
ABB MEASUREMENT & ANALYTICS | ANALYTICAL MEASUREMENT

Ethylene plant production excels with the PGC1000



Measurement made easy

Why the PGC1000?

The most efficient analysis

The PGC1000 is a revolutionary product designed to handle the challenge. ABB is proud to meet the demands of an ever-changing and ever-growing staple of the petrochemical market.

Ethylene production is a competitive industry. The PGC1000 provides the flexibility, reliability and performance for efficient, low maintenance, and high throughput ethylene production. Isn't that what is needed?

PGC1000 offers

- **Low cost** Cost effective (no shelter) and low maintenance
- **Mounting options** Online, wall-mounted or pole-mounted
- **Carrier options** Helium, hydrogen, or nitrogen
- **Compact size** 6.75" diameter x 16" length x 9" height, 28 lbs.
- **Modular** Modular hardware and software for greater ease of use
- **GC valve** No metal moving parts, offering millions of cycles between failures
- **TCD** Detector sensitivity unmatched in the industry
- **Applications** Ability to address a variety of petrochemical applications
- **Operational efficiency** Low carrier usage rates, low power consumption, and no compressed air

Ethylene is one of the largest volume commodity chemicals on the market. It is used in the manufacture of plastics, fibers, and other organic compounds such as polypropylene, butadiene, and pyrolysis gasoline. The increased global demand for ethylene is matched by expanded supply from new production sources such as shale gas and Greenfield ethylene plants. As demand and supply grow, so must process throughput and reliability.

Monitoring contaminants in ethylene production is critical for maximizing production output, extending equipment life, and limiting unscheduled shutdowns. ABB's PGC1000 process gas chromatograph (GC) is ideal for ethylene plant operation maximization – optimizing process control, improving product quality, providing environmental monitoring, mass balancing, and enhancing safety.

PGC1000 and process analytics

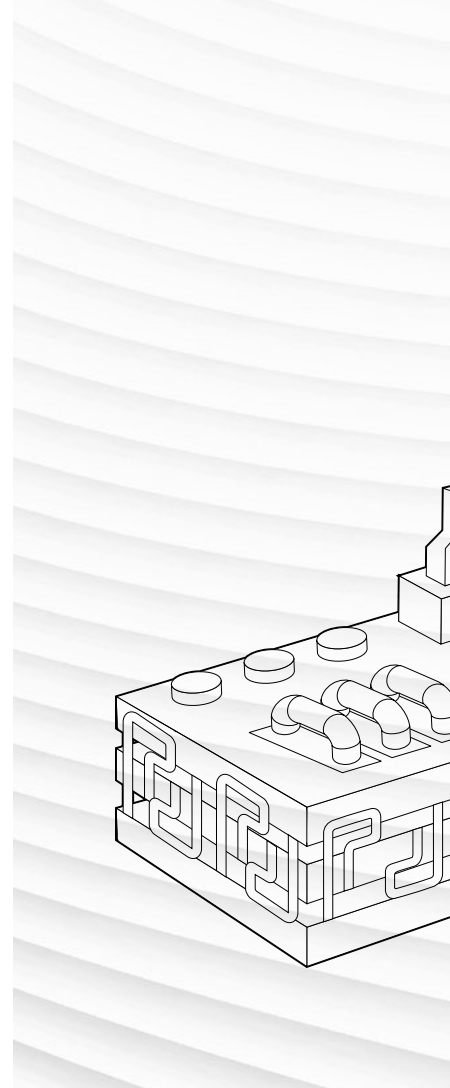
Ethylene plant diagrams

Simple proven design, easy installation, low maintenance, and faster troubleshooting of the PGC1000 means greater process uptime.

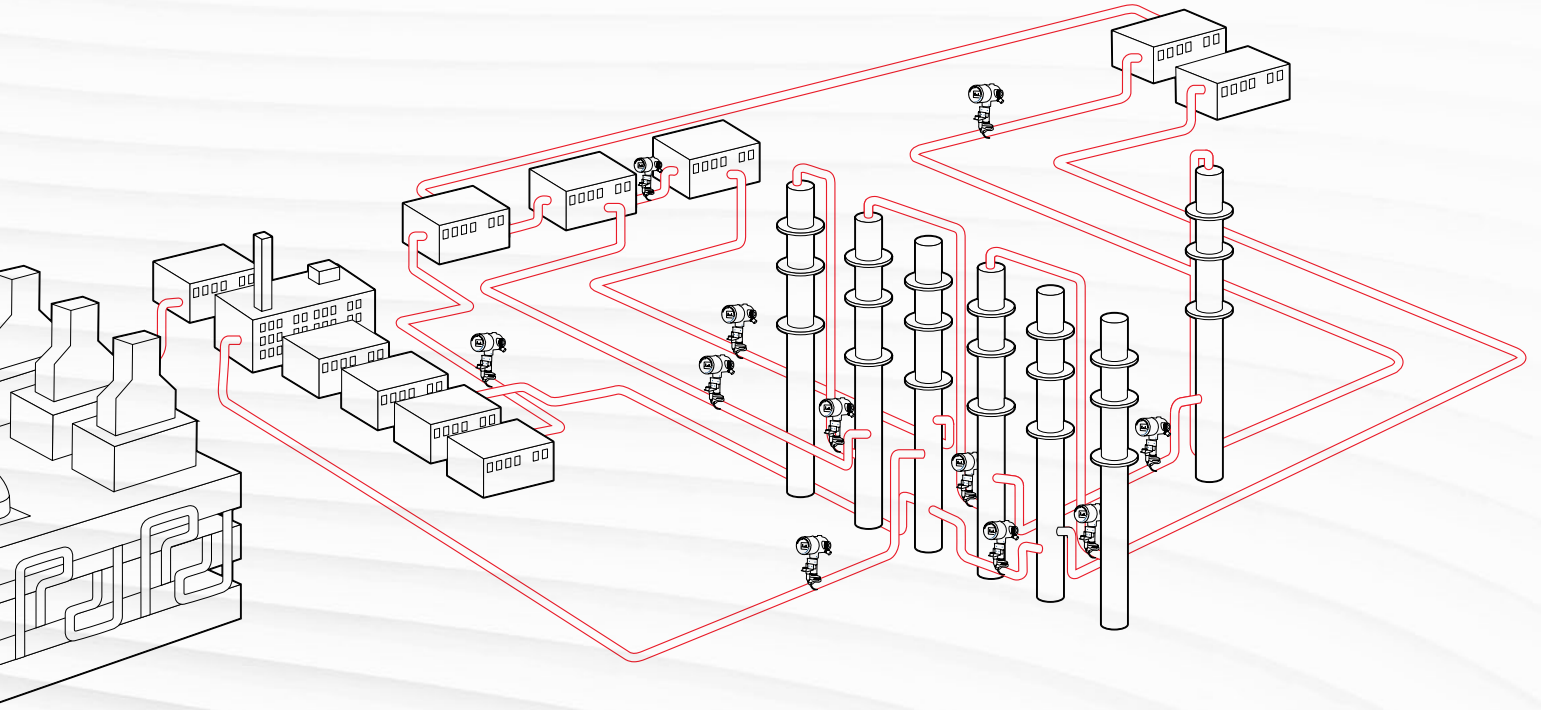
The PGC1000 is specifically designed for the hydrocarbon processing industry (HPI). The PGC1000 is a field-mounted process GC measuring C1 - C9+, inert gases, and H₂S. In addition, the PGC1000 precisely analyzes H₂, O₂, CO, H₂O, and CO₂ process stream components. These components are important to evaluating ethylene plant operational efficiency.

The PGC1000 offers the most accurate/cost-effective GC solution on the market, requiring no shelter and substantially lowering life cycle product costs. Simple proven design, easy installation, low maintenance, and faster troubleshooting of the PGC1000 means greater process uptime. This has a direct impact on the plant's bottom line.

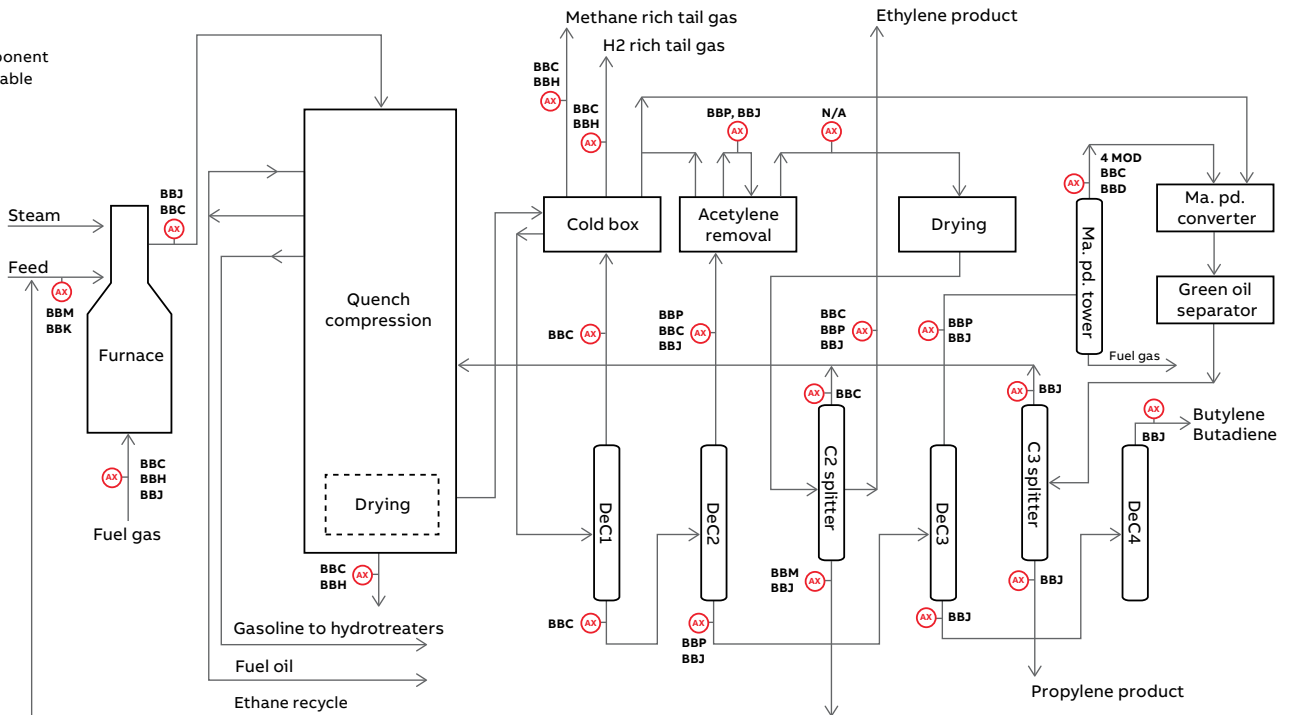
PGC1000 is well-suited for ethylene production areas such as feed and furnace, compression, and hydrocarbon separation.



Column train designator	Measured components	Carrier
BBC	C3+, He, N ₂ , C1, CO ₂ , C2=, C2, C2*	H ₂ /He
BBH	C1+, He, O ₂ , N ₂ , CO	H ₂ /He
BBJ	C5+, C3, C3=, IC4, NC4, B-1 & IC4=, TB-2, CB-2, 1,3-BD	H ₂ /He
BBK	C6+, C3, IC4, NC4, NeoC5, IC5, NC5	H ₂ /He
BBM	C6+, C3, H ₂ S, IC4, NC4, NeoC5, IC5, NC5	H ₂ /He
BBP	O ₂	H ₂ /He



— Measured component ranges are available



PGC1000

Ethylene plant applications

— Maximizing furnace efficiency is economically beneficial, since it uses the most energy in an ethylene plant.

Furnace applications

Furnace optimization is vital to plant performance. Cracking excessively can lead to furnace shutdown because of unwanted coke formation on the catalyst. It impedes heat transfer and restricts process flow. Not cracking sufficiently can have a negative impact on overall production. The PGC1000 provides the component evaluation for achieving the correct balance. The PGC1000 furnace measurement capabilities are outlined in the chart below.

Sample point	Measured components	Column trains
Fresh feed	C1, C2, C3+, C4+ (PINA)	BBM, BBK
Mixed feed (fresh and recycle)	C1, C2=, C2, C3, C4+	BBM, BBK
Fuel gas to furnaces	N2, H2, C1, C2=	BBC, BBH
Furnace convection	O2	BBP
Cracked gas at TLE exit	CO, NO (NO2), O2	BBH, BBP
Boiler combustion	O2	BBP

Compression applications

The gas from the quench tower goes through a compression train to achieve a pressure which adequately separates hydrocarbons from H2O. Acid gases (CO2 and H2S) are also removed. A cracked gas compressor (CGC) can cost up to \$50 million, and it operates continuously. Therefore, plant economics may be severely affected by fouling in a CGC, resulting in added energy costs and production losses. The CGC is also an ideal place to return various recycle streams in the ethylene plant. These may contain fouling precursors. They include oxygen, peroxides, and other organic components that adversely impact compressor operation. The PGC1000 helps monitor components for better compressor control and extended life of the equipment. The PGC1000 compression component measurement capabilities are outlined below.

Sample point	Measured components	Column trains
Cracked gas at quench inlet	H2, C1, C2+, C2	BBC, BBH
Drying/chilling outlet (to methanizer)	CO, C2=	BBC, BBH

Hydrocarbon separation applications

Understanding the concentration of permanent gases (CO, CO2, O2, N2, and methane) is important for controlling the ethylene plant hydrocarbon separation process and product quality. Impurities such as CO and CO2 in ethylene are harmful to certain catalysts. Another harmful byproduct from ethylene production is acetylene. It is toxic to downstream polymerization catalysts. The PGC1000 is ideal for monitoring and controlling hydrocarbon separation to improve the quality of the ethylene product and by-products such as methane, ethane, propane, and butane. The PGC1000 compression component measurement capabilities are outlined below.

Sample point	Measured components	Column trains
Hydrogen rich tail gas	H2, N2, C1, C2=, C2, CO	BBC, BBH
Methane rich tail gas	H2, N2, C1, C2=, C2, CO	BBC, BBH
DeMethanizer bottoms	C2/C3=	BBC
DeEthanizer	C3=/C2	BBP, BBJ
C2 split bottoms	C2=, C3=	BBJ, BBM
Ethylene product	C1, C2, C2=	BBC, BBP
To DeButanizer	C1, C2, C2=	BBJ
DePropanizer	C2, C3=, C3, C4+	BBJ
C3 split bottoms Propylene product	C3=, C4+, Propadiene, Propine	BBJ
Butene-1 product	C2, C2=, C4, C4=, C6=	BBJ

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