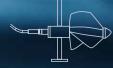


# **HYDRO-BIOS**

# **Smart Sampling!**









**HYDRO-BIOS** 

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Based on our expert knowledge and long term experience we provide advancing sampling techniques for marine applications and specialised designed instruments for the needs of individual clients. As a company well-known for our in-depth knowledge of reliable techniques, we also make sure we are always keeping an eye on the ever-present new challenges, questions and changes within the scientific world.

Our engineering departments possess an integrated computerised chain from mechanical and electronic draft via design process and production to complete instrumentation.

Our network of external experts expands our own technical portfolio in view of specialised production and technology.

## **Smart Sampling!**



03

## **History**

## Smart Sampling for eight decades

**HYDRO-BIOS** has its seeds in the small enterprise, "Walter Schweder Precision Engineering", founded in 1927. In these early days the company focused on the production of small limnological samplers for water, bottom and plankton sampling.

In **1960** the legal form was changed and the company received its new name: **HYDRO-BIOS** Apparatebau GmbH.

In **1963** Hans Fischer joined the company, initially as factory manager – the success story begins with the relocation of **HYDRO-BIOS** to a new building at its new (and current) address in Kiel-Altenholz.

The following years are characterised by increasing activities for the development, manufacturing and world-wide distribution of an increasing portfolio of mechanical samplers for limnology and oceanography. The company expands with an additional building located at a neighbouring plot.

Since **1980 HYDRO-BIOS** is a completely family-owned company.

The eighties are characterised by the installation of our own electronics department with expanding use of computers for circuit and board design, resulting in increasing application of electronics inside our

The nineties are defined by the implementation of computer aided design (CAD) for our engineering department and the introduction of microprocessor technology at our electronics department – an electronic mile stone.

Since **2005** the mechanical design of our products is based on full three-dimensional computer aided design (3D CAD) with extended use of the digital models for computer aided manufacturing (CAM).

The addition of the second floor to our company building in **2012** meets the challenges of continuously growing business. It doubles the space of our electronics department and nearly triples our plankton net sewing workshop.

The simultaneous installation of a photovoltaic rooftop power station, together with our well established block heat and power plant, meets the concerns of environmental protection and cares for our improved green carbon footprint.



## **Philosophy**

**HYDRO-BIOS** is the leading manufacturer of high quality sampling equipment for hydrography, science, research and environmental monitoring in marine environments.

Achieving accurate data, based on faultless samples is the wish of each limnologist, the goal of every oceanographer and the motivation for all water monitoring authorities. Guiding our valuable customers to instrumentation, which perfectly fits their needs, is our ambition.

It takes more than diligence and R&D to deliver top level equipment for the benefit of the end users. At HYDRO-BIOS we are a highly motivated team of professionals dedicated to providing reliable sampling tools for your daily routine work.

In this day and age it requires passion and determination to follow the traditional way of business practice where the complete customer satisfaction is our intent. This includes a high degree of openness, flexibility and reliability resulting in good, long term contacts with our worldwide customers. The sustainability of this fundamental practice is ensured by the continuation of **HYDRO-BIOS** Apparatebau GmbH being a family-run business, managed for three generations within the family. The will to care about our clients and our attitude of fairness in all aspects of business is the basic principle behind our long lasting successful history.

Ì WATER SAMPLERS

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PLANKTON NETS Ģ

SEDIME

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BOTTOM

**PLANKTON** EXAMINATION

MISCELLANEOUS INSTRUMENTS



## **Standard Water Sampler acc. to Ruttner**

The classic for limnological water sampling

#### ABOUT

Based on the design of Prof. Dr. Franz Ruttner, our contemporary model is a handy and versatile instrument to take water samples from any desired depth. Due to the simple and practical design of the transparent sampling tube and the closing mechanism the sampler is renown for its reliability for many years.



The Standard Water Sampler (whilst open) is lowered into the water by rope. Upon reaching the desired depth, the messenger activated closing mechanism is released and closes the lids of the sampling tube. A built-in thermometer, ranging from  $-2^{\circ}$ to  $+30^{\circ}$ C, indicates the temperature of the sample. To retrieve the water sample for analyses only the discharge cock at the lower lid has to be opened.

TECHNICAL DATA	
Material	Sampling tube: Plexiglass Metal parts: Nickel-plated brass
Dimensions	Ø 10 cm x 56 cm for the 1000 ml version Ø 10 cm x 75 cm for the 2000 ml version
Weight	4.5 kg for the 1000 ml version 5 kg for the 2000 ml version

ORDERING INFORMATION	
Products	
436 131	Standard Water Sampler acc. to Ruttner, 1000 ml capacity
436 132	Standard Water Sampler acc. to Ruttner, 2000 ml capacity
Spare Parts	
436 136	<b>Spare Thermometer,</b> range -2° to +30°C, divided in 0.2° C (set of 3 pcs.)
440 000	<b>Spare Messenger</b> for releasing the closing mechanism, with 6 mm bore. Weight 400 g

## **Industrial Water Sampler**

Limnological water sampler with metal-free interior

#### ABOUT

The Industrial Water Sampler is a specialised version of the Standard Water Sampler acc. to Ruttner. It has been developed to meet the demands for more accurate chemical analysis of water samples. The inside of the sampling tube is completely metal-free and thus tests for the determination of trace elements are possible. The Industrial Water Sampler (whilst open) is lowered by rope into the water. Upon reaching the desired depth, the messenger activated closing mechanism is released and closes the lids of the sampling tube. To retrieve the water sample for analyses only the discharge hose at the lower lid has to be opened. In contrast to the Standard Water Sampler acc. to Ruttner the Industrial Water Sampler is not equipped with a thermometer.

TECHNICAL DATA	
Material	Sampling tube and all parts contac- ting the sample: Plexiglass Metal parts: Powder-coated brass, nickel-plaited brass, stainless steel
Dimensions	Ø 8 cm x 60 cm
Weight	2 kg

ORDERING INFORMATION	
Products	
436 152	Industrial Water Sampler, 1000 ml capacity
Spare Parts	
440 000	<b>Spare Messenger</b> for releasing the closing mechanism, with 6 mm bore. Weight 400 g







## **LIMNOS Water Sampler**

Limnological water sampling without contamination by surface water

#### THE LIMNOS WATER SAMPLER MEETS TWO ESSENTIAL DEMANDS OF LIMNOLOGISTS:

- Avoiding sample contamination by surface water
- Avoiding analytical errors due to mishandling of the sample during transport and decanting

#### ABOUT

The LIMNOS Water Sampler is an approved and uncomplicated instrument to take water samples up to 30 m depth. It consists of the holder device to hold two exchangeable 1000 ml glass bottles as sampling vessels.

The LIMNOS Water Sampler is attached to a wire and lowered into the water in closed condition in order to prevent sample contamination by surface water. An ingeniously simple technique is used to keep the sampler closed during descent: Two silicone hoses are fixed in bent position. The sampler is activated by a messenger upon reaching the desired water depth. When the messenger hits the anvil, the silicone hoses spring up allowing water to ingress and air to drain the bottle. For transport and investigation of the sam-



ples, the glass bottles are simply unscrewed from the holder and closed with a lid. This avoids falsification of the sample by pouring it from one vessel to another.



TECHNICAL DATA	
Material	Holder Device: PVC Metal parts: Stainless steel Hoses: Silicone Sampling bottles: Glass
Operational depth	Max. 30 m

ORDERING INFORMATION	
Products	
436 140	LIMNOS Water Sampler with two glass bottles 1000 ml each and Plastic Covered Messenger
Spare Parts	
436 145	Glass Bottles 1000 ml for use up to 30 m water depth (package of 10 pcs.)
440 002         Plastic Covered Messenger with 6 mm bore. Weight 500 g	

## **MICROS Water Sampler**

Slenderised autoclavable version of the LIMNOS Water Sampler

#### THE MICROS WATER SAMPLER MEETS ESSENTIAL DEMANDS OF LIMNOLOGISTS:

- Avoiding sample contamination by surface water
- Avoiding analytical errors due to mishandling of the sample during transport and decanting
- Special feature: It is possible to sterilise (autoclave) the instrument

#### ABOUT

The MICROS Water Sampler is an approved and uncomplicated instrument to take water samples up to 100 m depth. The slim shape allows the sampling from tubes as small as 80 mm diameter. It consists of a stainless steel frame equipped with a Teflon headpiece to hold an exchangeable 500 ml glass bottle as sampling vessel. The MICROS Water Sampler is attached to a wire and lowered into the water in closed condition in order to prevent sample contamination by surface water.

An ingeniously simple technique is used to keep the sampler closed during descent, consisting of two silicone hoses fixed in a bent position. The sampler is activated by a messenger upon reaching the desired water depth. When the messenger hits the anvil, the silicone hoses spring up from their bent position allowing water to ingress and air to drain the bottle. For transport and investigation of the samples, the

TECHNICAL DATA	
Material	Holder device: Stainless steel Headpiece: PTFE (Teflon) Hoses: Silicone Sampling bottles: Glass
Operational depth	Max. 100 m

ORDERING INFORMATION	
Products	
436 160	MICROS Water Sampler with one glass
Spare Parts	
436 165	Glass Bottles 500 ml for use up to 100
440 002	Plastic Covered Messenger with 6 mm



bottle 500 ml and Plastic Covered Messenger

m water depth (package of 3 pcs.) bore. Weight 500 g





## **Plastic Water Sampler PWS**

Niskin-Type oceanographic general purpose water sampler



## ABOUT

The Plastic Water Sampler PWS features all plastic (PVC) design, consisting of a tube with two lids connected by a latex rubber tubing. The lids are kept open during descent, caring for a fair flushing of the sampling tube. The sampling tube is completely metal-free.

The PWS on the one hand is the standard oceanographic sampler to be used on Multi Water Sampler/ Rosette/Carousel arrays and on the other hand it can be used as single or series instrument connected to a hydrographic wire.

When used on a wire, a messenger, dropped down the wire from the surface, releases the end stoppers for closure. For the use of several PWS in a row a second messenger below the first sampler is used to actuate a series of samplers along the wire. When operated as a single instrument without bottom weight, we recommend to use a Centered Mounting Rack (436 380 ... 436 395) which cares for a vertical position of the sampler. Retrieve the water sample via the discharge cock/tube at the lower end of the sampler.



TECHNICAL DATA	
Material	Plastic parts: PVC Rubber cord: Natural latex Sealings: NBR
Dimensions	1.7 l model: 90 x 140 x 590 mm 2.5 l model: 90 x 140 x 765 mm 5 l model: 140 x 190 x 640 mm 10 l model: 140 x 190 x 1040 mm 30 l model: 225 x 280 x 1210 mm
Weight	1.7 l model: 3 kg 2.5 l model : 3.5 kg 5 l model: 4 kg 10 l model: 5.5 kg 30 l model: 15 kg

#### **ORDERING INFORMATION**

Products	
436 300	Plastic Water Sampler PWS, capacity 1
436 302	Plastic Water Sampler PWS, capacity 2
436 305	Plastic Water Sampler PWS, capacity 5
436 315	Plastic Water Sampler PWS, capacity 1
436 325	Plastic Water Sampler PWS, capacity 3
Accessories	
436 380	Centered Mounting Rack for PWS and
436 385	Centered Mounting Rack for PWS and
436 390	Centered Mounting Rack for PWS and
436 395	Centered Mounting Rack for PWS 30 I
Spare Parts	
440 000	Spare Messenger for releasing the closi

1.7 litre, incl. messenger
2.5 litres, incl. messenger
5.0 litres, incl. messenger
10.0 litres, incl. messenger
30.0 litres, incl. messenger
4 Free Flow Water Sampler 1-2.5 I
4 Free Flow Water Sampler 5 I

d Free Flow Water Sampler 10 I

sing mechanism, with 6 mm bore. Weight 400 g



## **Free Flow Water Sampler**

Free-flushing oceanographic water sampler



#### ABOUT

The Free Flow Water Sampler is an innovative design which avoids the limitations of the PWS/Niskin bottles caused by their reduced inlet and outlet diameters.

The outstanding feature of the Free Flow Water Sampler is the really free-flushing construction of the sampler where no cone or ball-valve influences the water exchange inside the sampling tube. The Free Flow Water Sampler features all plastic (PVC and POM) design, consisting of a tube with two lids connected by a latex rubber tubing. The lids are kept open during descent, caring for a perfect flushing of the sampling tube. The sampling tube is completely metal-free.

Like the PWS, the Free Flow Water Sampler on the one hand can be used on Multi Water Sampler/ Rosette/Carousel arrays and on the other hand it can be used as single or series instrument connected to a hydrographic wire.

When used directly connected to a hydrographic wire, a messenger, dropped down the wire from the surface, releases the end stoppers for closure. For the use of several Free Flow Water Samplers in a row a second messenger below the first sampler is used to actuate a series of samplers along the wire. When operated as a single instrument without bottom weight, we recommend to use a Centered Mounting Rack (436 380 ... 436 390) which cares for a vertical position of the sampler. Retrieve the water sample via the discharge cock/tube at the lower end of the sampler.

TECHNICAL DATA	
Material	Plastic parts: PVC, POM Rubber cord: Natural latex Sealings: NBR
Dimensions	1   model: 90 x 140 x 515 mm 5   model: 140 x 190 x 700 mm 10   model: 140 x 190 x 1150 mm
Weight	1 l model: 3 kg 5 l model: 6 kg 10 l model: 8.5 kg

#### **ORDERING INFORMATION**

Products	
436 340	Free Flow Water Sampler, capacity 1 lit
436 344	Free Flow Water Sampler, capacity 5.0
436 346	Free Flow Water Sampler, capacity 10.
Accessories	
436 380	Centered Mounting Rack for PWS and
436 385	Centered Mounting Rack for PWS and
436 390	Centered Mounting Rack for PWS and
Spare Parts	
440 000	Spare Messenger for releasing the closi

## **Centered Mounting Rack for PWS** and Free Flow Water Sampler

Helpful tool to keep oceanographic water samplers in an upright position

#### ABOUT

Instead of adding heavy bottom weights the Centered Mounting Rack can be used to keep Plastic Water Samplers or Free Flow Water Samplers in a vertical position in case they are used as single instruments. This stainless steel tool is connected to the end eye of the wire and transmits the release impulse of the messenger to the sampler.

ORDERING INFORMATION	
Products	
436 380	<b>Centered Mounting Rack</b> for PWS and Free Flow Water Sampler 1-2.5 I
436 385	<b>Centered Mounting Rack</b> for PWS and Free Flow Water Sampler 5 I
436 390	<b>Centered Mounting Rack</b> for PWS and Free Flow Water Sampler 10 I
436 395	Centered Mounting Rack for PWS 30 I

	C	
4	1	

litre, incl. messenger

0 litres, incl. messenger

0.0 litres, incl. messenger

Free Flow Water Sampler 1-2.5

Free Flow Water Sampler 5

Free Flow Water Sampler 10 I

sing mechanism, with 6 mm bore. Weight 400 g





## **Integrating Water Sampler IWS III**

Depth or time integrated water sampling made easy

#### ABOUT

The Integrating Water Sampler IWS III is a light and handy instrument for the acquisition of summing (integrated) water samples according to the European Water Framework Directive. The integrated sample



is automatically achieved in one single draft. There is no need for repeated operations of standard water samplers, followed by mixing procedures. The sampling technique is very simple. An electric motor actuates a piston inside a transparent tube. A microprocessor controls the sampling procedure according to the pre-selected depth, time or spot scenario.

A built-in high precision pressure sensor cares for accurate depth measurements. Power supply of the sampler is made by rechargeable lithium-ion batteries, using the safest chemistry currently available.



#### FEATURES:

- Depth integrated sampling with programmable depth interval
- Time integrated sampling
- Spot sampling take a complete sample at a single depth
- External battery pack with rechargeable Li-lon batteries
- Quick-start key repeat the last sampling scenario without re-programming
- Extended operation protocol fully integrated in OceanLab3 software
- Bluetooth connection to the hand unit and PC
- Long-distance telemetry via electromechanical cables

#### SAMPLING IS MADE EASY WITH THE IWS III:

- Select a sampling mode via hand unit or PC without connecting any cable.
- Enter the requested depth or time interval.
- Put the sampler into the water and lower it to desired depth – the sample will be precisely aspirated according to the selected scenario.
- Recover the sampler after the end of the selected depth, time or spot scenario.
- Extract the sample by opening the hose clamp located at the bottom of the sampler.
- Repeat the scenario by simply pressing the quick-start key.



TECHNICAL DATA	
Material	POM, Acrylic, titanium, stainless steel
Diameter	190 mm
Length	2.5 l model: 720 mm 5 l model: 880 mm
Weight	2.5 l model: 7.5 kg 5 l model: 8 kg
Battery type	Lithium iron phosphate (LiFePO4)
Battery capacity	sufficient for up to 20 operations
Operational depth	max. 100 m

ORDERING INFORMATION	
Products	
436 601	IWS III, capacity 2.5 litres
436 606	IWS III, capacity 5 litres



PLANKTON NETS Ç SEDIMENT TRAPS  $\bigotimes$ BOTTOM SAMPLERS MEASURING PLANKTON EXAMINATION MISCELLANEOUS INSTRUMENTS

MATER SAMPLERS

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## **Single Fire Module**

The time-tested Multi Water Sampler technology reduced to the max – releasing a single water sampler at a precise depth



#### ABOUT

The Single Fire Module consists of a Plastic Water Sampler (also known as Niskin Bottle) of 1.7 litres capacity, mounted to a stainless steel rack which is equipped with a motor-driven release device. Power supply is made by internal rechargeable lithium-ion batteries, using the safest chemistry currently available.

#### Digital standard model

The digital standard model, by design, is a standalone instrument. In online mode, operated in conjunction with standard electro-mechanical cables, the water sampler is actuated via push-button control by the battery powered Hand Unit. This also handles measuring data of the integrated high-precision pressure sensor.

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

# Digital model for control by external CTD probes

This model has been designed to be controlled by external up-to-date CTD probes. It is equipped with a serial RS-232 port to receive action commands and provide a return signal to the CTD. This version is not equipped with a pressure sensor.

# Analogue model for control by external CTD probes

Even old-fashioned CTD probes are able to control the Single Fire Module. For this purpose a model with an analogue interface is available which is activated by a switched contact and delivers a return signal and battery voltage via two analogue channels. This version is not equipped with a pressure sensor.

#### **FEATURES**

- Digital and analogue versions available for adaption to various applications
- Compact size and low weight
- Standard depth range 3000 m
- Low power consumption
- Battery operated Underwater Unit
- Electronics operate from -40°C up to +85°C
- EC-conformity (CE) EN 50081-1, EN 50082-1

#### **TECHNICAL DATA**

Dimensions	1200 x 120 x 255 mm
Empty weight	8.5 kg
Material	Titanium, stainless steel, POM, PVC
Operational depth	max. 3000 m
Hand Unit	Plastic housing, splash-proof (IP 65), batt interface for PC (RS-232)
Data memory	4 MByte
Data rate	1 Hz (1 data set per sec.)
Pressure sensor	$0.0 \dots 3000.0 \text{ dbar} \pm 0.1\% \text{ f.s.}$ (standard
Battery type	Lithium iron phosphate (LiFePO4)
Battery capacity	sufficient for up to 200 operations
Type of water sampler	Plastic Water Sampler PWS, capacity 1.7

ORDERING INFORMATION	
Products	
436 990	Single Fire Module, digital standard mod capacity 1.7 I for combined online/offline serial RS-232 port and long-distance FSK Motor Unit with microprocessor, integrated battery powered Hand Unit Windows based OceanLab 3 software inc
436 991	<b>Single Fire Module,</b> analogue model for PWS, capacity 1.7 I, Motor Unit with analogue electronics, ana
436 992	<b>Single Fire Module,</b> digital model for con capacity 1.7 I, Motor Unit with microprocessor, serial RS



ttery powered LC-display 4 x 20 characters,

rd)

' I (various sampler capacities are available upon request)

bdel equipped with 1 Plastic Water Sampler PWS, e use,

K-telemetry,

ed lithium-ion batteries, integrated pressure sensor,

cluded

control by CTD equipped with 1 Plastic Water Sampler

alogue interface, integrated lithium-ion batteries

ontrol by CTD equipped with 1 Plastic Water Sampler PWS,

-232 port, integrated lithium-ion batteries

## Multi Water Sampler MWS 12

Water Sampling System for Oceanography and Limnology



#### ABOUT

The approved Multi Water Sampler MWS 12 is an instrument designed for the collection of water samples in successive water layers. Only one operation for 12 different samples! The sturdy stainless steel array is equipped with twelve racks to which Plastic Water Samplers or Free Flow Samplers with capacities from 1.7 to 10 litres capacity can be mounted. The MWS 12 is equipped with a motor-driven release device with an integrated Depth Meter (measuring range according to customers' requirements). The water samplers are sequentially closed in the succession of their mounting to the array (i.e. No. 1, 2, 3, ..., 10, 11 and 12).

The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from -  $40^{\circ}$ C up to + $85^{\circ}$ C.

The maximum operational water depth is 3000 metres. A special version for operational depths down to 6000 metres is available upon request. The MWS 12 is generally delivered for combined Online/Offline use and is therefore the ideal all-purpose rosette system for use on any research vessel worldwide.

## Online

The water samplers are actuated via push-button control by the mains operated Deck Command Unit. The commands for actuation of the water samplers are given via a single or multi-conductor cable between the Underwater Unit and the Deck Command Unit. The Deck Command Unit is equipped with a serial port for data transfer to PC.

#### Offline

In case that a conducting cable is not available on board, the required sampling depth can be preprogrammed via personal computer. The actuation of the water samplers is then carried out automatically according to the pre-selected depth intervals. All measuring data are stored inside the internal data memory (16MB) during the operation and can be read out by a PC when the system is back on board.

#### ACCESSORIES CT-Set

Together with the optional CT-Set the system offers the full capability of a state-of-the-art oceanographic CTD probe. The CT-Set consists of one conductivity sensor, one temperature sensor and an additional electronics board which are completely integrated into the Motor Unit of the MWS 12. From the CTD data the system computes salinity, density and sound velocity according to UNESCO formulas.

#### FEATURES

- Combined online/offline use
- Bi-directional communication
- Standard depth range 3000 m
- Long distance FSK-telemetry (> 10000m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°C
- EC-conformity (CE) EN 50081-1, EN 50082-1



#### **OPTIONS**

- Slenderised array for 12 water samplers with capacities from 1.7 to 5 litres (Ø 110 x 125 cm)
- Variant array sizes for 6 or 24 water samplers are available upon request
- > Additional sensors of various parameters
- Special version for operational depths down to 6000 metres
- Serial RS-232 port, intended for external control of the Multi Water Sampler by third-party CTD probes

#### **TECHNICAL DATA**

Dimensions	Ø 140 cm x 160 cm
Empty weight	approx. 100 kg
Operational depth	max. 3000 metres
Array	made of stainless steel
Motor Unit	made of titanium, battery powered (3 x D
Deck Command Unit	metal housing for use in 19"-rack or as a for closing of water samplers, indication data. LCD-display with LED backlight, int 85 - 260 V AC
Data memory	16 MByte
Pressure sensor (Depth Meter)	$0.0 \dots 3000.0 \text{ dbar} \pm 0.1\% \text{ f.s.}$ (standard

ORDERING INFORMATION	
Products	
436 912	<b>MWS 12</b> for 12 Plastic Water Samplers of Please note: The Multi Water Sampler MW be ordered separately!
Accessories	
450 500	<b>CT-Set</b> for Multi Water Sampler Additional electronics board, Conductivity sensor: $0 \dots 65 \pm 0.01 \text{ mS/}$ Temperature sensor: $-2 \dots +32 \pm 0.005^{\circ}$ Data rate: 1 Hz (1 data set per second)



## DL 123A/3V)

table housing, not for use on deck; push-button control of sampler no., pressure, battery status, optional CTD terface for Personal Computer (RS-232), power supply:

d)

or Free Flow Water Samplers of 1.7 to 10 I capacity IWS 12 is delivered without Water Samplers, they have to

S/cm 5°C







## Multi Water Sampler SlimLine 6

Compact Water Sampling System for Oceanography and Limnology



#### ABOUT

The compact version of the Multi Water Sampler MWS SlimLine 6 is an instrument designed for the collection of water samples in successive water layers. Only one operation for 6 different samples! The sturdy stainless steel array is equipped with six racks to which Plastic Water Samplers with capacities of 1, 3.5 or 5 litres (depending on model selected) are mounted. Due to its compact dimensions and light weight it can easily be handled even on small vessels. The MWS SlimLine 6 is equipped with a motor-driven release device with an integrated Depth Meter (measuring range according to customers' requirements). The water samplers are sequentially closed in the succession of their mounting to the array (i.e. No. 1, 2, 3, ...).

The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from -  $40^{\circ}$ C up to + $85^{\circ}$ C.

The maximum operational water depth is 3000 metres. A special version for operational depths down to 6000 metres is available upon request. The MWS SlimLine 6 is generally delivered for combined Online/Offline use and is therefore the ideal allpurpose rosette system for use on research vessels with limited deck space.

#### Online

The water samplers are actuated via push-button control by the mains operated Deck Command Unit. The commands for actuation of the water samplers are given via a single or multi-conductor cable between the Underwater Unit and the Deck Command Unit. The Deck Command Unit is equipped with a serial port for data transfer to PC.

#### Offline

In case that a conducting cable is not available on board, the required sampling depth can be preprogrammed via personal computer. The actuation of the water samplers is then carried out automatically according to the pre-selected depth intervals. All measuring data are stored inside the internal data memory of (16MB) during the operation and can be read out by a PC when the system is back on board.

#### ACCESSORIES CT-Set

Together with the optional CT-Set the system offers the full capability of a state-of-the-art oceanographic CTD probe. The CT-Set consists of one conductivity sensor, one temperature sensor and an additional electronics board which are completely integrated into the Motor Unit of the MWS SlimLine 6. From the CTD data the system computes salinity, density and sound velocity according to UNESCO formulas.



#### **FEATURES**

- Compact size and low weight
- Combined online/offline use
- Bi-directional communication
- Standard depth range 3000 m
- Long distance FSK-telemetry (> 10000m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°C
- EC-conformity (CE) EN 50081-1, EN 50082-1

TECHNICAL DATA	
Dimensions	1   model: Ø 55 cm x 83 cm 3.5   model: Ø 65 cm x 88 cm 5   model: Ø 66 cm x 98 cm
Empty weight	1   model: 40 kg 3.5   model: 45 kg 5   model: 55 kg
Operational depth	max. 3000 metres
Array	made of stainless steel
Motor Unit	made of titanium, battery powered (3 x D
Deck Command Unit	metal housing for use in 19"-rack or as a for closing of water samplers, indication data. LCD-display with LED backlight, int 85 - 260 V AC
Data memory	16 MByte
Pressure sensor (Depth Meter)	$0.0 \dots 3000.0 \text{ dbar} \pm 0.1\% \text{ f.s.}$ (standard

## **ORDERING INFORMATION**

Products	
436 975	MWS SlimLine 6 with water samplers o
436 976	MWS SlimLine 6 with water samplers o
436 977	MWS SlimLine 6 with water samplers o
Accessories	
450 500	<b>CT-Set for Multi Water Sampler</b> Additional electronics board, Conductivity sensor: $0 \dots 65 \pm 0.01$ mS/c Temperature sensor: $-2 \dots +32 \pm 0.005^{\circ}(0)$ Data rate: 1 Hz (1 data set per second)



#### **OPTIONS**

- Additional sensors of various parameters
- Special version for operational depths down to 6000 metres
- Serial RS-232 port, intended for external control of the Multi Water Sampler by third-party CTD probes

#### DL 123A/3V)

table housing, not for use on deck; push-button control of sampler no., pressure, battery status, optional CTD terface for Personal Computer (RS-232), power supply:

#### rd)

of 1 I capacity

of 3.5 I capacity

of 5 I capacity

°C °C





## **Automatic Water Sampler MULTI-LIMNOS**

Limnological Multiple Water Sampler based on the LIMNOS-principle

#### JUST LIKE THE LIMNOS, THE MULTI-LIMNOS WATER SAMPLER MEETS TWO ESSENTIAL DEMANDS OF LIMNOLOGISTS:

- Avoiding sample contamination from surface water
- Avoiding errors in analysis due to mishandling of the sample during transport and decanting



#### ABOUT

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

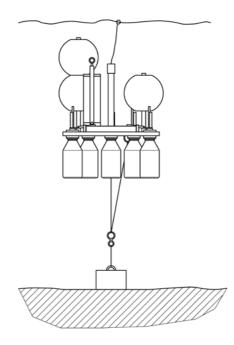
The system is equipped with 10 Duran glass bottles of 1 litre capacity each, which can also be used as transportation and storage vessels. The bottles are screwed into modified LIMNOS headpieces and attached to the base plate.

When the system is lowered to the desired water depth all bottles are closed. They are opened successively according to the preselected time intervals. When the bottles are filled with water, they are automatically closed by integrated check valves. The MULTI-LIMNOS is equipped with a microprocessor-controlled Motor Unit, activating the bottles in pre-programmed time intervals in real-time (date and time).

The operation schedule is programmed via PC by using OceanLab 3 software.

Power supply is made by 3 long-time lithium batteries placed inside an external battery housing.

The bottom anchoring system offers the possibility to choose the water depth and, if required, change the depth with each operation. The MULTI-LIMNOS comes with a ball that floats on the water surface for keeping track of its positioning.



The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from  $-40^{\circ}$ C up to  $+85^{\circ}$ C.

Optionally a protective stainless steel array for conventional suspension e.g. for operating the instrument from a boat or ship is available.

#### **OPTIONS**

- Protective stainless steel array for conventional suspension
- Special version made of high-tech plastics (PVDF/PTFE) e.g. for metal tracer analysis is available upon request.

TECHNICAL DATA	
Dimensions	Ø 60 cm x 83 cm
Weight	on air: approx. 27 kg (bottles empty) in water: approx. 7 kg buoyancy (bottle
Operational depth	max. 30 metres
Material	Motor Unit and Battery Housing: Titanium Base plate: PVC Headpieces: PTFE Release mechanism: PVC, Titanium Bottom anchoring system: Stainless steel Sampling bottles: DURAN-glass

ORDERING INFORMATION	
Products	
436 985	Automatic Water Sampler MULTI-LIMP incl. 6 floats and bottom anchoring sys
Spare Parts	
436 145	Spare Duran glass bottles 1 litre (10 p



es filled)		

**INOS** with 10 Duran glass bottles 1 litre, ystem (without bottom weight)

pcs.)



## Hand Net acc. to Boettger

Small dip net for near-bottom sampling



#### ABOUT

The frame of the Hand Net acc. to Boettger, made from stainless steel, is equipped with a handle joint with receiving inner diameter of 20 mm to fix a Telescopic Rod. Rods with different lengths are available upon request.

Due to the square design with a mouth opening of 25 x 25 cm it is the perfect solution for assessing near-bottom samples in shallow waters like rivers and lakes. The net bag of 500 microns mesh size is 35 cm deep, other mesh sizes are available upon request.

ORDERING INFORMATION	
Products	
438 310	Hand Net acc. to Boettger
Accessories	
438 305	<b>Telescopic Rod,</b> made from anodised aluminium, length 2 m

## **Kick Net Sampler acc. to AQEM-method**

Small dip net for bottom sampling



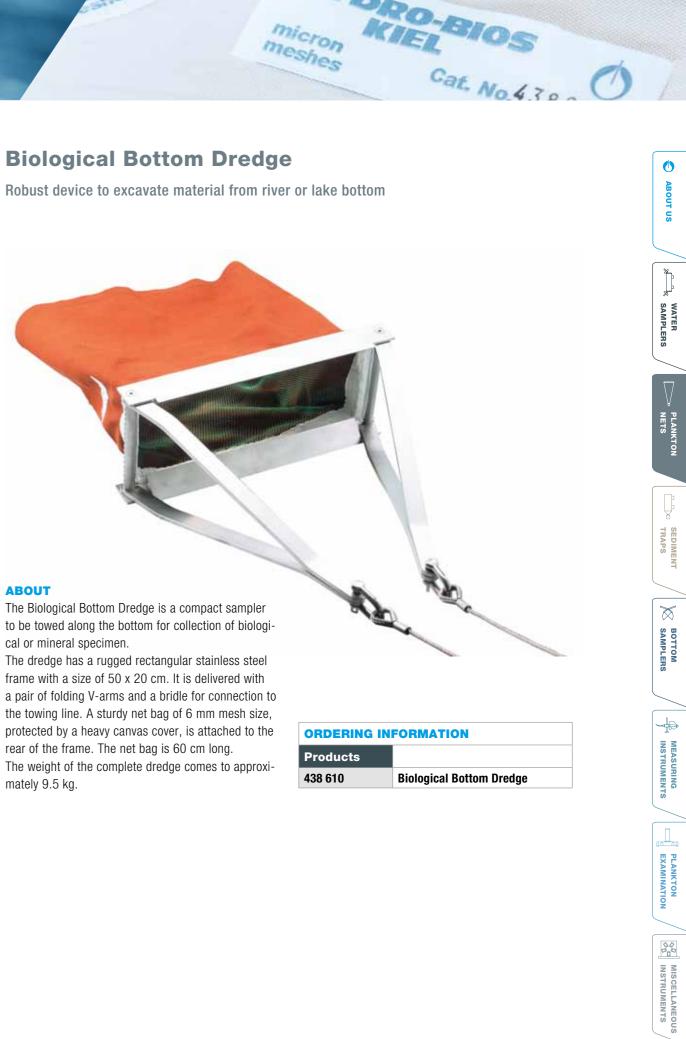
#### ABOUT

The AQEM-method resulted out of a project under the EU Water Framework Directive. This Kick Net Sampler is a dip net that has been designed for bottom invertebrate sampling meeting the EU-WFD requirements. Position the square net bag into the current and disturb the streambed in front of it by foot or hand. The water sample will then go through the 25 x 25 cm net opening into the bag. The perfect solution for

assessing invertebrate samples in shallow running waters.

The net frame, made from stainless steel, is equipped with a handle joint with receiving inner diameter of 20 mm to fix a Telescopic Rod. Rods with different lengths are available upon request. The net bag of 500 microns mesh size is 70 cm deep, other mesh sizes are available upon request.

ORDERING INFORMATION		
Products		
438 311	Kick Net Sampler acc. to AQEM-method	
Accessories		
438 305	<b>Telescopic Rod,</b> made from anodised aluminium, length 2 m	
Spare Parts		
438 313	Spare Net Part for Kick Net Sampler acc. to AQEM-method	



## **Stream Bottom Sampler – Surber Type**

Kick net for bottom sampling

# **Set of Benthos-Sieves**

Cost-effective fractionation of larger bottom samples

## ABOUT

The Surber Sampler has been designed to gather samples of insects, larvae and other forms of aquatic life found in shallow flowing waters. In contrast to the AQEM sampler, this kick net is equipped with a down-foldable frame which defines an exact area on the ground which is to be disturbed. Ideal for water depth of 30 to 45 cm.

The sampler assembly consists of Nylon net supported by a solid stainless steel folding frame, equipped with a handle joint with receiving inner diameter of 20 mm to fix a Telescopic Rod. Rods with different lengths are available upon request.

The rectangular mouth opening of the net bag and bottom frame have dimensions of 32 x 32 cm. The net bag of 500 microns mesh size is 70 cm deep, other mesh sizes are available upon request. A zip fastener at the net bag allows for fast dismounting for cleaning.

ORDERING IN	FORMATION
Products	
438 650	Stream Bottom Sampler – Surber Type
Accessories	
438 305	<b>Telescopic Rod,</b> made from anodised aluminium, length 2 m
Spare Parts	
438 652	Spare Net Part for Stream Bottom Sampler



ORDERING INFORMATION	
Products	
438 920	Set of Benthos-Sieves



#### ABOUT

Adjusted to the size of macrozoobenthos, the Set of Benthos-Sieves is used to separate bottom samples into 4 fractions.

The plastic bowls are equipped with bottom sieves made from plankton net fabric in 4 different mesh sizes: 2000/1000/780/500 microns.

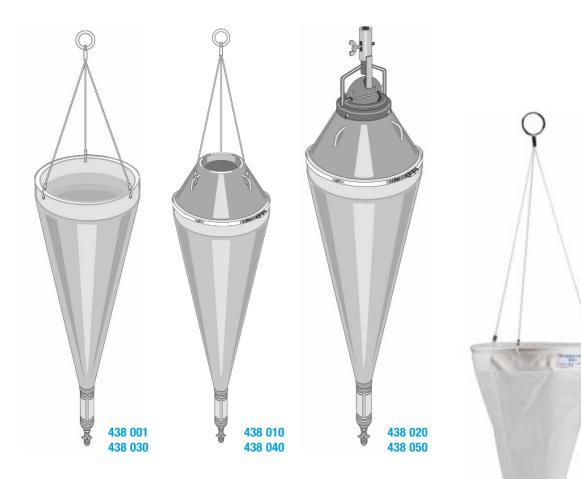
An additional bowl with closed bottom is used as drain vessel.

The opening of the bowls has a diameter of approx. 38 cm.



## **Plankton Nets acc. to Apstein**

Limnological standard plankton nets for vertical operations



#### ABOUT

The Plankton Nets acc. to Apstein, used in limnological investigations, are manufactured in various shapes and sizes.

The basic versions, intended for qualitative collections, comprise a stainless steel ring to which a conical net bag is attached. For easy retrieval the sample is concentrated inside a removable net bucket with sieve gauze covered side window or bottom (cat. no. 438 000 only).

The quantitative versions are equipped with plastic cowls, reducing the mouth opening of the net and thus caring for a higher filtering efficiency.

The closing versions are equipped with a messenger triggered closing mechanism, functioning like a butterfly-valve. This closing mechanism allows for sampling defined depth layers.



MOnyl synthetic tissue is used as sieve material. The standard mesh size of the Plankton Nets acc. to Apstein is 55 micron, which is used for the collection of Phytoplankton. For collection of Zooplankton the

ORDERING IN	FORMATION
Products	
438 000	<b>Surface Net,</b> for qualitative collection, dia Length of net bag: 50 cm Unscrewable net bucket with gauze bottom
438 001	<b>Surface Net,</b> for qualitative collection, dia Length of net bag: 50 cm Unscrewable net bucket with side window
438 030	<b>Plankton Net,</b> for qualitative collection, d Length of net bag: 100 cm Unscrewable net bucket with side window
438 010	Plankton Net, for quantitative collection, Height of cowl: 13 cm Diameter of net: 25 cm Length of net bag: 50 cm Unscrewable net bucket with side window
438 020	Plankton Net, for quantitative collection Diameter of aperture: 10 cm/0.00785 m <sup>2</sup> Height of cowl: 13 cm Diameter of net: 25 cm Length of net bag: 50 cm Unscrewable net bucket with side window
438 040	Plankton Net, for quantitative collection, Height of cowl: 20 cm Diameter of net: 40 cm Length of net: 100 cm Unscrewable net bucket with side window
438 050	<b>Plankton Net,</b> for quantitative collection Diameter of aperture: 17 cm/0.0227 m <sup>2</sup> Height of cowl: 20 cm Diameter of net: 40 cm Length of net: 100 cm Unscrewable net bucket with side window
Spare Parts	
438 000-001	Spare net bag for 438 000 and 438 001
438 005	Spare net bucket with gauze bottom for
438 015	Spare net bag for 438 010 and 438 020
438 025	Spare net bucket for 438 001, 438 010
438 030-001	Spare net bag for 438 030
438 045	Spare net bag for 438 040 and 438 050
438 055	Spare net bucket for 438 030, 438 040
440 000	Spare Messenger with 6 mm bore, weig



nets are available with a mesh size of 335 microns. For special requirements select mesh sizes between 55 and 780 microns. Mesh sizes below 55 microns are available at extra charge.

liameter of aperture: 25 cm/0.05 m<sup>2</sup>

om

liameter of aperture: 25 cm/0.05 m<sup>2</sup>

wws and stop-cock diameter of aperture: 40 cm/0.125 m<sup>2</sup>

ws and stop-cock

, diameter of aperture: 10 cm/0.00785 m<sup>2</sup>

ws and stop-cock

n with closing mechanism, operated by messenger  ${}_{\!\!\!\!\!\!^{2}}$ 

ws and stop-cock

, diameter of aperture: 17 cm/0.0227 m<sup>2</sup>

ws and stop-cock

with closing mechanism, operated by messenger

ws and stop-cock

1

438 000

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0 and 438 020

50

10 and 438 050

ight 400 g





## **Nansen Closing Net**

Oceanographic closing net for vertical operations

#### ABOUT



The Nansen Closing Net is a vertical plankton net with messenger operated closing mechanism. A 70 cm diameter stainless steel ring with a 3 meter long net bag, is operated in conjunction with a heavy net bucket frame for high towing rope speed during descent. For easy retrieval the sample is concentrated inside a removable plastic net bucket with side window (covered with sieve gauze). The open net is brought to the greatest scheduled depth. During ascent the net can be closed in the intended depth by strangulating the net bag below the net ring. This allows for sampling defined depth layers. The Nansen Closing Net can be used in conjunction with one Mechanical

Flow Meter with back-run stop for measurements	of
filtered water volume.	

TECHNICAL DATA		
Material	Net ring and net bucket frame: Stainless steel Closing mechanism: Powder- coated and nickel-plated brass Net bag: MOnyl (PA) Net bucket: PVC	
Dimensions	70 cm x 350 cm (dia. x l)	
Weight	30 kg	
Mouth opening	70 cm dia./0.3848 m <sup>2</sup>	
Mesh size	100/55 microns	

ORDERING INFORMATION				
Products				
438 505	<ul> <li>Nansen Closing Net</li> <li>1. Messenger-operated closing mechanism, including messenger 800 g and closing rope</li> <li>2. Bridle of Nylon rope with thimble and shackle</li> <li>3. Net ring of stainless steel with loops for bridle and bucket ropes, with Nylon webbing and zip fastener.</li> <li>4. Net Part, consisting of: <ul> <li>a) Canvas part, cylindrical, with zip fastener and loops for the closing rope, length 100 cm</li> <li>b) Net part, conical, length 1 m, 100 microns</li> <li>c Net part, conical, length 1 m, 55 microns</li> </ul> </li> <li>5. Vertical Net Bucket consisting of: <ul> <li>a) Fixing Ring with over centre fasteners</li> <li>b) PVC Net Bucket with side windows covered with sieve gauze</li> <li>c) Net Bucket Frame for vertical operation</li> </ul> </li> </ul>			
Accessorie	es			
438 115	<b>Mechanical Flow Meter</b> with back-run stop for counting the amount of water passing through the net			
Spare Part	s			
438 507	Spare Net Part, 100 / 55 microns			
438 520	Messenger-operated closing mechanism, including messenger 800 g and closing rope			
440 003	Messenger, with 10mm bore, 800g			
438 975	Spare Vertical Net Bucket, complete with net bucket frame			

## **WP2 Closing Net**

Small oceanographic closing net for vertical operations

#### ABOUT

Based on the design of the UNESCO Working Party 2, the WP2 Closing Net is a vertical plankton net with messenger operated closing mechanism. A 57 cm diameter stainless steel ring with a 2.6 meter long net bag, is operated in conjunction with a heavy net bucket frame for high towing rope speed during de-

TECHNICAL DATA	
Material	Net ring and net bucket frame: Stainless steel Closing mechanism: Powder-coated and nickel-plated brass Net bag: MOnyl (PA) Net bucket: PVC
Dimensions	57 cm x 300 cm (dia. x l)
Weight	28 kg
Mouth opening	57 cm dia./0.255 m²
Mesh size	200 microns (or as per choice between 100 and 1500 microns)

#### **ORDERING INFORMATION**

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roducts		
38 515	<ul> <li>WP2 Closing Net</li> <li>1. Messenger-operated closing mechanism</li> <li>2. Bridle of Nylon rope with thimble and s</li> <li>3. Net ring of stainless steel with loops for and zip fastener.</li> <li>4. Net Part, consisting of: <ul> <li>a) Net part, cylindrical, with zip fastener</li> <li>200 microns</li> <li>b) Net part, conical, length 165 cm, 20</li> </ul> </li> <li>5. Vertical Net Bucket consisting of: <ul> <li>a) Fixing Ring with over centre fastenee</li> <li>b) PVC Net Bucket with side window c</li> <li>c) Net Bucket Frame for vertical operation</li> </ul> </li> </ul>	
ccessories		
38 115	Mechanical Flow Meter with back-run s the net	
pare Parts		
38 517	Spare Net Part, 200 microns	
38 520	Messenger-operated closing mechanis	
40 003	Messenger, with 10mm bore, 800g	
38 975	Spare Vertical Net Bucket, complete wi	

- scent. For easy retrieval the sample is concentrated inside a removable plastic net bucket with side window (covered with sieve gauze).
- The open net is brought to the greatest scheduled depth. During ascent the net can be closed in the intended depth by strangulating the net bag below the net ring. This allows for sampling defined depth layers. The WP2 Closing Net can be used in conjunction with one Mechanical Flow
- Meter with back-run stop for measurements of filtered water volume.

A North		
Je la	-	
	(peak)	

sm, including messenger 800 g and closing rope shackle or bridle and bucket ropes, with Nylon webbing

er and loops for the closing rope, length 95 cm,

200 microns

ers covered with sieve gauze ation

stop for counting the amount of water passing through

ism, including messenger 800 g and closing rope

ith net bucket frame





# **Indian Ocean Standard Net**

Oceanographic non-opening/non-closing net for vertical operations

#### ABOUT

The Indian Ocean Standard Net is the standard non-opening/ non-closing plankton net for quantitative sampling of larger volumes of water during vertical tows.

A 113 cm diameter stainless steel ring with a 4.7 meter long net bag, is operated in conjunction with a heavy net bucket frame for high towing rope speed during descent. For easy retrieval the sample is concentrated inside a removable plastic net bucket with side window (covered with sieve gauze). The Indian Ocean Standard Net can be used in conjunc-

tion with one Mechanical Flow Meter with back-run stop for measurements of filtered water volume.

ADDEDING	INFORMATION
URDERING	INFURMATION

Products	
438 815	<ul> <li>Indian Ocean Standard Net <ol> <li>Bridle of Nylon rope with thimble and shackle</li> <li>Net ring of stainless steel with loops for bridle and bucket ropes, with Nylon webbing and zip fastener.</li> <li>Net Part, consisting of: <ol> <li>Net part, cylindrical, length 1,7 m, 335 microns</li> <li>Net part, conical, length 3 m, 335 microns</li> </ol> </li> <li>Vertical Net Bucket consisting of: <ol> <li>Fixing Ring with over centre fasteners</li> <li>PVC Net Bucket with side windows covered with sieve gauze</li> <li>Net Bucket Frame for vertical operation</li> </ol> </li> </ol></li></ul>
Accessories	
438 115	<b>Mechanical Flow Meter</b> with back-run stop for counting the amount of water passing through the net
Spare Parts	
438 817	Spare Net Part for Indian Ocean Standard Net, 335 microns
438 975	Spare Vertical Net Bucket, complete with net bucket frame

# TECHNICAL DATAMaterialNet ring and net bucket frame:<br/>Stainless steel<br/>Net bag: MOnyl (PA)<br/>Net bucket: PVCDimensions113 cm x 500 cm (dia. x l)Weight35 kgMouth opening113 cm dia. /1 m²Mesh size335 microns (or as per choice<br/>between 100 and 1500 mircons)



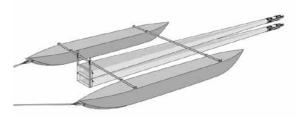
# Neuston Net acc. to David/Hempel Model 300

Plankton net for sampling surface and sub-surface fauna

TECHNICAL DATA	
Material	Catamaran, spreader bars and double net frame: aluminium Net bags: MOnyl (PA) Net bucket: PVC
Dimensions	300 cm x 220 cm x 60 cm (I x w x h) Immersion depth of swimmer: approx. 30 cm
Weight	95 kg
Mouth opening of net bags	2 x 30 x 15 cm / 2 x 0.045 m <sup>2</sup>
Length of net bag	400 cm
End dia. of net bag	11 cm
Mesh size	300 microns (or as per choice between 100 and 500 microns).



ORDERING INFORMATION	
Products	
438 210	Neuston Net acc. to David/Hempel Mod 1. Catamaran Swimmer body of aluminum 2. Bridle for selectable use from port side, 3. Double Net Frame for surface and sub-s 4. Surface Net Bag with zip fastener, 300 r 5. Sub-surface Net Bag with zip fastener, 3 6. Two Plastic Net Buckets, consisting of: a) Fixing Ring with over centre fasteners b) PVC-Net Bucket with side window, co
Spare Parts	
438 212	Spare Net Bag for Neuston Net, 300 micro
438 955	Plastic Net Bucket, consisting of: a) Fixing Ring with over centre fasteners b) PVC-Net Bucket with side window, co



#### ABOUT

- The Neuston Net acc. to David/Hempel Model 300 has been designed for accurate epineuston and hyponeuston sampling. A current field of application is e.g. microplastic sampling.
- It consists of a slender catamaran swimmer body of aluminium with relative high draft, caring for a stable position even under choppy conditions at sea.
- The vertically adjustable double net frame receives the rectangular surface and sub-surface net bags with a standard mesh size of 300 microns (or as per choice between 100 and 500 microns).
- For easy retrieval the sample is concentrated inside two removable plastic net buckets with side window (covered with sieve gauze).
- A bridle with one adjustable leg is used to operate the net from starboard, portside or stern.

#### del 300

n with adjustable holding rack for the net parts e, starboard or stern -surface net with Nylon webbings and zip fasteners

- -surface net with hylon webbings and zip fasteners I microns
- 300 microns

rs for attaching to the end of a net covered with sieve gauze

#### rons

ers for attaching to the end of a net covered with sieve gauze

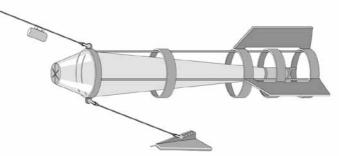
ABOUT US
WATER SAMPLERS
BOTTOM SAMPLERS
PLANKTON EXAMINATION
MISCELLANEOUS INSTRUMENTS

## **IKMT Isaacs-Kidd Midwater Trawl Net**

Oceanographic midwater trawl for horizontal or oblique tows

# High Speed Plankton Collector "Nackthai"

Gulf V sampler, modified for higher sampling efficiency



#### ABOUT

The IKMT Isaacs-Kidd Midwater Trawl Net (also known as HPN Hamburg Plankton Net) is the standard net for collection of larger quantities of macrozoplankton and micronekton.

A wide U-shaped diving vane (depressor) keeps the mouth of the net open and exerts a depressing force, keeping the trawl net in any desired depth for extended periods at towing speeds from 0.5 to 4 knots. Due to the design of the bridle and the position of the spreader bar the mouth opening of the net is unobstructed by the towing cable.

For the security of the IKMT a predetermined breaking-point has been constructed into the bridle, which makes the net collapse when the dynamic pressure becomes too strong.

The IKMT is equipped with a net bag of MOnyl with 500 micron mesh size. The mouth opening of the net comes to 7 m<sup>2</sup>, the overall length is 10 meters. The fine-meshed net is supported by a coarsemeshed covering net and 5 webbings along the net.

TECHNICAL D	АТА
Material	Depressor and spreader bar: Aluminium Net bag: MOnyl (PA) Covering net: Nylon, 40 mm mesh size
Dimensions of net bag	10 m x 2 m x 2.6 m (l x w x h)
Dimensions of depressor:	0.65 m x 3 m x 0.8 m (l x w x h)
Weight	approx. 120 kg
Mouth opening	7 m <sup>2</sup>
Mesh size	500 microns (or as per choice between 500 and 1500 microns).

ORDERING IN	ORDERING INFORMATION	
Products		
438 250	IKMT Isaacs-Kidd Midwater Trawl Net, 500 microns mesh size	
Spare Parts		
438 252	Spare Net Part of MOnly, 500 micron mesh size	
438 255	Spare Covering Net of 40 mm mesh size	

# **TECHNICAL DATA**

Material	Tube frame: Stainless steel Net bag: MOnyl (PA) Net bucket: PVC
Dimensions	275 cm x 100 cm x 70cm (I x w x h)
Weight	70 kg
Mouth opening	20 cm dia./0.03142 m <sup>2</sup>
Mesh size	405 microns (or as per choice between 100 and 1500 mircons)

ORDERING INFORMATION	
Products	
438 410	<ul> <li>High Speed Plankton Collector "Nack</li> <li>1. Metal frame - sides to net open</li> <li>2. Net Part consisting of: <ul> <li>a) Ring Bond of Nylon webbing with zip</li> <li>b) Net Bag with zip fastener, conical, fin of synthetic material, mesh 405 mid</li> </ul> </li> <li>3. Plastic Net Bucket, consisting of: <ul> <li>a Fixing Ring with over centre fastenee</li> <li>b) PVC-Net Bucket with side window, of</li> </ul> </li> <li>4. V-Fin Depressor with steel rope and side</li> </ul>
Accessories	
438 110	Mechanical Flow Meter
Spare Parts	
438 412	Spare Net Bag for High Speed Plankton
438 955/B	PVC-Net Bucket with side window, cove
438 416	V-Fin Depressor with steel rope and sha

#### ABOUT

The High Speed Plankton Collector "Nackthai" has been developed to catch mobile organisms with increased efficiency.

It consists of a 150 cm long net bag, protected by a robust but light-weight tube frame with conical nose of 20 cm inlet diameter. Three plastic fins guarantee for stable orientation during the operation. A 22 kg V-Fin depressor is used to create negative lift at the instrument.

For easy retrieval the sample is concentrated inside a removable plastic net bucket with side window (covered with sieve gauze). The "Nackthai" can be used together with one Mechanical Flow Meter to measure the filtered water volume.

No bridles or other towing devices precede the mouth of the net so that organisms are not being "warned". The mouth opening of the net is unobstructed Due to the low weight of the frame the "Nackthai"

can easily be handled even under rough weather conditions.

#### kthai"

zip fastener front opening 38 cm, back opening 11 cm, length 150 cm, nicron

ners for attaching to the net end covered with sieve gauze shackle, weight 22 kg

n Collector "Nackthai", 405 microns

vered with sieve dauze

shackle, weight 22 kg





## **Ring Trawl (CalCOFI) Net**

Oceanographic net for horizontal or oblique tows in CalCOFI design

#### ABOUT

Based on the design of California Cooperative Oceanic Fisheries Investigations (CalCOFI), the Ring Trawl Net today is the standard non-opening/non-closing plank-



ton net for quantitative sampling of larger volumes of water during horizontal or oblique tows. The 100 cm diameter stainless steel ring, equipped with a 4 meter long net bag should be operated in conjunction with a 22 kg V-Fin depressor to create negative lift at the instrument. For easy retrieval the sample is concentrated inside a removable plastic net bucket with side window (covered with sieve gauze). A Mechanical Flow Meter can be fixed in the net to measure the filtered water volume.

TECHNICAL DATA	
Material	Net ring: Stainless steel Net bag: MOnyl (PA) Net bucket: PVC
Dimensions	100 cm x 400 cm (dia. x l)
Weight	19 kg
Mouth opening	100 cm dia. / 0.7854 m²
Mesh size	500 microns (or as per choice between 100 and 1500 mircons)

ORDERING IN	FORMATION	
Products		
438 700	<ul> <li>Ring Trawl (CalCOFI) Net</li> <li>1. Bridle with thimble and shackles</li> <li>2. Net ring of stainless steel, with Nylon webbing and zip fastener</li> <li>3. Net Part consisting of: <ul> <li>a) Net Part with zip fastener, cylindrical, diameter 1m, length 1 m, 500 microns</li> <li>b) Net Part, conical, upper diameter 1 m, lower diameter 11 cm, length 3 m, 500 microns</li> </ul> </li> <li>4. Plastic Net Bucket, consisting of: <ul> <li>a) Fixing Ring with over centre fasteners for attaching to the end of a net</li> <li>b) PVC-Net Bucket with side window, covered with sieve gauze</li> </ul> </li> </ul>	
Accessories		
438 416	V-Fin Depressor with steel rope and shackle, weight 22 kg	
438 110	Mechanical Flow Meter for counting the amount of water passing through the net	
438 703	Net Part for Ring Trawl (CalCOFI) Net with bolt rope for Soft Net Bucket	
438 935	Mounting ring for Soft Net Bucket	
438 930	Soft Net Bucket with bolt rope	
Spare Parts		
438 702	Spare Net Part for Ring Trawl (CalCOFI) Net, 500 microns	
438 955	<ul> <li>Spare Plastic Net Bucket, consisting of:</li> <li>a) Fixing Ring with over centre fasteners for attaching to the end of a net</li> <li>b) PVC-Net Bucket with side window, covered with sieve gauze</li> </ul>	

## **Bongo Net**

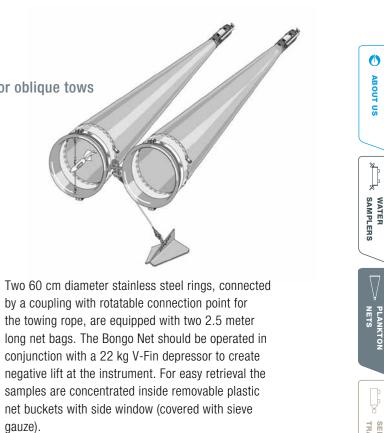
Oceanographic double-ring net for horizontal or oblique tows

#### ABOUT

The double-ring construction not only avoids disturbances usually caused by the towing bridles fixed in front of the mouth opening of non-opening/non-closing plankton nets but it allows the investigator to work with two different mesh sizes at a time.

TECHNICAL DATA	
Material	Net rings and coupling: Stainless steel Net bag: MOnyl (PA) Net bucket: PVC
Dimensions	250 cm x 135 cm x 60 cm (I x w x h)
Weight	20 kg
Mouth opening	2 x 60 cm dia./2 x 0.2827m <sup>2</sup>
Mesh size	500 microns (or as per choice between 100 and 1500 mircons)

ORDERING INFORMATION	
Products	
438 750	<ul> <li>Bongo Net</li> <li>1. Double Net ring of stainless steel, with</li> <li>2. Two Net Parts (one per ring) with zip f lower diameter 11 cm, length 250 cm</li> <li>3. Two Plastic Net Buckets, each consist a) Fixing Ring with over centre fasten b) PVC-Net Bucket with side window,</li> <li>4. Distance Rod for Plastic Net Buckets</li> </ul>
Accessories	
438 416	V-Fin Depressor with steel rope and sh
438 110	Mechanical Flow Meter for counting the
438 753	Net Part for Bongo Net (one single net)
438 935	Mounting ring for Soft Net Bucket
438 930	Soft Net Bucket with bolt rope
Spare Parts	
438 752	Spare Net Part (one single net), 500 mi
438 150	Spare Plastic Net Bucket, consisting of a) Fixing Ring with over centre faster b) PVC-Net Bucket with side window



Use the Bongo Net in conjunction with two Mechanical Flow Meters to measure the filtered water volume.

ith Nylon webbings and zip fasteners fastener, conical, upper diameter 60 cm, cm, 500 micron sting of: ners for attaching to the end of a net v, covered with sieve gauze

shackle, weight 22 kg

the amount of water passing through the net

with bolt rope for Soft Net Bucket

nicrons

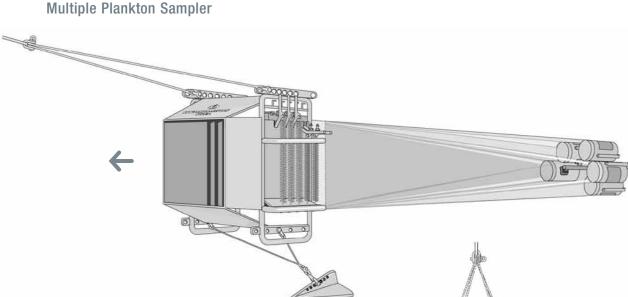
of:

eners for attaching to the end of a net w, covered with sieve gauze





## **MultiNet**



#### ABOUT

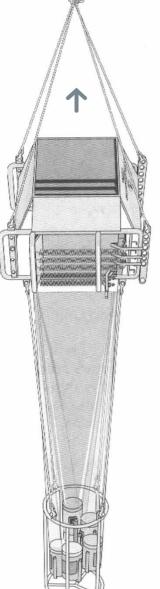
Smart Sampling at its best – with the improved MultiNet generation of the Multiple Plankton Sampler, the world's leading sampling system for horizontal, oblique and vertical collections in successive water layers.

The MultiNet can be delivered in 4 sizes (apertures): Mini (0.125 m<sup>2</sup>), Midi (0.25 m<sup>2</sup>), Maxi (0.5 m<sup>2</sup>) and Mammoth (1 m<sup>2</sup>).

Depending on the model 5 or 9 net bags are attached to the stainless steel frame with strong canvas part by means of zip fasteners. The net bags are opened and closed by means of levers which are triggered by a battery powered Motor Unit. The commands for actuation of the net bags are given via single or multi-conductor cable between the Underwater Unit and the included Deck Command Unit.

A wide selection of mesh sizes for the net bags is available to meet the requirements of all standard and non-standard applications. For common horizontal collections a mesh size of 300 microns is recommended (mesh sizes from 100 to 780 microns available), for vertical collections mesh sizes from 55 to 780 microns are applicable.

An integrated Pressure Sensor (measuring range according to customers' requirements) allows continuous supervision of the current operating depth. Depth values and all relevant system data are shown on the LCD-display of the Deck Command Unit. Two Electronic Flow Meters with automatic angle compensation are mounted to the Underwater Unit:



#### **FEATURES**

- Horizontal and vertical sampling with one single instrument
- Combined online/offline use (standard)
- Bi-directional communication
- Standard depth range 3000 m
- Long distance FSK-telemetry (> 10000m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°
- EC-conformity (CE) EN 50081-1, EN 50082-1
- Expandable range of sensors

one inside the frame for the determination of the amount of water passing through the open nets, one outside the opening for the determination of clogging effects.

For horizontal collections a V-Fin Depth Depressor is attached to the MultiNet. To carry out vertical collections, a stainless steel support is securely attached to the net buckets and enables a quick lowering to depth.







#### Operation

In its initial position the MultiNet is brought to water with all net bags closed and the water flowing freely through the frame. The instrument can be lowered with high speed to the greatest desired depth. There the first net bag is opened by push-button control from the Deck Command Unit.

At the end of the horizontal collection resp. after passing the intended depth interval in case of vertical operation, the first net bag is closed by a second command.

The second net is opened simultaneously. This procedure is repeated for the remaining net bags and the Deck Command Unit indicates the number of the currently active net bag.

During operations of Mini and Midi versions the last net (no. 5) remains open to collect plankton from the smallest desired depth up to the water surface. Using the Maxi and Mammoth versions the last net (no. 9) can be closed before reaching the water surface.

#### Offline Use

In case that a conducting cable is not available on board, the required sampling depth can be preprogrammed via personal computer. The activation of the net bags is then carried out automatically according to the pre-selected depth intervals. All measuring data are stored inside the internal data memory of 16 MByte during the operation and can be read out by a PC when the MultiNet is back on board.









#### ACCESSORIES

#### CT-Set

Together with the optional CT-Set the system offers the full capability of a state-of-the-art oceanographic CTD probe. The CT-Set consists of one conductivity sensor, one temperature sensor and an additional electronics board which are completely integrated into the Motor Unit of the MultiNet. From the CTD data the system computes salinity, density and sound velocity according to UNESCO formulas.

## Pitch and Roll Sensor

The Pitch and Roll Sensor has been developed for measurements of pitch angle and roll angle of the

Underwater Unit of the MultiNet. It allows continuous supervision of the current orientation during horizontal operations.

#### **OPTIONS**

- > Additional sensors of various parameters
- Special version for operational depths down to 6000 metres

TECHNICAL DA	ATA			
Underwater Unit	Type Mini No. 438 120	Type Midi No. 438 130	Type Maxi No. 438 140	Type Mammoth No. 438 180
Dimensions (w x l x h)	65 cm x 90 cm x 80 cm	80 cm x 90 cm x 95 cm	120 cm x 110 cm x 135 cm	150 cm x 120 cm x 160 cm
Net opening	35.5 cm x 35.5 cm = 0.125 m <sup>2</sup>	50  cm x 50  cm = 0.25 m <sup>2</sup>	71 cm x 71 cm = $0.5 \text{ m}^2$	100  cm x 100  cm = 1 m <sup>2</sup>
Net Bags	5 pcs., length: 160 cm	5 pcs., length: 250 cm	9 pcs., length: 365 cm	9 pcs., length: 550 cm
Standard mesh size	300 microns	300 microns	300 microns	300 microns
Plastic Net Buckets	5 pcs., 11 cm dia.	5 pcs., 11 cm dia.	9 pcs., 11 cm dia.	9 pcs., 11 cm dia.
Soft Net Buckets	5 pcs., 11 cm dia.	5 pcs., 11 cm dia.	9 pcs., 11 cm dia.	9 pcs., 11 cm dia.
Overall length ready for operation (from bridle to net bucket	470 cm	560 cm	800 cm	1000 cm
Weights				1
Net Frame	approx. 75 kg	approx. 100 kg	approx. 260 kg	approx. 390 kg
Stainless Steel Support	approx. 30 kg	approx. 50 kg	approx. 70 kg	approx. 100 kg
V-Fin Depth Depressor	approx. 22 kg	approx. 22 kg	approx. 70 kg	approx. 70 kg
Materials				
Net frame	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Motor Unit and Battery Housing	Titanium	Titanium	Titanium	Titanium
Net Bags	Polyamide	Polyamide	Polyamide	Polyamide
Net Buckets	PVC/Canvas	PVC/Canvas	PVC/Canvas	PVC/Canvas
V-Fin Depth Depressor	Aluminium, lead-weighted	Aluminium, lead-weighted	Aluminium, lead-weighted	Aluminium, lead-weighted
Operational Depth	Standard 3000 metres	Standard 3000 metres	Standard 3000 metres	Standard 3000 metres
Pressure Sensor	Standard 3000.0 dbar $\pm$ 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar $\pm$ 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar $\pm$ 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar $\pm$ 0.1% f.s. (other ranges on request)
Offline-Set	Data memory: 16 MB	Data memory: 16 MB	Data memory: 16 MB	Data memory: 16 MB
Electronic Flow Meter	2 pcs., 0.0 9.9 m/s	2 pcs., 0.0 9.9 m/s	2 pcs., 0.0 9.9 m/s	2 pcs., 0.0 9.9 m/s
<b>Connection Plug</b>	SUBCONN IL 2 M	SUBCONN IL 2 M	SUBCONN IL 2 M	SUBCONN IL 2 M
Cable Counter Plug	SUBCONN IL 2 F	SUBCONN IL 2 F	SUBCONN IL 2 F	SUBCONN IL 2 F
Cable connection	onnection Electro-mechanical single- or multi-conductor cable, one pole can be in contact with sea water			





**0** 41

Towing Cables	Type Mini No. 438 120	Type Midi No. 438 130	Type Maxi No. 438 140	Type Mammoth No. 438 180
Breaking load for shallow water applications (up to 500 m)	approx. 1500 kg	approx. 2000 kg	approx. 4000 kg	approx. 8000 kg
for deep sea applications (from 500 m up to 3000 m)	approx. 5000 kg	approx. 8000 kg	approx. 12000 kg	approx. 18000 kg
Max. cable resistance (go- and-return line)	1000 Ohms	1000 Ohms	1000 Ohms	1000 Ohms
Deck Command Unit:	Metal housing for use in 19" rack or as table housing, not for use on deck; push-button control for net changing; indication of net number, pressure, battery status, Supertwist LCD-display with LED backlight; Interface for Personal Computer (RS 232)			
Power Supply				
Underwater Unit	3 Lithium Batteries DL	123 A/3V, sufficient for ap	oprox. 100 hours operation	n
Deck Command Unit	85 - 260 VAC	85 - 260 VAC	85 - 260 VAC	85 - 260 VAC
Towing Speed	Recommended for nets with 300 microns standard mesh size			
Horizontal Collections	max. 4 knots	max. 4 knots	max. 4 knots	max. 4 knots
Vertical Collections	max. 1 m per sec.	max. 1 m per sec.	max. 1 m per sec.	max. 1 m per sec.
The single- or multi-conductor cable is not included in our scope of delivery.				

The single- or multi-conductor cable is not included in our scope of delivery.

ORDERING INFORMATION	
Products	
438 120	MultiNet Type Mini, 0.125 m <sup>2</sup>
438 130	MultiNet Type Midi, 0.25 m <sup>2</sup>
438 140	MultiNet Type Maxi, 0.5 m <sup>2</sup>
438 180	MultiNet Type Mammoth, 1 m <sup>2</sup>
Accessories	
450 500	CT-Set for MultiNetConductivity sensor: $0 \dots 65 \pm 0.01 \text{ mS}_{2}$ Temperature sensor: $-2 \dots +32 \pm 0.005^{\circ}$ Data rate:1 Hz (1 data set per
438 161	Pitch and Roll SensorChannel Pitch: $+ 60^{\circ} \dots - 60^{\circ} \pm 1^{\circ}$ relateChannel Roll: $+ 60^{\circ} \dots - 60^{\circ} \pm 1^{\circ}$ relate
Spare Parts	
438 123	Spare Net Part (one single net) for MultiN
438 127	Spare Canvas Part for MultiNet Type Mini
438 133	Spare Net Part (one single net) for MultiN
438 137	Spare Canvas Part for MultiNet Type Mid
438 143	Spare Net Part (one single net) for MultiN
438 147	Spare Canvas Part for MultiNet Type Max
438 183	Spare Net Part (one single net) for MultiN
438 187	Spare Canvas Part for MultiNet Type Mar
438 150	Spare Plastic Net Bucket, consisting of: a) Fixing Ring with over centre fasteners b) PVC-Net Bucket with side window, co
438 930	Soft Net Bucket with bolt rope
438 935	Mounting ring for Soft Net Bucket
438 116	Electronic Flow Meter for MultiNet



	ABOUT US
mS/cm, )05°C per second)	WATER SAMPLERS
elated to the horizontal elated to the horizontal ultiNet Type Mini	PLANKTON NETS
Mini IltiNet Type Midi Midi IltiNet Type Maxi Maxi	SEDIMENT TRAPS
IltiNet Type Mammoth Mammoth of: ners for attaching to the end of a net <i>I</i> , covered with sieve gauze	BOTTOM SAMPLERS



PLANKTON EXAMINATION

## Sediment Trap acc. to Saarso

**Cylindrical Sedimentation Vessel** 



#### ABOUT

Sediment Traps are containers that allow to quantify sinking particulate matters in aquatic environments. Our tubular design provides a relatively small sampling area but allows suspended matters to settle without the risk of being flushed out even under turbulent environmental conditions (as it happens with large-area conical traps).

The Sediment Trap has been designed for autonomous operation in aquatic environments with relatively high vertical particulate flux value. The instrument does not need heavy moorings. Two wide clamps simplify its use in vertical series attached to the same mooring line. Each trap is equipped with a dismountable baffle grid at the opening to reduce turbulences, avoiding wash out of the sediment from the upper part of the cylinder. The water above the collecting bottle can be drained via two cocks. The transparent funnel bottom enables to check for re-suspension of sediment from the collecting bottle after recovery.

#### **TECHNICAL DATA**

LEONNOAL DATA	
Opening area	0.015 m <sup>2</sup>
Cylinder diameter	140 mm
Cylinder length	560 mm
Total length	900 mm
Diameter to length ratio	1:4
Cone angle	40°
Grid dimensions	20 x 20 x 40 mm
Mooring line diameter	6 mm
Material	PVC, PE
Weight in air/ water	3 kg /1 kg

ORDERING INFORMATION	
Products	
444 000	Sediment Trap (Single bottle version)
Spare Parts	
444 150	<b>Spare Collecting Bottles</b> 250 ml with screw cap (1 set of 24 pcs.)

## **Multi Sediment Trap**

## Cylindrical Sedimentation Vessel with Collecting Bottle Revolver

#### ABOUT

The rugged titanium array of the Multi Sediment Trap encapsulates the singular standard Sediment Trap (444 000) together with a motor-driven rotary table that can accommodate 6, 12 or 24 plastic collecting bottles.

The instrument has been designed as a light and handy instrument for autonomous operations in lakes, continental shelf and aquatic environments with relative high vertical particulate flux value. It has proven its reliability during numerous long-time operations in arctic, antarctic, tropic and sub-tropic environments. The instrument does not need heavy moorings and can be easily deployed and recovered from smaller vessels.

The cylindrical trap is equipped with a dismountable baffle grid at the opening to reduce turbulences, avoiding wash out of the sediment from the upper part of the cylinder. The inside of the trap is completely metal-free.

#### **FEATURES**

- Titanium array
- Compact size and low weight
- Standard depth range 3000 m
- Low power consumption
- Electronics operate from -40°C up to +85°C
- > EC-conformity (CE) EN 50081-1, EN 50082-1







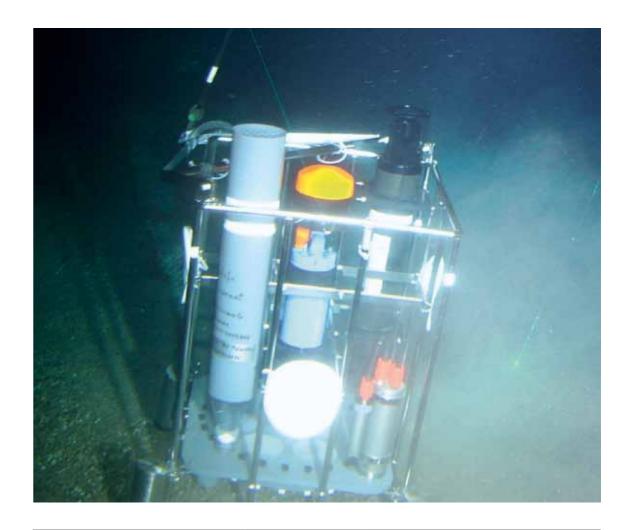
The tubular design of our Sediment Trap provides a relatively small sampling area but cares for reliable sedimentation of suspended matters even under turbulent environmental conditions. It avoids the risk of re-suspension of the sample as it can regularly be detected inside large-area conical sediment traps. The collecting bottles of the Multi Sediment Trap are isolated from the surrounding environment when inactive. During deployment and recovery operations the trap bottom is open allowing a free flow through the body.





Power supply is made by 3 long-time lithium batteries, placed inside an external battery housing. The operation schedule is programmed via PC by using OceanLab 3 software. Preselect active periods for the collecting bottles from 1 minute up to 8760 hours in real time (year, month, day, hour, minute) or as individual time intervals (hours and minutes).





#### **TECHNICAL DATA**

Material	PVC, PE, PTFE, Titanium			
Operational depth	Standard 3000 m, optional 6000 m			
Number of samples	Dimensions	Height	Weight on air	Weight in water
6 bottles	320 mm dia.	1200 mm	12 kg	5 kg
12 bottles	520 mm dia.	1040 mm	25 kg	10 kg
24 bottles	800 x 800 mm	1000 mm	45 kg	20 kg

#### **ORDERING INFORMATION** Products 444 101 Multi Sediment Trap, 6 bottle version 444 121 Multi Sediment Trap, 12 bottle version 444 141 Multi Sediment Trap, 24 bottle version Spare Parts 444 150 Spare Collecting Bottles 250 ml with screw cap (1 set of 24 pcs.) 444 160 **Spare Lithium Batteries** (1 set = 3 pcs.)





# Bottom Sampler acc. to Ekman-Birge

Box-shaped sediment sampler with spring-loaded jaws

#### ABOUT

The Bottom Sampler acc. to Ekman-Birge is a quantitative sampler with precise sampling area to achieve nearly undisturbed samples in soft grounds. It consists of a sturdy-walled metal cabinet equipped with two spring-loaded jaws which will be released by a messenger. Two light plates cover the top opening of the sampler to prevent the sample from being washed out during ascent.



#### **ORDERING INFORMATION**

Products	
437 200	<b>Bottom Sampler acc. to Ekman- Birge,</b> incl. messenger Material: <b>Powder-coated brass</b> Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 3.5 kg
437 201	Bottom Sampler acc. to Ekman- Birge, incl. messenger with perforated stainless steel plate for macrozoobenthos acc. to EU-WFD Material: Powder-coated brass Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 3.5 kg
437 210	Bottom Sampler acc. to Ekman- Birge, incl. messenger lead-weighted to achieve greater penetration depths Material: Powder-coated brass Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 7.5 kg

7	201	

437 212	<b>Bottom Sampler acc. to Ekman- Birge,</b> incl. messenger Material: <b>Stainless steel</b> Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 3.5 kg
437 213	Bottom Sampler acc. to Ekman- Birge, incl. messenger lead-weighted to achieve greater penetration depths Material: Stainless steel Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 7.5 kg
437 214	<b>Bottom Sampler acc. to Ekman- Birge, large model,</b> incl. messenger Material: <b>Stainless steel</b> Box size: 20 x 20 x 35 cm Grasping area: 400 cm <sup>2</sup> Weight: 7 kg
437 215	Bottom Sampler acc. to Ekman- Birge, large model, incl. messenger lead-weighted to achieve greater penetration depths Material: Stainless steel Box size: 20 x 20 x 35 cm Grasping area: 400 cm <sup>2</sup> Weight: 11 kg
Spare Parts	
440 000	<b>Spare Messenger</b> for releasing the closing mechanism, with 6 mm bore. Weight 400 g
	437 213 437 214 437 215 Spare Parts

# **Bottom Sampler acc. to Lenz**

Box-shaped sediment sampler with dividing sheets

#### ABOUT

The Bottom Sampler acc. to Lenz is a modified version of the Ekman-Birge model. This precise quantitative sampler is equipped with dividing sheets to separate the sample into 5 layers of 20 mm thickness. These layers can then be removed separately for individual examination. The Lenz sampler consists of a sturdy-walled metal cabinet equipped with two spring-loaded jaws which are released by a messenger. Two light plates cover the top opening of the sampler to prevent the sample from being washed out during ascent.

# 437 310

ORDERING INFORMATION	
Products	
437 310	<b>Bottom Sampler acc. to Lenz,</b> incl. me Material: Powder-coated brass Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 5 kg
437 315	<b>Bottom Sampler acc. to Lenz,</b> incl. me <b>lead-weighted</b> to achieve greater penet Material: Powder-coated brass Box size: 15 x 15 x 20 cm Grasping area: 225 cm <sup>2</sup> Weight: 9 kg
Spare Parts	
440 000	Spare Messenger for releasing the clos





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sing mechanism, with 6 mm bore. Weight 400 g



## **Rod-Held Closing Mechanism**

Special Closing Mechanism for Bottom Samplers acc. to Ekman-Birge and Lenz



#### ABOUT

In shallow waters the Bottom Samplers acc. to Ekman-Birge and Lenz can easily be operated with the Rod-Held Closing Mechanism. The samplers will be pushed by hand into the water bed and then released by the closing mechanism of the sampler. Any rod with a diameter of 20 mm can be used.

ORDERING INFORMATION	
Products	
437 320	Special Closing Mechanism for Bottom Samplers acc. to Ekman-Birge and Lenz Material: Powder-coated and nickel-plated brass Weight: 400 g

## **Bottom Sampler acc. to Van Veen**

**Clamshell-shaped bottom sampler** 

#### ABOUT

The Bottom Sampler acc. to Van Veen is a qualitative sampler to achieve low-disturbed sediment samples in soft or medium hard grounds from any desired depth. It consists of two clamshell jaws connected by a hinge.

During descent both levers are locked wide apart and the jaws are open. Upon touching the water bed the locking mechanism is released and when the rope is pulled taut to raise the sampler the jaws close. During retrieval the jaws are holding the sample and prevent sample wash-out.



ORDERING INFORMATION		
Products		
437 330	Bottom Sampler acc. to Van Veen, small model Material: Stainless steel Grasping area: 250 cm2 Overall dimensions: approx. 20 x 30 x 60 (cm) Weight: approx. 5.5 kg	
437 332	<b>Bottom Sampler acc. to Van Veen, large model</b> Material: Stainless steel Grasping area: 1000 cm2 Overall dimensions: approx. 35 x 42 x 90 (cm) Weight: approx. 25 kg	
437 333	<b>Bottom Sampler acc. to Van Veen, heavy model</b> Material: Stainless steel Grasping area: 1250 cm2 Overall dimensions: approx. 36 x 45 x 90 (cm) Weight: up to 65 kg	

## **Sediment Corer**

Tube-shaped bottom sampler for soft and sandy grounds



## **TECHNICAL DATA**

Material	stainless steel, PVC, plexiglass
Dimensions	100 mm dia. x 1000 mm length
Core tube size	600 mm length, 70 mm inner dia.
Weight	6 kg

ORDERING INFORMATION	
Products	
437 400	Sediment Corer incl. transparent plexiglass core tube
Accessories	
437 410	<b>Transverse Bar</b> to be fixed onto the stirrup for sampling by hand
Spare Parts	
437 405	Replacement Core Tube, made of plexiglass
437 406	Special Core Tube, made of stainless steel

#### ABOUT

The Sediment Corer is easy to handle and can be operated manually in shallow waters with a push rod or on a rope simply using gravity in greater water depths. During descent the plastic valve flap on top of the transparent plexiglass tube is held open to let the water flow freely through the tube. To retrieve the sample the corer is lifted from the sediment and the water pressure at the valve flap closes the tube. A vacuum is holding the sediment sample in place and is preventing washout. Out of the water the provided piston is put into the lower end of the tube. The tube holder with rope stirrup is taken off and the tube with the core sample is placed onto the piston. When the tube is now pressed onto the piston the core sample will be removed for examination.







## **Mechanical Flow Meter**

#### Mechanical counter to quantify water filtered by plankton nets



#### ABOUT

The main application of the Mechanical Flow Meter is the **determination of the amount of water passing through a plankton net.** Additionally it may be used in stationary applications such as flow monitoring of rivers and outfalls.

They use a three-blade impeller, directly coupled to a five-digit counter which records the revolutions of the impeller.

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438 115

# The Mechanical Flow Meter is available in two versions:

For horizontal operations use the basic version without back-run stop.

For vertical operations use the Mechanical Flow Meter with back-run stop. This avoids faulty measurements caused by reverse counting during descent.

TECHNICAL DATA	
Hydraulic pitch	0.3 m per revolution
Range of counter	99999 revolutions
Impeller diameter	75 mm
Material	Plastics, titanium

#### **ORDERING INFORMATION**

	Products	
	438 110	Mechanical Flow Meter without back-run stop
	438 115	Mechanical Flow Meter with back-run stop

## **Rod Held Current Meter RHCM**

Portable flow velocity indicator

spread sheet and database software.

#### ABOUT

This portable device is a point-by-point measuring instrument for **assessing the current speeds in running waters.** The RHCM consists of a hydrometric three-blade impeller at the lower end of a telescopic rod and a splash-proof Hand Terminal. The measuring head can be angled up to  $\pm 90^{\circ}$ . The measuring values are displayed together with a date and time stamp on a hand terminal. They can be stored and transferred to a PC by means of the software OceanLab 3. At the PC the measuring files are stored in ASCII format for processing with current word processing,

TECHNICAL DATA	
Measuring range	0.100 9.999 m/s
Resolution	0.001 m/s
Accuracy	± 1 % (0.50 9.99 m/s) ± 5 % (0.10 0.499 m/s)
Measuring cycle	5 to 30 s (user adjustable)
Memory	4000 measuring values
Ambient temperature	0°C 50°C
Submerging depth of measu- ring head	10 m
Hand Terminal	splash-proof IP 65
EC-Conformity (CE)	EN 50081-1, EN 50082-1
Power supply	Battery 9 V (PP3) or external: 712 V, max.12 mA

## **ORDERING INFORMATION**

Products	
445 500	Rod Held Current Meter RHCM with telescopic rod 2 x 110 cm (220 cm)
445 505	Rod Held Current Meter RHCM with telescopic rod 3 x 100 cm (300 cm)
445 510	Rod Held Current Meter RHCM with telescopic rod 3 x 133 cm (399 cm)
445 515	Rod Held Current Meter RHCM with telescopic rod 3 x 150 cm (450 cm)

#### **OPTIONS**

- Data memory up to 4 MByte
- Mains supply circuit
- Submerging depth of the measuring head up to 100 meters using a cable (without Telescopic Rod).







## **Depth Meter for Online/Offline Operation**

Handy precision pressure transmitter and recorder



#### **FEATURES**

- Combined online/offline use
- Compact size and low weight
- Bi-directional communication
- Standard depth range 3000 m
- Long-distance FSK-telemetry (>10000 m)
- Low power consumption
- > Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°C
- > EC-conformity (CE) EN 50081-1, EN 50082-1

#### ABOUT

This light and handy measuring instrument provides accurate pressure data during operations of plankton nets, water samplers and other sampling equipment in limnological and oceanographic applications. It can be used in online mode with integrated long-distance telemetry via electro-mechanical towing cables as well as in self-contained mode with data recording inside its internal data memory.

The system consists of a titanium pressure housing with integrated sensor, electronics, rechargeable batteries. A splash-proof hand unit is the link between underwater unit and PC during online operations. The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from  $-40^{\circ}$ C up to  $+85^{\circ}$ C.

The maximum operational depth is 3000 meters. The Depth Meter is delivered with the data acquisition software OceanLab 3, an easy-to-use package for pre-deployment system set-up, real-time data acquisition, data visualisation, storing and export.

TECHNICAL DATA	
Measuring range	0 3000 dbar $\pm$ 0.1% f.s.
Data memory	4 MByte, sufficient for 290 hours recording
Data sampling rate	1 Hz (one data set per second)
Telemetry connector:	SUBCONN IL 2 M
Dimensions	45 mm dia. x 230 mm
Weight	1 kg
Material	Titanium
Hand Unit	Plastic housing, splash-proof (IP65), battery powered, LC-display 4 x 20 characters, interface for PC (RS-232)

ORDERING INFORMATION	
Products	
	Depth Meter for online/offline
450 400	operation incl. hand unit, battery
	charger and OceanLab 3 software

## **Depth Meter with 2 Flow Meters for Online Operation**

Handy precision pressure, flow velocity and volume data transmitter



#### ABOUT

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This light and handy measuring instrument provides accurate pressure, flow velocity and volume data during operations of plankton nets for limological and

TECHNICAL DATA	
Measuring range pressure	0 3000 dbar $\pm$ 0.1% f.s.
Measuring range velocity	0.1 9.9 m/s
Accuracy velocity	± 1% (0.5 9.9 m/s) ± 5% (0.1 0.5 m/s)
Measuring range volume	0.0 6500.0 m <sup>3</sup> (net opening below 0.25 m <sup>2</sup> ) 0.0 65000 m <sup>3</sup> (net opening above 0.25 m <sup>2</sup> )
Data sampling Rate	1 Hz (one data set per second)
Telemetry connector	SUBCONN BH 2 M
Dimensions	75 mm dia. x 350 mm
Weight	4 kg
Material	Titanium (pressure tube), stainless steel (flow meters)
Hand Unit	Plastic housing, splash-proof (IP 65), battery powered, LC-display 4 x 20 characters, interface for PC (RS-232)

#### **ORDERING INFORMATION**

Products	
50 401	Depth Meter with 2 Electronic Flow Meters for online operation
50 401	incl. hand unit, battery charger and OceanLab 3 software

oceanographic applications. The 2 Electronic Flow Meters to measure flow velocity and volume are ideal to be operated with either single-ring plankton nets or double-ring plankton nets.

The integrated long-distance telemetry can be used via electro-mechanical towing cables of more than 10000 m length.

The system consists of a titanium pressure housing with integrated pressure sensor, electronics, rechargeable batteries and two Electronic Flow

Meters. A splash-proof hand unit is the link between underwater unit and PC during the operations.

The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from  $-40^{\circ}$ C up to  $+85^{\circ}$ C.

The system is rated to a maximum operational depth of 3000 meters.

The Depth Meter is delivered with the data acquisition software OceanLab 3, an easy-to-use package for pre-deployment system set-up, real-time data acquisition, data visualisation, storing and export.

#### **FEATURES**

- Compact size and low weight
- Bi-directional communication
- Standard depth range 3000 m
- Long-distance FSK-telemetry (>10000 m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°C
- EC-conformity (CE) EN 50081-1, EN 50082-1



INSTRUMENTS

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## **Net Probe CTD with 2 Electronic Flow Meters**

Classic conductivity, temperature and pressure measurement in combination with flow velocity and volume data acquisition



#### ABOUT

The Net Probe is unique! It is the only CTD probe which is equipped with 2 Electronic Flow Meters for accurate measurement of flow velocity and volume data during plankton net operations. Ideal both for single-ring and double-ring plankton nets. Either to be used in online mode with long-distance telemetry via electro-mechanical towing cables or in self-contained mode with data recording inside its internal data memory.

## FEATURES

- Combined online/offline use
- Bi-directional communication
- Standard depth range 3000 m
- Long-distance FSK-telemetry (>10000 m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°C
- EC-conformity (CE) EN 50081-1, EN 50082-1
- Expandable range of sensors

The system consists of a titanium pressure housing with integrated conductivity, temperature and pressure sensor, measuring electronics, 2 Electronic Flow Meters and a Deck Command Unit. This is the link between underwater unit and PC during online operations and displays the measuring data of the probe in clear text.

Power supply of the underwater unit is made by 3 long-time lithium batteries placed in an external removable battery pack. Batteries can easily be replaced without opening the main electronics housing which eliminates the risk of water ingress and corrosion of the electronics board.

The state-of-the-art electronics, optimised in power consumption, are designed for ambient temperatures from  $-40^{\circ}$ C up to  $+85^{\circ}$ C.

The system is rated to a maximum operational depth of 3000 meters.

The Net Probe is delivered with the data acquisition software OceanLab 3 – an easy-to-use package for pre-deployment system set-up, real-time data acquisition, data visualisation, storing and export.



#### **TECHNICAL DATA Pressure sensor** $0 \dots 3000 \text{ dbar} \pm 0.1\% \text{ f.s.}$ Conductivity $0 \ ... \ 65 \pm 0.01 \ \text{mS/cm}$ sensor Temperature -2 ... +32 ± 0.005 °C sensor Measuring 0.1 ... 9.9 m/s range velocity Accuracy ± 1% (0.5 ... 9.9 m/s) velocity ± 5% (0.1 ... 0.5 m/s) Measuring 0.0 ... 6500.0 m3 (net opening below 0.25 0.0 ... 65000 m3 (net opening above 0.25 range volume Data sampling 1 Hz (one data set per second) rate **Data memory** 16 MByte Telemetry SUBCONN IL 2 M connector Dimensions approx. 10 x 16 x 48 cm Weight 7 kg Material Titanium (pressure tube and battery pack) Metal housing for use in 19"-rack or as ta **Deck Command** LCD-display with LED backlight, interface Unit power supply: 85 - 260 V AC

ORDERING INFORMATION	
Products	
450 100	Net Probe CTD with 2 Electronic Flow Me



## **OPTIONS**

- > Additional sensors of various parameters
- > Operational depth down to 6000 meters

5 m²) 5 m²)	
), stainless steel (flow meters)	
able housing, indication of sensor data, battery status, for Personal Computer (RS 232),	

Neters incl. Deck Command Unit





# **Counting Chamber for Zooplankton**

Tray for easy enumeration of large amounts of zooplankton

#### ABOUT

Based on the Bogorov design the Counting Chambers for Zooplankton have been designed for easy enumeration of large amounts of zooplankton. A plexiglass block with

precisely machined grooves and a polished bottom provides best possible transparency. Due to the small dimensions all chambers can be used with stereo microscopes. The standard models are manufactured with grooves in meander profile.



The Ballast Water models, modified by Gollasch, are manufactured with grooves in line pattern, bisect line pattern and grid pattern. This very much alleviates the use of the chambers on moving vessels even under choppy sea conditions.

## **ORDERING INFORMATION** Products

435 010	Standard Counting Chamber for Zooplankton dimensions 40 x 70 (mm), 9 ml
435 011	Standard Counting Chamber for Zooplankton dimensions 80 x 100 (mm), 22 ml
435 012	Standard Counting Chamber for Zooplankton dimensions 80 x 140 (mm), 70 ml
435 011 A	Modified Counting Chamber acc. to Gollasch dimensions 80 x 100 (mm), line pattern, 6 counting fields, 5.4 ml per section
435 011 B	Modified Counting Chamber acc. to Gollasch dimensions 80 x 100 (mm), bisect line pattern, 12 counting fields, 2.4 ml per section
435 011 C	Modified Counting Chamber acc. to Gollasch dimensions 80 x 100 (mm), grid pattern, 30 counting fields, 0.8 ml per section

## **Plankton Chamber acc. to Kolkwitz**

Tray for easy enumeration of small amounts of phytoplankton



#### ABOUT

The Plankton Chamber acc. to Kolkwitz has been designed for easy enumeration of small amounts of phytoplankton. Due to the small dimensions the chambers can be used with standard microscopes, inverted microscopes and stereo microscopes. Made from glass the chambers are precisely adjusted to their nominal volume. The cover plates are marked with an orthogonal counting grid for an easy zoning of the sample.

TECHNICAL DATA	
Material	Glass
Dimensions	33 x 33 mm with 22 mm boring
Thickness chamber	1.3 mm for the 0.5 ml version, 2.6 mm for the 1.0 ml version
Bottom glass	0.5 mm
Cover plate	1.5 mm

ORDERING INFORMATION	
Products	
435 015	Plankton Chamber acc. to Kolkwitz, capacity 0.5 ml
435 016	Plankton Chamber acc. to Kolkwitz, capacity 1.0 ml

## **Tubular Plankton Chamber**

Phytoplankton sedimentation cylinder for microscopic analysis



#### 435 021

#### **TECHNICAL DATA**

Material	Plexiglass, glass, chrome-plated brass
Diameter of base ring	43 mm
Diameter of base ring alignment	42 mm
Inner diameter of sedimentation tube	26 mm
Height of chamber	approx. 10 mm for the 5 ml version approx. 19 mm for the 10 ml version approx. 46 mm for the 25 ml version

ORDERING INFORMATION	
Products	
435 021	Tubular Plankton Chamber, capacity 5 ml
435 022	Tubular Plankton Chamber, capacity 10 ml
435 023	Tubular Plankton Chamber, capacity 25 ml
Spare Parts	
435 028	<b>Cover Plates</b> for Tubular Plankton Chambers and Combined Plate Chamber, 33 mm Ø, 2 mm thick, in package of 50 pcs.
435 035	<b>Base Plates</b> for Tubular Plankton Chambers and Combined Plate Chamber, 27.5 mm Ø, 0.2 mm thick, in package of 250 pcs.



435 022

435 023

## ABOUT

Tubular Plankton Chambers are used for microscopic analysis of phytoplankton samples. The sedimentation process is carried out inside the original inspection cylinder to avoid any falsification of the samples during handling.

The chamber consists of a plexiglass tube with an unscrewable metal base ring holding a thin base plate of just 0.2 mm.

Analysis of the sample is made on inverted microscopes.

Our scope of delivery includes one chamber, one glass cover plate and a set of 50 glass base plates.



## **Combined Plate Chamber**

Utermoehl style phytoplankton sedimentation and counting chamber

#### ABOUT

The Combined Plate Chamber allows you to look at sedimented samples from a very short distance. How? Put the sample into a cylinder on top of a rectangular plexiglass plate with a thin base plate, let the fixed plankton concentrate and after sedimentation simply push the cylinder with excess liquid aside. The handling support underneath the plate will collect the extra water from the cylinder. You can now take the plate and examine the sample under an inverted microscope. Three calibrated cylinder sizes are provided with each set allowing to analyse different sample volumes.



TECHNICAL D	ATA
Material	Plexiglass, glass, chrome-plated brass
Dimensions of plexiglass plate	43 x 120 mm
Diameter of plexiglass plate alignment	39 mm and 42 mm
Inner diameter of sedimenta- tion tube	26 mm
Height of sedimentation cylinders	approx. 15 mm for the 10 ml version, approx. 92 mm for the 50 ml version, approx. 185 mm for the 100 ml version

ORDERING INFORMATION	
Products	
435 025	<b>Combined Plate Chamber</b> (Utermoehl Chamber) set with one cylinder 10 ml, 50 ml and 100 ml each, complete with three cover plates, 50 base plates and handling support
Spare Parts	
435 028	<b>Cover Plates</b> for Tubular Plankton Chambers and Combined Plate Chamber, 33 mm Ø, 2 mm thick, in package of 50 pcs.
435 035	<b>Base Plates</b> for Tubular Plankton Chambers and Combined Plate Chamber, 27.5 mm Ø, 0.2 mm thick, in package of 250 pcs.



Easy retrieval of precise small plankton sub-samples

ORDERING INFORMATION	
Products	
435 090	Plunger Sampling Pipette acc. to Hensen, capacity 0.1 ml
435 091	Plunger Sampling Pipette acc. to Hensen, capacity 0.25 ml
435 092	Plunger Sampling Pipette acc. to Hensen, capacity 0.5 ml
435 093	Plunger Sampling Pipette acc. to Hensen, capacity 1.0 ml
435 094	Plunger Sampling Pipette acc. to Hensen, capacity 2.5 ml
435 095	Plunger Sampling Pipette acc. to Hensen, capacity 5.0 ml
Spare Parts	
435 098	<b>Spare Dilution Bottle,</b> 250 ml capacity, made of Duranglass 50 (package of 10 pcs.)

## **Folsom's Plankton Sample Divider**

Easy division of large plankton samples



ORDERING INFORMATION	
Products	
435 100	Folsom's Plankton Sample Divider

#### ABOUT

The Plunger Sampling Pipettes acc. to Hensen are simple but precise tools to retrieve small plankton sub-samples. The volume of the sub-samples is defined by the accurately machined geometry of the piston, avoiding any volume errors.

Each pipette is delivered completely with dilution bottle and stopper.



#### ABOUT

Folsom's Plankton Sample Divider provides a fast and easy method to divide large plankton samples into an amount suitable for examination. This instrument divides samples in halves. Simply repeat the operation until the desired amount is left. The transparent plastic drum of the divider is suitable for samples up to 100ml. The base is provided with a water level and two levelling screws for easy horizontal alignment. Net weight approx. 1 kg





# **V-Fin Depressor**



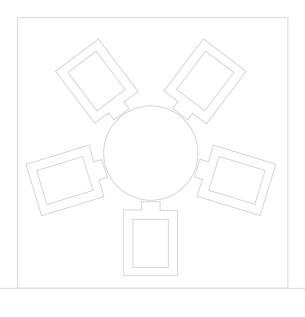
#### ABOUT

The V-Fin Depressor gives negative lift to the towing rope during horizontal or oblique plankton net operation. This also stabilises the net in the water and allows for good sampling results. It consists of a lead-weighted body and a stainless steel rope with shackle.



#### **ORDERING INFORMATION**

Products	
438 416	V-Fin Depressor, 22 kg aluminium model, Dimensions: 60 x 70 x 40 (cm)
438 417	V-Fin Depressor, 5 kg aluminium model, Dimensions: 38 x 50 x 25 (cm)
438 418	V-Fin Depressor, 70 kg aluminium model, Dimensions: 100 x 114 x 65 (cm)
438 419	V-Fin Depressor, 45 kg stainless steel model, Dimensions: 60 x 70 x 40 (cm)



## **Hand Winch**

## A useful tool to operate hydrometric and limnological instruments

#### ABOUT

The winch is made of sea-waterproof aluminium and additionally protected against corrosion by an enamel finish.

A counting wheel allows to read out the length of wire paid out. Zero setting is possible. The rope can be fixed at any desired depth.

A heavy double-screw steel clamp allows for easy fixing at the walls of boats, bridges, rails, well pipes, etc.

Rope can be ordered separately at any length up to 200m.

TECHNICAL DATA	
Material	Aluminium with enamel finish
Max. payload	15 kg
Drum capacity	200 m rope of 2.5 mm dia.
Empty weight	8 kg
Span width of clamp-on device	70 mm

## **ORDERING INFORMATION**

Products	
440 060	Hand Winch with ONE crank handle (with
440 061	Hand Winch with TWO crank handles (w
Accessories	
440 065	Stainless Steel Rope, 2.5 mm diameter



ithout rope)

without rope)

er, length 100 m





## **Clinometer**

Wire Angle Indicator

#### ABOUT

The Clinometer is a mechanical, rugged instrument for the determination of the length of rope needed to operate towed devices at a certain depth. The angle of inclination of the towing rope is determined by aligning the slit of the Clinometer to the towing rope.

The current depth (X) of the instrument attached to the towing rope depth can be calculated by the formula:  $X = metre rope x \cos \alpha$ 



ORDERING INFORMATION	
Products	
460 800	Clinometer

## Visibility Disc acc. to Secchi

Water transparency determination in lakes and oceans made easy



#### ABOUT

The Visibility Disc acc. to Secchi is a white lacquered brass disk with a diameter of 200 mm and a weight of 1.7 kg. It is an easy-to-use instrument for standard monitoring of water transparency in lakes and oceans.

The standard Visibility Disc is equipped with a rope of 3 meters in length. The first 2 meters of rope above the disc have 10 marks every 20 cm for measurement purpose. For even more accurate readings we offer the disc with a 10 m long tape measure.

The Visibility Disc is lowered into the water and the immersion depth is read from the marked rope or the graduation at the tape measure at the moment the disc vanishes from sight. It is lowered another 0.5 m and then heaved slowly again. The second reading is made when the disc reappears. The arithmetic mean from both readings equals the visibility depth.

ORDERING INFORMATION	
Products	
443 590	Visibility Disc acc. to Secchi with 3 m rope, marks every 20 cm
443 592	Visibility Disc acc. to Secchi with 10 m tape measure

## **ICES** Incubator

ICES standard for phytoplankton primary production measurements



#### ABOUT

One of the most important marine processes is the formation of organic material resulting from the interaction of carbon dioxide, water and sunlight, a process known as photosynthesis. The ability to measure this process is of great importance when assessing marine pelagic systems. In practice the best way to measure photosynthesis is to look at the absorption of carbon dioxide. The high sensitivity of carbon dioxide absorption measurements allows to use this method under all circumstances. Neither low or very high algal concentrations nor low light conditions and low temperatures are restrictions for this method. Based on the <sup>14</sup>C method, using the absorption of the radio-active <sup>14</sup>C isotope of carbon (Steemann-Nielsen, 1952), the ICES Incubator is the ICES standard for phytoplankton primary production measurements.

The incubator shown here has been mainly developed for monitoring purposes. It should be used preferably for water samples taken from a mixed water layer with a fixed temperature. Measurements of the amount of phytoplankton (based on chlorophyll-a concentration measurements) should be carried out for interpretation purposes.

The ICES Incubator consists of an illuminated transparent plexiglass tank incorporating a turning wheel on which 12 experimental bottles can be clamped. The tank is filled with water which is set in motion by an adjustable circulating pump. Thus the turning wheel is set in rotation at speeds up to 10 rpm with the experimental bottles acting as paddles. Tank connections for a second water circulation allow for temperature adjustments of the water by using external tempering equipment.



The 12 experimental bottles of 50 ml capacity each have different optical coatings, so that each bottle has individual transmission rates and thus generating a number of 12 different irradiance (or light intensity) levels.

The illumination unit is equipped with 10 fluorescent tubes with a wave spectrum according to ICES specifications, each can be switched individually.

For higher irradiance levels a second illumination unit can be mounted onto the ground plate of the ICES Incubator.



#### **ORDERING INFORMATION**

Products	
450 000	ICES Incubator consisting of: 1 Ground plate with fixing screws for plexiglass tank and illumination unit, Dimensions: 510 x 325 x 20 mm 1 Centrifugal pump (power supply 220 - 240 V AC, 50 / 60 Hz required), Hauling capacity: 10 I/min. 2 PVC tubings, 415 mm long 1 Illumination Unit with 10 individually switchable fluorescent tubes (power supply 220 - 240 V AC, 50 / 60 Hz required) Dimensions: 350 x 335 x 150 mm 1 Plexiglass tank with diaphragm valve and hose nozzles, Dimensions: 350 x 400 x 100 mm 1 Turning wheel for 12 experimental bottles Dimensions: 180 mm dia.
Accessories	
450 010	Set of 12 Experimental Bottles, 50 ml capacity with optical coating, transmission rates: 0 - 100 %
450 030	Additional Illumination Unit
Spare Parts	
450 020	Set of 10 Spare Fluorescent Tubes





photos: Pixelwerft Kiel;

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