HYDRO-BIOS
Apparatebau GmbH

TWIN FIRE MODULE - DIGITAL STANDARD MODEL

CATALOGUE NO. 436 996

OPERATION MANUAL
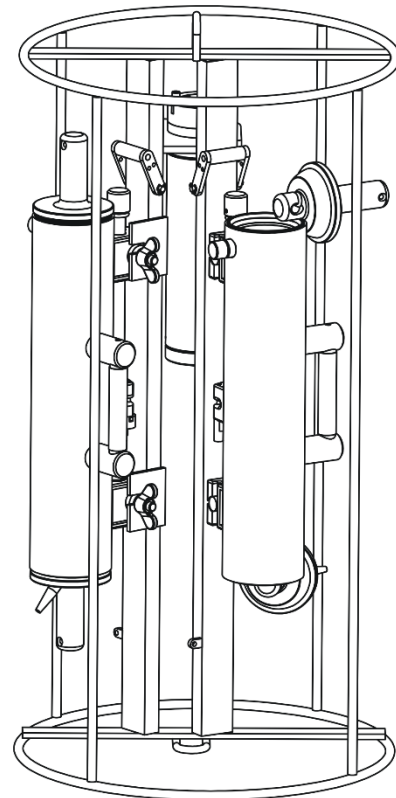
Edition 01/24

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GENERAL DESCRIPTION

The TWIN FIRE MODULE is a light and handy instrument for obtaining two water samples at specific depths. The DIGITAL STANDARD MODEL is a stand-alone instrument.

The TWIN FIRE MODULE consists of two standard water samplers, mounted to a stainless steel rack which is equipped with a motor-driven release device. Impact protection for sampler and release device is made by a metal frame.

The standard rack can accommodate PLASTIC WATER SAMPLERS (also known as NISKIN SAMPLERS) of 1.7, 2.5 and 5 liters capacity and FREE FLOW WATER SAMPLERS of 5 liters capacity.

In online mode, operated in conjunction with standard electro-mechanical cables, the water sampler are individually actuated via push-button control by the battery powered Hand Unit. The Hand Unit also displays measuring data of the integrated high-precision pressure sensor.

In offline mode, operated in conjunction with a steel or fiber rope the water samplers are automatically actuated according to pre-programmed pressures (depths). Measuring data of the pressure sensor is recorded inside the internal data memory during the operation.

Power supply is made by internal rechargeable lithium-ion batteries using the state-of-the-art lithium iron phosphate chemistry (LiFePO4) with capacity sufficient for more than 30 operations. The rechargeable batteries can be charged with the supplied automatic charger. Thanks to most up-to-date technique and primary plug-set the charger is usable worldwide.

STANDARD EQUIPMENT

1. 1 Twin Fire Module with motor-driven release device
2. 2 Plastic Water Samplers
3. 1 Dummy connector SUBCONN MC DC 5 M
4. 1 Automatic **LiFePO4** charger with connecting cable
5. 1 Hand Unit with programming cable and connecting cable to PC
6. 1 Battery 9 V (PP3)
7. 1 Can pin lubricant
8. 1 Hexagon socket screw key 4 mm
9. 1 Hexagon socket screw key 5 mm
10. 1 Connecting cable to PC, 5 meters long
11. 1 Adaptor cable Subconn MC IL 5 M --> IL 2 M (for online operations)
12. 1 Counter plug Subconn IL 2 F (to be terminated to the winch cable)
13. 1 Connecting cable from Hand Unit to slip ring box of winch, 3 meters long
14. 1 Operation manual
15. 1 USB-Stick Ocean Lab

TECHNICAL DATA

Twin Fire Module:

Length:	835 mm
Diameter:	400 mm
Empty weight:	17 kg
Material of water sampler:	PVC, NBR
Material of rack:	stainless steel
Material of motor unit:	titanium
Material of release device:	POM
Operational depth:	3000 m
Operating temperature:	-2° ... + 60°C
Connector at Motor Unit:	Subconn MC BH 5 F
Data memory:	4 MByte

Power supply:

Type:	2 LiFePO4 lithium ion batteries
Nominal voltage:	6.6V
Capacity:	2500 mAh, sufficient for approx. 30 operations
Charge conditions:	approx 2.5 hours at 1500 mA to 80% capacity
	approx. 5 hours at 1500 mA to 100% capacity
Charge temperature:	+15° ... +35°C
Life expectancy:	up to 2000 charge-discharge-cycles
Self-discharge:	typ. 3% per month

Charger:

System:	automatic charger for double-cell LiFePO4 packs
Type:	FRIWO FW7290
Input voltage:	100 ... 240 V AC
Charge current:	1500 mA

Hand Unit:

Dimensions:	152 x 83 x 33,5 millimeters
Power supply:	internal: Battery 9 V (PP3)
	external: 7 ... 12 V DC, max. 12 mA
LC-display:	4 x 20 characters
Keyboard:	12 keys
Protection type:	IP 65
Operating temperature:	-5° ... +50°C

CHARGING THE ACCUMULATORS OF THE UNDERWATER UNIT

SAFETY INSTRUCTIONS
Keep the charger in a dry place (indoor use only)!
The charger should be disconnected from mains supply when not in use.
Do not plug in the charger in case of damaged cabinet or power plug.
Use the supplied charger for rechargeable double cell LiFePO4 packs only!

CHARGING PROCEDURE
1. Bring the TWIN FIRE MODULE in a dry room.

2. Connect the charger to the TWIN FIRE MODULE by using the supplied connecting cable.

3. Connect charger to mains supply (100 ... 240 V AC). Select appropriate primary plug for your mains supply. The charging process will start automatically.

4. A **green fast flashing** of the chargers LED indicates the rapid charge process. Depending on state of discharge, the rapid charge process will last up to 2.5 hours.

Note: A **yellow fast flashing** of the chargers LED indicates that the batteries are defective or connected in wrong polarity.

5. Having completed the rapid charge process (leading to approx. 80% state of charge), the charger switches over to maintenance charge (indicated by **green slow flashing** of the charger's LED). The maintenance charge process will last up to an additional 2.5 hours.

6. Having completed the maintenance charge process, a **permanent green** LED indicates that the batteries have been completely charged.

7. Disconnect charger from mains supply.

8. Disconnect TWIN FIRE MODULE from charger.

THE BATTERY
The lithium ion batteries embedded in the TWIN FIRE MODULE use the lithium iron phosphate (LiFePO4) chemistry. This type of battery inherently is the **safest** rechargeable battery currently available on the market with highest thermal and chemical stability and highest tolerance to abuse. In contrast to other lithium ion batteries, the LiFePO4 battery does **NOT** tend to thermal runaway, gassing or explosion.

BATTERY MAINTENANCE
LiFePO4 batteries do have **no memory effect**, thus a random or partial charge is fine. LiFePO4 batteries do not need a full charge or discharge for a long battery life.

Charge batteries to approx. 80% state of charge (according to item 5. at this page) and keep them cool for storage - this reduces self discharge and prolongs the battery life.

Avoid total discharge of the batteries to ensure a long battery life. **Charging of batteries is needed at the latest when the battery voltage falls below 5.5 V.**

The capacity of completely charged accumulators is sufficient for approx. 30 operations.

BATTERY REPLACEMENT OF THE HAND UNIT

1. The battery case is located at the rear side of the Hand Unit. For battery replacement remove the lid, kept by two screws (tool: screwdriver).

2. Remove the exhausted battery.

3. Clip a fresh battery (9 V, PP3) onto the battery contacts.

4. Make sure that packing and sealing surfaces are clean.

5. Remount the lid (tool: screwdriver).

EXTERNAL POWER SUPPLY
The Hand Unit can alternatively be powered via two banana sockets by an external mains supply circuit (7 ... 12 V DC, 12 mA, red = +, black = -).

CONNECTIVITY

The TWIN FIRE MODULE - DIGITAL STANDARD MODEL provides two different options for connecting the Hand Unit. One of them is also used to connect the TWIN FIRE MODULE to a PC.

Both communication channels provide identical functionality.

SERIAL COM-PORT
The communication via serial COM-port is used for applications where the TWIN FIRE MODULE shall be used in pre-programmed mode **by a PC only**.

Use the supplied PC cable to connect the TWIN FIRE MODULE to the PC.

Alternatively connect the TWIN FIRE MODULE to the Hand Unit (Long-Distance Telemetry) and connect the Hand Unit (Serial-COM-port) to the PC.

In either case TWIN FIRE MODULE is switched on automatically.

LONG-DISTANCE TELEMETRY

Use the supplied programming cable to connect the TWIN FIRE MODULE to the Hand Unit.
A connection Hand Unit – Underwater Unit can be established by Long-Distance Telemetry only.

The long-distance telemetry can only be used for connecting the Hand Unit to the TWIN FIRE MODULE and is required for applications where manual activation of the water sampler and a supervision of the TWIN FIRE MODULE during the entire operation is intended. It is not supported by personal computers.

Use the supplied adaptor cable (Subconn MC IL 5 M --> IL 2 M) to connect the TWIN FIRE MODULE to the electro-mechanical winch cable. A counter plug Subconn IL 2 F is supplied to be terminated to the electro-mechanical winch cable. Pin 1 (black wire) of the connector SUBCONN IL 2 F is used as electrical ground, pin 2 (white wire) is used for data transmission. When using a single conductor cable the electrical ground must be connected to the steel armor of the electro-mechanical cable, the data wire must be connected to the isolated core of the electro-mechanical cable.

Use the 5 meters long programming cable between Hand Unit and Underwater Unit for checking the general functionality of the long-distance telemetry by eliminating influences of winch and towing cable.

Use the supplied connecting cable to connect the Hand Unit to the slip ring box of the winch. Electrical ground has to be connected to the brown core of the connecting cable, the data wire has to be connected to the blue core of the connecting cable.

To avoid corrosion at the contacts of the Subconn MC BH 5 F connector of the TWIN FIRE MODULE the contacts should be slightly greased with pin lubricant and always be protected by the corresponding dummy when not in use.

PIN ASSIGNMENT OF SUBCONN MC BH 5 F
Pin 1:   Electrical ground (GND)
Pin 2:   Long-distance telemetry (FSK)
Pin 3:   + of rechargeable battery (charger)
Pin 4:   Transmitter of serial COM-port (Tx)
Pin 5:   Receiver of serial COM-port (Rx)
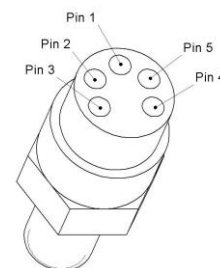
HAND UNIT: SWITCHING ON AND OFF

To switch on the Hand Unit press any key once.

To switch off the Hand Unit press any key for 3 seconds until the text at the display disappears. To make sure that the TWIN FIRE MODULE is in the intended state ("**PROGRAM ACTIVE**" when the TWIN FIRE MODULE shall be deployed in offline mode, "**SAMPLER CLOSED**" or "**CLOSING = ENTER**" when no operation is planned) it is advised to switch into **MAIN SCREEN** before switching off the Hand Unit. The accumulators of the Underwater Unit will be discharged within approx. 100 hours whilst the **PROGRAM** is **ACTIVE**.

Additionally an integrated auto-power-off function switches off the Hand Unit after 5 minutes of inactivity (no key pressed, no communication with the Underwater Unit).

After switching on the following text will be temporarily displayed at the LC-display:

```
HAND UNIT            9.2 V
        NO DATA


```

HAND UNIT	**9.2 V**	Battery voltage of the Hand Unit.
NO DATA		No instrument connected or connected instrument not ready for communication.
alternatively:		
INVALID DATA		The instrument connected is not supported by the Hand Unit.
alternatively:		
CABLE: SHORT CIRCUIT		Short circuit detected in the **long-distance telemetry connection** between Hand Unit and TWIN FIRE MODULE.

After connecting the TWIN FIRE MODULE to the Hand Unit (via serial COM-port or long-distance telemetry) the TWIN FIRE MODULE is switched on automatically.

HAND UNIT: MAIN SCREEN

If a correct communication between Hand Unit and Underwater Unit has been established, the following **MAIN SCREEN** will be displayed:

```
SFM                  3000 m
PRESSURE           0.0 dbar
SAMPLER               6.5 V
      CLOSING = ENTER
```

This **MAIN SCREEN** will be displayed any time you call function **F1** (by pressing **SHIFT** and **7** successively).

SFM 3000 m	Type of instrument connected: TWIN FIRE MODULE, maximum operational depth 3000 meters. Please note that the TWIN FIRE MODULE is a variant of the SINGLE FIRE MODULE and therefore it is identified as SINGLE FIRE MODULE (SFM).
PRESSURE 0.0 dbar	Current measuring value of the Underwater Units pressure sensor.
SAMPLER 6.5 V	Accumulator voltage of the Underwater Unit. Charge accumulators at the latest when the voltage falls below 5.5 V **If the accumulator voltage falls below 4.4 V,** **the Underwater Unit will be switched off automatically. Before re-starting the accumulators of the Underwater Unit have to be charged.**
CLOSING = ENTER alternatively:	To close the water sampler press the **ENTER** key at the keyboard.
MOTOR RUNS alternatively:	The closing process for the water sampler is running.
SAMPLER CLOSED alternatively:	The water sampler has been closed.
PROGRAM ACTIVE	The TWIN FIRE MODULE is activated for automatic sampling.

HAND UNIT: PROGRAMMING

To open the **PROGRAMMING** dialog for automatic pressure depending sampling call function **F2** by pressing **SHIFT** and **9** successively.

Two different events have to be programmed:

```
UNLOCK          1262.0 dbar
CLOSING 1       1260.0 dbar
CLOSING 2       1255.0 dbar
       ACTIVATE = ENTER
```

The first event to be entered is the **UNLOCK** pressure. The electric motor of the Underwater Unit will be locked until exceeding the **UNLOCK** pressure to avoid closing of the sampler during downcast. Lowering of a closed water sampler could damage the water sampler.

The first digit of the **UNLOCK** pressure is blinking and can be entered via the keyboard. Thereafter the remaining digits of the **UNLOCK** pressure can be entered.

The **CLOSING** event represents the pressure where the water sampler will automatically be closed during upcast. Continue to enter the **CLOSING** pressure digits via the keyboard. The **CLOSING** pressure **have to be smaller** than the **UNLOCK** pressure.

The navigation during data input is made via cursor keys ⇐ (by pressing **SHIFT** and **4** successively) and ⇨ (by pressing **SHIFT** and **6** successively). Upon finishing the programming procedure by pressing the **ENTER** key, the entered data is checked and stored inside the Underwater Unit and the TWIN FIRE MODULE is activated for automatic sampling.

The programming can only be made when the TWIN FIRE MODULE is **INACTIVE** and the electric motor of the Underwater Unit is not running.

PROGRAMMING	Name of function
UNLOCK **1258.0 dbar**	Unlock pressure for the release device.
CLOSING **1255.0 dbar**	Closing pressure for the water sampler.
ACTIVATE = ENTER	To store the entered program and to activate the Underwater Unit for automatic sampling press the **ENTER** key.
alternatively:	
DEACTIVATE = ENTER	The Underwater Unit is active, to switch off the TWIN FIRE MODULE (when no operation is planned) press the **ENTER** key.
alternatively:	
NO END POSITION	The electric motor of the Underwater Unit did not reach its end position (e.g. due to discharged batteries). After re-charging the batteries use MENU function MOTOR CONTROL (page 12) to move the electric motor into the start position.

HAND UNIT: MENU MOTOR CONTROL

To enter the **MENU**, offering additional dialogs, call function **F5** by pressing **SHIFT** and **3** successively.

```
MENU
 > MOTOR CONTROL
   RESET PRESSURE
   IDENT NUMBER
```

The navigation inside the menu is made via the cursor keys ⇧ (by pressing **SHIFT** and **8** successively) and ⇩ (by pressing **SHIFT** and **2** successively).
To enter the menu item selected press the **ENTER** key.
To quit the menu or a menu item call one of the function keys **F1** or **F2**.

The **MENU** incorporates the following menu items:

Menu item **MOTOR CONTROL:**
The menu item **MOTOR CONTROL** is used for synchronization purposes of motor unit and release device. It starts a short motor run (1/2 revolution of the motor axle).

```
MENU
  MOTOR CONTROL
  (SEE MANUAL)
     START = ENTER
```

MENU	Indicator for menu
MOTOR CONTROL	Motor control for synchronization purposes.
START = ENTER	To start a short motor run (1/2 revolution of the motor axle) press the **ENTER** key.

HAND UNIT: MENU RESET PRESSURE

Menu item **RESET PRESSURE:**
Due to the high accuracy of the pressure sensor used inside the TWIN FIRE MODULE air pressure fluctuations cause variations of the pressure measurements which can be eliminated with assistance by the menu item **RESET PRESSURE**.

The Underwater Unit **have not to be immersed into the water** while compensating the air pressure influences.

```
MENU

  0.3 dbar
       RESET = ENTER
```

MENU   Indicator for menu
  0.3 dbar   Current pressure value of the Underwater Unit.
  RESET = ENTER   To eliminate air pressure variations (recalibrate the pressure sensor) press the **ENTER** key.
                        Use menu item whilst **Underwater Unit stands on deck** at temperatures from +5°C to +35°C and has reached surrounding temperature only.

HAND UNIT: MENU IDENT NUMBER

Menu item **IDENT NUMBER:**
The menu item **IDENT NUMBER** gives access to the identification number of the TWIN FIRE MODULE:

```
┌─────────────────────────────────┐
│ MENU                            │
│                                 │
│    IDENT NUMBER      12345      │
│                                 │
└─────────────────────────────────┘
```

PREPARATION FOR OPERATION

1. Connect the TWIN FIRE MODULE to the Hand Unit by using the programming cable.

2. When the TWIN FIRE MODULE has not been operated for a longer period a TEST RUN should be carried out as follows to control proper functioning of the system.
   **THE WATER SAMPLERS HAVE NOT TO BE OPENED FOR THE TEST RUN!**
   Switch on the Hand Unit by pressing any key once. If correct communication between Hand Unit and Underwater Unit has been established the **MAIN SCREEN** will be displayed.

   Press the **ENTER** key at the keyboard once to activate the release device. The red releaser will advance to the next plastic ball **C**.

3. Check battery voltage of the **SAMPLER** (third line inside the **MAIN SCREEN**). **Charging of batteries is needed at the latest when the battery voltage falls below 5.5V.**

4. Check **PRESSURE** value of the Underwater Unit (second line inside the **MAIN SCREEN**). Use **MENU** function **RESET PRESSURE** to eliminate air pressure variations in case the value considerably differs from zero.

5. Disconnect the programming cable from Hand Unit and Underwater Unit.

6. Lift the striking bar **A** of the rack and put rope **B** with the plastic ball **C** into the slot of the release device. Do this at both samplers.
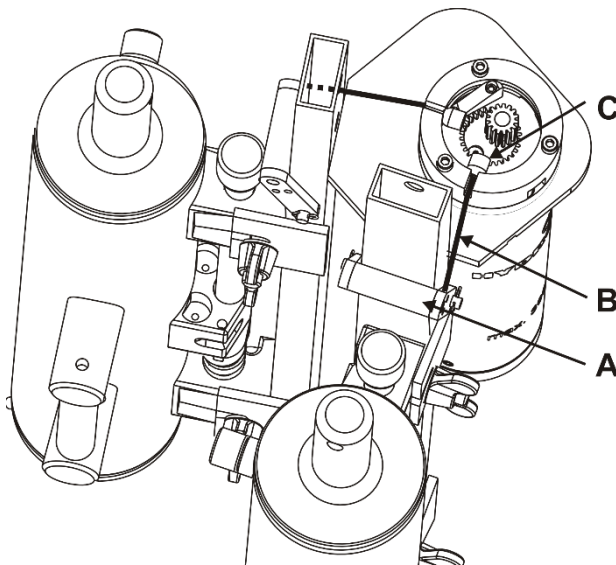
7. The Water Samplers are opened as described on its label.

8. When no connection of the Underwater Unit is needed, the connector MC BH 5 F at the Underwater Unit should always be protected by the corresponding dummy connector MC DC 5 M to avoid corrosion of the contacts. Regularly grease the pins of the dummy connector with supplied PIN-lubricant.

9. The TWIN FIRE MODULE is now ready for operation.
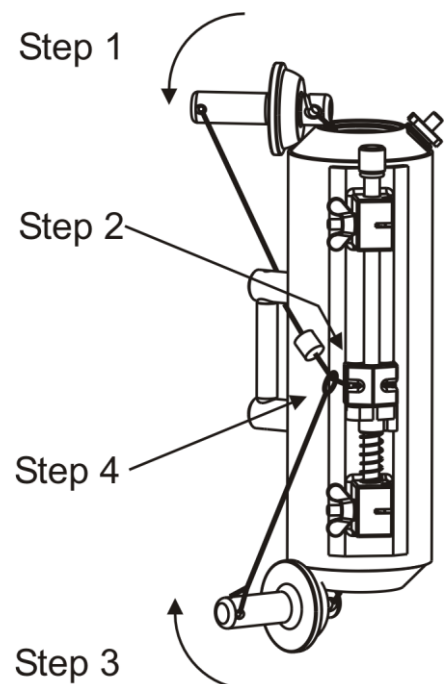
OPERATION IN ONLINE MODE

1. Connect the Hand Unit to the slip ring box of the winch by using the supplied 3 meters long connecting cable.

2. Connect the TWIN FIRE MODULE mechanically and electrically (by using the supplied adaptor cable) to the winch cable. Regularly grease the pins of the underwater connectors with supplied PIN-lubricant.

3. Switch on the Hand Unit by pressing any key once. The following text will be temporarily displayed at the LC-display:

```
HAND UNIT          9.2 V
        NO DATA


```

4. The **MAIN SCREEN** will be displayed if communication has been established:

```
SFM               3000 m
PRESSURE        0.0 dbar
SAMPLER           6.5 V
      CLOSING = ENTER
```

5. Lower the TWIN FIRE MODULE to the desired depth.

6. Press the **ENTER** key at the keyboard of the Hand Unit once to activate the release device for the first sampler. The activating process of the water sampler is indicated by **MOTOR RUNS** in the fourth line of the **MAIN SCREEN**.

```
SFM               3000 m
PRESSURE      380.3 dbar
SAMPLER           6.5 V
        MOTOR RUNS
```

7. When the first sampler is closed, CLOSING = ENTER is again displayed in the fourth line. Move to the second desired depth and press the **ENTER** key again to close the second sampler.

8. Wait until closing of the water sampler has been finished, indicated by **SAMPLER CLOSED** in the fourth line of the **MAIN SCREEN**.

```
SFM               3000 m
PRESSURE      150.6 dbar
SAMPLER           6.5 V
      SAMPLER CLOSED
```

8. Retrieve the TWIN FIRE MODULE and bottle the sample for storage.

9. Switch off the Hand Unit by pressing any key for 3 seconds until the display blanks out.

10. Disconnect Underwater Unit from the winch cable.

11. Protect the connector MC BH 5 F at the Underwater Unit by the corresponding dummy connector MC DC 5 M to avoid corrosion of the contacts. Regularly grease the pins of the dummy connector with supplied PIN-lubricant.

12. Thoroughly rinse the TWIN FIRE MODULE with fresh water.

OPERATION IN OFFLINE MODE

1. Use the supplied cable to connect the TWIN FIRE MODULE to the Hand Unit (Long-Distance Telemetry) and connect the Hand Unit (Serial-COM-port) to the PC. Alternatively use the supplied PC cable to connect the TWIN FIRE MODULE to the PC for programming via the PC software OceanLab.

    Alternatively connect the TWIN FIRE MODULE to the Hand Unit only (Long-Distance Telemetry) in case programming shall be made via the Hand Unit.

2. Switch on the Hand Unit by pressing any key once. The following text will be temporarily displayed at the LC-display:

    ```
    HAND UNIT           9.2 V
              NO DATA
    ```

3. The **MAIN SCREEN** will be displayed when communication has been established:

    ```
    SFM              3000 m
    PRESSURE        0.0 dbar
    SAMPLER           6.5 V
          CLOSING = ENTER
    ```

4. Open the **PROGRAMMING** dialog by pressing **SHIFT** and **9** successively:

    ```
    PROGRAMMING
    UNLOCK        1258.0 dbar
    CLOSING       1255.0 dbar
          ACTIVATE = ENTER
    ```

5. Enter **UNLOCK** and **CLOSING** pressure according to the scheduled sampling scenario. The electric motor of the Underwater Unit will be locked during downcast until the programmed **UNLOCK** pressure has been reached or exeeded. Afterwards the water samplers will be closed during upcast when passing the respective **CLOSING** pressures. Thus the **CLOSING** pressures **have to be smaller** than the **UNLOCK** pressure.

6. Press the **ENTER** key to store the entered program. The Underwater Unit is automatically activated for sampling.

7. Switch off the Hand Unit by pressing any key for 3 seconds until the display blanks out.

8. Disconnect the programming cable from the Underwater Unit.

9. Protect the connector MC BH 5 F at the Underwater Unit by the corresponding dummy connector MC DC 5 M to avoid corrosion of the contacts. Regularly grease the pins of the dummy connector with supplied PIN-lubricant.

10. Lower the TWIN FIRE MODULE to or beyond the **UNLOCK** depth.

11. Slowly heave the TWIN FIRE MODULE until passing the **CLOSING** pressure. Thereafter the upcast can be finalized with increased speed.

12. Retrieve the TWIN FIRE MODULE and bottle the sample for storage.

13. Optionally connect the Underwater Unit to a PC to download the pressure profile of the operation into the PC software OceanLab for evaluation.

14. Thoroughly rinse the TWIN FIRE MODULE with fresh water.

PC SOFTWARE OCEANLAB

MINIMUM PC REQUIREMENTS
Celeron or Athlon PC 1 GHz, 2GB RAM
10 MB free space on hard-disk drive
Windows 11 / Windows 10 / Windows 8.1 / Windows 7
Display 800 x 600
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 on your PC run Setup from the OceanLab USB stick. 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.
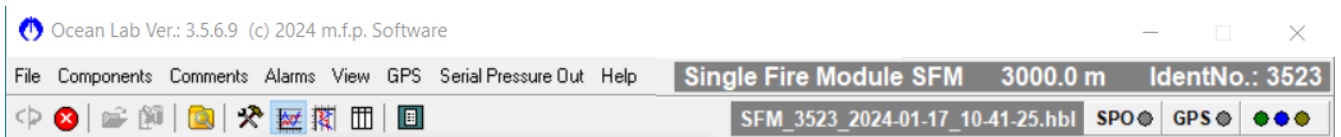
Please note that the TWIN FIRE MODULE is a variant of the SINGLE FIRE MODULE and therefore it is identified as SINGLE FIRE MODULE (SFM).

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 instrument connected.
Additionally three LEDs indicate the communication state of OceanLab 3:
> Green LED indicates that OceanLab 3 is sending commands to the instrument.
> Blue LED indicates that OceanLab 3 receives data from the instrument.
> 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.
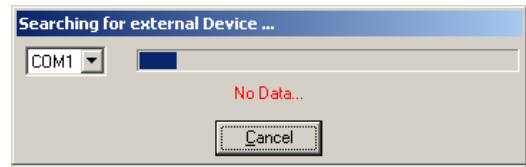
During online operations the GRAPHS window visualizes a live time- or pressure-depending graph with the sets of measuring data received from the instrument. Alternatively the graph can be replaced by a tabulated data list.

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.

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 Underwater Unit is made via a serial COM-port. The Underwater Unit may be connected to any COM-port available at the PC. After starting OceanLab 3 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 Underwater Unit. If OceanLab 3 is unable to establish a connection to the Underwater Unit select the appropriate COM-port inside the pull-down table COM-PORT of the CONNECT dialog. After having successfully connected OceanLab 3 enters the CONTROLING MODE to give access to the control of the TWIN FIRE MODULE.

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

Should communication problems occur during a mission OceanLab 3 automatically tries to re-connect.

To stop the data transmission from the Sampler to the PC use the button STOP SESSION inside the toolbar or inside the FILE menu.

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

FILE MANAGEMENT

The disk files to store measuring data from the instrument are automatically created by OceanLab 3. According to Microsoft guidelines the sub-directory LOGFILES of OceanLab3 is created inside an application data directory of Windows. The location of the application data directory depends on the Windows version used on your PC. To find the actual path of the LOGFILES directory **at your PC** please use menu item ENTER FILES DIRECTORY inside the FILES menu to start the Windows Explorer inside the LOGFILES directory.

Inside the LOGFILES directory each instrument creates its own sub-directory, named with:
      Type of system connected (e.g. MWS for Multi Water Sampler)
      Identity number (IdentNo.) of the electronics board inside the Probe resp. Motor Unit

OceanLab 3 creates sub-directories inside the instruments sub-directory to separate ONLINE and OFFLINE sessions.

A file set of one session consists of two files, named with:
      Type of system connected, Identity number (IdentNo.), date and time of session start
      File extensions: .hbl   containing the measuring data of the session
                    .hbc   containing additional user defined information to be stored in connection with the data file

When data or comments files are modified after stopping the session the modified file sets are stored with numerical index:
      name_x.hbl   (x = numerical index) containing the modified data of the session
   name_x.hbc   (x = numerical index) containing modified user defined information

OceanLab 3 starts a new session automatically (and thus creates new data and comments file) when modifications are made inside the CONTROLLING dialogs of the CONTROLLING MODE.

SIMULATION

For training purposes OceanLab 3 can be started in SIMULATION MODE with no HYDRO-BIOS system connected. For general training and software evaluation OceanLab 3 offers simulations for some different standard HYDRO-BIOS systems. Additionally OceanLab 3 automatically creates a simulation for each HYDRO-BIOS system during the first connecting process. The simulations are accessible via menu item SIMULATIONS inside the FILE menu, offering all modules and functions necessary to control the specific HYDRO-BIOS system. The simulations can only be started when no session or simulation is active and no file is opened inside OceanLab 3.

The data file sub-directories and the data files of simulations are marked with SIM as leading expression.
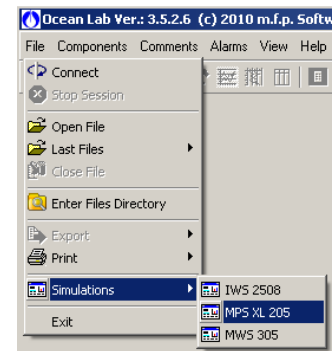
HARDWARE CONSTELLATIONS

Depending on the kind of mission there are two constellations intended for the following applications:

For PREPARING OFFLINE-OPERATIONS, where the PC is directly connected to the Probe resp. Motor Unit via serial port, OceanLab 3 offers a special programming dialog for instruments working in self contained mode where the user can enter a list of action events and program the instrument electronics to execute this list.

The POST-DEPLOYMENT DATA DOWNLOAD where the PC is directly connected to the Probe resp. Motor Unit via serial port is needed to transfer measuring data stored inside the instruments data memory during OFFLINE-OPERATIONS after recovery.

OPERATING MODES

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

In MONITORING MODE live 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.

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.

MONITORING MODE

To enter the MONITORING MODE click on button MONITORING MODE inside the toolbar. The MONITORING MODE incorporates independent program windows as follows:

GRAPHS WINDOW

Inside the GRAPHS window a live time- or pressure-depending graph visualizes the sets of measuring data received from the instrument. Alternatively the graph can be replaced by a tabulated data list. The appearance of the GRAPHS window can be selected inside the VIEW menu of the MAIN window.

To temporarily enlarge a specific area inside the graphic mark the region of interest with the mouse whilst left button pressed.
To temporarily zoom the graphic use the wheel of the mouse or + and – keys at the keyboard.
To temporarily navigate inside the GRAPHS window use the right mouse button or the scroll bars.
To return to the default settings double-click inside the GRAHPS window.
To temporarily display the graph of the complete active mission use button ZOOM ALL inside the toolbar.

The GRAPHS window in MONITORING MODE will return to the default settings after 10 seconds automatically.

To select a parameter for the vertical axis of the GRAPHS window click at the parameter inside the COMPONENTS window.

Inside the time-depending GRAPHS window blue boxes mark the positions of header information, yellow boxes mark the positions of LOGFILE EDITOR comments connected to the data file. Red boxes mark the positions of LOGFILE EDITOR comments automatically created by OceanLab 3 when communication problems occur during the mission. To open a LOGFILE EDITOR comment click once at the blue, yellow or red box or select it inside the COMMENTS menu.

COMPONENTS WINDOW

Inside the tabulated COMPONENTS window real-time measuring data received from the instrument and data calculated from the measuring data is displayed in engineering units. An ACTION button enables the user to initiate the respective action of the instrument.

OPTIONS DIALOG

A configuration dialog of a component is accessible by clicking with the right mouse button at the name of the component inside the COMPONENTS window and selecting OPTIONS inside the pop-up menu.

Inside the OPTIONS dialog the component can be configured as follows:

COLOR: Select a color for the component to be used inside the graph.

- LINE IS VISIBLE: Use tick box to hide the component inside the graph.
- LINE IS INVERTED: Use tick box to mirror the graph of the component (lower limit of Y-axis at the top, upper limit of Y-axis at the bottom).
- VALUE WINDOW IS VISIBLE: Use tick box to create an additional value window for the component. This value window can be individually adjusted in size and position at the windows desktop.
- LINE WIDTH: Select line width to be used inside the graph from the pull-down box.
- WARNINGS: Each component can be associated with high and low value alarms. A pop-up window will indicate the crossing of the selected limit.
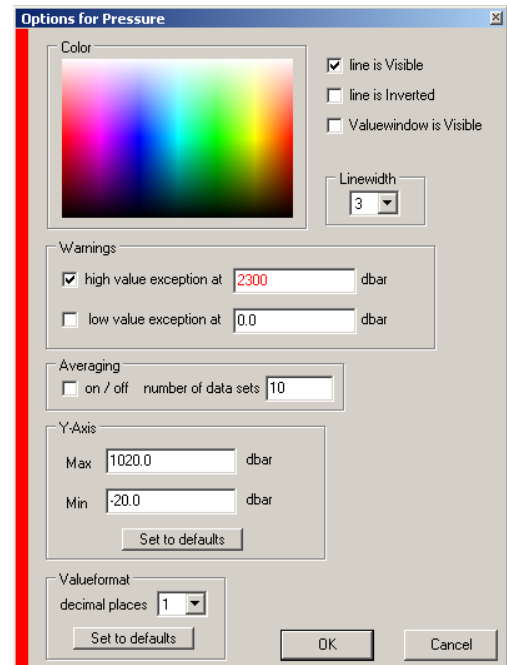
- AVERAGING: To smoothen a graph of a component and to average the physical data (in case of unstable or jumping readings) use tick box to activate averaging and enter the number of data sets to be used for averaging. A component with active averaging is marked with an overline inside the COMPONENTS WINDOW.
- Y-AXIS: Enter upper and lower limit of Y-axis at will for a permanent magnification of the graph.
- VALUE FORMAT: Select number of decimal places for the component from the pull-down box. This function does NOT increase the accuracy!
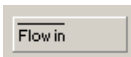
LOGFILE EDITOR

When starting a session OceanLab 3 automatically creates a header information which is intended to enable the user to enter all necessary information to be stored in connection with the data file (e.g. ship, cruise no., station no., …). As template for this comment OceanLab 3 uses the file "header.txt" (located inside the OceanLab 3 application data directory) which can be individually configured according to the needs of the user. Inside the GRAPHS window a blue box marks the position of the header information which can be opened for modification with the LOGFILE EDITIOR by clicking at the blue box. The header information will be incorporated into the export files that can be created inside the VIEWER module of OceanLab 3.
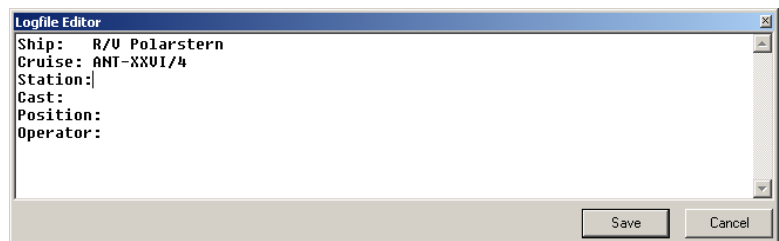
Additional LOGFILE EDITOR comments can be created at any time (e.g. to connect additional information of interest to a specific moment) by simply pressing the space bar at the keyboard of the PC. Inside the time-depending GRAPHS window yellow boxes mark the positions of the LOGFILE EDITOR comments. The LOGFILE EDITOR comments will be incorporated into the export files that can be created inside the VIEWER module of OceanLab 3.

As template for the additional comments OceanLab 3 uses the file "comments.txt" (located inside the OceanLab 3 application data directory) which can be individually configured according to the needs of the user.

OceanLab 3 starts a new session automatically (and thus creates new data and comments files) when modifications are made inside the CONTROLLING dialogs of the CONTROLLING MODE.

CONTROLLING MODE
The tabulated COMPONENTS window offers a list of all components implemented into the actual instrument.

Clicking on one implemented device opens an individual CONTROLLING dialog for the selected device, offering all necessary features of the specific device (e.g. calibration coefficients, clock...).

The following CONTROLLING dialogs for TWIN FIRE MODULE are available:

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 clock data will be used to add time stamps to the offline data files.

The date format is   MM-DD-YYYY   MM = month, 2 digits

DD = day, 2 digits

YYYY = year, 4 digits

(2000 … 2099)
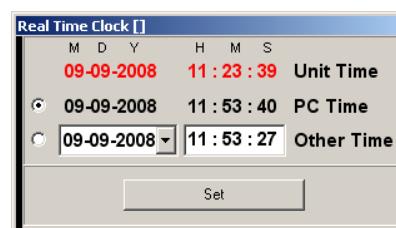
The time format is: hh:mm:ss   hh = hour, 2 digits (0 … 24)

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.

BOTTLE
The CONTROLLING dialog BOTTLE offers a dialog to control the motor of the instrument manually:
The button ACTION is used to activate the motor of the instrument to move to the next position.
The button HALF STEP is used for synchronization purposes to synchronize the motor with the release mechanism of the SINGLE FIRE MODULE. The axle of the motor will carry out a half revolution and the motor counter BOTTLE will be set to zero.
The button RESET COUNTER is used to set the motor counter BOTTLE to zero for synchronization purposes.

PRESSURE

The CONTROLLING dialog PRESSURE incorporates the indication of the sensors raw data and the possibility to read and modify the sensors calibration coefficients (cal 0 … cal 8).

The button SEND TO PRESSURE SENSOR is used to transfer the calibration coefficients to the instrument after modifications.

Due to the high accuracy of the pressure sensor used inside the TWIN FIRE MODULE air pressure fluctuations cause variations of the immersion depth measurements which can be eliminated with assistance by the button RESET PRESSURE SENSOR. Use function **while the Underwater Unit stands on deck** at temperatures from +5°C up to +35°C when the instrument has reached the surrounding temperature only!
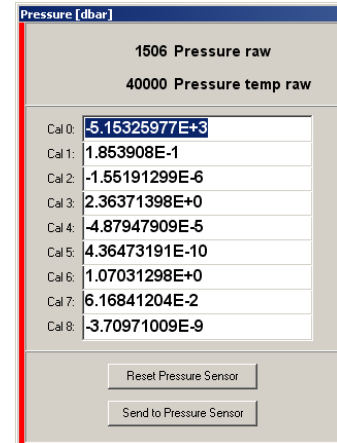
MEMORY

The MEMORY dialog informs about the complete size of the data memory, the used size of the data memory and the remaining space inside the data memory. Additionally the MEMORY dialog offers the possibility to select data files for download into a disk file. In case of not completely free memory the instrument will automatically start to create a new data file inside the data memory if started in OFFLINE MODE. The measuring data of previous OFFLINE OPERATIONs will not be deleted, but the instrument will stop recording measuring data automatically when the memory is completely used.

All data files stored inside the instruments data memory are available inside the FILE table. Each file is marked with date and time of session start, file size and a green or red dot.
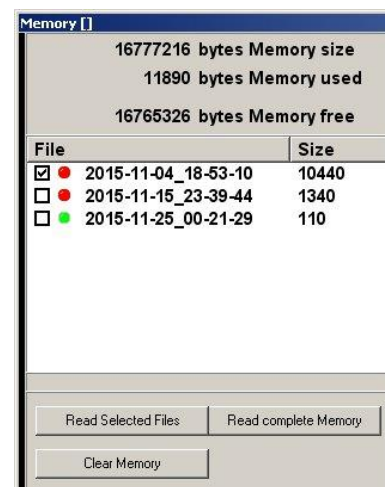
  A GREEN DOT indicates that the file has already been transferred to and stored at the PC.
  A RED DOT indicates that the file has not yet been stored at the PC.

Tick-boxes are used to select data files for data transfer to the PC.

The button READ SELECTED FILES is used to start data transfer of the selected data files from the instrument into a disk file.

The button CLEAR MEMORY is utilized to clear the data memory of the instrument. **This function is irreversible! Therefore make sure the measuring data has been transferred from the instrument to a disk file!**

The additional button READ COMPLETE MEMORY can be used to save the complete data memory of the instrument into one single disk file even if the data memory of the instrument has been cleared by mistake. OceanLab 3 cannot open this special disk file unless it is pre-processed by HYDRO-BIOS Apparatebau GmbH. Therefore the disk file has to be sent to our factory.

Since the TWIN FIRE MODULE is NOT equipped with a main switch an additional button ACTIVATE resp. DEACTIVATE inside the COMPONENTS WINDOW is used to switch ON (= ACTIVE) or OFF (= INACTIVE) the Underwater Unit for automatic sampling and data storage.
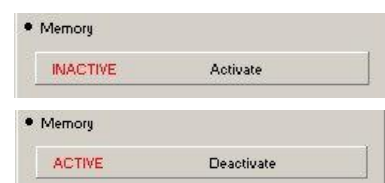
PRESSURE PROGRAMMING

The CONTROLLING dialog PRESURE PROGRAMMING is used to access the programmable activating pressures of the TWIN FIRE MODULE.

PRESSURE PROGRAMMING can only be done while the instruments action device is in START POSITION.

The first event to be entered is the UNLOCK pressure. The electric motor of the Underwater Unit will be locked until exceeding the UNLOCK pressure but measuring data will be continuously recorded.

The CLOSING event represents the pressure where the water sampler will automatically be closed during upcast. The CLOSING pressures **have to be smaller** than the UNLOCK pressure.

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

The buttons LOAD SCHEDULE and SAVE SCHEDULE give access to a list of operation templates that can be created, arranged and deleted by the end user. The position of the highlighted entry can be changed by means of the buttons ↑ and ↓. The button X is used to delete the highlighted entry. To re-name an entry just select it from the list and enter a new name.

The button PRINT SCHEDULE is used to provide a hard copy of the current list of unlock and activating pressures on your printer.

The button EXPORT SCHEDULE is used to store the current list of unlock and activating pressures in an ASCII-file.

The button ACTIVATE resp. DEACTIVATE is used to switch ON (=ACTIVE) or OFF (=INACTIVE) the Underwater Unit in offline mode.

VIEWER MODULE

To view disk files of previous operations OceanLab 3 offers the VIEWER MODULE. It is accessible via the button OPEN FILE inside the toolbar or menu item OPEN FILE inside the FILE menu. The 6 previous data files are accessible by menu item LAST FILES inside the FILE menu.

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

The VIEWER MODULE incorporates program windows identical to the MONITORING MODE.

The following additional feature is implemented into the GRAPHS WINDOW of the VIEWER MODULE: To mark a point of interest the time-depending graph offers a vertical red marking line. This marking line can be moved via drag-and-drop (left mouse button) or ← and → keys of the keyboard (use STRG- resp. CTRL-key of the keyboard to increase the step width).

EXPORT DATA

The data files created by OceanLab 3 are stored at the PC in binary format. To export physical data of complete binary files in ASCII-format for use with current word-processing, spreadsheet and data base software use item DATA of the EXPORT menu inside the FILE menu.

The LOGFILE EDITOR comments will be incorporated into the export files.

EXPORT ZOOMED DATA

With active time-depending graph an additional menu item ZOOMED DATA is enabled. It allows to export physical data files in ASCII format of the time interval currently visible inside the GRAPHS window.

PRINT GRAPH
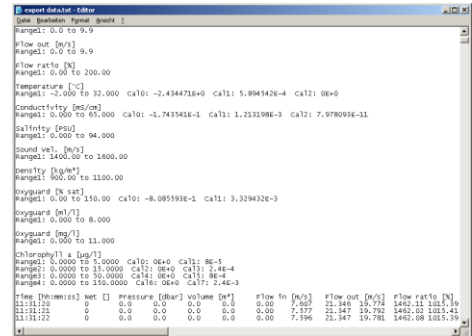
All printers available inside the actual PC configuration can be used to create a hard copy of the graph as currently visible inside the GRAPHS window. Use item GRAPH of the PRINT menu inside the FILE menu.

PRINT DATA
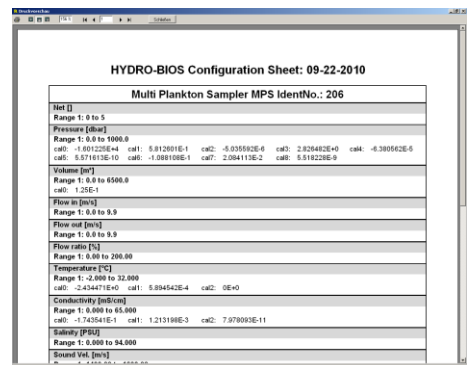
All printers available inside the actual PC configuration can be used to print the complete physical data file as tabulated list. Use item DATA of the PRINT menu inside the FILE menu.

PRINT CONFIGURATION

All printers available inside the actual PC configuration can be used to print the actual configuration of the HYDRO-BIOS system (including the complete set of calibration coefficients). Use item CONFIGURATION of the PRINT menu inside the FILE menu.

REMOVAL AND MOUNTING INSTRUCTIONS FOR THE MOTOR

If the motor of the TWIN FIRE MODULE has to be removed for repair or maintenance the following steps have to be carried out:

REMOVAL
1. Remove any cable from connector MC BH 5 F at the Motor Unit.

2. Place dummy MC DC 5 M on connector MC BH 5 F.

3. Loosen three hexagon socket screws M 5 of the black release mechanism.
   Tool: Hexagon Socket Screw Key 4 mm

4. Remove the gear ring.

5. Hold the Motor Unit to keep it from dropping.
   Loosen both hexagon socket screws M6 of the black plate.
   Tool: Hexagon Socket Screw Key 5 mm

MOUNTING
The Underwater Unit only works properly when the synchronization between motor and gearing has been established. In order to re-establish the synchronization before mounting the following steps have to be carried out:

1. Connect the TWIN FIRE MODULE to the Hand Unit.

2. Activate TWIN FIRE MODULE by Hand Unit control once.
   The motor is synchronized and ready for re-mounting.

3. Remove connecting cable from connector MC BH 5 F at the Motor Unit.

4. Place dummy MC DC 5 M on connector MC BH 5 F.

5. Insert the Motor Unit from below into the hole from the metal plate and align the threads with the corresponding holes in the plate. Place the black plate on top and align the holes. Insert and tighten the screws.

6. Place the gear ring and the release mechanism on top and align release wedge according to illustration.

6. Align slot of the release device in the direction of the rope at the striking bar.

7. Tighten three hexagon socket screws M 5 of the black release mechanism.

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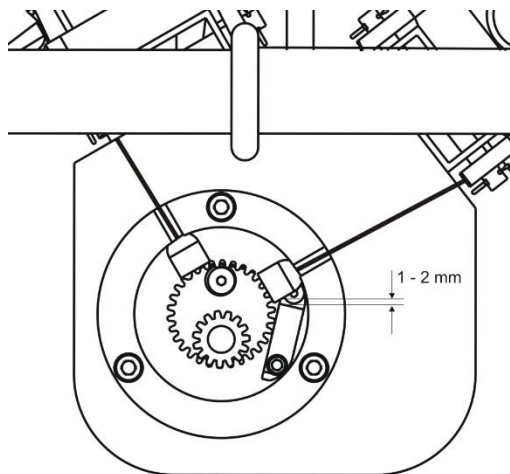
REPLACEMENT OF ACCUMULATORS

The LiFePO4 power pack is fully integrated into the Motor Unit of the TWIN FIRE MODULE. A replacement by the end user is not possible.

The Motor Unit of the TWIN FIRE MODULE has to be returned to our factory for power pack replacement when the accumulators have reached their end of life.

The expected life time of the accumulator is typically 1500 charging cycles / 10 years.