

-4H- FerryBox Family:

Typical applications and technical specifications of different types of FerryBoxes

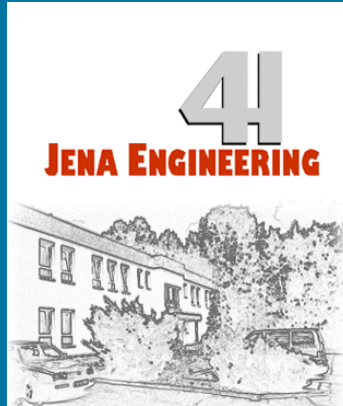
Tobias Boehme
-4H- JENA engineering GmbH

Scientific Cooperation:

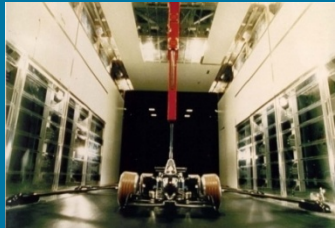
Contents

- Company profile
 - Marine measuring techniques
- -4H-FerryBox Family
 - Modularity
 - Fouling/antifouling
 - Software features
 - Applications
- Summary

Company profile



Optical inspection techniques



Industrial services



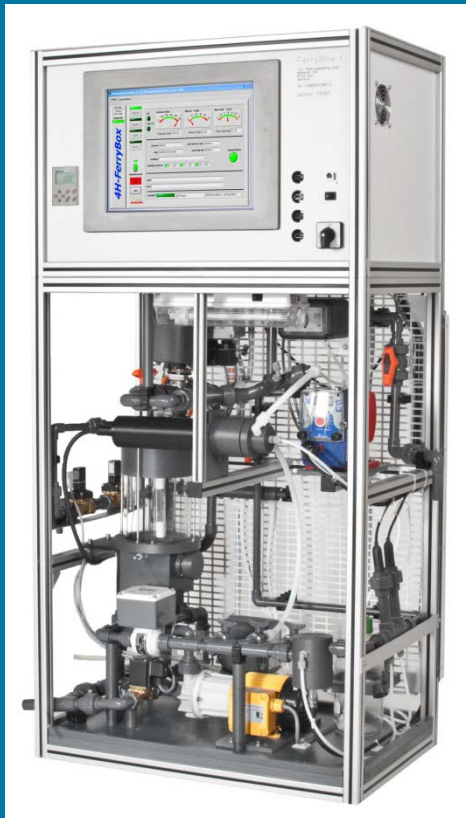
Marine measuring techniques

Marine measuring techniques

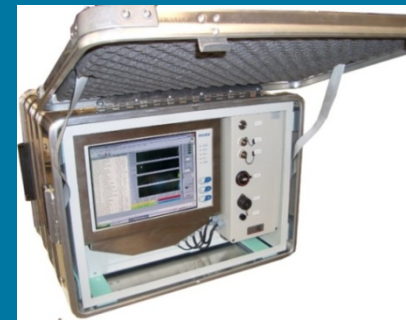


4H-Ferrybox family

-4H- FerryBox I



-4H- PocketBox



-4H- FerryBox II



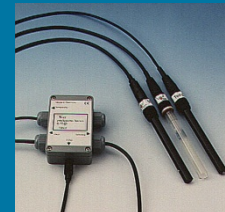
-4H- AquaControl



Modular and Expandable

Parameters:

- Temperature
- Salinity
- DO
- pH
- Algae classes
- Chlorophyll-a
- Turbidity
- Nutrients
- pCO₂
- Weatherstations, ...



The Customer configure their own system

Fouling the big problem for sensors and systems

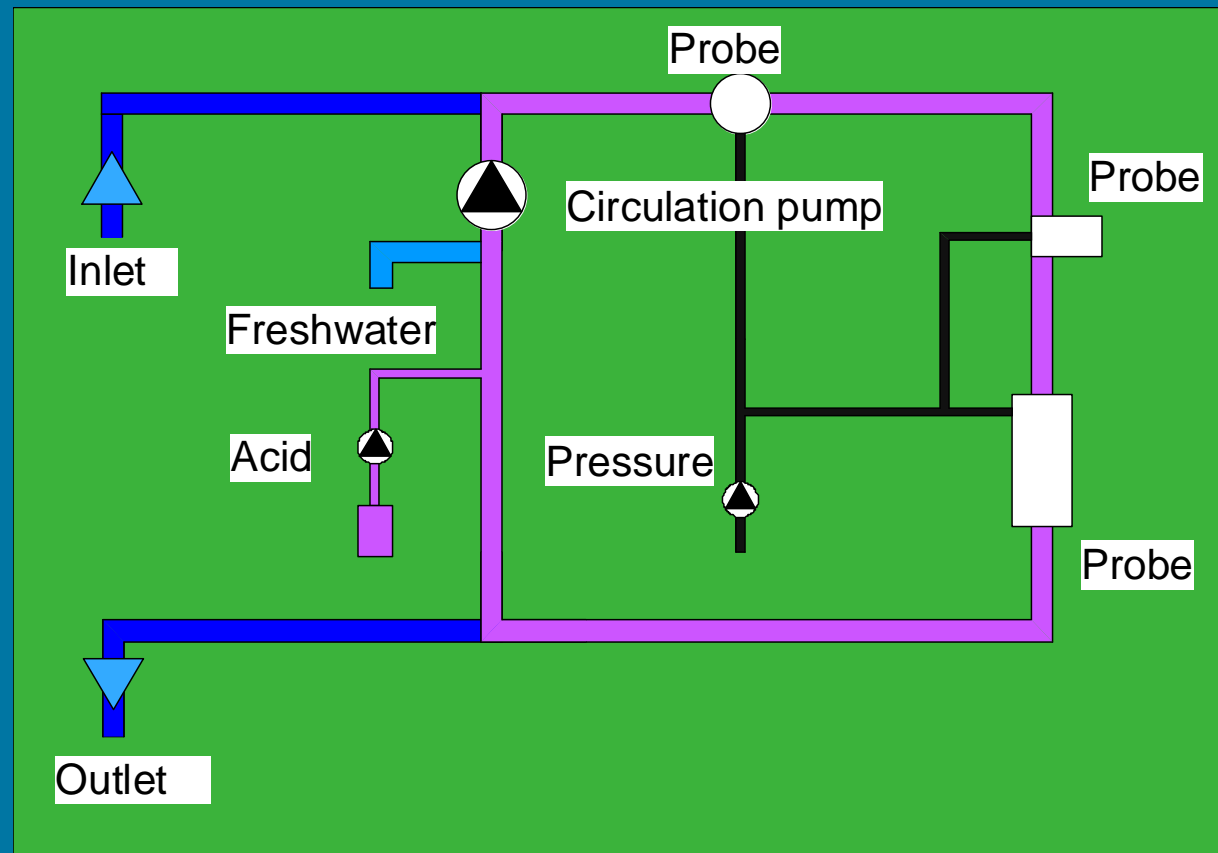
- Anti-fouling technology is one of the most important support technologies for autonomous instruments
- Protection against or prevention of possible fouling is of great importance for a maintenance-free function over a longer period (long-term stability)
- Necessary for height data quality

Antifouling concept of the 4H Ferrybox

Principle of the water system

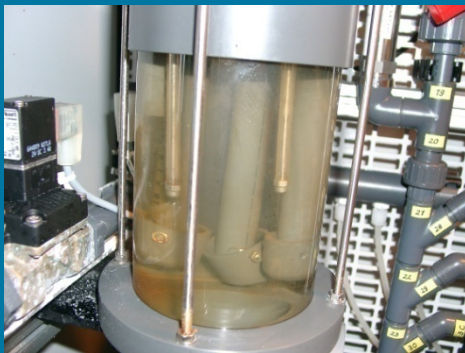
Antifouling:

1. Freshwater
2. Acid
3. High pressure
4. Chlor
5. Back Flash



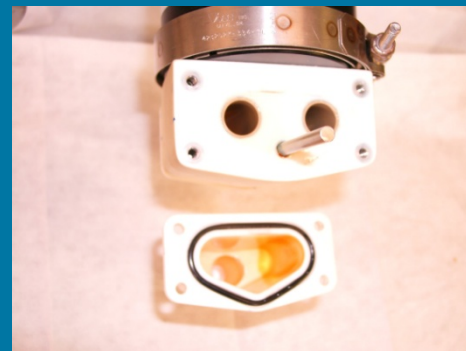
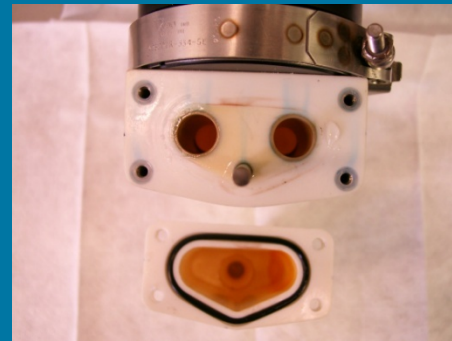
Cleaning results

Debubbler after 2 years
without manual cleaning



© BAH/AWI

Iron impurities
Cleaning with oxalic acid



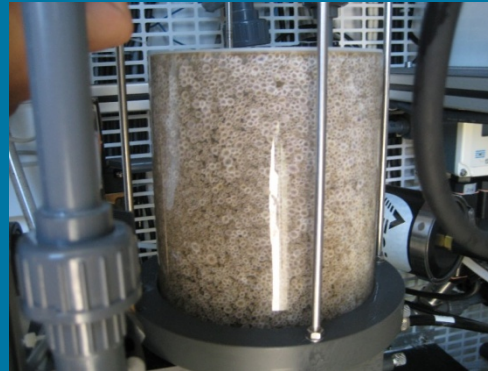
© Rijkswaterstaat

2 weeks no freshwater available

Debubbler December
2007 Paranaguá



Debubbler January 2008
with no antifouling



Cleaning results

Seapoint Chl-a after one year



Process controlled Water system

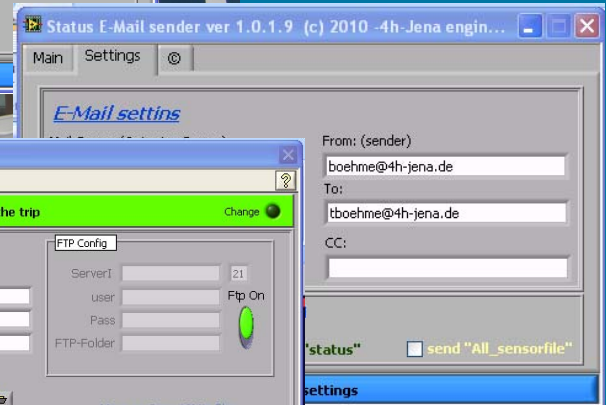
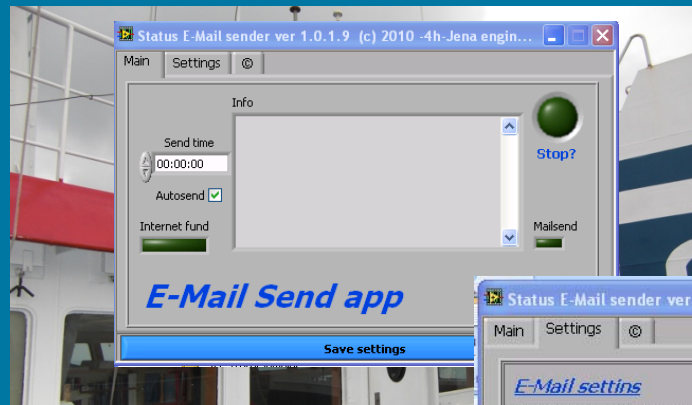
- Datasystem based on LabVIEW
- Intuitive operation
- Soft SPS tools
- Error handling
 - Back flush, SMS,...
- Event and position controlled
- Calibration

The screenshot displays the '4H-FerryBox' process control software interface. The main window shows real-time data for pressure (1113,70 mbar), flow in (25,53 l/min), and flow man (27,15 l/min). It includes a 'System Check notify' dialog box with the message: 'No new GPS value 2008.12.10 08:30:36 Check GPS device'. Below this, there is a 'Start Calibration?' dialog box with a graph showing raw values over time, and input fields for buffer settings. The bottom right shows a table for sample positions with columns for N/S, Longitude, E/W, distance, and save sample positions.

N/S	Longitude	E/W	distance	save sample positions?
min	deg	min	km	
30	0	0	0,5	<input type="checkbox"/>
0	0	0	0,2	<input type="checkbox"/>
57	0	0	0,2	<input type="checkbox"/>
50	0	0	0,2	<input type="checkbox"/>
43	0	0	0,2	<input type="checkbox"/>
36	0	0	0,2	<input type="checkbox"/>
29	0	0	0,2	<input type="checkbox"/>
22	0	0	0,2	<input type="checkbox"/>
15	0	0	0,2	<input type="checkbox"/>
8	0	0	0,2	<input type="checkbox"/>

Data Transmission

- Telemetry
 - UMTS/G3
 - Iridium
 - WLAN
- Email
- FTP
- Remote control



The screenshot shows the 'Displays_Pfad_Header.vi' interface. It features a status bar with 'Wait 1748' and a message 'Please fill out all fields for the trip'. Below this are various configuration fields for 'ConfigurationDate', 'Cruise', 'ContractCode', 'SIC', 'Customer', 'Info0-Info2', 'FTP Config', and file paths. A table at the bottom lists sensor data.

SensorTypeDescr	SensorManufac	SensorModel	SerialNum	ParDescr	Unit	Telemel	ParCode
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	455235602	Temperature	°C	1190	TEMP
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	455235602	Conductivity	mS/cm	1191	COND
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	455235602	Salinity	psu	1192	SAL
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	455235602	sound velocity	m/s	1193	SNDEL
Optode	Aanderaa	Aanderaa Optode - Type 3835	752	Oxygen	umol/l	1096	O2CONC
Optode	Aanderaa	Aanderaa Optode - Type 3835	752	Saturation	%	1097	O2SAT
Optode	Aanderaa	Aanderaa Optode - Type 3835	752	Temperature	°C	1098	TEMP
Fluorometer	Turner	Turner SCUFA II Chlorophyll Fluorometer	79	Raw Fluorescence	Arbitrary units	192	FLUORT
Fluorometer	Turner	Turner SCUFA II Chlorophyll Fluorometer	79	Fluorescence TC	µg/l	194	CHLOR
Fluorometer	Turner	Turner SCUFA II Chlorophyll Fluorometer	79	Turbidity	NTU	193	NTU
Fluorometer	Turner	Turner SCUFA II Chlorophyll Fluorometer	79	Temperature	°C	195	TEMP
Fluorometer	Seapoint	Seapoint Chlorophyll Fluorometer	2757	Fluorescence	Arbitrary units	144	FLUORS
ADAM	ADAM Tech	ADAM PT100	105852	Temperature	°C	2064	TEMP

Data quality and Database exchange

Scufa_A_Fluorescence TR_20100808 [Schreibgeschützt] - Microsoft Excel

Start Einfügen Seitenlayout Formeln Daten Überprüfen Ansicht Add-Ins Acrobat

Normal Seitenlayout Umbruchvorschau Benutzerdef. Ansichten Einblenden/Ausblenden Zoom 100% Zoommodus: Auswahl Neues Fenster Alle anordnen Aufgabenbereich speichern Fenster wechseln

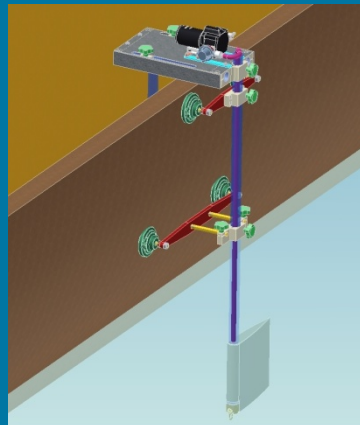
Arbeitsmappenansichten Fenster

E11

	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	\$METADATA													
2	\$Project; FerryBox													
3	\$Hostname; CEFAS-FERRYBOX													
4	\$DateTime; 2010.08.08 00:00:00													
5	\$Filename; Scufa_A_Fluorescence TR_20100808.txt													
6	\$Type; 998-2002													
7	\$Formula; Meas=a0+a1*Raw+a2*Raw^2+a3*Raw^3													
8	\$Ranges; 1													
9	\$Range1.a0; 0.0000000000E+0													
10	\$Range1.a1; 1.0000000000E+0													
11	\$Range1.a2; 0.0000000000E+0													
12	\$Range1.a3; 0.0000000000E+0													
13	\$FORMATS													
14	\$1; Timestamp, Date Time; YYYY.MM.DD hh:mm:ss													
15	\$2; Fluorescence TR, $\mu\text{g/l}$; Float													
16	\$3; Quality, Flags; Int													
17	\$4; MeasCount, Cnt; Int													
18	\$5; MeanTime, Sec; Int													
19	\$6; Range, MR; Int													
20	\$7; Minimum, $\mu\text{g/l}$; Float													
21	\$8; Maximum, $\mu\text{g/l}$; Float													
22	\$9; Variance, Units; Float													
23	\$10; Longitude, Deg; Float													
24	\$11; Latitude, Deg; Float													
25	\$12; Rawvalue, Units; Float													
26	\$13; Info, Flags; Int													
27	\$DATASETS													
28	\$Timestamp	Fluorescen	Quality	MeasCount	MeanTime	Range	Minimum	Maximum	Variance	Longitude	Latitude	Rawvalue	Info	
29	\$Date Time	$\mu\text{g/l}$	Flags	Cnt	Sec	MR	$\mu\text{g/l}$	$\mu\text{g/l}$	Units	Deg	Deg	Units	Flags	
30	08.08.2010 00:22	3.749667	0	60	60	1	3.329	4.093	0.030548	3.863623	52.368889	3.749667	0	
31	08.08.2010 00:23	3.875267	0	60	60	1	3.388	4.307	0.036292	3.86549	52.370752	3.875267	0	
32	08.08.2010 00:24	3.848267	0	60	60	1	3.484	4.314	0.029124	3.867341	52.372622	3.848267	0	

-4H-PocketBox

- Developed for field experiments
- Portable system for operation on small boats
- ~25 kg transportable via airplane
- Low power consumption



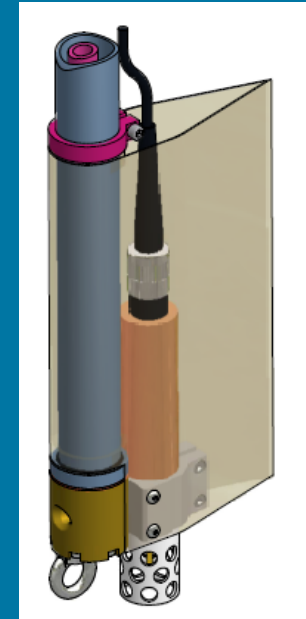
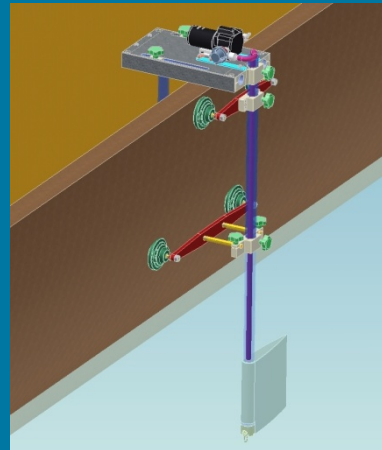
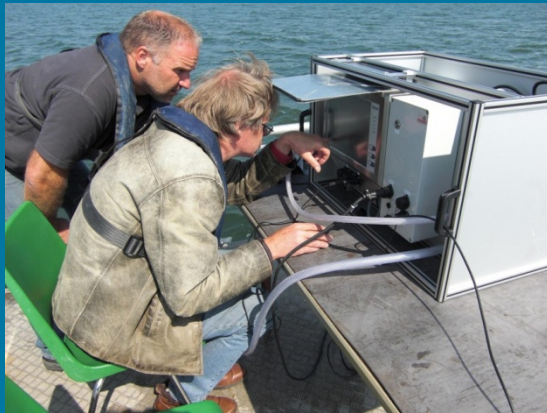
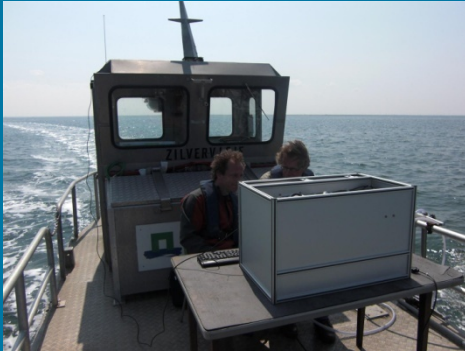
Applications -4H- Pocketbox Bay of Paranaguá



Parameter:
T, S, DO, pH, Chl-a, Turbidity, CDOM

(Photo.: HZG)

Applications -4H- PocketBox NIOS Texel



Parameter:
T, S, DO, pH, Algeagroups, Absorbtion

-4H-FerryBox I and II

- Long term water quality monitoring
- Open system for many Sensors
- Suitable for nutrient analysers and pCO₂ systems
- Easy extantionable
- Event controlled Water sampler
- Effective antifouling procedures
- position control

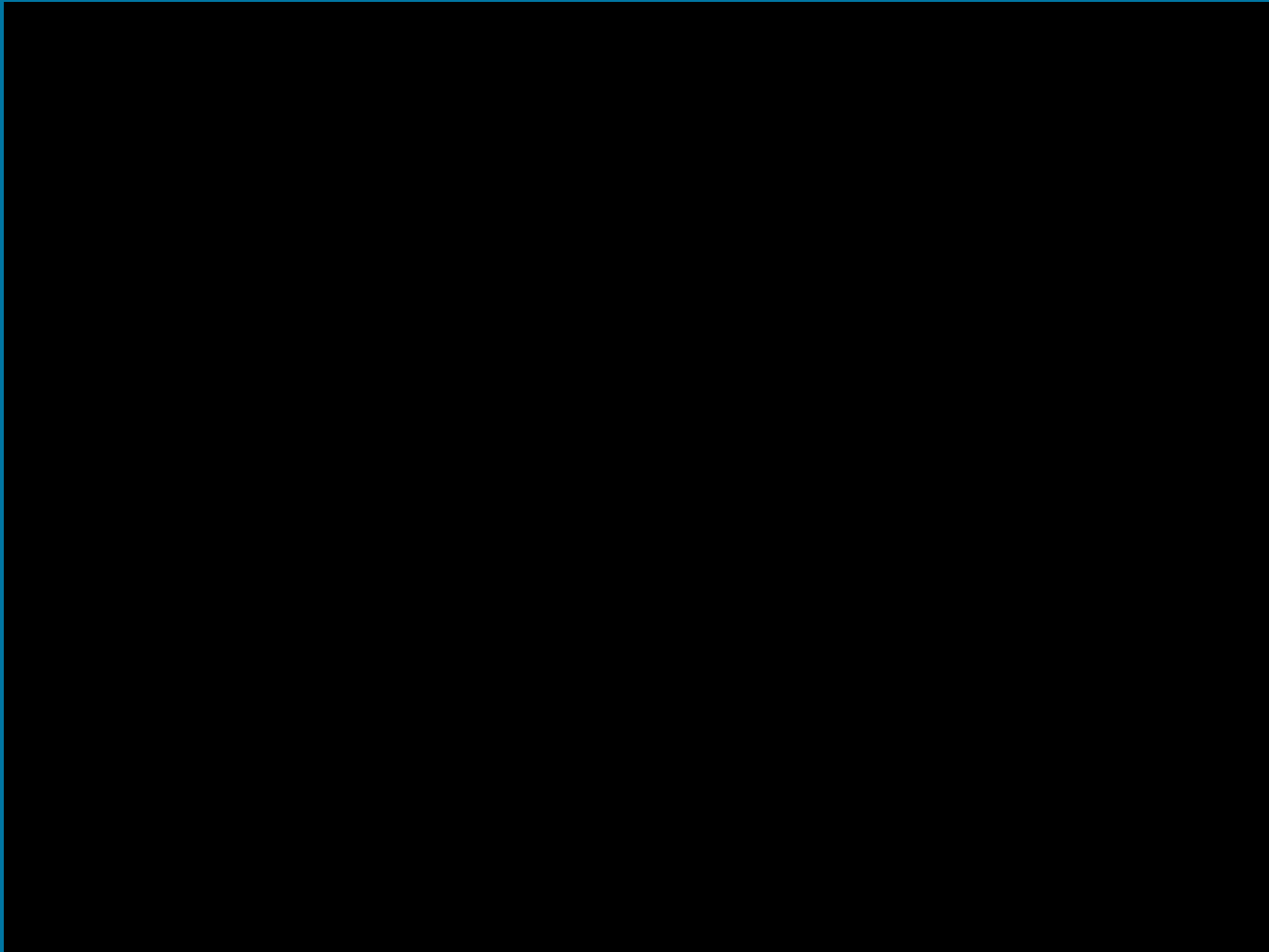


Applications -4H- FerryBox I mobile monitoring

FerryBoxes for the research
Institutes IFREMER and
CRNS



Parameter:
T, S, DO, Chl-a, CDOM, turbidity, pH,
Inlet temperature, pCO₂, water sampler



Applications -4H- FerryBox I stationary monitoring

Continues measurements
of metrological, oceanographic
and biological parameters
at the Elbe Estuary (HZG)



Parameter:

T, S, DO, pH, Chl-a, turbidity, inlet temperature,

Tide gauge, metrology, water sampler, webcam, sediment trap

Applications -4H- FerryBox II mobile monitoring

FerryBox as
scientific equipment
on the Polarstern
Email as Data export

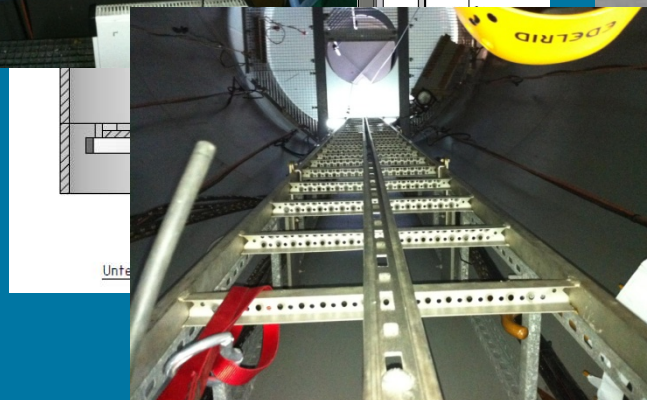
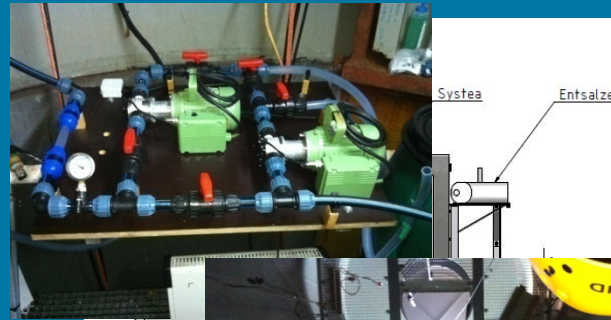


Parameter:

T, S, DO, pCO₂, pH, Chl-a, turbidity,
lilet temperature, water sampler,
nutrients (NH₄⁺, P, NO₃⁻/NO₂⁻, Si_xO_y)

Applications -4H- FerryBox II stationary monitoring

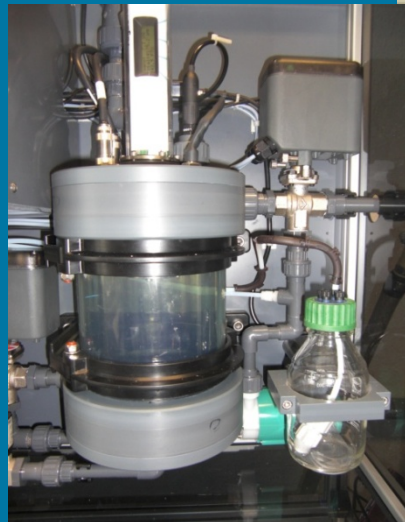
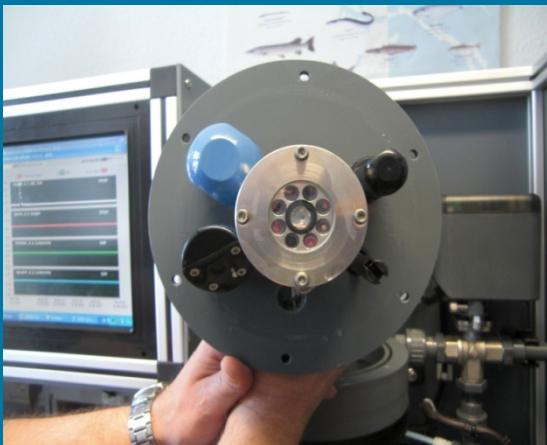
FerryBox as monitoring equipment on the Fino III Platform



Parameter:
T, S, DO, pH, Chl-a, Turbidity,
Nutrients, watersampler

-4H- Aquacontrol

- water quality monitoring for fish farms
- Limited sensors
- Light antifouling available
- Top mounted Sensor



Applications -4H- AquaControl

Fish and coral tank at
ZMT



Parameter:
T, S, Redox, pH, Chl-a, Turbidity,
Nutrients, watersampler

Summary

- The 4H-FerryBox provides solutions to most of the problems associated with long-term in-situ monitoring of rivers, estuaries, coastal zones and open sea.
- The modular flow-through system combines high flexibility in the choice of sensor-types and –methods with a fully integrated antifouling concept and the possibility for automatic and remote-controlled operation.
- -4H- Jena engineering has already more than 10 years experiences on Ferrybox Systems

Thank you very much
for your attention

