



Scientific Cooperation:



4H FerryBox

Automatic and remote-controlled measurements for
Ships of opportunity, with special aspects to
antifouling and data quality

Tobias Boehme

-4H- JENA engineering GmbH

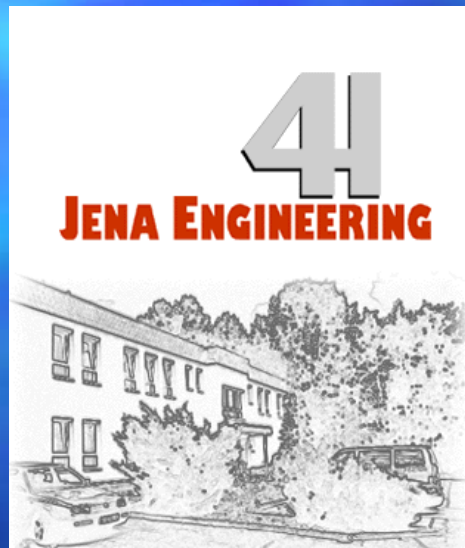
Contents

- Company profile
 - Marine measuring techniques
- 4H-FerryBox
 - Concept
 - New data system
 - Interfaces
 - FerryBox "family"
 - Applications
- Summary

Company profile

**Windtunnel
techniques**

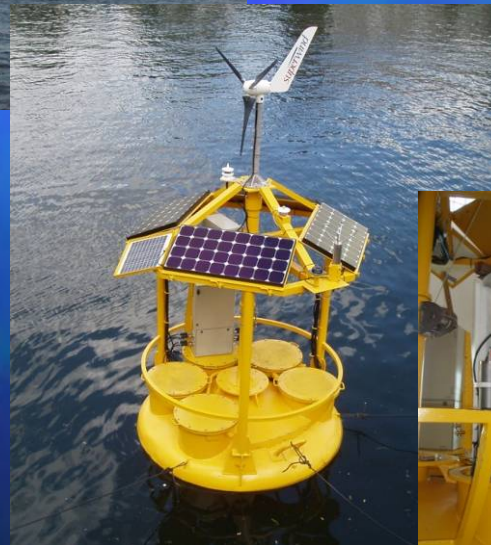
**Optical
inspection
techniques**



**Optical
devices**

**Marine
measuring
techniques**

Marine measuring techniques



4H-FerryBox

- flow through measuring systems
- long-term in situ monitoring of rivers, estuaries, coastal zones and open sea



4H-FerryBox I
Galathea expedition



4H-FerryBox II
Ferry Funny Girl

Concept of the 4H FerryBox

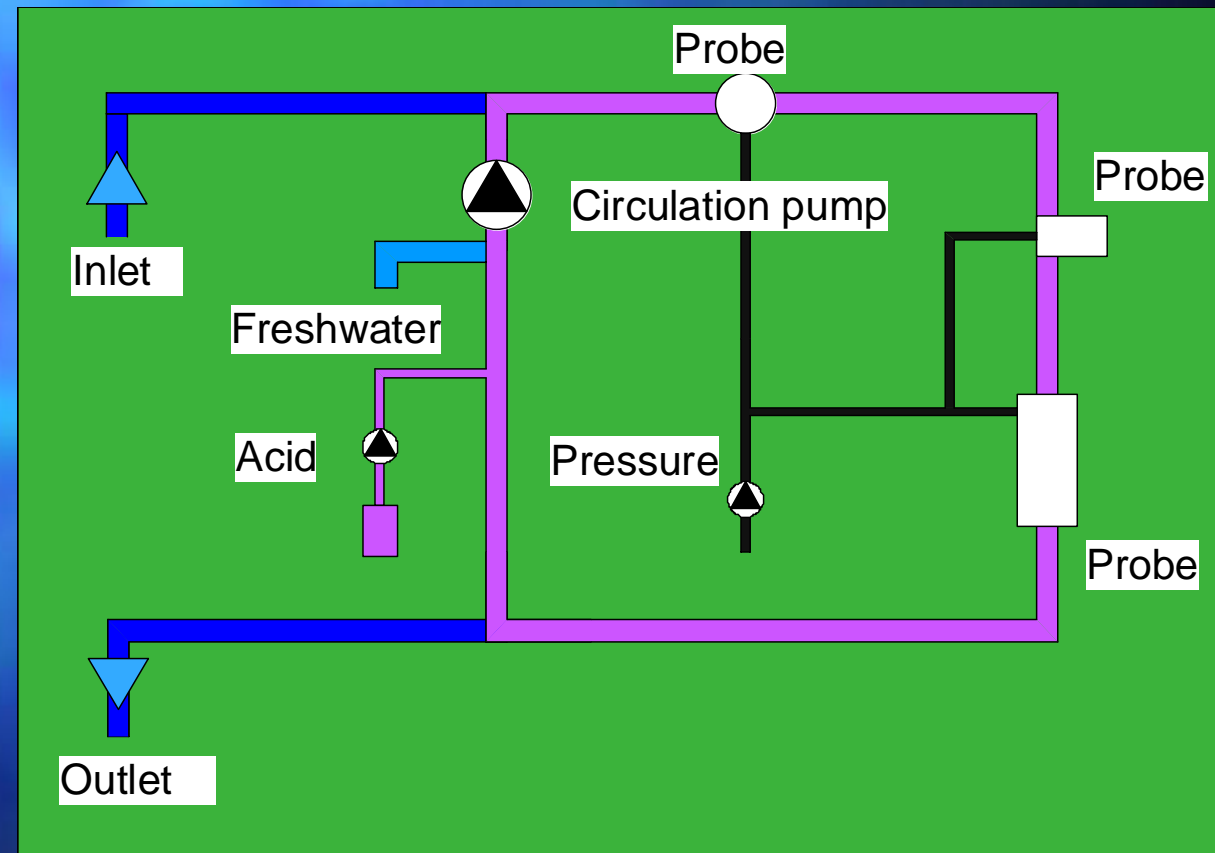
- Antifouling concept
- Modular and expandable
- Process controlled water system
- Data
 - Visualization
 - Transmission
 - Quality

Antifouling concept

Principle of the water system

Antifouling:

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



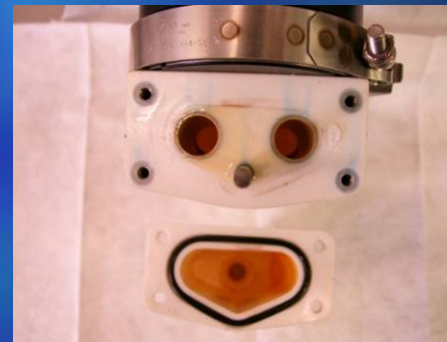
Cleaning results

Debubbler after 2 years
without manual cleaning



© BAH/AWI

Iron impurities
Cleaning with oxalic acid



© Rijkswaterstaat

Modular and Expandable

Parameters:

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



New Interfaces of devices

- RS232
- RS484
- Analoge (V, 4-20mA)
- IEEE
- Paralell Bus
- CAN, Profibus, ..
- USB (2, 3, ..)
- LAN (1000, 10000)
- WLAN
- ??

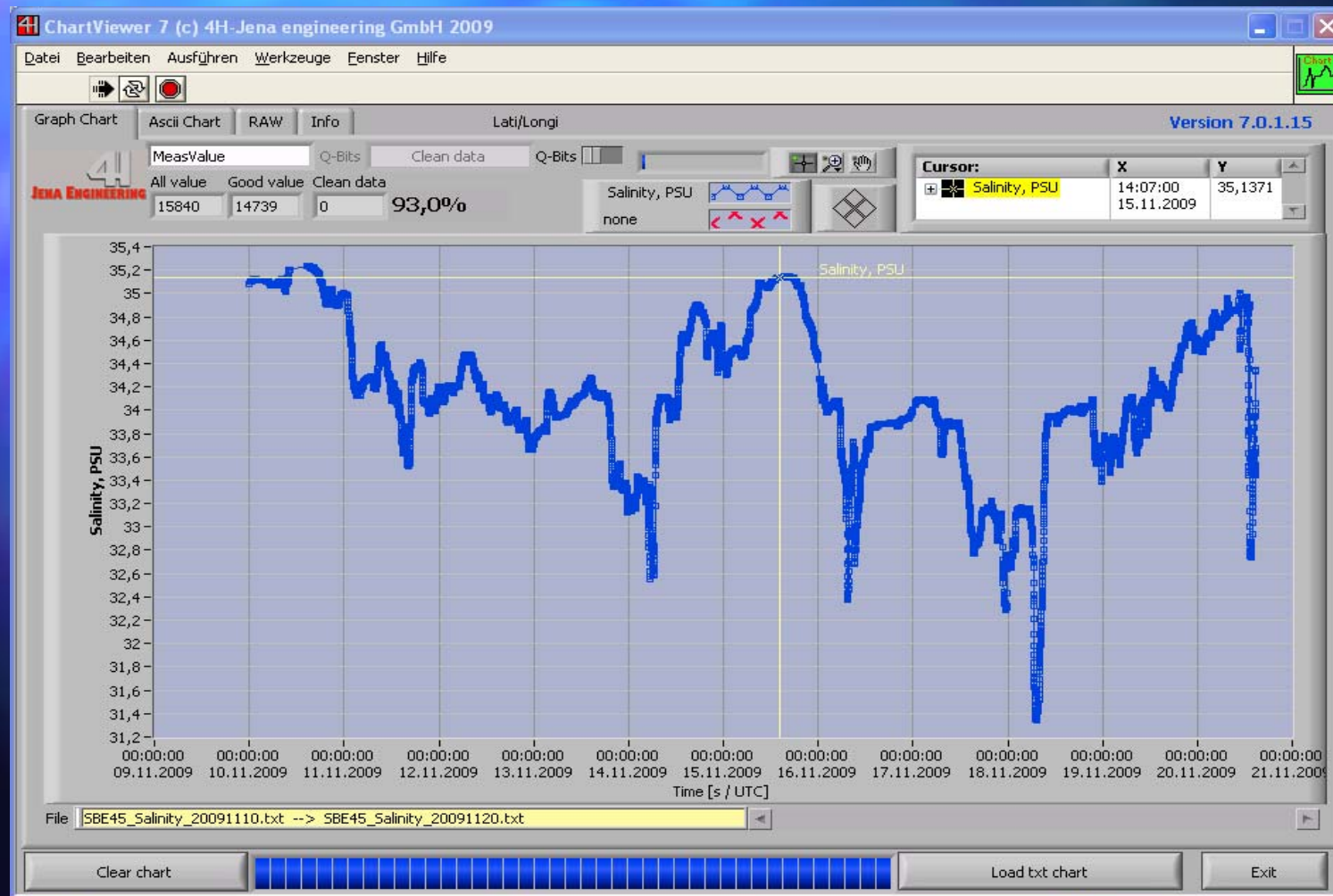
Process controlled Water system

- 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' control interface. The main window shows real-time data for pressure (1113,70 mbar), flow in (25,53 l/min), and flow main (27,15 l/min). It includes control buttons for Operate, Standby, Wash, and Service, along with a 'Positioncontrol' section with an emergency stop button. A 'System Check notify' dialog box is open, displaying an alert: 'Alert lamp' and 'No new GPS value 2008.12.10 08:30:36 Check GPS device'. Below this, a 'Wash times' configuration window is visible, showing three wash time slots with their respective hour and minute settings. In the foreground, a 'Calibration' window is active, showing a graph of 'Raw value' vs 'time' with a value of 6,756. It contains input fields for 'insert pH of buffer 1' (7) and 'raw buffer 1 stable?' (6,944), and another set for 'insert pH of buffer 2' (9) and 'raw buffer 2 stable?' (7,2508). A table of GPS coordinates is also visible in the background.

Longitude	Latitude	Distance
10,375	51,44,965	1,5
10,36,5	51,45,6	5
10,36,2	51,45,7	5
10,34,2	51,45,4	9
10,32,6	51,45,3	1,5
10,31,3	51,49,2	12
10,29,3	51,41,4	2
10,27,3	51,31,5	1
10,8,5	51,2	2
10,19	51,9,5	2
10,42,000	51,4	0,2

Data Visualization



Data Transmission

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

The screenshot displays the 'E-Mail Send app' interface, which includes several windows and a data table.

E-Mail Send app - Info window:

- Send time: 00:00:00
- Autosend:
- Internet fund:
- Buttons: Stop?, Mail send

E-Mail settings window:

- From: (sender) boehme@4h-jena.de
- To: tboehme@4h-jena.de
- CC:
- checkbox: send "All_sensorfile"

Displays_Pfad_Header.vi window:

- Wait: 1748
- ConfigurationDate: 11:49:11, 08.03.2010
- Enabled whis password:
- FTP Config: Server1 (21), user, Pass, FTP-Folder, Ftp On
- Save 10Min files under: D:\Working\10minfiles_in
- Save 10Min files backup under: Y:\working
- Comment: You have char free 1018

Data Table:

SensorTypeDescr	SensorManufac	SensorModel	SerialNum	ParDescr	Unit	Telemet	ParCode
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	45523560	Temperature	°C	1190	TEMP
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	45523560	Conductivity	mS/cm	1191	COND
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	45523560	Salinity	psu	1192	SAL
Thermosalinograph	Seabird	Seabird SBE45 Thermosalinograph	45523560	sound velocity	m/s	1193	SNDVEL
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 SCUA II Chlorophyll Fluorometer	79	Raw Fluorescence	Arbitrary units	192	FLUORT
Fluorometer	Turner	Turner SCUA II Chlorophyll Fluorometer	79	Fluorescence TC	µg/l	194	CHLOR
Fluorometer	Turner	Turner SCUA II Chlorophyll Fluorometer	79	Turbidity	NTU	193	NTU
Fluorometer	Turner	Turner SCUA 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

\$Filename; CDT90_1_Temperatur_20080605.txt										
\$FORMATS										
\$1; Timestamp, Date Time; YYYY.MM.DD hh:mm:ss										
\$2; Temperatur, °C; Float										
\$3; Quality, Flags; Int										
\$4; MeasCount, Cnt; Int										
\$5; MeanTime, Sec; Int										
\$6; Range, MR; Int										
\$7; Minimum, °C; Float										
\$8; Maximum; °C; Float										
\$9; Variance, Units; Float										
\$10; Longitude, Deg; Float										
\$11; Latitude, Deg; Float										
\$DATASETS										
\$Timestamp	Temperatur	Quality	MeasCour	MeanTirr	Range	Minimum	Maximum	Variance	Longitude	Latitude
\$Date Time	°C	Flags	Cnt	Sec	MR	°C	°C	Units	Deg	Deg
05.06.2008 18:32	22,86	16	516	60	0	22,79	22,88	0,00117	10,18	54,33
05.06.2008 18:33	22,80	16	515	61	0	22,78	22,82	0,00018	10,18	54,33
05.06.2008 18:34	22,82	16	516	61	0	22,81	22,84	0,00012	10,18	54,33
05.06.2008 18:35	22,83	16	517	61	0	22,82	22,84	0,00003	10,18	54,33
05.06.2008 18:36	22,84	16	515	61	0	22,82	22,86	0,00024	10,18	54,33
05.06.2008 18:37	22,88	16	515	61	0	22,86	22,89	0,00008	10,18	54,33
05.06.2008 18:38	22,91	0	515	61	0	22,89	22,92	0,00014	10,18	54,33
05.06.2008 18:39	22,93	0	514	61	0	22,92	22,93	0,00002	10,18	54,33
05.06.2008 18:40	22,94	0	516	61	0	22,93	22,96	0,00005	10,18	54,33
05.06.2008 18:41	22,97	0	515	61	0	22,96	22,99	0,00007	10,18	54,33
05.06.2008 18:42	22,98	0	514	61	0	22,97	22,99	0,00003	10,18	54,33
05.06.2008 18:43	23,00	0	516	61	0	22,99	23,00	0,00003	10,18	54,33
05.06.2008 18:44	22,98	0	515	61	0	22,98	23,00	0,00002	10,18	54,33
05.06.2008 18:45	23,01	0	517	61	0	23,00	23,02	0,00006	10,18	54,33
05.06.2008 18:46	23,02	0	516	61	0	23,02	23,03	0,00002	10,18	54,33
05.06.2008 18:47	23,01	0	516	61	0	22,99	23,03	0,00009	10,18	54,33
05.06.2008 18:48	22,97	0	516	61	0	22,94	22,99	0,00013	10,18	54,33
05.06.2008 18:49	22,91	0	515	61	0	22,90	22,94	0,00012	10,18	54,33
05.06.2008 18:50	22,91	0	516	61	0	22,89	22,93	0,00020	10,18	54,33

The 4H-Ferrybox family

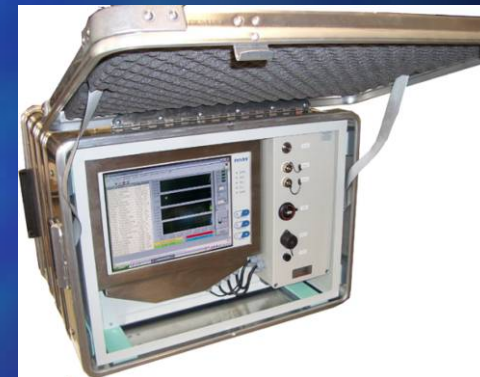
Standard FerryBox I



FerryBox II



Pocket FerryBox



Stationary ocean-monitoring

Continues measurements of metrological, oceanographic and biological parameters in of the Bay of Paranaguá

Parameter:
T, S, DO, pH, Chl-a, Turbidity,
Inlet Temperature, Pressure, Global Radiation



Stationary ocean-monitoring

Continuous measurements of chemical, oceanographic and biological parameters in the German Bight.
(Biological Institute Helgoland, BAH/AWI, Germany)



Parameter:
T, S, DO, pH, Chl-a, Algae classes,
Turbidity, Nutrients (NH_4^+ , P, $\text{NO}_3^-/\text{NO}_2^-$, Si_xO_y)

Applications

Mobile ocean-monitoring

FerryBox as standard monitoring equipment on the Cost guard research vessels RF Zirfaea
(Photo.: Rijkswaterstaat, Netherlands)

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



Mobile ocean-monitoring

FerryBox as monitoring equipment on the Container Vessel Trans Carrier

(Rijkswaterstaat)

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



Applications

Mobile ocean-monitoring

FerryBox as
scientific equipment
on the Polarstern
Email as Data export



Parameter:
T, S, DO, DCO₂, pH, Chl-a, Turbidity,
inlet temperature, watersampler,
Nutrients (NH₄⁺, P, NO₃⁻/NO₂⁻, Si_xO_y)

Applications

Mobile ocean-monitoring

FerryBox as standard monitoring equipment of the institute for coastal research at the GKSS

Parameter:
T, S, DO, pH, Chl-a, Algae classes,
Turbidity, Nutrients (NH_4^+ , P, $\text{NO}_3^-/\text{NO}_2^-$, Si_xO_y)
Water sampler



Applications

Mobile ocean-monitoring

FerryBox as standard monitoring equipment of the Estonian marine institute Tallinn.



Parameter:
T, S, Chl-a, Turbidity,
Inlet Temperature, Nutrients (NO₃-/NO₂-)
Water sampler

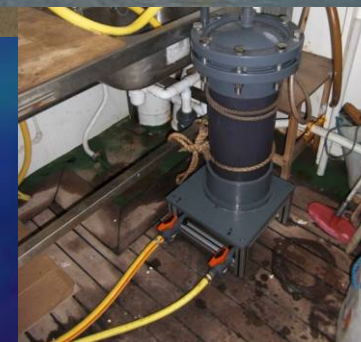


Applications

Mobile ocean-monitoring

FerryBox as a standard monitoring equipment of the research vessel Endeavour

(marine observation at Cefas)



Parameter:

T, S, DO, Chl-a, Algea activity,
Turbidity, pH, Insitu Temperature,
Water sampler, debubbler

Applications

Mobile ocean-monitoring

FerryBox as a enviromental monitoring equipment on the ferry Mv-Caledonian-Isles

(marine observation at SEPA)



Parameter:
T, S, DO, Chl-a, Turbidity,
Water sampler

Applications

New Projects:

FerryBoxes for the research
Institutes IFREMER and
Roscoff

Installation:
End of March

Parameter:
T, S, DO, Chl-a, CDOM, Turbidity, pH,
Inlet Temperature, Water sampler

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.

Thank you very much
for your attention

