

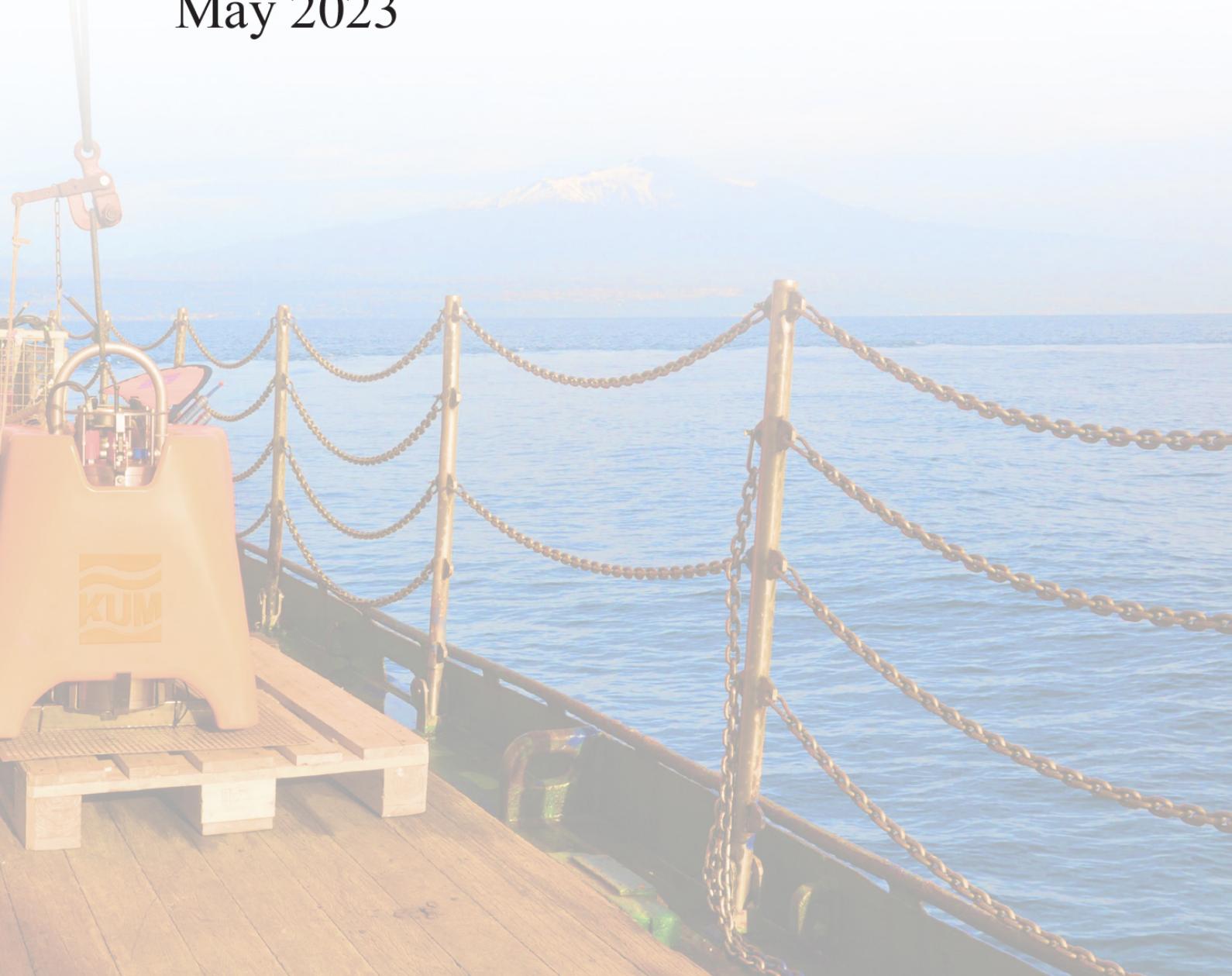
OBS NAMMU & 6D6.7 / 6D7

Longterm Ocean Bottom
Seismometer



K/MT 4230-00

Manual
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REMARK

This manual is a reference book only. It does not claim completeness and refers to other literature in certain chapters. This manual cannot and shall not substitute an instrument introduction through an expert. Programming and deployment of an autonomous deep-sea instrument is an utmost complex affair and require the detailed know-how of all components and their composition in order to guarantee successful operation. That's why we strongly recommend that solely trained personnel shall operate and maintain the instruments.

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1 Technical Data

Weight with 90 Li-Cells	In air (In salt water)
Weight without anchor	157 kg (-14 kg)
Weight with anchor	206 kg (29 kg)
Weight of pressure tube	46 kg (34,6 kg)
Weight of Releaser KUMQuat	11 kg (6,4 kg)
Maximum operation depth	6000 m
Maximum operation time	16.5 month (90 LiThCl D-cells) (See page 26 for configurations / operational times.)
Size without flag w × h × d	635 mm × 770 mm × 800 mm
Anchor size	800 mm × 600 mm
Seismic Sensors	120 sec broadband seismometer or 4.5 Hz Geophones
Pressure Sensor	100 sec Hydrophon HTI-04-PCA ULF
Data Logger	K.U.M. 6D6/6D6.7/6D7: 4 channels at 32bit at 142db
Releaser	KUMQuat 562

2 Preparation in the laboratory

2.1 Work place and initiative steps

As the pressure tube – including its inner life – weights up to 45kg, the laboratory should be close to the deck – no stairs: danger of falling! For 10 OBS you need a table area of about 15 m, since both Recorder pressure tubes and Releasers need to be prepared.

Furthermore, you need a Linux PC or laptop for programming, a GPS connection (for signal output), and memory capacities for the enormous data quantities (each recorder can record up to 512 GB).

First, install the GPS clock “UHURA” (see picture below) and test it with a 6D6/6D7 recorder. Please refer to the “DIRC II& UHURA” manual for installation and use of the GPS.



Next you should discuss with the chief scientist if and when the time releases shall be programmed. With the hand terminal you can read out and programme the time releases as well as measure the battery voltages from the outside. You will find further information in the Releaser Manual.

Now, collect the radio beacons. The beacons do have 4 different frequencies, if possible, do not place two beacons with the same frequencies next to each other. Make a plan, check their function. If you also have a direction finder check it, too, following the instruction in its manual.

Open all recorder pressure tubes and check the o-rings. Actually it is not necessary to mention: when opening and closing the pressure tubes turn the screws evenly and alternately. There is no need of using a rubber mallet. Check the battery connectors (also those of the battery packs). Carefully check the battery voltages! Never use doubtful battery packs!

According to discussion with the head of excursion, according to airgun power, water depth and time schedule program the Recorders (programming instruction see chapter 3).

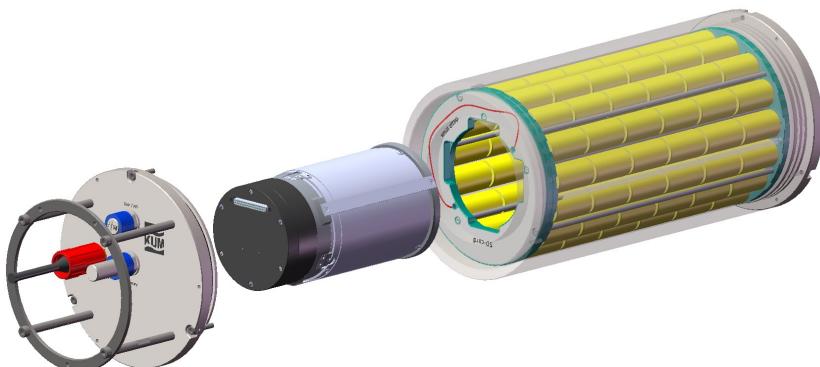
2.2 Battery container

The Recorder can be operated with Lithium D-cells, we use SAFT LS 33600. Another brand is Tadiran, but the battery container needs some upgrade for the Tadiran batteries because of the isolation on the top head. **Never mix different battery types!**

The battery container can host up to 90 batteries. Our experience shows that a 6D6/6D7-Recorder combined with a broadband seismometer consumes 305 mW and a Lithium Mono-cell lasts for 5 days¹. In the annex you find a list of battery packs and their longevity (see section 8.1).

2.3 The Broadband Seismometer

The seismometer we use is a very broadband instrument. Its frequency ranges covers 50 Hz down to 120 s (0.0083 Hz). Seismometer and recorder combined consume approximately 305 mW . Please refer to the seismometer manual for further information.



2.4 Geophones

As an alternative, the NAMMU can be equipped with Geophones instead of the broadband seismometer. Frequencies are limited down to 4.5 Hz – on the other hand, the power consumption decreases from 305 mW to 125 mW.

¹If anybody takes the time and checks this he will notice that mono cells have less than 40% of the nominal capacity – on one hand this is due to the very optimistic calculation of the supplier and on the other hand due to the temperatures of +/- 0 °C at the sea floor. The low current consumption, too, contributes to less capacity.

2.5 The Recorder 6D7

NAMMU is equipped with the Recorder “6D7” from K.U.M.



The recorder has four seismic channels and additional inputs for technical data e.g. battery voltage, temperature and humidity. Data are stored on external StiK™ or an internal μ SD-card. After having the Recorder installed you can program it, you need the “DIRC II to connect to your PC or to establish an Access Point for your WiFi device.

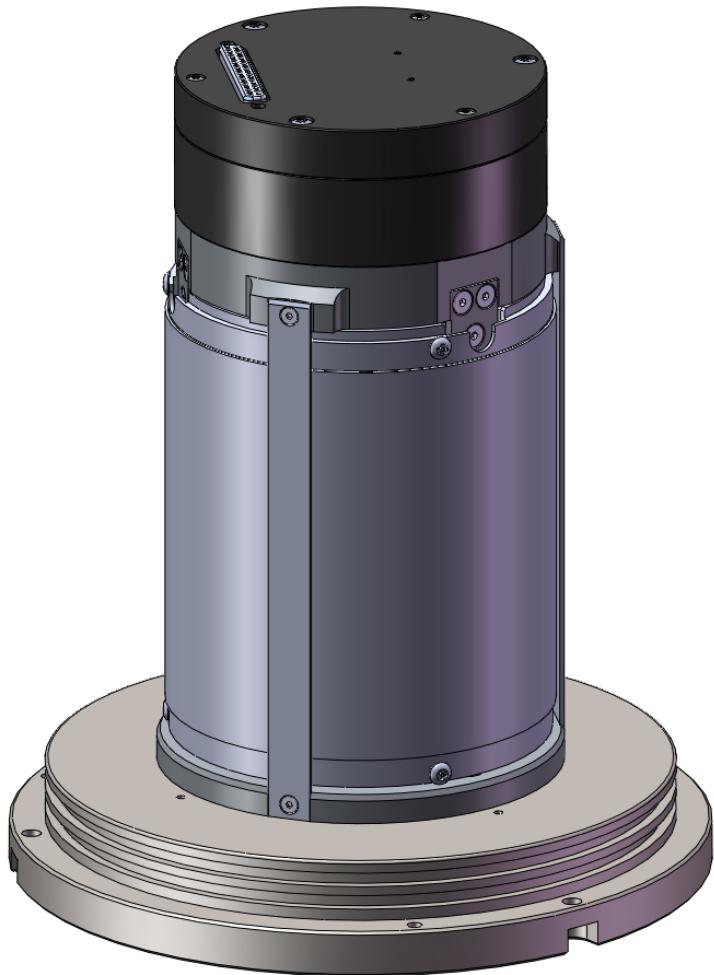
For Recorder programming you need a PC/Laptop, a GPS receiver “UHURA” for the time signal, a “DIRC II”, a battery container and the sensors (hydrophone, seismometer).

3 Connection and Use of the Datalogger

NAMMU is equipped with the Recorder “6D7” from K.U.M. In any case of doubt the recorder manual is decisive. Here we present only a short extract out of the original manual.

3.1 Connection

The power for the datalogger is supplied by a battery pack, usually included in the pressure vessel. After placing the datalogger on top of the seismometer fix it by carefully tightening the Torx screws and connect to the power cable. The recorder is ready for use now.



3.2 Web Interface

The communication device "DIRC II" is equipped with a web-server and an access-point. If connected to DIRC II a WiFi is established and you can use any web browser for communication. It takes about 45 seconds for the DIRC II to boot, as soon as the LED lights permanently the WiFi is ready for use. The SSID of the net always starts with "Dirc2-" followed by the 3-digit number of the device. The default password is "seismics". Connect your device (laptop, tablet or mobile) to the WiFi and type the IP-address (it is *always* "10.0.0.1") into the address field of your web browser. The following website will appear:

The screenshot shows the main dashboard of the Recorder 6D7. At the top, there are navigation links: Recording (selected), Liveview, System, and Help. Below the header, there are several sections:

- Status**: Shows the recorder ID 72301011 and a message: "The time is not synchronized!". A "Start Recording" button is present.
- Real Time Clock**: Displays the current time as 2023-06-30 13:06:28 UTC and a "Synchronize now" button.
- Settings**: Includes a sample rate dropdown set to 250, and sections for Channels (H, X, Y, Z all set to On) and Storage (StiK, Capacity: 256GB, Used Space: 0B, Free Space: 256GB).
- Info**: Provides sensor readings: Temperature: 23.4°C, Relative Humidity: 52%, and Battery Voltage: 13.7V.
- Comment**: A text input field containing "Station OBS01" and an "Edit" button.

Homepage of the "6D7" datalogger

3.2.1 Status

You can't start a recording in the example above because the the clock is not synchronized – this is indicated by both the magenta colored LED of the datalogger and the magenta colored dot on the web site.

3.2.2 Real Time Clock

It is shown in the area "Real Time Clock" that the clock is not synchronized. If an external GPS called "UHURA" is attached, synchronize it.

Important: It is mandatory to synchronize the clock *directly before* use and *directly after* end of recording.

The screenshot shows the Recorder 6D7 software interface. At the top, there is a navigation bar with tabs: Recording, Liveview, System, and Help. Below the navigation bar, the main content area is divided into several sections:

- Status:** Shows the recorder ID 72301011 and a message: "The time is not synchronized!". A "Start Recording" button is present.
- Real Time Clock:** Displays the current time as 2023-06-30 13:07:13 UTC and a note: "Synchronization Time: -". A "Sync" button is shown.
- Settings:** Includes a "Sample Rate" dropdown set to 250, and a "Channels" section with dropdown menus for H, X, Y, and Z, all set to "On". A dropdown menu for "Channel" is open, showing options 100, 250 (selected), 500, 1000, 2000, and 4000.
- Storage:** Shows the device as StiK with a capacity of 256GB, used space of 0B, and free space of 256GB.

3.2.3 Settings

To switch channels on or off and to define the samplerate use the buttons in the area "Settings".

The screenshot shows two instances of the "Settings" section from the Recorder 6D7 software. Both instances have a "Sample Rate" of 250. The first instance shows all channels (H, X, Y, Z) set to "On". The second instance shows channel Z set to "Off". A vertical line connects the "Channel" dropdown in the first instance to the "Z: Off" dropdown in the second instance, indicating a change in the Z channel setting.

3.2.4 Memory Requirements

The required memory is depending on both samplerate and recording time. The system records with 32 bit (= 4 byte), so the required memory is: $M = 4 \cdot 60 \cdot 60 \cdot 24 \cdot 30 = 10,5 \text{ MB}$ per channel per month per sps.

Example: At four channels and a samplerate of 250 sps you will need a monthly memory of:
 $4 \cdot 250 \cdot 10,5 \text{ MB} = 10,5 \text{ GB}$.

3.2.5 Storage

Some configurations of the data logger are equipped with an internal storage. If the internal storage has been replaced, it must be formatted according to the SD card standard (256 GB in this example). Storage that has been used with a datalogger before will be erased before use. A common warning here: Please verify that you have backed up the existing data.

Two different storage modules are available: First, the storage module "StiK™" that is placed on a connector outside of the endcap of the pressure vessel. In addition, some configurations of the data logger come with an inside storage.

Internal storage will be shown with the title "Internal storage" while the pressure-resistant external storage is called "StiK™" on the web page. If both the storage modules are connected to the datalogger, generally StiK™ is prioritized.

The screenshot shows the Recorder 6D7 web interface. On the left, there's a sidebar with "Recording", "Liveview", "System", and "Help". The main area has several sections: "Status" (recorder 72301011, start recording button), "Real Time Clock" (Time: 2023-06-30 13:15:16 UTC, Synchronization Time: 2023-06-30 13:07:18 UTC, Skew Measurement button), "Settings" (Sample Rate: 250, Channels H, X, Y, Z all set to On), "Storage" (StiK, Capacity: 256GB, Used Space: 1.26MB, Free Space: 256GB), "Recording" (Start Time: 2023-06-30 13:09:53 UTC, End Time: 2023-06-30 13:15:07 UTC, Duration: 5m 14s, SyncTime: 2023-06-30 13:07:18 UTC, a "Delete" button circled in red with a green arrow pointing to it), and "Info" (Temperature: 23.4°C, Relative Humidity: 52%, Battery Voltage: 13.6V). There's also a "Comment" section with a text input field and an "Edit" button.

Formatting internal storage

3.2.6 Skew

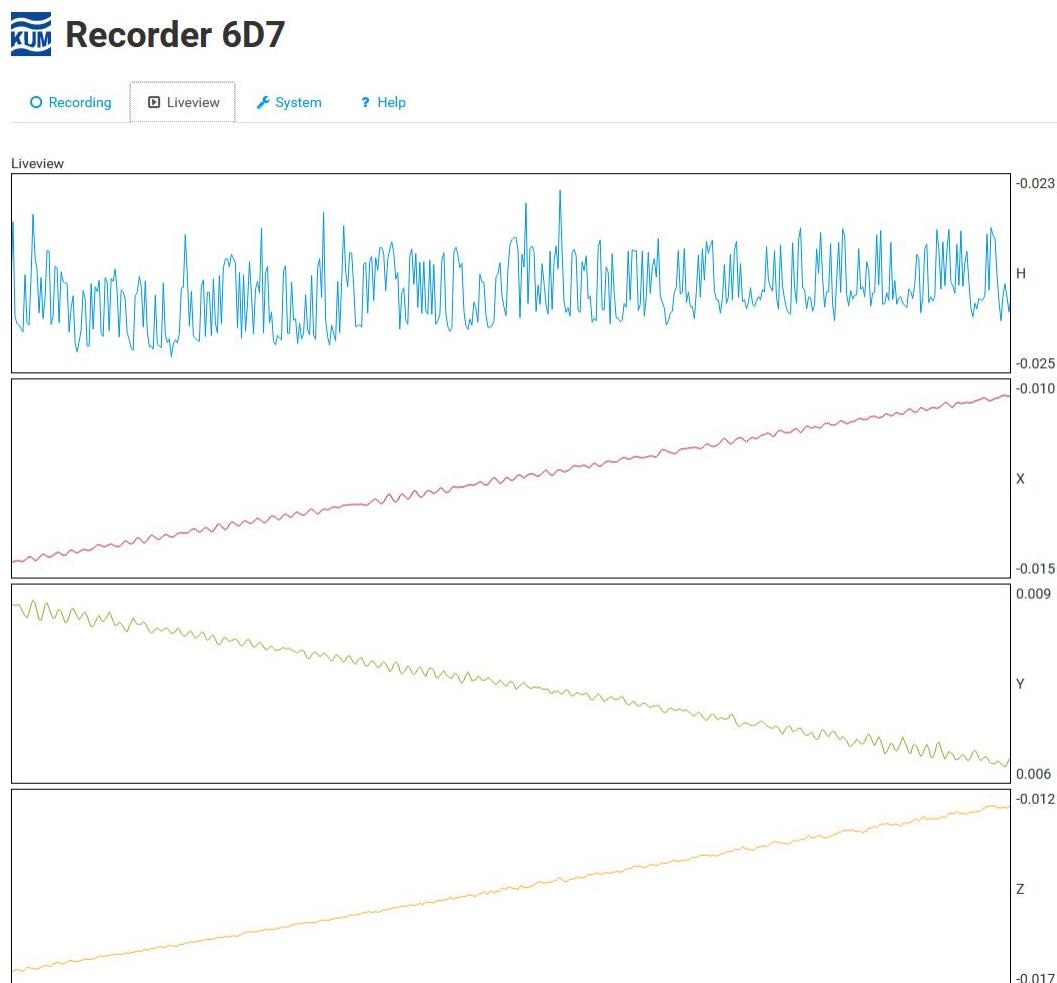
After recording you can make a second GPS fix to determine any clock drift – in this example a deviation of 1 μ s.

The screenshot shows the Recorder 6D7 software interface. At the top, there is a navigation bar with tabs: Recording (selected), Liveview, System, and Help. Below the navigation bar, the main content area is divided into several sections:

- Status**: Shows the recorder ID **72301011** and the message "Ready for recording". A button labeled **Start Recording** is present.
- Real Time Clock**: Displays the current time **2023-06-30 12:50:28 UTC** and synchronization time **2023-06-30 12:08:37 UTC**. A button labeled **Skew Measurement** is shown.
- Settings**: Includes a sample rate dropdown set to **250**. Under **Channels**, dropdowns for H, X, Y, and Z are all set to **On**.
- Storage**: Shows a **StiK** drive with **Capacity: 256GB**, **Used Space: 1.85MB**, and **Free Space: 256GB**.
- Recording**: Provides details about the current recording session: **Start Time: 2023-06-30 12:42:06 UTC**, **End Time: 2023-06-30 12:49:47 UTC**, **Duration: 7m 41s**, **SyncTime: 2023-06-30 12:08:37 UTC**, and **Skew: 1 μ s, Skew Time: 2023-06-30 12:49:58 UTC**. A green circle highlights the **Skew** and **Skew Time** entries.

3.2.7 Liveview

Click on "Liveview" in the task menu to switch to a display of online data from all the channels in use:



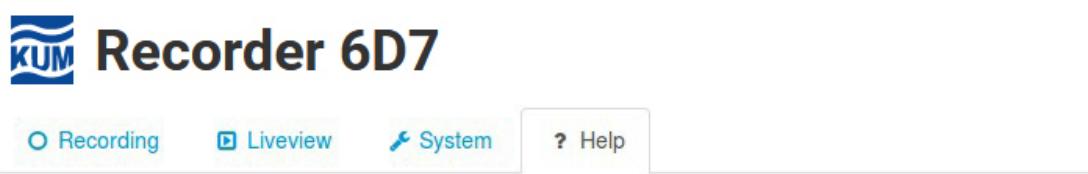
Please note that the signals shown are just a coarse representation of the data recorded – even on a 4k screen it is not possible to show four channels of 32 bit data...

3.2.8 System

Use the tab "System" in the task menu to change to the system's options. You may change SSID and password for this DIRC II, however, we recommend to do so with good reasons only. You can also upload a new firmware image to the datalogger, if necessary.

3.2.9 Help

At this tab you will find a html-version of this chapter.



The screenshot shows a web-based help interface for the KUM Recorder 6D7. At the top left is the KUM logo, followed by the text "Recorder 6D7". Below the logo is a horizontal navigation bar with four items: "Recording" (highlighted in blue), "Liveview", "System", and "Help".

? Help

1. Connection

The power for the datalogger comes from inside the pressure tube normally. After placing the datalogger on top of the seismometer fix it by carefully tightening the Torx screws and connect to the power cable. The recorder is ready for use now.



3.3 Pressure tubes and mounting

When working with the different NAMMU pressure tubes meticulous cleanliness is of utmost importance! Even smallest particles of dirt on the sealing areas or o-rings as well as smallest damages can cause water intrusion! Never open the pressure tubes on deck, never at a dusty or dirty work place!

Each time you work with the tubes check the sealing areas for scratches. Check the connectors: are they completely free of deformation and corrosion, even the pins? Check also the o-rings, replace them if necessary. Grease them slightly with Molicote 44.

To assemble everything and close the cover of the pressure vessel we recommend the following. One persons holds the cover while a second person connects the power cable and the data cable with the cover. First check whether old drying agent bags are in the tube – remove them. Put the battery pack carefully into the tube, push it down to the bottom and add a drying agent bag. Add a cylinder of damping foam, if neccessary. Then install the cover with the recorder. Close the cover evenly and alternating between the screws and put plastic screws in the unused threads in order to protect them against sand and salt. Protect the connectors with dummies until operation.

By means of metal clamps attach the pressure tube to the OBS frame. Connect the sensors, protect the connectors not in use with dummies and locking sleeves.

On the picture, you can see three connectors.



The connector on the left side is for the hydrophone, we use a HTI-PC04-ULF. The center connector is reserved for the external memory StiK™ and the upper connector for communication with both the user or AIS. If any of the connectors is not in use, **always seal it with the corresponding dummy-plug! Make sure not to overtighten the locking sleeve!**

3.4 Releaser

You do not need to open the releaser's body for battery voltage measurement. How to do this is described in the KUMQuat manual which is attached. If desired program the timer. Note system time and release time in the protocol. We recommend setting the *DISABLE* command: the releaser then won't answer anymore to the range command. By that on one hand you avoid that the releaser answers with a ping to *each* 10 kHz signal (a 10 kHz signal can also generate from e.g. machine noise etc.) and discharges the batteries, on the other hand it is useful to activate only this one releaser for ranging – if not it could happen that all the other releasers send an answer.

4 Preparation on deck

A free space of $6\text{ m} \times 6\text{ m}$ is needed for deck work with OBS. Less space is possible if it does not endanger the safety for crew members and technicians. This is a completely equipped OBS:



The headbuoy below the front handle is partly hollow and houses the recovery line. When the anchor is released, the OBS turns upright and lets loose the headbuoy. The recovery line unfolds – to ensure it does, install the line as follows: turn it in 5 turns each at buoy's length and put it crosswise into the buoy. Secure it with the stainless bar. Use an elastic strap to fix it on the buoyancy before placing both onto the anchor.



4.1 Installing the Pressure Tube

Before closing the pressure tube carefully check the o-rings and o-ring-grooves of the endcap. Clean it from any dirt, sand or salt and *slightly* grease the o-rings with silicone grease. Do not use metal tools when removing or installing the o-rings!

The pressure tube is equipped with three clamps for easy installing. There is only one orientation for installing the tube.

Attention: Adjust the clamps in case they are too tight or not tight enough. Once the tube is installed as shown on the picture the clamps can be secured with tie-wraps of 2.5 mm size (red circle in picture). For opening the clamps after recovery use the tool as shown the picture.

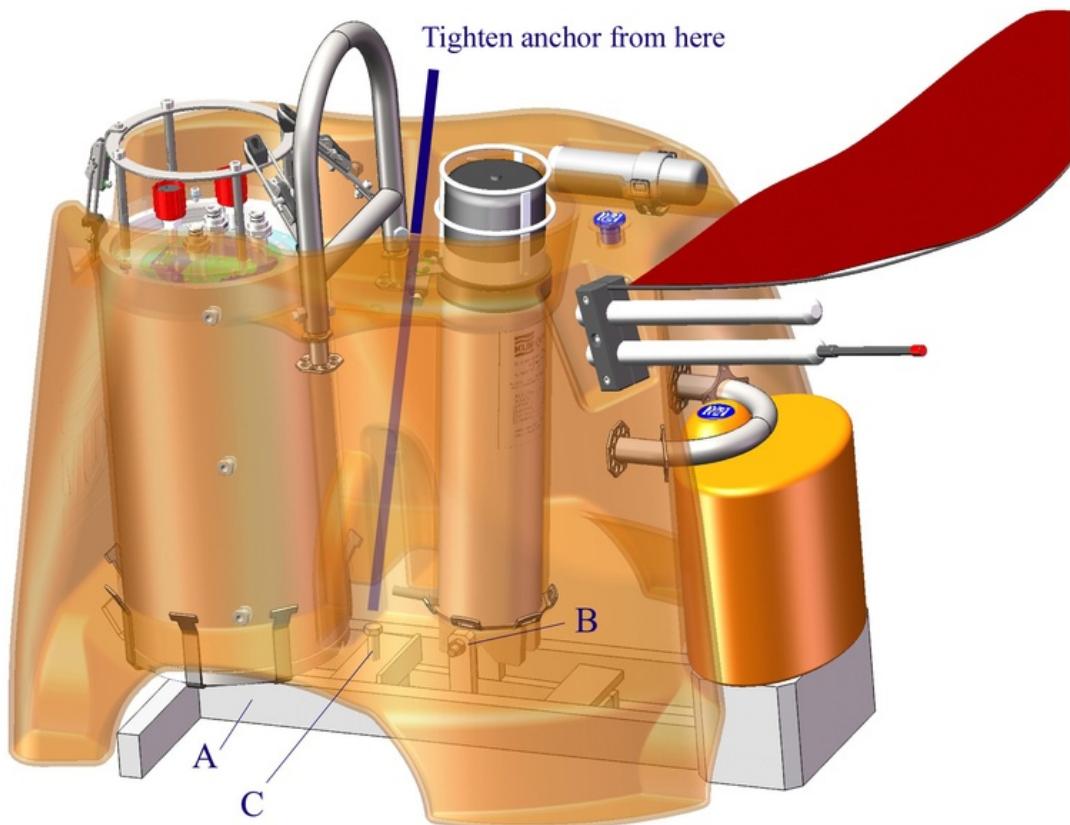
The hydrophone collects and stores severe static electricity when the connector is open. For this reason, our hydrophones are equipped with a short-cut dummy, marked with a red tail. Make sure the hydrophone's connector is short-cut directly before you connect it to the datalogger!



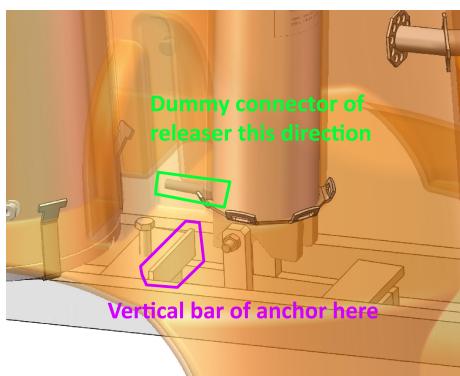
4.2 Anchor tightening

Close the release hook and attach the release unit with the corresponding clamp. Pay attention to the opening direction of the hook, only one position goes with the anchor. The clamps from the tubes and the release unit stay with them when demounting later on.

In the picture you can see the frame (the OBS is transparent for a better view), the release unit, the anchor “A”, the anchor hook with bolt “B” and the tightening screw “C” that tighten the anchor.



Both release unit and anchor hook need to be installed in a certain orientation as shown in the picture.



It is also shown that the headbuoy is clamped between the front handle and the anchor, housing the recovery line. When set the OBS including the *closed* release unit on top of the anchor, apply the bolt (M12 × 110) with plastic washers and fix it. For long-term deployment, the bolt should be covered with fibre-plastics. To tighten the anchor, fasten screw “C” from top of the OBS, using the tool that comes along with the OBS. The screw has to be tightened with 5 Nm.

For closing/opening the release unit enter the individual Release Code into the deck unit and transmit the code. Transmission of the signal is audible by two sequences of 8 pings each. When the release unit has released the anchor, it answers with sequence of pings. With the clamp bolt, the anchor plate is pushed against the seismometer. The anchor is tightened now and the seismometer has a good coupling.

There is a lever arm on the clamp bolt! Therefore, do not tighten it too much. A torque of 5 Nm is perfect for a safe and working fastening! If you overcharge the release hook the releaser does not work safely anymore and in the worst case you will loose the instrument!

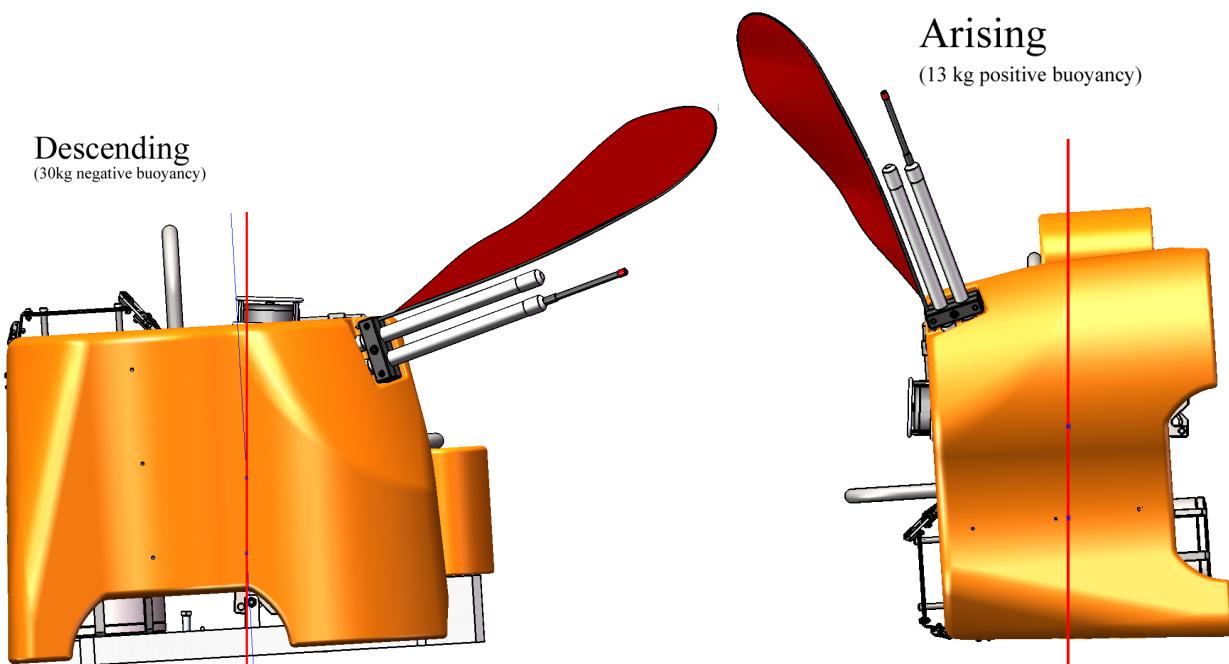
Sometimes, when ground is soft, we recommend a sand metal sheet that avoids release units penetration in the muddy sea floor. The sand metal sheet with holes is fixed under the anchor and covers the area under the release unit.

When ground is very hard the anchor can be equipped with three additional feet in order to guarantee safe and sturdy standing on the rock.

Upon recovery it is useful to put the OBS down on the next anchor (provided that more deployments are planned). This reduces the number of crane operations and accelerates the next operation.

5 OBS deployment

NAMMU's main task is the detection of small and smallest movements of the seafloor and of pressure waves in the water. Therefore – that goes without saying – noise avoidance is of utmost importance. In order to avoid interferences caused by the water current the OBS system was designed as flat and streamlined as possible. But the flat construction certainly has its natural limits: the center of mass of the *floatation* still must be obviously above from the center of mass of the *weight* to prevent the OBS system to spin when descending and possibly landing top down or in an oblique position. In addition the centers of mass must be directly one above the other, if not the OBS system descends in a tilted fashion.

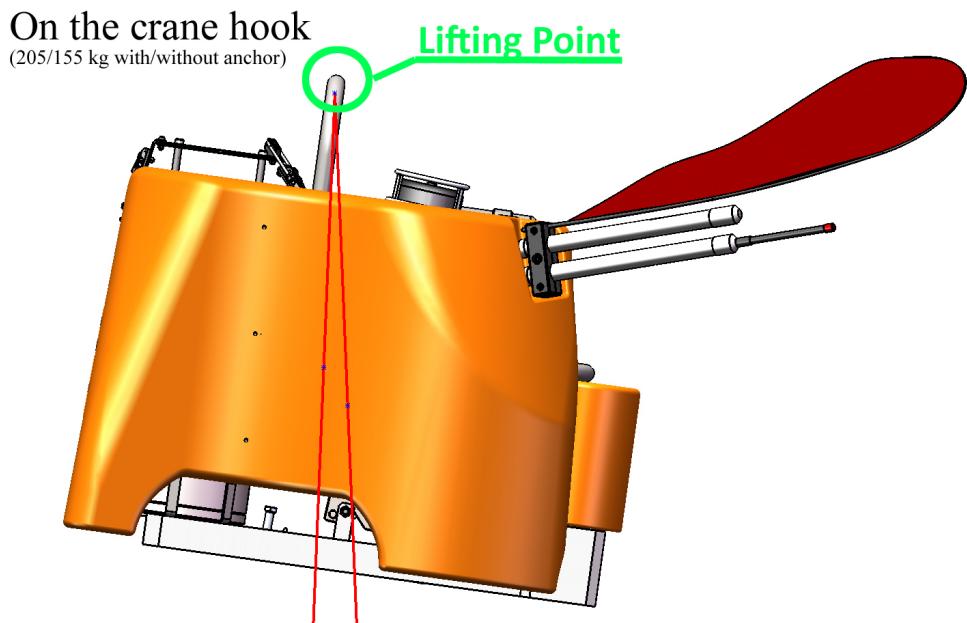


The balance of the OBS system changes as soon as the Releaser releases the anchor. Since the part of the downforce that was below is missing now, the center of gravity of the mass automatically moves upwards - the OBS system would obviously become unstable. As its only task is to lift, this would not matter, but problems would occur at the water surface at the latest: Radio beacon, flasher and flag would be partly under water - positioning would become much more difficult. And the pick-up hook would also cause problems when salvaging with the crane.

In order to avoid these problems the OBS system was designed asymmetrically: nearly the whole drift was placed on the left side, the drift of the anchor, however, nearly completely right. Both together effect that the drift – when the anchor is attached – then is in the center; without anchor, however, the OBS system tilts by 90° into a stable vertical position in the water column.

Current resistance now is less and the OBS system ascends quicker; radio beacon, flasher, flag and peck up hook vertically come out of the water whereas the transducer head of the Releaser stays in the water.

Finally, it needs to be ensured that the OBS is horizontal during crane operations.



6 Recovery

The OBS ascends with approximately 0.8 to 1.0 m/s speed – hence it needs approximately one hour to emerge from a depth of 4000 m. Customarily one releases an OBS at 500 m distance away from the position.

The OBS answer to the release code is a sequence of beeps. The sequence of pulses tells whether the hook has been turned; the number of beeps tells whether the releaser is in horizontal or vertical position. That is to show whether the releaser still stands at the seafloor (releaser vertical) or is already ascending (releaser horizontal). During ascent you can bleep the releaser from time to time with the *RANGE* command and follow the ascent with decreasing range. **Caution: Before ranging you must put the releaser into active ranging mode with the *ENABLE* command.**

Once emerged you have the following OBS recovery aids:

- flag for the view
- by means of the releaser you can try to measure the distance – but: this does not work well as interferences directly under the water surface are high
- flasher (only at night). Please refer to the corresponding manual.
- radio beacon: With a *direction finder* you can trace the direction of the strongest signal (user's handling in the corresponding manual). In addition you should have switched on a radio set to the corresponding frequency in order to hear when the OBS emerges.
- the OBS can be equipped with an AIS antenna ("Automatic Identification System", used for ships tracking). Once the OBS pops up and sends its GPS-position, it can be located on the screen on the ships bridge.
- the OBS also can be equipped with an Iridum antenna. Again, have a look into the corresponding manual.

The following picture shows that it is not easy to detect an OBS by day, at night it is easier. But, during night ship manoeuvres are much more difficult as it is hard to estimate the flasher's distance.



The OBS is equipped with a recovery line for the peck up. A loop in the line serves as the suspension for the crane. You lift the OBS on deck and put it down either on a pallet or on the next anchor.

After recovery you first clean it carefully with fresh water. Then you take away flasher and radio beacon, switch them off and put them into a fresh water basin. You can leave the releaser integrated in the OBS until the last deployment, but clean it carefully.

In case you are using a Stik™ for data storage, you might want to determine the clock drift now using your GPS. When synchronisation is done, you can remove the Stik™, put a cover on the endcaps connector, and download the data from the Stik™.

If you use internal SD card for data storage, separate the hydrophone from the pressure tube and cover the connector with a dummy. Demount the pressure tube and bring it into the laboratory. Secure the OBS on deck. There is no need to open the tube to stop the recording or to synchronize the clock: it can all be done with DIRC while the tube is still closed. Connect the Recorder to the PC, determine the skew and terminate recording according to the instructions in the manual.

7 After recovery

If the units are to be stored after recovery one has to remove and carefully clean the pressure tubes. Cleaning must not stop at a simple wash with freshwater: especially for the flasher and radio beacon more detailed maintenance is necessary. Remove endcaps and clean it from any salt water.

The titanium tubes are resistant against corrosion, however, the salty water will form salt crystals after a while. When opening or closing the tubes these crystals might move below the o-rings: leakage is – at least in theory – possible. That is why cleaning the endcaps is so important.

To open the pressure tube remove the three short titanium M6 screws and turn three long M6 screws (they have been part of the delivery) into the threats of the endcap. Turn the screws carefully and simultaneously to lift the endcap.



Remove all batteries from the tubes. For transport the batteries of the flasher, radio beacon and release unit may be left inside the housing but have to be removed directly after transport. Check the time release of the release unit: if still active, deactivate it. You might also wish to reprogram it to a few minutes or hours in the future to check whether it is working correctly. When the time release is supposed to open during transport, be sure that the hook is closed and will open: if the hook is to close during transport, it might be damaged because you have no control over the correct position.

The recorder must not be transported inside the pressure tubes. Handle the recorder – as well as the sensors – with great care and store well safed against bumps.

Be careful when removing cables of the NAMMU frame: think twice and use diagonal cutting pliers only! Do not use a knife or similar: you might damage the cable in a way that is not directly visible.

8 Attachments

8.1 Battery configuration NAMMU: 6D7 and Broadband Seismometer

The OBS Nammu is equipped with a datalogger “6D7”, a 120 sec broadband seismometer and with a battery container to be filled with up to 90 D-sized batteries. Each 6 batteries are connected in a row, up to 15 row can be used parallel (protected against discharge with diodes). Depending on the configuration different times of operations can be calculated.

Power consumption Nammu with seismometer (May 2023): 305 mW

Power consumption Nammu with geophones (May 2023): 125 mW

Capacity Lithium (KUM-calculations) 37.7 Wh

Maximum operational time: equipped with seismometer

Lithium D-Cells	24	36	48	60	72	84	90
Operational days	123	185	247	309	370	432	463
Operational Month	4.3	6.5	8.8	11	13	15.3	16.5

²You might notice that due to our calculations mono cells have less than 40% of the nominal capacity – on one hand this is due to the very optimistic calculation of the supplier and on the other hand due to the temperatures ±0°C at the sea floor. The low current consumption, too, contributes to less capacity.

8.2 Optional upgrades

More than 13 months of deployment is a long time, of course. The picture below shows the standard one year system.



However, you can get an upgrade to let the system continuously operate for more than 3 years. The next two pictures show the “backpack” of additional two years of power and the combined system:



The OBS “Nammu” is of amazingly small size and designed to perfectly fit on standard wooden palettes. The system can be stacked and six or eight systems can be transported on a standard palette with a size of 1200 mm × 800 mm.



You can purchase anchors from us, of course. However, to further safe container space you might want to purchase the anchors on site rather than transporting them halfway around the globe.

Use the drawings of the following pages. We encourage you to ask for assistance in case of any questions.

	1	2	3	4	5	6
POS-NR.	MENGE	BENENNUNG	Zeichnungsnr.	Material	Halbzeug	
1	1	Ankergewicht - 4230	4230-A-07-02-001	Unlegierter Baustahl	120 x 120, 230 lang	A
2	2	Anker Flachstahl - 4230	4230-A-07-02-003	Unlegierter Baustahl	25 x 50, 580 lang	
3	1	Ankergewicht hinten- 4230	4230-A-07-02-002	Unlegierter Baustahl	50 x 25, 500 lang	
4	1	Anker quer Gewinde - 4230	4230-A-07-02-005	Unlegierter Baustahl	10 x 50, 125 lang	
5	1	Anker quer - 4230	4230-A-07-02-004	Unlegierter Baustahl	10 x 50, 125 lang	
6	1	Ankersicherung - 4230	4230-A-07-02-006	Unlegierter Baustahl	Flach 5 x 30, 130 lang	

Maßstab	1:10	A4	Gewicht:	42.7 kg
Titel				
OBS Nammu 1Y/Anker				
Allgemeintol. DIN 8570 - B				
1st Angle Projektion				
a) Abstände geändert	11.11.15	AS	Bearb.	A.Schwenk
b) Pos 6 von 200 auf 130 gekürzt	26.05.16	AS	Gepr.	T.Sandmann
			Norm	
OBS Nammu 1Y/Anker				
Umwelt- und Meeres- technik Kiel GmbH	Zeichnungsnr.			
0431 / 790220	4230-A-07-02-000			
www.kum-kiel.de				
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1	Ers. für:	Schweißen Anker Nammu 1Y Basis - 4230		
2	Zust.	Änderung	Datum	Name

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Blatt 1	Blattanzahl: 1
Plot Datum	27.05.2016

	1	2	3	4	5	6
A						
POS-NR.	MENGE	BENENNUNG	Zeichnungsnr.	Material	Halbzeug	
1	2	Ankerwippe senkrecht - 4230	4230-A-07-03-001	Unlegierter Baustahl	15 x 25, 85 lang	
2	2	Ankerwippe quer - 4230	4230-A-07-03-002	Unlegierter Baustahl	20 x 50, 60 lang	
3	2	Ankerwippe längs - 4230	4230-A-07-03-003	Unlegierter Baustahl	15 x 20, 285 lang	
4	1	Ankerwippe Spirene - 4230	4230-A-07-03-004	Unlegierter Baustahl	-	
5	1	Norm 931 - M 10 x 110	Norm-/Kaufteil			
6	1	Norm 934 - M 10	Norm-/Kaufteil			
B						
C						
D						

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Umwelt- und Meeresteknik Kiel GmbH
0431 / 7209220
www.kum-kiel.de

OBS Nammu 1Y/Anker

Zeichnungsnr.
4230-A-07-03-000

Blatt 1
Blattanzahl: 1
Plot Datum
26.11.2015

Urspr.:
Schweißen Anker Nammu 1Y Wippe - 4230

Ers. für: -
Ers. durch: -

A

B

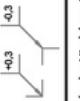
C

D

780

009

1,50



			Maßstab	1:10 A4	Gewicht:	3.1 kg
			Material	Unlegierter Baustahl		Lochblech 10-15-1,5mm
			Werkstückkanten DIN 6784	-		

Titel

Gitterblech - 4230

Lochblech

Umwelt- und Meerestechnik Kiel GmbH

0431 / 7209220

www.kum-kiel.de



Zeichnungsnr.

4230-A-07-01-001

Plot Datum

Blatt 1

Blattanzahl: 1

Plot Datum

03.11.2016

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1	2	Zust.	Änderung	Datum	Name	Urspr.: Gitterblech - 4230-A-07-01-001
						Ers. für: -

NAMMU STATION-PROTOCOL

V1.1

Cruise:

Project:

Profile:

Station:

Date UTC:

Date local:

Battery-pack: Lithium at _____ Volts
 two dry packs inserted sealing area checked 6D7-SN: _____
 all screws fixed

OPERATOR:

Recorder 6D7 SN: _____ Firmware: _____
 ON H Z Y X
 signals show H Z Y X format capacity total _____
 rate _____
 GPS-Sync: GPS date (dd.mm.yyyy) _____ time (hh:mm:ss) _____
 Start Date _____ time (GPS) _____
 remarks _____

RECORDING STARTED CHECKED (capacity) OPERATOR:

Releaser SN: _____ Command1: _____ Command2: _____
 Release: _____ Enable R: _____ Disable R: _____ DISABLE?
 ST date: _____ UTC time: _____ UTC RT date: _____ UTC time: _____ UTC
 Batt 1: _____ Batt 2: _____ two dry packs inserted OPERATOR:

Prepare on Deck

frame SN: _____ Flag: fixed
 Tube SN: _____ all conn.: fixed
 Flash SN: _____ switched ON tested
 Radio SN: _____ switched ON tested channel A B C D
 Hydrophone SN: _____ fixed
 bolt material: fasten with _____ Nm (max 5Nm!)
 OPERATOR:

Deployment	Date UTC	Time UTC
Operator _____	local date	local time
coordinates: lat _____ N/S	long _____ E/W	waterdepth _____

Recovery: First Release	Date UTC	Time UTC
Operator: _____	local date	local time
Recovery: on surface	local date	local time
Recovery: on deck	local date	local time
coordinates: lat _____ N/S	long _____ E/W	waterdepth _____

Recorder GPS: date _____ time _____
 skew _____ recorded data _____
 no errors errors:

downloaded to: OPERATOR:

9 WARNING – READ THIS FIRST!

All personnel involved with the installation, operation, or maintenance of the equipment described in this manual should read and understand the warnings and recommendations provided below.

WARNING

This manual is a reference book only. It does not claim completeness and refers to other literature in certain chapters. This manual cannot and shall not substitute an instrument introduction through an expert. Programming and deployment of an autonomous deep-sea instrument is an utmost complex affair and require the detailed know-how of all components and their composition in order to guarantee successful operation. That is why we strongly recommend that solely trained personnel shall operate and maintain the instruments.

Static Sensitive Devices

This equipment contains devices that are extremely sensitive to static electrical charges. Therefore extreme care should be taken when handling them, as static electricity may be present on the body and clothing. Normal handling precautions involve the use of anti-static protection materials and grounding straps for personnel.

High Voltages

High Voltage may be present in all parts of the OBS “Nammu”. Use caution when the electronics are removed from their containers for servicing.

Improper Line Voltage

Operation with improper line voltage may cause serious damage to the equipment. Always ensure that the proper line voltage is used.

Hardware Variations and Compability

The OBS “Nammu”contains both standard and proprietary hardware. At times K.U.M. may change the standard components due to their availability or performance improvements. Al-

though the component manufacturers, along with their models and styles may change from unit to unit, replacement components will generally be interchangeable. K.U.M. will make every effort to see that replacement components are interchangeable. K.U.M. may also change certain hardware per customer requirements. Therefore, portions of this manual, such as parts lists and test features, are subject to change. These sections should be used for reference only. When changes are made that affect OBS “Nammu” operation, they will be explicitly noted.

Purpose of this Manual

The purpose of this manual is to provide the user with information on the setup, operation, care, and features of the OBS “Nammu”. Although this manual encompasses the latest operational features of the OBS “Nammu”, some features of the OBS “Nammu” may be periodically upgraded. Therefore the information in this manual is subject to change and should be used for reference only.

Warnings, Cautions, and Notes

Where applicable, warnings, cautions, and notes are provided in this manual as follows:

WARNING!

Identifies a potential hazard that could cause personal injury or death to yourself or to others.

CAUTION!

Identifies a potential hazard that could be damaging to equipment or could result in the loss of data.

NOTE:

Recommendations or general information that is particular to the material being presented. It may also refer to another part of this manual or to another manual.

Liability

K.U.M. has made every effort to document the OBS “Nammu” in this manual accurately and completely. However, K.U.M. assumes no liability for errors or for any damages that result from the use of this manual or the equipment it documents. K.U.M. reserves the right to upgrade features of this software and to make changes to this manual without notice at any time.

Warranty statement

All equipment manufactured by K.U.M. is warranted against defective components and workmanship for a period of one year after shipment. Warranty repair will be done by K.U.M. free

of charge. Shipping costs are to be borne by the customer. Malfunction due to improper use is not covered in the warranty, and K.U.M. disclaims any liability for consequential damage resulting from defects in the performance of the equipment. No product is warranted as being fit for a particular purpose, and there is no warranty of merchantability. This warranty applies only if:

- The items are used solely under the operating conditions and in the manner recommended in Seller's instruction manual, specifications, or other literature.
- The items have not been misused or abused in any manner, nor have repairs been attempted thereon without the approval of K.U.M. Customer Service.
- Written notice of the failure within the warranty period is forwarded to Seller and the directions received for properly identifying items returned under warranty are followed.
- The return notice authorizes Seller to examine and disassemble returned products to the extent Seller deems necessary to ascertain the cause for failure.

The warranties expressed herein are exclusive. There are no other warranties, either expressed or implied, beyond those set forth herein, and Seller does not assume any other obligation or liability in connection with the sale or use of said products. Any product or service repaired under this warranty shall be warranted for the remaining portion of the original warranty period only.

Equipment not manufactured by K.U.M. is supported only to the extent of the original manufacturer's warranties.

Returned Material Authorization

Prior to returning any equipment to K.U.M., a Returned Material Authorization (RMA) number must be obtained. The RMA will help us identify your equipment when it arrives at our receiving dock and track the equipment while it is at our facility. The material should be shipped to the address provided in the K.U.M. Customer Service section. Please refer to the RMA number on all documents and correspondences as well. All returned material must be shipped prepaid. Freight collect shipments will not be accepted.

CAUTION! Never attempt to ship portable topside units in their outdoor case alone. Although rugged, these cases are not intended to be used as shipping containers, and the delicate internal components could be damaged if used in this manner.

All shipments must be accompanied by a copy of your proforma invoice, showing the value of the material and the reason for its return. When shippend from outside the European Union:

If the reason is for repair, it must be clearly stated in order to move through customs quickly and without duties being charged. Whenever possible, please send copies of original export shipping documents with the consignment.

Final Disposal

The OBS "Nammu" contains materials (especially batteries) that need proper disposal. Please contact customer service if your local disposal contractor is in doubt.

Customer Service

Customer service personnel at K.U.M. are always eager to hear from users of our products. Your feedback is welcome, and is a valuable source of information which we use to continually improve these products. Therefore we encourage you to contact K.U.M. Customer Service to offer any suggestions or to request technical support:

E-mail: kum@kum-kiel.de

Mail: K.U.M. GmbH

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