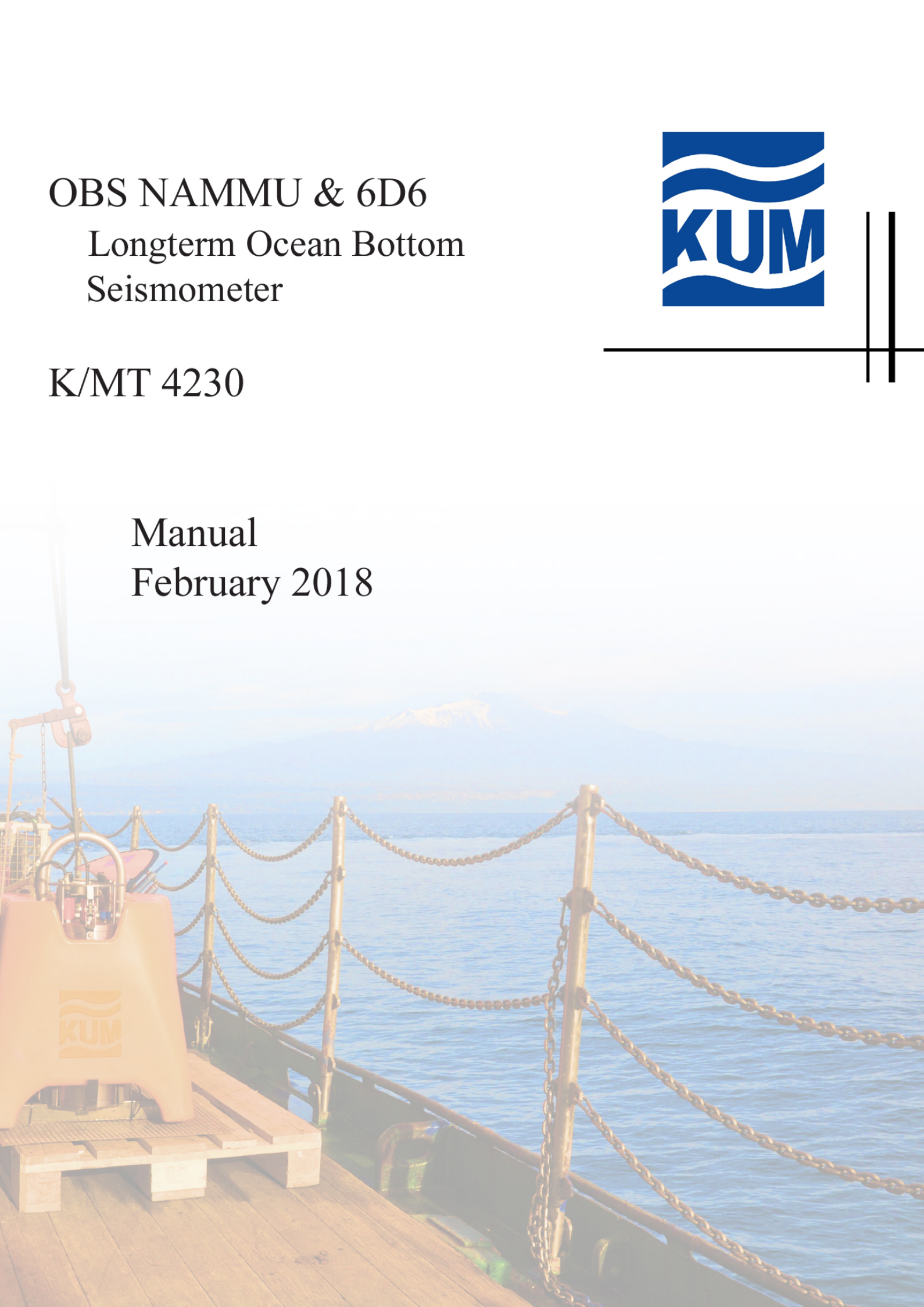
OBS NAMMU & 6D6

Longterm Ocean Bottom Seismometer

K/MT 4230

Manual
February 2018



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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.

Contents

1 Technical Data

Weight with 80 Li-Cells	In air (In salt water)
Weight without anchor	156 kg (-13 kg)
Weight with anchor	205 kg (30 kg)
Weight of pressure tube	45 kg (33,6 kg)
Weight of Releaser KUMQuat	11 kg (6,4 kg)
Maximum operation depth	6000 m
Maximum operation time	13,7 month (80 LiThCl D-cells)
	(See page 24 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
	or
	Differential Pressure Gauge (DPG)
	or
	Absolute Pressure Gauge (APG)
Data Logger	K.U.M. 6D6: 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 recorder. Please refer to the "DIRC & 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 programm 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).

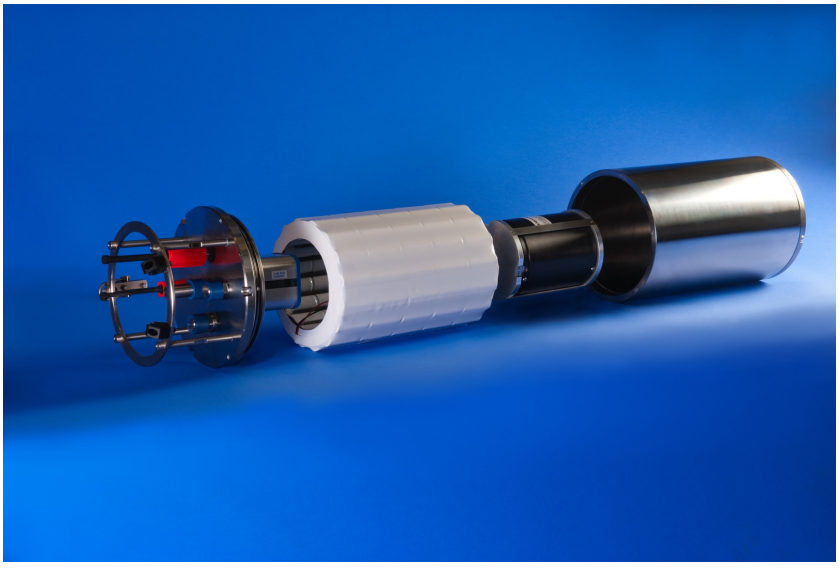
2.2 Battery packages/rechargable batteries of the recorder

The Recorder can be operated with both Alkali battery packs (18 V) and Lithium battery packs (10.8 V). **Never mix different battery types!!**

The battery pack has either 80 or 90 batteries. The Alkali-cells are connected 12 to 18 V each, the Lithium-cells 3 to 10.8V each. Our experience shows that a 6D6-Recorder combined with a trillium compact consumes 305mW and a Mono-cell lasts for 4.4 days[1]. In the annex you find a list of battery packs and their longevity (see section 8.1).

2.3 The Seismometer trillium compact

The seismometer is a broadband instrument called Trillium Compact from Nanometrics. Its frequency ranges covers 50 Hz down to 120 s (0.0083 Hz). Seismometer and 6D6 recorder combined consume approximately 305 mW. Please refer to the Trillium 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 to 125 mW.

[1]If 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 6D6

NAMMU is equipped with the Recorder “6D6” 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 SD-card. After having the Recorder installed you can program it, you need the “DIRC in the box” to connect to your PC or to establish an Access Point for your WiFi device.

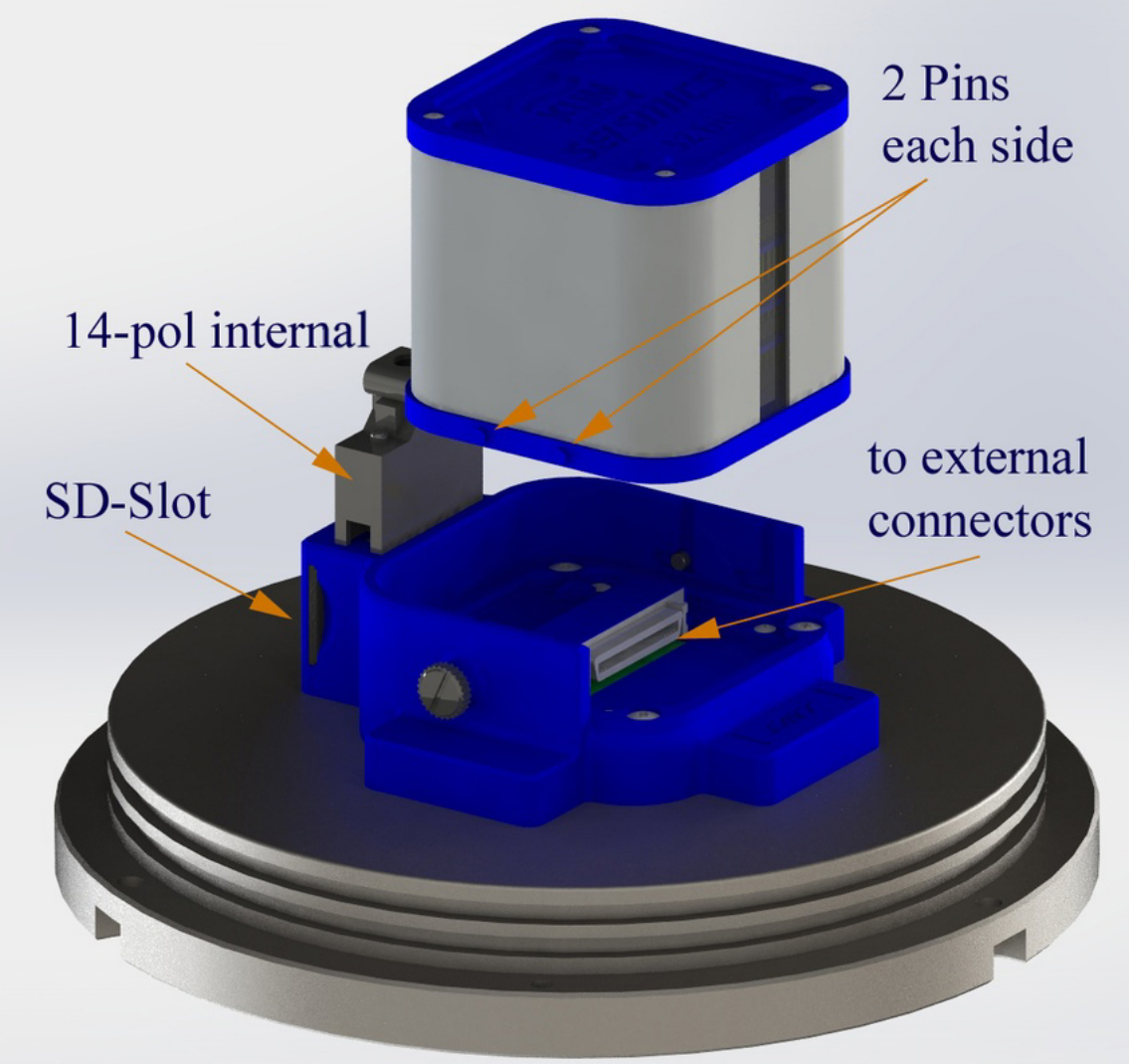
For Recorder programming you need a PC/Laptop, a GPS receiver “UHURA” for the time signal, a “DIRC in the box”, a battery pack (or accumulator, mono cells...) and the sensors (hydrophone, seismometer).

3 Connection and Use of the Datalogger

NAMMU is equipped with the Recorder "6D6" 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

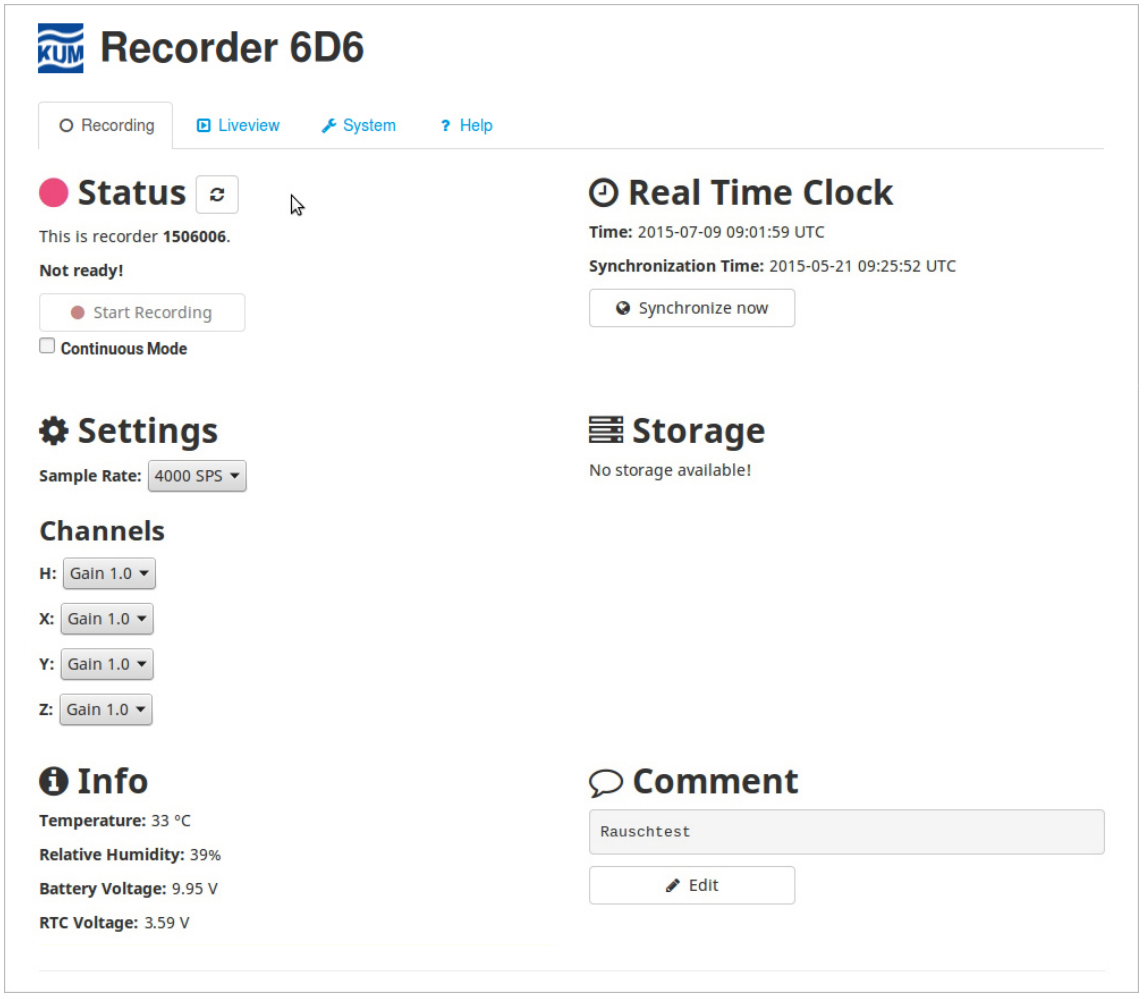
The power for the datalogger normally comes from inside the pressure tube. There exist four little pins top on both sides of the recorder that fit into a bayonet nut to guide the connector. After placing the datalogger fix it by carefully tightening the knurled screws. The recorder is ready for use now.



Recorder and Mount

3.2 Web Interface

The basic configuration of the datalogger "6D6" has a web-server integrated, added by an Access-Point inside "DIRC in the box". If connected to "DIRC in the box" a WiFi is established and you can use any web browser for communication. You will find the SSID on a sticker placed on the logger, the default password is "seismics". Connect your device 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:



Homepage of the "6D6" datalogger

3.2.1 Status

You can not start a recording in the example above because there is no storage available – this is indicated by both the magenta colored LED of the datalogger and the magenta colored dot on the web site.

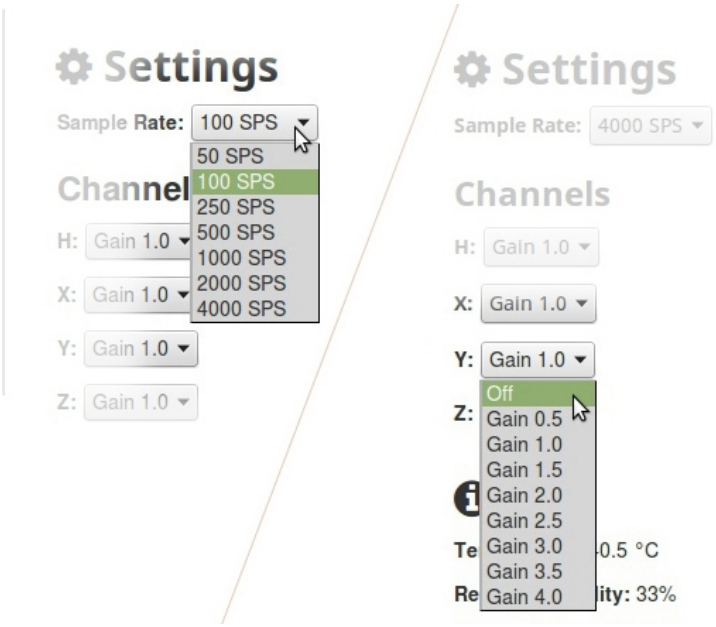
3.2.2 Real Time Clock

It is shown in the area “Real Time Clock” that the clock is synchronized. If an external GPS called “UHURA” is attached, you may synchronize it again (but you do not need to).

Important: In contrast to other dataloggers the “6D6” has its own clock battery incorporated. Therefore it is not mandatory to synchronize the clock *directly before* use or *directly after* end of recording – you might do both synchronizations in the lab at home, even months before or after operation.

3.2.3 Settings

To change number and gain of the channels and the samplerate use the buttons in the area “Settings”.



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: $M = 4 \cdot 60 \cdot 60 \cdot 24 \cdot 30 = 10,5$ MB per channel per month per sps.

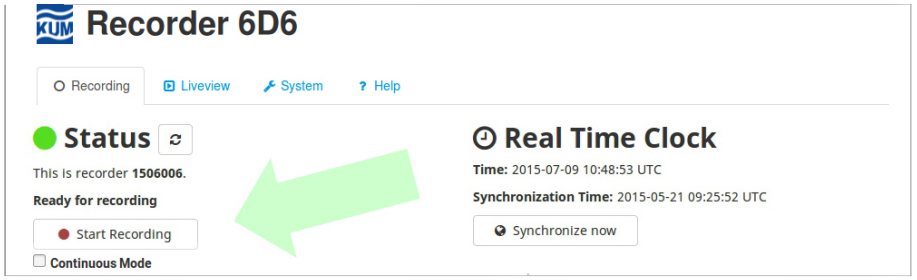
Example: At four channels and a samplerate of 250 sps you will need a monthly memory of: $4 \cdot 250 \cdot 10,5$ MB$= 10,5$ GB.

3.2.5 Storage

Two different storage modules are available: A SD card that is placed inside the mount of the datalogger, and the storage module "StiK™" that is placed on a connector outside of the endcap of the pressure vessel. If both the storage modules are connected to the datalogger, generally StiK™ is priorized.

3.2.6 Recording

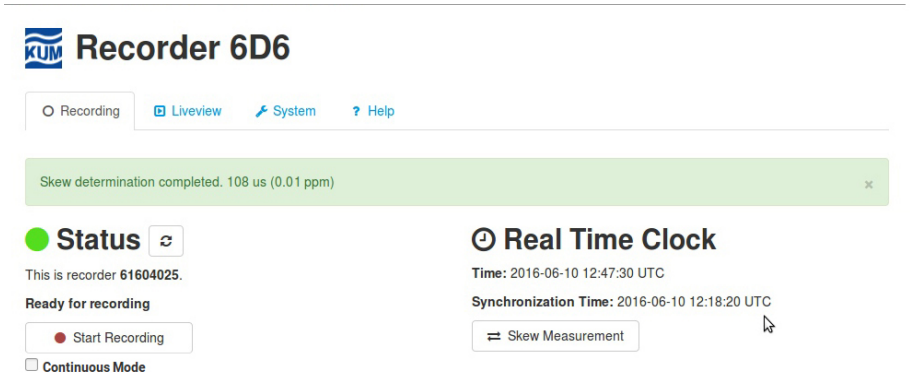
After formatting the storage the datalogger indicates "ready for recording" using a green dot at the web page (and a green LED at the datalogger itself).



You can choose either "continuos recording" or common recording. In continuous mode, the recorder will format any storage medium that will be attached within 30 seconds and start a new recording. For further details, please refer to the 6D6 manual.

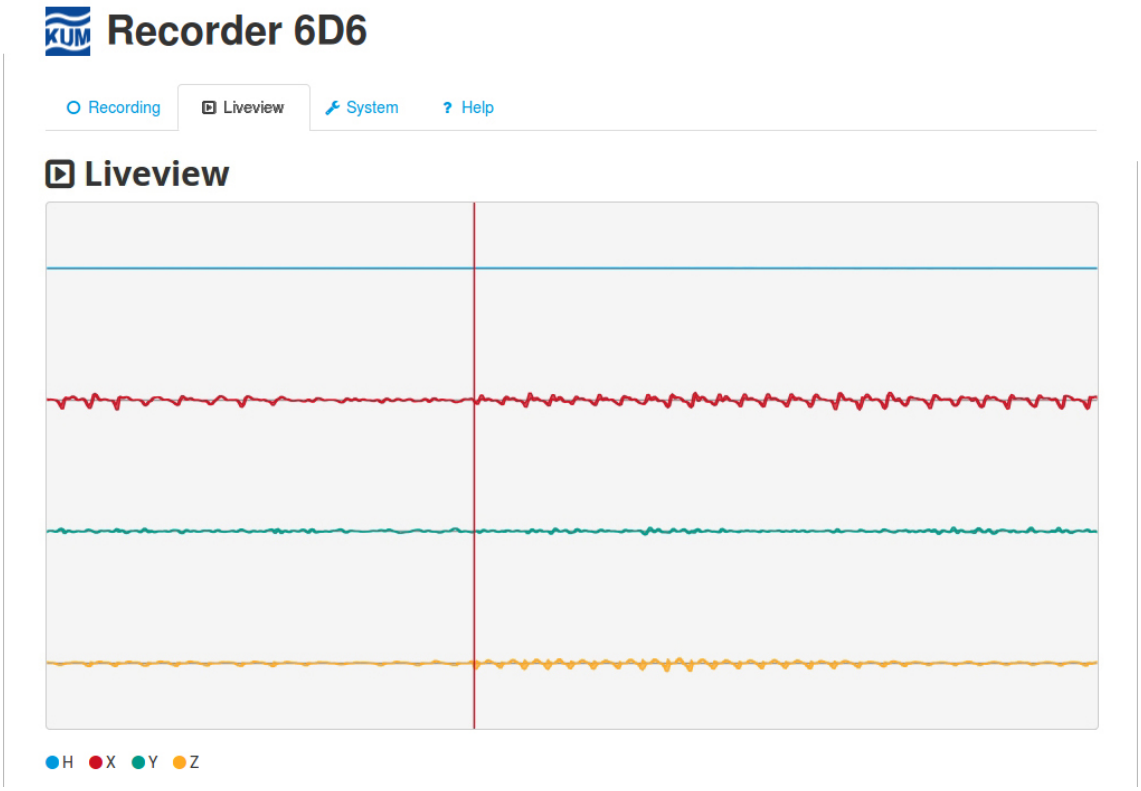
3.2.7 Skew

After recording you can make a second GPS fix to determine any clock drift. A colored bar will show the progress – in this example a deviation of 108 μs.



3.2.8 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...

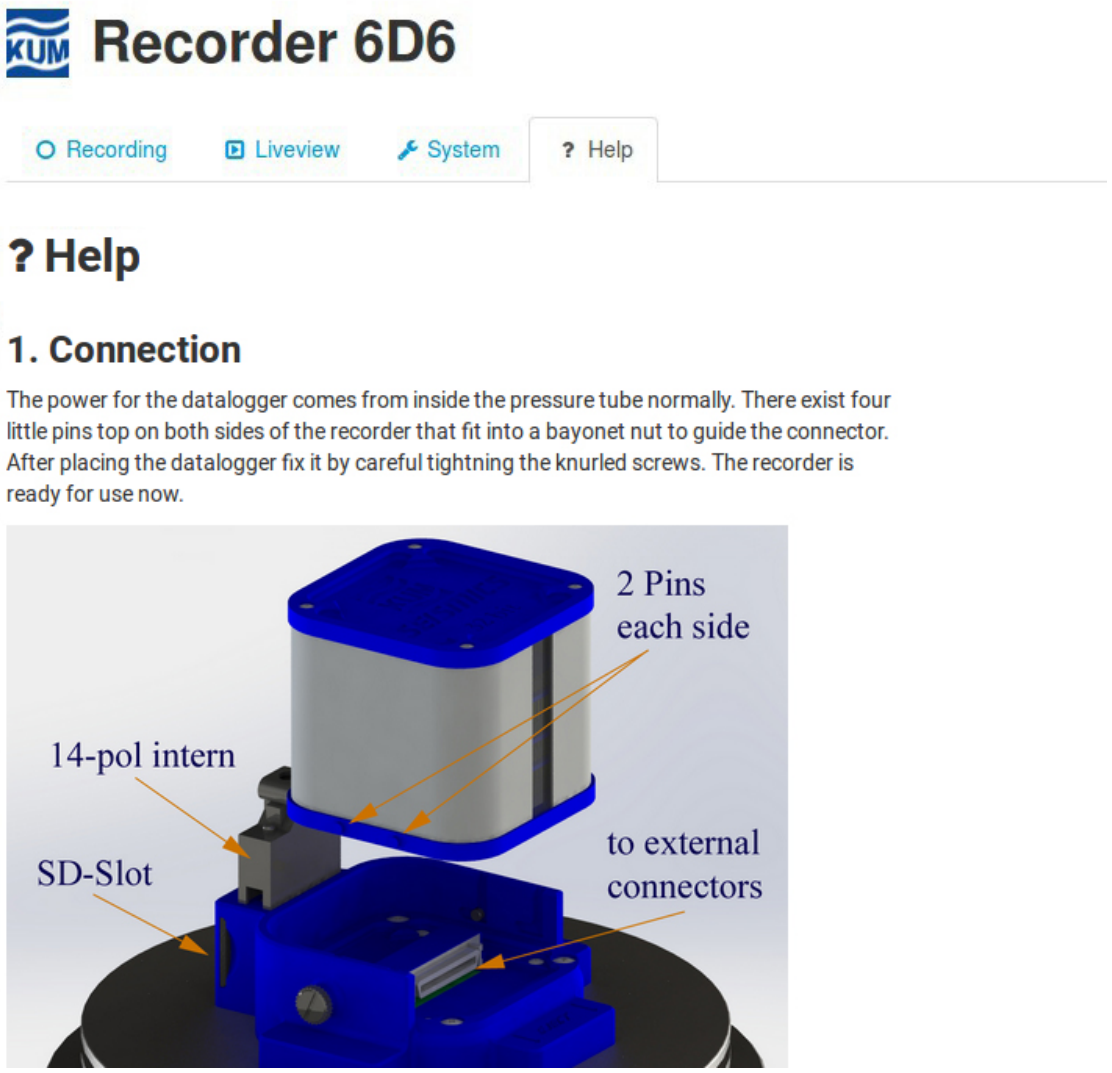
3.2.9 System

Use the item “System” in the task menu to change SSID and password for this datalogger, however, we recommand to do so with good reasons only.

You can also upload a new firmware image to the datalogger, if necessary.

3.2.10 Help

At this tab you will find a HTML version of the datalogger manual.



3.3 Pressure tubes and mounting

When working with the different NAMMU pressure tubes meticulous cleanness is of utmost importance! Even little bits 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!

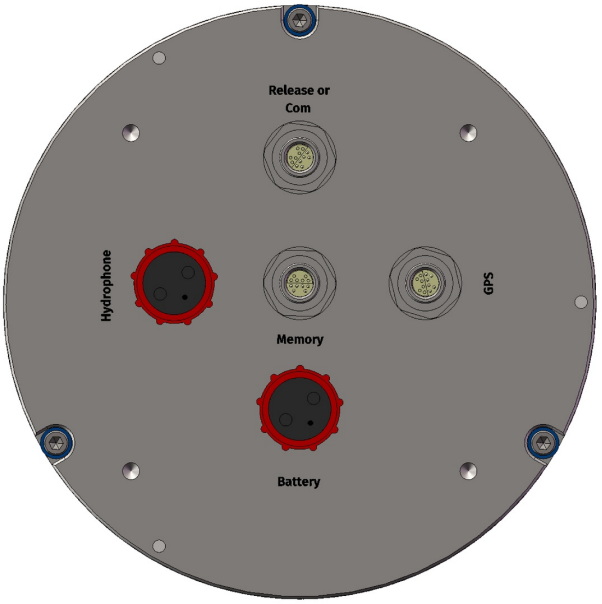
Each time you work with the tubes check the sealing areas for scratches. Check the connectors: are they completely free of deformation and corrosion, even the pins? Check also the o-rings, replace them if necessary. Grease them slightly with Molicote 44.

One person takes the battery pack, another person the recorder. 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 five connectors.



The connector on the left side is for the hydrophone, we use a HTI-PC04-ULF. In case you use a battery extension pack, it is attached to the bottom connector. The center connector is reserved for the external memory StiK™ and the upper connector for communication with both the user or the acoustic release. Finally, there is a connector on tzhe right side reserved for the GPS/AIS/Iridium antenna. 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 m × 6 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.

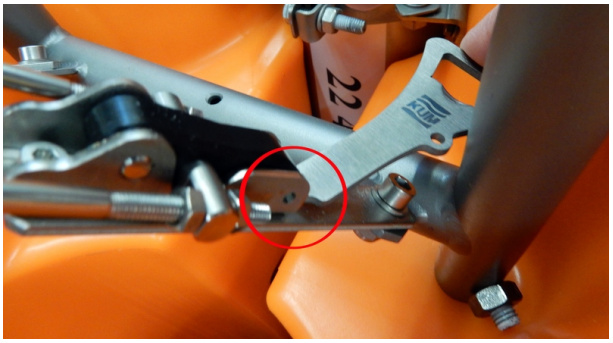
4.1 Installing the Pressure Tube

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.

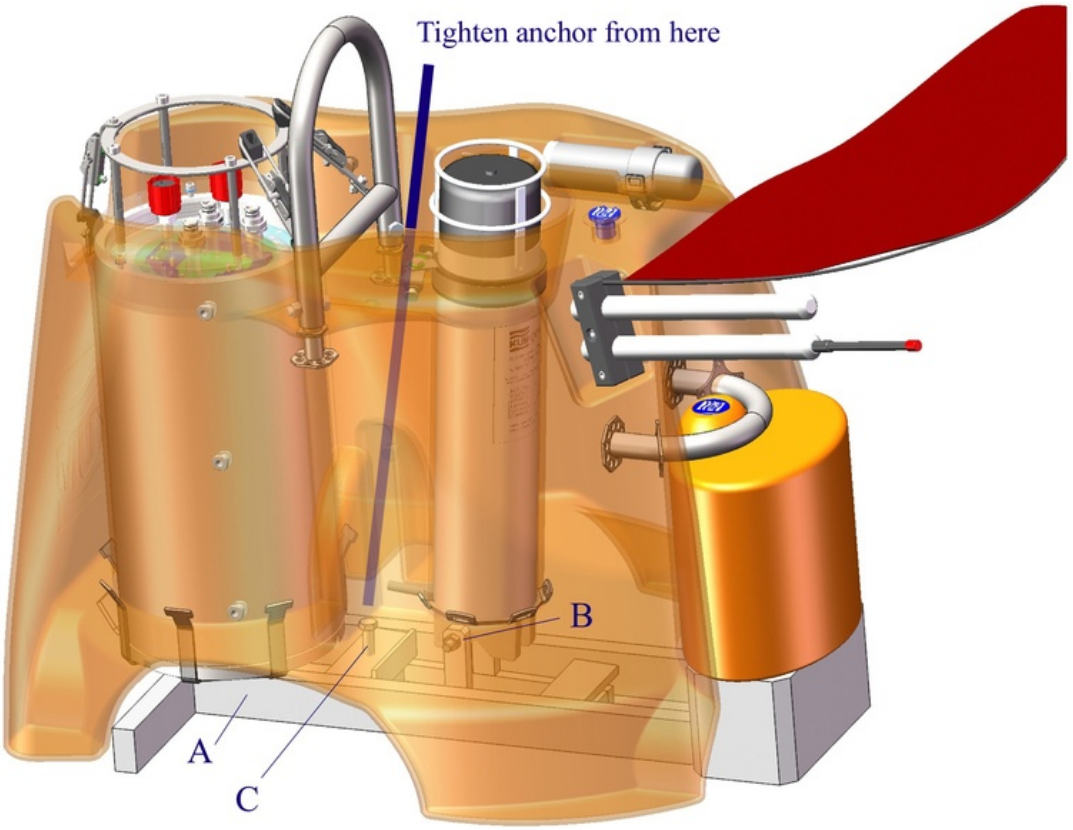
The hydrophone collects and stores severe static electricity when the connector is open. For this reason, our hydrophones are equipped with a short-cut dummy, marked with a red tail. Make sure the hydrophone's connector is short-cut directly before you connect it to the datalogger!



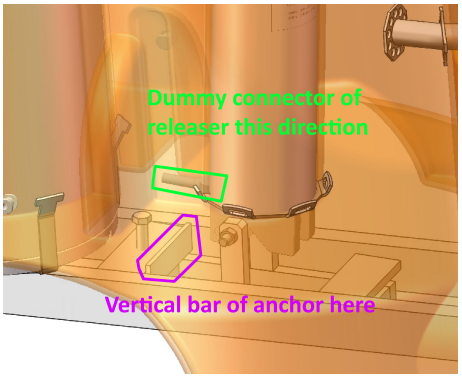
4.2 Anchor tightening

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!

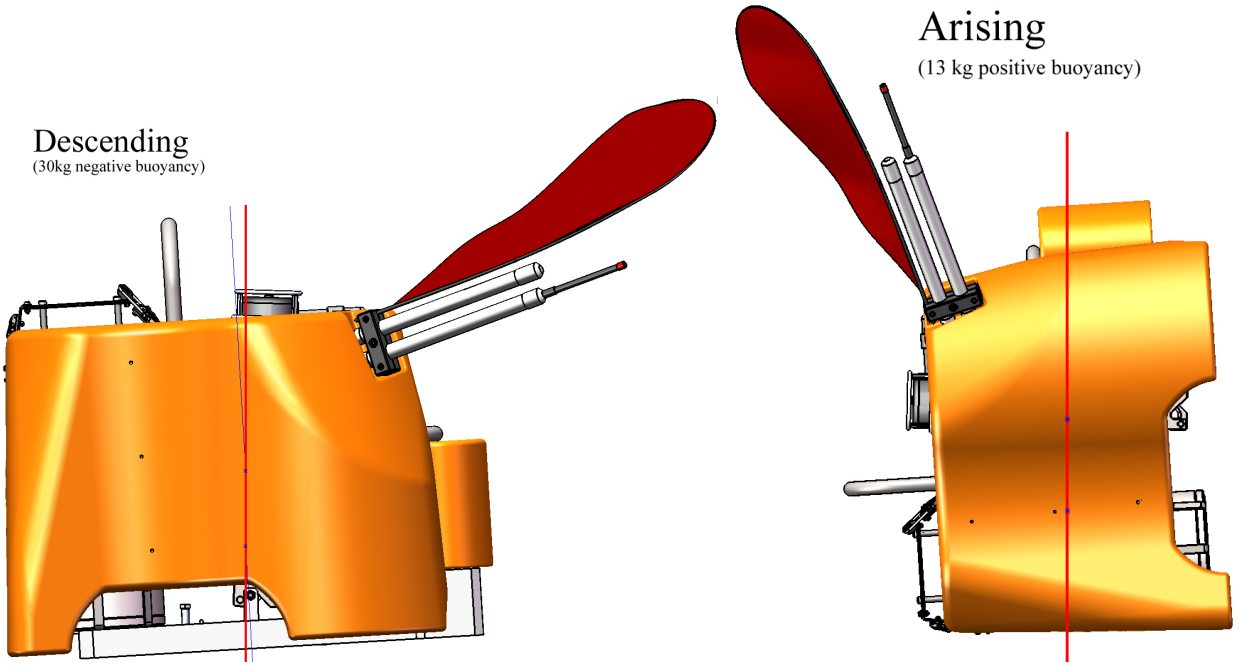
Sometimes, when ground is soft, we recommend a sand metal sheet that avoids release units penetration in the muddy sea floor. The sand metal sheet with holes is fixed under the anchor and covers the area under the release unit.

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.

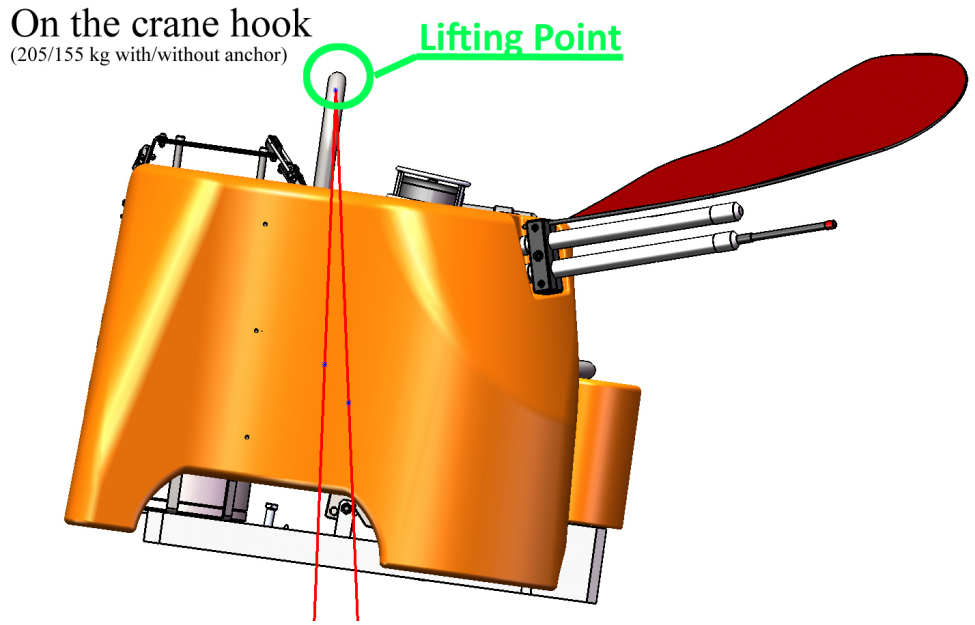


Balance of the OBS system changes as soon as the releaser releases the anchor. Since the part of the drift that was at the bottom is missing now the center of mass moves automatically in direction to the top – the OBS system evidently would become instable. As its sole task is ascending this would not matter, but at the water surface at the latest problems would occur: radio beacon, flasher and flag wag and would be partly under water – positioning would become considerably more difficult. And also the wagging peck up hook would cause problems to attach the OBS system to 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

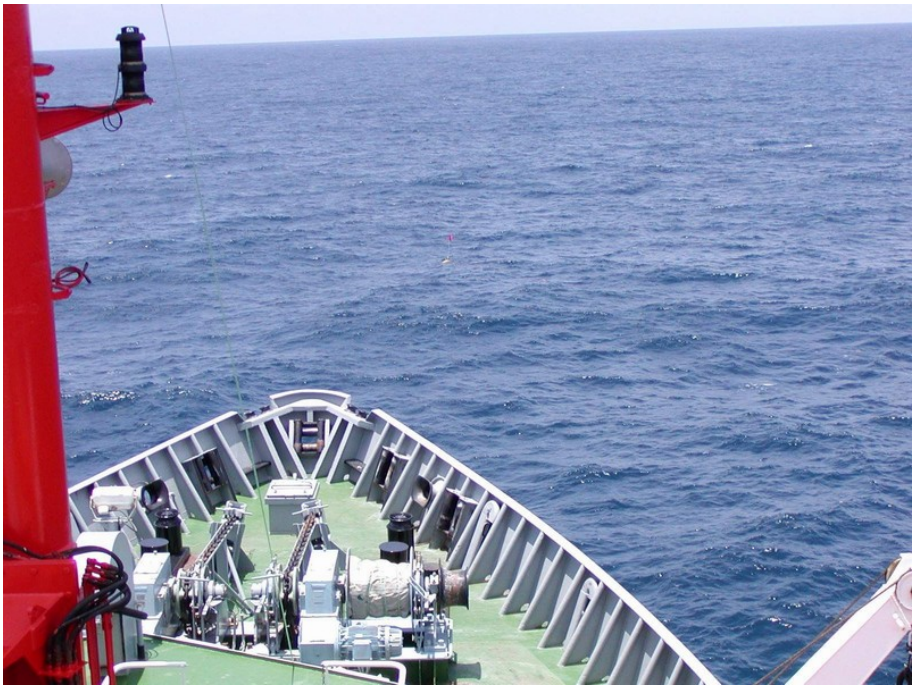
The OBS ascends with approximately 0.8 to 1.0 m/s speed – hence it needs approximately one hour to emerge from a depth of 4000 m. Customarily one releases an OBS at 500 m distance away from the position.

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 neccessary. 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 theese 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 actice, 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 simular: you might damage the cable in a way that is not directly visible.

8 Attachments

8.1 Battery configuration NAMMU: 6D6 and Broadband Seismometer

The OBS Nammu is equipped with a datalogger "6D6", a 120 sec broadband seismometer and with a battery cage to be filled with 90 D-sized batteries. However, Nammu can also be equipped with a geophone package instead of a seismometer and with a soldered battery package that contains 80 batteries. Depending on the configuration different times of operations can be calculated.

Power consumption[1] Nammu with seismometer (July 2019):	288 mW
Power consumption[1] Nammu with geophones (July 2019):	108 mW
Capacity Alkaline (KUM-calculations[2])	9 Wh
Capacity Lithium (KUM-calcculations)	37.7 Wh

Maximum operational time: equipped with seismometer

Alkaline D-Cells	16	32	48	64	80	90
Capacity in Wh	144	288	432	576	720	810
Operational days	20	41	61	82	103	116
Operational Month			2	2.7	3.4	3.8
Lithium D-Cells	16	32	48	64	80	90
Capacity in Wh	600	1210	1810	2410	3020	3400
Operational days	86	173	261	349	436	461
Operational Month	2.8	5.7	8.7	11.6	14.5	15.4

[1]Until June 2019: total power consumption had been 305 mW and 6D6 power consumption had been 125 mW.

[2]You 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 Pin-out 6D6 - Trillium

8.2.1 Connection 6D6 to Trillium: 14 pin internal connector

Pin	Purpose	Description
1	X+	Pos. Trillium output
2	Y+	Pos. Trillium output
3	Z+	Pos. Trillium output
4	AGD	Trillium analogue GND
5	GND Trillium	Power GND Trillium
6	VCC Trillium	Power Trillium
7	V+	VDD Battery
8	X-	Neg. Trillium output
9	Y-	Neg. Trillium output
10	Z-	Neg. Trillium output
11	TX	TX Trillium [1]
12	RX	RX Trillium
13	nb	unused [2]
14	V-	VSS Battery [3]

[1] The Trillium needs its own RS232-connector to program levelling .

[2] The Trillium levels autonomously.

[3] The sensor Trillium is switched on by the datalogger 6D6. If 6D6 is removed or switched off Trillium is switched off automatically. In addition, the sensor Trillium switches off when the voltages drops below 9 V.

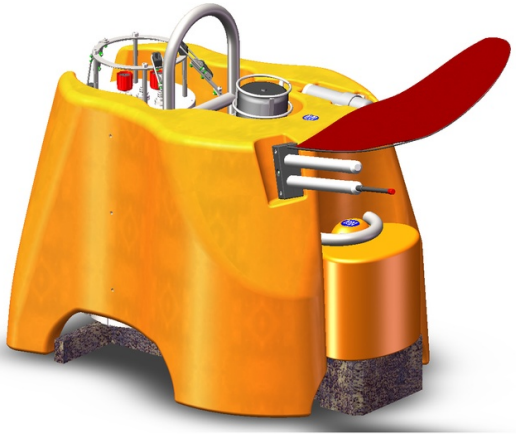
8.2.2 50-pin internal connector

Pin	Function	Notes	used in base system
1	Vbat +	battery pack plus	yes
2	Vbat -	battery pack minus	yes
3	NC01	nc	no
4	H+	hydrophone +	yes
5	H-	hydrophone -	yes
6	X+	geophone/seismometer X+	yes
7	X-	geophone/seismometer X-	yes
8	Y+	geophone/seismometer Y+	yes
9	Y-	geophone/seismometer Y-	yes
10	Z+	geophone/seismometer Z+	yes
11	Z-	geophone/seismometer Z-	yes
12	NC02	nc	no
13	1PPS	second pulse from external GPS, CMOS level	yes
14	NMEA	NMEA messages from ext. GPS, CMOS level	yes
15	NC03	nc	no
16	TX	transmit data serial RS232, regular level +/-10V	yes
17	RX	receive data serial RS232, regular level +/- 10V	yes
18	LVL/VTRILL	Trillium: Power supply on (FET)	yes
19	NC04	nc	no
20	Z1-	optional second 3 channel sensor	no
21	Z1+	optional second 3 channel sensor	no
22	Y1-	optional second 3 channel sensor	no
23	Y1+	optional second 3 channel sensor	no
24	X1-	optional second 3 channel sensor	no
25	X1+	optional second 3 channel sensor	no
26	SCLKSD	SPI clock signal for external SD card	yes
27	MISOSD	SPI receive data from ext. SD card	yes
28	MOSISD	SPI transmit data to ext. SD card	yes
29	TX1	trillium RS232 transmit	yes
30	RX1	trillium RS232 receive	yes

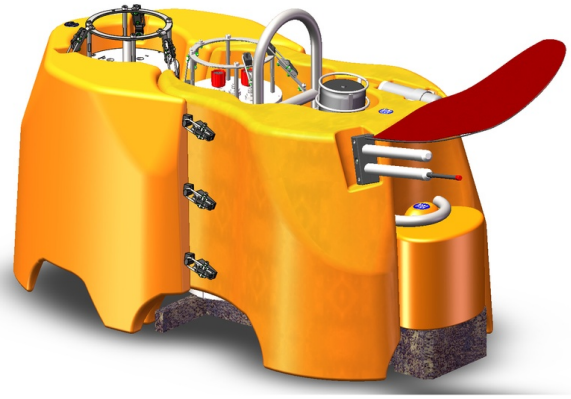
Pin	Function	Notes	used in base system
31	NC05	nc	no
32	NC06	Request Releaser Status	no
33	NC07	Releaser Status 1	no
34	NC08	Releaser Status 2	no
35	NC09	turn AIS/GPS/IMU on (on release?)	no
36	NC10	I/O signal, request release from releaser	no
37	VUSB+	USB Power +	yes
38	DN	USB Data -	yes
39	DP	USB Data +	yes
40	VUSB-	USB Power -	yes
41	VCNC	Power for CNC board, externally switched	yes
42	NC11	nc	no
43	NC12	nc	no
44	DET1	SD card detect 1	yes
45	VCC3.3	VCC for SD card	yes
46	CSSD1	CS for SD card 1	yes
47	DET2	SD card detect 2	yes
48	CSSD2	CS for SD card 2	yes
49	NC13	optional analog input	no
50	NC14	nc	no

8.3 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 continouusly operate for more than 3 years. The next two pictures show the "backpack" of additional two years of power and the combined system:

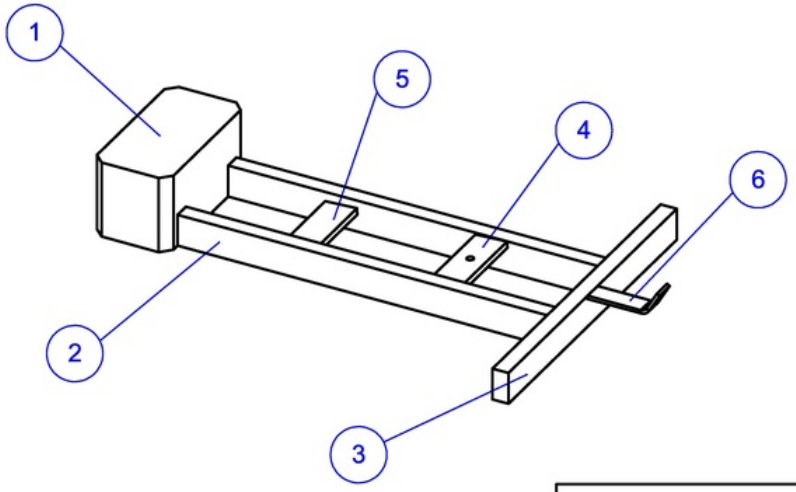


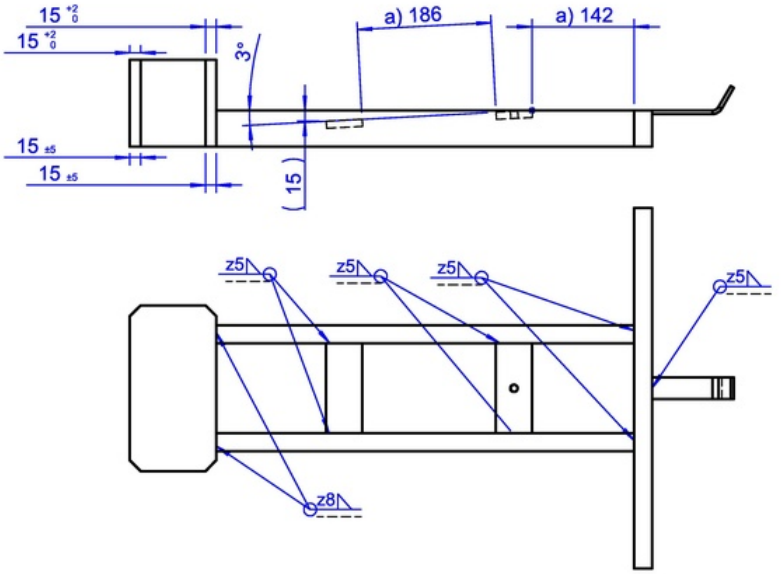
The OBS “Nammu”is of amazingly small size and designed to perfectly fit on standard wooden palettes. The system can be stacked and six or eight systems can be transported on a standard palette with a size of 1200 mm × 800 mm.

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.

POS-NR.	MENGE	BENENNUNG	Zeichnungsnummer	Material	Halbzeug
1	1	Ankergewicht - 4230	4230-A-07-02-001	Unlegierter Baustahl	120 x 120, 230 lang
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





Zust.	Änderung	Datum	Name
a)	Abstände geändert	11.11.15	AS
b)	Pos 6 von 200 auf 130 gekürzt	26.05.16	AS

1st Angle Projektion

Allgemeintol. DIN 8570 - B

Bearb.	06.11.2014	A.Schwenk
Gepr.	20.10.2015	T.Sandmann
Norm		

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

Ursprung: Schweissen Anker Nammu 1Y Basis - 4230

Maßstab 1:10 A4

Gewicht: 42.7 kg

Material -

Titel

Anker Nammu 1Y - Baugruppen - 4230

OBS Nammu 1Y/Anker

Zeichnungsnummer

4230-A-07-02-000

Blatt 1

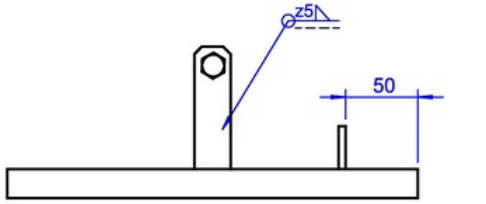
Blattanzahl: 1

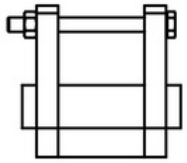
Ers. für: -

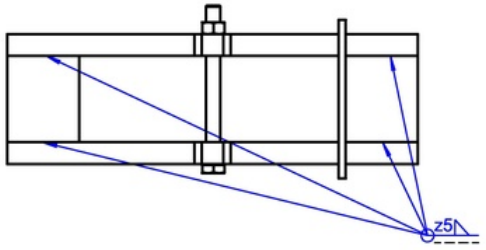
Ers. durch: -

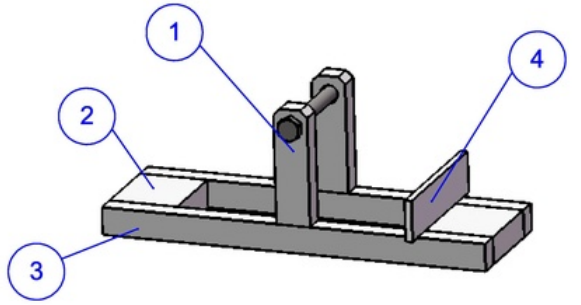
Plot Datum 27.05.2016

POS-NR.	MENGE	BENENNUNG	Zeichnungsnummer	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 Sperre - 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		









Zust.	Änderung	Datum	Name
a)	Pos 4 dazu	26.11.15	AS

1st Angle Projektion

Allgemeintol. DIN 8570 - B

Bearb. 06.11.2014 A.Schwenk

Gepr. 20.10.2015 T.Sandmann

Norm

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

Urspr.: Schweissen Anker Nammu 1Y Wippe - 4230

Maßstab 1:5 A4

Gewicht: 2.9 kg

Material -

Titel

Anker Nammu 1 Y - Wippe - 4230

OBS Nammu 1Y/Anker

Zeichnungsnummer

4230-A-07-03-000

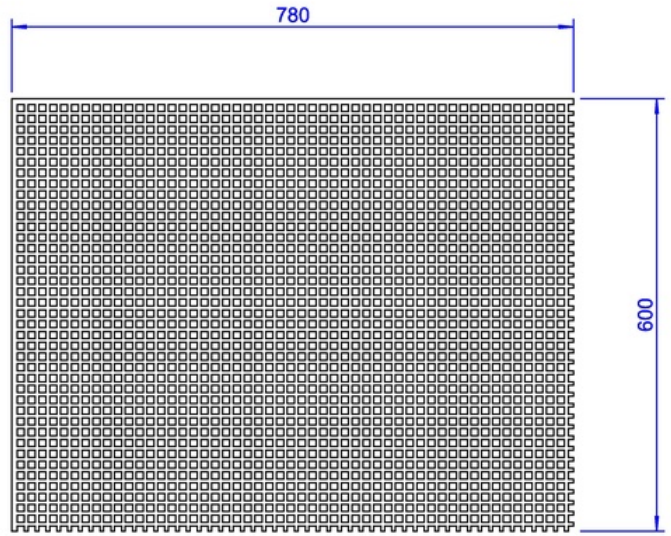
Blatt 1

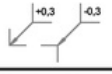
Blattanzahl: 1

Ers. für: -

Ers. durch: -

Plot Datum 26.11.2015





Zust.	Änderung	Datum	Name

1st Angle Projektion

Werkstückkanten DIN 6784

Allgemeintol. DIN 2768 mK

Bearb.	19.11.2014	A.Schwenk
Gepr.	-	-
Norm		

Ursprung: Gitterblech - 4230-A-07-01-001

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

Maßstab 1:10 A4 | Gewicht: 3.1 kg

Material: Unlegierter Baustahl - | Lochblech 10-15-1,5mm -

Titel

Gitterblech - 4230

Lochblech

Zeichnungsnummer: 4230-A-07-01-001

Blatt 1

Blattanzahl: 1

Ers. für: - | Ers. durch: -

Plot Datum 03.11.2016

NAMMU STATION-PROTOCOL V1.0

Cruise: **Project:**

Profile: **Station:**

Date UTC: **Date local:**

Battery-pack: Alkaline ☐ or Lithium ☐ at _____ Volts 6D6-SN: _____

two dry packs inserted ☐ sealing area checked ☐ all screws fixed ☐

Operator:

Recorder 6D6 SN: _____ Firmware: _____

_____ format ☐ capacity total _____

gain H ☐ Z ☐ Y ☐ X ☐ channels _____ rate _____

signals show H ☐ Z ☐ Y ☐ X ☐ remarks _____

trillium levelling: _____

GPS-Sync: No of Sats: ☐ GPS date (dd.mm.yyyy) _____ time (hh:mm:ss) _____

Start Date _____ time (GPS) _____

RECORDING STARTED ☐ CHECKED (capacity) ☐ OPERATOR:

Releaser SN: _____ User1: _____ User2: _____

Release: _____ Enable: _____ Disable: _____ DISABLE? ☐

ST date: _____ UTC time: _____ UTC RT date: _____ UTC time: _____ UTC

Batt 1: _____ Batt 2: _____ Operator:

Prepare on Deck

frame SN: _____ Flag: fixed ☐

Tube SN: _____ fixed ☐ all conn.: fixed ☐

Flash SN: _____ switched ON ☐ tested ☐

Radio SN: _____ switched ON ☐ tested ☐ channel A ☐ B ☐ C ☐ D ☐

Hydrophone SN: _____ fixed ☐

Anchor:

bolt material: fasten with _____ Nm (max 5Nm!)

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 No of Sats: ☐ date _____ time _____

skew _____ recorded data _____

☐ no errors ☐ errors:

downloaded to:

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 storm 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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24148 Kiel, Germany

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