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# **GMD and GMDK**

**MEASURING DEVICE OF CO<sub>2</sub> CONTENT IN FERMENTING  
TANKS AND KEG CASKS**

**USER'S GUIDE**



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# 1.0 RANGE OF SUPPLY AND DEVICE APPLICATION

## Standard range of supply:

- GMD (GMDK)device ..... 1 unit
- adapter AC/DC GMD (GMDK) ..... 1 unit
- tubes – length about 1 m GMD (GMDK) ..... 2 units
- cable RS485/USB FTDI USB-RS485-WE-1800-BT
- for connection to PC (only for type GMDK) ..... 1 unit
- DVD with DataViewer software for PC (only for type GMDK)..... 1 unit

## Optional accessories:

- withdrawal head for kegs ..... 1unit

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

GMD is a measuring device for measurement of CO<sub>2</sub> content in beer, soft drinks and mineral water in tanks and KEG casks.

**Note:** Adapted only for industrial application

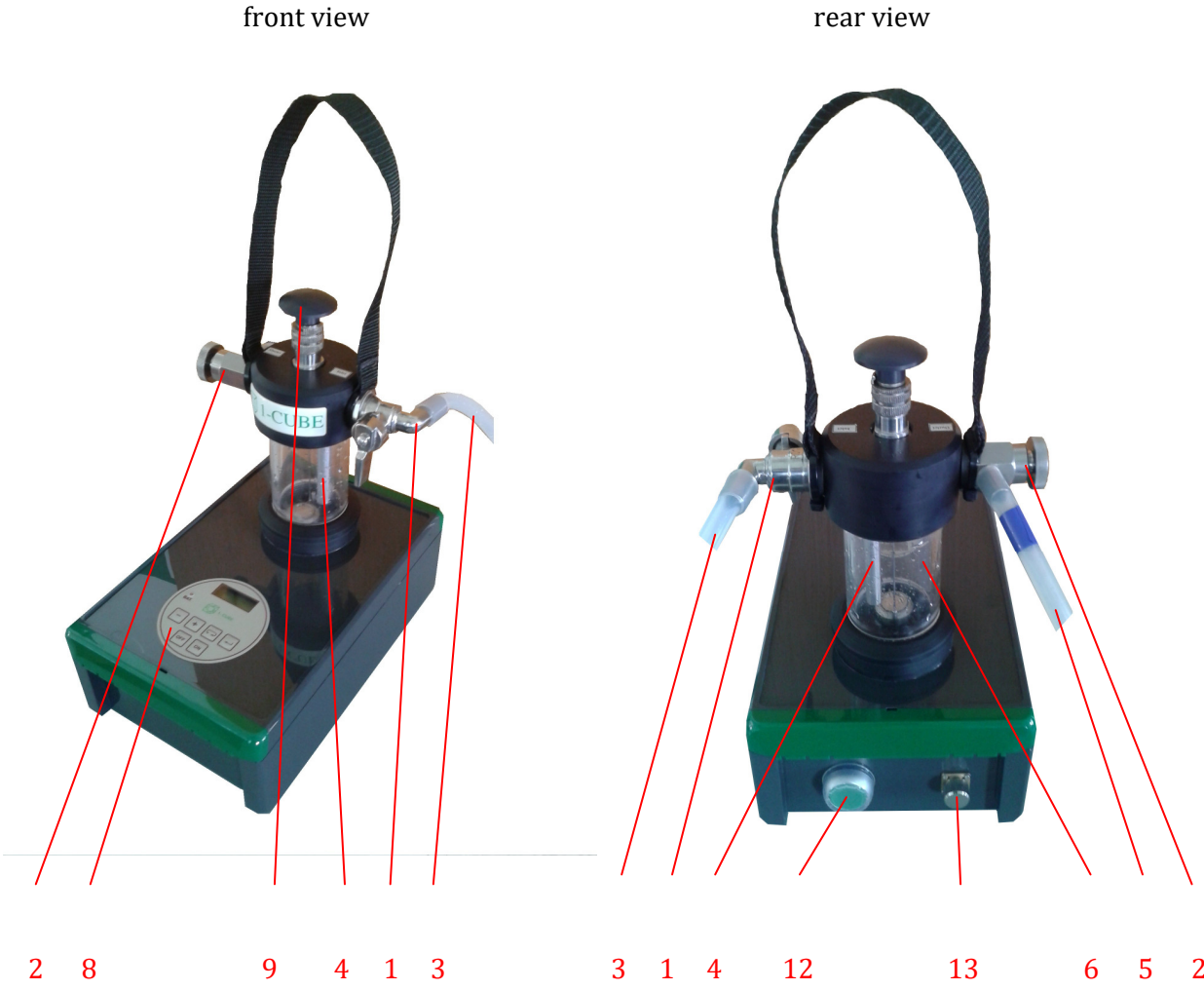
Whenever in the future GMD unit can be upgraded to GMDK unit if required.

With the comfortable version GMDK, the CO<sub>2</sub> measurement can be transferred to PC. The results can be displayed on graph and saved into files, useful for further, deeper analysis.

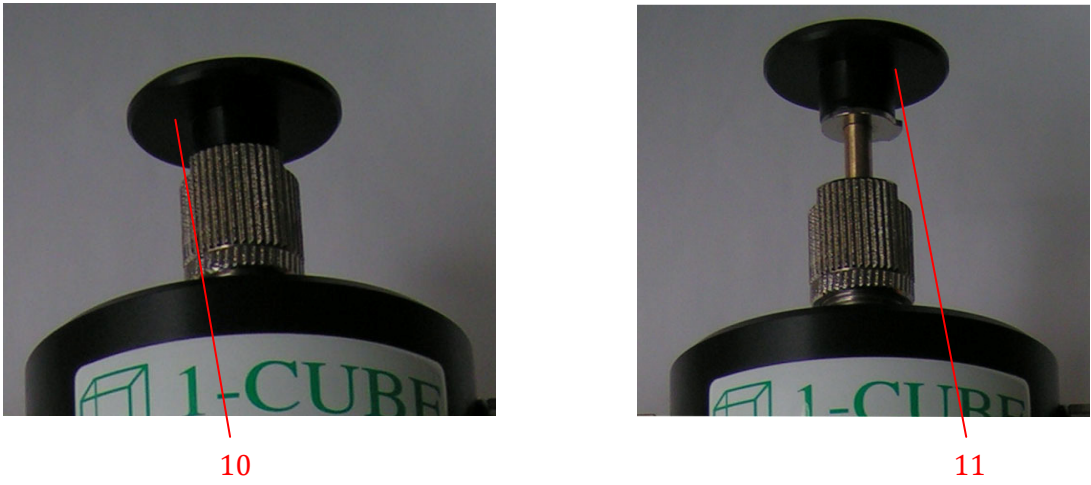


# 2.0 INSTALLATION - PUTTING THE DEVICE INTO OPERATION AND ITS MAINTENANCE

**Pic.1 GMD set**



**Pic.2 Button position**



**Explanation:** **1.** Inlet valve, **2.** Outlet valve, **3.** Inlet hose **4.** Stainless steel tube, **5.** Outlet hose, **6.** Transparent vessel, **7.** Bottom of the vessel, **8.** Keyboard with display, **9.** Button, **10** Down position, **11.** Upper position, **12.** Power button, **13.** Connector cover

## 2.1 TAKING OF SAMPLES

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

Preceding the own measurement connect the device by fixing of inlet hose (3) to the sampling point. The measured sample must flow through stainless tube (4) to the bottom of the vessel. The inlet hose (3) must be secured at the sampling point not to fall out during taking of sample under pressure.

## 2.2 DISCHARGING OF THE SAMPLE

Close the sampling valve on the tank, then open both inlet and outlet valves to remove any pressure inside the hoses and the GMD. Then disconnect the inlet hose (3), place the outlet hose (5) to the drain and turn the device upside down. At the same time hold the inlet hose (3) 10 cm over the device. Check visually if the transparent vessel (6) is empty.

If you are going to measure other samples, you don't need to empty the GMD. You can rinse the old sample with the new one by leaving the new beer flowing through the GMD about 30 s.

If you have finished measurement, clean the device. Rinse the device with clean water.

## 2.3 CLEANING OF THE DEVICE

Open the inlet valve (1) and the outlet valve (2). Place the outlet hose (5) to the drain. Connect the inlet hose (3) to the potable water supply. Afterwards open slowly the water cock and rinse the device with water. Both ball valves (1,2) have to be open during rinsing.

**Warning!** Pressure of water must not exceed value 250kPa.

Whole internal space of the vessel (6) must be filled with water during cleaning. During rinsing pull out and consequently press down several times the button (9) to rinse both pump and capillary.

It is important to remove any traces of beer to prevent the piston getting stuck.

After rinsing:

Once the cleaning is over, switch off the water cock. Disconnect the inlet hose (3) from the water cock. If you plan to use the device next day, do not discharge the water from the device and pull up the button (9) to suck the water inside the pump.

If you want to discharge the water then place the outlet hose (5) to the drain and turn the device upside down. At the same time hold the inlet hose (3) 10 cm over the device. First open the outlet valve (2) and subsequently open the inlet valve (1) and discharge the water. Check visually if the graduated vessel (6) is empty.

Clean the external surface with soft flannel moistened with water. After this handling the device is ready for next measurement.

The unit must not squirt water!

## 3.0 SAFETY RECOMMENDATIONS

Measuring device of CO<sub>2</sub> 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 CO<sub>2</sub> 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.

## 4.0 TECHNICAL DATA

range of CO<sub>2</sub> measurement ..... 2.0 – 9.99 g/l or in mass percentage 0.2 – 0.99 m%

range of temperature measurement..... 0 – +30 °C

range of pressure measurement..... 0 – 600 kPa

accuracy of CO<sub>2</sub> content measurement. ± 0.1 g/l or in mass percentage ± 0.01 m%

accuracy of temperature measurement ± 0.1 °C

accuracy of pressure measurement..... ± 0.5 %

dimensions ..... 280x180x300 mm

weight (of empty device)..... about 1.5kg

protection..... IP 54 (with threaded cover on connector)

## 5.0 OPERATING INSTRUCTIONS

### 5.1 MEASUREMENT PROCEDURE

You can see the instruction video on: <https://youtu.be/XRgAYRne3HM>

#### 5.1.1 TAKING OF SAMPLES

Measuring device for measurement of CO<sub>2</sub> content in beer, soft drinks and mineral water in cylindro-conical fermenters, tanks and KEG casks completed with withdrawal head for kegs (Optional accessories).

Check device before each measurement. Do not use visibly damaged device.

**Notice!** Sludge the sampling point before connecting the device. Sludge the sedimented yeast to fill inside the chamber only beer without sedimented yeast!



Check button (9) on the top of the device if it is in secured position (10b). Afterwards connect the device by fixing of inlet hose (3) to the sampling point. The inlet hose (3) must be secured not to fall out with the pressure.

If there is a big difference in diameters of the hose and sampling valve, use a reduction in the supplied hose and the other one in another hose satisfactory for safe sampling. We recommend to fix the hoses on the reduction with clamps.

Place the outlet hose (5) to the drain, the inlet valve (1) is shut during this handling. Afterwards open fully the valve of the sampling point and let beer or saturated beverage go into the inlet hose (3) to inlet valve (1). Open fully the inlet valve (1) on the device.

### *5.1.2 CO<sub>2</sub> CONTENT MEASUREMENT*

Open both valves (1), (2) to let the sample fill in the transparent chamber (6) SLOWLY, to avoid foam creation.

Let the beer flow through the device for at least 20s, 30s or more if you are rinsing the sample from a previous measurement or if it's the first measurement and the GMD was stored in a warmer place before.

Fill the transparent chamber (6) completely with the sample. Check visually if there is no foam or bubbles inside the chamber (6)!

The device is on the ground during taking of sample.

Now first shut the outlet (2) valve, then the inlet (1) valve. Press the power button (12) to turn on. Switch on the microcontroller by pressing the On key and when the device is ready, press the Enter key. The GMD starts measuring continuously the pressure and waits for depressurization. You have to open the outlet valve (2) to remove the overpressure from the tank. Open it slowly and close it immediately after hearing the sound emitted by the buzzer and the display shows "close v.", which indicates that the pressure is under threshold level. Then push out the button (9) of the secured position (10b) and pull it out into the upper position (11) (look pic.2). Hold it for a while in this position to equalize the pressure. Then press down the button (9) to the very down unsecured position (10 a). After this handling dissolved CO<sub>2</sub> is fluttered and the pressure increases in the chamber (6). Repeat this action one more time.

You should not pump more than three times to get good results and a good repeatability.

If the device was stored in a warm place before using it, the first measurement won't be relevant because of big temperature variation.

Then lock the button (9) in the down secured position (10 b).

Then follow the procedure described in *5.2.3 CO<sub>2</sub> CONTENT MEASUREMENT*

### *5.1.3 DISCHARGING OF THE SAMPLE*

Close the sampling valve on the tank, then open both inlet and outlet valves to remove any pressure inside the hoses and the GMD. Then disconnect the inlet hose (3), place the outlet hose (5) to the drain and turn the device upside down. At the same time hold the inlet hose (3) 10 cm over the device. Check visually if the transparent vessel (6) is empty.

If you are going to measure other samples, you don't need to empty the GMD. You can rinse the old sample with the new one by leaving the new beer flowing through the GMD about 30 s. If you are finished with measurements, don't forget to clean the device. Wipe device with a damp cloth.

### *5.1.4 CLEANING OF THE DEVICE*

Open the inlet valve (1) and the outlet valve (2). Place the outlet hose (5) to the drain. Connect the inlet hose (3) to the potable water supply. Afterwards open slowly the water cock and rinse the device with water. Both ball valves (1,2) have to be open during rinsing.

**Warning!** Pressure of water must not exceed value 250kPa.

Whole internal space of the vessel (6) must be filled with water during cleaning. During rinsing pull out and consequently press down several times the button (9) to rinse both pump and capillary.

It is important to remove any traces of beer to prevent the piston of the pump getting stuck.

After rinsing:

Once the cleaning is over, switch off the water cock. Disconnect the inlet hose (3) from the water cock. If you plan to use the device next day, do not discharge the water from the device and pull up the button (9) to suck the water inside the pump.

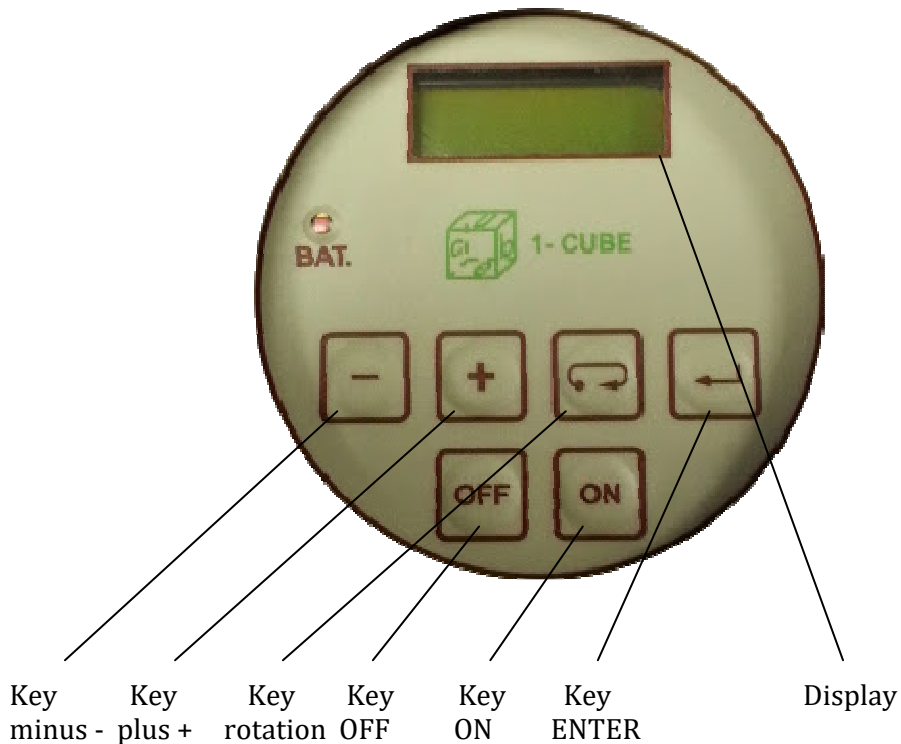
If you want to discharge the water then place the outlet hose (5) to the drain and turn the device upside down. At the same time hold the inlet hose (3) 10 cm over the device. First open the outlet valve (2) and subsequently open the inlet valve (1) and discharge the water. Check visually if the graduated vessel (6) is empty.

Clean the external surface with soft flannel moistened with water. After this handling the device is ready for next measurement.

## 5.2 CONTROL OF THE ELECTRONICS

The device operation (i.e. switch-on, shutdown, measurement, ...) is controlled with the help of the membrane keyboard and the display.

**Pic.3.**



### 5.2.1 SWITCHING ON AND OFF THE DEVICE

Press the power button (12) to turn on and then press the key ON to switch on the microcomputer. Press the key OFF to switch microcomputer off and then press the power button (12) to turn off.

### 5.2.2 CHARGING OF THE DEVICE

If the battery voltage is too low then after the switch-on of the device, the text „Recharge battery“ appears on the display for a second. It is possible to work with the device for another 30 minutes. If the device is not recharged during this time then the text „Low voltage“ appears on the display and the device is shut down. If you want to monitor how the battery is charged while working with the device – press the rotation key - the text „battery“ appears on the first line of display and the voltage of the battery on the second line. During charging of the device, the led BAT is lit.

Press the power button (12) to turn on and then unscrew the connector cover (13) and put the opposite connector of the adaptor in to charge the device.

**Warning: watch the right orientation (Boss of the adaptor connector into the groove of the socket connector. The groove is marked with colored dot). AC/DC adaptor can be plugged into the electric socket now.**

**Note: In case the connectors will not be put in the right way they will be damaged. This type of damage is not covered by manufacturer's warranty.**

The device can be charged only with the supplied adaptor. Average charging time is about 8 hours and the voltage of a charged accumulator is nearly 19V. „Recharge battery“ is displayed under 16.5V and „Low voltage“ under 15.5V The charging time can be shortened if needed but the running period and the accumulator life-time will be shortened too. Once the charging of the device is over, unplug the adaptor and the connector from the device. Then screw the cap of the connector (13) for protection and press the power button (12) to turn off.

Notice: If the power button (12) is switched off during charging than the accumulator isn't charging.

### 5.2.3 CO<sub>2</sub> CONTENT MEASUREMENT

Follow the paragraphs 5.1.1. and 5.1.2 and further:

1) Press the power button (12) to turn on and then press the key ON to switch on the microcomputer. The text „1-CUBE“ with the program version appears on the display for a moment. Then the following text appears:

„ENT.meas.“ | „+ view.“

2) Press the key ENTER. At the beginning of the measurement sequence, the pressure is measured and displayed, until the pressure goes under the threshold value. This is achieved by opening briefly the outlet valve (2). When the pressure is low enough, you will hear the buzzer of the GMD and the display shows "close v.", which indicates that you have to close immediately the valve (2). Now you can start releasing the CO<sub>2</sub> from the beer with the pump on the top of the GMD (look pic.2). Push out the button (9) of the secured position (10b) and pull it out into the upper position (11). Hold it for a while in this position to equalize the pressure. Then press down the button (9) to the very down unsecured position (10 a). After this handling dissolved CO<sub>2</sub> is fluttered and the pressure increases in the chamber (6). Repeat this action one more time. Use it two times, not less, not more, then be sure to secure the piston in the down position. Press the Enter key and „measure“ is displayed. The program waits a while for equilibrium, then the measured value of pressure (e.g. 140kPa), followed by the measured value of temperature (e.g. 5.0 °C) appear on the display.

Finally, the computed value of CO<sub>2</sub> content is shown e.g. 0.51 %bw | 5.1 g/l

By displaying CO<sub>2</sub> content the measurement of sample is over and the CO<sub>2</sub> value is saved in the GMD(K) memory.

Press the key ENTER to finish the measurement, the text:

„ENT.meas.“ | „+ view.“

The device is ready for next measurement. When the new sample has been taken, you just need to repeat this procedure to measure it. If it has been automatically shut off, switch it on as described above. Press the power button (12) to turn off once the measurement is finished.

#### 5.2.4 READING RECORDED VALUES OF CO<sub>2</sub> FROM MEMORY

The measured values of CO<sub>2</sub> are kept into the device non-volatile memory. The capacity of memory is 450 measured values.

1) Press the key ON to switch on the device. The text „1-CUBE“ with the program version appears on the display for a moment. Then the following text appears:

„ENT.meas.“ | „+ view.“

2) Press the key plus (+). There is text „**memory**“ on the first line and the measured values of CO<sub>2</sub> in g/l appear in turn from the oldest value to the newest ones on the second line.

after the last saved value the numbers start to appear 655.35 which indicates blank memory values. Press the key ENTER to stop scanning memory. Then the following text appears „ENT.meas.“ | „+ view.“

Note: Once memory is full, then it will be automatically deleted.

Then the following text appears:

„**memory**“ | „**deleting**“

All the saved values are overwritten with number 655.35.

#### 5.2.5 DELETING THE CONTENT OF THE MEMORY

The measured values can be deleted from memory at any time. The memory capacity will be completely recovered (450 values) and newly measured values will be saved in sequence.

1) Press the key ON to switch on the device. The text „1-CUBE“ with the program version appears on the display for a moment. Then the following text appears:

„ENT.meas.“ | „+ view.“

2) Press the key minus (-).Then the following text appears: „**memory**“ | „**deleting**“

All the saved values are overwritten with number 655.35.

## 6.0 CO<sub>2</sub> TRANSFERRING MEASURED VALUES FROM MEMORY TO PC COMPUTER(TYPE GMDK ONLY)

Only type GMDK has the functionality of data transfer with a communication cable to PC. Before the first data transfer from the device to the PC, first install program DataViewer from our supplied CD.

1) Connect the shut-off device GMDK with the help of cable FTDI USB-RS485-WE-1800-BT (supplied with the device version GMDK) with USB port of your PC. Wait until the driver is fully installed and ready. This occurs the first time you plug the USB adapter into a USB port of your computer.

2) Run the program DataViewer in your PC and select the corresponding COM port (e.g. COM 5). If you don't know which COM port is affected to the USB adapter, you can find it easily by plugging the USB adapter, then launch the DataViewer program and open the list box under Com port select. Look at the entries. Then close the program, unplug the USB adapter and re-open the software. The missing entry in the list box corresponds to the COM port affected to the USB Adapter. The program will memorize the selection and you will not have to select it again the next time.

3) Press the key ON to switch on the device GMDK. The text „1-CUBE“ with the program version appears on the display for a moment.

4) Press the key plus (+). There is text „**memory**“ on the first line and the measured values of CO<sub>2</sub> in g/l appear in turn from the oldest to the newest ones on the second line. At the same time these values are displayed in DataViewer program window in column in turn from the oldest value to the newest ones and also plotted on the graph. These values can be saved into file with the Save file button.

Note: the measured values are displayed in g/l in DataViewer program.

## 7.0 SERVICE

For service contact the manufacturer:

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580 01 Havlíčkův Brod  
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**Please visit our website for latest news and products : <http://www.1-cube.com>**

**NOTICE:** It is forbidden for anyone except for the manufacturer or authorized company to repair the apparatus.

At the end of the apparatus life we recommend that it is according to corresponding waste categorization.

Take the metallic parts made of iron, brass, plastic elements and packing material to the separated collection as a secondary raw material. You can also order the apparatus liquidation at the above mentioned company that ensures the liquidation of the waste according to Waste Act.