The Series 590 DID GC contains a single, GOW-MAC® patented* discharge ionization detector (DID) which is non-radioactive, universal, and concentration dependent. The detector uses an electrical discharge in helium to generate high energy UV photons and metastable helium which ionizes all compounds except helium. The DID exhibits a dynamic range of $< 5 \text{ ppb}$ to $< 1\%$ by volume.

The most significant feature of the DID is the utilization of an electrical discharge as the radiation source, not a radioactive source. Series 590 DID Gas Chromatographs in operation have displayed a stability and reliability not generally attributed to ppb detection. Performance is equal to or better than detectors with conventional radioactive sources.

The extremely sensitive DID is placed in a helium purged housing to eliminate possible system contamination. Background noise and detector limits are dependent upon the use of an ultrapure helium carrier gas. The entire installation must also be clean and leak-tight. The system is designed to prevent contamination by utilizing bellows type metering valves and by locating gas sample valves in a helium purged housing.

Sample gas “memory” within the system has been eliminated through the use of sample isolation valves. This configuration has proven to be reliable with faster and easier start-up.

*U.S. Pat. No. 4,975,648
Flow System

Two gases are required to operate the Series 590 DID GC. Ultra-high purity helium is used for both the carrier gas and the discharge gas. Zero grade helium is used for purging the detector and valve housing, and to actuate all valves. Bellows metering valves are used to control the carrier gas flow throughout the system. The zero grade helium flow is controlled by independent needle valves. All critical gas connections possess 1/4” VCR® fittings.

The GOW-MAC® Series 590 GC with Discharge Ignition Detector is a complete, dedicated gas chromatographic system requiring only data handling and a few accessories.

Temperature Controls

Temperature controls are solid state proportioning type with direct dial setting. Temperature readout for the column oven and detector is displayed on a digital LED meter. Selector switches are used to set and read the desired temperature.

Data Handling Capabilities

Software

GOW-MAC offers the powerful Chrom Perfect® chromatography software. A variety of interactive PC chromatography data software packages are available. Each package differs in the degree of remote instrument control and requested comprehensive data handling and reporting capability. A chromatographer can create methods, design custom reports, view calibration curves, acquire and process data, and create and run batch sequences from a single window. Chrom Perfect requires the use of at least a 486 PC with Windows® 3.1.

Specifications

Columns

<table>
<thead>
<tr>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10”W x 4 1/2”D x 7 1/2”H</td>
</tr>
<tr>
<td>10”W x 4 1/2”D x 7 1/2”H</td>
</tr>
<tr>
<td>(25.44 cm x 11.43 cm x 19.05 cm)</td>
</tr>
<tr>
<td>(25.44 cm x 11.43 cm x 19.05 cm)</td>
</tr>
</tbody>
</table>

Temperature Range

Ambient to 300°C

Temperature Readout

3 1/2 digit LED digital display meter

Temperature Control

Solid state, time proportioning, RTD sensors, direct reading, ambient to 300°C

Oven Capacity

Can accommodate up to four (4) 20’ to 30’ 1/8” columns

Detector

Type

Discharge Ignition

Design

low volume

Sensitivity

<10 ppb CH₄

Carrier Gas

Ultra-high purity helium

Discharge Gas

Ultra-high purity helium

Temperature Range

Ambient to 120°C

Linearity

>10%

Gas Flow

Valves for separate flow control of purged housing and helium actuated valves.

Bellows-type metering valves for separate flow control of column carrier gases and detector discharge gas.

Detector Power Supply

Output

Continuous, stable adjustment, from zero to rated voltage and current by means of an external zero

Linearity

±1% full scale

Accuracy

1% of range, ±1% of setting

Output Voltage

0 - 1.5 kV

Output Current

0 - 10 mA

Stability

0.01%/hr after ½ hour warm-up

Ripple

10 µV

Input

115/230Vac ±10%, 50-60 Hz, 0.5A/0.25A

Stability

0.01%/hr; 0.02%/8hrs after ½ hr warm-up

Protection

Short circuit output is limited to <120% of the max. rated output current. Are protected and self restoring. Precision for remote TIP input is included. Includes input line fuses.

Electrometer Amplifier

Circuit

Solid state FET operational amplifier powered by voltage regulated hybrid regulator circuit

Sensitivity

1.5 x 10⁻⁶ amps at maximum

Dynamic Range

1 x 10⁴

Noise

With cable ±2 µV at maximum

Drift

<2 µV/hr under controlled environmental conditions

Input Ranges

10⁻¹, 10⁻², 10⁻³, 10⁻⁴ A/mV

Output Ranges

Binary, 1 to 1024 plus infinity (=)

Power Requirements

Series 580

105 - 125 Vac, 60 Hz

Series 682

200 - 240 Vac, 50 Hz

Circuit Breaker

Series 580: 10 amp

Series 592: 5 amp

Overall Dimensions

Bench Top

28”W x 22”D x 12 1/2”H

(71.12 cm x 56.0 cm x 31.75 cm)

Back Mount

19”W x 20”D x 21”H

48.26 cm x 50.8 cm x 53.34 cm)

Weight

Bench Top

140 lbs. (63.76 kg)

19” Rack Mount

145 lbs. (65.70 kg)

Net

125 lbs. (56.70 kg)

40 lbs. (18.14 kg)

Shipping

140 lbs. (63.76 kg)

165 lbs. (74.84 kg)

Accessories

Model 75-500: He Purifier, H₂ Separator, & O₂ Trap System

Model 75-800: Noble Gas Purifier

Model 75-850: Hydrogen Separator

Model 75-900: Oxygen Trap

Model 21-050: Mini Gas Leak Detector

Model 21-250: Deluxe Gas Leak Detector

Part No. 180-567: Digital Flowmeter (for non-corrosive gases)

Part No. 180-568: Digital Flowmeter (for corrosive gases)

Part No. 59-595: Complete DID Accessory Package (REQUIRED to install and operate a GOW-MAC DID-GC system)
An electrometer amplifier converts the DID output current to a voltage signal. This signal is fed through a 4-step programmable gain amplifier covering the ranges of 10^{-6}, 10^{-10}, 10^{-11} and 10^{-12}. The signal then goes through a 12-step output attenuator (1 to 1024 plus infinity).

**Flow System**

Two gases are required to operate the Series 590 DID GC. Ultra-high purity helium is used for both the carrier gas and the discharge gas. Zero grade helium is used for purging the detector and valve housing, and to actuate all valves. Bellows metering valves are used to control the carrier gas flow throughout the system. The zero grade helium flow is controlled by independent needle valves. All critical gas connections possess 1/4" VCR® fittings.

The GOW-MAC® Series 590 GC with Discharge Ignition Detector is a complete, dedicated gas chromatographic system requiring only data handling and a few accessories.

**Specifications**

- **Column Oven**
  - Dimensions: 10"W x 4 1/2"D x 7 1/2"H
  - Temperature Range: Ambient to 300°C
  - Temperature Readout: 3 1/2 digit LED digital display meter
  - Temperature Control: Solid state, time proportioning, RTD sensors, direct reading, ambient to 300°C
  - Oven Capacity: Can accommodate up to four (4) 20' to 30' 1/8" columns

- **Detector**
  - Type: Discharge Ignition
  - Design: low volume
  - Sensitivity: <10 ppb CH₄

- **Carrier Gas**
  - Ultra-high purity helium

- **Discharge Gas**
  - Ultra-high purity helium

- **Temperature Range**
  - Ambient to 120°C

- **Linearity**
  - > 10⁻⁶

- **Gas Flow**
  - Valves for separate flow control of purged housing and helium actuated valves.
  - Bellows-type metering valves for separate flow control of column carrier gases and detector discharge gas.

**Power Requirements**

Series 590
- 105 - 125 Vac, 60 Hz
Series 592
- 200 - 240 Vac, 50 Hz

**Circuit Breaker**

Series 590: 10 amp
Series 592: 5 amp

**Overall Dimensions**

- **Bench Top**
  - 26"W x 23"D x 12 1/2"H (66.05 cm x 58.42 cm x 31.75 cm)
  - 15"W x 23"D x 21"H (38.10 cm x 58.42 cm x 53.34 cm)

- **Back Mount**
  - 10"W x 23"D x 21"H (25.40 cm x 58.42 cm x 53.34 cm)

**Weight**

- **Bench Top**: 125 lbs. (56.70 kg)
- **Back Mount**: 140 lbs. (63.76 kg)
- **Shipping**: 140 lbs. (63.76 kg)
- **Bench Mount**: 165 lbs. (74.84 kg)

**Ordering Information**

Each Series 590 is custom built to a particular application. Call GOW-MAC or your local representative to discuss the details of your specific requirements.

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**Impurities in Helium**

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**Temperature Controls**

Temperature controls are solid state proportioning type with direct dial setting. Temperature readout for the column oven and detector is displayed on a digital LED meter. Selector switches are used to set and read the desired temperature.

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**Impurities in Argon**

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**Impurities in Oxygen**

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**Impurities in Hydrogen**

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**Impurities in HC₁ (ULSI Grade)**

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**Data Handling Capabilities**

Software

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**Electrometer Amplifier**

- **Circuit**: Solid state FET operational amplifier powered by voltage regulated hybrid regulator circuit
- **Sensitivity**: 1.5 x 10⁻⁸ amps at maximum
- **Dynamic Range**: 1 x 10⁶
- **Noise**: With cable ±8 µV at maximum
- **Drift**: <2 µV/hr under controlled environmental conditions
- **Input Ranges**: 10⁻⁹, 10⁻¹⁰, 10⁻¹¹, 10⁻¹² A/mV
- **Output Ranges**: Binary, 1 to 1024 plus infinity (=)

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Sample gas “memory” within the system has been eliminated through the use of sample isolation valves. This configuration has proven to be reliable with faster and easier start-up.

System

The Series 590 DID GC is offered in several different configurations, each having a unique valving and flow system to accomplish a variety of trace impurity gas applications. When a base gas other than helium is to be analyzed, the separation of the trace impurities from the base gas peak is critical to the analysis. Each system has been developed to chromatographically manipulate this base gas peak.

All Series 590 DID GC systems can be manufactured with corrosion resistant materials. Corrosion resistant refers to the wetted surface area that comes in contact with the sample. All Series 590 DID GC systems are available in either 19” rack or bench top chassis.

Electronics

Electronics for the Series 590 DID GC consist of a high voltage detector power supply and an electrometer amplifier. The DID Power supply provides the high voltage necessary to produce the ionization arc in the DID. Readout occurs on two separate LED displays; one for the discharge current (mA) and one for the dc voltage.