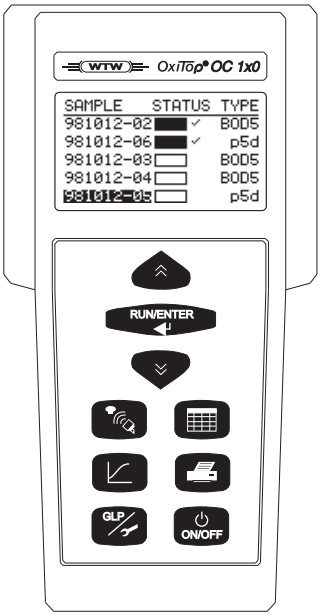
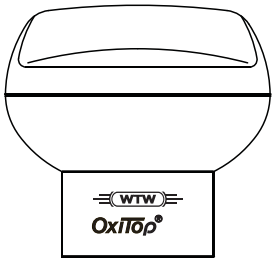




OPERATING MANUAL

ba31116e05 07/2014

OxiTop® Control OC 110
OxiTop® C or OxiTop® C/B

BOD/OXYGEN CONSUMPTION: BOD, RESPIRATION, BIOGAS DETERMINATION

WTW

a xylem brand

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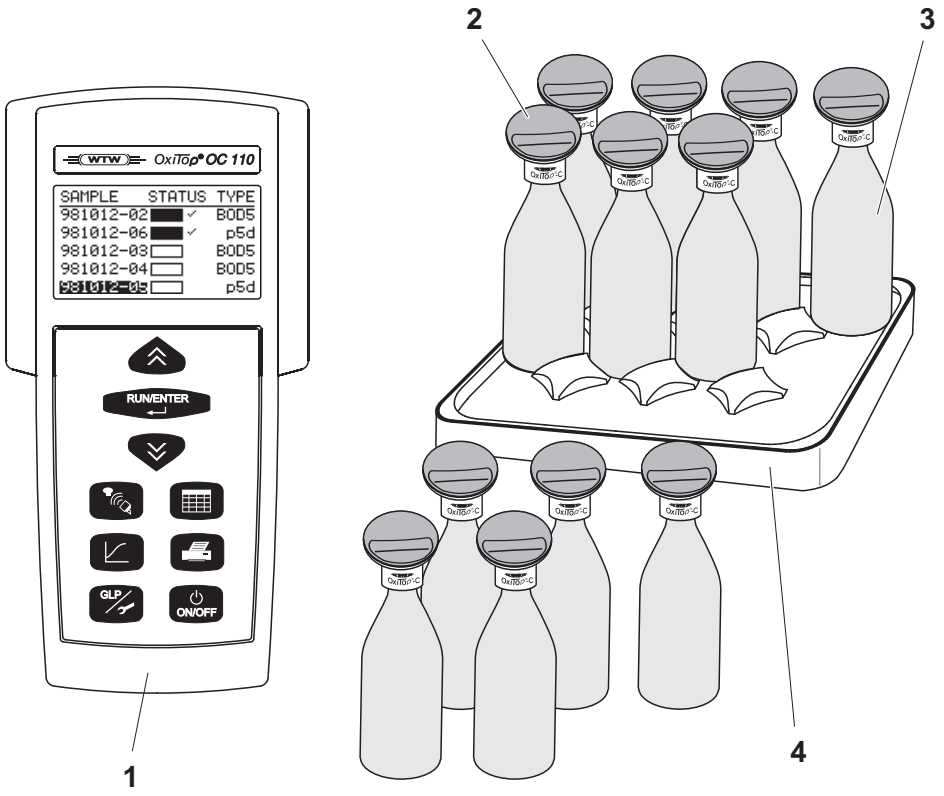
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1 Overview

1.1 The system OxiTop® Control

The classical application field for the OxiTop® measuring heads and controller is the BODx determination (BODx = Biochemical Oxygen Demand for the time x). The evaluation of biological degradability (e.g. test according to OECD 301F) is also part of this field.

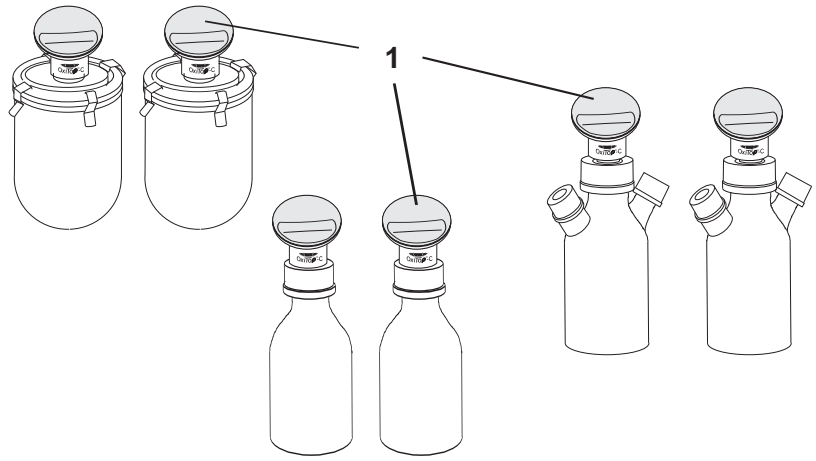


1 Controller OxiTop® Control OC 110
2 Measuring head OxiTop®-C or OxiTop®-C/B
3 Sample bottle
4 Inductive Stirring system

With different sample vessels, the OxiTop® measuring heads and the OxiTop® Controller 110 can also be used for other applications such as:

- Evaluation of respiration and toxicity in earth, sludge, waste and sediment (e.g. extraction of contaminated earth according to recovery concepts)
- Evaluation of the respiration rate of cell cultures
- Microbiological growth and stress examinations
- Measurement of anaerobic degradation processes (e.g. biogas determination with the measuring head OxiTop®-C/B)

Accessories: see WTW catalog and price list



1 Measuring head OxiTop®-C or OxiTop®-C/B

1.2 The measurement principle

The respirometric measurement is a pressure measurement. If oxygen is consumed in a closed vessel at a constant temperature, a negative pressure develops. If a gas is released, an overpressure develops. The OxiTop® measuring head measures and stores this pressure for the whole duration of a measurement once started.

The OxiTop® OC 110 controller collects the pressure values from the measuring heads and processes them.

The formula shown below is the basis for all calculations for the BOD using the values from the OxiTop® measuring head.

$$BOD = \frac{M(O_2)}{R \cdot T_m} \cdot \left(\frac{V_t - V_l}{V_l} + \alpha \frac{T_m}{T_0} \right) \cdot \Delta p(O_2)$$

$M(O_2)$	Molecular weight (32000 mg/mol)
R	Gas constant (83.144 l·mbar/mol·K)
T_0	Reference temperature (273.15 K)
T_m	Measuring temperature
V_t	Bottle volume (nominal volume in ml)
V_l	Sample volume in ml
a	Bunsen absorption coefficient (0.03103)
$\Delta p(O_2)$	Difference of the D. O. partial pressure (mbar)

The interpretation of the pressure differences in the temporal course depends on the measured material and its preparation and on the sample manipulation (e. g. intermediate aerations) during the measuring period.

1.3 Data management

The measuring head records the measured values and stores the measuring data. Using the controller, the collected and stored data are read out from the measuring head and stored in the “sample management“. Starting at the OxiTop® sample management, it is possible to make the graphical and statistical evaluation of the sample data.

The data can be transferred from the controller to a computer via the RS232 interface. The read-out software Achat OC facilitates to process the stored data further.

Additionally, the data can be transferred to an IR printer via the IR interface.

1.4 Literature

Further information and application reports on the subject of measuring with the system OxiTop® Control can be obtained at no cost from WTW:

- CD-ROM Applications for OxiTop® Control
- CD-ROM Principles of measuring technique

2 Safety

2.1 Safety information

2.1.1 Safety information in the operating manual

This operating manual provides important information on the safe operation of the instrument. Read this operating manual thoroughly and make yourself familiar with the instrument before putting it into operation or working with it. The operating manual must be kept in the vicinity of the instrument so you can always find the information you need.

Important safety instructions are highlighted in this operating manual. They are indicated by the warning symbol (triangle) in the left column. The signal word (e.g. "CAUTION") indicates the danger level:



WARNING
indicates a possibly dangerous situation that can lead to serious (irreversible) injury or death if the safety instruction is not followed.



CAUTION
indicates a possibly dangerous situation that can lead to slight (reversible) injury if the safety instruction is not followed.

NOTE
indicates a possibly dangerous situation where goods might be damaged if the actions mentioned are not taken.

2.1.2 Safety signs on the meter

Note all labels, information signs and safety symbols on the instrument. A warning symbol (triangle) without text refers to safety information in this operating manual.

2.2 Safe operation

2.2.1 Authorized use

Only the operation and running of the instrument according to the instructions and technical specifications given in this operating manual is authorized (see section 13 TECHNICAL DATA, page 97).

Any other use is considered unauthorized.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

- The instrument may only be operated according to the authorized

use specified above.

- The instrument may only be supplied with power by the energy sources mentioned in this operating manual.
- The instrument may only be operated under the environmental conditions mentioned in this operating manual.
- The instrument may only be opened if this is explicitly described in this operating manual (example: Changing the batteries).

2.2.3 Unauthorized use

The instrument must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see section 13 TECHNICAL DATA, page 97).

3 Commissioning

3.1 Scope of delivery

- Controller OxiTop® OC 110
- Battery holder with batteries (3 x Mignon, AA, AM3, LR6)
- Operating manual
- Additional scope of delivery: depending on set composition

3.2 Power supply

The controller OxiTop® OC 110 and measuring head OxiTop®-C or OxiTop®-C/B are both battery-powered.

Additionally, the controller has a data backup battery. This battery ensures that your measuring data and instrument settings are stored in the controller OxiTop® OC 110.

3.2.1 Batteries

Controller	Power supply	3 alkaline batteries (alkali manganese), Size: Mignon, AA, AM3, LR6 Runtime: > 100 h (approx. 1000 start-ups in normal use)
	Data backup	1 x lithium battery CR2430 (accessory). Runtime: typically 4 years
Measuring head	Power supply	Batteries: 2 x lithium battery CR2430 (accessory). Runtime: typically 2 years

3.2.2 Battery status signals

The OxiTop®-OC 110 controller and the OxiTop® measuring heads are powered by batteries. A low battery status of the controller or measuring head is automatically indicated by a display message and a signal tone after the instrument is switched on (see section 12.2 DISPLAY MESSAGES ON THE CHARGING STATUS OF THE BATTERIES, page 92).

1st level (warning level)	*Battery LoBat !*
2nd level (error level)	*Battery empty !*

The current battery status can also be queried in the menu:

- Controller: Menu *GLP/TOOLS - Check - Controller Info*
- Measuring head: Menu *GLP/TOOLS - Check -* 🌪 *info*

3.2.3 Energy saving feature (automatic switch-off)

The instrument switches off automatically following the last key actuation after expiry of the specified switch-off interval.

To specify the switch-off interval: see section 9.4.8 SWITCH-OFF INTERVAL, page 65.

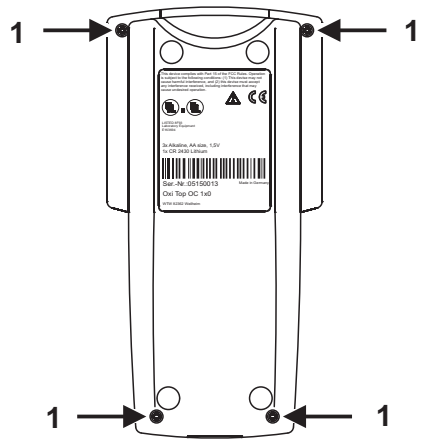
3.3 Initial commissioning

Perform the following activities:

- Insert the supply battery holder in the controller (see section 3.3.1 INSERTING THE SUPPLY BATTERY HOLDER - CONTROLLER, page 14)
- Switch on the instrument
- Set the date and time (see section 9.4 SETTINGS, page 59)

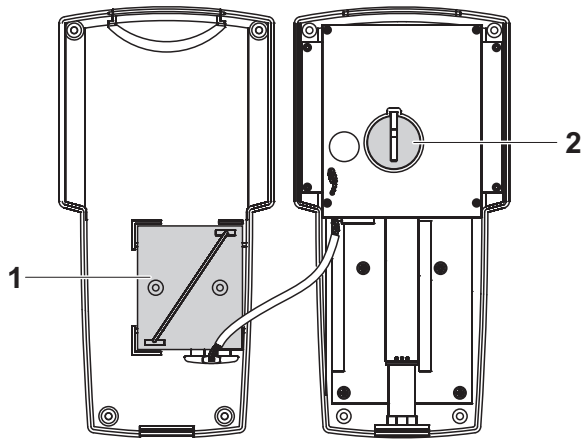
3.3.1 Inserting the supply battery holder - controller

- Loosen the 4 screws underneath the housing using a Phillips screwdriver.



1 Screws

- Place the controller on the lower case.
- Remove the upper case and put it down to the right next to the lower case with the display downwards.
- Connect the supply battery holder with the power supply contacts of the upper case.
- Insert the supply battery holder in the lower case with the open side down.



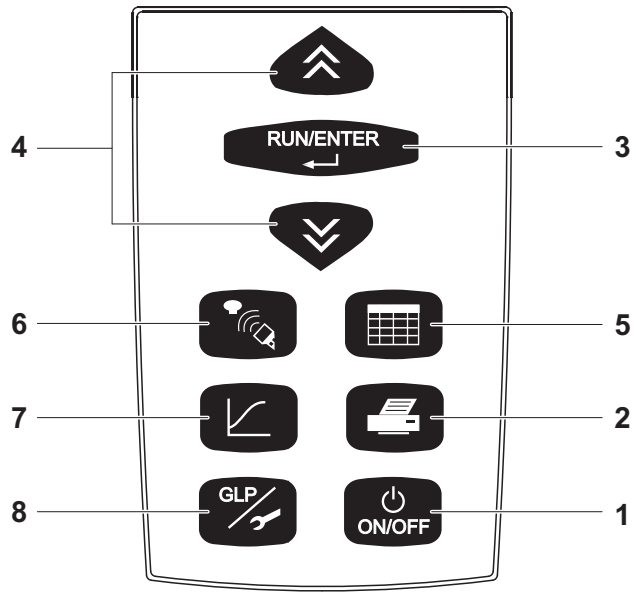
1 Supply batteries in the battery holder (lower case)
2 Data backup battery (upper case)

- Set the upper case on top of the lower case, turn the controller and tighten the housing screws using the screwdriver.
- Switch on the controller. The battery insertion was successful if no error message appears concerning the supply batteries.

4 Operation

4.1 General operating principles

4.1.1 Keys - controller



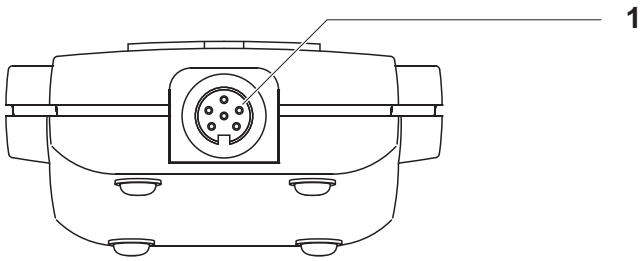
1		**<On/Off>**	Switching on/off
2		**<PRINT>**	**Printing** of measurement data and settings via IR interface
3		**<RUN/ ENTER>**	**Confirmation** of entries
4		**<▲><▼>**	**Select** and change settings

Function keys:

5		**<ORG>**	**Sample management:** List of samples, reading/calling up/deleting the data of individual measuring heads or samples, shows measuring heads or samples
6		**<COMM>**	**Communication with measuring heads:** Start measuring, change or show settings, call up data
7		**<GRAPH>**	**Evaluation:** Graphic and numerical display of measuring data
8		**<GLP>**	**GLP/Tools:** Change or display settings, display free measuring heads, display or change settings, perform checks or maintenance

The function keys are used to start a function or to change to another function. Confirmed data and settings are preserved.

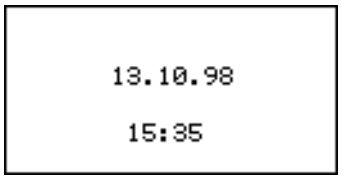
4.1.2 Socket field - controller



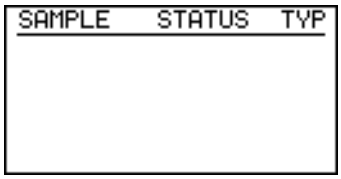
1 RS232 interface
The RS232 interface is used for communication with the PC. Usage of the RS232 interface is exclusively intended with the WTW software "Achat OC“ (see section 10.1 ACHAT OC SOFTWARE, page 80).

4.2 Switching on

4.2.1 Switching on the controller



The current date and time appear for approx. 2 seconds (important for the allocation of sample numbers).
If the date or time is wrong, correct them under *GLP/TOOLS*.



The instrument is in the sample management mode (operating mode *BOD Standard*, in the default condition).

4.2.2 Switching on the measuring heads

The measuring heads are immediately ready for operation. The controller switches the measuring heads on and off during communication.

To avoid malfunctions:
If you use two or more controllers simultaneously make sure that the distance between the controllers is at least 3 meters!

4.3 Navigation

4.3.1 Operating modes

***BOD Routine*:**

- Measurement of single samples for a BOD_X (x = 0.5h ... 99d) at 20 °C
- The measuring range and filling volume can be selected out of seven permanent ranges and the corresponding filling volumes.
- The function is permanently switched on

***BOD Standard*: (preselected)**

- Measurement of up to 12 parallel sample processes per overall sample for a BOD_X (x = 0.5h ... 99d) at 20 °C
- The measuring range and filling volume can be selected out of seven permanent ranges and the corresponding filling volumes.
- Automatic sample statistics with averaging
- The *AutoTemp* function and the *GLP* mode can be switched on

***BOD Special*:**

- Measurement of up to 12 parallel sample processes per overall sample for a BOD_X (x = 0.5h ... 99d)
- Measuring range, dilution, bottle volume and sample volume can be set
- The altitude above sea level and the starting air pressure respectively can be set
- The incubation temperature (5 °C to 40 °C) can be set up
- Automatic sample statistics with averaging
- The *AutoTemp* function and the *GLP* mode can be switched on

***Pressure p*:**

- The *Pressure p* mode is a pure pressure measurement
- The absolute pressure of single samples is measured between 500 hPa and 1350 hPa
- A "limit pressure“ can be set
- Up to 10 manually triggered measurements (momentary values) are saved with pressure value and point in time
- The *GLP* mode can be switched on

4.3.2 Menus, functions and dialogs

Example: Pressing the **<COMM>** button causes the controller to change to the *SELECT ACTION* menu (communication with the measuring heads).

Action: Press button.	**The instrument displays:**	**Description of what the action caused and possible further request:**
		*SELECT ACTION* menu (communication with the measuring heads): Preselected: - *Start sample*. Select a menu item with **<▲><▼>**. The selected function or line is displayed in inverse video. Confirm the menu item with **<RUN/ENTER>**. The submenu is opened or the function is carried out.

Signal tone



This symbol in the operating manual means:
A signal tone sounds.

Measuring head

Each measuring head that receives a command from the controller indicates this by a short flashing signal.

The OxiTop® measuring head is indicated by the symbol

4.3.3 The course of the measurement

Preparation before starting the measurement

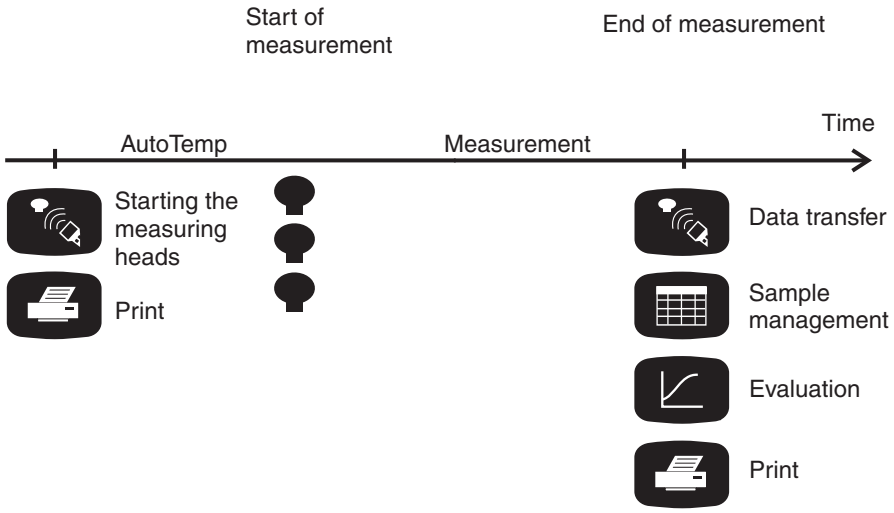


- Select operating mode
- Select settings



Operating mode and settings cannot be changed for a measurement once it is started!

Measuring



5 Operating mode: *BOD Standard* / *BOD Routine*

The *BOD Standard* mode (parallel sample process for up to 12 measuring heads per overall sample) is preset in the delivery condition of the controller.

To change to the *BOD Routine* operating mode (single samples): see section 9.4.1 OPERATING MODE, page 60.

The handling of controller and measuring heads is basically the same in both operating modes. Where there are differences for the *BOD Routine* operating mode they are described.

5.1 Sample preparation

See application reports.

Screw the OxiTop® measuring heads onto the measuring vessels and close them tightly.

NOTE
Never use joint grease or other lubricants for your OxiTop® measuring heads. Some of these products contain solvents that can cause severe damage to the plastic housing of the measuring head.
The sealing of the measuring vessels is perfectly adequate without grease. However, you should always wipe off heavy contamination and particles on the sealing surfaces of the rubber sleeves and OxiTop® measuring heads. WTW accepts no liability for damage due to the use of joint grease.

5.2 Starting the measurement

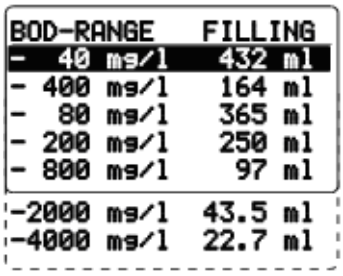




SELECT ACTION menu (communication with the measuring heads):
Preselected: - *Start sample*.

(In *BOD Routine* mode appears: *START*).

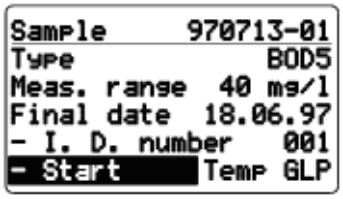




Select the measuring range with **<▲><▼>**.
The filling volume required is given in the right hand column.

The controller stores the setting (memory function: the last selected measurement range is set).

RUN/ENTER



Confirm the selected measurement range for the sample. The automatically assigned sample number (YY/MM/DD and sequential number) is given in the header line.

Additional information:

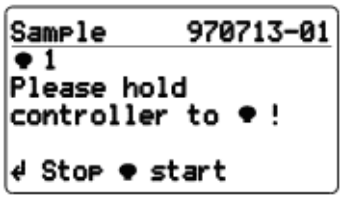
- Type of measurement, run duration, measurement range, final date, ID number.
- *Temp* display => the *AutoTemp* function (see section 9.1 GLP/TOOLS MAIN MENU, page 57) is switched on.
- *GLP* display => the *GLP* function (see section 9 GLP/TOOLS, page 57) is switched on.

Change the ID number for the additional identification of the sample (e.g. sampling location) as follows:

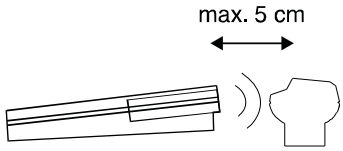
- Select the - *I.D. number* menu item with **<▲><▼>**
- Confirm with **<RUN/ENTER>**.
- Set the required Id number (setting range 001 ... 255) with **<▲><▼>**.
- Confirm with **<RUN/ENTER>**.

Use **<PRINT>** to print out the entire sample information (in *BOD Routine* mode only), see section 8 PRINTING, page 54).

RUN/ENTER

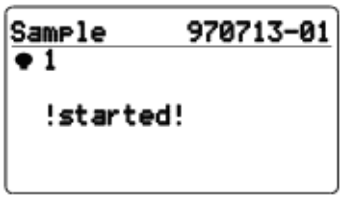


Confirm the start of measurement. Contact selection:



The controller repeatedly sends the start information in the scanner mode until feedback is successfully received from the OxiTop® measuring head. After the successful start message from the measuring head:



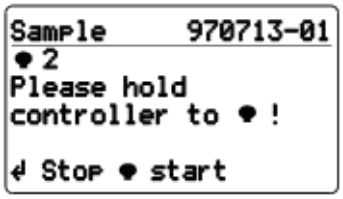


Displays *! started !*

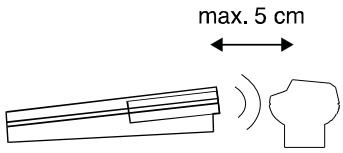
From this point in time, the sample exists within the *SAMPLE STATUS TYPE* list (sample management).

Subsequently, the request to start the next measuring head is made automatically.

In *BOD Routine* operating mode there is no 1... identifier in the display, and the controller automatically returns to the entry menu after starting the measuring head.



Start the next measuring head (2).
Contact selection:



The number of the measuring head is automatically incremented.

The controller continues to work with the contact selection, i.e. you can now start a sequence of measuring heads (parallel sample process) without having to press any further keys by holding the controller to the next measuring head to be started.

When all the measuring heads provided for this sample have been started:
Confirm *Stop start* with **<RUN/ENTER>**.
The controller returns to the entry menu.

If no measuring head is started (e.g. because the controller was not held to - or not close enough to - a measuring head):





The start was stopped.

Use **<RUN/ENTER>** - *Continue start* to confirm “Continue start” and hold the controller to a measuring head (see above).

Return to entry level menu with - *Stop start*

If an attempt is made to start a measuring head that was already started:



Displays *already used!*

Use **<RUN/ENTER>** to confirm - *New* and hold the controller to a free measuring head (see above).

Return to entry level menu with - *Stop start*



In the delivery state, the controller automatically makes space when *Start* is selected if the measured value memory is full.
To do this, it deletes the oldest finished sample (if a finished sample is available). You can change this setting to “manual erase” (see section 9.4.6 DATA STORAGE, page 63).

5.3 Calling up all data

This function is used to call up the data of all measuring heads, no matter in which operating mode they were started.

To call up the data of individual measuring heads: see section 5.4 SAMPLE STATUS TYPE LIST (SAMPLE MANAGEMENT), page 28.



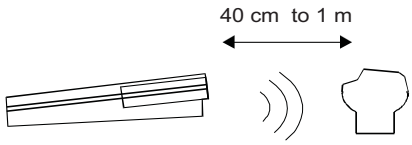


SELECT ACTION menu (communication with the measuring heads):
Preselected: - *Start sample*.

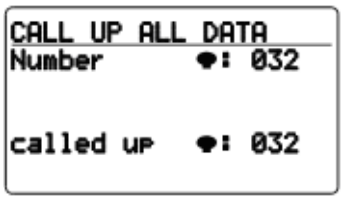


Select the - *Call up all data* menu item with **<▲><▼>**

Point the controller at the measuring heads:



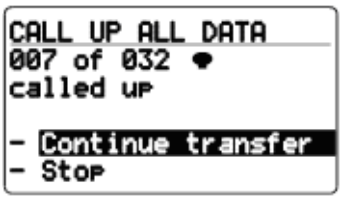




Queries the data of all active measuring heads in the scanner mode.

The controller stores the data obtained and updates the *SAMPLE STATUS TYPE* list (sample management).
Duration of a pass: approx. 3 seconds for 12 measuring heads in a stirring system.

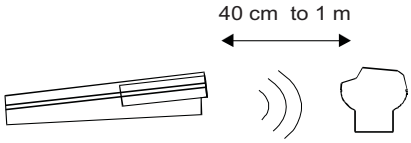
If the measuring heads do not all respond in the 1st pass of the data query, the controller searches for the missing measuring heads in the scanner mode for approximately a further 7 seconds. Without having to press another key, you can continue the data queries at other locations (e.g. other stirring platforms or other thermal cabinets).
Approximately 7 seconds after the last call up was performed, the scanner mode breaks off automatically and the following display appears:



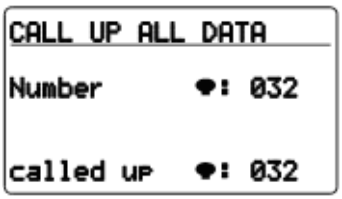
Preselected:
- *Continue transfer*:
A new pass is made only for measuring heads that have not yet responded.

Return to the entry menu with - *Stop*
For information on searching for missing measuring heads, see section 12 WHAT TO DO IF..., page 87

Point the controller at the measuring heads:



RUN/ENTER



The call up of further measuring heads is performed in the scanner mode.





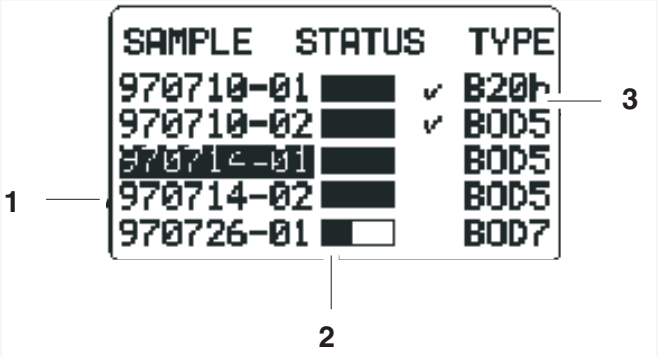
Message that all the data of all the measuring heads has been called up. The instrument then returns to the entry menu.

Immediately after the complete measurement data records of a finished measurement have been called up, the corresponding measuring head is given the *free* status. The measuring head can be used for a new measurement. The relevant sample in the *SAMPLE STATUS TYPE* list (sample management) is marked as finished (see section 5.4 SAMPLE STATUS TYPE LIST (SAMPLE MANAGEMENT), page 28), as soon as the measurement time has expired and the data of all measuring heads of this sample have been called up.

5.4 *SAMPLE STATUS TYPE* list (sample management)



Entry into the sample management.
A list of samples appears in the display (if samples are available):



1 Sample number:
Date (JJ/MM/TT) and consecutive number

2 Temporal process of the sample:

– Status bar partly filled:
The sample is not yet ready.

– Status bar filled:
The ready and complete data set of the sample can be called up from the measuring head.

– Status bar filled plus checkmark:
The sample is ready. The complete data set is given in the controller for evaluation.

3 BOD type and run duration.

– B20h: BOD with 20 hours run duration

– BOD5: BOD with 5 days run duration



The samples started in the *BOD Routine* operating mode also appear in the *SAMPLE STATUS TYPE* lists (sample management) of all other modes. Data of samples that have been started in other operating modes do not appear in the sample management of the *BOD Routine* operating mode.

Reporting order:

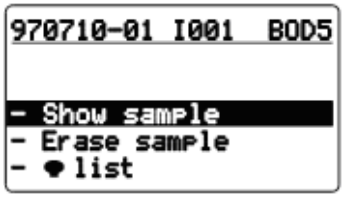
- At the upper end of the list: finished samples (if available)
- Under this: current samples

Sorting of the samples:
according to date and sequential number 01 ... 99,
from the oldest to the newest sample.

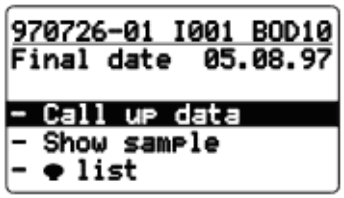


Select a sample.
According to the sample selected, one of the two following menus appears.

Finished sample



Current sample



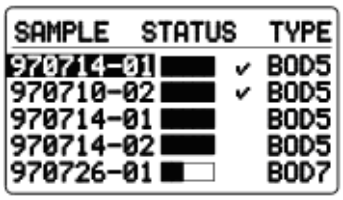
The header line contains the following data of the selected sample:

- Sample number
- ID number (e.g. I001)
- BOD type and run duration.

5.4.1 Showing a sample

This function is used to find the measuring heads or samples. Sample labeling is not necessary.

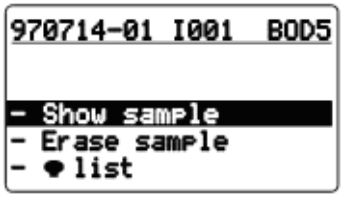




SAMPLE STATUS TYPE list (sample management)

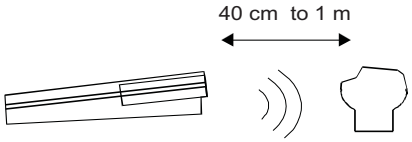
Use **<▲><▼>** to select a sample.



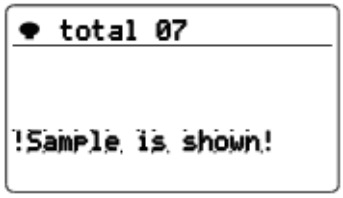


Select the - *Show sample* menu item with **<▲><▼>**

Point the controller at the measuring heads:







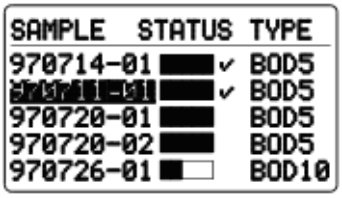
The controller transmits the call up of the selected sample. The allocated measuring heads flash for approx. 5 seconds.

After the message, the controller automatically returns to the previous menu.

5.4.2 Erasing data of finished samples

This function erases the data of finished samples from the *SAMPLE STATUS TYPE* list (sample management) of the controller. You can only erase a sample if it is finished; in non-finished samples, the menu item - *Erase sample* does not appear.

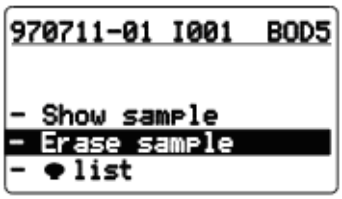




SAMPLE STATUS TYPE list (sample management)

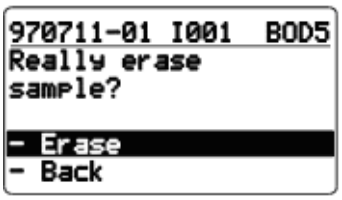
Use **<▲><▼>** to select a finished sample.





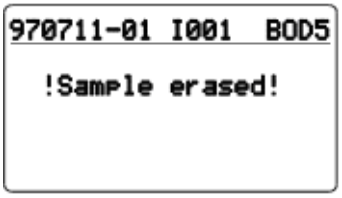
Select the - *Erase sample* menu item with **<▲><▼>**.





Safety prompt with possibility to return.



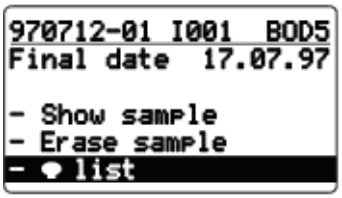


The sample was erased.

After the message, the controller automatically returns to the *SAMPLE STATUS TYPE* list (sample management).

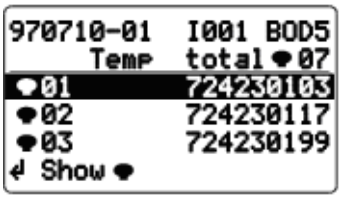
5.4.3 Showing the measuring head list

This function is used to allocate individual measuring heads to the relevant sample in the *SAMPLE STATUS TYPE* list (sample management) and to find individual measuring heads.



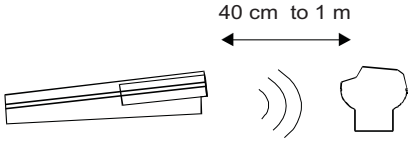
Select the - *list* menu item with **<▲><▼>**





The list of measuring heads of the selected sample is displayed together with the serial numbers of the measuring heads.
(In the *BOD Routine* operating mode, this list always contains only one measuring head.)

Point the controller at the measuring heads:



Use **<▲><▼>** to select a measuring head and confirm with **<RUN/ENTER>**.
The controller repeatedly transmits the call up of the selected measuring head. The measuring head flashes for approx. 5 seconds.



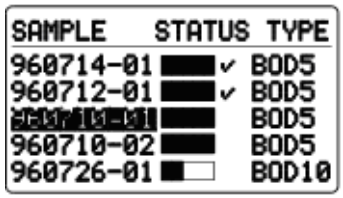
Use **<ORG>** to return to the *SAMPLE STATUS TYPE* list (sample management).

5.4.4 Calling up data

This function is used to call up the data of individual samples.

To call up the data of all samples, see section 5.3 CALLING UP ALL DATA, page 26.



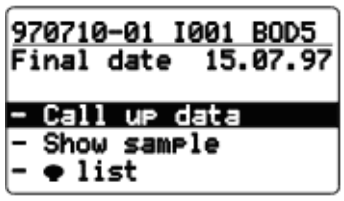


SAMPLE STATUS TYPE list (sample management)

Use **<▲><▼>** to select a sample whose

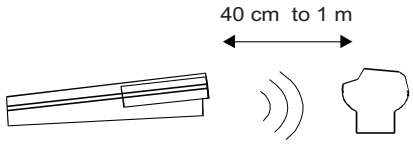
- run duration is not yet completed (bar not yet full)
- data after complete measurement that have not yet been called up (bar full, no checkmark)



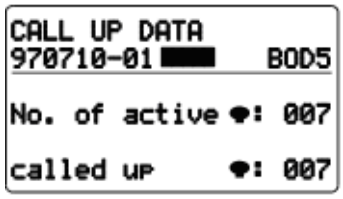


Jumps to submenu of the selected sample.
Preselected: - *Call up data*

Point the controller at the measuring heads:





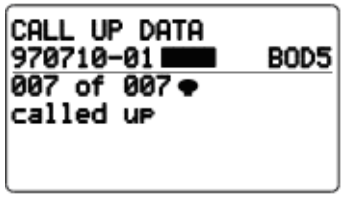


Sequential call up of the measuring heads allocated to the sample (in this example: 7) in the scanner mode:

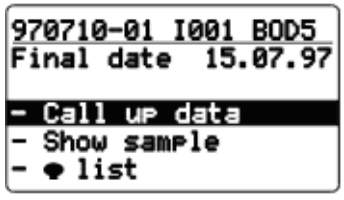
The controller

- stores the data obtained
- updates the *SAMPLE STATUS TYPE* list (sample management)

Duration of a pass:
approx. 3 seconds for 12 measuring heads in a stirring system.



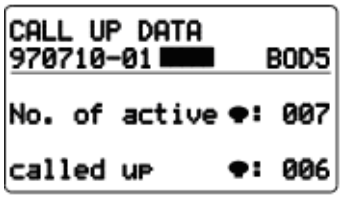
The controller confirms the call up performed.



The controller then returns automatically to the submenu.

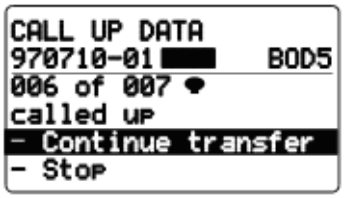
If the measuring heads do not all respond, the following display appears:





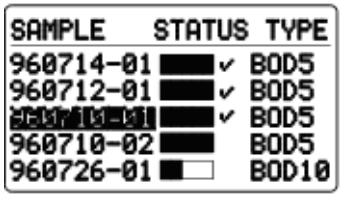
Renewed start of the data call up.

The controller continues to search for missing measuring heads in the scanner mode. Without having to press another key, you can continue the data queries at other locations (e.g. other stirring platforms or other thermal cabinets). Approximately 7 seconds after the last call up was performed, the scanner mode breaks off and the following display appears:



Use **<RUN/ENTER>** to restart the data transfer (see above).





Return to the *SAMPLE STATUS TYPE* list (sample management).

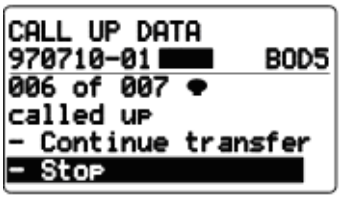
Transferred and completed samples appear with a checkmark next to them.
(The complete measurement data records of all finished measuring heads of the sample have been procured.)



Immediately after the successful data transfer of a sample, the allocated measuring heads are given the *free* status. The measuring heads can be used for a new measurement.

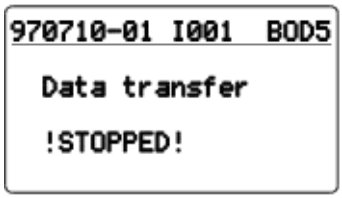
The user administration function is not active in the delivery condition.

5.4.5 Calling up data - Stop



If a measuring head is missing or defective and the controller cannot call up the sample as a result, you can stop the data transfer with the - *Stop* menu item.

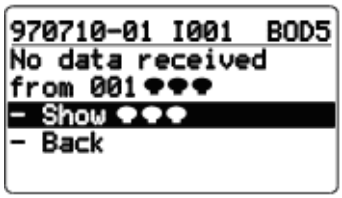
RUN/ENTER



After confirmation, the display message shown here appears.

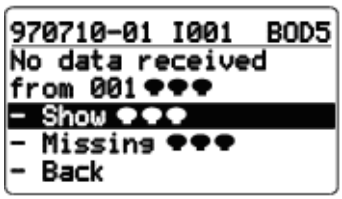
Three displays are then possible:

Case 1



The sample is still running and individual measuring heads of the sample are not attainable.

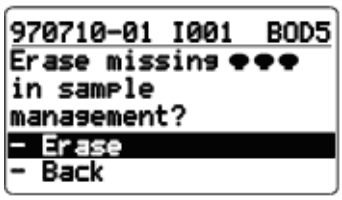
Case 2



The run duration of the sample has ended and the finished, all data of the attainable measuring heads have been transferred.

then

RUN/ENTER

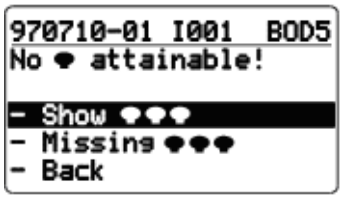


- Erase:
Removes missing measuring heads from the data stock. The completed sample is given the “finished” status.

- Back:
Jumps back to the previous menu.

Abort using a function key: The stopped sample is not declared as “finished”.

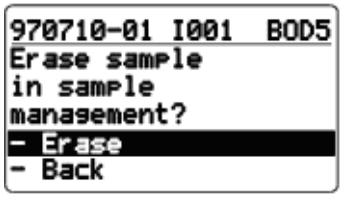
Case 3:



No measuring head of a sample is attainable.
(In the *BOD Routine* operating mode: The relevant measuring head is not attainable).

then

RUN/ENTER



- Erase:
Removes a sample from the data stock.

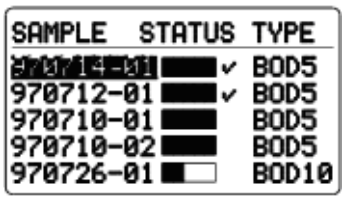
- Back:
Jumps back to the previous menu.

- Show : As in *- Show sample*, but selectively for missing measuring heads (identification option if only the sender of the measuring head is defective. Otherwise, see the section 12 WHAT TO DO IF..., page 87)

- Missing 🌳🌳🌳:

Only appears when the run duration of the sample has expired. Here you can remove the data of a missing or defective measuring head from the *SAMPLE STATUS TYPE* list (sample management) of the controller. In the *BOD Standard* operating mode, you can set a sample to the "finished" status (checkmark) if all the other measuring heads are already “finished”: Erases the missing measuring heads from the *SAMPLE STATUS TYPE* list (sample management).

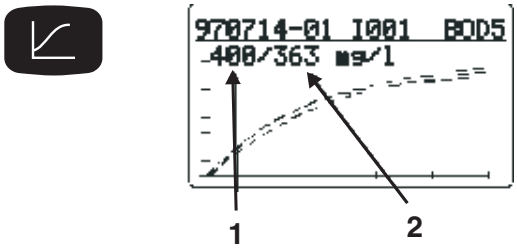
5.5 Evaluation



SAMPLE STATUS TYPE list (sample management)

Use **<▲><▼>** to select a sample.

Use **<PRINT>** to print out the results with curves.

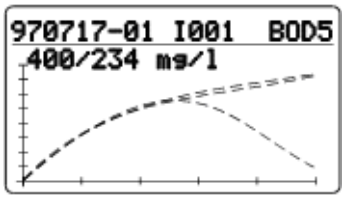


1 End of measuring range

2 Mean value

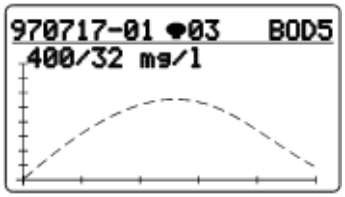
Evaluation of the sample: Display of all the curves together with mean value data.
Check the display for outliers.

Use **<PRINT>** to print the results with curves (according to printing format - see the section 8 PRINTING, page 54)



Example: Overall sample with outlier.

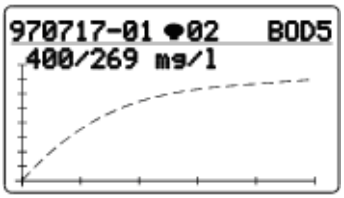
In the *BOD Routine* operating mode, the evaluation shows the selected sample as a single curve with the measured value data.
Use **<RUN/ENTER>** to switch between the cursor interrogation (see section 5.5.3 CURSOR INTERROGATION, page 38) display of the curve with measured value data.



Scroll through the parallel samples: Display of individual curves (cyclical pass) with data of the BOD final value.

Use **<PRINT>** to print out a single result with a single curve.

5.5.1 Sample statistics (*BOD Standard* operating mode)



Starting point:
Display of a single curve.

RUN/ENTER



Changes to sample statistics.

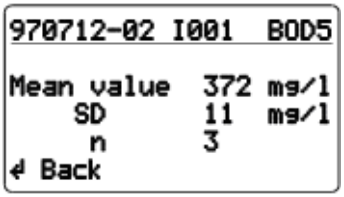
The menu selection shown here only appears if the number of measuring heads (n) is at least 2.

If n = 1 pressing of **<RUN/ ENTER>** changes directly to the cursor interrogation.

When jumping to the selection menu from “Show all curves“, the menu item - *Exclude curve* is not displayed.

RUN/ENTER

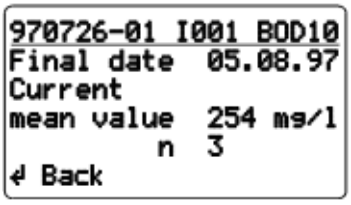
Results of the **finished** sample:



- Mean value
- SD: standard deviation (from n = 3)
- n: number of measuring heads

<PRINT>
Printout of the results with curves

Data of the **current** sample:



- end date
- current mean value
- n: number of measuring heads

<PRINT>
Printout of the data (current mean value, n, sample information) with curve paths to date

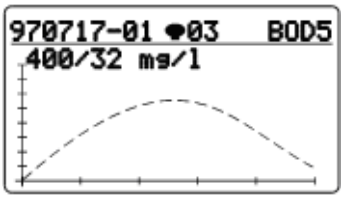
5.5.2 Excluding a curve (*BOD Standard* operating mode)

This function is used to temporarily exclude a single curve (e.g. an outlier) from the evaluation and averaging of an overall sample.

The curve is only excluded temporarily! The data stock of the *SAMPLE STATUS TYPE* list (sample management) does not change. The excluded curve is present again when the call is repeated.

The function "List of measuring heads“ (see section 5.4 SAMPLE STATUS TYPE LIST (SAMPLE MANAGEMENT), page 28) is used to find leaky or defective single samples.





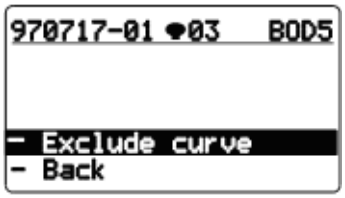
Display of single curves: Select curve.





Use **<▲><▼>** to select - *Exclude curve*.

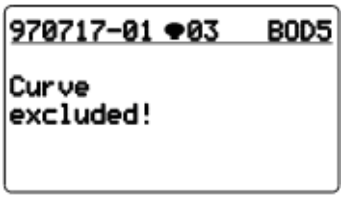




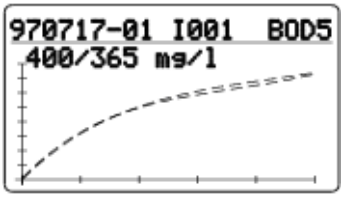
- *Exclude curve* is preselected.

- *Back*: Returns to the previous menu.





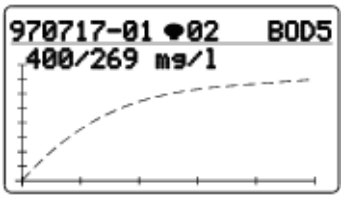
Message *Curve excluded!*.



Updated display (curve excluded, mean value recalculated).

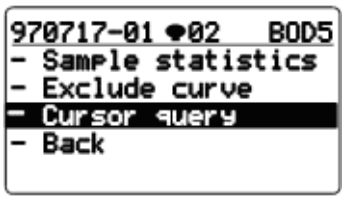
Use **<PRINT>** to print the updated results with curves (without the excluded curve).

5.5.3 Cursor interrogation



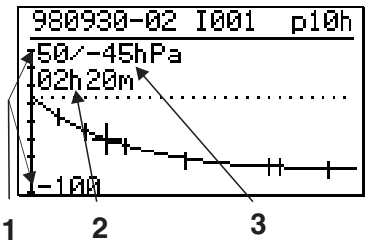
Starting point:
Display of a single curve with measured value data.

RUN/ENTER



Use **<▲><▼>** to select - *Cursor query* (this menu is not displayed in the *BOD Routine* operating mode).

RUN/ENTER



Use **<▲><▼>** to run through the curve values.

Use **<PRINT>** to print out the current display.

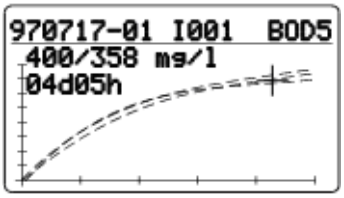
1 The scaling of the Y-axis is automatically adapted to the measured value

2 Measuring time at the cursor position

3 Measured value at the cursor position

Or from the display of all the single curves:

RUN/ENTER



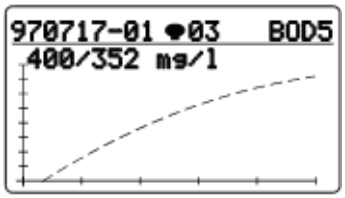
Use **<▲><▼>** to run through the curve mean values.

Use **<PRINT>** to print out the current display.

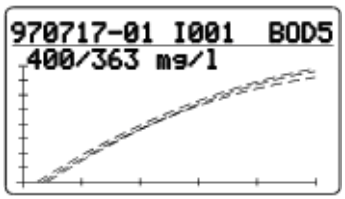
Return to the previous menu using **<RUN/ENTER>**.

Return to the display of all the single curves using **<GRAPH>**.

5.5.4 Curves display for cold samples



Display of a single curve.



Display of all curves.

When samples are inserted that are too cold the maximum *AutoTemp* time is not sufficient
for the sample temperature to reach the incubation temperature: Warming the sample can cause excess pressure.

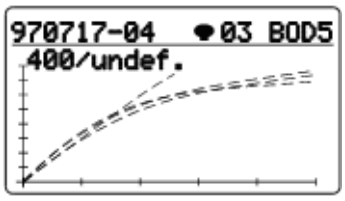
Display: Negative values of the curve will be truncated and the curve originates from the time axis but not the origin.

5.5.5 Measured values outside the measuring range

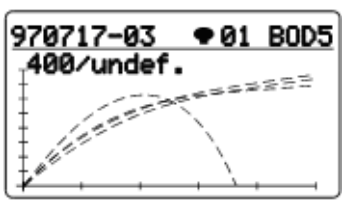
In the following cases, *undef.* (undefined) is displayed instead of the measured
value or mean value during evaluation:

- A measured curve exceeding the measuring range at any point of its path.
- A measured curve undercutting the measuring range at its end point.

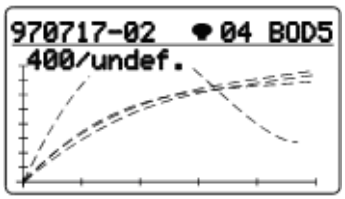
Sample displays:



A measured value exceeds the measuring range (Overflow).



A measured value undercuts the measuring range (Underflow).



A measured value temporarily leaves the measuring range.

After the exclusion of the defective curve (see section 5.5.2 EXCLUDING A CURVE (BOD STANDARD OPERATING MODE), page 37), the controller displays the mean value again.

6 Operating mode: *BOD Special*

To change to the operating mode *BOD Special* see section 9.4.1 OPERATING MODE, page 60.

6.1 Sample preparation

See application reports.

Screw the OxiTop® measuring heads onto the measuring vessels and close them tightly.

NOTE
Never use joint grease or other lubricants for your OxiTop® measuring heads. Some of these products contain solvents that can cause severe damage to the plastic housing of the measuring head.
The sealing of the measuring vessels is perfectly adequate without grease. However, you should always wipe off heavy contamination and particles on the sealing surfaces of the rubber sleeves and OxiTop® measuring heads. WTW accepts no liability for damage due to the use of joint grease.

6.2 Starting the measurement

Before starting the measurement, set the temperature and air pressure (see section 9 GLP/TOOLS, page 57).





SELECT ACTION menu (communication with the measuring heads):
Preselected: - *Start sample*.

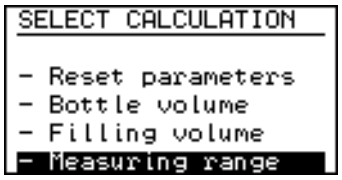
In the *BOD Special* mode there are 6 variable parameters:

Parameters	Default setting	Admissible setting range
Bottle volume	510 ml	50 to 9.999 ml
Filling volume	164 ml	10 ml to bottle volume minus 10 ml
Dilution	1 + 0	1 + 0 to 1 + 99
Measuring range (BOD)	395 mg/l	up to 400,000 mg/l
Temperature	20°C	5 °C to 40 °C (setting: see section 9 GLP/TOOLS, page 57)
Air pressure	954 hPa	500 hPa to 1100 hPa (setting: see section 9 GLP/TOOLS, page 57)

Parameters	Default setting	Admissible setting range
Altitude	500 m	-698 m to 5572 m (setting: see section 9 GLP/TOOLS, page 57)

In the *SELECT CALCULATION* menu you can select one parameter out of bottle volume,
filling volume and measuring range to be calculated by the controller based on the other parameters. Enter the respective other parameters using **<▲><▼>** or confirm the presettings using **<RUN/ENTER>**. When doing this the parameter to be calculated is changed simultaneously.





With **<▲><▼>** select the parameter the controller will calculate.
The controller stores the settings.
Preselected
in the delivery state: - *Measuring RANGE*.

- *Reset parameters* resets the settings to the delivery state.

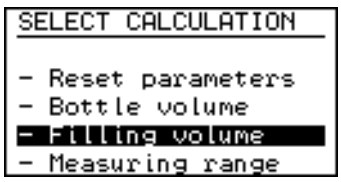




After confirming, the display shows the values last set up for bottle volume, filling volume of the sample, dilution (these can be changed), and the measuring range that the controller calculated from these.
marks the parameter calculated by the controller.

Example: Change parameters to:

- Filling volume of the sample to be calculated by the controller,
- Bottle volume 900 ml, dilution 1 + 1, measuring range 2000 mg/l.



SELECT CALCULATION menu:

Select the - *FILLING volume* menu item with **<▲><▼>**

RUN/ENTER



The *SETTINGS* menu appears.





Select the - *Bottle ml* menu item.

RUN/ENTER



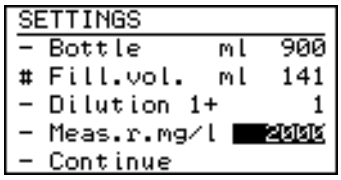
Set the bottle volume to 900 ml with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.
Select the - *Dilution 1*+ menu item with **<▲><▼>**.

RUN/ENTER



Using **<▲><▼>**, select - *Dilution 1*+1.
Confirm with **<RUN/ENTER>**.
Select the - *Measuring RANGE* menu item with **<▲><▼>**.

RUN/ENTER



Set the measuring range (mg/l) to 2000 with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

If, while setting the parameters, the value calculated by the controller is above or below the admissible range for the relevant parameter, the controller displays UFL or OFL for this parameter. After the **<▲><▼>** key is no longer pressed, the controller displays the last admissible setting for the respective parameter to be calculated.





When the settings are correct:
Select the - *Continue* menu item.

RUN/ENTER



Confirm the settings for the sample. The automatically assigned sample number (YY/MM/DD and sequential number) is given in the header line.

Additionally displayed information:

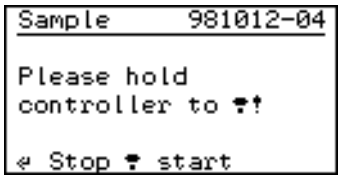
- Type of the measurement, run duration (setting see section 9 GLP/TOOLS, page 57), measuring range, end date, Id number.
- *GLP* display => the *GLP* function (see section 9 GLP/TOOLS, page 57) is switched on.
- Possibly *Temp* display => The *AutoTemp* function (see section 9 GLP/TOOLS, page 57) is switched on (only with run durations ≥ 1 day).

Change the ID number for the additional identification of the sample (e.g. sampling location) as follows:

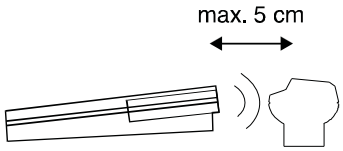
- Move the cursor to Id number with **<▲><▼>**.
- Confirm with **<RUN/ENTER>**.
- Set the required Id number (setting range 001 ... 255) with **<▲><▼>**.
- Confirm with **<RUN/ENTER>**.

Print all the sample information with **<PRINT>** (see section 8 PRINTING, page 54).





Confirm the start of measurement. Contact selection:



The calculation of the BOD value in the OC 110 controller is based on the assumption that the D. O. partial pressure in the bottle is at least 60 hPa after the measurement is over.

The further steps from starting the samples to evaluation are as described for *BOD Standard* operating mode (see section 5 OPERATING MODE: BOD STANDARD / BOD ROUTINE, **page 23).**

7 Operating mode: *Pressure p*

Switch to the *Pressure p* operating mode: see section 9.4.1 OPERATING MODE, page 60.

7.1 Hazards during the determination of biogas



CAUTION

During the anaerobic degradation of organic material in sealed equipment, high pressure can develop due to biogas (main components: methane and carbon dioxide).

The following hazards can occur:

- **Risk of bursting due to the high pressure and risk of injury caused by flying glass splinters.**
- **Risk of explosion due to development of flammable gas mixtures if high concentrations of methane escape.**

Take the following precautionary measures for safe operation:

- **Only use WTW measurement bottles of the MF/... series, which are especially designed for biogas determination (see WTW catalog).**
- **Only use measurement bottles that are not damaged (e.g. are not cracked, chipped or scratched).**
- **Determine the reaction conditions (temperature, quantity) under which no dangerous excess pressure develops by means of monitored preliminary tests (e.g. with diluted material).**
- **For unmonitored measurements, include a buffer for the developing pressure, as the composition of biological material can considerably vary. Therefore, a pressure that is higher than planned on can develop.**
- **Only use the corrosion resistant OxiTop®-C/B measuring heads. They were designed especially for biogas applications.**
- **Please not that the OxiTop® measuring head displays a pressure of up to 1350 hPa max.If the pressure is greater, -1000 hPa is displayed.**

CAUTION

The pressure sensor in the measuring head may be destroyed by a pressure of 2000 hPa or higher.

CAUTION
If, despite all precautionary measures, the OxiTop® Control OC 110 displays a pressure of -1000 hPa (pressure > 1350 hPa), the actual pressure may already be much higher. Terminate the measurement immediately:

- **Wear protective equipment (face shield, protective clothing, gloves).**
- **Wrap the bottle in a thick towel.**
- **Vent the bottle.**

7.2 Sample preparation

See application reports.

Screw the OxiTop® measuring heads onto the measuring vessels and close them tightly.

NOTE
Never use joint grease or other lubricants for your OxiTop® measuring heads. Some of these products contain solvents that can cause severe damage to the plastic housing of the measuring head.
The sealing of the measuring vessels is perfectly adequate without grease. However, you should always wipe off heavy contamination and particles on the sealing surfaces of the rubber sleeves and OxiTop® measuring heads. WTW accepts no liability for damage due to the use of joint grease.

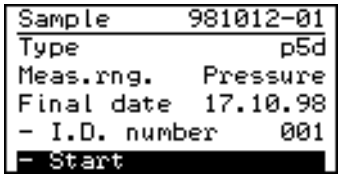
7.3 Starting the measurement





SELECT ACTION menu (communication with the measuring heads):
Preselected: - *Start sample*.





The automatically assigned sample number (YY/MM/DD and sequential number) is given in the header line of the display.

Additionally displayed information:

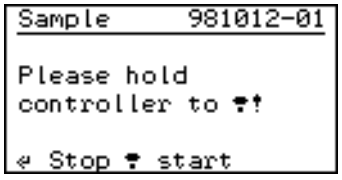
- Type of the measurement, run duration (setting see section 9 GLP/TOOLS, page 57), measuring range, end date, Id number.
- *GLP* display => the *GLP* function (see section 9 GLP/TOOLS, page 57) is switched on.

Change the ID number for the additional identification of the sample (e.g. sampling location) as follows:

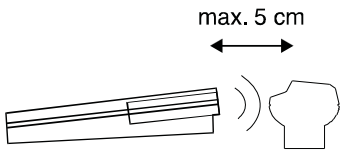
Move the cursor to Id number with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.
Set the required Id number (setting range 001 ... 255) with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

Print all the sample information with **<PRINT>** (see section 8 PRINTING, page 54).



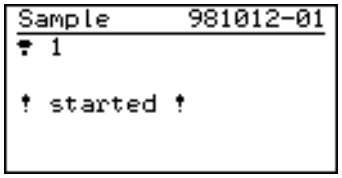


Confirm the start of measurement. Contact selection:



The controller repeatedly sends the start information in the scanner mode until feedback is successfully received from the OxiTop® measuring head.





! started ! display.
From this point in time, the sample exists within the sample management. The controller then returns automatically to the entry menu.
(In the *Pressure p* operating mode, samples can only be started as single samples.)

If no sample is started (e.g. because the controller was not held to - or not close enough to - a measuring head):





Sample start was stopped.
Use **<RUN/ENTER>** to confirm the - *Continue start* menu item and hold the controller to the measuring head (see above).

Return to the entry menu with - *Stop start*.

If an attempt is made to start a sample that was already started:



Displays *already used!*
Confirm the - *New* menu item and hold the controller to a free measuring head (see above).

Return to the entry menu with - *Stop start*.

In the delivery state, the controller automatically makes space when *Start* is selected if the measured value memory is full. To do this, it deletes the oldest finished sample (if a finished sample is available). You can change this setting to “manual erase” (see section 9.4 SETTINGS, page 59).

7.4 Calling up all data

This function is used to call up the data of all measuring heads (no matter in which measuring mode they were started).

To call up the data of individual measuring heads: see section 7.5 SAMPLE MANAGEMENT, page 50.





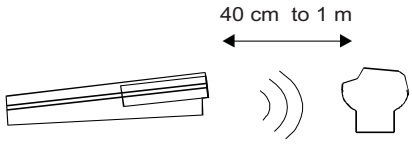
SELECT ACTION menu (communication with the measuring heads):
Preselected: - *Start sample*.



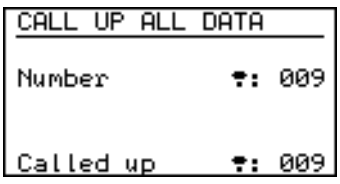


- Call up all data

Point the controller at the measuring heads:



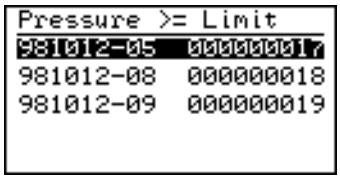




Queries the data of all active measuring heads in the scanner mode.

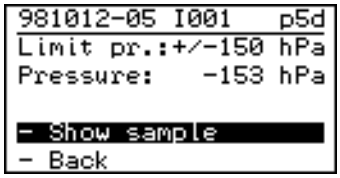
The controller stores the data obtained and updates the list of the sample management.
Duration of a pass: approx. 3 seconds for 12 measuring heads in a stirring system.

After calling up the data of all measuring heads the controller checks for all samples
started in the *Pressure p* mode the maximum difference pressure (negative or
positive) compared to the start pressure. The controller lists all samples the value of which exceeds the amount of the difference pressure in a table (to set up the difference pressure see section 9.4.12 LIMIT PRESSURE (PRESSURE P OPERATING MODE), page 67).



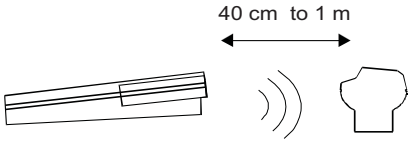
Example list with samples the value of which exceeds the maximum limit pressure.
Use **<▲><▼>** to select a sample.

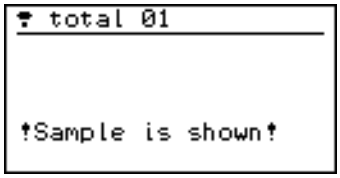
RUN/ENTER



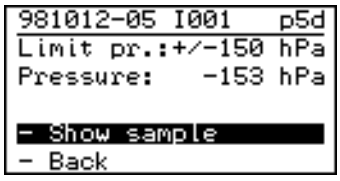
The set limit pressure and the currently measured pressure of the sample selected are displayed.

Point the controller at the measuring heads:





The allocated measuring head flashes for approx. 5 seconds.



Then the controller displays the pressure values again.

- *Back*.: Return to the list

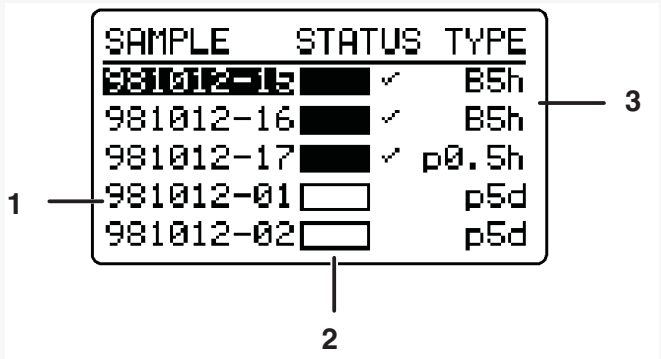
To exit the list, press any function key.

Immediately after the data transfer of the complete measurement data records of a finished measuring head, this measuring head is given the *free* status. The measuring head can be used for a new measurement.
The relevant sample in the sample management is marked as finished (see section 7.5 SAMPLE MANAGEMENT, page 50).

7.5 Sample management



Entry into the sample management.
A list of samples appears in the display (if samples are available):



1 Sample number:
Date (JJ/MM/TT) and consecutive number

2 Temporal process of the sample:

– Status bar partly filled:
The sample is not yet ready.

– Status bar filled:
The ready and complete data set of the sample can be called up from the measuring head.

– Status bar filled plus checkmark:
The sample is ready. The complete data set is given in the controller for evaluation.

3 Type and run duration of the pressure measurement.

– p0.5h: Pressure measurement with 0.5 hours run duration

– p10d: Pressure measurement with 10 days run duration



Data of samples that have been started in other operating modes do also appear in the sample management.

Reporting order:

- At the upper end of the list: finished samples (if available)
- Under this: current samples

Sorting of the samples: according to date and sequential number 01 ... 99, from the oldest to the newest sample.

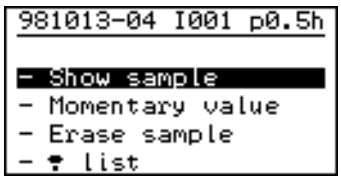


Select a sample.

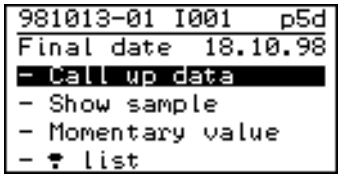
RUN/ENTER

According to the sample selected, one of the two following submenus appears.

Finished sample



Current sample



The header line contains:

- Sample number
- ID number (e.g. I001)
- Type and run duration

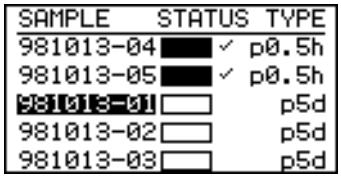
of the selected sample.

For the menu items - *Show sample*, - *Erase sample* - *list* and - *Call up data* refer to the corresponding paragraphs in section 5 OPERATING MODE: BOD STANDARD / BOD ROUTINE, page 23.

7.6 Calling up momentary values

With this function you can call up and store the momentary pressure value of a sample. The controller can store up to 10 momentary values per sample. They appear as vertical lines on the curve in the evaluation.

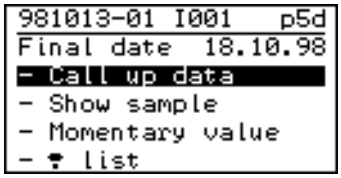
The date and time must not be changed in the controller between the start and end of a sample so the momentary values can be correctly stored.



SAMPLE STATUS TYPE (sample management):

Use **<▲><▼>** to select a sample.

RUN/ENTER



A list with menu items for the sample appears.



```
981013-01 I001   p5d
Final date  18.10.98
- Call up data
- Show sample
- Momentary value
- ▼ list
```

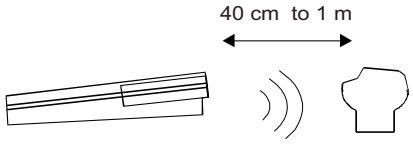
Select the - *Momentary value* menu item.

RUN/ENTER

```
Call up momentary v.


Please direct
controller to ▼!
```

Point the controller at the measuring heads:



RUN/ENTER

```
Call up momentary v.
Current Value
      -10 hPa

- Save
- Stop
```

The momentary value of the sample is called up and displayed.

- *Stop*:
leads to the next display but one without saving.

RUN/ENTER

```
Call up momentary v.


Momentary 1
value no. saved!
```

The controller saves the momentary value with a sequential number (1 to 10).

```
981013-01 I001   p5d
Final date  18.10.98
- Call up data
- Show sample
- Momentary value
- ▼ list
```

The controller returns to the entry menu. Up to 10 momentary values can be stored at selectable points in time within the run duration of the sample.

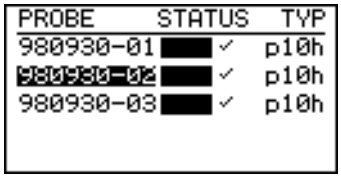
This message is displayed for approx. 3 seconds if already 10 momentary values have been stored for a sample:

```
981013-01 I001   p5d

Maximum number
of momentary values
saved!
```

Then the previous display appears again.

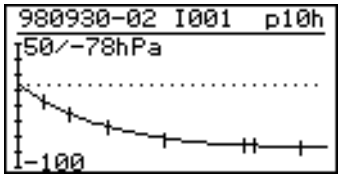
7.7 Evaluation



SAMPLE STATUS TYPE (sample management):

Use **<▲><▼>** to select a sample.

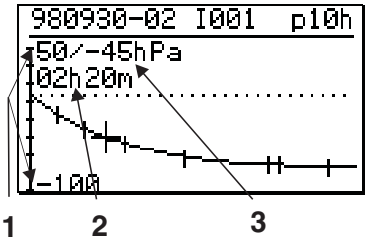




Entry into the evaluation:
Display of the selected sample as a curve with measurement value data.
Stored momentary values appear additionally as vertical lines on the curve.

Change to cursor query:





1 The scaling of the Y-axis is automatically adapted to the measured value

2 Measuring time at the cursor position

3 Measured value at the cursor position

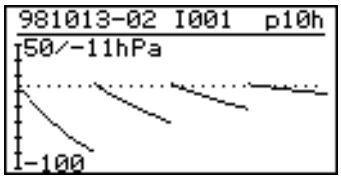
Use **<▲><▼>** to run through the curve values.

The allocated run duration and the corresponding measured value are each displayed.

Use **<PRINT>** to print out the current display.

Use **<RUN/ENTER>** to switch between the cursor interrogation and display of the curve with measured value data.

Sample display for a measurement with intermediate aerations without any saved momentary values:

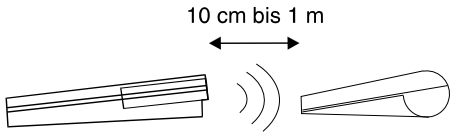


Interventions in the course of the measurement, for example intermediate aerations, are visible in the curve.

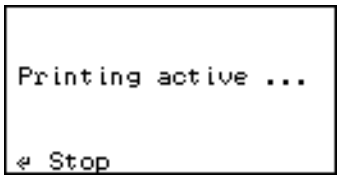
8 Printing

Switch on the IR printer.

Point the controller at the printer:





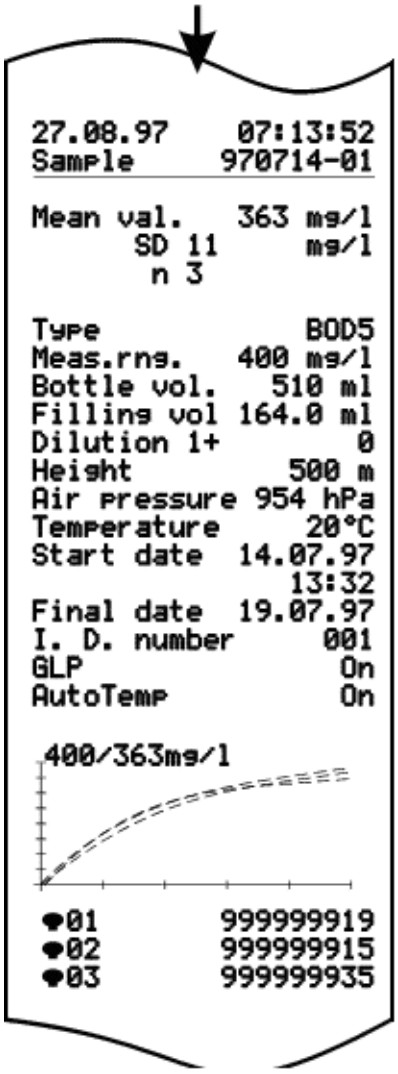


When printing from the *SAMPLE STATUS TYPE* list (sample management) or from the evaluation:

The controller transfers the **report data of the selected sample** to the IR interface.

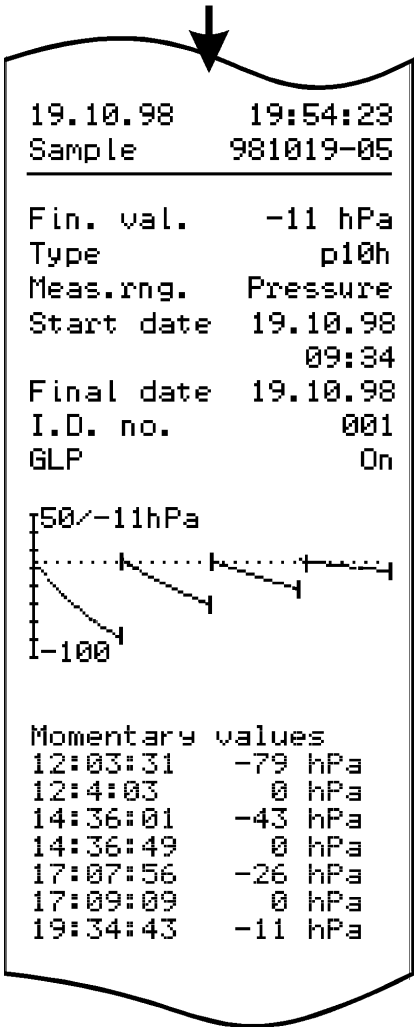
- Print date and print time
- Sample number
- Measured value: mean value, SD, n (with parallel samples) or end value (with single samples)
- Type and run duration, measurement range
- More information is available for the samples started in the *BOD Special* operating mode: Bottle volume, filling volume, dilution, height, air pressure, temperature
- Start date and start time, end date, ID number
- If *GLP* is switched on: Note, *GLP On*
- If the *AutoTemp* function is switched on: Note, *AutoTemp On*
- Curve(s) + BOD mean value or end value
- With *GLP On*: List of the serial numbers of the measuring heads allocated to the sample (only for samples started in the *BOD Standard* and *BOD Special* measuring modes)
- With samples started in *Pressure p* operating mode: Stored momentary values with call-up time

Sample printout for a sample with 3 measuring heads that was started in the *BOD Special* operating mode:



Printing from the evaluation:
The printout always shows the curve(s) shown in the display.

Sample printout for a sample that was started in the *Pressure p* operating mode:



Printing from the evaluation:
The printout always shows the curve that is shown in the display.

Pressing <PRINT>:

- When starting a sample prints the start data of the sample
- In the - *Show Settings* submenu (see section 9 GLP/ TOOLS, page 57) prints a list with the current settings
- In the "- 🌪 -Info“ submenu (see section 9.5 CHECK, page 69) prints a list with information on the measuring head
- In the - *Controller Info* submenu (see section 9.5 CHECK, page 69) prints a list with information on the controller.

9 *GLP/TOOLS*

9.1 *GLP/TOOLS* main menu





GLP/TOOLS menu:

Select a menu item with **<▲><▼>**.

Confirm with **<RUN/ENTER>**.
The selected menu opens up or the function is carried out.

GLP/TOOLS menu:

- Show free	This function is used to identify free measuring heads. Thus an additional sample labeling is not required. Free measuring heads can be used to start new samples.
- Show Settings	The current settings are displayed here.
- Settings	Here you can undertake or change the following settings: *- Operation mode* *- Measuring time* *- date/time* *- GLP*; calibration interval (not in the *BOD Routine* operating mode) *- Memory erase!* *- AutoTemp* (*BOD Standard* and *BOD Special*) operating modes: *- Switch-off interv.*(not in the *BOD Routine* operating mode) *- Temperature* (*BOD Special* operating mode) *- Height* (*BOD Special* operating mode) *- Air pressure* (*BOD Special* operating mode) *- Limit pressure* (*Pressure p* operating mode) *- Language*
- Check	*- Show* (finished/all) *- info* (with report printout) *- Controller Info* (with report printout) *- Cal Test* *- Pneumatic test*
- Maintenance	*- Erase sample* (in the controller - *SAMPLE STATUS TYPE* list (sample management)) *- Reset/release* *- Restore data*

9.2 Show free measuring heads

This function is used to identify free measuring heads. Free measuring heads can be used to start new samples.

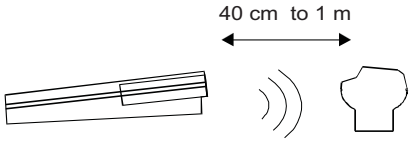




GLP/TOOLS menu:
Preselected: - *Show free* .

Press **<RUN/ENTER>**.

Point the controller at the measuring heads:



All free measuring heads flash for approx. 5 seconds.

9.3 Show settings

The current settings are displayed here.



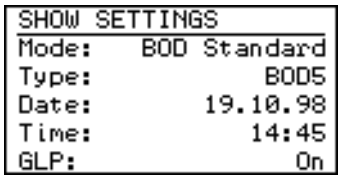


GLP/TOOLS menu:

Select the - *Show Settings* menu item with **<▲><▼>**

The following example illustrates the presettings in the *BOD Standard* operating mode:

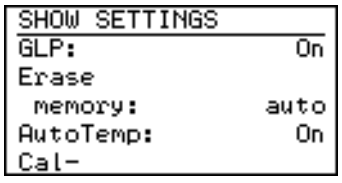




SHOW SETTINGS menu:

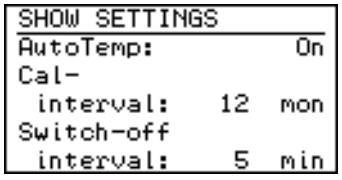
A list containing the current settings is displayed.





Use **<▲><▼>** to scroll. (Automatic stop at the beginning and end of the list)







In the "Show settings“ menu:
Print out the whole list of current settings (as in the display).

9.4 Settings

With this function you can undertake or change settings. The table below shows the settings in the delivery state.





GLP/TOOLS menu.

Select the - *Settings* menu item with **<▲><▼>**

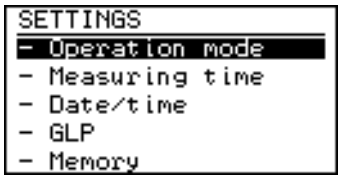
Setting	**Default setting (bold)** and setting range			
Operating mode	***BOD Standard***	*BOD Routine*	*BOD Special*	*Pressure p*
Operational life	**5 days** (0.5 h to 99 days)	**5 days** (0.5 h to 99 days)	**5 days** (0.5 h to 99 days)	**5 days** (0.5 h to 99 days)
Date	current	current	current	current
Time	current	current	current	current
GLP	***On*** *Off*	***Off*** (permanently set)	***On*** *Off*	***On*** *Off*
Calibration interval	**12 months** to 36 months	---	**12 months** to 36 months	**12 months** to 36 months
Clearing the memory	**automatic** or manual	**automatic** or manual	**automatic** or manual	**automatic** or manual
AutoTemp	***On*** *Off*	***On*** (permanently set)	***On*** *Off*	***Off*** (permanently set)
Switch-off interval	**5 minutes** to 15 minutes	**5 minutes** (permanently set)	**5 minutes** to 15 minutes	**5 minutes** to 15 minutes
Temperature	**20 °C** (permanently set)	**20 °C** (permanently set)	**20 °C** (5 °C to 40 °C)	---
Height	**500 m** (permanently set)	**500 m** (permanently set)	**500 m** (-698 - 5572 m)	---
Air pressure	**954 hPa** (permanently set)	**954 hPa** (permanently set)	**954 hPa** (500 - 1100 hPa)	---
Limit pressure	---	---	---	**150 hPa** (50 - 500 hPa)
Language	***German***	***German***	***German***	***German***

9.4.1 Operating mode

You can select the following operating modes:

- *BOD Standard*
- *BOD Routine*
- *BOD Special*
- *Pressure p* (see also section 4.3.1 OPERATING MODES, page 19).

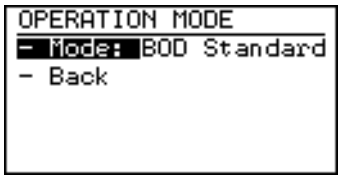
RUN/ENTER



SETTINGS menu:

Select the - *Operation mode* menu item with **<▲><▼>**.

RUN/ENTER

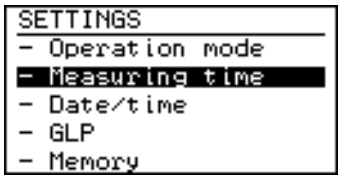


Confirm with **<RUN/ENTER>**.
Select the required operating mode **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back*:: Return to the main menu *SETTINGS*:

9.4.2 Operational life

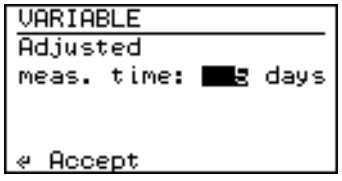
Here you determine the run duration of the measurement.



SETTINGS menu:

Use **<▲><▼>** to select the - *Measuring time* menu item.

RUN/ENTER

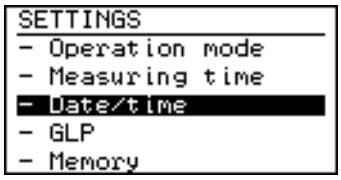


Set the days (1 to 99) or hours (0.5 to 23) with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

Display:
Adjusted meas. time.
Delivery condition: 5 days.

9.4.3 Date/time

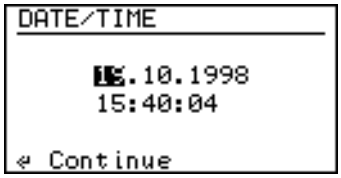
Here you set the date and time for the controller (important for the assignment of sample numbers).



SETTINGS menu:

Use **<▲><▼>** to select the - *date/time* menu item.





Use **<▲><▼>** to set each number block on a black background.
Confirm with **<RUN/ENTER>**.

Set the day, month, year, minutes, seconds one after the other.

The run duration of samples already started is not affected by changing the date or time.

Exception: The date and time must not be changed in the controller between the start and end of a sample so momentary values can be correctly stored in the *Pressure p* mode.

9.4.4 *GLP* (operating modes *BOD Standard*, *BOD Special* and *Pressure p*)

The GLP (Good Laboratory Practice) set of rules requires a detailed description of all equippings and procedures in a laboratory.

These descriptions include the room equipment of the laboratory, the instruments used, and the measuring procedures laid down, and require the complete documentation of the samples tested. The type and frequency of the use of test resources is to be described and documented as well.

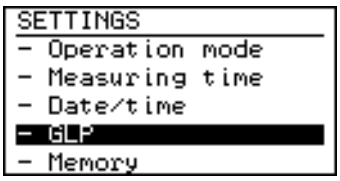
To make the documentation of the test resource monitoring easier and simpler the OxiTop® Control system has a *GLP* mode.
When this mode is switched on, the following data are documented:

- the calibration intervals that have been set
- the calibrations that have been performed

The reports contain the series numbers of the measuring head and controller and the date of the calibration.

The *GLP* mode monitors the calibration intervals and blocks the start of a new measurement if a calibration will be due within the measuring time.

Switching the *GLP* function on or off



SETTINGS menu:

Use **<▲><▼>** to select the - *GLP* menu item.

RUN/ENTER



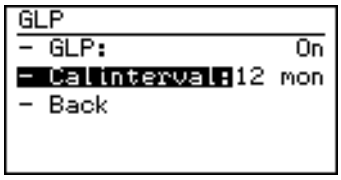
GLP menu:
Preselected: - *GLP*

Confirm with **<RUN/ENTER>**.
Use **<▲><▼>** to select either *GLP On* or *Off*.
Confirm with **<RUN/ENTER>**.

9.4.5 *GLP* - calibration interval (- *Calinterval*)

Set the time period (1 to 36 months) here. When it expires, the instrument registers that the next test resource monitoring of the measuring heads is due. After the calibrating interval expires, measuring is blocked until the calibration is performed or the *Off* setting is selected.

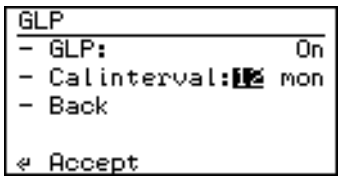
If the end of the calibrating interval set up lies within the measuring time of a measurement to be started, this measurement cannot be started.



GLP menu:

Use **<▲><▼>** to select the - *Calinterval* menu item.

RUN/ENTER



Confirm with **<RUN/ENTER>**.
Use **<▲><▼>** to set the time period for the calibrating interval (1 - 36 months).

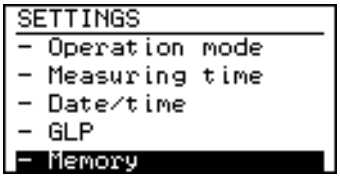
Default setting:
12 months.
Confirm with **<RUN/ENTER>**.

9.4.6 Data storage

Here, you can set whether the controller should automatically erase the oldest finished samples if the memory is full to create space for new measurement data (setting *auto*).

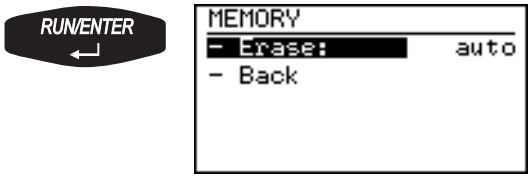
With the *manual* setting, the message "*Memory lack! Erase finished sample/s!* is displayed if the memory is full (see section 12 WHAT TO DO IF..., page 87).

Back up your data regularly!



SETTINGS menu:

Use **<▲><▼>** to select the - *Memory* menu item.



Preselected: *MEMORY - Erase auto*

To change it:
Confirm with **<RUN/ENTER>**.
Use **<▲><▼>** to select either *auto* or *manual*.
Confirm with **<RUN/ENTER>**.

- *Back* (return to the *SETTINGS* menu)

9.4.7 *AutoTemp*

The *AutoTemp* function controls the automatic start of the measurement after checking the temperature adaptation.

The pretemperature regulation to the precise incubator temperature is recommended but not essential. Recommendation: e.g. regulate the temperature of the sample for BOD5 measurements from 15 °C up to 20 °C.

You can tightly close the sample bottle with the measuring head immediately and start the measurement. The *AutoTemp* function then automatically triggers the start of the actual measuring after checking the temperature adaptation. The measuring time of the *AutoTemp* phase (adaptation phase plus the test phase) is added to the sample measuring time selected in the settings.

Pretemperature regulation of the sample

With the *AutoTemp* function switched on and, adhering to the recommendation according to the table, the error quota that results from the temperature adaptation of the sample to the incubator temperature,

$T_{Incubator}$, is smaller than 1% of the selected measurement range final value.

Measuring time of the measurement	Recommended sample temperature at the start of the measurement
1 day	$T_{Incubator}$-0.5K ... $T_{Incubator}$
2 days	$T_{Incubator}$-1K ... $T_{Incubator}$
3 days	$T_{Incubator}$-2K ... $T_{Incubator}$
4 days	$T_{Incubator}$-3K ... $T_{Incubator}$
5 ... 99 days	$T_{Incubator}$-5K ... $T_{Incubator}$
BOD5	15°C ... 20°C

The AutoTemp function

The *AutoTemp* function is made up of the **adaptation phase** and the **test phase**.

Adaptation phase

The phase without evaluation of the pressure process. The duration of the adaptation phase is defined for the various measuring times according to the table. The adaptation of the microbiology to the characteristics of the sample is made in this phase and small temperature deviations, too high and too low temperatures of the sample, can be compensated for. The measuring system is zeroed after the adaptation phase has expired.

Test phase

The phase in which the further pressure process direction in the sample bottle is checked. The test phase is defined for the various measuring times according to the table.
In this phase, the continuing temperature deviation can be compensated if the temperature of the sample is too low.

Sequence of the test phase:

With a further drop in pressure (consumption) or constant pressure after the adaptation phase, the pressure value at the end of the adaptation phase is the starting point of the measurement.

On a further increase of pressure following the adaptation phase (the sample is still too cold), the turning point of the pressure process at which the pressure increase changes into a pressure drop, is the starting point of the measurement. If the sample is too warm the test phase is dropped (temper the sample according to the table on the last page).

If no starting point is found (according to the procedure given in points 1 and 2) after the termination of the *AutoTemp* phase (time limit exceeded), the last measuring point of the *AutoTemp* phase forms the starting point.

This means that the BOD curve in the graphical evaluation does not emerge from the coordinate origin at the zero time point. A sample that was too cold was started.

BOD measuring time	Duration of the adaptation phase	Duration of the test phase
0.5 to 23 hours	Since the measurement times are very short, the system always suppresses the *AutoTemp* phase here even if the AutoTemp function is switched on in the settings.	
1, 2, 3, 4, 5 days	14, 28, 42, 56, 70 minutes	Max. 28, 56, 84, 112, 140 minutes
6 to 99 days in a 1 day pattern	70 minutes	Max. 140 minutes

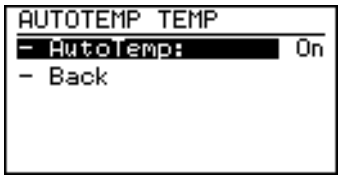
Switch the *AutoTemp* function on or off (only in operating modes *BOD Standard* and *BOD Special*):



SETTINGS menu

Use **<▲><▼>** to select the - *AutoTemp* menu item.





Preselected: - *AutoTemp On*

To change it:
Confirm with **<RUN/ENTER>**.
Use **<▲><▼>** to select either - *AutoTemp On* or *Off*.
Confirm with **<RUN/ENTER>**.

- *Back* (to the *AutoTemp* menu)

9.4.8 Switch-off interval

The time interval after the last time a key is pressed can be set here. After this time interval expires, the controller switches itself off to save energy. Possible settings: 5 to 15 minutes. Default setting: 5 minutes.

In *BOD Routine* mode the switch-off interval is permanently set to 5 min and cannot be changed.



SETTINGS menu:

Use **<▲><▼>** to select the - *Switch-off interv.* menu item.





Preset:
- *Interval*: 5 minutes

To change it:
Confirm with **<RUN/ENTER>**.
Set the required number of minutes with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back* (to the *SETTINGS* menu)

9.4.9 Temperature (*BOD Special* operating mode)

Here you can set the temperature (incubation temperature) of the sample. The temperature influences the quantity of oxygen dissolved in the sample. The setting range is 5 °C to 40 °C. The default setting is 20 °C.



SETTINGS menu:

Use **<▲><▼>** to select the - *Temperature* menu item.





Preselected: - *Temperature*: 20°C

To change it:
Confirm with **<RUN/ENTER>**.
Set the required temperature with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back* (to the *SETTINGS* menu)

9.4.10 Height (*BOD Special* operating mode)

Here you can set the height above sea level at the measuring location. The setting range is -698 m to 5572 m. The default setting is 500 m.

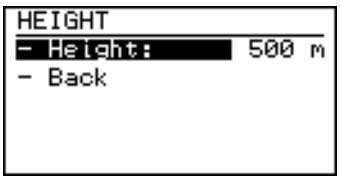
The height above sea level is directly connected to the air pressure (the air pressure influences the equation for the BOD determination). Therefore, if you change one of these two parameters, the other one is also changed automatically.



SETTINGS menu:

Use **<▲><▼>** to select the - *Height* menu item.





Preset: - *Height*: 500 m

To change it:
Confirm with **<RUN/ENTER>**.
Set the required height with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back* (to the *SETTINGS* menu)

9.4.11 Air pressure (*BOD Special* operating mode)

Here you can set the air pressure at the measuring location. The setting range is 500 hPa to 1100 hPa. The default setting is 954 hPa.

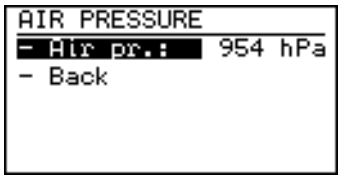
The air pressure is directly connected to the height above sea level (the air pressure influences the equation for the BOD determination). Therefore, if you change one of these two parameters, the other one is also changed automatically.



SETTINGS menu:

Use **<▲><▼>** to select the - *Air pressure* menu item.





Preset:
- *Air pressure*: 965 hPa

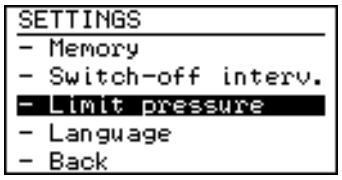
To change it:
Confirm with **<RUN/ENTER>**.
Set the required air pressure with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back* (return to the *SETTINGS* menu)

9.4.12 Limit pressure (*Pressure p* operating mode)

Select the limit pressure here, i. e. the pressure difference compared to the starting pressure (negative or positive pressure) at which the controller takes the relevant sample into a list which is automatically displayed after the data have been called up.
With this function, the course of the test can be monitored.

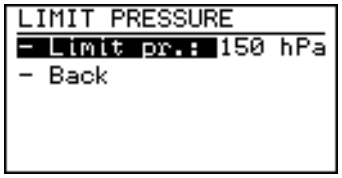
The setting range is 50 hPa to 500 hPa. The default setting is 150 hPa.



SETTINGS menu:

Use **<▲><▼>** to select the - *Limit pressure* menu item.

RUN/ENTER



Preset:
- *Limit pressure*: 150 hPa

To change it:
Confirm with **<RUN/ENTER>**.
Set the required limit pressure with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.

- *Back* (return to the *SETTINGS* menu)

The limit pressure can be changed for a running measurement. After the data have been called up once again the new limit pressure is taken into account.

9.4.13 Language

Select the language here in which the displays of the OxiTop® controller appear. The
controller has the following 5 languages stored in it (default *German*):
German - English - French - Italian - Spanish.



SETTINGS menu:

Use **<▲><▼>** to select the - *Language* menu item.

RUN/ENTER



Preset:
- *Mode German*

To change it:
Confirm with **<RUN/ENTER>**.
Set the required language with **<▲><▼>**.
Confirm with **<RUN/ENTER>**.
From now on the displays appear in the selected language.

- *Back* (return to the *SETTINGS* menu)



SETTINGS menu.

- *Back* (to the *GLP/TOOLS* menu)
or
with **<GLP>**.

9.5 Check

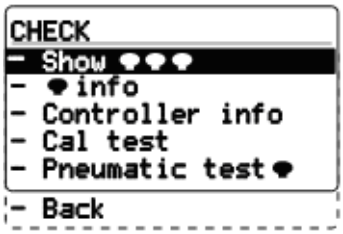


Main menu *GLP/TOOLS*.

Use **<▲><▼>** to select the - *Check* menu item.

9.5.1 Showing the measuring heads

RUN/ENTER



CHECK menu:
Preselected:
- *Show*

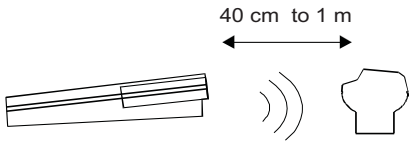
RUN/ENTER



SHOW menu:
Preselected:
- *Show free*

Use **<▲><▼>** to select either
- *Free* or
- *All*
.

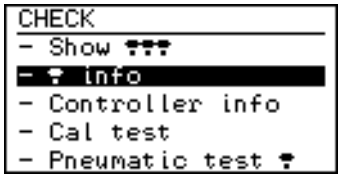
Point the controller at the measuring heads:



RUN/ENTER

All the measuring heads that are addressed flash for 5 seconds.

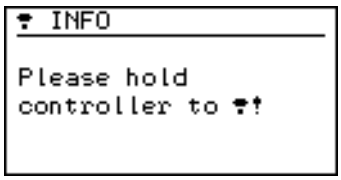
9.5.2 Measuring head information

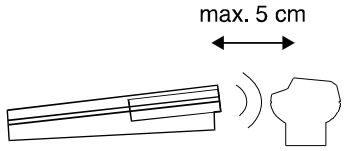


CHECK menu:

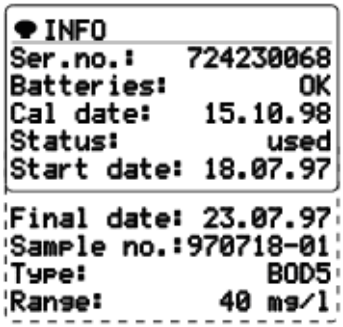
Select the - *info* menu item with **<▲><▼>**.







The measuring head flashes.



A display appears on the controller giving the following information:

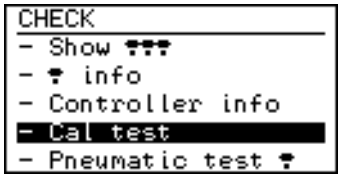
- Series number of the measuring head,
- Battery status (*OK*/*LOBAT*/*EMPTY*!!),
- the next calibration date (only in operating modes *BOD Standard*, *BOD Special*, *Pressure p* and *GLP On*)
- Status of the measuring head (*free*/*used*/*defective*).

If the measuring head is "*used*":

- Use **<▲><▼>** to scroll through the display of further information:
  - Start date
  - Final date
  - Sample number
  - Type and
  - Measuring range of the measurement
- Use **<RUN/ENTER>** to return to the *CHECK* menu.

Repeat the procedure for each measuring head.

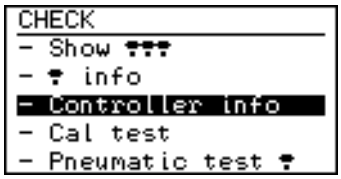
If the measuring head does not respond, the following display appears after approximately 7 seconds:



Query stopped!

You can select between
- *Continue query* (see above) and
- *Stop* (return to the *CHECK* menu)

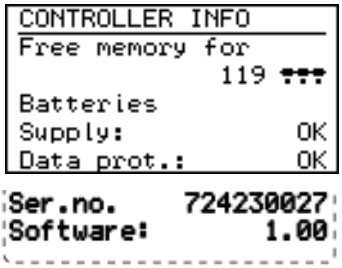
9.5.3 Controller information



CHECK menu.

Use **<▲><▼>** to select the - *Controller Info* menu item.





The display shows the following information:
- Number of measuring heads for which there is still memory capacity
- Status of the supply batteries
- Status of the data backup batteries (*OK*/*LOBAT*).

Use **<▲><▼>** to scroll to the specification of the
- Software version
- Series number (can differ from the example shown here)

Return to the *CHECK* menu: With **<RUN/ENTER>**.

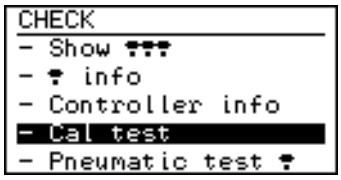
9.5.4 *cal-test*

The *cal-test* function is used to test the sealing of the system measuring head - rubber sleeve - sample bottle and the operability of the system OxiTop® Control.

In the *BOD Standard* mode with the *GLP On* setting, the controller indicates when the next cal test is due, depending on the set calibration interval (see section 9.4.4 GLP (OPERATING MODES BOD STANDARD, BOD SPECIAL AND PRESSURE P), page 61).

To perform the test, you need the WTW test resource, OxiTop® PM, order number 209 333.

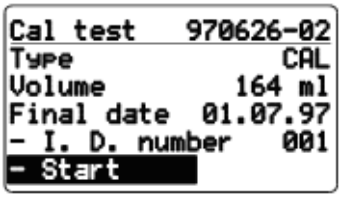
Sample preparation: see operating manual of the OxiTop® PM test resource.



CHECK menu.

Use **<▲><▼>** to select the - *Cal Test* menu item.

RUN/ENTER

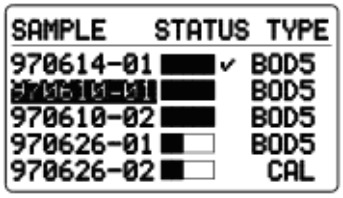


The instrument automatically allocates the sample number (in the header line).
The filling volume (164 ml) and the type together with the run time of 5 days are preset.

For information on the further handling of the sample up to the “finished” status: See section 5.2 STARTING THE MEASUREMENT, page 23.

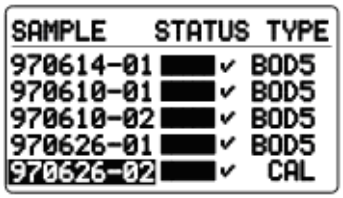
The Cal sample appears together with the other samples in the *SAMPLE STATUS TYPE* list (sample management). The BOD type is *CAL*:





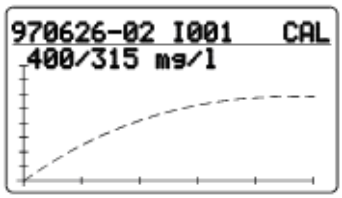
SAMPLE STATUS TYPE list (sample management)

Evaluation of the Cal test



Use **<▲><▼>** to select the test sample.

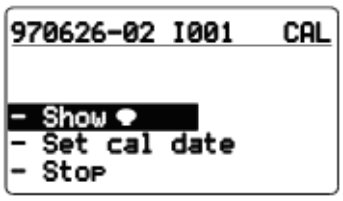




Entry into the evaluation.
Display of the selected sample as a curve with measurement value data.

Compare measurement value with lot test value (according to operating manual of OxiTop® PM) .

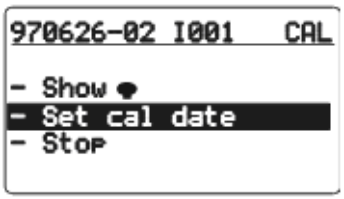




Now you can set a new calibration date for the measuring head with the controller.

- *Show* (to find the relevant measuring head):
Function and messages as described (see section 5.4 SAMPLE STATUS TYPE LIST (SAMPLE MANAGEMENT), page 28.

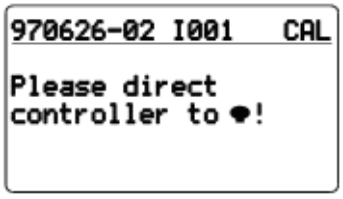


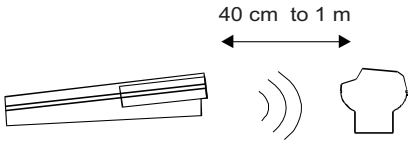


- *Set Cal date*
This menu item only appears if the controller is in the *BOD Standard* operating mode, *GLP* is switched on and the test is finished.

- *Stop*:
Return to the curve display. The Cal test is considered as not performed.

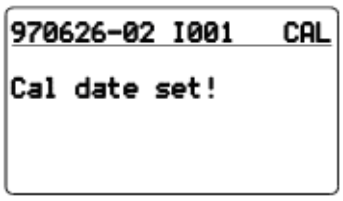






The controller sets a new test date in the measuring head. The controller calculates the new test date from the current date + the specified check interval (see section 9.4.5 GLP - CALIBRATION INTERVAL (- CALINTERVAL), page 62).

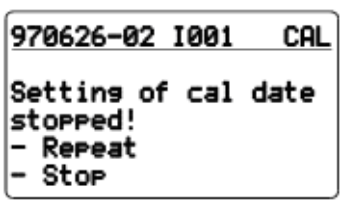




The controller displays the setting of the calibration date.

If the date was not set successfully (e.g. because the controller was not held to - or not held close enough to - the measuring head):





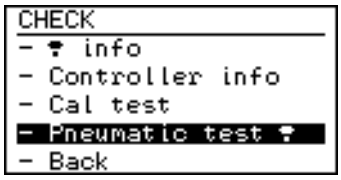
Repeat the procedure using **<RUN/ENTER>**.
Then continue as described above.

9.5.5 Pneumatic test

The pneumatic test tests the measurement precision of the measuring head.
It says nothing about the long-term impermeability of the system.

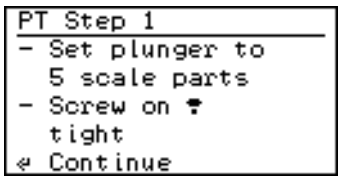
To perform the pneumatic test, you require the test resource, OxiTop® PT (WTW order number 209 334).

The user interface of the controller guides you through the test:



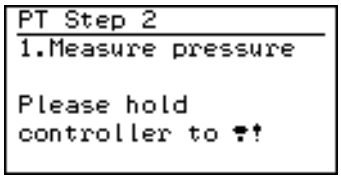
CHECK menu.
Use **<▲><▼>** to select the - *Pneumatic test* menu item.

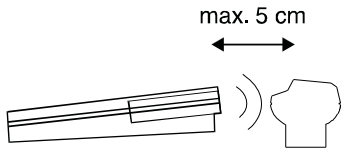
RUN/ENTER



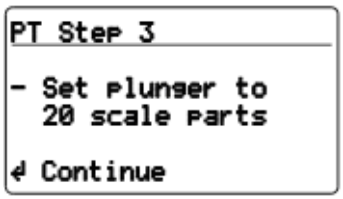
Set the plunger of the syringe on the OxiTop® PT test resource to 5 scale parts.
Tightly screw the measuring head to be tested onto the OxiTop® PT test resource.

RUN/ENTER

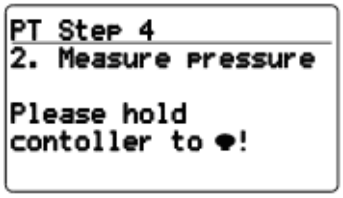


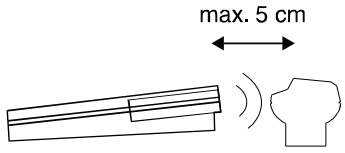


(Exceeding the time causes a return to the *CHECK* menu).

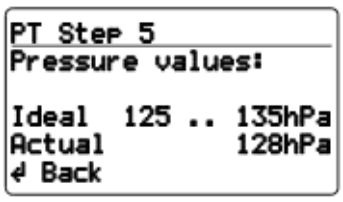


RUN/ENTER





(Exceeding the time causes a return to the *CHECK* menu).



The controller display shows the result of the pneumatic test.

Use **<RUN/ENTER>** to return to the *CHECK* menu.

9.6 Maintenance



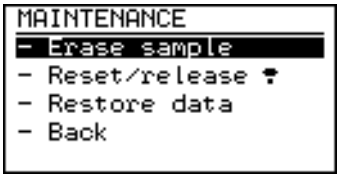
GLP/TOOLS menu.

Use **<▲><▼>** to select the - *Maintenance* menu item.

9.6.1 Erasing finished samples

Here you can erase the data of finished samples that are already evaluated or no longer required in order to free memory in the controller.

RUN/ENTER



MAINTENANCE menu:
- *Erase sample* preselected

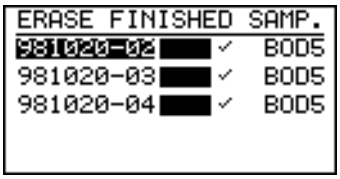
RUN/ENTER



ERASE FINISHED SAMP. menu:
Preselected: - *From sample no.*

- *all*
- *Back* (to the *MAINTENANCE* submenu)

RUN/ENTER



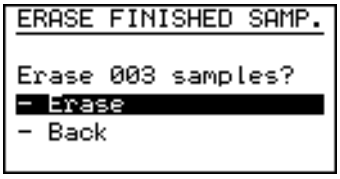
The controller displays the list of the finished samples.
The oldest finished sample is marked.





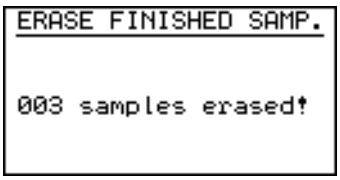
With **<▼>**, you can mark further samples.
With **<▲>**, you can remove the marking again.

RUN/ENTER



The controller asks if you really want to erase the marked samples from the memory.

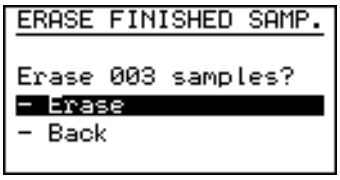
RUN/ENTER



After confirmation, the display message shown here appears for 2 seconds and then the controller returns to the menu *ERASE FINISHED SAMP.*.

In the selection of erase “All“ samples, the following display appears:





The controller asks if you really want to erase the samples from the memory.

Continue: see above.

If no finished samples are available in the memory, the following display appears:



9.6.2 Reset/release

This function can be used to release measuring heads again that were unintentionally started.

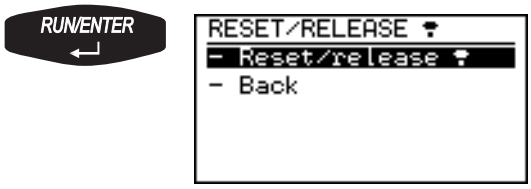
After carrying out the - *Reset/release* 🌳 function the data of the measuring head are erased!



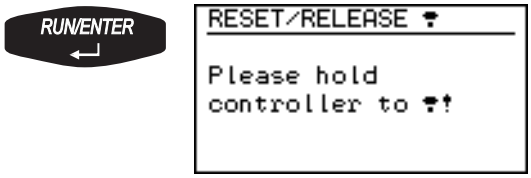
MAINTENANCE menu:

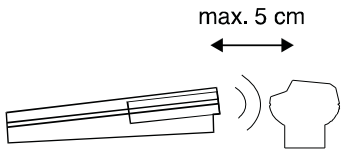
Use **<▲><▼>** to select the - *Reset/release* 🌳 menu item.

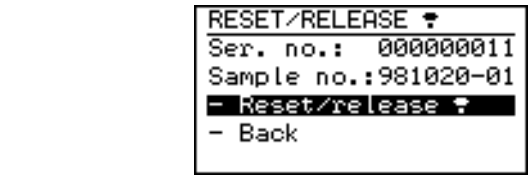
RUN/ENTER



RUN/ENTER



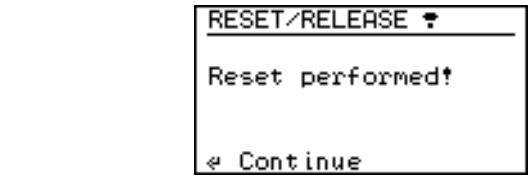




The serial number of the measuring head and the sample number appear on the display.

- Reset/release 🌳
Confirm with **<RUN/ENTER>**.
The release for the measuring head has been performed..

- Back:
(measuring head not released)



Display message:
Reset performed!

Repeat the procedure for each measuring head to be released.

Display message when the last measuring head of a sample has been released:



Use **<RUN/ENTER>** to return to the *RESET/RELEASE* 🌳 menu.

9.6.3 Reading out data

In case you lost your controller or your controller is defective, the "Restore data" function facilitates to restore the data of running measurements using a new or other controller. This means the data are not lost!

To perform this function the memory of the controller must be absolutely empty! The data of each single measuring head are restored one after the other in a sequence. It is not possible to leave this function and to continue it afterwards because then the memory would no longer be empty.



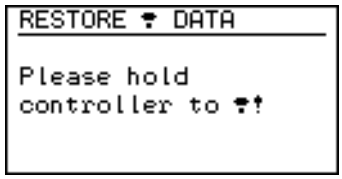
Select the - *Restore data* menu item.

RUN/ENTER

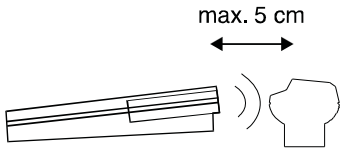


Select the - *Restore* *data* menu item.

RUN/ENTER



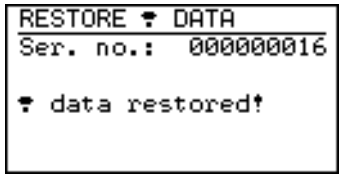
Confirm the restoration for one measuring head and hold the controller to the measuring head. Contact selection:





The controller displays the serial number of the selected measuring head.

RUN/ENTER



After confirming again the data of the measuring head are read out and stored in the controller.

The Id number of the sample is not restored, it is always I999.



The controller returns to the *RESTORE DATA* menu. Perform this procedure for every measuring head with a measurement running, without leaving the *RESTORE DATA* function.

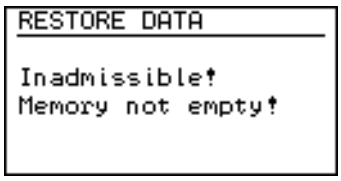
If the data of a measuring head were already restored the following is displayed for approx. 3 seconds:



Then the controller returns to the *RESTORE DATA* menu. Perform the restoration with another measuring head.

If the memory of the controller is not empty the following is displayed for approx. 3 seconds:





After this, the *RESTORE DATA* menu is displayed again.
It is not possible to restore the data with the controller. Contact the WTW service department.



It is possible to restore the data of all running measurements if the controller is in the *BOD Routine* operating mode. In the *SAMPLE STATUS TYPE* list (sample management), however, only the samples that were started in the *BOD Routine* operating mode are displayed in this case. To have all samples shown, switch over to another operating mode (see section 9 GLP/TOOLS, page 57).

10 Transmitting data

The RS232 interface is used to transmit data to a PC (see section 4.1.2 SOCKET FIELD - CONTROLLER, page 18).

For details, see operating manual of the Achat OC software.

10.1 Achat OC software

With the Achat OC software, you can

- Execute the sample management of the controller on the PC (back up the data regularly!)
- Comfortably display the sample management together with additional information on the screen
- Select samples in the PC and transfer the measurement data of the selected samples from the controller to the PC
- Export the measurement data for processing with spreadsheet programs

For details, see operating manual of the Achat OC software.

11 Maintenance, cleaning, disposal

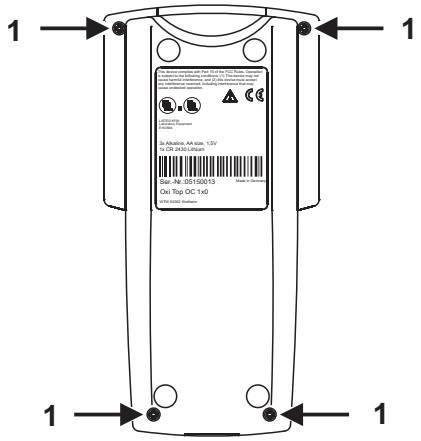
11.1 Maintenance

11.1.1 General maintenance activities

The only maintenance activity required is replacing the batteries.

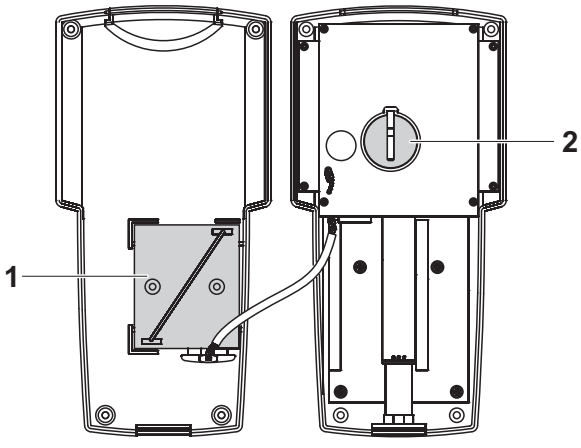
11.1.2 Replacing the supply batteries (controller)

- Switch off the controller OxiTop®-OC 110.
- Loosen the 4 screws underneath the housing using a Phillips screwdriver.



1 Screws

- Place the controller on the lower case.
- Remove the upper case and put it down to the right next to the lower case with the display downwards.



1 Supply batteries in the battery holder (lower case)

2 Data backup battery (upper case)

- Remove the supply battery holder from the fixing in the lower case and turn it around.
- Remove the empty supply batteries.
- Insert the new supply batteries - 3 pieces, alkaline (alkali manganese), Size: Mignon, AA, AM3, LR6).

NOTE
Ensure that they are inserted in the correct position!
(The poles are marked in the supply battery holder.)
Always replace the complete set of batteries.

- Turn the supply battery holder around again and place it in the fixing in the lower case.
- Set the upper case on top of the lower case, turn the controller and tighten the housing screws using the screwdriver.
- Switch on the controller. The battery change was successful if no error message appears concerning the supply batteries.
- It is recommended to use only brand name batteries of the type specified as “Alkaline“. Using other types of battery can adversely affect the reliable functioning.
- The supply batteries have no influence on data integrity.



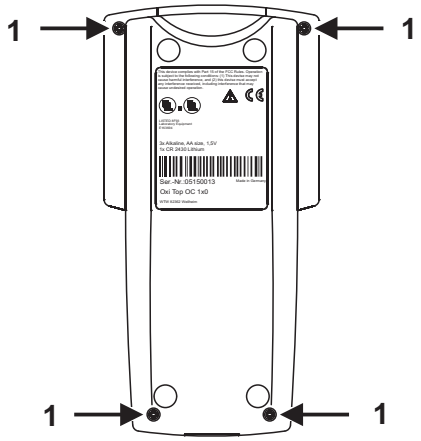
Dispose of used batteries according to the local regulations of your country.

End users within the European Union are obligated to return used batteries (even ecologically compatible ones) to a collection point set up for recycling purposes.

Batteries are marked with the crossed-out waste container symbol. Therefore, they may not be disposed with the domestic waste.

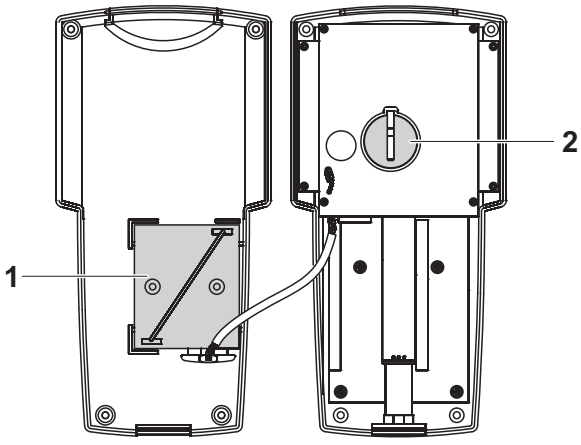
11.1.3 Replacing the data backup battery (controller)

- Evaluate and back up all the measurement data.
  Options available:
  - print out the results (see section 8 PRINTING, page 54)
  - save the data in the PC using the software “Achat OC“, see section 10.1 ACHAT OC SOFTWARE, page 80
  - handwritten documentation of the results.
- Documentation of your instrument settings:
  printout of your instrument settings, see section 9.3 SHOW SETTINGS, page 58.
- Switch off the controller OxiTop®-OC 110.
- Loosen the 4 screws underneath the housing using a Phillips screwdriver.



1 Screws

- Place the controller on the lower case.
- Remove the upper case and put it down to the right next to the lower case with the display downwards.



1 Supply batteries in the battery holder (lower case)

2 Data backup battery (upper case)

- Remove the empty data backup battery.
- Insert the new data backup battery (1 piece, lithium battery, CR2430, e.g. WTW type Batt/ OxiTop®).

NOTE
Ensure that they are inserted in the correct position! The positive pole must point upwards.

- Set the upper case on top of the lower case, turn the controller and tighten the housing screws using the screwdriver.
- Switch on the controller. The message *Please Set system clock!* appears.
  This message is a reminder and should be acknowledged by pressing **<RUN/ENTER>**.
- The battery change was successful if no error message appears concerning the data backup battery.
- Enter the current date/time and your settings.



Removing the data backup battery and the supply battery simultaneously will erase all data (instrument reset)!



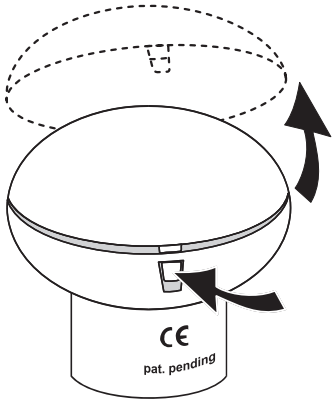
Dispose of used batteries according to the local regulations of your country.

End users within the European Union are obligated to return used batteries (even ecologically compatible ones) to a collection point set up for recycling purposes.

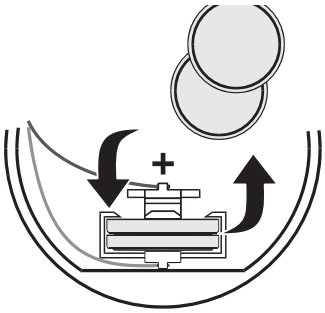
Batteries are marked with the crossed-out waste container symbol. Therefore, they may not be disposed with the domestic waste.

11.1.4 Changing the supply battery (measuring head)

- Change the battery after the measurement has been terminated.
- Press in the snap-action holder and open the upper case.



- Remove the batteries.



- Insert new batteries (2 x lithium batteries, CR2430, e.g. WTW type Batt/OxiTop®). When doing so make sure the batteries are inserted in the correct position!
- Insert the upper case with the lug in the locking pin (lower case). Caution! Do not crush the cable connection!
- Close the upper case (let the hook snap into place).

Check if the battery change was successful:
In the *GLP/TOOLS - Check -* 🌳 *info* menu, *Batteries*: *OK* must appear.

The batteries do not affect the data integrity of the OxiTop® measuring head.

Dispose of used batteries according to the local regulations of your country.

End users within the European Union are obligated to return used batteries (even ecologically compatible ones) to a collection point set up for recycling purposes.

Batteries are marked with the crossed-out waste container symbol. Therefore, they may not be disposed with the domestic waste.

11.2 Cleaning

11.2.1 Cleaning of the sample bottles

See application reports.

11.2.2 Cleaning of the controller and measuring heads

Occasionally wipe the outside of the measuring instrument with a damp, lint-free cloth.

NOTE **The housing is made of synthetic material (ABS). Thus, avoid contact with acetone or similar detergents that contain solvents. Remove any splashes immediately.**

11.3 Disposal

At the end of its operational lifetime, the instrument must be returned to the disposal or return system statutory in your country. If you have any questions, please contact your supplier.

12 What to do if...

12.1 Display messages

Display message	Cause	Remedy
already used!	The selected measuring head has already been started for a measurement and can only be used for a new measurement after the current measurement is finished and the measurement data completely retrieved.	• Select a new and free measuring head or • - *Stop* *start* or • Release the measuring head (section 9.6.2 RESET/RELEASE, page 77)
Please Set system clock!	Data backup battery was changed.	Set the clock (see section 9.4.3 DATE/TIME, page 61).
defective!	The selected measuring head is defective. Please return it to WTW.	• Select a new and free measuring head or • - *Stop* *start*
No samples available!	There are no finished samples stored in the sample management.	• Transfer the unfinished samples of the sample management to “finished” status. To do this, the measurement data of all measuring heads must be called up and evaluation and documentation of the measurement data of the finished samples must be performed. • If the measurement data of the measuring heads are not yet finished, no instant remedy is possible! The memory capacity limit of the instrument has been reached.

Display message	Cause	Remedy
No active 🌪!	● No measurement has been started. ● The measuring heads are placed at another location (e.g. other levels in the incubator, other incubators, further storage locations). ● The measuring heads have no optical contact with the controller: – Distance too great, angular position imprecise – IR window of the measuring head averted from the controller – Shading by other object. ● Controller defective	● Modification of the distances or angle ● Search at other storage locations ● Check the controller ● Check the measuring heads (see section 12.3 GENERAL INFORMATION, page 93)
cal test 🌪 due on 18.07.98! (sample date)	● GLP is switched on ● The test resource monitoring is due within the measuring time of measurement for the selected measuring head. ● Date/time is not correctly set in the controller.	● Use another free measuring head that has been checked ● Start the due measuring head with the Cal test (see section 9.5.4 CAL-TEST, page 71) ● Switch off GLP and start the measuring head (if your laboratory practice permits this). ● Set the date/time in the controller.
Lack of memory possible! *Memory for 11 🌪 free* ! *Continue*	This message is used as information in the *BOD Standard* or *BOD Special* operating mode. There are a lot of sample data stored in the sample management. The memory is almost full. It is still possible to start a sample as a parallel sample start with 11 measuring heads (the number 11 🌪 used here is an example, possible numbers: 1...11 🌪).	Problem solution, if necessary: ● Erase finished samples section 9.6.1 ERASING FINISHED SAMPLES, page 75 ● Alternative: Changing the instrument setting to automatic erasing of finished samples: section 9.4.6 DATA STORAGE, page 63

Display message	Cause	Remedy
Memory lack! *No ready samples autom. erasable!*	The instrument works with the setting, Erase memory *auto* (automatically). The memory is full and only unfinished samples are stored in the sample management. The instrument can only erase finished samples automatically.	● Transfer the unfinished samples of the sample management to “finished” status. To do this, the measurement data of all measuring heads must be called up and evaluation and documentation of the measurement data of the finished samples must be performed. ● If the measurement data of the measuring heads are not yet finished, no instant remedy is possible! The memory capacity limit of the instrument has been reached.
Memory lack! *Erase finished sample/s!*	The instrument works with the setting, Erase memory "manually". The memory is full.	● Transfer the unfinished samples of the sample management to “finished” status: ● Call up the measurement data of all measuring heads ● Perform the evaluation and documentation for the measurement data of the finished samples ● Erase finished samples from the sample management: section 9.6.1 ERASING FINISHED SAMPLES, page 75 Note: Only the finished samples in the sample management can be erased.

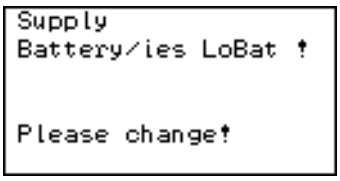
Display message	Cause	Remedy
undef. (Display in the curve presentation or sample statistics)	● The selected measurement range has been exceeded. ● The sample filled was too warm. ● The AutoTemp function is switched off. ● The sample filled was very cold and has a low consumption behavior (small BOD value). ● The system is not sealed (bottle internal pressure = atmospheric pressure).	● Select the correct measurement range (see application reports on the CD-ROM, Principles of measuring technique). ● Pre-temper the sample more precisely. ● Switch on the AutoTemp function (only effective with run durations of more than 1 day). ● Check the system for leaks by means of a visual check: Are the sealing surfaces of the bottle and measuring head clean and fault-free? Are there cracks in the sleeve, bottle or measuring head? ● Perform a *cal-test* (see section 9.5.4 CAL-TEST, page 71). ● Check the incubator temperature.
10 of 12 *called up* (sample message, no. is variable)	● Two measuring heads have not been found by the controller ● The measuring heads are placed at another location (e.g. other levels in the incubator, other incubators, further storage locations) ● The measuring heads have no optical contact with the controller: - Distance too great, angular position imprecise - IR window of the measuring head averted from the controller - Shading by other objects ● The missing measuring heads are defective.	● Modification of the distances or angle. ● Search at other storage locations. ● Search for and check measuring heads (see section 12.3 GENERAL INFORMATION, page 93)

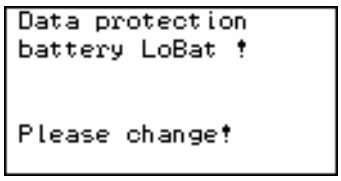
Display message	Cause	Remedy
0 of 19  *called up* (sample message, no. is variable)	● No measuring head was found by the controller. ● The measuring heads are placed at another location (e.g. other levels in the incubator, other incubators, further storage locations) ● The measuring heads have no optical contact with the controller. – Distance too great, angular position imprecise – IR window of the measuring head averted from the controller – Optical shading by other objects ● The controller is defective.	● Modification of the distances or angle ● Search at other storage locations ● Check the controller (see section 12.3 GENERAL INFORMATION, page 93)

12.2 Display messages on the charging status of the batteries

12.2.1 Batteries in the controller

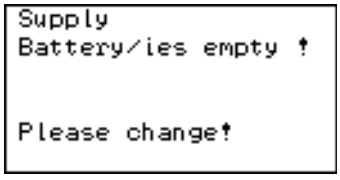
Display message

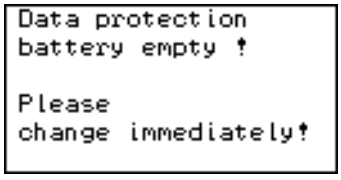




Notes/ explanation

The warning appears for approx. 3 seconds.
The instrument then continues to run normally.
The instrument can still be safely operated within the specifications.
When the message first appears, there is still a running reserve available.
Please obtain new batteries and replace the old ones!

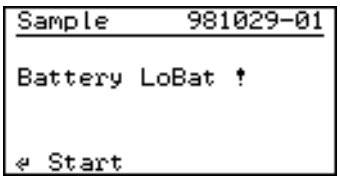




The message appears for approx. 3 seconds.
The instrument then switches itself off.
The instrument can no longer be used.
The supply batteries must be replaced by new ones.

12.2.2 Battery in the measuring head

Display message





Notes/ explanation

The instrument can still be safely operated within the specifications.
The running reserve of the instrument is still sufficient for the measurement to be started.
Please obtain new batteries and replace the old ones!

The instrument can no longer be used.
The supply batteries must be replaced by new ones.
It is possible to start a new measuring head or to complete a sample start.

12.3 General information

	Cause	Remedy
No or missing sample entries in the sample management	● The *BOD Routine* operating mode is switched on. Samples were started in the other operating modes.	● Switch the instrument to the *BOD Standard*, *BOD Special* or *Pressure p* operating modesection 9.4.1 OPERATING MODE, page 60
At the beginning of the measurement, no measurement curves are displayed Measurement curves do not emerge from the origin	● The sample filled and started was too cold. ● The *AutoTemp* function is switched off.	● Temper the sample more precisely. ● Switch on the *AutoTemp* function (only effective with run durations of more than 1 day).
No measurement curves are displayed although the measurement has already been running for an extended period of time	● No data were retrieved from the measuring heads. ● The AutoTemp phase is still running (see section 9.4.7 AUTOTEMP, page 63).	● Call up the data of the measuring heads. See section 5.3 CALLING UP ALL DATA, page 26. ● Wait for the end of the AutoTemp phase then start the evaluation.
Search for free measuring heads for a new measurement	Perform the - *Show free* function (see section 9 GLP/TOOLS, page 57). The controller causes the free measuring positions to flash for 5 seconds.	
Measuring head unintentionally started for measurement Measuring head started with incorrect settings Measuring head is required for another sample	The measuring head can be released again with the command Reset/release: see section 9.6.2 RESET/RELEASE, page 77. The controller guides you further through the operation. If only one measuring head is stored under the relevant sample number (in the *BOD Routine* and *Pressure p* operating modes, this is always the case), the controller automatically erases the sample in the sample management.	
Search for a defective measuring head	Perform a measuring head reaction test (see above). A measuring head that repetitively shows no reaction to the test is defective. If the defective measuring head cannot be established in this way, perform the measuring head check (see “Single check”). In doing this, each individual measuring head must be checked until the defective measuring head has been found.	
A measuring head is missing or is defective. Requirement: To determine the corresponding sample	Call up the function “Call up data” from the sample management for each individual unfinished sample. The corresponding sample can be determined by this. For subsequent error handling, see section 5.4.4 CALLING UP DATA, page 31.	

	Cause	Remedy
Which measuring head belongs to which measurement curve?	● Prepare the relation separate curve – number of measuring head; see section 5.5 EVALUATION, page 35. ● Read number of measuring head out of headline ● Have measuring head shown; see section 5.4.1 SHOWING A SAMPLE, page 29	
The precision and sealing of the system sample bottles plus measuring head should be checked	see section 9.5.4 CAL-TEST, page 71	
Measuring head check (single check) (To which running sample does the selected measuring head belong?)	Single check method: Menu *GLP/TOOLS - Check -* 🌪 *info* ● The controller guides you further through the operation. ● All single information on the state of the measuring heads is listed, i.e. the measuring head responds. ● The check can be undertaken at any time without affecting the measurement that is running. ● If no reaction at all can be determined, the batteries should be changed and the measuring head check repeated. ● The measuring precision cannot be checked with this!	
The measuring precision of the measuring head should be checked.	See section 9.5.4 CAL-TEST, page 71 or section 9.5.5 PNEUMATIC TEST, page 74	
Perform measuring head reaction test	● Menu *GLP/TOOLS - Check - All* 🌪🌪🌪: ● All optically attainable measuring heads must flash for approx. 5 seconds independent of their status. ● The check can be undertaken at any time without affecting the measurement that is running. ● This test only checks the reaction to commands. ● If no measuring head reacts, the controller should be checked.	

	Cause	Remedy
Check of the controller	Controller information ● See section 9.5.3 CONTROLLER INFORMATION, page 71 All single information on the state of the controller is listed. The check can be undertaken at any time without affecting the measurements that are running. ● Perform the command: - *All* 🌳🌳🌳. See *GLP/TOOLS - Check - Show* 🌳. (The check is used in this case to test the IR interface.) All working measuring heads must flash for 5 seconds. ● Perform a measuring head check (see section 9.5.2 MEASURING HEAD INFORMATION, page 70). (The check is used in this case to test the IR interface.) Here, a working measuring head should supply its status data. ● Keyboard, display and signal tone should show the required reaction. ● Check the function of the clock (prerequisite: Clock is set). Switch off the instrument and switch it on again. Time and date each appear showing the current values. ● Check RS232 interface (only required when using the WTW software, ACHAT OC): – Connect the controller to your PC by means of the interface cable AK540/B. – Switch on the controller and start the PC program, ACHAT OC. In doing so, the PC program checks the RS232 interface.	
The controller does not react / is defective – the data of the running measurements should be restored	Send the controller to WTW. Using a repaired or new controller (memory must be empty!) perform the “Restore data” procedure (see section 9.6 MAINTENANCE, page 75).	
Incorrect time display on being switched on	● Data backup battery was changed. ● Summer/winter time change has taken place.	Set the clock (see section 9.4.3 DATE/TIME, page 61). Note: The date and time must not be changed in the controller between the start and end of a sample so momentary values can be correctly stored in the *Pressure p* mode.

	Cause	Remedy
The IR printer does not react	● The printer is not switched on ● The printer has no optical contact with the controller: – Distance too great, angular position imprecise – IR window of the printer averted from the controller – Shading by other objects. ● Printer batteries are empty. ● No paper or the wrong paper is loaded. ● Printing is not possible in the operating state of the controller selected. ● The printer or the controller is defective.	● Switch on the printer ● Establish optical contact ● Check or change the printer batteries. Please read the operating instructions of the printer. ● Check in the operating manual of the controller whether printing is possible in the state selected. Note: During printing, the message *Printing active ...* always appears on the display

13 Technical data

13.1 Controller OxiTop® OC 110

Measuring ranges	*BOD Standard* and *BOD Routine* operating modes: 0 ... 40 / 80 / 200 / 400 / 800 / 2000 / 4000 mg/l BOD *BOD Special* operating mode: 0 ... 400,000 mg/l BOD *Pressure p* operating mode: 500 ... 1350 hPa	
Run durations and data records	**Measuring time of the measurement**	**Datasets**
Per measurement	0.5 hours	180
	1.5 hours	270
	2.5 hours	300
	3.5 hours	315
	4.5 hours	324
	5.5 hours	330
	All whole hours (1, 2, 3 to 23 hours)	360
	All whole days (1, 2, 3 to 99 days)	360
Display	LCD graphic display 64 x 128 pixels	
Memory capacity	Data of 120 measuring heads	
Power supply	Supply batteries: 3 pieces, alkaline (alkali manganese), size: Mignon, AA, AM3, LR6 Data backup battery: 1 piece lithium battery, CR2430, WTW order no. 209 012	
Battery runtime		
Supply battery	> 1000 start-ups in case of normal use (the instrument has an automatic shut off)	
Data backup battery	typically 4 years	
Protective class	3, instrument safety: N 61010 -1	
Type of protection	IP 41	
EMC	EN 61326-1, FCC Class A	
Ambient temperature	Storage: -25°C ... +65°C Operation: +5°C ... +40°C	
Dimensions	45 x 100 x 200 mm (H x W x D)	
Weight	Approx. 390 g	
Test certificates	CE	

13.2 Measuring head OxiTop®-C or OxiTop®-C/B

Measuring principle	Piezoresistive pressure sensor
Operation pressure range	500 ... 1350 hPa (mbar).
Maximum allowed pressure	2000 hPa (mbar)
Accuracy	± 1% of the measured value ± 1 hPa
Resolution	1 hPa
Display	LED pilot lamp
Power supply	2 x lithium battery CR2430
Battery runtime	Typically 2 years, in case of normal use
Protective class	3, instrument safety: EN 61010-1
Type of protection	IP 54
EMC	EN 61326-1, FCC Class A
Ambient temperature	Storage: -25°C ... +65°C Operation: +5°C ... +50°C
Dimensions	H: 70 mm, Ø 70 mm
Weight	95 g
Test certificates	CE

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What can Xylem do for you?

We're a global team unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to xyleminc.com.

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