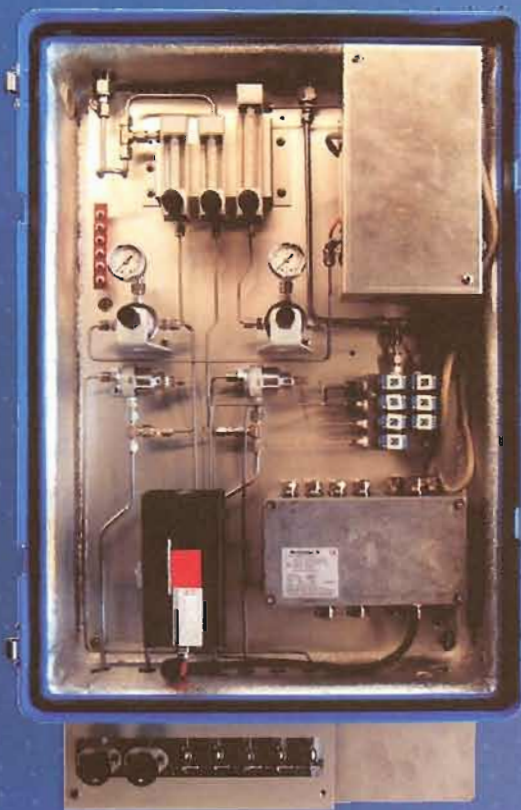


SERVING THE GAS INDUSTRY WORLDWIDE



Technical Product Information

GAS CHROMATOGRAPH PGC 6000



GAS CHROMATOGRAPH PGC 6000

Overview, Features and Advantages

Overview

The model PGC 6000 is the world smallest gas chromatograph, which is capable of analyzing 11 different components of natural gas and digitally publishing the derived parameters, such as calorific value, Wobbe-index, or density.

By using our leading sensing & control technology, we designed the model PGC 6000 specifically for custody transfer, quality control, and other natural gas applications to meet the demands of the expanding natural gas market.

The model PGC 6000's size, weight, cost and other great features gives the user the benefits of functionality, flexibility and economy from the production site to the pipe line station to the gas distributor and onto the end user's station.

Features

Small size for easy field installation

The model PGC 6000 has a compact design thus facilitating field installation. In addition, the device can be mounted with a sampling system in the field.

- Small compact packaging
- No analyzer house is required
- Flameproof certified

Pre-engineered analysis and calculations for Natural Gas Metering

The model PGC 6000 has pre-engineered analysis and calculations for Natural Gas Metering so that no additional programming or application work is required.

- Easy to set up straight out of the box
- Analysis of 11 components and pre-configured value calculations
- Analysis and calculations based on international standards

Digital communication for system integration

The model PGC 6000 is capable of supporting FOUNDATION™ fieldbus and MODBUS protocols with optional analog output capabilities and has been tested with leading flow computers.

PC monitoring and online diagnostics

The Process Gas Chromatograph Monitor (PGM) is a PC-based software that allows the user to view all data and diagnostic information from a laptop computer.

Advantages

Simple to start-up and easy to maintain

A huge amount of time and cost in the analyzer system start up phase can be saved with the model PGC 6000's unique packaging and pre-engineered functions. The unit's easy-to-maintain design contributes to time and cost savings and it can be repaired without the need for analyzer expertise.

Functional Specifications

Principle of measurement

Gas chromatography

Measured gas streams

1

Analyzed components

11

Analysis time

300 sec.

Detector

Micro TCD (Thermal Conductivity Detector)

Chromatographic method

ISO 6974, part 4

Heat value calculation method

ISO 6976

Gas to be analyzed

Natural gas

Auto-calibration

External solenoid valve and HMU contact are required.

Normalization of concentrations

On-line diagnostics

Hazardous area certification

ISSeP/CENELEC ATEX certifications: II 2 GD EEx d IIC T6 IP65

Component measuring ranges and minimum detection

Components	Ranges (mol%)	Minimum detection (mol%)
Sum of C6+	0-0.3	0.01
C3H8 (propane)	0-3	0.05
i-C4H10 (i-butane)	0-1	0.01
n-C4H10 (n-butane)	0-1	0.01
neo-C5H12 (neo-pentane)	0-0.5	0.01
i-C5H12 (i-pentane)	0-0.5	0.01
n-C5H12 (n-pentane)	0-0.5	0.01
N2 (nitrogen)	0-20	0.1
CH4 (methane)	50-100	-
CO2 (carbon dioxide)	0-10	0.05
C2H6 (ethane)	0-15	0.05

Analyzer outputs

PV1	C6+ (sum of C6+)
PV2	C3H8 (propane)
PV3	i-C4H10 (i-butane)
PV4	n-C4H10 (n-butane)
PV5	neo-C5H12 (neo-pentane)
PV6	i-C5H12 (i-pentane)
PV7	n-C5H12 (n-pentane)
PV8	N2 (nitrogen)
PV9	CH4 (methane)
PV10	CO2 (carbon dioxide)
PV11	C2H6 (ethane)
PV12	SCV (real) (MJ/m ³) [default] or SCV (ideal) (MJ/m ³) or ICV (real) (MJ/m ³) or ICV (ideal) (MJ/m ³)
PV13	Density (real) (kg/m ³) [default] or Density (ideal) (kg/m ³) or Relative density (real) or Relative density (ideal)
PV14	Wobbe index (real) (MJ/m ³) [default] or Wobbe index (ideal) (MJ/m ³)
PV15	Compressibility factor
PV16	Total of raw concentrations
PV17	Oven temperature
PV18	Carrier gas pressure
PV19	ICV (real) (MJ/m ³) [default] or ICV (ideal) (MJ/m ³)
PV20	Relative density (real) [default] or Relative density (ideal)

Process Gas

Temperature

-10°C to 50°C

Flow rate

50 ± 20ml/min

Dust and mist

None

Moisture

Less than 2000 ppm

Coexisting components limit

H2 < 0.1 mol%

He < 0.1 mol%

Oxygen < 0.1 mol%

H2S (dry) < 0.1 mol%

Ambient temperature limits

-10°C to 50°C

-40°C to 70°C for storage and transportation

Ambient humidity Range

0-95%RH

CE marking

Electromagnetic compatibility (EMC)(89/336/EEC, 92/31/EC, 93/68/EEC)Equipment explosive atmospheres (ATEX): 94/9/EC

Performance Specifications

Repeatability of analysis

± 0.05% CV

Physical Specifications

Color

Metallic light green, silver

Material

Body

Cast aluminum

Oven

Cast aluminum

Wet-parts

304 Stainless steel, polyimide

Sensor

Pt, glass, gold

Dimensions

W: 100 mm × D: 115 mm × H: 244 mm

Weight

3.5kg

GAS CHROMATOGRAPH PGC 6000

Communication and Installation

Communications

The model PGC 6000 communicates via Foundation Fieldbus Protocol to a PC for configuration, maintenance and data transmission. PC and Fieldbus connections are provided as standard equipment. A specific Windows-

based model PGC 6000 software, the PGC Monitor PGM, enables convenient model PGC 6000 instrument control in a user-friendly environment. Retransmission of data to the central system can be performed via the Internet. Modbus communication is also available for networking with, for example, a flow computer or SCADA system.



Installation

Mounting

Vertical 2 in. pipe mount

Power supply

24V DC \pm 15% 4A min

Power consumption

5~50VA at -10°C to 50°C

Environmental classification

Sheltered location (protected from sunlight or precipitation)

Utilities

Carrier gas: Helium

Purity

99.99% or higher

Pressure

400 kPa \pm 50 kPa

Consumption

25ml/min (approximately)

Instrument air (for actuating the valve)

Pressure

400 kPa \pm 50 kPa

GAS CHROMATOGRAPH PGC 6000

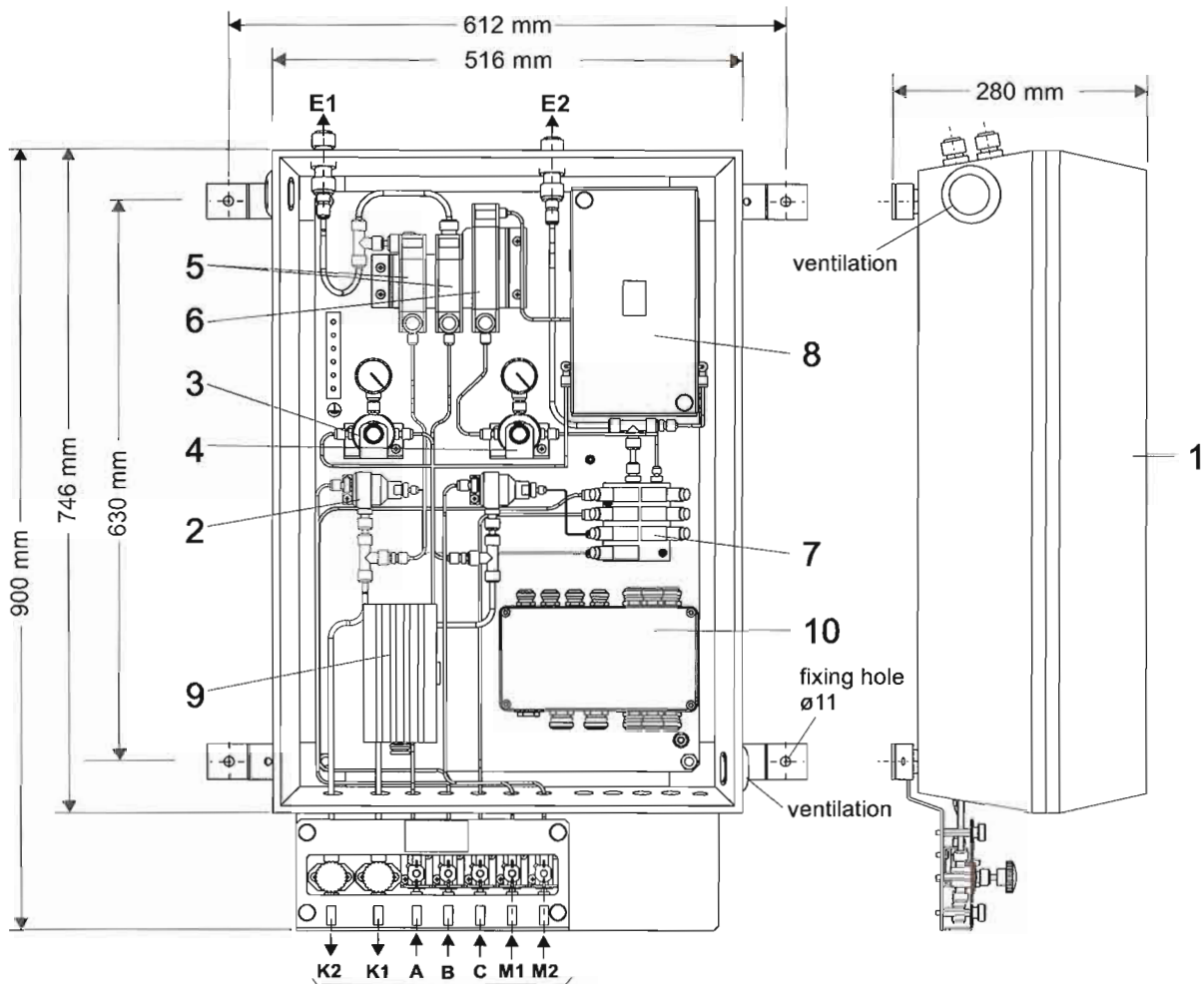
Dimensions

Model Selection

Gas Chromatograph
PGC 6000 - I / II

Basic Model No.		PGC 6000	
I	Conduit entry	1/2 NPT	1
	Gas connection	1/4 NPT	
II	Explosion-protection	ISSEP/CENELEC Flameproof E	

Dimensions



Gas inlets:

- A. carrier gas (inlet pressure 4.5 bar)
- B. int. calibration gas (inlet pressure 2-3 bar)
- C. ext. test gas (inlet pressure 2-3 bar)
- M. measuring gases (inlet pressure 2-3 bar)

All tube fittings and connections in Swagelok system, tube diameters for the connections:

- A, B, C: 1/8"
- M1, M2: 4 mm
- K1, K2: 6 mm
- E1, E2: 12 mm

- 2-stream (option)
- 1-stream (standard)

Gas outlets:

- E1. vent line of bypass
- E2. vent line of measuring gas
- K1+K2. condensate outlet

- 1.) isolation cabinet with window in cover
- 2.) liquid separator for measuring gas
- 3.) pressure reducer for carrier gas
- 4.) pressure reducer for measuring gas
- 5.) flowmeter for bypass of measuring gas 1+2
- 6.) flowmeter for measuring gas
- 7.) solenoid valve block
- 8.) measuring element CP 6000
- 9.) heater 100 W with 10°C fixed value thermostat in the connecting cable
- 10.) EEx (e) connection box for pos. 7, 8, 9

GAS CHROMATOGRAPH PGC 6000

Calibration Example

Calibration Example

Report date: Nov-09-2007

No.	Data Items	Data	
1	PD Tag	HGC	
2	Product No.	D-94902-48-101	
3	Model No.	HGC303-1E	
4	HGC S/N	30000596	
5	Device ID	ODFC96RMG_HG030202Y705Y00002	
6	Module	S / N	30000282
		1st column	DC200
		2nd column	Porous polymer beads
		3rd column	DC200
7	TCD sensor data	S / N	289
		TCD RH	563.2 ohm
		TCD AH	0.0034°C
		Temp. Rr	5346.0 ohm
		Temp. AR	0.0034°C
		RA	660.14 ohm
8	Pressure sensor data	Span Calibration	-0.0100 V
		Zero Calibration	0.0583 V
9	S/W version	V3.2 - HGC303	
10	Carrier SP	192 kPa (27.8 psi)	
11	Analyzing cycle	300 sec	
12	Oven Temp. SP	58°C (136.4°F)	
13	1st valve operation	ON (Start)	0 sec.
		OFF (Backflush time)	17 sec.
14	2nd valve operation	ON (Start)	172 sec.
		OFF (Backflush time)	290 sec.

15 Outputs configuration data

PV	Name	Gain			Low cut off	Detect. method	Calibration curve data coefficient					
		Set	On	Off			0	1	2	3	4	
PV1	C6+	17.5	21.1	30.1	2	0.005	7	-0.0001	0.0118	0.0000	0.0000	0.0000
PV2	C3H8	47.0	48.0	60.0	1	0.030	5	0.0000	0.0803	0.0000	0.0000	0.0000
PV3	i-C4H10	61.0	62.0	75.0	2	0.010	7	0.0000	0.0158	0.0000	0.0000	0.0000
PV4	n-C4H10	75.0	75.0	98.0	2	0.010	7	0.0000	0.0186	0.0000	0.0000	0.0000
PV5	neo-C5H12	84.0	84.0	93.0	2	0.010	9	0.0000	0.0182	0.0000	0.0000	0.0000
PV6	i-C5H12	108.0	109.0	135.0	2	0.005	15	0.0000	0.0249	0.0000	0.0000	0.0000
PV7	n-C5H12	135.0	135.0	159.0	2	0.005	15	0.0000	0.0286	0.0000	0.0000	0.0000
PV8	N2	205.0	205.0	237.0	0	0.030	17	0.0000	0.4886	0.1678	0.0000	0.0000
PV9	CH4	221.0	206.0	238.0	0	5.000	7	0.0000	0.4623	0.6774	0.0000	0.0000
PV10	CO2	251.0	252.0	269.0	1	0.030	15	0.0000	0.2240	0.0000	0.0000	0.0000
PV11	C2H6	269.5	270.0	288.5	1	0.030	15	0.0000	0.2372	0.0475	0.0000	0.0000
PV12	SCV/ICV	SCV (Real)										
PV13	Density	Density (Real)				Reference conditions						
PV14	Wobbe Index	Real				Combustion temperature	15°C					
PV15	Compressibility Factor	Real				Metering temperature	15°C					
PV16	Total of raw concentrations	Real				Atmospheric pressure	101.325 kPa					
PV17	Oven temperature	Real				C6+ Configuration	n -C6H14					
PV18	Carrier gas pressure	Real				Total (Raw) error limit	105 mol%					
PV19	ICV	Real					95 mol%					
PV20	Relative density	Real				C2 Rt SP	277.0 sec					

16 Operating conditions

Heater duty		12.96
Carrier PV	193.16 kPa	28.02 psi
Oven Temp. PV	58.02°C	136.44°F

GAS CHROMATOGRAPH PGC 6000

Calibration Example

17 Calibration data

PV	Name	STD %	Calibration	
			Raw conc. (mol%)	Normal. (mol%)
PV1	C6+	0.051	0.051	0.051
PV2	C3H8	1.510	1.511	1.511
PV3	i-C4H10	0.301	0.303	0.303
PV4	n-C4H10	0.311	0.311	0.311
PV5	neo-C5H12	0.101	0.102	0.102
PV6	i-C5H12	0.050	0.050	0.050
PV7	n-C5H12	0.052	0.050	0.050
PV8	N2	2.990	2.991	2.991
PV9	CH4	91.183	91.166	91.183
PV10	CO2	0.502	0.500	0.500
PV11	C2H6	2.950	2.947	2.947
PV12	Heating Value	[MJ/m3] 38.975	—	38.977
		[BTU/CF] 1044.24	—	1044.296
PV13	Density	[kg/m3] 0.7539	—	0.7539
		[lb/1000CF] 46.972	—	46.9733
PV14	Wobbe Index	[MJ/m3] 49.689	—	49.692
		[BTU/CF] 1331.1	—	1331.1
PV15	Compressibility	ISO 0.9977	—	0.9977
	Factor	GPA 0.9977	—	0.9977
PV16	Total (Raw conc.)	100.00	99.98	100.00

All reported "Heating value" and "Compressibility factor" are calculated in accordance with ISO6976-1995 and GPA 2172-96.

18 Verification Medium CV (Normal, Calibration gas)

PV	Name	STD %	1	2	3	4	5	6	7	8	9	10	Ave.	Error %	RSD%
PV1	C6+	0.051	0.052	0.051	0.051	0.050	0.051	0.051	0.050	0.051	0.052	0.052	0.051	0.86	1.03
PV2	C3H8	1.510	1.508	1.512	1.512	1.508	1.515	1.508	1.509	1.508	1.509	1.504	1.509	-0.05	0.19
PV3	i-C4H10	0.301	0.303	0.303	0.303	0.301	0.304	0.303	0.303	0.302	0.303	0.304	0.303	0.62	0.32
PV4	n-C4H10	0.311	0.311	0.312	0.313	0.312	0.313	0.312	0.314	0.311	0.312	0.314	0.313	0.48	0.34
PV5	neo-C5H12	0.101	0.102	0.101	0.101	0.099	0.102	0.101	0.102	0.100	0.100	0.102	0.101	0.04	0.93
PV6	i-C5H12	0.050	0.050	0.050	0.049	0.049	0.050	0.048	0.049	0.050	0.051	0.048	0.049	-0.72	2.21
PV7	n-C5H12	0.052	0.051	0.053	0.052	0.052	0.053	0.051	0.052	0.053	0.053	0.051	0.052	0.97	1.82
PV8	N2	2.990	2.987	2.988	2.989	2.991	2.985	2.992	2.991	2.993	2.987	2.987	2.989	-0.04	0.09
PV9	CH4	91.183	91.183	91.180	91.181	91.180	91.172	91.180	91.177	91.181	91.180	91.180	91.179	0.00	0.00
PV10	CO2	0.502	0.503	0.500	0.497	0.507	0.503	0.502	0.500	0.500	0.502	0.502	0.502	-0.07	0.50
PV11	C2H6	2.950	2.950	2.948	2.951	2.950	2.953	2.953	2.953	2.952	2.952	2.956	2.952	0.06	0.07
PV12	Heating Value	[MJ/m3] 38.975	38.979	38.984	38.982	38.970	38.988	38.973	38.981	38.976	38.982	38.980	38.979	0.01	0.01
		[BTU/CF] 1044.24	1044.34	1044.47	1044.43	1044.11	1044.58	1044.18	1044.39	1044.26	1044.42	1044.38	1044.36	0.01	0.01
PV13	Density	[kg/m3] 0.7539	0.7540	0.7540	0.7540	0.7539	0.7541	0.7539	0.7540	0.7539	0.7540	0.7540	0.7540	0.01	0.01
		[lb/1000CF] 46.9722	46.9762	46.9799	46.9753	46.9727	46.9857	46.9714	46.9776	46.9730	46.9789	46.9761	46.9767	0.01	0.01
PV14	Wobbe Index	[MJ/m3] 49.689	49.692	49.696	49.697	49.683	49.698	49.687	49.694	49.690	49.694	49.694	49.693	0.01	0.01
		[BTU/CF] 1331.06	1331.14	1331.24	1331.27	1330.89	1331.30	1331.00	1331.18	1331.08	1331.20	1331.18	1331.15	0.01	0.01
PV15	Compressibility	ISO 0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.00	0.00
	Factor	GPA 0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977	0.00	0.00
PV16	Total (Raw conc.)	100.000	99.955	100.015	99.937	99.934	99.822	99.960	99.977	100.011	99.939	99.950	99.950	-0.05	0.05

19 Process gas flow rate

flow rate (ml/min.)	Total (Raw)%	Difference(%)
30	100.529	0.053
50	100.475	—
70	100.626	0.150

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RMG is your competent partner along the entire chain ranging from exploration to the supply of final consumers. Our reliable products and systems offer you full control in the fields of control engineering and measuring technology.

Furthermore, we design and build plants according to your requirements and offer you reliable and state-of-the-art solutions in station automation as well. Please contact us. We look forward to your challenges.

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