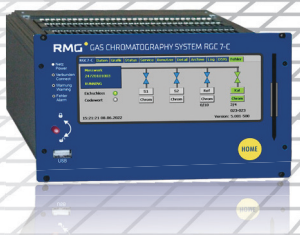
RMG
ONE STEP AHEAD

RMG PROCESS GAS CHROMATOGRAPH

RGC 7

Technical data sheet



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Document information

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Version	Version date	Changes
V00	October 2023	Initial creation
V01	July 2025	Revision of content and layout

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Technical data sheet

General information
The process gas chromatograph RGC 7 is a device from the gas quality measurement family. Increasing fluctuations in natural gas quality, caused among other things by the admixture of hydrogen, make it necessary to measure hydrogen and oxygen components in order to accurately determine gas quality
Functionality
The RGC 7 process gas chromatograph analyses, depending on the type of measuring unit, either the composition of natural gas with hydrogen admixture or the composition of hydrogen with impurities, and determines its key components in molar percentage (up to 14 components depending on the measuring unit configuration). To achieve this, the RGC 7 separates individual gas constituents in specialised capillaries, i.e. columns. These components then pass sequentially through a thermal conductivity detector, which measures their respective molar percentages. During this process, a carrier gas continuously flows through the miniature column/detector unit and is supplied with a defined quantity of sample gas for analysis To ensure consistent accuracy, the gas chromatograph is automatically calibrated at regular intervals. For this purpose, a gas mixture with a known composition is analysed. Based on the determined molar fractions, the RGC 7-C controller calculates the values for calorific value, heating value, standard density, density ratio, and Wobbe index. In addition, the RGC 7-C controller is used for operation, controls the analysis process as the system computer, and outputs measurement results. All operating parameters are stored on it. The controller can only be used with the RGC 7 process gas chromatograph and is not compatible with any other system.

Functions	**Measuring unit RGC 7-M** ■ Measurement of up to 14 different components in natural gas, biogas, comparable gas mixtures, and hydrogen with impurities (depending on the type of measuring unit). ■ Automatic, regular calibration. **Gas analysis controller RGC 7-C** ■ Controller for the RGC 7-M measuring unit. ■ Calculation of calorific value, standard density, heating value, density ratio, and Wobbe index based on the percentage composition of the individual gas components, in accordance with ISO 6976 or GPA 2172-09. Optional calculation of the methane number according to DIN EN 16726. ■ Storage of analysis results in archives (minute, hour, day, month). ■ Comprehensive communication capabilities (Modbus, RMGBus, DSfG, etc.). ■ Selection of operating modes for maintenance purposes and for the analysis of gas samples. ■ Maintenance function: heating out (bake-out) ■ Monitoring of analogue and binary input signals.
Measuring units RGC 7-M	
Type designations	
RGC 704	■ Application: Extended natural gas analysis, including helium measurement and an increased measuring range for hydrogen.
RGC 717	■ Application: Hydrogen > 97%

Structure Measuring units	RGC 704	RGC 717
Measuring unit consisting of three gas chromatography columns:	■ Column 1, UBNDXP (carrier gas I) for the determination of: CH_4, CO_2, C_2H_6 ■ Column 2, PDMS (carrier gas I) for the determination of: C_3H_8, iso-C_4H_{10}, n-C_4H_{10}, iso-C5H12, n-C5H12, C6+ (higher hydrocarbons are measured as a sum) ■ Column 4, MS5A (carrier gas II) for the determination of: He, H_2, O_2, N_2	■ Column 1, UBNDXP (carrier gas I) for the determination of: CO_2, C_2H_6 ■ Column 2, PDMS (carrier gas I) for the determination of: C_3H_8, iso-C_4H_{10}, n-C_4H_{10}, iso-C5H12, n-C5H12, C6+ (higher hydrocarbons are measured as a sum) ■ Column 4, MS5A (carrier gas II) for the determination of: He, H_2, O_2, N_2, CH4, CO
Number of measurement streams	■ max. 2	■ max. 2
Carrier gases	■ Carrier gas I: Helium 5.0 ■ Carrier gas II (molecular sieve column): Argon 5.0, a carrier gas filter (Gas Clean Filter) is required for argon	■ Carrier gas I: Helium 5.0 ■ Carrier gas II (molecular sieve column): Helium 5.0, a carrier gas filter (Gas Clean Filter) is required for helium
Process gas connections	■ General: All gas inlets of the RGC 7 are, by default, located on the left-hand side. ■ Sample gas: 4 mm compression fitting. ■ Alternative fittings (1/8 inch, 3 mm, 6 mm) are not standard but available on request. ■ Carrier gas (I and II) and calibration gas: 1/8 inch tube connection/compression fitting. ■ Exhaust gas: 2 × 12 mm, 1 × 6 mm tube connection/compression fitting. The system includes a bypass line, an exhaust line, and an additional vent line for the housing of the RGC 7.	
Electrical connections	■ Wiring diagram: See operating manual. ■ Recommended cable type for power supply and heating: NYY-J 3×2.5 mm² For distances greater than 50 m between the control cabinet and the RGC 7, the following cable type should be used for the power supply: ■ NYY-J 3G 4 mm²	
Cable glands	Cable gland clamping ranges (permissible cable diameters): ■ 1 × 3.1 – 8.0 mm (inner sheath) ■ 1 × 8.7 mm (inner sheath), 6.1 – 13.1 mm (outer sheath) ■ 2 × 9.5 – 15.9 mm (inner sheath)	
Data cables	The maximum length for data lines is 50 m when using the following specified cable types: ■ Recommended cable type for indoor installation: Helukat 600 S/FTP 4 × 2 AWG23/1 FRNC ■ Recommended cable type for underground installation: Helukat, 600E S/FTP 4 x 2 AWG23/1 PVC ■ Recommended cable type for outdoor installation: Helukat, 600A S/FTP 4 x 2 AWG23/1 PVC/PVC When using other cable types, the maximum length cannot be guaranteed. Note for distances between the measuring unit and the RGC 7-C > 50 m: These lengths can be reliably achieved by converting the signal to VDSL.	

VDSL	■ The maximum length is limited to 1,500 m. ■ Required couplers: Industrial Ethernet-VDSL2 Extender by EKS Engel ■ Recommended cable types: - Helukat 600A S/FTP 4 x 2 x AWG23/1 PVC/PVC - Helukabel RE-2Y(St)Yv with n x 2 x 0.75 mm² - Helukabel PAAR-Tronic-CY-CY (LIYCY-CY) with n x 2 x 0.75 mm²		
Grounding concept	Earthed on both sides (+/– or L/N) via capacitors (DC or AC)		
Shielding	to be provided on-site		
Dimensions (W × H × D)	■ 305 x 1834 x 325 mm		
Weight	■ 60 kg including stand		
Application range of measuring units	**RGC 704**	**RGC 717**	
Ambient temperature at installation site	■ -20°C to +60°C (ambient temperature; installation in temperature-controlled indoor environments) ■ -20°C to +55°C (metrological temperature; PTB approval)		
Measuring unit and gas cylinder rack	Note: According to PTB requirement 7.62, for measurements subject to legal metrology, the RGC 7 and the pressurised gas cylinder for internal calibration gas must be stored in a room where the ambient temperature does not fall below +5°C.		
Minimum sample gas temperature	Above the water and hydrocarbon dew point		
Maximum sample gas temperature	100°C		
Analysis duration	approx. 60 s per measurement stream	approx. 90 s per measurement stream	
Maximum storage time before commissioning	The RGC 7 may be stored **without a permanent helium supply for a maximum of 4 weeks**, provided it is carefully sealed against moisture. If the device remains without helium supply for a longer period or is stored in an unsuitable environment, damage to the unit cannot be ruled out. **Warranty claims are explicitly excluded in such cases.**		
Approvals in accordance with			
EU directives	■ EMC Directive 2014/30/EU	■ EMC Directive 2014/30/EU	
EX approvals	■ ATEX Directive 2014/34/EU ATEX labelling: II2G Ex db eb IIB+H2 T4 Gb ■ IECEX	■ ATEX Directive 2014/34/EU ATEX labelling: II2G Ex db eb IIB+H2 T4 Gb	
National laws and regulations	■ Measurement and Calibration Act – MessEG, from 25.07.2013 ■ Measurement and Calibration Regulation – MessEV, from 11.12.2014		

Analysis values RGC 704	**Measuring range[1)]**	**Max. measurement uncertainty2)**	**Repeatability[3)]**
Calorific Value (Ho):	5,53 – 14,00 kWh/m³	0,129 kWh/m³ (0,8% of full-scale value)	<0,003 kWh/m³ (<0,028% of measured value)
Standard density (ρn):	0,59 – 1,36 kg/m³	0,5% of measured value	<0,00015 kg/m³ (<0,02% of measured value)

Additional Parameters:	■ Wobbe Index ■ Relative Density (D_v) ■ Gross Calorific Value (H_u) ■ Lower Wobbe index (W_u)

1) In accordance with PTB approval for compliance with legal metrological error limits. Extended requirements available on request.
2) Calculated according to DIN 32645
3) Twofold standard deviation (2σ) based on 20 consecutive laboratory measurements of synthetic gas 13K (calibration gas).

Analysis values RGC 717	**Measuring range**[1)]	**Max. measurement uncertainty**[2)]	**Repeatability**[3)]
Calorific Value (Ho):	3,43 – 3,75 kWh/m³	0,003 kWh/m³	<0,0001 kWh/m³
Standard density (ρn):	0,089 – 0,135 kg/m³	0,15 % of measured value	<0,0001 kg/m³
Additional Parameters:	■ Wobbe Index ■ Relative Density (D_v) ■ Gross Calorific Value (H_u) ■ Lower Wobbe index (W_u)		

Gas composition RGC 704	**Measuring range [mol%]**[1)]	**Detection limit [ppm]**[4)]	**Max. measure-ment uncertainty [mol%]**[2)]	**Repeatability [mol%]**[3)]
Methane	>50	5	0,3	<0,025
Ethane	<15	5	0,3	<0,007
Propane	<15	5	0,2	<0,001
iso-butane	<4	5	0,1	<0,0002
n-butane	<1,8	5	0,1	<0,0002
neopentane	<0,1	5	0,04	<0,0002
iso-pentane	<0,5	5	0,04	<0,0002
n-pentane	<0,5	5	0,04	<0,0002
C6+ (hexanes and heavier hydro-carbons)	<0,3	5	0,04	<0,0002
Carbon dioxide	<20	5	0,3	<0,001
Nitrogen	<30	10	0,3	<0,025
Oxygen	<3,8	10	0,2	<0,005
Hydrogen	<20	10	0,2	<0,004
Helium	<0,36	10	0,2	not present in the calibration gas

4) In conformity with the permissible error limits defined by calibration regulations. Additional specifications available upon request.

Gas composition RGC 717	**Measuring range [mol%]**[1)]	**Detection limit [ppm]**[4)]	**Max. measure-ment uncertainty [mol%]**[2)]	**Repeatability [mol%]**[3)]
Methane	<2	5		<0,0006
Ethane	<0,05	5		<0,0001
Propane	<0,03	5		<0,00015
iso-butane	<0,015	5		<0,0001

n-butane	<0,015	5		<0,0001
neopentane	<0,015	5		<0,0001
iso-pentane	<0,015	5		<0,0005
n-pentane	<0,015	5		<0,0005
C6+ (hexanes and heavier hydro-carbons)	<0,015	5		<0,0002
Carbon dioxide	<1	5		<0,0001
Nitrogen	<2	10		<0,0004
Oxygen	<1	10		<0,0002
Hydrogen	>97	10	0,05	<0,0006
Carbon monoxide	<1	10		<0,0006

Technical data measuring units	**RGC 704**	**RGC 717**
Inlet pressure:		
Measurement / Calibration / Test Gas	■ 1 – 2 bar	
Carrier gas (I and II)	■ 4,5 bar	
Gas consumption:		
for 3 columns	■ QT ~ 1,05 Nl/h	
Carrier gas I	■ Helium: ~ 0,7 Nl/h This results in a calculated carrier gas consumption of 6000 Nl/year.	
Carrier gas II	■ Argon: ~ 0,35 Nl/h This results in a calculated carrier gas consumption of 3000 Nl/year.	■ Helium: ~ 0,35 Nl/h This results in a calculated carrier gas consumption II of 3,000 Nl/year, i.e. in total with carrier gas I about 9,000 Nl/ year.
Sample gas	■ 2 – 3 Nl/h	
Bypass	■ 0 – 100 Nl/h (adjustable)	
Calibration gas	■ 2 – 3 Nl/h (if switched on, e.g. during calibration) With 10 calibration measurements per day (where runs 1 and 2 are discarded), the calculated consumption is approximately 180 Nl/year. Note: The stated calibration gas consumption is subject to variation.	
Calibration:		
Procedure according to PTB type approval	Calibration takes place daily for custody transfer measurements. This comprises at least 6 individual measurements, whereby the mean values of the last 3 measurements are used for calibration. In addition, two runs are carried out for peak tracking.	PTB approval not possible at the moment (as of 07/2025).
Incorrect calibration	If the first calibration is faulty, a second calibration is automatically performed as standard. If this second calibration also fails, the RGC 7 switches to operating mode "STOP".	

Technical data measuring units	RGC 704		RGC 717	
Setpoints for the calibration gas	**Gas components for 13K in [mol %]:**		**Gas components in [mol %] (preliminary):**	
	■ Methane (CH_4): 87,4	■ Carbon dioxide (CO_2): 1,50	■ Methane (CH_4): 0,6	■ Carbon dioxide (CO_2): 0,1
	■ Ethane (C_2H_6): 4,00	■ Propane (C_3H_8): 1,0	■ Ethane (C_2H_6): 0,05	■ Propane (C_3H_8): 0,03
	■ iso-butane (iso-C_4H_{10}): 0,20	■ n-butane (n-C_4H_{10}): 0,20	■ iso-butane (iso-C_4H_{10}): 0,01	■ n-butane (n-C_4H_{10}): 0,01
	■ neo-pentane (neo-C_5H_{12}): 0,05	■ iso-pentane (iso-C_5H_{12}): 0,05	■ neo-pentane (neo-C_5H_{12}): 0,00	■ iso-pentane (iso-C_5H_{12}): 0,01
	■ n-pentane (n-C_5H_{12}): 0,05	■ n-hexane (n-C_6H_{14}): 0,05	■ n-pentane (n-C_5H_{12}): 0,01	■ n-hexane (n-C_6H_{14}): 0,01
	■ Hydrogen (H_2): 1,00	■ Oxygen (O_2): 0,50	■ Hydrogen (H_2): 98,37	■ Oxygen (O_2): 0,30
	■ Nitrogen (N_2): 4,00		■ Nitrogen (N_2): 0,30	■ Carbon monoxide (CO): 0,20
Power supply:				
Measuring unit	■ 20 – 28 V DC			
Housing heating	■ 24 V DC (21 V – 27 V)			
Protection class	■ IP 65 (Observe the installation instructions in the operating manual!)			
Power consumption:				
Measuring unit connection	■ Typically 35 - 40 W, max. 75 W (according to manufacturer's specifications)			
Measuring unit and internal control (without heating)	■ 4 A (continuous) in operation			
Housing heating connection	■ 50 W (when switched on)			
Inrush currents	■ max. 6 A, ~2 A (continuous) at the housing heating connection (when switched on)			
Total	■ max. 150 W			
Safety shutdown measuring unit:				
In the event of a power outage:	The measuring unit starts in safety mode after a power failure and performs a self-test. Once all operating parameters have returned to normal, the unit becomes ready to measure again. If the RGC 7-C controller is restarted following the power outage, the incident is registered as a fault and an initial calibration is carried out. Once calibration has been successfully completed, standard measuring operations resume.			
In the event of carrier gas pressure failure:	The RGC 7-C controller halts measurement if the carrier gas pressure deviates beyond the set tolerances 5% for the RGC 704 and 20% for the RGC 717. If the carrier gas pressure drops below the column pressure, the RGC 7 switches to stabilisation mode and, if necessary, to fault mode. The ongoing analysis is discarded. Once the required operating pressure has been restored, measurement operations resume.			

Gas analysis controller RGC 7-C	
Housing	
Dimensions	213 x 128,4 x 310 mm (B x H x T)
Weight	2,5 kg
Ambient temperature	-20…55 °C
Protection class	IP 20 (protection against foreign bodies > 12.5 mm, no splash water protection)
Power supply	
Power supply	24 V DC -10 %/+15 %
Power consumption	25 W
Operation	
Control buttons	1 button (HOME)
Display	LCD Touchscreen 640 x 240 dots 256 Colours
Output (Text)	■ current measurement values, archived measurment data ■ programmable customer Display for quick access to the 20 most important parameters ■ Immediate help function
Output (Graphics)	■ Trends for all measurement values ■ current chromatograms
Electronic signature	■ if desired, possible signature settings: - None - RMD160+ECDSA192 - SHA256+ECDSA192
Web interface	Display and export of archives and parameters (e.g. in MS Excel format)/Event log access/Error log for the measuring unit
RMGView GC operating software	■ Display, Modification, and Export of Archives, Parameters, and Measurement Values (e.g. in MS Excel format)[5)] ■ Data book generation[5)] ■ Display and storage of chromatograms ■ Diagnose ■ The software is provided free of charge.
5) These functions are only available to a limited extent for measurements in custody transfer within Germany (read authorisation only).	
Storage/archiving	
Storage capacity (standard)	4 GB, SD card (industry requirements)
Measured values	■ Single analysis (1,054,080 entries, equivalent to approx. 2 years) ■ Hourly averages (17,568 entries, equivalent to approx. 2 years) ■ Daily averages (186 entries, equivalent to approx. ½ year) ■ Monthly averages (120 entries, equivalent to 10 years) ■ Calibration results (14,640 entries, equivalent to 40 years) ■ DSfG-A (see operating manual) ■ Event logbook (1,000 entries) ■ Parameter logbook (1,000 entries)
Chromatograms	■ Storage for up to 10 days

Hardware			
Embedded PC	CPU ARM1176 533 MHz 128 MB RAM 64 MB Flash		
Operating system			
Windows CE 6.0			
Digital inputs[6]		**Digital Outputs**[6]	
Quantity	20	Quantity	12
U_{max}	5 V (+10 %)	U_{max}	24 V
I_{max}	13 mA	I_{max}	100 mA
f_{max}	10 Hz	P_{max}	100 mW
Overvoltage protection	6,8 V	Overvoltage protection	33 V
Analog inputs[6]		**Analog outputs**[6]	
Quantity	8	Quantity	4
Resolution	20 Bit	Resolution	12 Bit
I_{max}	28 mA	Load	700 Ohm
R_i	250 Ohm	Overvoltage protection	33 V
Overvoltage protection	6,8 V (Inputs 1…4) 33 V (Inputs 5…8)		
[6] can be expanded using external WAGO modules; up to 16 additional analogue/digital inputs and outputs are possible.			
Temperature inputs			
Temperature input 1	PT100		
Temperature input 2	PT100, PT1000		
More			
Alarm contact	1 x available, R_{on} = 30 Ω		
Warning contact	1 x available, R_{on} = 30 Ω		
Passive inputs	2 x available, U_{max} = 30V		
Data interfaces (Ethernet 2x)			
LAN 1	Operator network, DHCP server, DHCP client or static IP address		
LAN 2	Operator network, DHCP client or static IP address, Modbus TCP/IP or HTTP		
For data exchange, RMG recommends using a static IP address, which must then be configured in the connected volume correctors (e.g. ERZ2000-NG, …).			
USB (2x)			
Front	for mouse, external hard drive or keyboard		
Rear panel	for connecting a PC		
Due to approval requirements (i.e. legal metrology reasons), these ports are generally not available.			

Serial interfaces (7x)	
COM 1	RS 232 / RS 485, configurable via jumpers
COM 2[7)]	RS 232
COM 3	RS 232 / RS 485, configurable via jumpers
COM 4	RS 232 / RS 485, configurable via jumpers
COM 5	RS 232
COM 6	RS 232 / RS 485, configurable via jumpers
COM 7	RS 232 / RS 485, configurable via jumpers

[7)] This interface is not available for custody transfer within Germany.

Configuration bus/protocols:	DSfG	Modbus RTU/ Modbus ASCII	RMGBus	WAGO - IO
COM 1		X		
COM 2[7)]				X
COM 3	X	X	X	
COM 4	X		X	
COM 5		X		
COM 6		X	X	
COM 7		X		

ONE STEP AHEAD

Subject to change without notice!

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Additional information

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