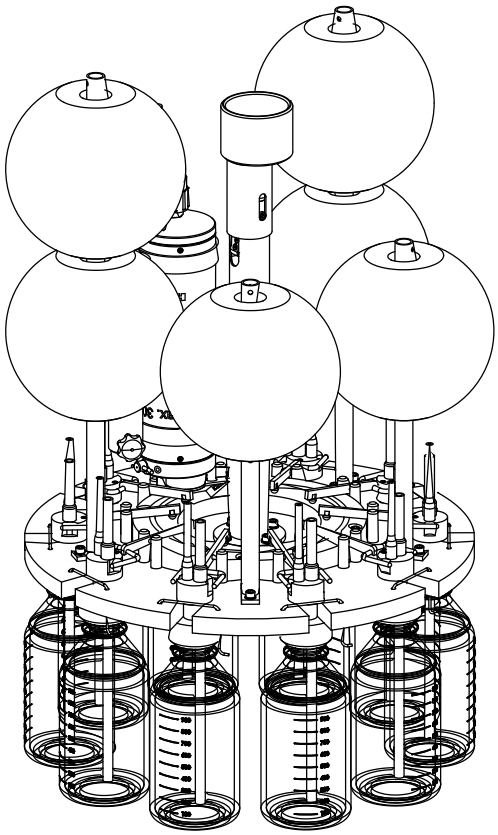


Automatic Water Sampler MULTI-LIMNOS

OPERATION MANUAL

Product ID 436 985

Edition 12/24

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NOTICE



Please read this manual carefully before operating or performing maintenance on the instrument. Pay special attention to all danger, warning and caution statements. Failure to do so could result in serious injury and/or damage to the instrument. Keep manual available at all times.

LAYOUT AND MEANING OF WARNINGS

All safety instructions found in this operation manual are composed in accordance with the following pattern (signal words):

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.
NOTICE may also indicate a situation which, if not avoided, may cause damage to equipment.

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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 wich 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.

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 Dummy connector MC DC 5 F
13. 1 USB flash drive 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 2.5 mm
23. 1 Hexagon socket screw key 4 mm
24. 1 Hexagon socket screw key 5 mm
25. 1 Spanner 10 mm
26. 1 Operation manual

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 meters
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, uPVC
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

PC-SOFTWARE OCEANLAB 3

The standard HYDRO-BIOS 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 currently connected.

MINIMUM PC REQUIREMENTS

Pentium PC 350 MHz with 64 MB RAM, 10 MB free space on hard-disk drive,
USB-port,

Windows 11 / Windows 10 / Windows 8.1 / Windows 7

1 free serial COM-port (RS 232) or USB-adaptor

2-Button Wheel-Mouse

INSTALLATION: (Ensure you have Administrator Rights for the installation)

To install OceanLab 3 on your PC run Setup from the OceanLab USB flash drive. Follow the dialog box instructions to install the software. The installation directory (acc. to Microsoft guidelines) is C:\ProgramFiles\OceanLab3.

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 in clear text and the identity number (IdentNo.) of the electronics board inside the connected instrument.

Additionally three LEDs indicate the communication state of OceanLab 3:

Green LED indicates that OceanLab 3 is sending commands to the IWS.

Blue LED indicates that OceanLab 3 receives data from the IWS.

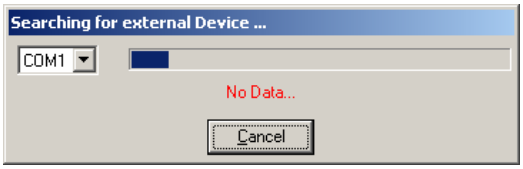
Yellow LED indicates that the electric motor inside the sampler is active.

Inside the tabulated COMPONENTS window real-time measuring data received from the instrument is displayed in engineering units (for applicable instruments only).

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

COMMUNICATION / CONNECTING

The communication between the PC and the MST is made via serial COM-port. Connect the MST to any COM-port available at the PC. After starting OceanLab 3 and switching on the MST 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 available COM-port to communicate with the MST.



If OceanLab 3 is unable to establish a connection to the MST 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.

If communication problems occur during an online mission OceanLab 3 automatically tries to re-connect and, marks date, time and kind of communication problem inside the log file. 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 MST to the PC 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.

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.

Note: The MONITORING MODE is of no use for the MST 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.

Note: The VIEWER MODULE is of no use for the MST because the MST is not equipped with internal data memory.

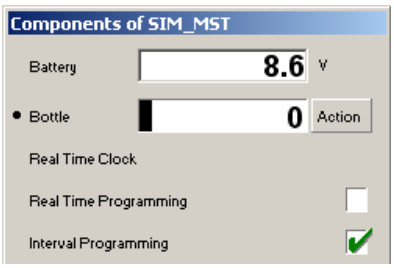
CONTROLLING MODE

To enter the CONTROLLING MODE click 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 actual instrument.



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

Clicking an 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.

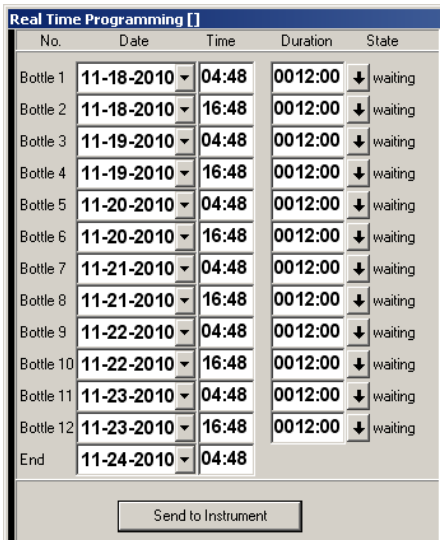
The date format is MM-DD-YYYY MM = month, 2 digits
DD = day, 2 digits
YYYY = year, 4 digits within the interval 2000 … 2099)
The time format is: hh:mm:ss
hh = hour, 2 digits within the interval 0 … 23
mm = minute, 2 digits
ss = second, 2 digits
The button SET is used to transfer the new date and time to the instrument after modifications.

CONTROLLING DIALOG REAL-TIME PROGRAMMING

> ***WARNING***
>
> MOVING PARTS CAN CRUSH AND CUT!
> Depending on the current programming of the MST the rotary table may start moving at any time. Keep fingers clear of gear wheel and bottle receptacles.

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

Note that REAL-TIME PROGRAMMING can only be done while 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 … 23
mm = minute, 2 digits

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

The following events can be programmed 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 actual 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.

CONTROLLING DIALOG INTERVAL PROGRAMMING

> **WARNING**
>
> MOVING PARTS CAN CRUSH AND CUT!
> Depending on the current programming of the MST the rotary table may start moving at any time. Keep fingers clear of gear wheel and bottle receptacles.

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

Note that INTERVAL PROGRAMMING can only be done while the instrument's 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:

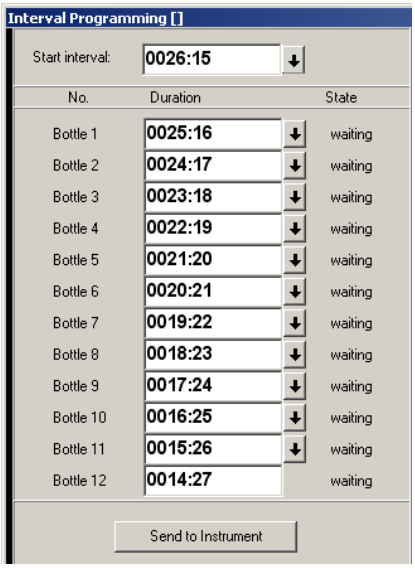
hhhh:mm
hhhh = hours, 4 digits within the interval 0 … 1499
mm = minutes, 2 digits

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

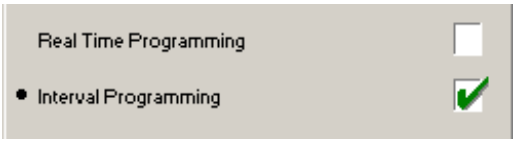
hhhh:mm
hhhh = hours, 4 digits within the interval 0 … 1499
mm = minutes, 2 digits

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.



PROGRAMMING



This instrument's 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 malfunctions make sure that the dummy SUBCONN DC 5 F is plugged into the connector SUBCONN BH 5 M at the underwater unit when no connection to the personal computer is intended.

1. Remove dummy SUBCONN DC 5 F from the connector SUBCONN BH 5 M of the underwater unit.
2. Connect programming cable IL 5 F --> Sub-D 9 pin to the connector BH 5 M of the underwater 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 rotary table of the MST is in start position (zero mark **0** is below the SEDIMENT TRAP).
5. Switch on the underwater unit.

6. Start OceanLab.
7. Inside OceanLab click button CONNECT on the toolbar and enter the CONTROLLING MODE.
8. Check BATTERY VOLTAGE. It is highly recommended to replace batteries before any deployment if the indicated voltage is below 8.9 V in standby mode (motor not running).
9. Select MOTOR from the list of components 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 MST operates in REAL-TIME mode, it is IMPOSSIBLE to repeat a mission without re-programming the underwater unit. Thus you have to program the underwater unit for every single operation.

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

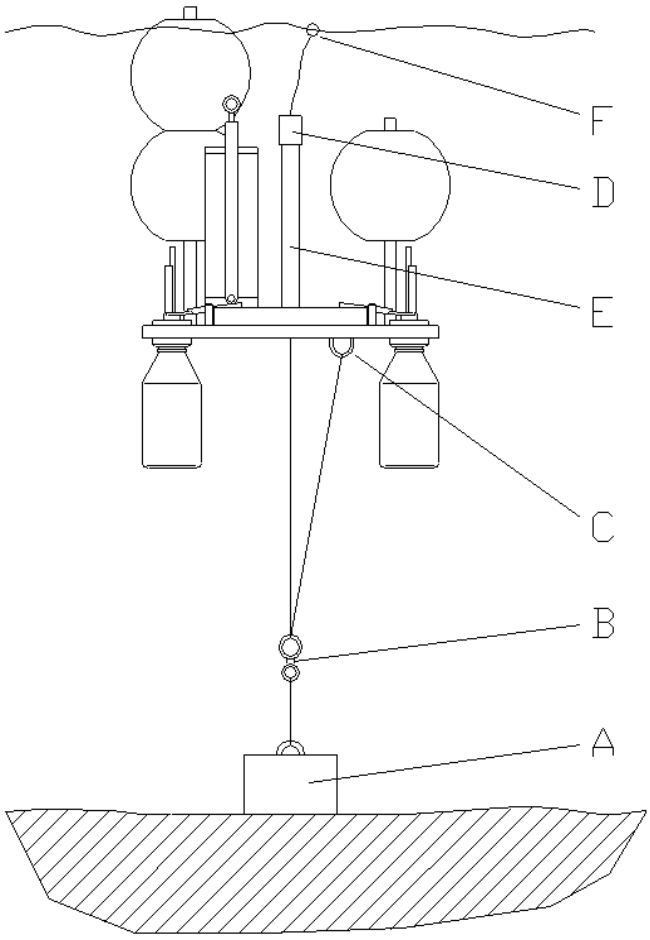
11. Click button SEND TO INSTRUMENT to transfer the activating events to the underwater unit.
12. Switch off the underwater unit.
13. Remove the programming cable (IL 5 F --> Sub-D 9 pin) from the underwater unit.

> ***NOTICE***
>
> Slightly grease the pins of the connector BH 5 M at the underwater unit with pin lubricant.
>
> **In no case must the underwater unit be submerged without the appropriate cable connections resp. dummy connectors attached to the respective connectors!**

14. Plug the dummy DC 5 F into the connector BH 5 M at the underwater unit and secure it with its locking sleeve.

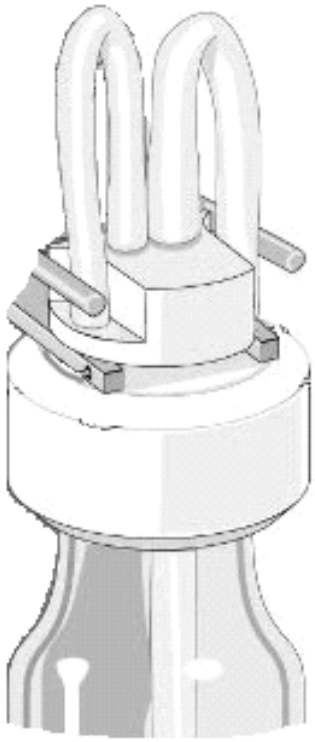
PREPARATION OF ANCHORING SYSTEM

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.



PREPARATION 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.



1. To avoid malfunctions make sure that the dummy connector SUBCONN MC DC 5 F is placed and secured on the connector SUBCONN MC BH 5 M at the motor unit.

> ***NOTICE***
>
> Slightly grease the pins of the connector MC BH 5 M at the underwater unit with pin lubricant.
>
> **In no case must the underwater unit be submerged without the appropriate cable connections resp. dummy connectors attached to the respective connectors!**

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.

   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 16) to return the MULTI-LIMNOS into start position.
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.

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 start position 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 CONNECT inside the toolbar.
5. By clicking ACTION the red releaser block will move to the next position. Press 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.
8. Slightly grease the pins of the connector MCBH 5 M at the underwater unit with pin lubricant, plug the dummy connector at the underwater unit and secure it with it´s locking sleeve..

> ***NOTICE***
>
> **In no case must the underwater unit be submerged without the appropriate cable connections resp. dummy connectors attached to the respective connectors!**

9. Terminate OceanLab.

MAINTENANCE

INSTALLATION OF BATTERIES

10. Make sure that the lever switch at the outside of the underwater unit is switched to position **O**.
11. Unplug the cable connection between battery housing and motor unit at the underwater unit.
12. Loosen the battery housing from the motor unit by unscrewing the star grip screw and take the battery housing into a dry room.
13. Unscrew the union nut from the battery housing and remove pressure tube.
14. Place 3 lithium batteries DURACELL DL 123 A / 3 V or equivalent into the battery holders. Observe **correct polarity**. Secure batteries with retainer covers.
15. Make sure that the sealing surface in the pressure tube is clean. If necessary use a lint-free cloth for cleaning.

NOTICE

Do not use absorbent cotton for cleaning!

16. Slightly grease the sealing surface in the pressure tube with O-ring lubricant.
17. Make sure that the O-ring in the flange is clean and undamaged. If necessary use a lintfree cloth for cleaning.
18. If the O-ring is defective,
    a. use a blunt tool (e.g.ball point pen cartridge or a piece of wood) to take the O-ring.

NOTICE

Take care that the groove in the flange is not damaged!

    b. Make sure that the groove in the flange is clean and undamaged. If necessary use a lintfree cloth for cleaning.
    c. Slightly grease a spare O-ring No. 120 with O-ring lubricant.
    d. Put the greased O-ring into the groove of the flange.
19. Carefully press the flange into the pressure tube.
20. Fasten the flange at the pressure tube with the plastic union nut.

NOTICE

Slightly grease the pins of the underwater connectors with pin lubricant and re-establish the electrical connection between battery housing and motor unit.

In no case must the underwater unit be submerged without the appropriate cable connections resp. dummy connectors attached to the respective connectors!

21. Place the battery housing in its seat at the motor unit.
22. Fix the battery housing to the motor unit with the star grip screw.

NOTICE

Do not use any tool when fasting the grip screw!

It is highly recommended to replace batteries before any deployment if the indicated voltage is below 8.9 V in standby mode (motor not running).

REMOVAL OF THE UNDERWATER UNIT

To avoid malfunctions make sure that the dummy SUBCONN DC 5 F is plugged into the connector SUBCONN BH 5 M at the underwater unit when no connection to the personal computer is intended.

1. Make sure that the lever switch at the underwater 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. Tool: Hexagon socket screw key 5 mm
3. Remove the underwater unit.

MOUNTING OF THE UNDERWATER UNIT

The MULTI-LIMNOS does only work properly, when the synchronization between underwater 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 dismounted underwater unit to the personal computer.
2. Switch the lever switch at the underwater unit into position **I**.
3. At the PC start OceanLab and click button CONNECT inside the toolbar.
4. Activate the CONTROLLING MODE.
5. Select BOTTLE from the list of implements.
6. Click button HALF STEP once. The axle of the underwater unit will carry out a half revolution and the motor counter will be set to 0.
7. Switch the lever switch at the underwater unit into position **O**.
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 without distorting the position of the rotary table. Remount the 3 hexagon socket screws M 6 from bottom side of the base plate. Establish a small slackness between gear wheel of the underwater unit and the rotary table.
   Tool: Hexagon socket screw key 5 mm

WARNING

MOVING PARTS CAN CRUSH AND CUT!
Depending on the current programming of the MST the rotary table may start moving at any time. Keep fingers clear of gear wheel and bottle receptacles.

10. Switch the lever switch at the underwater unit into position **I**.
11. At the PC start OceanLab and click button CONNECT inside the toolbar.
12. Verify the component “Bottle” reads 0 (zero). If it doesn’t click “Reset Counter” in the “Motor Position” window.
13. Click ACTION once. The red releaser block will move to the next position. When the movement has stopped press ACTION again, repeat this for the remaining positions until the “Motor Counter” indicates position 11 (which coincides with position 0).
14. Check that the initial position 0 is directly behind the motor unit. If not: Dismount and re-mount the underwater unit as described above.
15. Remove the connecting cable to PC from the underwater unit.
16. Slightly grease the pins of the connector MCBH 5 M at the underwater unit with pin lubricant, plug the dummy connector at the underwater unit and secure it with it’s locking sleeve.

NOTICE

In no case must the underwater unit be submerged without the appropriate cable connections resp. dummy connectors attached to the respective connectors!

17. Switch the lever switch at the underwater unit into position **O**.

LOCALIZATION OF FAULTS

To avoid malfunctions make sure that the dummy connector SUBCONN DC 5 F is plugged into the connector SUBCONN BH 5 M at the motor unit when no connection to the personal computer is intended.

NO DATA

Symptom: Upon startup of OceanLab the CONNECT dialog window indicates NO DATA:

Measures:

- Underwater unit is switched off. Switch lever switch of the underwater 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 underwater unit is not supported by OceanLab. Use compatible version of OceanLab resp. underwater unit.
- The programming cable between underwater unit and PC is defective. Check cable.

Symptom: During work with OceanLab the CONNECT dialog box indicates NO DATA:

Measures:

- Underwater unit is switched off. Switch lever switch of the underwater unit into position **I**.
- Batteries of the underwater unit are exhausted. Install new batteries.
- The programming cable between underwater unit and PC is defective. Check cable.

NOT FUNCTIONING AS EXPECTED

Symptom: A correctly programmed underwater unit did not execute the mission:

Measures:

- Batteries of the underwater unit are exhausted. Install new batteries.
- The dummy SUBCONN DC 5 F has not been plugged into the connector SUBCONN BH 5 M at the underwater unit. Prior to any operation make sure that the connector SUBCONN BH 5 M at the underwater unit is protected by the dummy SUBCONN DC 5 F.
- All real-time depending activating events had passed when the underwater unit has been switched on for the operation. Repeat the mission with a new program with correct dates and times.
- Check the gear on the underside of the MST for any debris that may have blocked the gear.

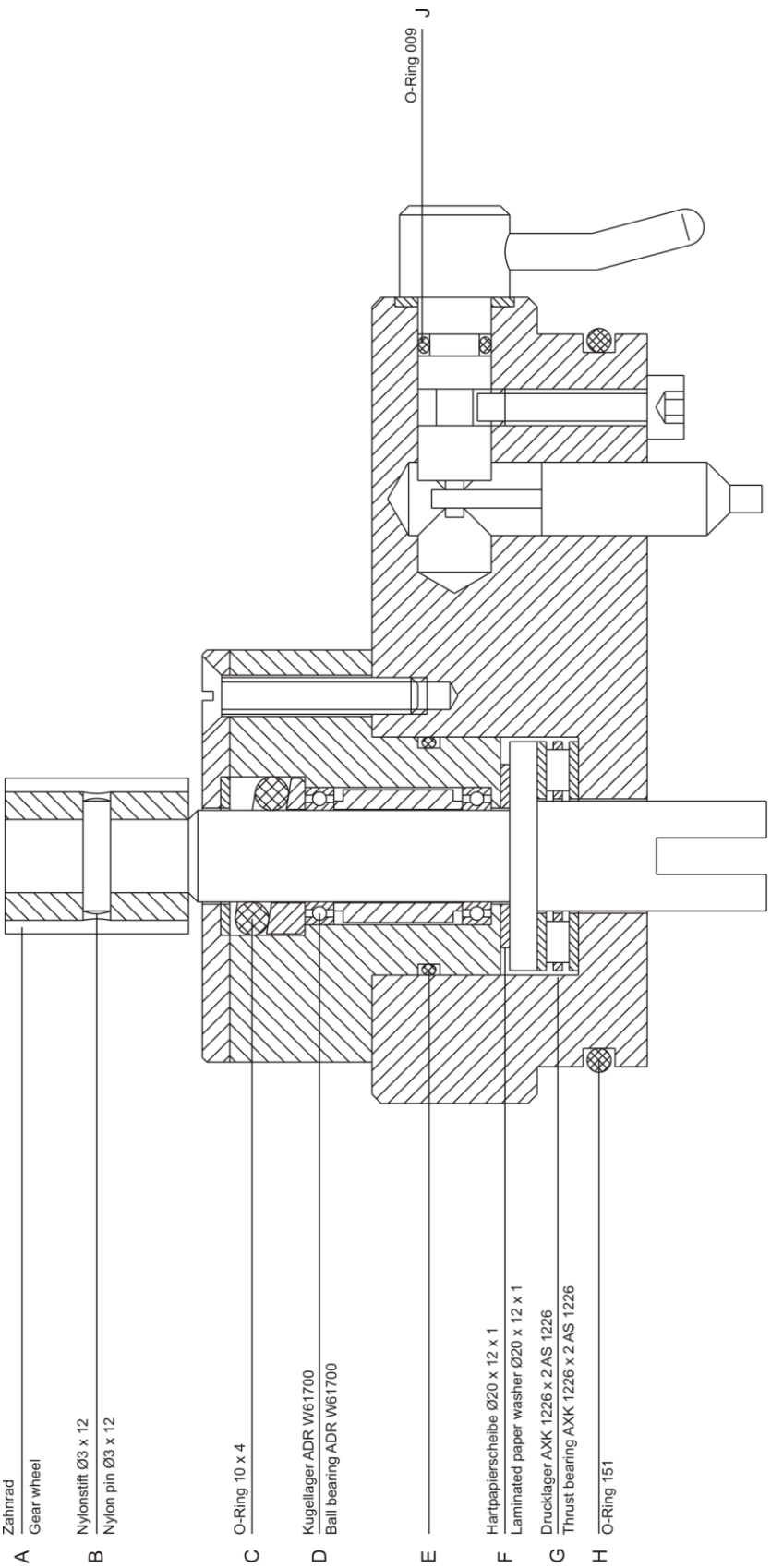

A Zahnrad
Gear wheel
B Nylonstift Ø3 x 12
Nylon pin Ø3 x 12
C O-Ring 10 x 4
D Kugellager ADR W61700
Ball bearing ADR W61700
E
F Hartpapierscheibe Ø20 x 12 x 1
Laminated paper washer Ø20 x 12 x 1
G Drucklager AXK 1226 x 2 AS 1226
Thrust bearing AXK 1226 x 2 AS 1226
H O-Ring 151
J O-Ring 009

Fig. 1