

1-CUBE s. r. o.

Hamry 3567, 580 01 Havl. Brod, Czech Rep.
tel + 420 569 433620, fax + 420 569 422144
e-mail: 1-cube @1-cube.com, www.1-cube.com

**MEASURING DEVICE
OF CO₂ CONTENT IN FERMENTING TANKS AND
KEG CASKS - TYPES GMD AND GMDK:**

USER'S GUIDE

Contents:

- 1.0 Range of supply**
- 2.0. Installation - putting the device into operation and its maintenance**
- 3.0 Safety recommendations**
- 4.0 Technical data**
- 5.0 Operating instructions**
- 6.0 Service**

1. Range of supply

the own measuring device GMD (GMDK)	1 unit
adapter.....	1 unit
cable for connection to PC (for type GMDK).....	1 unit
floppy disk with program for PC (for type GMDK).....	1 unit
user's guide.....	1 unit

Accessories:

withdrawal head for kegs.....	1 unit
pressure reducing valve with manometer.....	1 unit
pump for air.....	1 unit
check valve.....	1 unit
rubber hose (length and number of hoses according to customer's demand)	

Note: accessories is not part of the supply - only on customer's demand

2. Installation - putting the device into operation and its maintenance

The device is ready for measurement at the moment of delivery.

Preceding the own measurement the operator connects the device by fixing of inlet hose (3) to the withdrawal spot. The measured sample must flow through bigger stainless tube (4) to the bottom of the device vessel. The inlet hose (3) must be secured at the withdrawal spot not to fall out during withdrawal.

The operator must clean the device after its disconnection from the withdrawal spot. The device cleaning after the measurement is easy and fast.

First: the operator disconnects and lifts up the inlet hose (3) over the device

Second: the operator turns the device upside down, outlet hose (5) must be brought to the drain

Third: the operator opens valve (2) after equalizing overpressure the operator opens valve (1).

Let the measured sample flow to the drain

The cleaning:

Both ball valves (1,2) are still open now. The operator connects the inlet hose (3) to the water supply. Afterwards the operator opens slowly the water cock and rinses the device by water.

Warning! Pressure of water must not exceed value 250kPa - on the device manometer.

Whole internal space of the vessel (6) must be filled by water during cleaning. During rinsing the operator pulls out and consequently depresses button (9) to rinse both pump and capillary.

After cleaning:

The operator switches off the water supply and disconnects the inlet hose (3) from the water cock. The operator must bring the outlet hose (5) to the drain and turn the device upside down. At the same time the inlet hose (3) must be over the device so that all rinsed water can flow out of the device. The operator must discharge all water out of the device. After this handling the device is ready for next measurement.

Warning! After all measurements the operator must rinse the device by clean pressure water (before storing).

3. Safety recommendations

Measuring device of CO₂ content - types GMD (GMDK) may be operated only by person who became completely acquainted with its function within the framework of the training, or who became thoroughly acquainted with the user's guide of this device.

Measuring device GMD (GMDK) can be used only for determination of CO₂ content in the range of measured values determined by technical conditions. Never connect the measuring device to the withdrawal spots where measured parameters are over measuring capacity of the device.

Check device before each measurement. Do not use visibly damaged device and contact the qualified service personnel who provides service for delivered device.

Warning! It is forbidden to use the device for pressure higher than 600 kPa and for temperature higher than +30 degrees Celsius. It could cause device destruction and staff injury.

4. Technical data:

range of CO ₂ measurement.....	2,0 - 9,99 g/litre or in volume percentage 0,2 - 0,99
range of temperature measurement.....	0 - +30 degrees Celsius
range of pressure measurement.....	0 – 600 kPa
accuracy of CO ₂ content measurement.....	+ - 0,05g/litre or in volume percentage + - 0,005
accuracy of temperature measurement.....	+ - 0,1 degrees Celsius
accuracy of pressure measurement.....	+ - 0,5%
dimensions.....	290x200x90 mm
weight (of empty device).....	about 2,1kg
memory (type GMDK).....	700 samples

5. Operating instructions

5.1 Withdrawal of sample

Measuring device makes it possible to determine CO₂ content in cylindro-conical fermenters and fermenting tanks. It is possible to determine CO₂ content in kegs too but it is necessary to equip the measuring device with accessories for reliable withdrawal of sample from kegs.

Before each measurement it is necessary to check visually the device if it is not damaged. Button (9) on the top of the device must be secured in the lower position (10) before measurement.

Warning! Before withdrawal of sample from tank it is necessary to remove sedimented yeast so that filled beer or saturated drinks can be without these sedimented yeast.

1) Check button (9) on the top of the device if it is secured (10). Afterwards the operator connects the inlet hose (3) to the withdrawal spot. The inlet hose (3) must be secured not to fall out.

2) The operator brings the outlet hose (5) to the drain. During this handling the inlet ball valve (1) has to be already shut.

3) The outlet ball valve (2) is still shut. Afterwards the operator opens valve of the withdrawal spot and beer or saturated drink can go into the inlet hose (3) to inlet valve (1).

4) The operator opens the inlet ball valve (1) and handles outlet valve (2) and fills the measuring vessel (6) by measured sample. The filled sample of beer or saturated drink should foam as little as possible. The whole measuring vessel (6) must be filled only by beer or saturated drink and all foam must be forced out of the vessel. It is necessary to check it visually. The operator holds the device in a vertical position during filling of sample. The operator must try to fill the device vessel (6) without foaming. The operator can achieve it by handling with outlet ball valve (2).

5) After filling of measuring vessel (6) by beer or saturated drink the operator shuts the outlet (1) and the inlet (2) valve and afterwards shortly opens and immediately shuts the outlet valve (2). After this handling the pressure (in the measuring vessel (6)) is balanced to the zero value.

5.2 Measurement

1) After reaching the zero pressure in the vessel (6), the operator pulls out and consequently depresses (twice) the arrestment button (9) on the top of the device. After this handling dissolved CO₂ is fluttered. The operator arrests the button (9) of pump in secured position (10) by moving round. Then turn the instrument upside down couple of times.

Notice! The operator must always turn the button (9) in clock-wise direction.

Warning! The operator must make sure the closing valve on tank is shut and internal space of the inlet hose (3) is not under pressure before disconnection of the inlet hose (3) from the withdrawal spot. Afterwards the operator can disconnect the inlet hose (3) from the withdrawal spot.

Switching on and switching off the device, its charging:

- Switching on the switched off device:

- press key ON/OFF on the membrane keyboard
- connect the device to the adapter


When the operator connects the device to the adapter the time charging by higher current is activated for 14 hours. After this period the charging current is automatically changed over to holding current.


- Switching off the switched on device:

- a) press and release key ON/OFF on the membrane keyboard
 - b) disconnect the device from the charging adapter and press and release key ON/OFF on the membrane keyboard.
 - c) device is automatically interrupted if it is more than 2 minutes without service (without depression of any key on the keyboard), device beeps about 5 sec. before automatic interruption
 - d) device is automatically interrupted at discharge of the accumulator
- about 5-10 minutes before discharge of the accumulator yellow indicating LED BAT starts to wink
 - about 20-30 minutes before discharge of the accumulator intermittent acoustic indication is activated
 - device is automatically switched off if accumulator reaches critical value of voltage (2,2 V)

Determination of CO₂ content in regime of automatic numbering of measured samples:

2) press shortly key ON/OFF, text „unit“ will appear on the display

3) press (about 5s) key  , No. of sample will appear on the display (for example 0001), then CO₂ content of the sample No. 0001 (f.e. 5,15 [g/l]) will appear automatically on the display.

4) press shortly key  , No. of sample will appear on the display (for example 0002), then letter p and after several seconds value of measured pressure (for example “298 kPa”) will appear on the display, then letter t and after several seconds value of measured temperature (for example “20,4 degrees Celsius”) will appear on the display, then letter c and value of measured CO₂ content (for example 6,38 [g/l]) will appear on the display.

All measurement of sample No. 002 are over now and device is ready to start measurement of the following sample.

Before new measurement (sample No.003) the operator must withdraw the sample (see chapter 5.1) then device can take new measurement (see chapter 5.2).

After another following the instructions described above in paragraph No. 4) the device will measure the following sample. The device gives automatically No. 003 to this following sample .

9) press shortly key ON/OFF to switch the device off

Notes:

= If yellow light (BAT) winks it is necessary to charge the accumulator with the help of adapter (part of supply). Period of charging is not less than 14 hours.

= Follow the procedure described in paragraphs 4), 5), 6) only in case of you switched of the apparatus (using the keys ON/OFF). Skip the procedure described in paragraphs 4), 5), 6) in case the apparatus has not been switched off between measurement of two samples – in this case the procedure described in 4), 5), 6) will be followed automatically by the apparatus.

5. 3 Transfer and look-through in PC


Memory of microcomputer can save 700 samples. Possibility of data transfer through communicating cable into PC has only type GMDK (unlike type GMD). Before the first data transfer from the device into PC the operator must install software from our supplied floppy disk.

Installation of the software

- 1) Insert enclosed floppy disk (GMDK) into computer driver
- 2) Type text: **A:INSTAL** on the keyboard. After this operation data transfer (from disc into PC) starts
- 3) Ater the end of data transfer také floppy disk out of PC and press key RESET on the keyboard

Transfer of data from the device to PC


- 1) Switch off the device and PC
- 2) Connect round connector of connecting cable to device and connector-converter RS485 -RS232 (dismantling is forbidden) to fork COM2 to PC
- 3) Switch on PC and type text GMDK on the keyboard and press the key Enter.

- 4) Press keys Alt and R at the same time. „Window“ with text Filename will appear on the PC display - name data from the device GMDK, switch on GMDK, text „unit“ will appear on GMDK display
- 5) Press key  on the device GMDK for several seconds and wait till text „send“ appears on the GMDK display
- 6) Press keys Alt and R on PC keyboard at the same time.
- 7) Data are transferred from GMDK into PC. Transfer of data is over when text „unit“ appears on the GMDK display
- 8) Press keys Alt and R on PC keyboard at the same time. The transferred data from device GMDK will appear on the display.
- 9) Press keys Control and Pause on PC keyboard at the same time for the end of communication between GMDK and PC
- 10) Data from GMDK will be saved in PC memory under your chosen name (see paragraph 4) in directory C:\TERMINAL\

Warning:

Do not disconnect communicating cable between GMDK and PC if they are not switched off. GMDK and PC can be damaged in the opposite case!!!

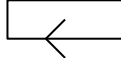

5. 4. Look-through of the measured data (results) in apparatus

Follow the procedure described in 5.2. paragraphs 2), 3), 4). When you follow this procedure, the value of CO₂ content of the last sample 6,38 [g/l] will appear on the display. After looking through the value of CO₂ content of the last sample (for example 0002), press the key  -No. of sample 0001 will appear on the display then CO₂ content of the sample No. 0001 (f.e. 5,15 [g/l]) will appear automatically on the display.

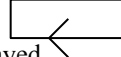
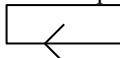

Notes:

= When you finish the look-through of the results, set up again the No. of the last sample by pressing the key + . Otherwise the original measured values will be overwritten with the new values.

5. 5. Measurement of the pressure only:

Follow the whole chapter 5.1. and paragraphs 1), 2), 3) of the chapter 5.2. and then press twice key  and the letter «P» will be displayed, press key  and the apparatus will measure only the pressure

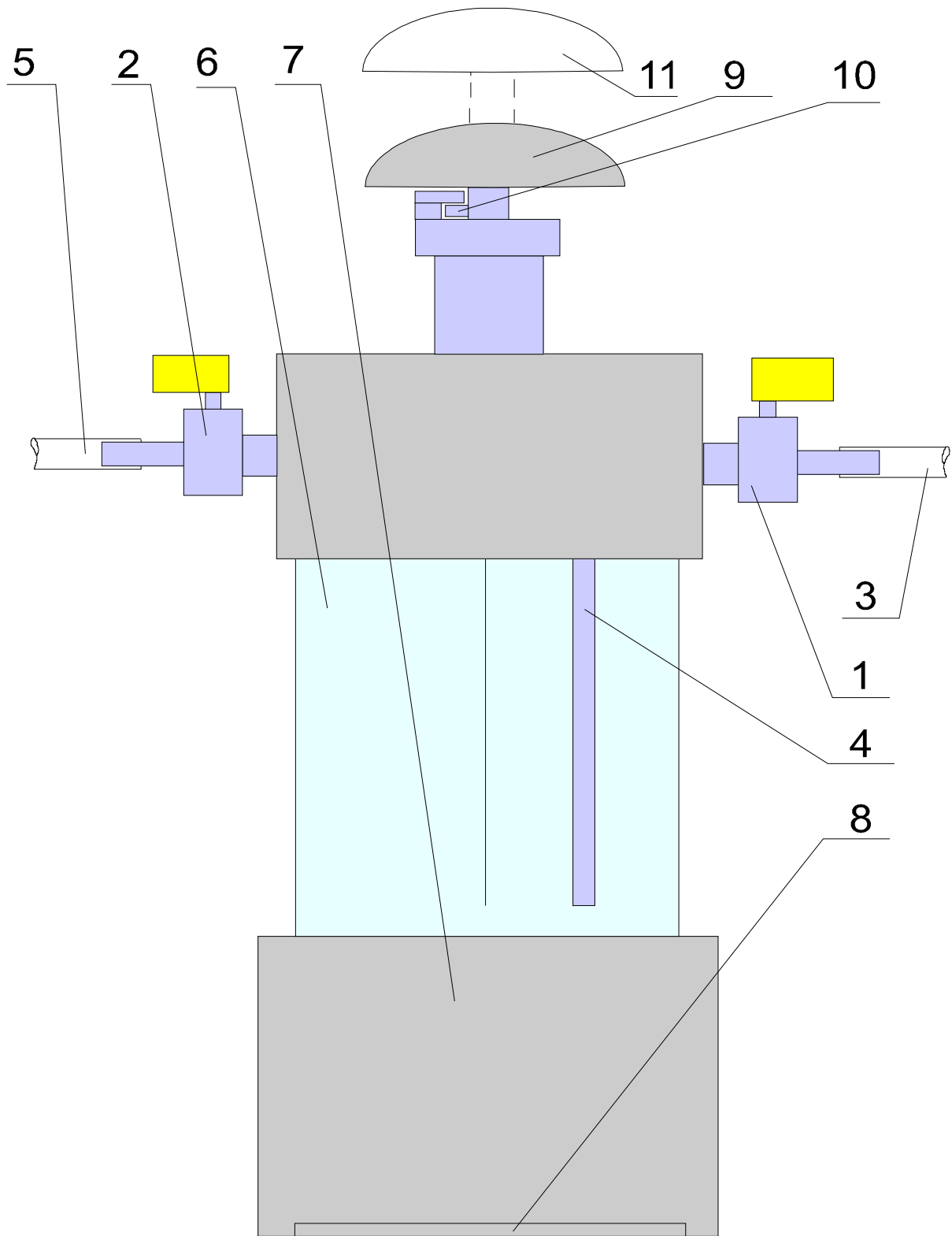
5. 6. Measurement of the temperature only:

Follow the whole chapter 5.1. and paragraphs 1), 2), 3) of the chapter 5.2. and then press twice key  and the letter «P» will be displayed, then press once key  and the letter «T» will be displayed, press key  and the apparatus will measure only the temperature

6.0 Service

Service is provided by company:

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Hamry 3567, 580 01 Havl.Brod, the Czech Republic
tel.+420-569-433620, fax. +420-569-422144
e-mail: 1-cube @1-cube.com, www.1-cube.com



Symbol description:

- | | | | |
|------------------|---------------------------|-------------------|-------------------------------|
| 1 - inlet valve | 4 - bigger stainless tube | 7 - microcomputer | 10 - secured (lower) position |
| 2 - outlet valve | 5 - outlet hose | 8 - keyboard | 11 - upper position |
| 3 - inlet hose | 6 - specific vessel | 9 - button | |