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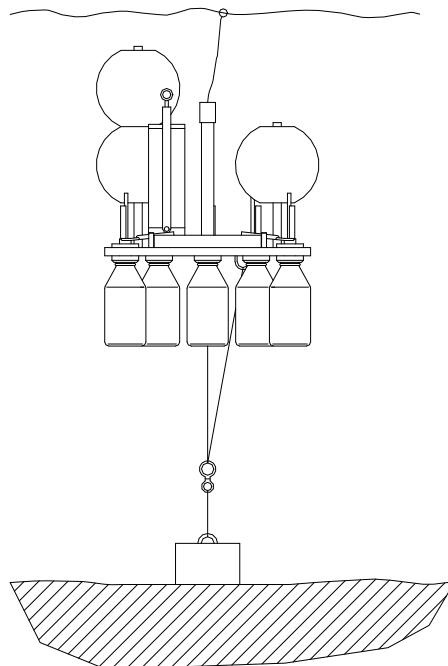
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## Automatic Water Sampler MULTI-LIMNOS

CATALOGUE NO. 436 985

### OPERATION MANUAL



Edition 05/22

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## GENERAL DESCRIPTION

The water sampler MULTI-LIMNOS with its programmable time release mechanism has been designed to automatically achieve up to 10 water samples in water depths down to 30 metres.

The system is equipped with 10 Duran glass bottles of 1 litre capacity each which can also be used as transportation and storage vessel. The bottles are screwed into modified LIMNOS heads and attached to the base plate.

When the system is lowered to the desired water depth all bottles are closed. They are opened one after the other according to preselected time intervals. When the bottles are filled with water, they are automatically closed by integrated ball valves.

The MULTI-LIMNOS is equipped with a microprocessor controlled Motor Unit, activating the bottles in pre-programmed time intervals (from 1 minute up to 8760 hours) **in real-time or in intervals**. The programming of the Motor Unit is made via personal computers by using the software OceanLab.

The instrument can be programmed at any location and easily be started on the spot by an outer switch just before operation.

Power supply of the Underwater Unit is made by 3 long-time lithium batteries placed in a removable battery housing. The battery capacity is sufficient for approx. 20 operations within 12 months.

The bottom anchoring system offers the possibility to easily choose the water depth and, if required, change the depth with each operation. A bottom weight of approx. 70 kg is sent to the bottom at which the MULTI-LIMNOS with its floats is suspended by means of a rope. The operational depth of the MULTI-LIMNOS is set by pulling at the rope which is led through a self-closing clamp. As marking at the water surface a float in the size of a handball is used. After operation the clamp will be released by means of a messenger and thus the instrument will float up to the water surface.

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## STANDARD EQUIPMENT

1. 1 Base plate with release mechanism, motor unit and self-closing clamp
2. 10 Modified LIMNOS heads with integrated ball valves
3. 10 Duran glass bottles, 1 litre capacity
4. 1 Nylon rope, 6 mm dia., 2 metres long
5. 1 Nylon rope, 6 mm dia., 100 metres long
6. 1 Revolving swivel with wheel block
7. 3 Stainless steel shackles
8. 6 Floats, 8 inch
9. 1 Float, 6 inch
10. 1 Messenger, 800 g
11. 1 Programming cable with SUBCONN MC IL 5 F
12. 1 Dummyconnector MC DC 5 F
13. 1 USB-Stick OceanLab
14. 3 Lithium batteries DL 123A / 3 V or equivalent
15. 1 Spare O - ring No. 10 x 4 for axle duct Fig. 1 C
16. 1 Spare O - ring No. 020 for axle box case Fig. 1 E
17. 1 Spare O - ring No. 151 for pressure housing Fig. 1 H
18. 1 Spare O - ring No. 009 for switch shaft Fig. 1 J
19. 1 Spare O - ring no. 120 for Battery Housing
20. 1 Can O-ring lubricant
21. 1 Can pin lubricant
22. 1 Hexagon socket screw key 4 mm
23. 1 Hexagon socket screw key 5 mm
24. 1 Spanner 10 mm
25. 1 Operation manual

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## TECHNICAL DATA

### Underwater Unit:

Dimensions:		600 mm dia. x 830 mm high
Weights:	on air:	approx. 27 kg
	in water:	approx. 7 kg buoyancy (with filled bottles)
Sampling vessels:		Duran glass bottles, 1 litre capacity, thread GL 45 x 4
Operational depth:		max 30 metres
Connector at Motor Unit:		SUBCONN MC BH 5 M
Sampling interval:		1 minute - 8760 hours in real-time or intervals
Material:	Motor Unit:	Titanium
	Battery Housing:	Titanium
	Base plate / release mechanism:	Titanium, Stainless steel, PVC
	Modified LIMNOS heads:	PTFE
Power supply:	3 Lithium batteries	DURACELL DL 123A / 3 V or equivalent
Battery capacity sufficient for:		up to 20 operations within 12 months
Storage time of new batteries:		approx. 10 years
Operating temperature:		-40°C ... +85°C

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## INSTALLATION OF BATTERIES

1. Make sure that the lever switch at the outside of the Motor Unit is switched to position **O**.
2. Unplug the cable connection between Battery Housing and Motor Unit at the Motor Unit.
3. Loosen the Battery Housing from the Motor Unit by screwing the star grip screw counter-clockwise.
4. Bring the Battery Housing into a dry room.
5. Unscrew the union nut from the Battery Housing and remove pressure tube.
6. Place 3 lithium batteries DURACELL DL 123 A / 3 V or equivalent into the battery holders. Take care of **correct polarity**. Secure all batteries with retainer covers.
7. Make sure that the sealing surface in the pressure tube is clean. If necessary use a lintfree cloth for cleaning.  
**Do not use absorbent cotton!**
8. Slightly grease the sealing surface in the pressure tube with O-ring lubricant.
9. Make sure that the O-ring in the flange is clean and uninjured. If necessary use a lintfree cloth for cleaning.
10. If the O-ring is defective, use a blunt tool (e.g. ball point pen cartridge or a piece of wood) to take the O-ring out of the groove.  
**Take care that the groove in the flange will not be damaged!**
11. Make sure that the groove in the flange is clean and uninjured. If necessary use a lintfree cloth for cleaning.  
**Do not use absorbent cotton!**
12. Slightly grease a spare O-ring No. 120 with O-ring lubricant.
13. Put the greased O-ring into the groove of the flange.
14. Carefully press the flange into the pressure tube.
15. Fasten the flange at the pressure tube with the plastic union nut.
16. Slightly grease the pins of the underwater connectors with pin lubricant.
17. Re-establish the electrical connection between Battery Housing and Motor Unit.
18. Place the Battery Housing in its seat at the Motor Unit.
19. Fix the Battery Housing at the Motor Unit with the star grip screw.  
**Do not use any tool!**
20. Batteries have to be replaced:
  - a. Before any long term operation
  - b. When battery voltage falls below 7 V

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## PC-SOFTWARE OCEANLAB 3

The data acquisition software OceanLab 3 is an easy-to-use package for pre-deployment system set-up, real-time control of the complete system, real-time data acquisition, post-deployment data download, data processing, data visualization, data storing and data export for HYDRO-BIOS systems.

OceanLab 3 is completely configured by the HYDRO-BIOS system and thus offers all modules, functions and calibration coefficients necessary to control the system actually connected.

### MINIMUM PC REQUIREMENTS

Celeron or Athlon PC 1 GHz, 2GB RAM

10 MB free space on hard-disk drive

Windows 10 / Windows 8.1 / Windows 7 / XP

Display 800 x 600 pix. minimum

1 free USB-port for serial port adaptor

2-button wheel-mouse

### INSTALLATION

Ensure you have **Administrator Rights** for the installation.

To install OceanLab 3 at your PC start the PC and insert the supplied OceanLab USB-stick. With AUTORUN function enabled (see Windows manual) the installation will start automatically on Windows XP. If the installation process is not started automatically please select START from the Windows task bar and click on RUN. Enter the installation command "D:\Setup.exe" (where the D is the identification letter for the USB stick drive in your PC) and confirm the command with the OK button.

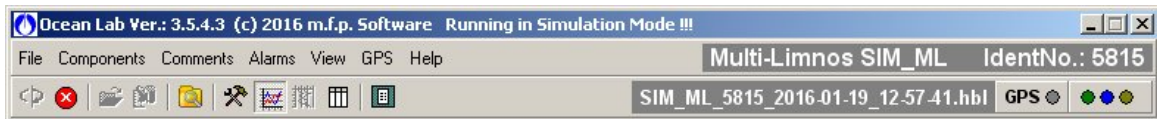


Follow the dialog box instructions to install the software. The installation directory (according to current Microsoft guidelines) is C:\Program Files (x86)\OceanLab3.

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### APPEARANCE OF OCEANLAB 3

OceanLab 3 consists of different program windows that can be independently modified in size and position at the Windows desktop.



The MAIN window incorporates the toolbar and the main menu. In the upper right of the MAIN window OceanLab 3 indicates the type of system connected in clear text and the identity number (IdentNo.) of the electronics board inside the Probe resp. Motor Unit.

Additionally three LEDs indicate the communication state of OceanLab 3:

- Green LED indicates that OceanLab 3 is sending commands to the HYDRO-BIOS system.
- Blue LED indicates that OceanLab 3 receives data from the HYDRO-BIOS system
- Yellow LED indicates that an action device inside the instrument Unit is active.

Inside the tabulated COMPONENTS window real-time measuring data received from the instrument and data calculated from the measuring data are displayed in engineering units.

During online operations the GRAPHS window visualizes a currently updated time- or pressure-depending graph with the sets of measuring data received from the instrument. Alternatively the graph can be replaced by a tabulated data list.

For system set-up OceanLab 3 offers an individual CONTROLLING dialog window for each implemented device, offering all necessary features of the specific device.

A LOGFILE EDITOR is available enabling the user to add individual header information to the active data file and to mark events of special interest inside the active data file.

### COMMUNICATION / CONNECTING

The communication between the PC and the HYDRO-BIOS system is made via a serial COM-port. Feel free to connect the HYDRO-BIOS system to any COM-port available at the PC. After starting OceanLab 3 and switching on the HYDRO-BIOS system click on button CONNECT inside the toolbar or select menu item CONNECT inside the FILE menu. During the connection process OceanLab 3 uses the first free COM-port to communicate with the HYDRO-BIOS system. When OceanLab 3 is unable to establish a connection to the HYDRO-BIOS system please select the appropriate COM-port inside the pull-down table COM-PORT of the CONNECT dialog. After having successfully connected OceanLab 3 in most configurations enters the MONITORING MODE and automatically starts to store the real-time measuring data into a disk file. In some configurations OceanLab 3 may switch into the CONTROLLING MODE automatically.



The CONNECTING process can only be started when no session or simulation is active and no file is opened inside OceanLab 3.

When communication problems occur during an online mission OceanLab 3 automatically tries to re-connect and, via LOGFILE EDITOR, marks date, time and kind of communication problem inside the LOGFILES. The positions of these error comments are marked with red boxes inside the GRAPHS window of MONITORING mode and VIEWER MODULE.

To stop the data transmission from the HYDRO-BIOS system to the PC please use the button STOP SESSION inside the toolbar or inside the FILE menu.

To close the actual data file and to prepare OceanLab 3 for the next mission use button CLOSE FILE inside the toolbar or inside the FILE menu.



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## OPERATING MODES

To meet the different hardware constellation requirements, OceanLab 3 incorporates three different operating modes:

In MONITORING MODE currently updated real-time data received from the instrument are stored into a disk file (for later analysis) and displayed in engineering units. Additionally the MONITORING MODE offers a user configurable graph to visualize the real-time data of the instrument. All action devices of the instrument can be controlled with an ACTION button.

**Please note:** The MONITORING MODE is of **no use** for the MULTI LIMNOS because it is not equipped with any sensor delivering real-time measuring data.

The CONTROLLING MODE offers a list of all devices implemented into the instrument. It is intended to control all implemented devices in view of pre-deployment system set-up and post-deployment data download.

The VIEWER MODULE of OceanLab 3 is used to view and export disk files of previous operations.

**Please note:** The VIEWER MODULE is of **no use** for the MULTI LIMNOS because it is not equipped with internal data memory and thus does not deliver any useful disk files.

## CONTROLLING MODE

To enter the CONTROLLING MODE click on button CONTROLLING MODE inside the toolbar.

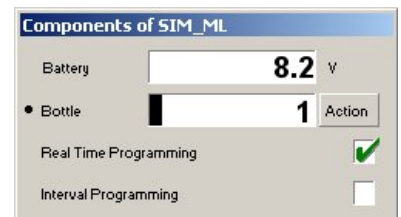
The CONTROLLING MODE incorporates the following independent program windows:

### COMPONENTS WINDOW

The tabulated COMPONENTS window offers a list of all components implemented into the instrument currently connected.

**Since the instrument connected automatically configures OceanLab 3 the list of implemented components may vary from instrument to instrument.**

Clicking at one implemented device opens an individual CONTROLLING dialog for the selected device, offering all necessary features of the specific device (e.g. real-time programming ...).

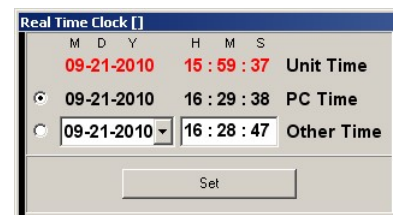


### CONTROLLING DIALOG REAL TIME CLOCK

The CONTROLLING dialog REAL TIME CLOCK is used to adjust the real time clock of the instrument. The real time clock of the instrument can be synchronized with the PC clock or adjusted at will.

The date format is MM-DD-YYYY MM = month, 2 digits  
DD = day, 2 digits  
YYYY = year, 4 digits within the  
interval 2000 ... 2099)

The time format is: hh:mm:ss hh = hour, 2 digits within the interval 0 ... 24  
mm = minute, 2 digits  
ss = second, 2 digits



The button SET is used to transfer the new date and time to the instrument after modifications.

## CONTROLLING DIALOG REAL-TIME PROGRAMMING

The CONTROLLING dialog REAL-TIME PROGRAMMING is used to programme real time depending activating events for the action device of the instrument.

Please note that REAL-TIME PROGRAMMING can only be done whilst the instruments action device is in STARTPOSITION.

The first event has to be entered as full date and time.

Date format: MM-DD-YYYY

MM = month, 2 digits

DD = day, 2 digits

YYYY = year, 4 digits within the interval 2000 ... 2099)

Time format: hh:mm

hh = hour, 2 digits within the interval 0 ... 24

mm = minute, 2 digits

The button ▼ next to the date can be used to open a calendar for an easy selection of the date intended.

The following events can be programmed at will as full date and time or as time duration.

Duration format: hhhh:mm

hhhh = hours, 4 digits

mm = minute, 2 digits

The duration must be less than one year (= 8760 hours)

The button ↓ next to the duration can be used to copy the current duration to all following events.

If you enter a duration OceanLab 3 will calculate the next events date and time, if you enter date and time OceanLab 3 will calculate the next events duration.

The button SEND TO INSTRUMENT is used to transfer the activating events to the instrument after modifications.

No.	Date	Time	Duration	State
Bottle 1	11-18-2010	04:48	0012:00	open
Bottle 2	11-18-2010	16:48	0012:00	open
Bottle 3	11-19-2010	04:48	0012:00	open
Bottle 4	11-19-2010	16:48	0012:00	open
Bottle 5	11-20-2010	04:48	0012:00	open
Bottle 6	11-20-2010	16:48	0012:00	open
Bottle 7	11-21-2010	04:48	0012:00	open
Bottle 8	11-21-2010	16:48	0012:00	open
Bottle 9	11-22-2010	04:48	0012:00	open
Bottle10	11-22-2010	16:48		open

## CONTROLLING DIALOG INTERVAL PROGRAMMING

The CONTROLLING dialog INTERVAL PROGRAMMING is used to programme time depending activating events with individual duration for each event.

Please note that INTERVAL PROGRAMMING can only be done whilst the instruments action device is in STARTPOSITION.

The START TIME, which is the time interval between switching on the instrument and the first activation of the action device, has to be entered in the format:

hhhh:mm

hhhh = hours, 4 digits within the interval 0 ... 1499

mm = minutes, 2 digits

The DURATIONS, which are the time intervals between two successive activation events of the action device, have to be entered in the format:

hhhh:mm

hhhh = hours, 4 digits within the interval 0 ... 1499

mm = minutes, 2 digits

The buttons ↓ next to the durations can be used to copy the current duration to all following events.

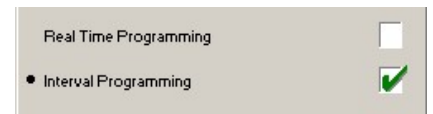
The button SEND TO INSTRUMENT is used to transfer the activating events to the instrument after modifications.

No.	Duration	State
Bottle 1	0025:16	open
Bottle 2	0024:17	open
Bottle 3	0023:18	open
Bottle 4	0022:19	open
Bottle 5	0021:20	open
Bottle 6	0020:21	open
Bottle 7	0019:22	open
Bottle 8	0018:23	open
Bottle 9	0017:24	open
Bottle 10		open

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## PROGRAMMING

This instruments configuration offers two programming functions. In this case the activation of the favoured programming function **for the instrument** is made inside CONTROLLING MODE or MONITORING MODE by clicking at the name of the programming function. This selection is permanently stored inside the instrument. A green tick inside the tick box **indicates the active programming function of the instrument**.



**To avoid misfunctions make sure that the dummy SUBCONN MC DC 5 F is placed on the connector SUBCONN MC BH 5 M at the Motor Unit when no connection to the personal computer is intended.**

1. Remove dummy SUBCONN MC DC 5 F from the connector SUBCONN MC BH 5 M of the Motor Unit.
2. Connect programming cable MC IL 5 F --> Sub-D 9 pin to the connector MC BH 5 M of the Motor Unit before switching it on.
3. Connect the programming cable to the serial COM-port of the PC.
4. Before programming make sure that the the red releaser block is positioned directly behind the Motor Unit.
5. Switch on the Motor Unit.
6. Start OceanLab.
7. Inside OceanLab and click on button CONNECT inside the toolbar and enter the CONTROLLING MODE.
8. Check BATTERY VOLTAGE. The batteries of the Underwater Unit should be replaced before any long term operation or when the voltage falls below 7V.
9. Select MOTOR from the list of implements and make sure that the MOTORPOSITION indicates 0 (zero).
10. Select appropriate programming function (real-time or interval programming) and enter scheduled mission.

**When the MULTI LIMNOS operates in REAL-TIME mode, it is IMPOSSIBLE to repeat a mission without re-programming the Motor Unit.** Thus you have to program the Motor Unit for every single operation.

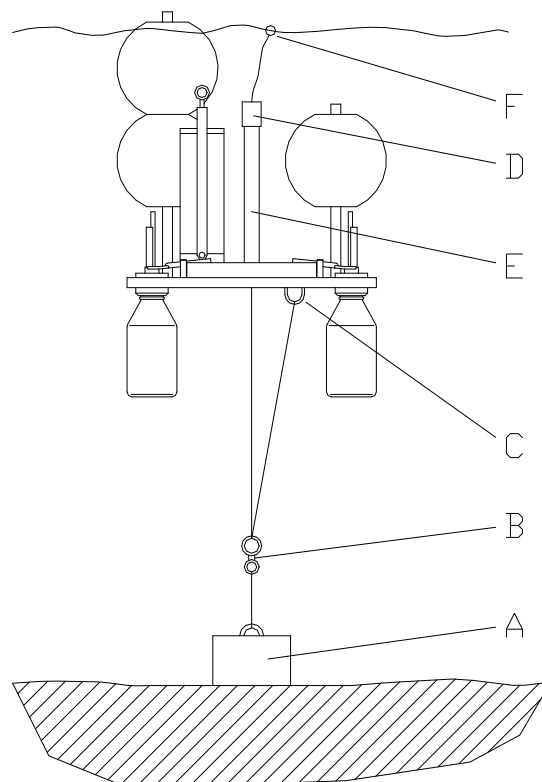
**When the MULTI LIMNOS operates in INTERVAL mode, you CAN repeat a mission without re-programming the Motor Unit.** In this case you can switch off the Motor Unit after operation and switch it on again to carry out an additional operation with the same intervals.

11. Click on button SEND TO INSTRUMENT to transfer the activating events to the Motor Unit.
12. Switch off the Motor Unit.
13. Remove the programming cable (MC IL 5 F --> Sub-D 9 pin) from the Motor Unit.
14. Slightly grease the pins of the connector MC BH 5 M at the Motor Unit with pin lubricant.
15. Place the dummy MC DC 5 F on the connector MC BH 5 M at the Motor Unit and secure it with its locking sleeve.

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## PREPARATION OF ANCHORING SYSTEM

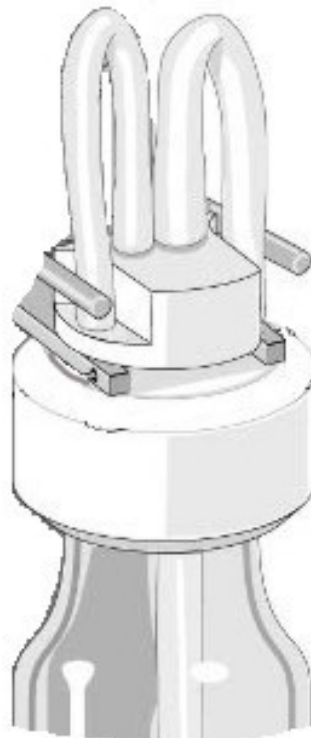
1. Make sure that the actual water depth on the spot does not exceed 50 metres!
2. Using one shackle, fix one end of the 2 metres long nylon rope at a bottom weight **"A"** of approx. 70 kg.
3. Using one shackle, fix the other end of the 2 metres long nylon rope at the smaller eye of the revolving swivel **"B"**.
4. Guide the half length of the 100 metres long nylon rope around the wheel block and fix both ends at your boat to make sure that bottom weight and nylon rope cannot be lost.
5. By means of the 100 metres long nylon rope send the bottom weight to the bottom.
6. Using a shackle fix the end eye of the 100 metres long nylon rope at the eye **"C"** at the lower side of the base plate.
7. Open the self-closing clamp by pressing the release tube **"D"** downwards.
8. Guide the free end of the 100 metres long nylon rope from bottom side through base plate and self-closing clamp **"E"**.
9. Securely knot the free end of the rope to the 6-inch float **"F"**.
10. Pull the release tube **"D"** upwards to ensure that the self-closing clamp is active.



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## PREPERATION FOR OPERATION

1. Screw the 10 Duran glass bottles into the modified LIMNOS heads.
2. Open the 10 fixing bows mounted at the base plate by pulling them upwards and slewing them aside.
3. Slide the modified LIMNOS heads into the cut outs of the base plate and close the fixing bows. An indication pin at each head cares for correct angular position of the heads.
4. Bend all silicone tubings and push them between the plastic head and the metal bars. Make sure that the silicone tubings are sharp bended to avoid ingress of water before the bottles have been opened.
5. Place the 6 large floats onto their tubes and fix them with the supplied spring cotters.



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## OPERATION

1. To avoid misfunctions make sure that the dummy SUBCONN MC DC 5 F is placed and secured on the connector SUBCONN MC BH 5 M at the Motor Unit.
2. Just before deployment the MULTI-LIMNOS is started by setting the lever switch at the outside of the Motor Unit into Position **I**.
3. An interruption resp. abortion of the programme execution can be made at any time by setting the lever switch at the outside of the Motor Unit into position **O**.
4. When the programme execution has been interrupted before the activation of the first sampling bottle, a new programme execution can be started by switching the lever switch at the outside of the Motor Unit into position **I** again. **Please note:** When operated in **REAL-TIME mode** make sure that date and time of the first activation has not passed when switching on the Motor Unit
5. When the programme execution has been interrupted after the activation of the first sampling bottle, follow the instructions of chapter OPERATION WITH LESS THAN 10 SAMPLING BOTTLES (page 15) to return the MULTI-LIMNOS into startposition.
6. Before deployment make sure that the release tube is in its upper position and thus the self-closing clamp is active.
7. Put the MULTI-LIMNOS into the water. The instrument is lowered by pulling at the end of the 100 metres long nylon rope which is equipped with the 6-inch float. 1 metre pulling means 1 metre depth increase.
8. Upon reaching the desired operational depth let off the nylon rope. The self-closing clamp will fix the instrument at the actual depth.
9. Wind up the remaining nylon rope and tie it to the 6-inch float. Put the rope with the 6-inch float into the water.
10. At the end of the programmed operation untie the nylon rope from the 6-inch float and tighten it until feeling clear resistance.
11. Drop the messenger down the tightened rope. Upon hitting the release tube the self-closing clamp will be released. The instrument floats to the water surface upon releasing the nylon rope.
12. When the MULTI-LIMNOS is back on board after the operation switch off the Motor Unit by setting the lever switch at the outside of the Motor Unit into position **O**.
13. Disconnect the messenger from the nylon rope.
14. Unscrew the Duran glass bottles and cover them with the supplied screw caps.
15. Mount a new set of Duran glass bottles.
16. When operated in **INTERVAL mode** a new operation with the same programme can be made without the need to re-programme the Motor Unit. The new operation can be started by switching on the Motor Unit again.  
When operated in **REAL-TIME mode** the Motor Unit has to be re-programmed for each operation.

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## OPERATION WITH LESS THAN 10 SAMPLING BOTTLES

When the MULTI-LIMNOS shall be operated with less than 10 sampling bottles, the bottles have to be screwed into the base plate in counter-clockwise order, starting on the right side of the Motor Unit. The last positions remain vacant. When the operational time of the mounted bottles has been elapsed, the MULTI-LIMNOS can be recovered. Switch off the Motor Unit by setting the lever switch at the outside of the Motor Unit into position **O**. The red releaser block is not located in its initial position directly behind the Motor Unit.

To return the red releaser block of the MULTI-LIMNOS into startposition the following steps have to be carried out:

1. Remove dummy SUBCONN MC DC 5 F from the Motor Unit.
2. Connect the programming cable to the PC and the connector SUBCONN MC BH 5 M at the Motor Unit.
3. Switch lever switch at the outside of the Motor Unit into position **I**.
4. At the PC start OceanLab and click on button **CONNECT** inside the toolbar.
5. By clicking on button **ACTION** the red releaser block will move to the next position. Activate the button **ACTION** repeatedly until the red releaser block reaches its initial position directly behind the Motor Unit.
6. Switch the lever switch of the Motor Unit into position **O**.
7. Remove the programming cable to PC from the Motor Unit. Place the dummy SUBCONN MC DC 5 F on the connector SUBCONN MC BH 5 M of the Motor Unit.
8. Terminate OceanLab.
9. Slightly grease the contacts of the connector SUBCONN MC BH 5 M at the Motor Unit with the supplied pin lubricant. Place the dummy SUBCONN MC DC 5 F at the connector SUBCONN BH 5 M at the Motor Unit and secure it with it's locking sleeve.

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## REMOVAL AND MOUNTING INSTRUCTIONS FOR THE MOTOR UNIT

### REMOVAL:

1. Make sure that the lever switch at the outside of the Motor Unit is in position **O**.
2. Unscrew the 3 hexagon socket screws M 6 which are located at the bottom side of the base plate. Take care that the 3 spacer sleeves do not get lost.  
Remove the Motor Unit.  
Tool: Hexagon socket screw key 5 mm.

### MOUNTING:

The MULTI-LIMNOS does only work properly, when the synchronization between Motor Unit and red releaser block has been established. In order to re-establish the synchronization, the following steps have to be carried out:

1. Connect the programming cable to PC and connector SUBCONN MC BH 5 M of the dismantled Motor Unit.
2. Switch lever switch at the outside of the Motor Unit into position **I**.
3. At the PC start OceanLab and click on button CONNECT inside the toolbar.
4. Activate the CONTROLLING MODE.
5. Select BOTTLE from the list of implements.
6. Click once at the button HALF STEP. The axle of the Motor Unit will carry out a half revolution and the Motor Counter will be set to **0**.
7. Switch the lever switch at the Motor Unit into position **O**. Terminate OceanLab.
8. Turn the red releaser block by hand until it is positioned directly behind the Motor Unit. Make sure that the red releaser block does not touch the first metal bar.
9. Remount the Motor Unit by using the 3 hexagon socket screws M 6 and the 3 spacer sleeves without distorting the position of the red releaser block. Care for a small slackness between the gearwheels.  
Tool: Hexagon socket screw key 5 mm
10. Switch the lever switch at the Motor Unit into position **I**.
11. At the PC start OceanLab and click on button CONNECT inside the toolbar.
12. Click once at the button ACTION. The rotary table will be moved to the next position. When the rotary table has reached position **1** check the slackness between gearwheel of the Motor Unit and the release mechanism.
13. Repeat this item 9 times until the revolution of the red releaser block has been completed.
14. Check that the the red releaser block is positioned directly behind the Motor Unit. If not: dismount the Motor Unit and remount it according to the instructions above.
14. Switch off the Motor Unit.
15. Remove the programming cable from the Motor Unit.
16. Place the dummy SUBCONN MC DC 5 F at the connector SUBCONN MC BH 5 M at the Motor Unit and secure it with it's locking sleeve.



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## LOCALIZATION OF FAULTS

**To avoid misfunctions make sure that the dummy SUBCONN MC DC 5 F is placed on the connector SUBCONN MC BH 5 M at the Motor Unit when no connection to the personal computer is intended.**

1. Upon startup of OceanLab the CONNECT dialog window indicates NO DATA and does not disappear:
  - Motor Unit is switched off. Switch lever switch of the Motor Unit into position I.
  - One or more batteries are placed in the Battery Housing in wrong polarity. Check polarity.
  - Batteries of the Underwater Unit are exhausted. Install new batteries.
  - The connected Motor Unit is not supported by OceanLab. Use correct version of OceanLab resp. use correct Underwater Unit.
  - The programming cable between Motor Unit and PC is defective. Check cable.
2. During working with OceanLab the CONNECT dialog box indicates NO DATA:
  - Underwater Unit is switched off. Switch lever switch of the Motor Unit into position I.
  - Batteries of the Underwater Unit are exhausted. Install new batteries.
  - The programming cable between Motor Unit and PC is defective. Check cable.
3. A correct programmed Motor Unit did not execute the mission:
  - Batteries of the Underwater Unit are exhausted. Install new batteries.
  - The dummy SUBCONN MC DC 5 F has not been placed upon the connector SUBCONN MC BH 5 M at the Motor Unit. Before an operation make sure that the connector SUBCONN MC BH 5 M at the Motor Unit is protected by the dummy SUBCONN MC DC 5 F.
  - All real-time depending activating events had passed when the Motor Unit has been switched on for the operation. Repeat the mission with a new program with correct dates and times.

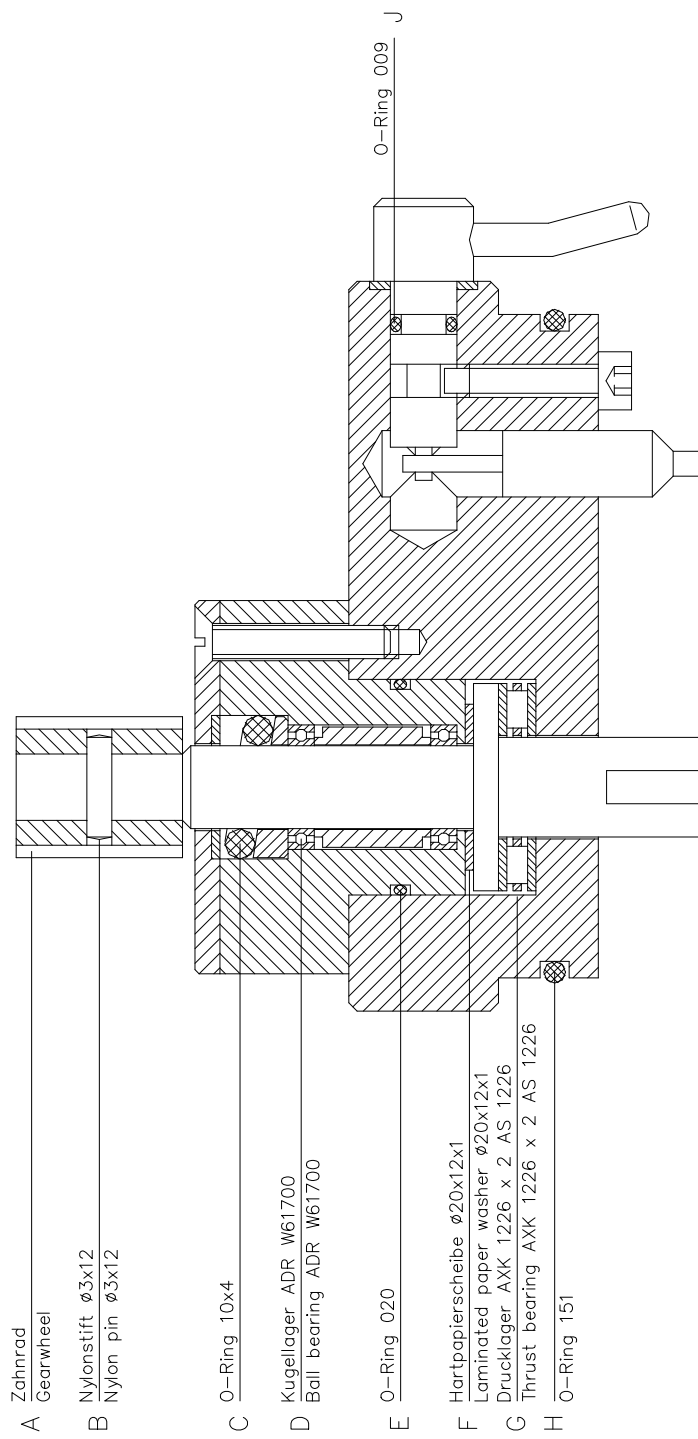


Fig. 1