Maintenance Book

PGC 9000 / PGC 9000 VC
Process Gas Chromatograph

Status: April 2004

Maintenance Book

PGC 9000 / PGC 9000 VC

Series No. GC 9000	
Series No. CP 4002	
User/Owner	
Station	
Measuring point	
Initial startup	
Maintenance Book No.	

Instructions for Keeping the Maintenance Book

The Maintenance Book serves to document the operational performance of the PGC 9000 VC and is prescribed by the German Federal Institute of Physics and Metrology (PTB).

Enter your station parameters on page 3 and number the individual maintenance books consecutively.

Read off key parameters and measured data from the PGC once a month (once a year if a data logger type DS 900 is installed) and enter them in the tables of the Maintenance Book. Additional maintenance works have to be done according to manufacturer's rule once a year.

1. Operating Parameters

Specified Values

The specified values for operating parameters are entered in the table on page 13 during the initial startup of the PGC and remain unchanged during its time of operation, unless they are modified by an RMG service engineer.

Actual Values

Enter actual values in the tables on page 14 ff. Please note that each table comprises two pages in each case.

To display the analytical values on the GC 9000 analytical computer, you must proceed as follows:

Press key	6	(Input) once	→	The **carrier gas pressure** will be displayed in bar.
Press key	▷	once	→	The **measuring gas pressure** will be displayed in bar.
Press key	0	(GC Status) once		
Press key	▽	five times	→	The actual **temperature** of column **A** will be displayed in °C.
Press key	▽	twice	→	The actual **temperature** of column **B** will be displayed in °C.
Press key	▽	twice	→	The actual **pressure** for column **A** will be displayed in bar.
Press key	▽	twice	→	The actual **pressure** for column **B** will be displayed in bar.

Cylinder Pressure Values

Read off the cylinder pressure values directly from the (left-hand) pressure gauges of the pressure reducers on the gas cylinders. Read off the pressure values for:

Helium	marked "carrier gas"
Internal calibration gas	under the cover

Enter the data read off below "p" and the difference from the pressure value of the previous reading below "Δp".

Then write down the flow rates in the exhaust gas pipe of the PGC. Read these from the **right-hand** variable-area flow meter mounted on top of the measuring element. To do this, wait for an analytical cycle (approx. 3 minutes). The flow rate during purging (approx. 80 seconds) is considerably higher than at other times.

2. Gas Analyses

Transcribe the specified values for calibration gases from the certificates into the table at the top left.

Print out the results of the last measuring gas analysis as chromatograms and as numerical values and enter the data for calorific value, standard density and CO_2 content in the table. To do this, you must proceed as follows:

a) Enter the code number:

Press key 4 (GC Mode) once

Press key ◁ twice

Press key ▽ once → Eight asterisks " * " will be displayed in the second line.

Press key ↵ once → The second line will turn darker.

Now enter the 8-digit code number.

Press key ↵ once → If the code number entered is correct, the second line turns brighter again and the green LED starts flashing.
(Preset code number: 9999-9999)

b) Start to print:

To print out **chromatograms**, you must proceed as follows:

Press key	[± ,]	(Print, ○ Select)	
Press key	[↵]	→	The second line turns darker.
Press key	[± ,]	four times →	"GRAPH-MEAS." will be displayed in the second line.
Press key	[↵]	once →	Printing of chromatograms will be started.

To print out the **analytical result**, you must continue as follows:

Press key	[▽]	six times →	"manual print OFF" will be displayed.
Press key	[↵]	once →	The second line will turn darker.
Press key	[± ,]	once →	"manual print ON" will be displayed in the second line.
Press key	[↵]	once →	Printing will be started. Shortly afterwards, "manual print OFF" will be displayed again.
Press key	[⇦]	twice (quickly without a pause) →	The green LED will stop flashing. If you want to make another input, you must enter the code number again.

3. Measures To Be Taken On Site

All modifications or changes, such as software replacements or printer settings, made by service engineers will be entered in this section. Also, any remarks on annual official inspection will be recorded here.

Please indicate here any damage or malfunctions (e.g. leakages) detected during your maintenance work.

Manufacturer's rule

Annual maintenance for process gas chromatographs

Check-up of the total system PGC 9000/PGC 9000 VC –
Preventive controls – official verification and maintenance (annually)

1. Maintenance of the pressure reducing unit type DRS

- Function control of the regulator
- Leakage control
- Function control of analytical gas heating (if existing)
- Function control of the heater of the pressure reducing unit (if existing)

2. Maintenance of gas supply unit

- Control and documentation of the cylinder pressure values of the carrier gas and calibration gas (indirect leakage controls)
- Function test of the cylinder heating
- Function control of the pressure regulator
- Check up of the contact pressure gauges (if existing)
- Function control of the second pressure regulation step (Porter-regulator - if existing)
- Leakage control

3. Maintenance GC 9000 and CP 4002

- Check up of the filter at the gas inlet module with filter (filter exchange if necessary)
- Leakage control
- Check up of the inlet pressures for carrier gas, measuring gas, internal and external calibration gas
- Function control of solenoid valves
- Function control of the case heating CP 4002
- Check up of the column pressures and column temperatures, if necessary putting in
- Evaluation of the documented automatic calibrations and chromatograms of the measuring gas
- Function control of the printer/data logger (optional)
- Control of the method parameters of the "method" by means of a special service software
- Control of the retention times
- Evaluation of the chromatograms

4. **Final total control of the PGC 9000/PGC 9000 VC**
If the **responsible authority** is present, the official verification of the PGC 9000/PGC 9000 VC takes place!

- Examination of the range of the existing current output
- Calibration (manually) of the PGC with internal calibration gas
- Check up with external calibration gases H and L with printing chromatograms
- Check up of the chromatogram of measuring gas
- Check up of the stream-transfer and/or of the bus transfer of the obligatory calibration values
- Perform switch-off test
- Logging of all works carried out. Enrollments in the maintenance book.

Section 1

Operating Parameters

Section 2

Gas Analyses

Section 3

Measures To Be Taken On Site

Section 1

Operating Parameters

Operating Parameters

Specified Values

Date	Carrier gas pressure	Measuring gas pressure	Column temperature		Column pressure		Exhaust gas with purging	Exhaust gas w/o purging
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]	[marks]	[marks]

Date	Analytical Values					
	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

Cylinder Pressure Values						**Initials**
Helium cylinder pressure		Internal calibration gas cylinder No.		Exhaust gas with purging	Exhaust gas w/o purging	
[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

Date	Analytical Values					
	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

Cylinder Pressure Values						**Initials**
Helium cylinder pressure		Internal calibration gas cylinder No.		Exhaust gas with purging	Exhaust gas w/o purging	
[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

Date	Analytical Values					
	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

Cylinder Pressure Values						**Initials**
Helium cylinder pressure		Internal calibration gas cylinder No.		Exhaust gas with purging	Exhaust gas w/o purging	
[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

Date	Analytical Values					
	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

Cylinder Pressure Values						**Initials**
Helium cylinder pressure		Internal calibration gas cylinder No.		Exhaust gas with purging	Exhaust gas w/o purging	
[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

Date	Analytical Values					
	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

Cylinder Pressure Values						**Initials**
Helium cylinder pressure		Internal calibration gas cylinder No.		Exhaust gas with purging	Exhaust gas w/o purging	
[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

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	Carrier gas pressure	Meas. gas pressure	Column temperature		Column pressure	
	[bar]	[bar]	A [°C]	B [°C]	A [bar]	B [bar]

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[bar]	∆p [bar]	[bar]	∆p [bar]	marks	marks	

Section 2

Gas Analyses

Specified Values for Calibration Gas				
Gases	Cylinder No.	Calorific value [kWh/m^3]	Stand. density [kg/m^3]	Carbon dioxide [mol%]
Internal calibration gas				
External cali-bration gas L				
External cali-bration gas H				

Gas Analyses					
Date	Gas	Filing Ref.	Calorific value [kWh/m^3]		
				Error	
			actual	absolute	%
	Process gas ☐ Internal gas ☐ External H ☐ External L ☐				
	Process gas ☐ Internal gas ☐ External H ☐ External L ☐				
	Process gas ☐ Internal gas ☐ External H ☐ External L ☐				
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	Process gas ☐ Internal gas ☐ External H ☐ External L ☐				

Gas Analyses					
Standard density [kg/m^3]			CO_2 content [mol%]		**Initials**
	Error			Error	
actual	absolute	%	actual	absolute	

Specified Values for Calibration Gas				
Gases	Cylinder No.	Calorific value [kWh/m^3]	Stand. density [kg/m^3]	Carbon dioxide [mol%]
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Gas Analyses					
Standard density [kg/m^3]			CO_2 content [mol%]		**Initials**
	Error			Error	
actual	absolute	%	actual	absolute	

Section 3

Measures To Be Taken On Site

Measures To Be Taken On Site

- ☐ Maintenance
- ☐ Recalibration
- ☐ Software exchange
- ☐ Pressure settings
- ☐ Leaks
- ☐ .....
- ☐ .....
- ☐ .....
- ☐ .....
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Date Initials

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