VACOM® MultiGraph
Manual
Display Unit
**VACOM® MultiGraph (VMG)**

Display unit for the use of

VACOM® gauges and other gauges

**BARION® atm**

**BARION® HV**

**VaX linkB**

**ANYGAS**

and further sensors

*Contact: support@vacom.de*
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1 General Informations

1.1 Product Description

The **VACOM® MultiGraph** (hereinafter referred to as **VMG**) is a display and operating device for operation of the VACOM wide range vacuum gauge of the **BARION®** series and of **ANYGAS**. Even some non-VACOM-gauges can be operated with **VMG**. Please note the manual belonging to the used vacuum gauges while using.

The **VACOM® MultiGraph** provides the operating voltage for the gauge and displays measuring values and operational parameters of the gauge. Furthermore, the **VMG** can be used for the manual control of functions of the gauge, for data exchange with PCs via RS232 interface and via two switchpoint relays for the floating pressure-dependent circuit of external low voltage units. The device is operated by front panel keys.

1.2 Storage

The **VMG** must only be stored in dry and dust-free rooms. The ambient temperature for storage should only be between -20 °C and +60 °C. Furthermore, the ambient may not be condensing and have to show a low air humidity.

1.3 General Regulations and Warranty

For the faultless function of the device we assume the warranty for one year. All material and manufacturing defects will be cleared free of charge within this period. Damages due to inappropriate use are not covered by warranty. The manufacturer will assume no warranty when the operator or third parties modify the product in any way which exceeds the operations listed in the appropriate manual. The product must be sent back in original packaging at the expense of the customer. We reserve the right to decide on replacement or reconditioning after inspection in our company.

1.4 Certificates/Approvals

The instrument does comply with the requirements of the following international/national standards, guidelines or specifications:

- 2006/95/EG (Low Voltage Directive)
- 2004/108/EG (EMV Directive)
- DIN EN 61010-1 (2002-08) (Safety requirements for electrical equipment for measurement, control and laboratory use)
- DIN EN 61326-1; VDE 0843-20-1:2006-10:2006-10 (Electrical equipment for measurement, control and laboratory – EMV requirements - Part 1: General requirements (IEC 61326-1:2005); German version EN 61326-1:2006)
2 Safety

2.1 Observance of Operating Instructions

The VMG is supplied ready for operation. We recommend to carefully read the manual to ensure an optimal operation right from the start.

The present manual contains important information on the device, its installation, putting into operation and control of the operation as well as help with malfunctions.

2.2 Signs and Symbols

- **NOTE, DANGER or WARNING:** Information on the prevention of personal injury or damage of all kinds.
- **DANGER:** Information on the prevention of personal injury or damage by electrical impact.
- **NOTE:** General leads on further information and related articles.

2.3 Basic Safety Guidelines

During all work, such as installation, maintenance and repair, please comply with respective safety regulations.

- **DANGER: Mains voltage**
  Contact with components inside the instrument carrying the mains voltage can, when introducing objects or liquids, cause danger to life.

- **WARNING: Improper usage**
  Improper usage can damage the instrument. Use the instrument only in accordance to the manufacturers’ instructions.

- **WARNING: Incorrect connection and operation data**
  Incorrect connection and operation data can damage the instrument. Comply with all prescribed connection and operation data.
3 First Steps/Unpacking

3.1 Check for any Physical Damage

Check the packaging for visible damages. Send an advice of damage to the carrier and to the insurer in case of damage (support@vacom.de).

3.2 Scope of Delivery

The scope of delivery includes one VMG, the required power supply for voltage supply (adapter included) as well as the manual.

3.3 Acclimatization

After unpacking and before first commissioning, please bring the instrument for acclimatization during several hours to room temperature. As a result, electrical short circuits and therefore the breakdown of the device can be prevented.
4 Mounting and Installation

The VMG can be operated as benchtop instrument and as rack installation.

**WARNING:**
Set up or install the instrument in such a way that you can disconnect the power supply at any time. Please observe the permitted ambient temperature during installation.

4.1 Benchtop Instrument

Place the instrument on a flat, vibration free surface. Ensure that the instrument is always installed securely.

4.2 Rack Installation

For the mounting in a front panel or a panel cut-out remove the alu frame attachment from the VMG housing via pull off. Insert the VMG on the front side of the panel into the cut-out.

4.3 Electrical Installation

On the rear of the device you will find the following connections:

1. TPC: Not in use
2. RS232: Connection for RS232 interface
3. DC in (24 V) and setpoint relay: Connection for power supply and setpoint relay
4. Gauge: Connection for one gauge or for the adapter to connect two gauges
4 Mounting and Installation

4.3.1 DC in (24 V) and setpoint relay

This connection provides the power supply and is intended for the floating switching contacts of the setpoint relay. The pin assignment is shown as follow:

```
1, 2  Operating voltage 24 V DC
3, 4  Floating relay contact 2
5, 6  Floating relay contact 1
7    Do not use
8    Do not use
9, 10 Operating voltage ground
11   Do not use
12   Do not use
13   Do not use
14   Do not use
15   Do not use
```

Connect a voltage source with the following data:

- Voltage: +24 V DC ±5 %
- Power output: min. 24 W

Connect external low voltage units with the following data if required:

- Power consumption: max. 1.0 A
- Operating voltage: max. 30 V AC/30 V DC

**WARNING:**
Incorrect power supply can damage the device. Only use shielded connecting cable when using this connection.

**DANGER: Dangerous contact voltages**
Volts higher than 60 V DC or 30 V AC are dangerous to touch. You are allowed to switch with the setpoint relay only voltages up to 30 V DC or 30 V AC. These voltages have to comply with the requirements of a grounded protective low voltage (SELV according to EN 61010). Contact with components inside the instrument carrying high voltage can, when introducing objects or liquids, cause danger to life.
4 Mounting and Installation

4.3.2 Gauge

Gauge is the connection who serves to connect the wide range vacuum gauge. For the operation of ANYGAS and of non-VACOM gauges a adapter (available from VACOM) is required. The pin assignment is shown as follow.

Connect the gauge with a shielded 1:1-cable (max. length 15 m).

**ATTENTION: Improper measuring instruments**

Measuring instruments, which are not intended for the usage via this connector, can damage the instrument. Operate this connector of the VMG only with the appropriate sensor.

4.3.3 RS232

RS232 provides a connection to another serial device (PC).

ATTENTION:
Apply a serial extension cable with a 9-pole connector and a 9-pole socket. The cable may not have crossed conductors.
The VMG has a graphic LC-display which is divided into several display areas. Below the display there are 4 multi functional front panel keys. The current function of the keys is shown in the bottom field of the display.

A Display of the connected sensor  
B Display of measuring value and display of parameters  
C Display of the current key settings  
D Front panel keys

5.1 Initial Operation

Switch on the device by connecting the operation supply of 24 V DC on the rear plug “DC in (24 V) and setpoint relay”.

After switching on the device performs the following steps:

- Supply the power for the wide range gauge at the connection “gauge”
- Self-test and display test
- Display of the used software version
- Restoring of the last set parameters
- Start of the digital communication with the wide range vacuum gauge
- Sending commands and receiving pressure measured values
- Activation of measurement display

To switch off the VMG, interrupt the power supply by removing the cable from plug “DC in (24 V) and setpoint relay”.

ATTENTION: waiting period
Please wait at least 5 seconds before switching on the device again.
5 Operation

5.2 Operating Elements

The VMG can be controlled either by using the front panel keys or the rear RS232 interface. The functional range of interfaces is different from the functional range of front panel keys. Both kind of operating modes can be used at any time. Entered commands via key press or RS232 are done in the sequence of arrival.

5.3 Device Functions

The Operating of the VMG by panel keys is menu-driven and intuitv. By pressing a key the corresponding submenu opens or the device function is executed and shown on the display. New parameter settings are only applied after pressing the key “Next”. To return to the next higher menu press the key “Back” by cancellation of the current action or press the key “Next” (the saving of parameters and returning to the main menu).

Note:
During the operating via front panel keys the pressure measurement of the wide range vacuum gauge is continuously read out and provided at the RS232 interface of the VMG.

The following parameter settings are preset at the factory:

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Current value</td>
</tr>
<tr>
<td>Unit</td>
<td>mbar</td>
</tr>
<tr>
<td>Emission</td>
<td>Auto</td>
</tr>
<tr>
<td>Filament</td>
<td>Auto</td>
</tr>
<tr>
<td>Lower SP, Upper SP</td>
<td>$1.00 \cdot 10^{-12}/9.00 \cdot 10^3$ mbar</td>
</tr>
</tbody>
</table>

During normal operation the graphic display shows the measurement value, operating parameters of the gauge and the key assignment of the main menu.

ATTENTION:
Take account of the gas-type dependence of the gauge.
5 Operation

Displayed Measurement Value

Pressure measurements can be displayed in three different modes:

- Digital display (current measurement value, 1 value per second)
- Graphic display of pressure characteristic 1 h (logarithmic, 1 value per 30 seconds)
- Graphic display of pressure characteristic 24 h (logarithmic, 1 value per 12 minutes)

Pressure measurements can be displayed in the units mbar, Pa or Torr. The selection is done via “Unit”.

Setpoints (setting of the setpoints Lower SP, Upper Sp)

The VMG provides two setpoint relays. With the front panel key „Channel“ the analoge or digital channel (depends on type of connection) can be selected (see compatible gauges chapter 8). The switching behavior is determined by two programmable threshold values “Lower SP” and “Upper SP”. When setting the two thresholds a switch hysteresis with mind. 20 %, based on the pressure value “Upper SP”, have to set. Otherwise the fault signal „Value not allowed“ appears on the display. Between both values in the measurement range the last relay circuit is preserved. With the hysteresis a frequent switching of the relay is prevented in case of minor changes of the pressure measurement close to one of the setpoints.

<table>
<thead>
<tr>
<th>Threshold values</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower SP</td>
<td>Lower threshold value (The relay is energized (contact close), if the pressure measurement falls below the lower setpoint).</td>
</tr>
<tr>
<td>Upper SP</td>
<td>Upper threshold value (The relay drops off (contact open), if the pressure measurement falls below the upper setpoint).</td>
</tr>
<tr>
<td>Switch hysteresis</td>
<td>mind. 20 % (based on the pressure value “Upper SP”)</td>
</tr>
</tbody>
</table>

The threshold values must be selected, from this it can be set via the arrow keys. The device prevents settings which would only apply: Lower SP > Upper SP. It may occur that “Upper SP” has to be increased before increasing “Lower SP”, or that “Lower SP” has to be decreased in advance to further reduce “Upper SP”.

![Diagram of setpoint behavior](image)
5  Operation

Parameter settings of the VACOM wide range vacuum gauges

The parameter settings of VACOM wide range gauges can be found on the menu setting “Digital Sensor”.

Selection of following functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust ATM: Atmosphere adjustment of the Pirani gauge</td>
<td>Only execute at atmosphere pressure (ca. $1 \cdot 10^{-3}$ mbar).</td>
</tr>
<tr>
<td>Adjust VAC: Zero point adjustment of the Pirani gauge</td>
<td>Do not execute at pressures $p \geq 1 \cdot 10^{-4}$ mbar. Deactivate hot cathode operation 1 min before per „Emission Off“ and reactivate after zero-point adjustment per „Emission Auto“.</td>
</tr>
<tr>
<td>Start Ioni: Starts the hot cathode operation manually</td>
<td>This function is allowed to call just in the permitted pressure range of the sensor. Non-compliance can result in the damage of sensor and manometer!</td>
</tr>
<tr>
<td>Stop Ioni: Stops the active hot cathode operation manually</td>
<td>The hot cathode operation starts no longer automatically.</td>
</tr>
<tr>
<td>Degas: Degas function</td>
<td>Can only be started at pressures $p \leq 1 \cdot 10^{-5}$ mbar.</td>
</tr>
<tr>
<td>Emission Auto: The emission current is set automatically depending on the pressure measurement.</td>
<td>With lower pressure the emission current increase.</td>
</tr>
<tr>
<td>Emission Low: The lowest common emission current is set to 2 μA.</td>
<td>The accuracy may degrade with this settings with pressure measurements of $p &lt; 10^{-6}$.</td>
</tr>
<tr>
<td>Emission Off: Forced Pirani mode</td>
<td>The hot cathode operation will be interrupt.</td>
</tr>
<tr>
<td>Both Filaments: Filament auto mode</td>
<td>Selection of filament 1, until there is no filament error. Then automatic switchover to filament 2.</td>
</tr>
<tr>
<td>Filament #1 Only: Operation mode filament 1</td>
<td>Filament 1 is selected</td>
</tr>
<tr>
<td>Filament #2 Only: Operation mode filament 2</td>
<td>Filament 2 is selected</td>
</tr>
</tbody>
</table>
5 Operation

<table>
<thead>
<tr>
<th>Function</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity:</td>
<td></td>
</tr>
<tr>
<td>To set the sensor sensitivity</td>
<td>Overwrite the present values!</td>
</tr>
<tr>
<td>Pirani parameter:</td>
<td></td>
</tr>
<tr>
<td>To set the pirani parameter</td>
<td>Overwrite the present values!</td>
</tr>
</tbody>
</table>

Note:
In the filament operation mode both, 1 and 2 the hot cathode sensor will switch on automatically depending on the pressure measurement of the Pirani gauge or switch off automatically depending on the pressure measurement of the hot cathode sensor.

5.4 Interface to ANYGAS

The ANYGAS is only allowed to be operated at VMG with the associated adapter (see chapter 5.3 Operation of an analogue gauge). Connect the gauge cable of ANYGAS to the adapter and the gauge by yourself. The ANYGAS gauge will be automatically detected by VMG.

5.5 RS232 Interface

The operation of the VMG using the RS232 interface is executed according to the VACOM protocol, which describes the available device functions, too. The manual to the VACOM protocol is available in the download area at www.vacom-vacuum.com.

5.6 Firmware Update

Available firmware updates are quickly installable at VMG provided by the customer. The current firmware and a program for download the firmware are available at www.vacom.de/downloads/software. The current firmware version of your VMG can be retrieved in the menu „Firmware“.

For the upgrade process, proceed as follows:

1. Plug the VMG via RS232 cable into your PC.
2. Connect the power supply with the VMG.
3. Start the program “VACOMFirmwareUpdater-VMG-Version.exe”.
4. Select the COM port who is connect with the VMG.
5. Click on „Update“ to start the update process.

In case of error messages, check the communication to the VMG. Is it properly connected, supplied with power and is the correct COM port selected.
5 Operation

5.7 Operation of an analog sensor

Analog sensors (see compatible sensors at chapter 8) have to be connected to the VMG via the corresponding adapter at the "analog" red connection.

Analog sensors are detected automatically from the VMG otherwise you have to choose the correct type from the list given by the VMG after sensor connection.

In case of the sensors CVM211/PTR90/MPG400, the sensor have to be selected manually at menu „Settings/Analog Sensor“.
5 Operation

5.8 Operation of two sensors

At the VMG the simultaneous operation of a digital and an analog sensor is possible. Depending on the type, the sensors are connected via the correct connection (digital or analog, see Chapter 8) of the corresponding adapter.

Both setpoints can be assigned to the desired sensor at menu „Setpoints“ under „Channel“.
# Troubleshooting, Maintenance and Service

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes</th>
<th>Possible remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>The display is blank</td>
<td>Power supply is not connected or operating voltage is too low.</td>
<td>Ensure power supply 24 V DC at rear Sub-D plug “DC in (24 V) and setpoint relay”.</td>
</tr>
<tr>
<td>Error message “no sensor”</td>
<td>Cable connection between VMG and wide range vacuum gauge is disturbed.</td>
<td>Check plug connections and ensure proper connections, or repair or replace cable.</td>
</tr>
<tr>
<td></td>
<td>Wide range vacuum gauge has a defect which disturbs the communication with VMG.</td>
<td>Repair or replace wide range vacuum gauge.</td>
</tr>
<tr>
<td></td>
<td>Power supply is below 21.6 V DC, but higher than 6 V DC.</td>
<td>Ensure 24 V DC power supply at rear D Sub plug “DC in (24 V) and setpoint relay”.</td>
</tr>
<tr>
<td></td>
<td>PTR90; MPG400; CVM211 - sensor is not detected.</td>
<td>Select the corresponding sensor in the menu item „Analog Sensor“.</td>
</tr>
<tr>
<td>VMG does not respond to keystroke</td>
<td>Device is in update mode.</td>
<td>Wait for update to finish and try again.</td>
</tr>
<tr>
<td></td>
<td>The previous firmware update has failed.</td>
<td>Perform firmware update again.</td>
</tr>
<tr>
<td>VMG does not respond to RS232 commands</td>
<td>Communication parameters of the master are set incorrectly.</td>
<td>Check and adjust communication parameters</td>
</tr>
<tr>
<td></td>
<td>The previous firmware update has failed.</td>
<td>Perform firmware update again and activate the checkbox „slow Update“.</td>
</tr>
</tbody>
</table>

If malfunction persists, please contact VACOM. Defective products can only be repaired by VACOM or authorised partner companies. VACOM cannot assume any responsibility or warranty if the operator or third persons do repair work on the device.

**Maintenance:**
The VMG is maintenance-free. The supply voltage should be switched off to clean the housing. Please use a dry cotton cloth for external cleaning. Do not use any aggressive or abrasive detergents, since these substances attack the surfaces.

**ATTENTION: Electrical components**
The device contains electrical components carrying high voltages. Do not introduce any objects into the openings of the instrument. Keep the instrument dry. Do not open the instrument.
7 Return/Disposal

Please keep the original packaging. You will need this packaging in case of storing the VMG or shipping to VACOM.

Regarding waste disposal the branch specific and local waste disposal and environment protection regulation for systems and electronics components are valid. In case of return VACOM will execute the professional resource separation and disposal.
## Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Outer dimensions**          | 96 x 96 x 60.3 mm (with front frame)  
                              | 90 x 91 x 53.3 mm (without front frame)                                                                                             |
| **Weight**                    | 306 g                                                                                                                                 |
| **Built-in depth**            | Ca. 120 mm (including connected plug)                                                                                               |
| **Operation voltage**         | +24 V DC, ±10%                                                                                                                        |
| **Power consumption**         | Max. 24 W                                                                                                                            |
| **Protection class**          | IP40                                                                                                                                 |
| **Electromagnetic compatibility** |  
                              | - 2004/108/EG                                                                                                                        |
                              | - 2006/95/EG                                                                                                                         |
                              | - EN 61010-1 (2002-08)                                                                                                               |
                              | - EN 61326-1 (2006-10)                                                                                                               |
| **Measuring rate**            | 1/s                                                                                                                                  |
| **Display unit**              | mbar, Pa, Torr (switchable)                                                                                                           |
| **Measuring range**           | 1 · 10⁻⁸ to 1 · 10⁵ Pa  
                              | 1 · 10⁻¹⁰ to 1000 mbar  
                              | 7.5 · 10⁻¹¹ to 750 Torr                                                                                                              |
| **Setpoints**                 | 2                                                                                                                                 |
| **Serial interface**          | RS232 (Baud rate 19200)                                                                                                               |
| **Compatible sensors**        | Digital:  
                              | - BARION® atm  
                              | - BARION® atm II  
                              | - BARION® HV  
                              | - VaX linkB  
                              | - ATMION  
                              | Analog:  
                              | - ANYGAS-XXX  
                              | - COLD-XXX  
                              | - PIRANI-XXX-C-X  
                              | - MEMBRAN-1XXX25-X  
                              | - PSG500, PSG502  
                              | - PCG550, PCG554  
                              | - TTR91, TTR96, TTR101  
                              | - MPG400  
                              | - PTR90  
                              | - CDG020D, CDG0250D  
                              | - CTR100  
                              | - CVM211                                                                                                                             |
| **Storage temperature**       | -20 to +60 °C                                                                                                                        |
| **Operation temperature**     | +5 to +50 °C                                                                                                                         |
| **Rel. humidity**             | Max. 80 %, non-condensing                                                                                                             |
VACOM®

Precision & Purity

UHV ■ XHV ■ UCV

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