital display of column-head pressure
- Automatic control of split vent solenoid valve

Packed column injector

- Removable glass liner for trapping nonvolatile residues
- Adapter for on-column injection to wide-bore capillary columns
- 50 °C to 450 °C in 1 °C increments
- 1/8-inch fitting
- 1/4-inch column adapter available
- Manual pneumatics – choice of flow controller with head-pressure gauge, or flow controller with head-pressure gauge and digital display of flow

Detectors

A choice of four detectors, optimized for sensitivity and selectivity, is available for use with the Clarus 400 GC. All built-in detectors include an automated background-compensation feature that corrects for column bleed. Whether you choose the Flame Ionization Detector, the Thermal Conductivity Detector, the Electron Capture Detector or the Nitrogen Phosphorus Detector, all conform to the highest industry standards for reliability and performance.

Flame Ionization Detector (FID)

- Wide linear dynamic range
- No makeup gas required due to efficient sweeping of column effluent by hydrogen combustion gas
- Air flow designed to minimize contamination and residue buildup
- 1/8-inch fittings
- Manual pneumatics – pressure regulator for hydrogen, needle valve for air
- “Flame out” warning and ready interlock

Operating temperature: 100 °C to 450 °C in 1 °C increments

Sensitivity: > 0.015 coulombs/g C

Min detectable quantity: < 3 • 10⁻¹² g C/sec nonane at a S/N = 2 to 1

Linearity: > 10⁶

Signal filtration: 50, 200, 800 msec

Input range: 1, 20

Makeup gas: Not required

Electron Capture Detector (ECD)

- High sensitivity
- Excellent selectivity
- High operating temperature for maximum stability
- 1/8-inch fittings
- Manual pneumatics – needle valve for makeup gas

Source:	15 mCi ⁶³ Ni
Temperature protect:	470 °C by software
Carrier gas:	Either Ar/CH ₄ or N ₂
Operating temperature:	100 °C to 450 °C in 1 °C increments
Min detectable quantity:	< 0.05 pg perchloroethylene with argon/methane or nitrogen
Linearity:	> 10 ⁴
Signal filtration:	200, 800 msec
Makeup gas:	Standard

Thermal Conductivity Detector (TCD)

- Capillary-column compatible
- Proven constant current design
- Software protection to prevent filament burnout
- Ideal for series operation
- 1/8-inch fittings
- Manual pneumatics – reference gas flow controller

Operating temperature:	100 °C to 350 °C in 1 °C increments
Sensitivity:	9 μV/ppm nonane at 160 mA at the bridge with a detector temperature of 100 °C
Min detectable quantity:	Typically < 1 ppm nonane
Linearity:	> 10 ⁵

Power supply:	Constant current with four selectable settings: 1: ±40 mA 2: ±80 mA 3: ±120 mA 4: ±160 mA
Signal filtration:	50, 200, 800 msec
Filament protection:	Self-limiting and resetting after transient overloads in either channel
Makeup gas:	Not required for 0.32- to 0.53-mm i.d. columns with flows ≥ 5 mL/min Required for 0.25-mm or smaller i.d. columns

Nitrogen Phosphorus Detector (NPD)

- Modular design
- Change bead in less than one minute
- Pre-aligned bead
- Rapid conditioning – up and running in less than two hours
- 1/8-inch fittings
- Manual pneumatics – pressure regulator for hydrogen, needle valve for air

Operating temperature:	100 °C to 450 °C in 1 °C increments
Min detectable quantity:	5 • 10 ⁻¹³ g N/sec 2,4-dimethylaniline 5 • 10 ⁻¹⁴ g P/sec tributylphosphate
Linearity:	> 10 ⁴
Signal filtration:	50, 200, 800 msec
Selectivity:	50,000:1 (N/C) 10:1 (P/N)
Input range:	1, 20
Makeup gas:	Not required

Keypad user interface

The Clarus 400 GC features a keypad user interface available in a choice of five languages:

- English
- Chinese
- Russian
- Brazilian Portuguese
- Spanish

The display of the Clarus 400 GC user interface is a two-line, 20-character vacuum fluorescent display in English.

Other Clarus 400 GC features

- Recorder attenuation range from 1 to 65,536 in binary steps
- Long-term battery backup of GC methods, autosampler programs, flow and temperature-calibration data
- Full instrument control via external computer
- Baseline compensation
- Auxiliary heated zone for accessory devices

Physical details

Power requirements:	120 V \pm 10%, 50/60 Hz \pm 1%, 2.4 kVA*
	220 V \pm 10%, 50/60 Hz \pm 1%, 2.2 kVA
	230 V \pm 10%, 50/60 Hz \pm 1%, 2.3 kVA
	* On an independent 20-amp line
Ambient temperature:	10 °C to 32 °C
Ambient humidity:	20% to 80% relative humidity without condensation
Altitude:	Operating: sea level to 2,000 m Non-operating: sea level to 12,000 m
Mean BTU output:	3400
Weight:	Clarus 400 GC without Autosampler: 49 kg (108 lb) Clarus 400 GC with Autosampler: 54 kg (118 lb)
Dimensions (HxWxD):	Clarus 400 GC without Autosampler: 54 x 67 x 72 cm (21 x 26 x 28 in) Clarus 400 GC with Autosampler: 80 x 67 x 72 cm (32 x 26 x 28 in)

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