

Gas Chromatograph

# Nexis GC-2030 Specifications



# Chromatography System

Nexis GC-2030 opens up an entirely new chapter in Shimadzu's long history with gas chromatographs. It showcases some of the best specifications on the market, while at the same time offers completely new and creative ways to use your gas chromatograph.

## The GC you can rely on

The complete redesign of the column oven, injection port, introduction of the 3rd generation advanced flow controller and addition of many other convenient and safety features make Nexis GC-2030 the most reliable gas chromatograph from Shimadzu yet.

- Retention time repeatability: < 0.0008 min\*
- Peak area repeatability: < 1 % RSD\*
- High quality deactivated liner, ultra low bleed septa and ultra clean ferrules guarantee you get the best results.
- Integrated leak check function allows you to easily check for leaks.
- Fully integrated alerts and counters for hardware and consumables notify you when to perform maintenance, avoiding costly downtime and loss of precious samples.
- Highly precise oven control eliminates any temperature irregularity, making sure you get reproducible and accurate results.
- Oven door sensor automatically shuts off all heating elements when the door is opened or not properly closed.
- Reliable error and warning system notifies you of any irregularity in the system.
- An optional hydrogen sensor is available for applications with hydrogen carrier gas. The sensor detects potential leaks and stops the system immediately.
- Every Nexis GC-2030 is strictly evaluated and tested in accordance with Shimadzu's highest level of quality. In addition, further performance verification is carried out when the unit is delivered and installed.

## Truly capable and versatile

There is a whole lot you can do with Nexis GC-2030. It is designed to house a multitude of injection units and detectors. This allows you to configure your GC exactly the way you want it. It supports a wide variety of samplers, multiple valve systems and even support for third party accessories.

- Flow control modes: constant pressure, constant column flow, constant linear velocity.
- Max simultaneous flow line installations: 3\*\*
- Max simultaneous injection unit installations: 3
- Max simultaneous detector unit installations: 4
- Max number of flow controllers: 6 (choose from a combination of 3 AFCs and/or 4 APCs)
- Valve systems: support for up to 8 valves
- Supported injection units:
  - Split/Splitless Injection Unit (SPL)
  - Direct Injection Unit (WBI)
  - On-column Injection Unit (OCI)
  - Programmable Temperature Vaporization Injection Unit (PTV)
- Supported detectors:
  - Flame Ionization Detector (FID)
  - Flame Photometric Detector (FPD)
  - Barrier Discharge Ionization Detector (BID)
  - Electron Capture Detector (ECD)
  - Thermal Conductivity Detector (TCD)
  - Flame Thermionic Detector (FTD/NPD)
- Samplers and accessories:
  - Automatic liquid injector (AOC-20i Plus)
  - Automatic liquid sampler (AOC-20s Plus)
  - Dual tower injection system
  - Multifunctional autosampler (AOC-6000) (liquid injection, headspace injection, SPME)
  - Static headspace sampler (HS-10)
  - High-end static headspace sampler (HS-20)
  - High-end trap type headspace sampler (HS-20 Trap)

\* Auto Injector AOC-20i (Plus); FID as the detector; tetradecane (2.5 ng to the column) split injection. Results may vary depending on the sample and the analytical conditions.

\*\* Up to 3 flow lines can be installed on the GC. Software control allows for up to 2 flow lines to be monitored simultaneously.

## Simply Seamless

Nexis GC-2030 builds on the already familiar features of the GC-2010 Plus but at the same time makes these even more accessible. The entire analytical workflow was reimagined during development. The result is a GC that is highly efficient and truly intuitive. Many areas of the GC have been redesigned to make operation more seamless. Nexis GC-2030 takes care of most of the unnecessary impediments so that you can focus on what matters most, the chromatography.

### More ways to connect

- Nexis GC-2030 supports both Ethernet (LAN) and USB connections

### Navigate with touch

- Color touch screen (transmissive type)
- Screen size: 7 in
- Dot format: 480 × 800
- Luminance: 270 (Cd/m<sup>2</sup>)

### Convenient tools now even more accessible

- With the introduction of the new touch screen, drastic improvements have been made to the user interface. Frequently used controls are made even more accessible. New functions have also been added to aid you during periodic maintenance.
- The one touch injection maintenance button prepares your GC for injection unit maintenance. Press the button again to continue where you left off.
- Usage counters for liners, septa and syringe injections notify you to replace these consumables when a certain threshold is met.
- Sleep/Wake Function: put your GC to sleep when not in use to save valuable energy and wake the system to restore the previous analytical settings. Extensive customization of the sleep and wake settings can be done directly using the touch screen interface.
- The diagnostics function easily notifies you if any irregularity occurs. It also gives contextual information as to the probable cause of the issue.

### ClickTek, it changes everything

The new ClickTek Nut and ClickTek Connector make their debut on Nexis GC-2030. ClickTek technology allows for leak free connections to be made completely tool-free. Over-tightening and under-tightening is a thing of the past. The innovative design allows for almost no variability in sealing torque because there are only two positions available; it is either open or closed.

#### ClickTek Nut

- Two-position locking mechanism guarantees leak-free sealing.
- Innovative locking mechanism prevents over-tightening.
- Supported injection units: Split/Splitless, WBI
- Max operating temperature: 450 °C
- Max operating pressure: 1035 kPa

#### ClickTek Connector with Ferrule

- Two-position locking mechanism guarantees quick and easy leak-free column-to-injection unit and/or column-to-detector connections.
- Innovative locking mechanism prevents over-tightening.
- Innovative ClickTek ferrule locking mechanism, allows the connector to be removed without compromising the ferrule, so you can store and readily use the same column and ferrule at a later time.
- Max operating temperature: 350 °C
- Compatible with conventional capillary columns
- ClickTek Connector and ferrule each sold separately.

#### A Brighter Oven

- Some types of columns are susceptible to damage when cooled very rapidly. Nexis GC-2030 makes it extremely easy to protect your columns. Choose from three preset oven cooling rates: fast, mid, slow or customize your own.
- The oven light illuminates the entire oven and can be safely used up to 450 °C. (option)

# Advanced Flow Controller (AFC-2030)

## Truly Advanced

The all new AFC-2030 is smaller and better in every single way. It features a completely new design, which has better stability and cleaner output gas. The new tool-free split line filter makes it easy for users to monitor and to replace the filter.



## Advanced Flow Controller (AFC) — Carrier

### Automatically compensates for variations in atmospheric pressure and temperature

- Pressure units : psi, kPa, bar
- Pressure range : 0 to 1035 kPa (0 to 150 psi)
- Pressure setpoint resolution : 0.1 kPa (0.001 psi)
- Pressure program ramps : 7
- Pressure sensor accuracy :  $< \pm 2.0$  % (full scale)
- Pressure sensor repeatability :  $< \pm 0.34$  kPa
- Temperature coefficient :  $< \pm 0.068$  kPa per °C
- Pressure drift :  $< \pm 0.68$  kPa/6 months

### Flow Control Modes: Constant Pressure, Constant Column Flow, Constant Linear Velocity

- Supported carrier gas types : He, N<sub>2</sub>, H<sub>2</sub>, Ar
- Carrier gas flow range :
  - He : 0 to 1300 mL/min
  - N<sub>2</sub> : 0 to 600 mL/min
  - H<sub>2</sub> : 0 to 1300 mL/min
- Flow setpoint resolution : 0.1 mL/min
- Flow ramps : 7
- Flow sensor accuracy :  $< \pm 5$  % (carrier gas dependent)
- Flow sensor repeatability :  $< \pm 0.35$  % of setpoint
- Temperature coefficient :  $< \pm 0.2$  % per °C

## Advanced Pressure Controller (APC) — Detector Gas

- Flow accuracy :  $< \pm 3$  mL/min or 7% of setpoint
- Flow repeatability :  $< \pm 0.35$  % of setpoint
- Temperature coefficient :  $< \pm 0.2$  % per °C

## Auxiliary Pressure Controller (AUX-APC)

Available in single channel and three-channel models

# Advanced Flow Technology (AFT)

## Heart-Cut System

The Heart-Cut System allows you to perform complicated separation of analytes by using two different columns in the same oven. Shimadzu's multiple-Deans switching technology reduces the likelihood of fluctuations in the retention times of eluted components, even if switching is performed several times in one run.

## Backflush System

The Backflush System reverses the carrier gas flow after the target compounds are detected, discharging residual components in the column through the injection unit split vent, shortening analysis times and increasing productivity. As the high boiling point components are discharged efficiently, retention time shifts, column contamination and column deterioration are reduced.

## Detector Splitting System

Compounds eluting from an analytical column are split to multiple detectors to obtain multiple chromatograms simultaneously. While offering abundant information in a single analysis, this system saves cost and reduces analysis times.

## Detector Switching System

The detector switching system allows you to introduce samples into either of two detectors installed on your GC. This decreases the frequency of necessary column changes as well as enables you to obtain more information from one system.

# Injection Ports

## Split/Splitless Injection Unit (SPL)

### Click, Set, Go

The new SPL with ClickTek presents a new advancement in injection port technology. Never has an injection port been so reliable, yet so easy to use.



Sealing mechanism	: ClickTek Nut
Injection mode	: Split; Splitless; High pressure injection
Split ratio	: Up to 9999.9:1
Pressure range	: 0 to 1035 kPa
Maximum operating temperature	: 450 °C

Supports capillary columns from 50 µm to 530 µm I.D. / Electronic septum purge comes built-in / Gas saver mode reduces gas consumption

	WBI Direct Injection Unit	OCI On-Column Injection Unit	PTV Programmable Temperature Vaporizer Injection Unit
Supported capillary columns	50 µm to 530 µm I.D.	50 µm to 530 µm I.D.*	50 µm to 530 µm I.D.
Electronic septum purge	Built-in	Built-in	Built-in
Gas saver mode	N/A	N/A	Available
Sealing mechanism	ClickTek Nut	Standard Nut	Standard Nut
Injection mode	Direct	Direct	Split/Splitless
Split ratio	N/A	N/A	Up to 9999.9:1
Pressure range	0 to 1035 kPa	0 to 1035 kPa	0 to 1035 kPa
Maximum operating temperature	450 °C	450 °C	450 °C
Programmable temperature ramps	N/A	7	7
Heating rate	N/A	50 °C to 250 °C: 250 °C/min 250 °C to 350 °C: 200 °C/min 350 °C to 450 °C: 150 °C/min	50 °C to 250 °C: 250 °C/min 250 °C to 350 °C: 200 °C/min 350 °C to 450 °C: 150 °C/min

\* For capillary columns smaller than 530 µm I.D. an optional easy OCI insert is required.

## Column Oven

Dimensions : (W) 280 × (H) 280 × (D) 175 mm

Oven volume : 13.7 L

Fits up to two 100 m × 0.530 mm I.D. capillary columns

Ambient rejection : < 0.01 °C per 1 °C

Max run time : 9999.99 min

Temperature range : (ambient +2 °C) to 450 °C

Cryogenic cooling range  
(with CO<sub>2</sub>) : -50 °C to 450 °C

Temperature Setpoint  
Resolution : 0.1 °C

Temperature accuracy : set value (K) ± 1% (calibration at 0.01 °C)

Temperature deviation : < 2 °C (on 200 mm dia. circumference  
30 mm from rear)

Programmable temperature ramps : 32 ramps

Negative ramps : allowed

Settable time for each step : 9999.99 min

Programmed rate settings range : -250 to 250 °C/min

Oven cool down time : 450 °C to 50 °C in 3.4 min

### Standard Oven

Range	Rate
50 °C to 200 °C	40 °C/min
200 °C to 250 °C	25 °C/min
250 °C to 380 °C	15 °C/min
380 °C to 450 °C	7 °C/min

### High Power Oven

Range	Rate
50 °C to 70 °C	120 °C/min
70 °C to 115 °C	95 °C/min
115 °C to 175 °C	65 °C/min
175 °C to 250 °C	55 °C/min
250 °C to 350 °C	45 °C/min
350 °C to 450 °C	35 °C/min

# Detectors

## Flame Ionization Detector (FID)

—our best FID yet—

The FID shows good response for all organic compounds. It is characterized by high robustness and a wide linear dynamic range.

- Minimum Detectable Quantity (MDQ) : < 1.2 pg C/s (dodecane)
- Linear dynamic range :  $1 \times 10^7$  ( $\pm 10\%$ )

### Flow rate settings:

Makeup	: 0 to 100 mL/min
H <sub>2</sub>	: 0 to 100 mL/min
Air	: 0 to 1000 mL/min

Max acquisition rate : 2 ms (500 Hz)

Max operating temperature : 450 °C

Automatic flame out detection and reignition



## Flame Photometric Detector (FPD)

—even more sensitive—

The new FPD improves on the core capabilities of our previous FPD. Sensitivities for both phosphorus (P) and sulfur (S) based compounds have been improved.

- Minimum Detectable Quantity (MDQ):
  - Tributyl phosphate (P) : < 45.0 fg P/s (tributyl phosphate)
  - Dodecanethiol (S) : < 2.0 pg S/s (dodecanethiol)
- Easy switching of photometric filters : P, S, Sn

### Dynamic range:

Tributyl phosphate (P)	: $1 \times 10^4$
Dodecanethiol (S)	: $1 \times 10^3$

### Flow rate settings:

H <sub>2</sub>	: 0 to 250 mL/min
Air	: 0 to 1000 mL/min

Max acquisition rate : 2 ms (500 Hz)

Max operating temperature : 450 °C



## Barrier Discharge Ionization Detector (BID)

### Plasma technology is the future of GC

A universal and highly sensitive detector for trace level analysis. The BID is commonly used for the analysis of highly dilute organic compounds and permanent gases.

Minimum Detectable Quantity (MDQ)	: < 0.8 pg C/s (dodecane)		
Dynamic range	: $1 \times 10^5$		
Max operating temperature	: 350 °C	<b>Flow rate settings:</b>	
Max acquisition rate	: 2 ms (500 Hz)	Discharge gas (He)	: 0 to 100 mL/min

## Electron Capture Detector (ECD)

### Unparalleled robustness & performance

The detector of choice for trace level analysis of electrophilic compounds such as halogenated, organometallic and nitro compounds.

Minimum Detectable Quantity (MDQ)	: < 4.0 fg/s (lindane)		
Dynamic range	: $1 \times 10^5$		
Max operating temperature	: 400 °C	<b>Flow rate settings:</b>	
Max acquisition rate	: 2 ms (500 Hz)	ECD gas (N <sub>2</sub> , Ar)	: 0 to 200 mL/min

## Thermal Conductivity Detector (TCD)

### Universal detection

A detector that senses changes in the thermal conductivity of the eluting sample. It can detect all compounds aside from the carrier gas.

Sensitivity	: > 20000 mV × mL/mg (decane)		
Dynamic range	: $1 \times 10^5$		
Max operating temperature	: 400 °C	<b>Flow rate settings:</b>	
Max acquisition rate	: 2 ms (500 Hz)	Makeup (He, H <sub>2</sub> , N <sub>2</sub> , Ar)	: 0 to 20 mL/min

## Flame Thermionic Detector (FTD)

### Selective for P and N

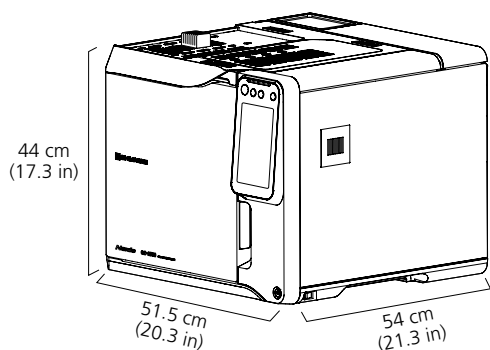
A detector that shows a selective response for compounds containing nitrogen or phosphorus.

Minimum Detectable Quantity (MDQ)	: < 0.1 pg N/s (azobenzene)		
Minimum Detectable Quantity (MDQ)	: < 0.01 pg P/s (malathion)		
Dynamic range (N)	: $1 \times 10^3$	<b>Flow rate settings:</b>	
Dynamic range (P)	: $1 \times 10^3$	Makeup (He, N <sub>2</sub> , Ar)	: 0 to 100 mL/min
Max operating temperature	: 450 °C	H <sub>2</sub>	: 0 to 30 mL/min
Max acquisition rate	: 2 ms (500 Hz)	Air	: 0 to 1000 mL/min

# System

## Size and Weight

Height	: 44 cm (17.3 in)
Width	: 51.5 cm (20.3 in)
Depth	: 54 cm (21.3 in)
Weight	: 43.5 kg (96 lbs)



## Electrical and Operating Requirements

Line voltage	: 100 V AC $\pm$ 10% (100 V Model) 115 V AC $\pm$ 10% (115 V Model) 230 V AC $\pm$ 10% (230 V Model)
Power consumption	: 1800 VA (100 V / 115 V Model) 2600 VA (230 V Model)
Frequency	: 50/60 Hz
Operating temperature	: 5 °C to 40 °C
Operating humidity	: 5% to 90%
Max operating altitude	: 2000 m
Storage extremes	: -10 °C to 40 °C (10% to 80% humidity)

## Other Specifications

PRG-2030 option: (additional board for EVENT output)
External DC 24 V $\times$ 16 ch (max 100 mA) or DC 24 V $\times$ 8 ch (max 100 mA) + contact closure $\times$ 2ch (max DC 30 V, 1 A)
PRG-Box option: (additional box for AC control)
External AC (100/120 V or 220–240 V) output $\times$ 8 ch (total max 15 A/10 A)

## Data Communications

Ethernet (LAN):
10BASE-T/100BASE-TX (IEEE 802.3)
USB 2.0 (full speed)
Analog output:
2 ch (1 ch as standard, additional 1 ch option)
Linear/Wide (for Chromatopac), range switching function
Remote I/O:
2 external input (programmable: START/STOP/WAIT/PREP RUN) as standard
4 external output (programmable: READY/RUN/START/ERROR) as standard

## Certifications

Restriction of hazardous substances directive compliant. (RoHS directive 2011/65/EU)
Conforms to EuroNorm (EN) 61010-1 safety standard safety requirements. (low voltage directive 2014/35/EU)
Conforms to EuroNorm (EN) 61326-1 Class A. (EMC directive 2014/30/EU)



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