BRIESE RESEARCH
FORSCHUNGSSCHIFFFAHRT

MARIA S. MERIAN

Manual

Status: May 2025

Content

1. Changes of the manual

Chapter	Processor	Date
4, 6, 7, 8, 9, 11, 13, 14, 15, 18	M. Maggiulli	25.10.2006
4, 6, 8, 14, 18	K. Bergmann	30.04.2007
14	K. Bergmann	31.07.2007
4	K. Bergmann	30.11.2007
1, 4, 6, 9, 14, 15	K. Bergmann	30.06.2008
8	K. Bergmann	30.09.2008
15	K. Bergmann	08.05.2009
14	K. Bergmann	21.07.2009
14	K. Bergmann	08.09.2009
2, 3	K. Bergmann	23.09.2009
8, 15	K. Bergmann	31.01.2010
13, 14	K. Bergmann	30.04.2010
all chapters	K. Bergmann	31.07.2011
10, 13, 15, 16, 19	K. Bergmann	28.08.2015
all chapters	R. Schmidt	14.07.2016
all chapters	K. Bergmann	14.08.2017
16	K. Bergmann	27.11.2017
12, 15	K. Bergmann	09.01.2018
14.2, 15.7, 16.3, 19	K. Bergmann	30.06.2018
12, 13.7.1, 15.1	E. Reize / K. Bergmann	15.09.2018
2, 6.2, 12, 16	K. Bergmann	21.01.2021
all chapters	M. Maggiulli / K. Bergmann	28.05.2025

2. Foreword to the users of the ice marging research vessel MARIA S. MERIAN

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Cover picture:© Klaus von Bröckel

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3. Maria Sibylla Merian

Maria Sibylla Merian (1647-1717) was the daughter of Matthäus Merian the Elder, a renowned engraver of his era. He was renowned for his engravings and published many European city views in copper. The journal 'Merian' was founded, and it continues to be published to this day. The journal has assumed sponsorship for the ship.

Maria Sibylla Merian began her scientific research by conducting detailed observations of the interrelationships inherent in nature. Initially, she concealed her artistic pursuits, as in the 17th century, it was considered an "unfeminine peculiarity" to create art. However, her stepfather, a renowned flower painter, recognised her talent and facilitated her training in painting and engraving.

She married a painter at the age of 18, had her first daughter at 21 and her second at 32. In addition to her duties as a wife and mother, she established a painting school for daughters from affluent patrician families and successfully operated a prosperous paint and varnish business.
She is committed to ongoing observation and documentation of the natural world through drawing. Her illustrations frequently showcase the complete metamorphosis of an insect species, along with the specific food plants that are characteristic of each stage of development. She incorporated the biological environment into her work systematically, theorised about the anatomy and classification of insects, and self-published with her husband. She also learned Latin, an indispensable language for any research at the time. In addition to her academic work, she undertook commissions to finance her research. Her most prominent publications are the three-volume "Flower Book", which serves as a comprehensive guide for sewing and embroidery projects, and “The caterpillars' wondrous transformation and strange flower food”

Upon observing a collection of butterflies from Dutch Guiana (presently known as Suriname), she resolved to undertake a comprehensive study of the region's tropical plant and animal life. In 1699, she embarked on a voyage with her daughter Dorothea. This was the first occasion on which a woman had been brave enough to lead an expedition of such significance. Her responsibilities include the collection of a wide range of insects and other natural materials, as well as the subsequent arrangement, drawing, preparation and analysis of these materials to identify any correlations.

After experiencing a severe bout of malaria, she was compelled to return. Her responsibilities include exhibiting her collections, delivering lectures and publishing her most significant work, entitled 'The Metamorphosis of Insects in Surinam'.

Sadly, she passed away at the age of 70, having suffered a stroke that left her paralysed, experiencing relative poverty.

Maria Sibylla Merian is widely regarded as the founder of German entomology. It is said that she coined the phrase "I dare to go public as a woman".

4 Ship's coat of arms

Literature:

Charlotte **Kerner**: Silkworm, jungle blossom. The life story of Maria Sibylla Me- rian. Weinheim 1989

Helmut **Deckert**: Maria Sibylla Merian's "New Flower Book". Leipzig / Frankfurt 1966/1987.

Renate **Feyl**: Maria Sibylla Merian 1647 - 1717. in: The Silent Awakening - Women in Science. Darmstadt 1983, p. 23 - 38

The stork with the snake in its beak, which now adorns the ship as the bow emblem, comes from the seal of the Merian family.

The seal of the Merian family with the inscription "PIETAS CON- TENTA LUCRATUR", which may mean: "zealous sense of duty brings profit" or "zealous pursuit of justice brings wealth" etc.

(pietas: piety, justice, sense of duty, sense of family, love of country; contenta: to strive, to strive eagerly, to bring; lucratur: wealth, profit)

5. General information

5.1. Information about the ship:

Ship name:	MARIA S. MERIAN
Callsign:	DBBT
IMO number:	9274197
ISSC number	01441
Flag:	German flag
Home port:	Rostock
Owner:	Ministry of Education, Science and Culture of Mecklenburg-Western Pomerania, represented by the Leibniz Institute for Baltic Sea Research Warnemünde Seestraße 15, 18119 Rostock-Warnemünde

5.2. Ship data

Building yard:	Kröger shipyard, Schacht-Audorf
Year of construction:	2003 / 2005
Construction number:	1566
Class:	DNV 100 A5 Research vessel equipped for carriage of containers, NAV-OC, MC E3 AUT RP (50%)* Hull E4 / Polar Code PC 7
Certified according to:	ISO 9001:2000, ISO 14001 (environment), 45001 (occupational health and safety management) and ISM
Length over all:	94,76 m
Length between the perpendiculars:	86,51 m
Width above al:	19,20 m
Depth:	6.5 m (max. 7.0 m)
Height main deck:	2,5 m
Total height:	38 m
London Survey:	5,573 GT
Empty weight ship:	4.493 t
Scientific payload:	150 t
Speed:	15 kn maximum; normal 12.5 kn
Range (at 12 kn):	7,500 nm
Max. sea service time:	35 days
Crew:	24
Scientists/technicians:	22
Temperature range - air:	-30° - +45°C
Temperature range - water:	-2° - +35°C
'clean ship':	48 hours

5.3. Engine/ technical system

The entire engine system (main diesel with generators, pumps and control panel room) is arranged redundantly in two engine rooms and is also redundant right up to the chimney. If one of the engine rooms with half of the systems fails, the second half is still fully functional.

Drive systems (diesel-electric):

2 SCHOTTEL POD drives type SEP-2 (rotatable by 360°) each 2050 kW/ 2780 A at 242 rpm

1 SCHOTTEL bow thruster pump-jet type SPJ-320 RD (rotatable by 360°) to 1900 kW (bollard pull 125 kN) at 320 rpm

Energy generation:

2 MAN B&W diesel generators type 8L21/31 of 1600 kW each, throttled to 1500 kW (at 1000 rpm) and 1875 kVA (690 V)
2 MAN B&W diesel generators type 6L21/31, 1200 kW each, throttled to 1100 kW (at 1000 rpm) and 1375 kVA (690 V)

Emergency generator:
1 MAN AVK diesel generator at 263 kW (at 1500 rpm) and 315 kVA (400 V)

Stabilization systems:

- during the voyage (>4 kn):	Fin stabilization system (Blohm & Voss) with active, retractable fins (6.8 m^2)
on station:	Tank stabilization system (Rolls-Royce Intering Products) - optimum filling volume = 263 m^3)

6. Crew & Scientists

6.1. Crew (maximum)

Function	Quantity
Captain	1
Ltd. officer	1
1st officer	1
2nd officer	1
Ltd. engineer	1
2nd engineer	1
3rd engineer	1
Electrician	1
Electronics	1
System operator	1
1. cook	1
2.cook	1
Steward(ess)	1
Bosun	1
Deck fitter	1
Ship mechanic (deck)	7
Ship mechanic (machine)	1
Ships doctor	1
Total:	**24**

Note: The crew consists of 24 persons. The entire deck crew (including bosun) consists of 8 persons. According to STCW 95 / ILO 180, the regular working time on board is 10 hours per day and must not exceed 72 hours per week. The day shift lasts from 6 a.m. to 6 p.m. and should be used for station work with labor-intensive equipment.

6.2. Scientific crew

The scientific crew (user groups) have 13 cabins with a total of 22 beds at their disposal. All cabins are equipped with their own shower and WC:

9 double cabins:

1st superstructure deck: Cabin no.: 6204, 6208, 6210
Main deck: 4207, 4210, 4211, 4212, 4214, 4215

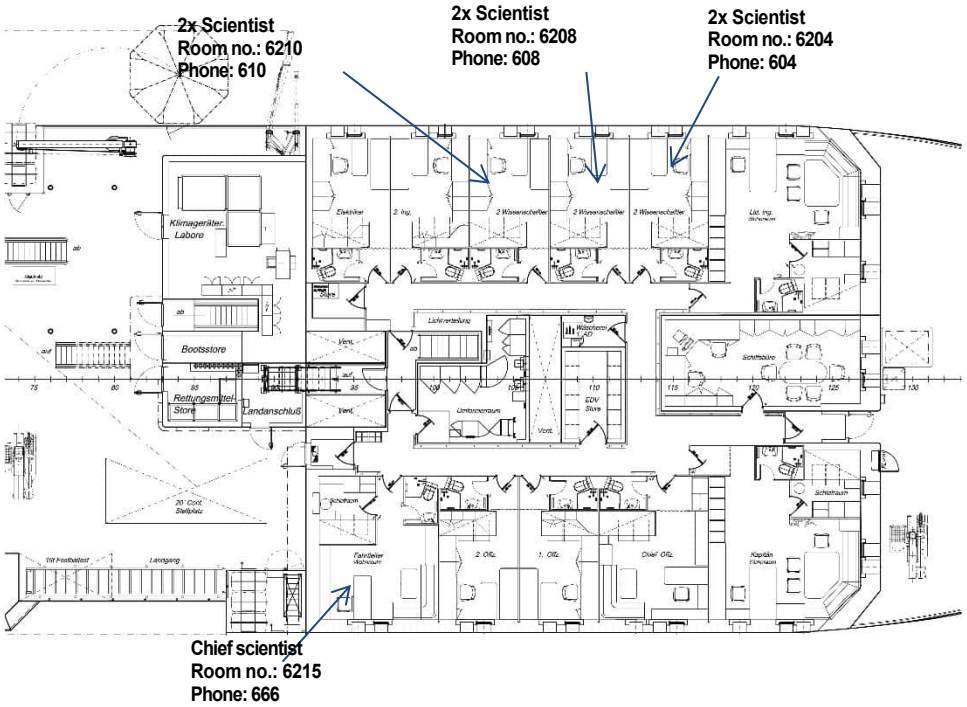
5 single cabins:

1st superstructure deck: Cabin no.: 6215 (cruise control)
Main deck: 4201, 4205, 4206

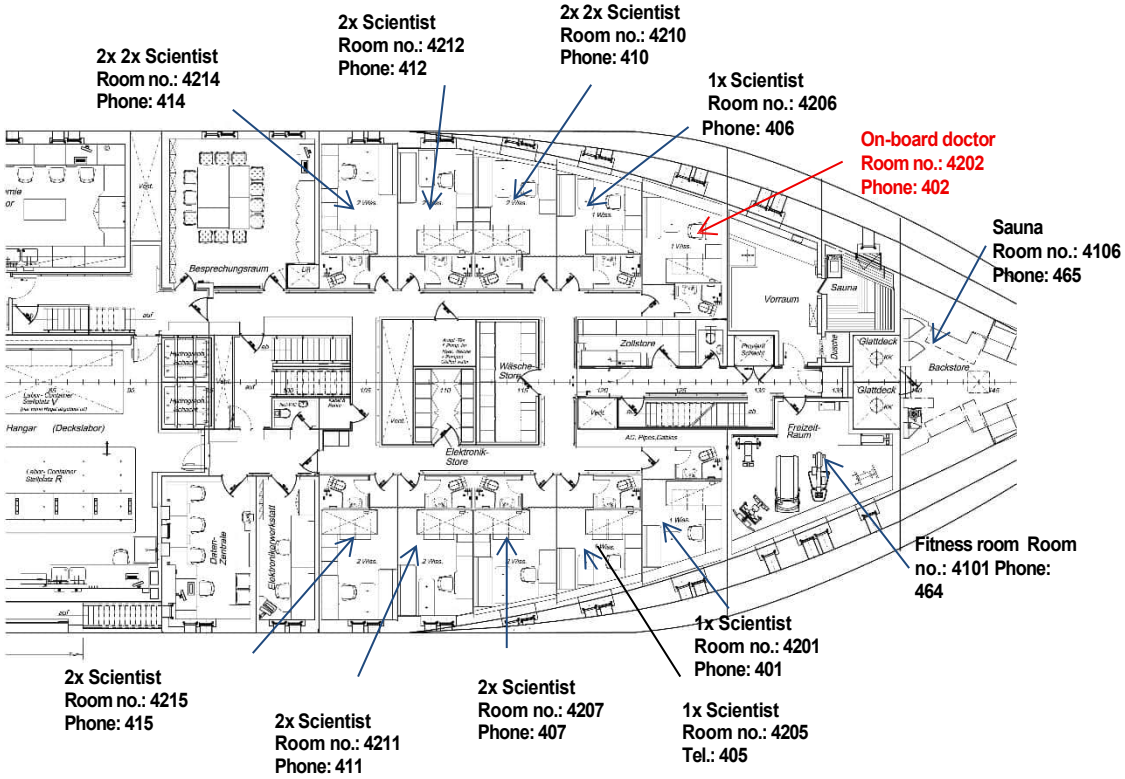
See cabin plan

6.3. Scientists cabins

1. Superstructure deck

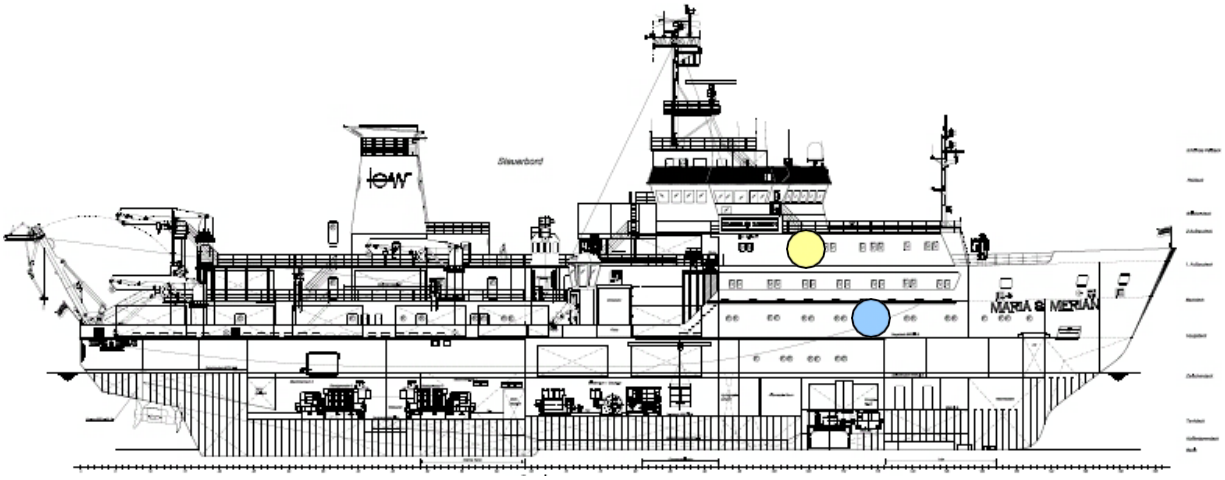


Main deck



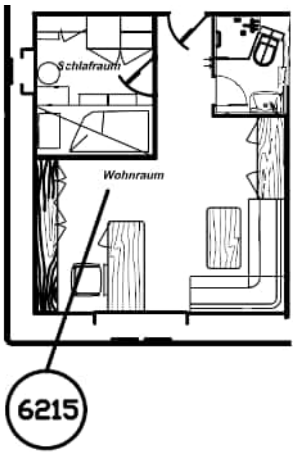
6.4. Cabin arrangement plan

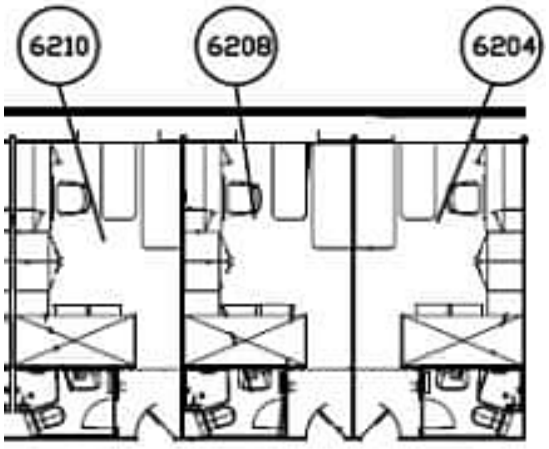
There are 14 cabins (5 single and 9 double cabins) with a total of 23 berths available on board the RV 'Maria S. Merian' for the accommodation of the scientists. The cabins are located on the 1st superstructure deck ("yellow" deck) on the port side and on the main deck ("blue" deck) on both outer sides of the ship.



		1st superstructure deck	
Cabine		**Title / First name, Last name**	**Telephone**
6215	Chief scientist		**666**
6204	Upper bunk		**604**
	Lower bunk		
6208	Upper bunk		**608**
	Lower bunk		
6210	Upper bunk		**610**
	Lower bunk		

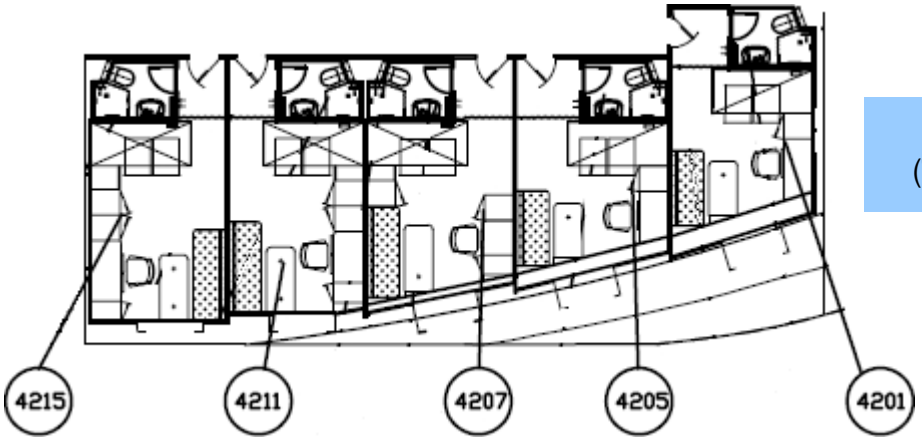
1st superstructure deck ("yellow" deck) stb. aft





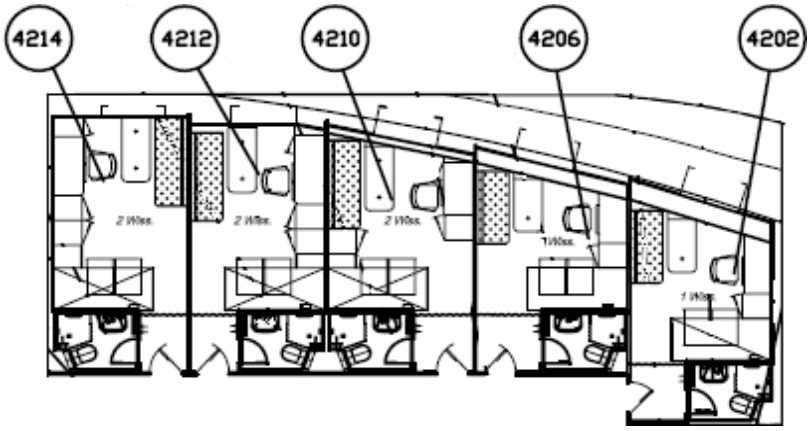
1st superstructure deck ("yellow" deck) Port front

Main deck (starboard)			
Cabin		**Title / First name, Last name**	**Telephone**
4201	Singel bunk		**401**
4205	Singel bunk		**405**
4207	Upper bunk		**407**
	Lower bunk		
4211	Upper bunk		**411**
	Lower bunk		
4215	Upper bunk		**415**
	Lower bunk		



Main deck
("blue" deck) Starboard

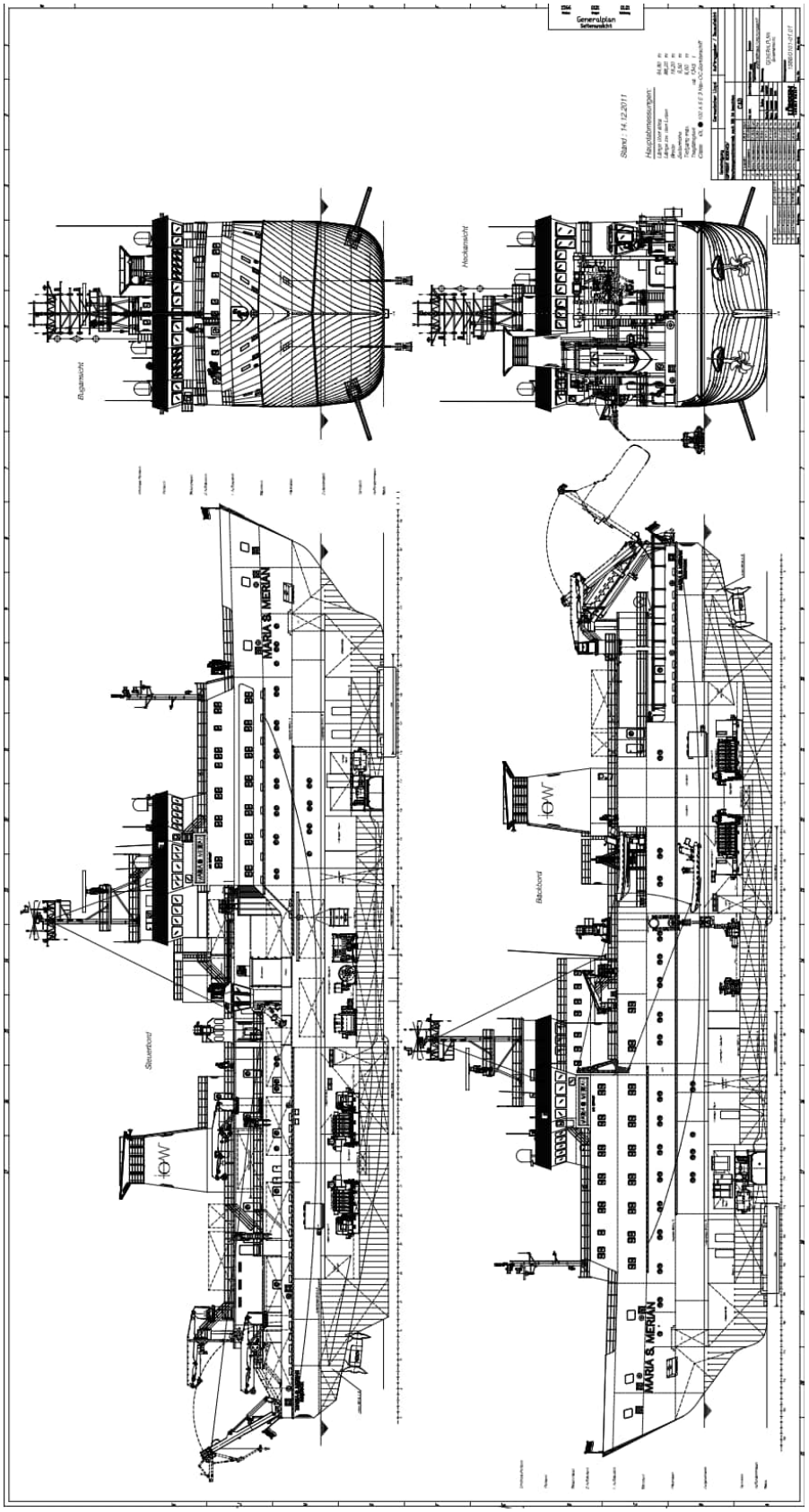
Main deck (port)			
Cabin		**Title / First name, Last name**	**Telephone**
4202	Singel bunk	**! Cabin reserved for the on-board doctor**	**402**
4206	Singel bunk		**406**
4210	Upper bunk		**410**
	Lower bunk		
4212	Upper bunk		**412**
	Lower bunk		
4214	Upper bunk		**414**
	Lower bunk		

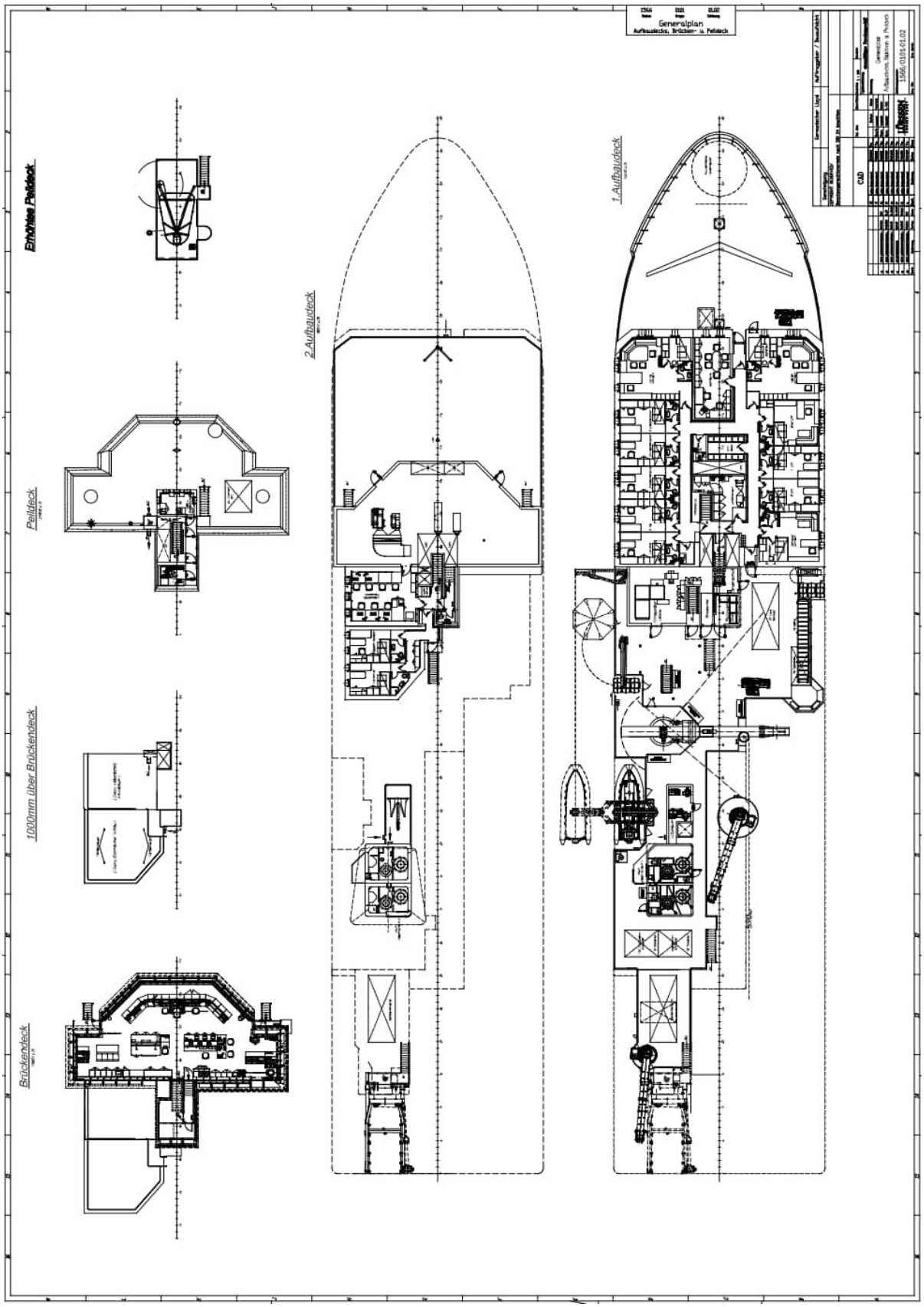


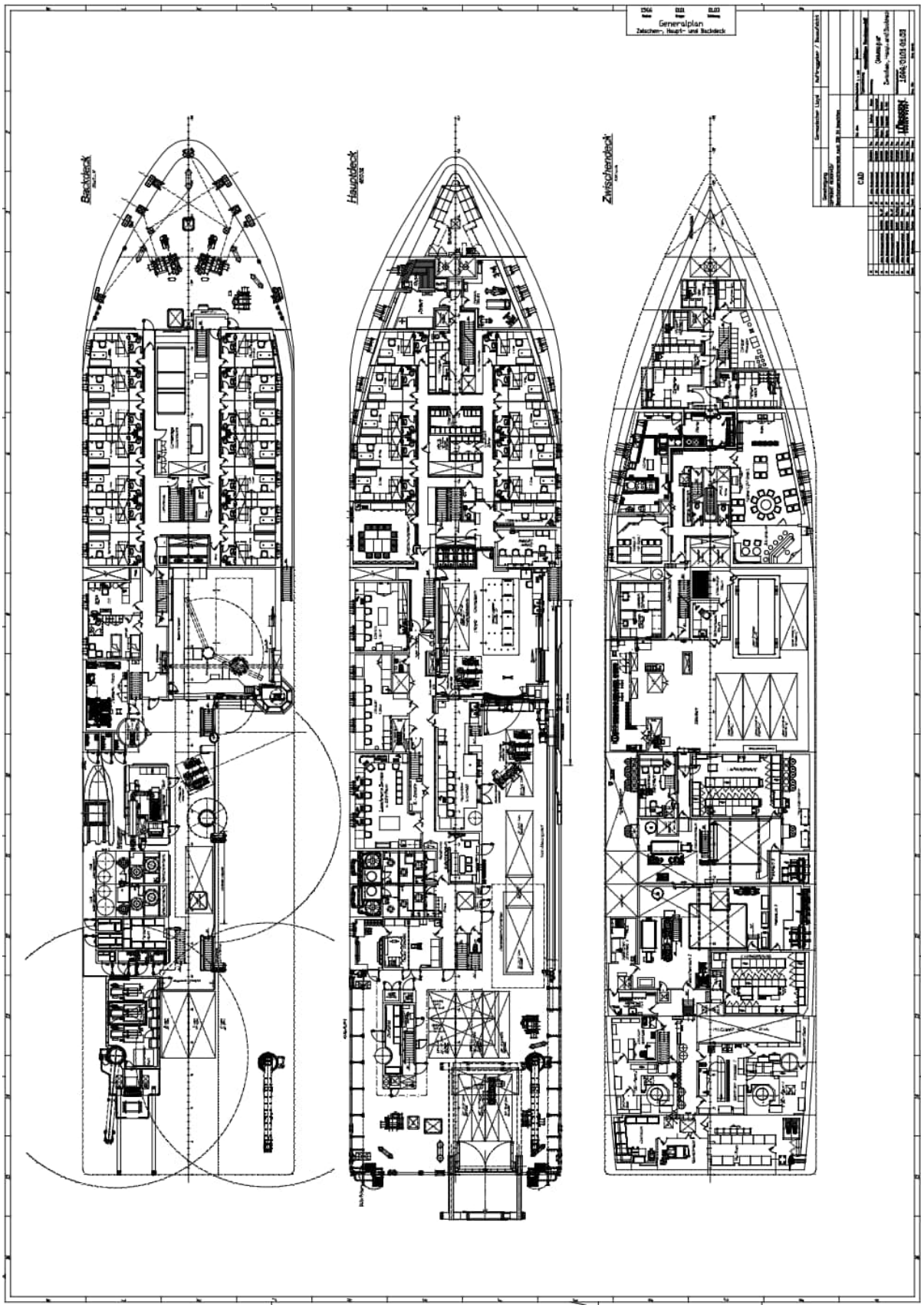
Main deck
("blue" deck) port side

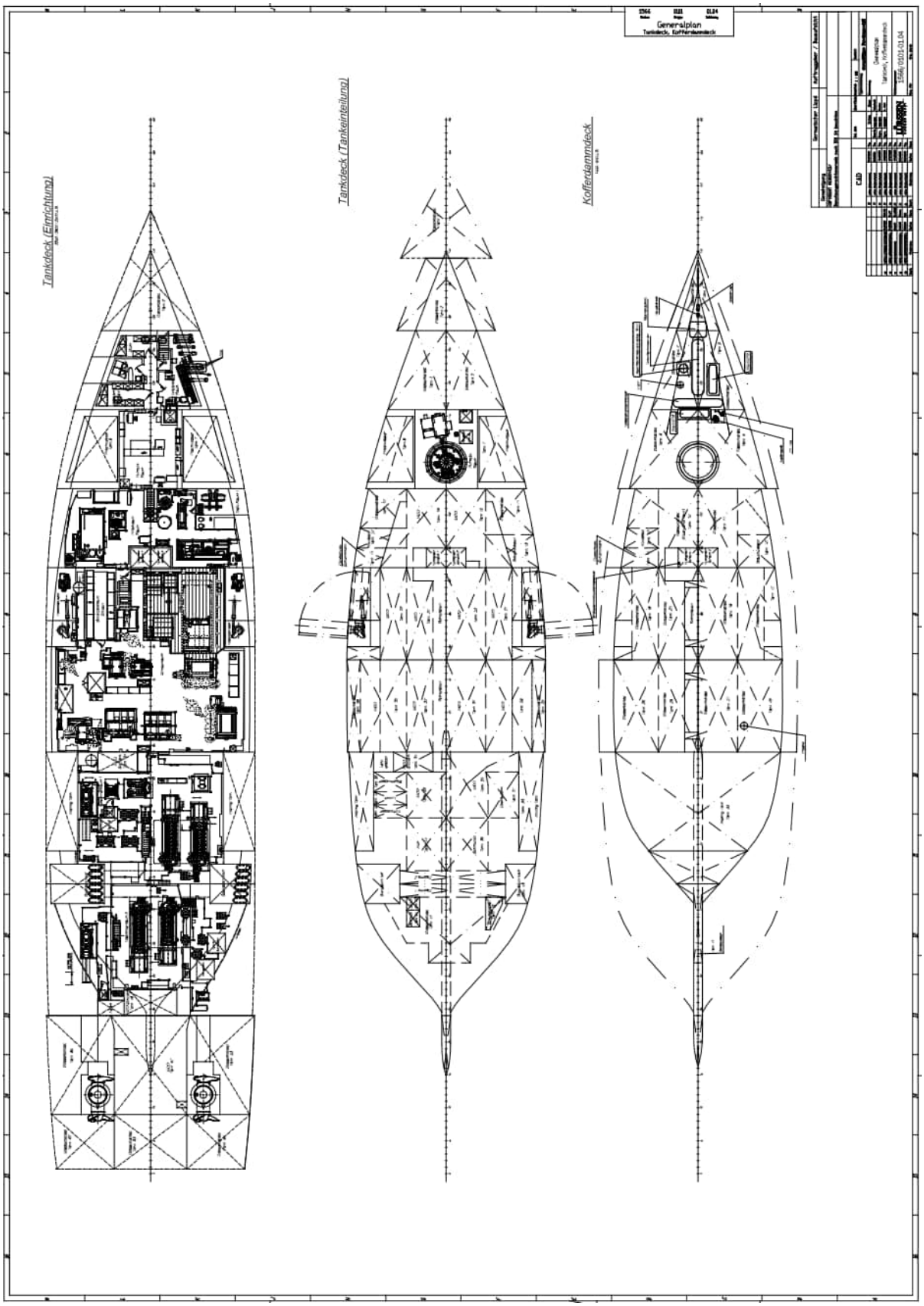
7. Ship plans

7.1. General arrangement plan

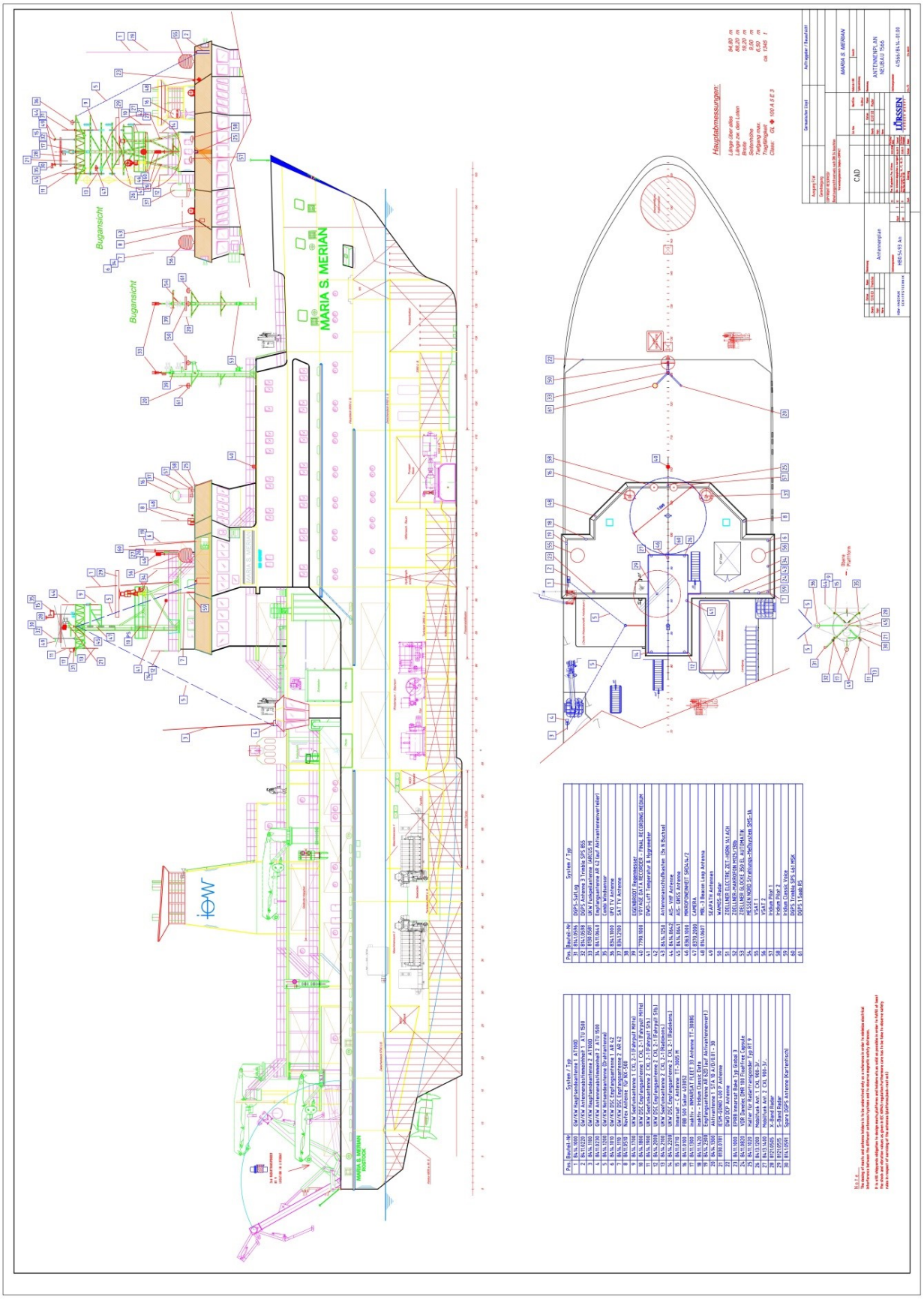


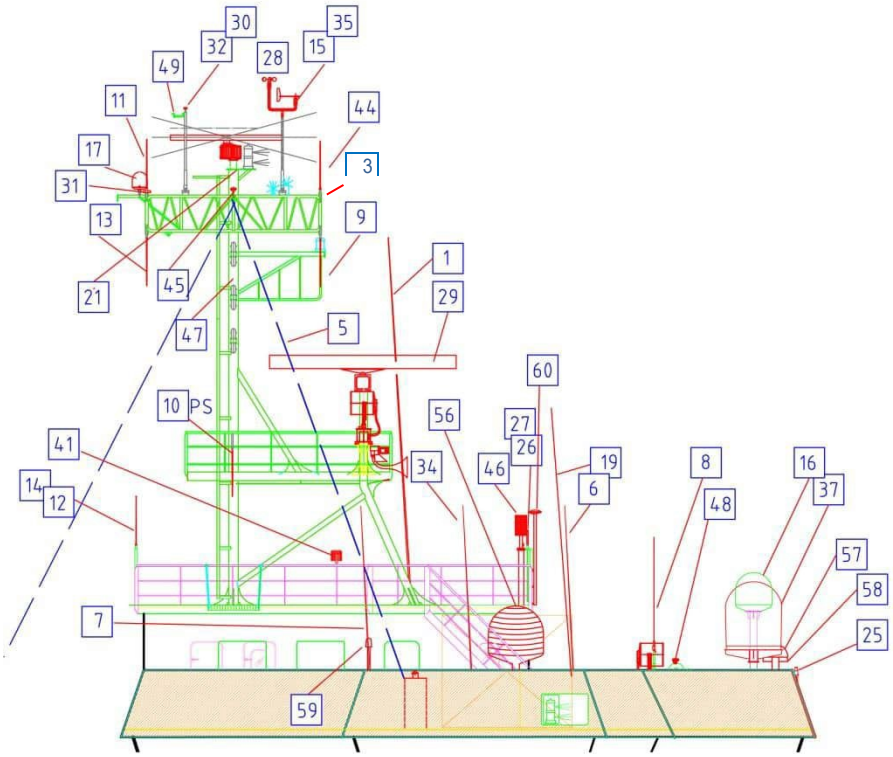

Generalplan
Aufbaudecks, Brücken- u. Peildeck
Erhöhtes Peildeck
Peildeck
1000mm über Brückendeck
Brückendeck
2.Aufbaudeck
1.Aufbaudeck


Generalplan
Zwischen-, Haupt- und Backdeck
Backdeck
Hauptdeck
Zwischendeck


Generalplan
Tankdeck, Kofferdammdeck
Tankdeck (Einrichtung)
Tankdeck (Tankeinteilung)
Kofferdammdeck

7.2 Antenna arrangement




30
35
32
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11
44
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60
10 PS
56
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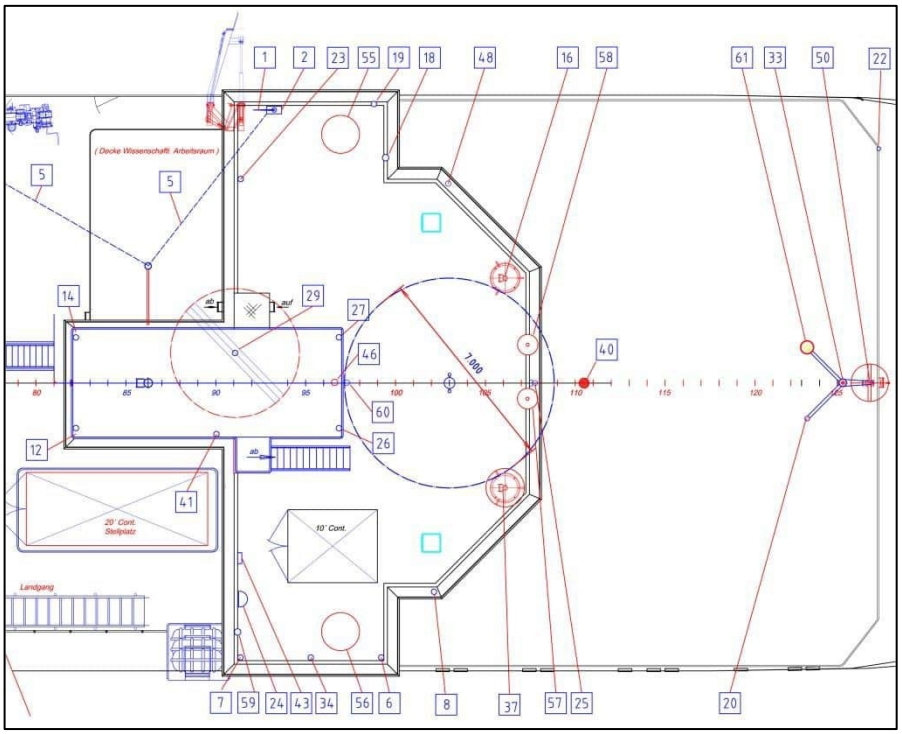
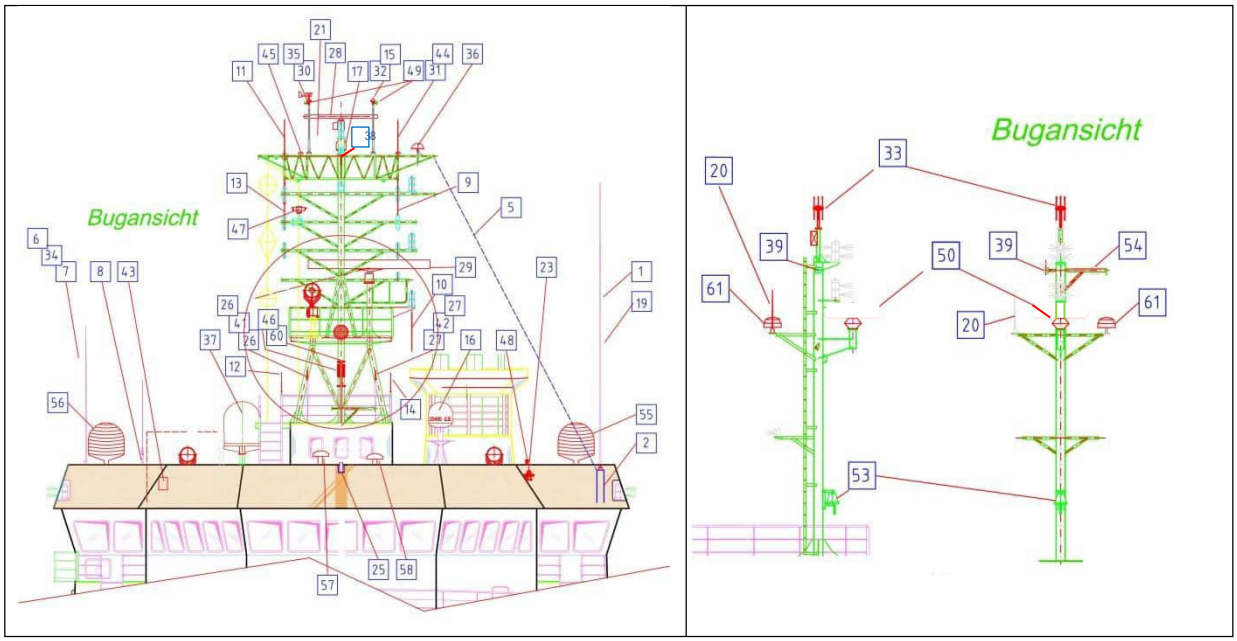
25
59

Top view


1
2
23
55
19
18
48
16
58
61
33
50
22
5
5
14
29
27
46
40
60
26
12
41
20' Cont. Stellplatz
10' Cont.
Landgang
7
59
24
43
34
56
6
8
37
57
25
20

View from the bow



Index

Po	System / Type
1	GW / KW Main transmitting antenna 1 AT100D
2	GW / KW antenna tuning unit 1 ATU 1500
3	GW / KW Main transmitting antenna 2 AT100D
4	GW / KW antenna tuning unit 2 ATU 1500
5	free
6	GW / KW DSC receiving antenna 1 AR 42
7	GW / KW DSC receiving antenna 2 AR 42
8	Navtex antenna
9	VHF marine radio antenna 1 CXL 2-1 (center console)
10	VHF DSC receiving antenna 1 CXL 2-1 (center control panel)
11	VHF marine radio antenna 2 CXL 2-1 (control panel, starboard)
12	VHF DSC receiving antenna 2 CXL 2-1 (control panel Stb)
13	VHF marine radio antenna 2 CXL 2-1 (radio console))
14	VHF DSC receiving antenna 2 CXL 2-1 (radio console)
15	INMARSAT-C antenna Sailor 3027
16	IRIDIUM Certus
17	free
18	IRIDIUM Classic (Voice)
19	AR 62D receiving antenna (on active antenna distributor)
20	Active antenna 1 STA 10 A/D/0.01-30
21	IESM-Gonio 400P antenna (temporary leading edge increased PD
22	DWD antenna (Iridium)
23	Seatrack FRB Tendertracking
24	VDR Danelec DMR 100 Floatfree Capsule
25	Holder for radar transponder type RT 9
26	Mobile phone antenna 1 CXL 900-3/..
27	Mobile radio antenna 2 CXL 900-3/..
28	X-Band Radar
29	S-band radar
30	Free

Po	System / Type
31	DGPS-SatLog SHM SLS 4120
32	DGPS antenna 3 Trimble SPS 855
33	VHF radio direction finding antenna ARCUS M
34	AR 42 receiving antenna (on active antenna) distributor)
35	Ultrasonic wind sensor (covered form)
36	free
37	SAT TV antenna
38	Ultrasonic wind sensor (open form)
39	EIGENBRODT rain gauge
40	Voyage Data Recorder - Final Recording Medium
41	DWD air temperature and hygrometer
42	DGPS 2 JRC-JLR21
43	Antenna connection box (3x N socket)
44	AIS - VHF antenna
45	AIS - GNSS antenna
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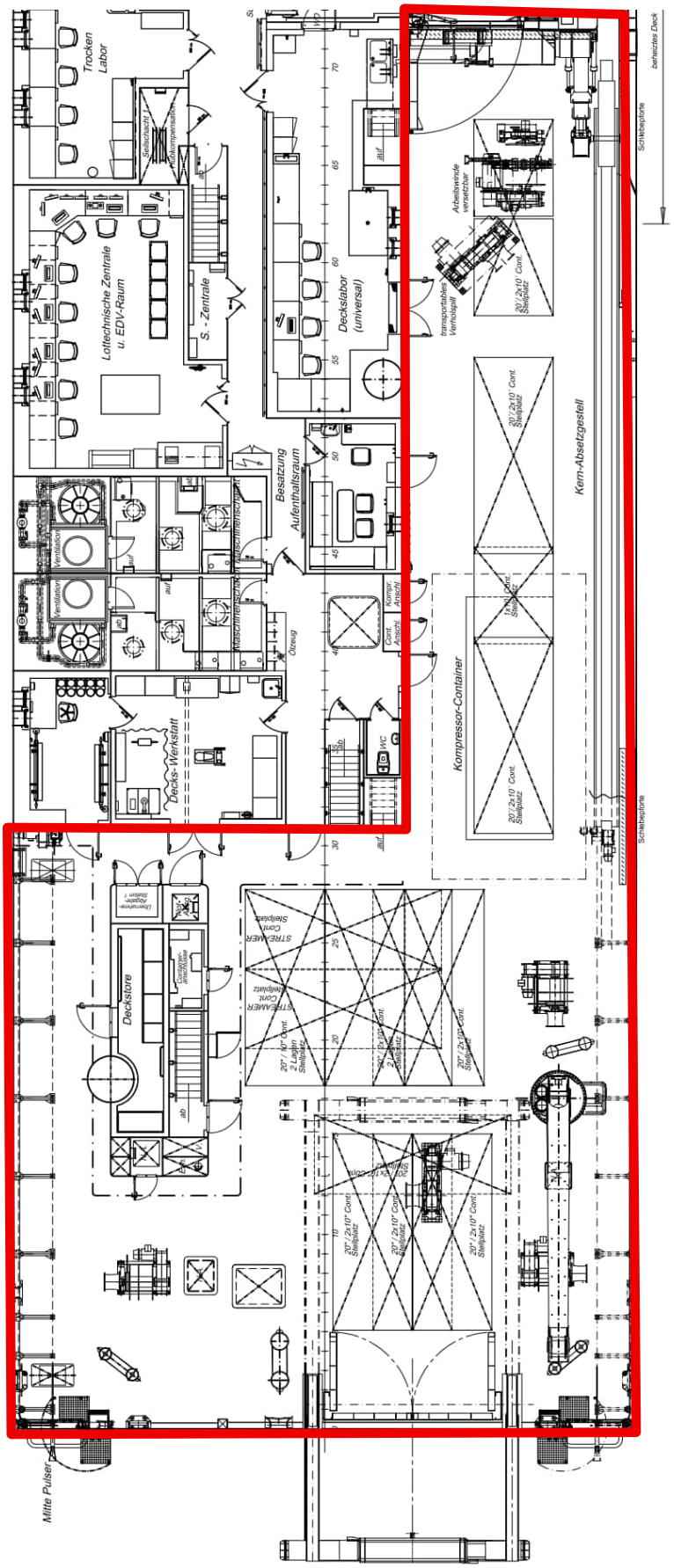
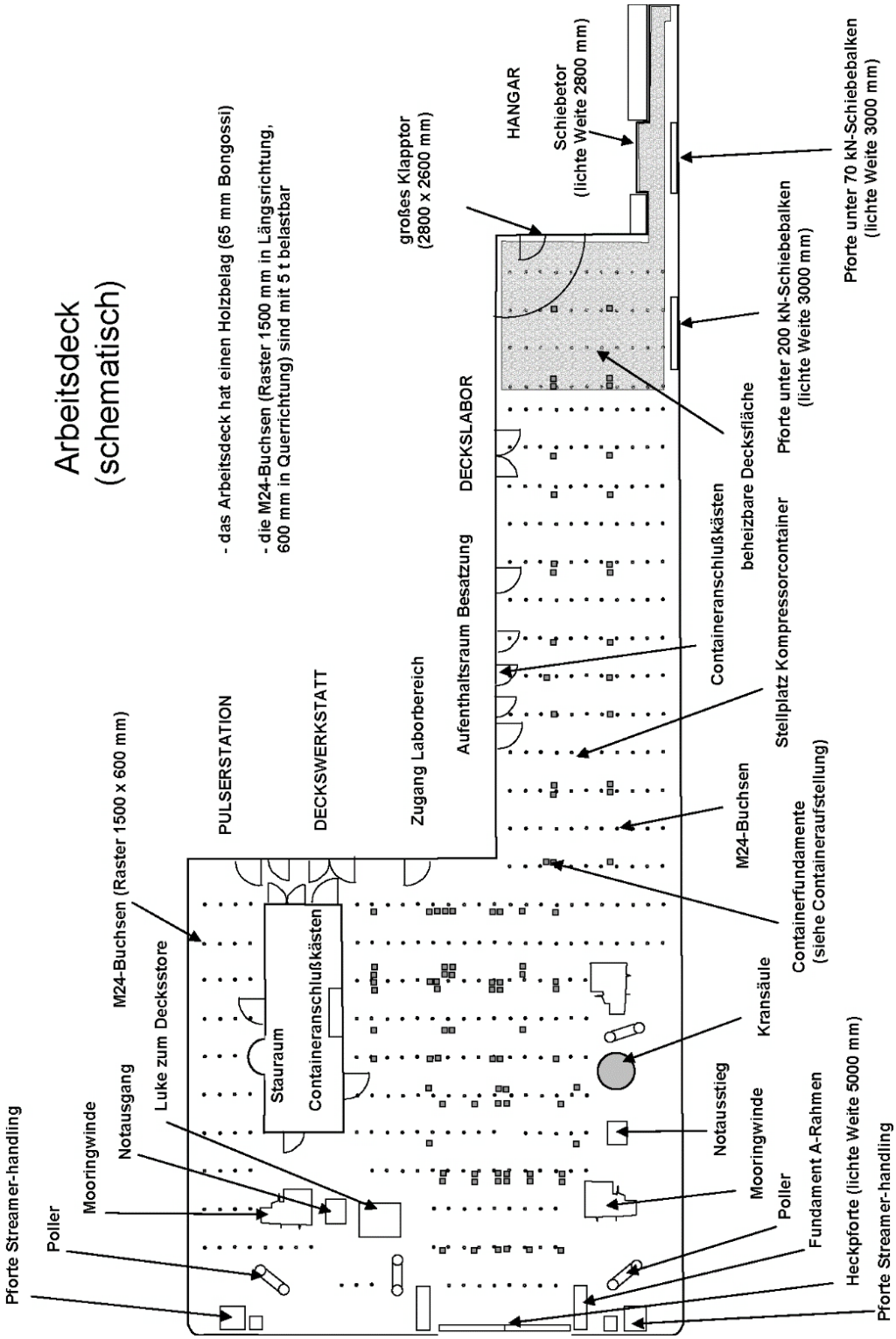
49	DGPS antennas 4 Seapath 380
50	FLIR camera
51	Zöllner Electric Zet-Horn 141 ACH
52	Zöllner macrophone M125/130b
53	Zöllner Bell 350 EL Automatic
54	Measure Nord radiation measuring system SMS-1A
55	VSAT antenna 1
56	VSAT antenna 2
57	Starlink antenna 1
58	Starlink antenna 2
59	Iridium Classic Data (inactive)
60	DGPS Trimble SPS 461 MSK
61	DGPS 1 Saab R5
62	WAMOS-2 wave radar

7.3. Working deck (arrangement)




Arbeitsdeck
(schematisch)
- das Arbeitsdeck hat einen Holzbelag (65 mm Bongossi)
- die M24-Buchsen (Raster 1500 mm in Längsrichtung, 600 mm in Querrichtung) sind mit 5 t belastbar
großes Klapptor (2800 x 2600 mm)
HANGAR
Schiebetor (lichte Weite 2800 mm)
Pforte unter 70 kN-Schiebebalken (lichte Weite 3000 mm)
Pforte unter 200 kN-Schiebebalken (lichte Weite 3000 mm)
beheizbare Decksfläche
Containeranschlußkästen
Stellplatz Kompressorcontainer
M24-Buchsen
Containerfundamente (siehe Containeraufstellung)
Kransäule
Notausstieg
Mooringwinde
Poller
Fundament A-Rahmen
Heckpforte (lichte Weite 5000 mm)
Pforte Streamer-handling
PULSERSTATION
DECKSWERKSTATT
Zugang Laborbereich
Aufenthaltsraum Besatzung
DECKSLABOR
M24-Buchsen (Raster 1500 x 600 mm)
Luke zum Decksstore
Notausgang
Mooringwinde
Poller
Pforte Streamer-handling
Stauraum
Containeranschlußkästen

8. Container

8.1. Container stowing positions

The containers can only be partially stowed using the on-board lifting gear.

The three deck cranes can only lift up 5 tons each, but together they can carry up to 10 tons, but then they do not longer cover the entire deck. The observation deck can be served by crane 2 (SWL 1.68t), but only in the area of the starboard aft edge; larger and heavier loads must be handled by an external crane in port.

The 200 kN sliding beam can transport containers weighing up to 12.5t into the hatch cover (1st superstructure deck) and thus into the hangar and the scientific stowage space (tween deck). There, the containers must be moved outside the hatch position (35/36) using winches.

Note on the installatio of refrigerated containers: Temperatures of up to 45 °C can occur permanently in the scientific storage room. Refrigerated containers must therefore be equipped with refrigerant 134 A or the older refrigerant R12. Coolants such as R22, R 404 A or R 407 C are not able to transfer the required cooling capacity at high outside temperatures. The coolant R11 is no longer approved and must not be brought on board!

The information below refers to 10' containers. When stowing 10' containers, attention must be paid to accessibility. This is not always the case. 20' containers are always accessible.

Monkey deck:

Number of 10' stowing positions:	1
Weight load:	20 tons

1. Superstructure deck:

Number of 10' stowing positions:	6 (or 3*20') - of which 2 on the hatch cover
Max weight:	10 tons per 10' slot

Forecastle deck:

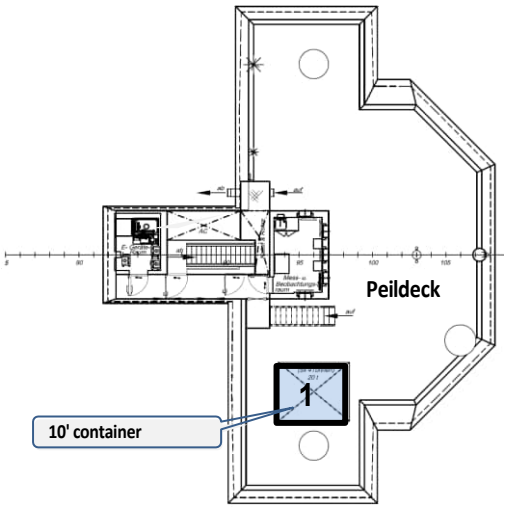
Number of 10' stowing positions:	2 (or 1*20')
Max weight:	10 tons per 10' slot

Main deck:

Number of 10' stowing positions:	max. 25, of which 13 in second position aft and 4 in the hangar, The overall stowage capacity is quite variable, depending on the stowage position amidships or athwartships (see illustration of container slots),
Quantity 'Oversize':	Stowing position for compressor container (then less 10' container)
Max weight:	15 t per 10' stowing position, 30 t for LMF compressor containers Two 20' containers (or two 10' containers) can be placed in the 2. tier, which are accessible from the back deck. 24t per 20' stowing position

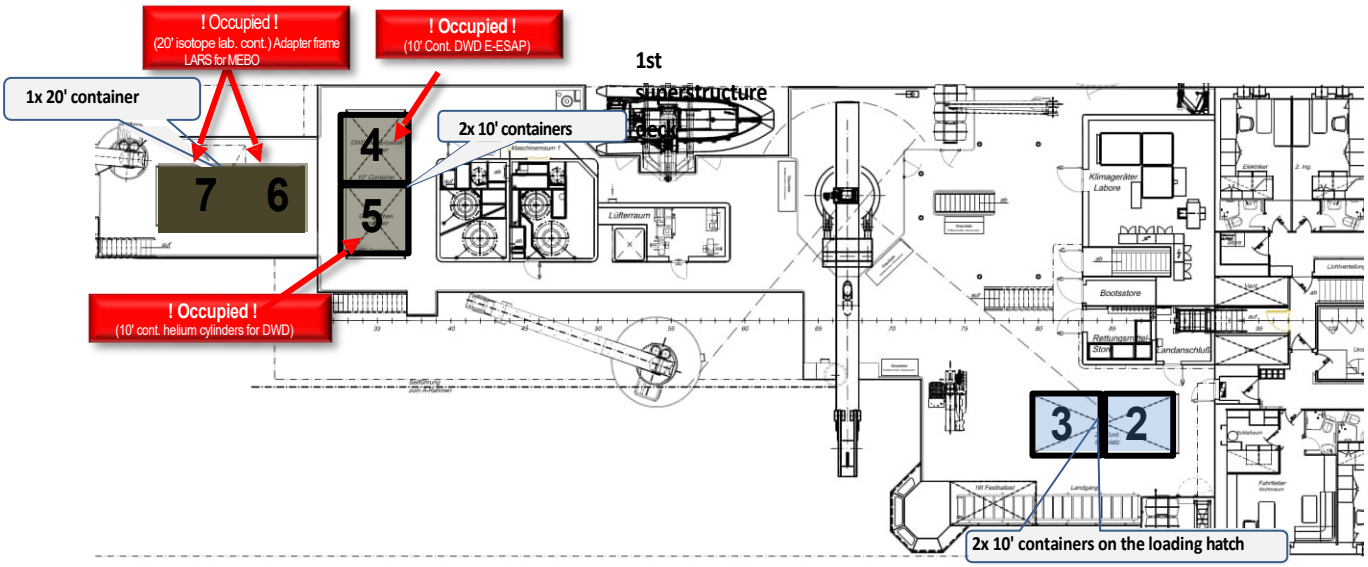
Tween deck (scientific hold):

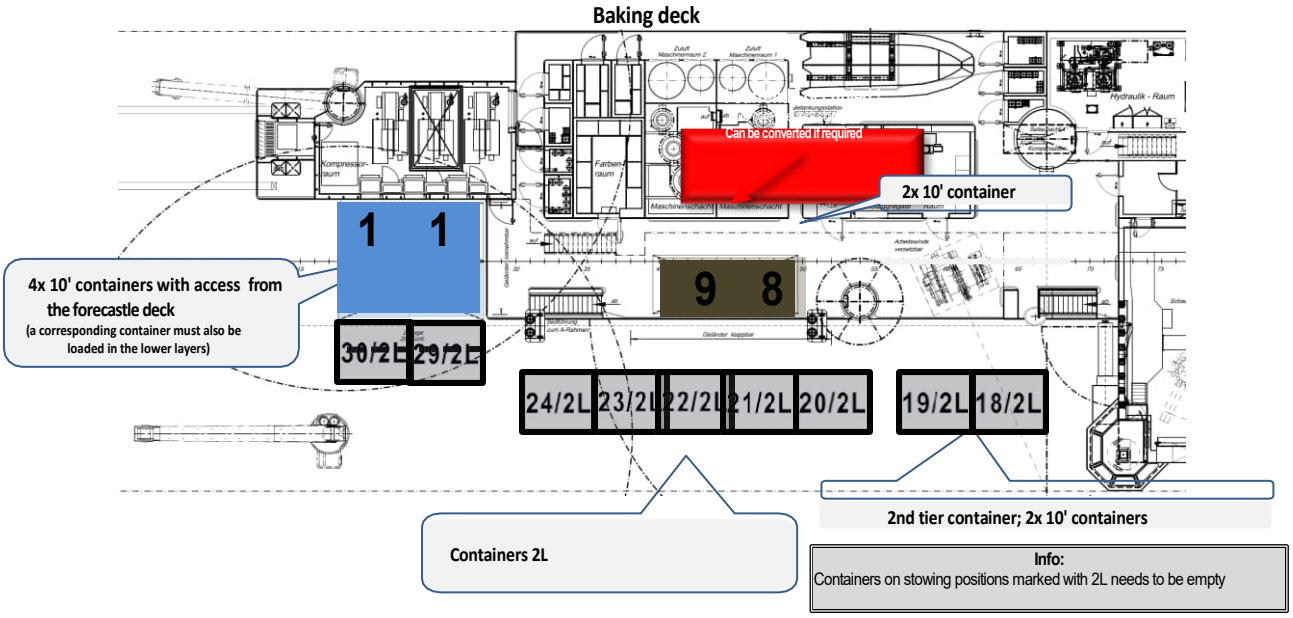
Number of 10' stowing positions:	10 pieces (or 5 x 20') - if 10 10' containers are towed not all accessible
Max weight:	15t per 10' stowing position 10t per 20' stowing position
Remark:	Only standard size container can be stowed in the scientific hold, no high cube containers



Notes:

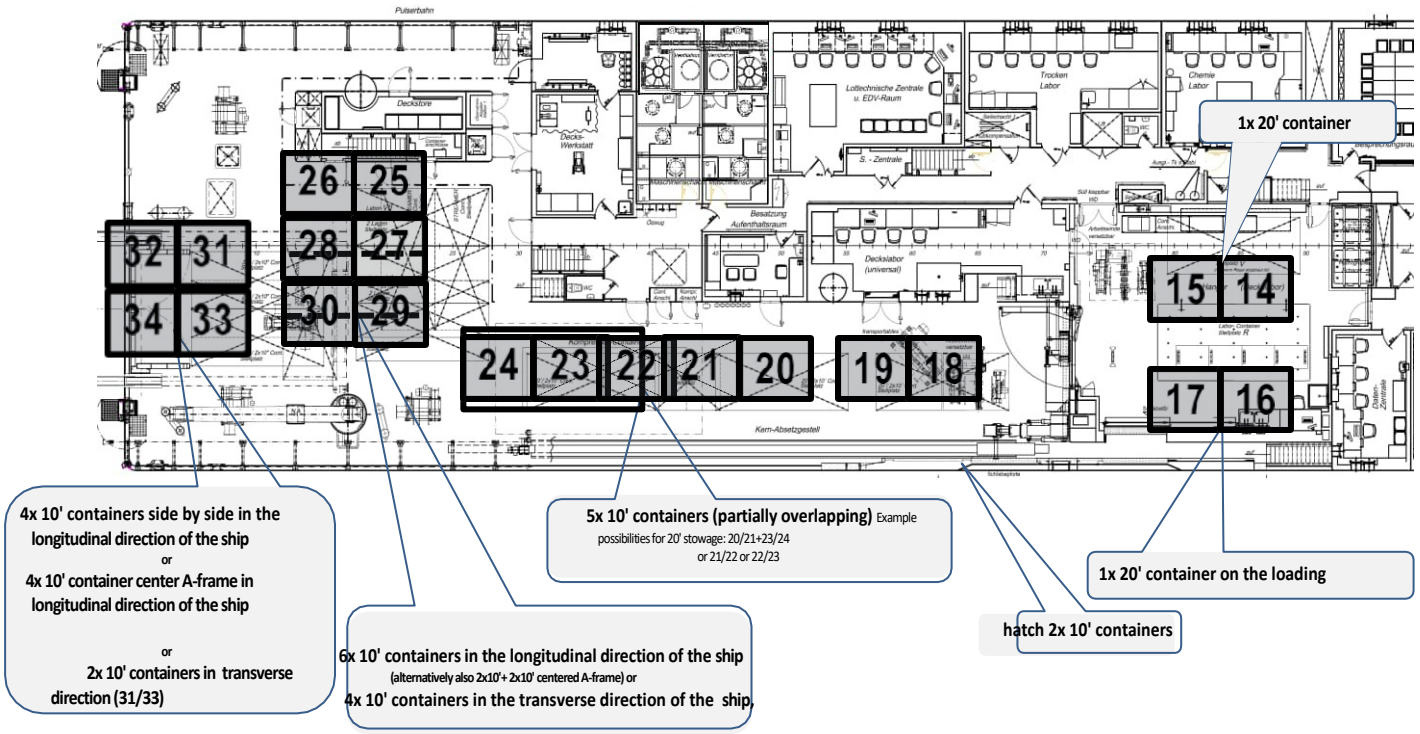
- 1x 20' container can be stowed for each 2x 10' container. The deck load on the main deck is: **15 tons per 10' grid** (i.e. **24 tons for a 20' container**). On all other decks: **10t per 10' grid** (**i.e. 10t per 20' container**).
- Connection boxes for laboratory containers are located in the scientific. storage space, on the main deck (center and aft), on the forecastle deck (center) and on the monkey deck.
- Not all connection boxes are equipped with all connections (see illustration "Container connection box")



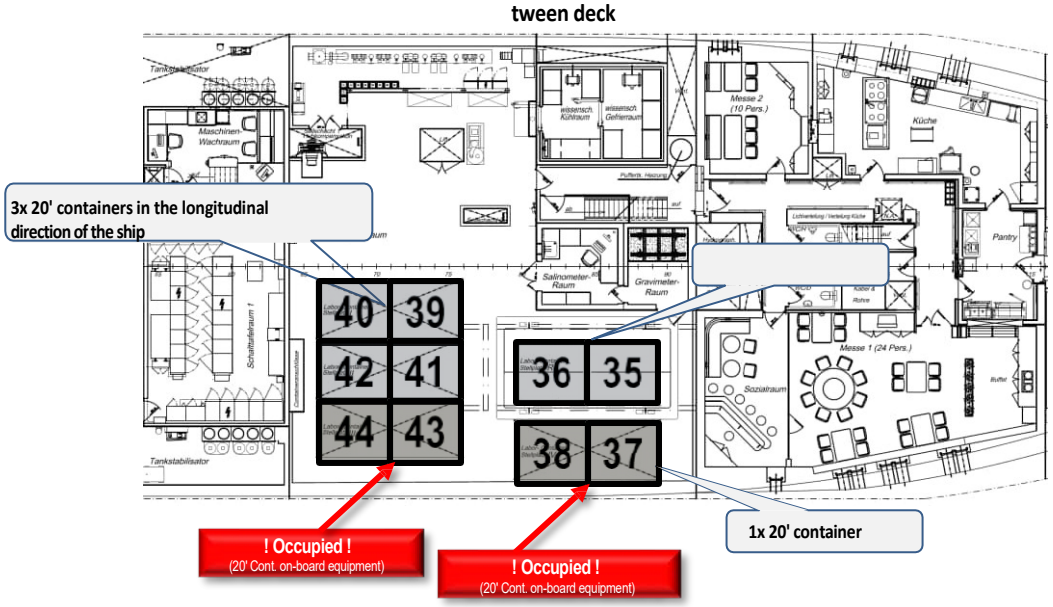


Info:
Containers on stowing positions marked with 2L needs to be empty

Main deck



tween deck



8.2. Container connection

8.2.1. Peildeck - niche frame1

electric:	
230V 50Hz on-board power supply (white)	2
230V 50Hz laboratory mains (red)	2
400V 50Hz three-phase current (CEE) 32A	1
400V 50Hz three-phase current (CEE) 16A	1
Water and air Supply and disposal:	
Industrial fresh water	1
Process sea water	1
Compressed air 0-10 bar	2
Communication:	
Junction box Data distribution system from measuring and observation room	2

8.2.2. 1st superstructure deck – niche frame S1A4

electric:	
230V 50Hz on-board power supply (white)	2
230V 50Hz laboratory mains (red)	2
400V 50Hz three-phase current (CEE) 32A	1
Water and air Supply and disposal:	
Fresh water cold/hot (drinking water)	1
Process fresh water	1

8.2.3. 1st superstructure deck - shore connection room

electric:
400V 50Hz three-phase current 400 A; open copper bars with holes for cable lugs 1

8.2.4. Forecastle deck - SB6 niche

electric:	
230V 50Hz on-board power supply (white)	2
230V 50Hz laboratory mains (red)	2
400V 50Hz three-phase current (CEE) 32A	1
Water and air Supply and disposal:	
Fresh water cold/hot (drinking water)	1
Process fresh water	1
Process sea water	1
Compressed air 0-10 bar	2

8.2.5. Main deck - Hangar

(Connections are located in the container connection box and in the area of the laboratory area (front starboard)

electric:	
230V 50Hz on-board power supply (white) 230V	2
50Hz laboratory mains (red)	2
400V 50Hz three-phase current (CEE) 16A 400V	1
50Hz three-phase current (CEE) 32A	2
Water and air Supply and disposal: Fresh water	
cold/hot (drinking water)	1
Process fresh water	1
Process lake water	1
Pure sea water (centrifugal pump)	1
Pure seawater (diaphragm pump)	1
Compressed air 0-10 bar	2
Communication:	
Junction box data distribution system Antenna	4
socket (radio / TV / video)	1
CCTV video connection box	2
BNC socket Timer	1
Connection for all single-wire winches Mobile fire	1
alarm	2
Laboratory container monitoring (connection to	1
machine room monitoring)	

8.2.6. Main deck - amidships - container connection box

electric:	
230V 50Hz on-board power supply (white)	6
230V 50Hz laboratory mains (red)	6
400V 50Hz three-phase current (CEE) 16A	2
400V 50Hz three-phase current (CEE) 32A	2
400V 50Hz three-phase current (CEE) 63A	1
400V 50Hz three-phase current (CEE) 125A	1
Communication:	
Junction box data distribution system	2
Science intercom system	1
CCTV video connection box	2
Connection for all single-wire winches	1
Telephone	1

8.2.7. Main deck - amidships - Compressor connection box

Water and air Supply and disposal:	
Fresh water cold/hot (drinking water)	1
Compressed air 250 bar	1
Compressed air 15 bar	1
Fuel supply and return	1 & 1
Sea cooling water supply and return	1 & 1
Condensate drain	1
Overproduction line (compressed air) to outboard	1

8.2.8. Main deck - aft

electric:	
230V 50Hz on-board power supply (white)	6
230V 50Hz laboratory mains (red)	6
400V 50Hz three-phase current (CEE) 16A	2 (2 used by DWD container & Isotopenconatiner)
400V 50Hz three-phase current (CEE) 32A	4 (2 used by DWD container & Isotopenconatiner)
400V 50Hz three-phase current (CEE) 63A	2
400V 50Hz three-phase current (CEE) 125A	1
400V 50Hz three-phase current (CEE) 200A	1
Earthing bolt to ship's ground M10	1
Circuit-breaker 400 A for ROV connection; open copper bar with 12 mm hole for cable lugs	1
Water and air Supply and disposal:	
Laboratory waste water	1
Waste water	1
Compressed air 0-10 bar	1
Communication:	
Junction box Data distribution system	4
Science intercom system	2
CCTV video connection box	2
Connection for all single-line winches	1
Telephone	2
Mobile fire alarm	3
Laboratory container monitoring (connection to machine monitoring system)	2

8.2.9. Tween deck - scientific hold

electric:

230V 50Hz on-board power supply (white)	8
230V 50Hz laboratory mains (red)	8
400V 50Hz three-phase current (CEE) 16A	1
400V 50Hz three-phase current (CEE) 32A	5

(Power supply also for transportable working winch (main deck stowing position under 200 kN sliding beam and in the hangar) and for transportable horizontal capstan (main deck stowing position under 200 kN sliding beam))

Water and air Supply and disposal:

Fresh water cold/hot (drinking water)	4
Process sea water	5
Pure sea water (centrifugal pump)	4
Clean seawater (diaphragm pump)	4
Compressed air 0-10 bar	5

Communication:

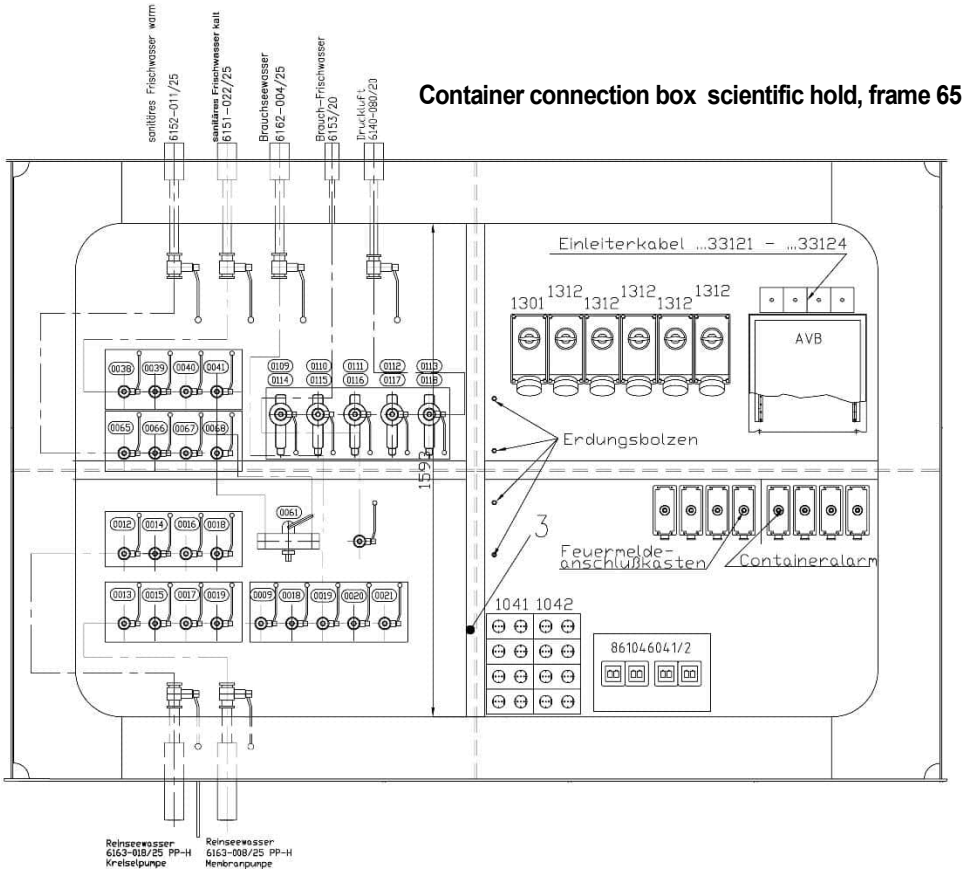
Junction box data distribution system	6
Science intercom system	2
CCTV video connection box	3
Connection for all single-wire winches	1
Telephone	2
Fire alarm	4
Container monitoring	4

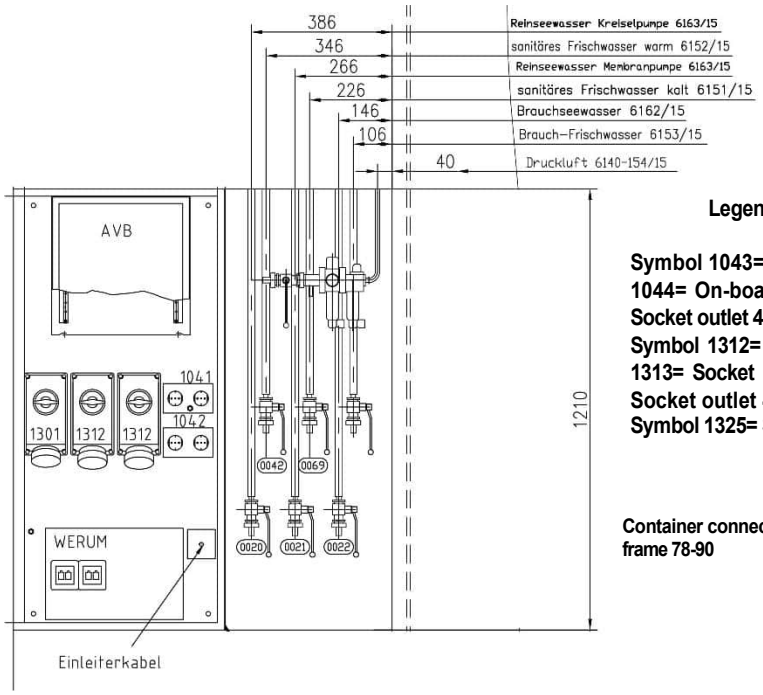
Electrical CEE socket outlet connection types:

up to and including 63 A:	3L+N+PE, 5-pole, 6
above 63 A (125 A, 200 A):	3L+PE, 4-pole, 6 o'clock

8.3. Container connection boxes

Container connection box scientific hold, frame 65

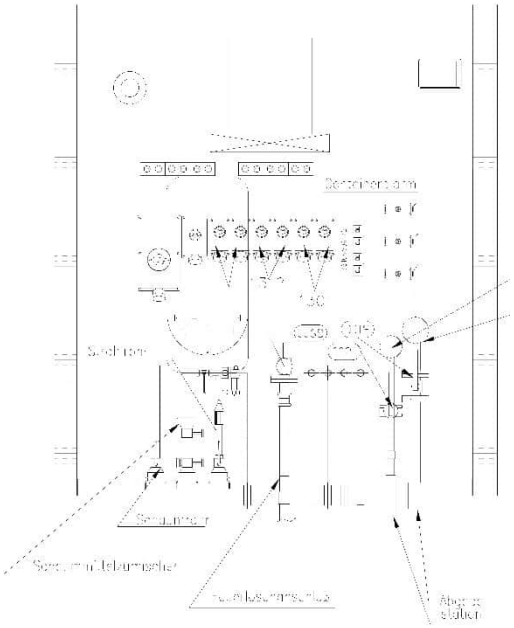




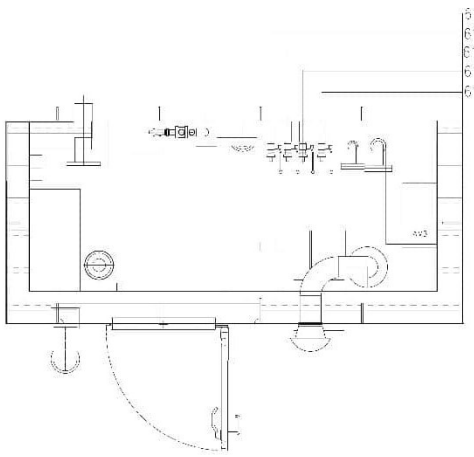
Legend

Symbol 1043= On-board power sockets 250 V / 16 A Symbol 1044= On-board power sockets 250 V / 16 A Symbol 1301= Socket outlet 400 V / 16 A
Symbol 1312= Socket outlet 400 V / 32 A Symbol 1313= Socket outlet 400 V / 63 A Symbol 1324= Socket outlet 400 V / 125 A
Symbol 1325= Socket outlet 400 V / 200 A

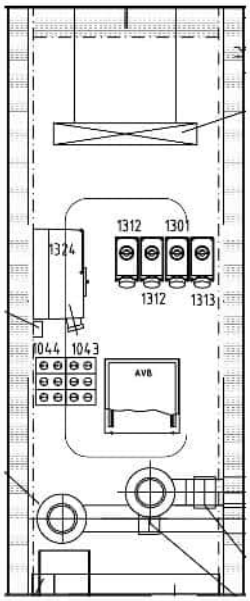
Container connection box main deck, frame 78-90

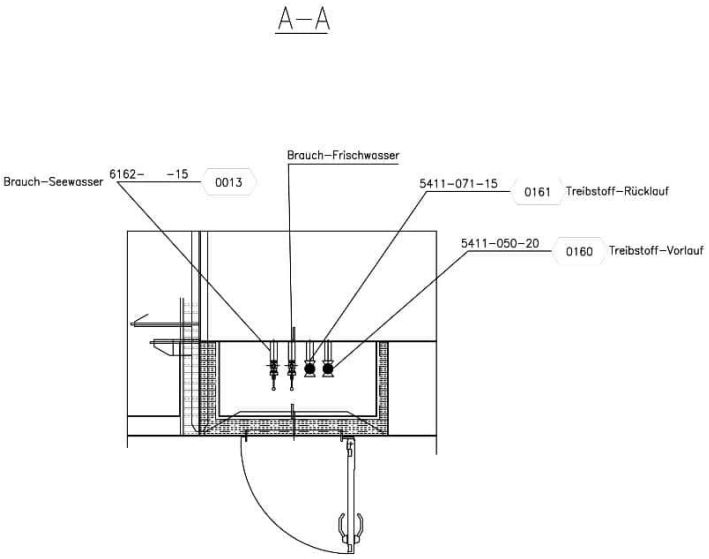


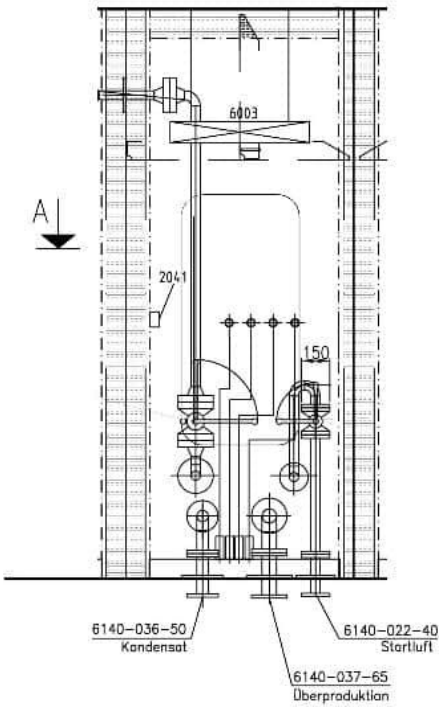
Container connection box main deck, frame 22-26



Container connection box main deck, frame 40-44 for compressor container

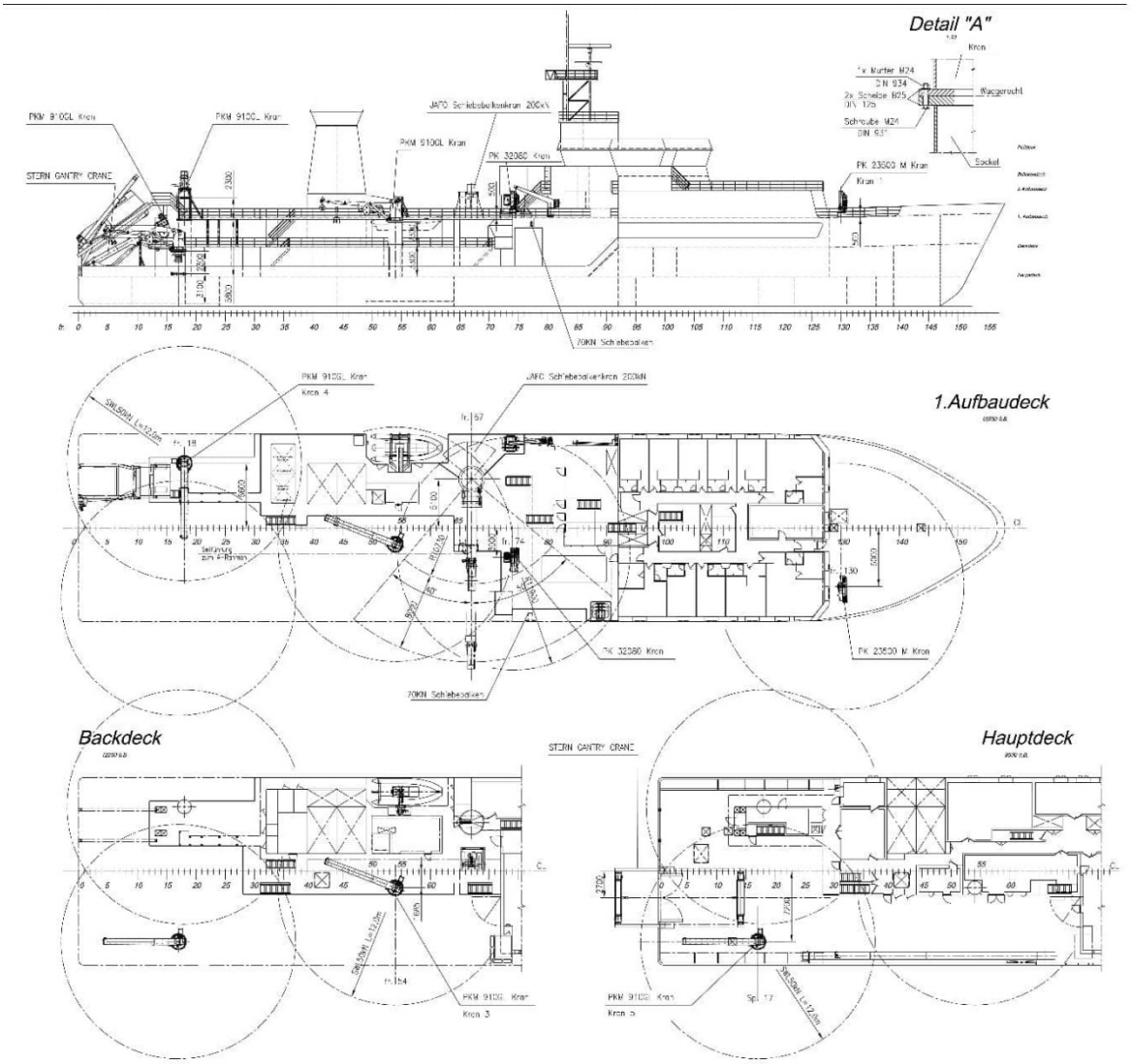

1312
1301
1324
1312
1313
1044
1043
AVB


A–A
Brauch–Seewasser
6162–
–15
0013
Brauch–Frischwasser
5411–071–15
0161
Treibstoff–Rücklauf
5411–050–20
0160
Treibstoff–Vorlauf

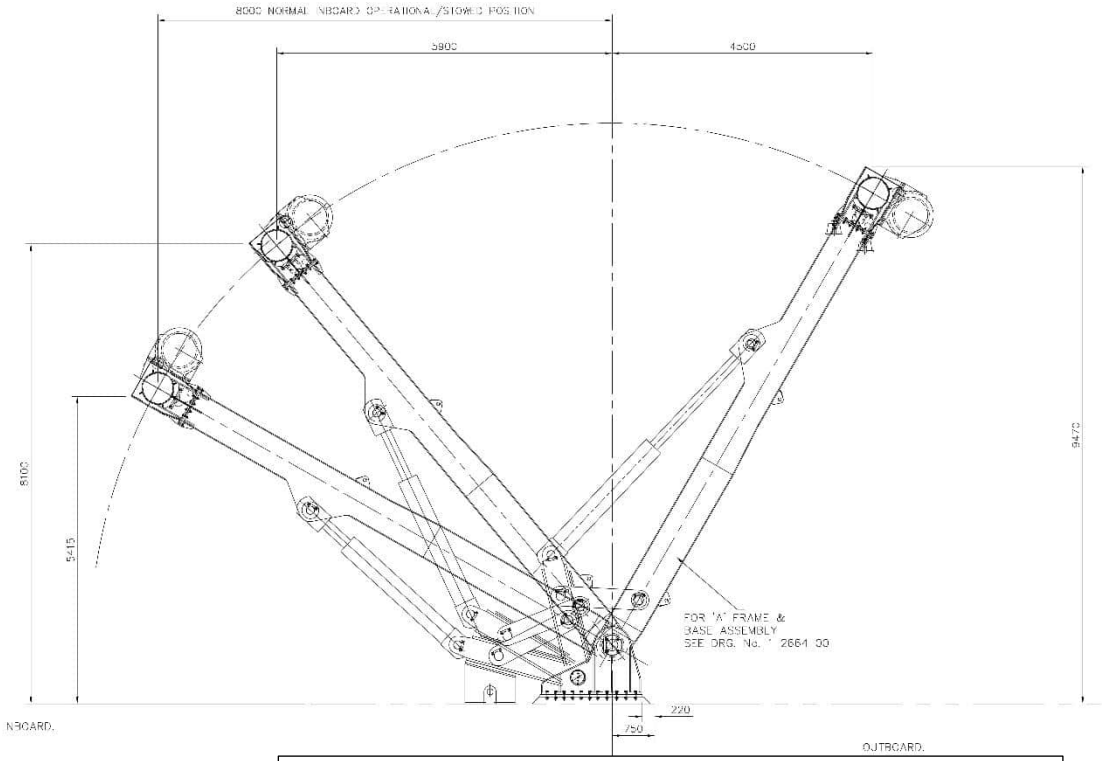

6003
A
2041
150
6140–036–50
Kondensat
6140–022–40
Startluft
6140–037–65
Überproduktion

9. Lifting gear

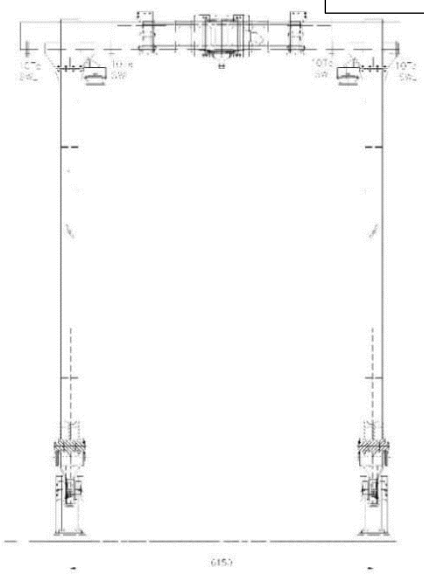
9.1. Arrangement and working area of the hoists

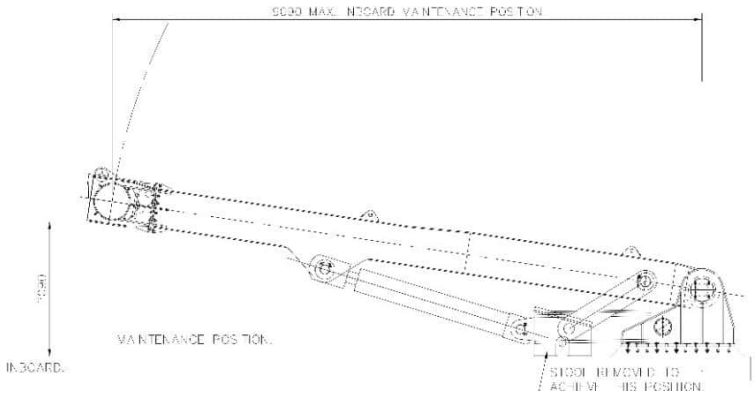


9.2. A-frame



Braking load:	**300 kN**
max. max swinging load :	**200 kN**
Clear width:	**5,5 m**
Clear hight:	**8,1 m**
Outreach:	**6,6 m inboard**
	bis 3,1 m outboard
Operation:	**remote control, control console**
Assistance winch:	**100 kN**
Additional features:	**additional support structure (100 kN)**



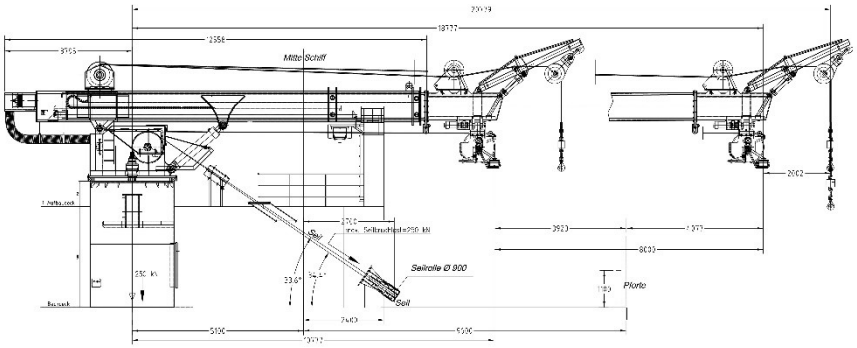


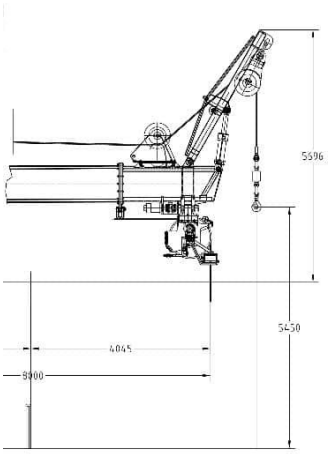
Maintenance position

9.3. Large sliding beam (200 kN)

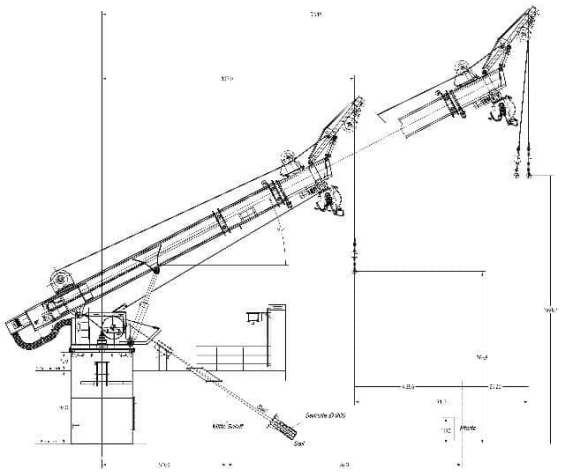
Design	Hydraulically extendable boom guided in the coker with automatic rope length compensation when extending and retracting, can be topped up as a crane
as a **sliding beam**	
Working range:	4.0 m inside to 4.0 m outside the dropside Load
capacity:	200 kN (SDL)
Clearance height:	Lower edge of head pulley above deck 5.3 m
Towing winch: Miscellaneous:	100 kN, clear height approx. 7.0 mm
as a **crane**	
Swinging range:	50° forward to 40° aft
Load capacity	125 kN (SWL)
max. clear height	approx. 15 m
Remark: Operation:	Container transport in hatch possible
Operation	Winch control stand, remote control

Sliding beam - view from aft

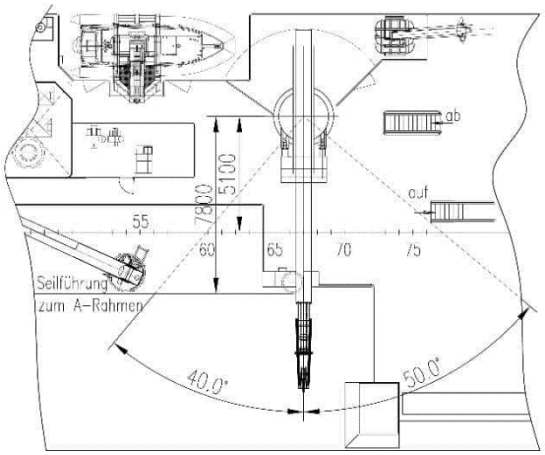




Crane - view from aft

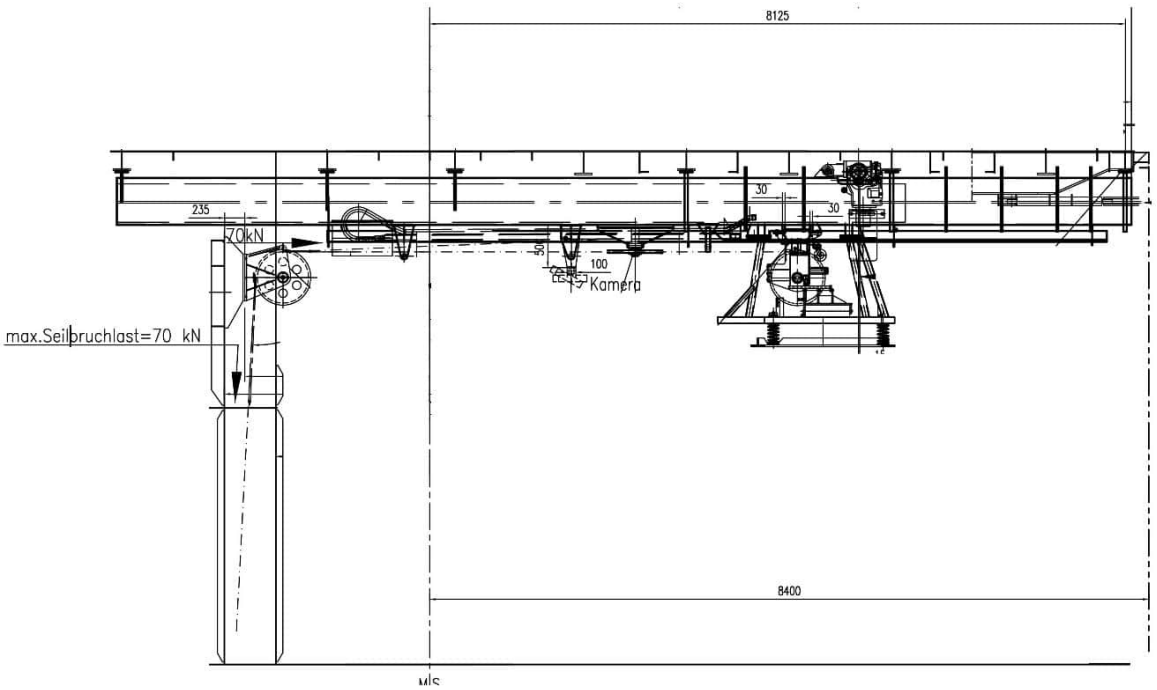


Swinging range



9.4. Small sliding beam (70 kN)

View from aft

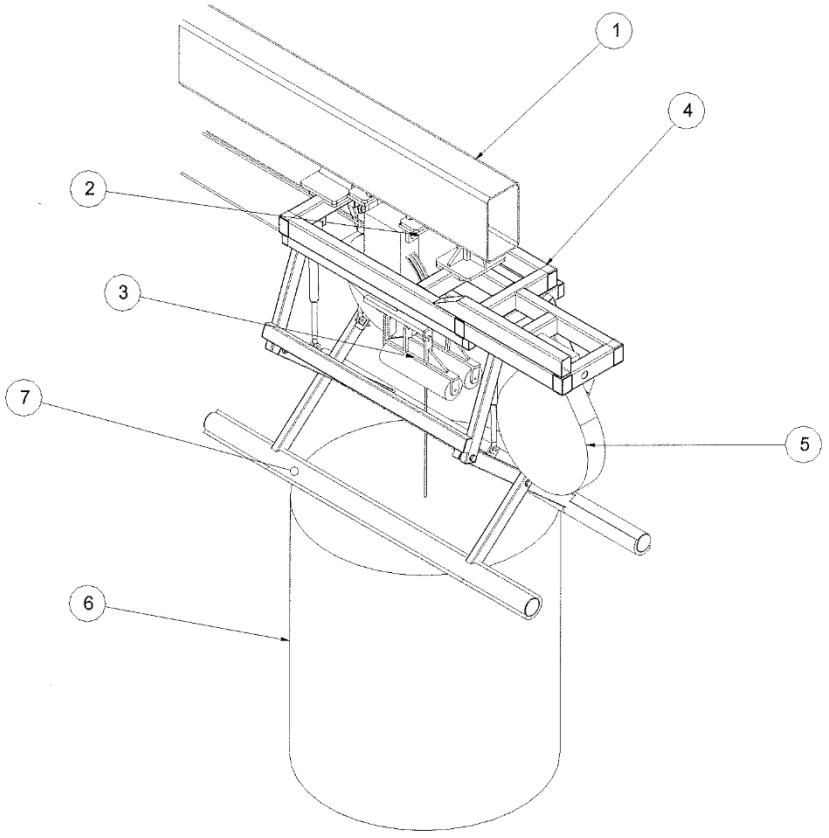


Location:	in the hangar
Design:	Electrically extendable boom guided in the coker with automatic rope length compensation during extension and retraction
Working range:	4.0m inboard to 3.0m outboard Load
capacity:	70kN
Clearance height:	approx. 4.5m
Miscellaneous:	Deflection roller with pressure roller with docking option for crane water scoop for pendulum-free transportation
Remark:	When extended, the large sliding gate can be closed
Operation:	Winch operator's platform, remote control)

9.4.1. Anti-oscillation unit

The 70 kN sliding beam in the hangar is equipped with an anti-pendel unit from Elbe Hydraulik GmbH to ensure the sway-free transportation of a water sampler (e.g. the CTD rosette on board) before and after use in the water.
The scissor-shaped arrangement of the damping elements with the 2.6 m long beams forms a unit with the support frame for the 5 t head roller and can be extended downwards by 77 cm to accommodate the rosette and fix it in place for transportation. Four hydraulic cylinders cushion the pendulum movement and raise and lower the scissor arms. The distance between them changes by approx. 45 cm at the upper edge of the rosette (be careful with protruding probes, e.g. the PAR sensor!).

Antipendeleinheit

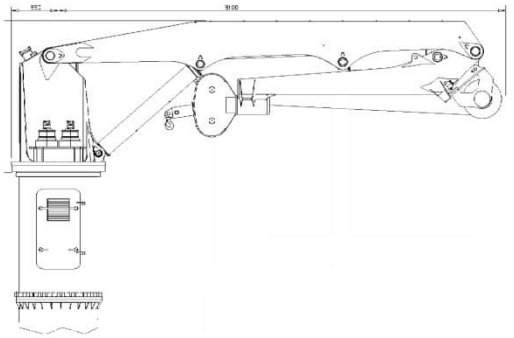


Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Profil Kranbalken	
2	1	Aufhängung Rolle	
3	2	Rolle	
4	1	Rahmen Rolle	
5	1	Klapprolle	
6	1	Wasserschöpfer	
7	1	Antipendeleinheit	

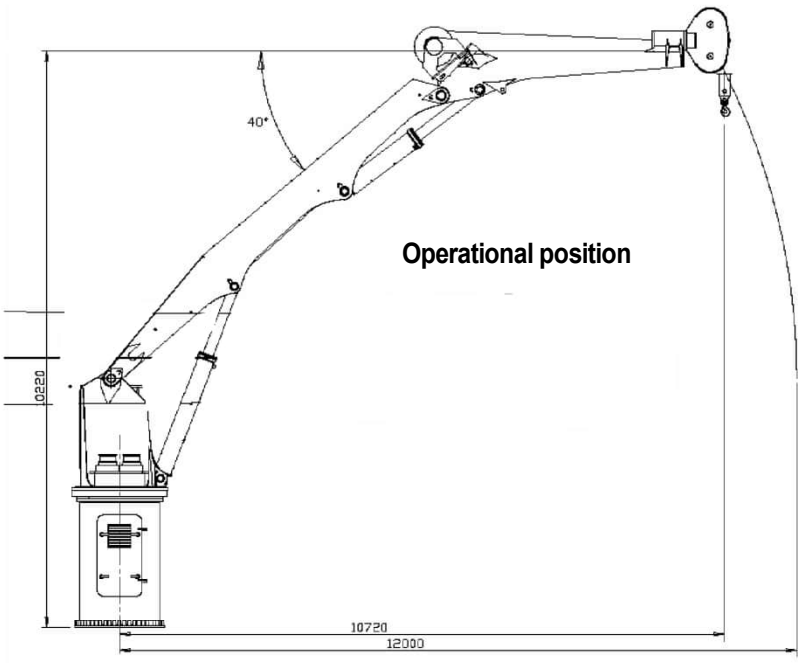
9.5. Working cranes (crane 3-5)

Working crane – 50kN

General three identical working cranes for offshore operation	**(up to max. 2m shaft height)**
Location:	**Forecastle deck midship crane no. 3**
	Main deck aft starboard (crane no. 5)
	1. Superstructure deck port aft (crane no 4)
SWL:	**5 tons**
Outreach:	**12m**
Hight:	**14m**
Opereration:	**remote control**

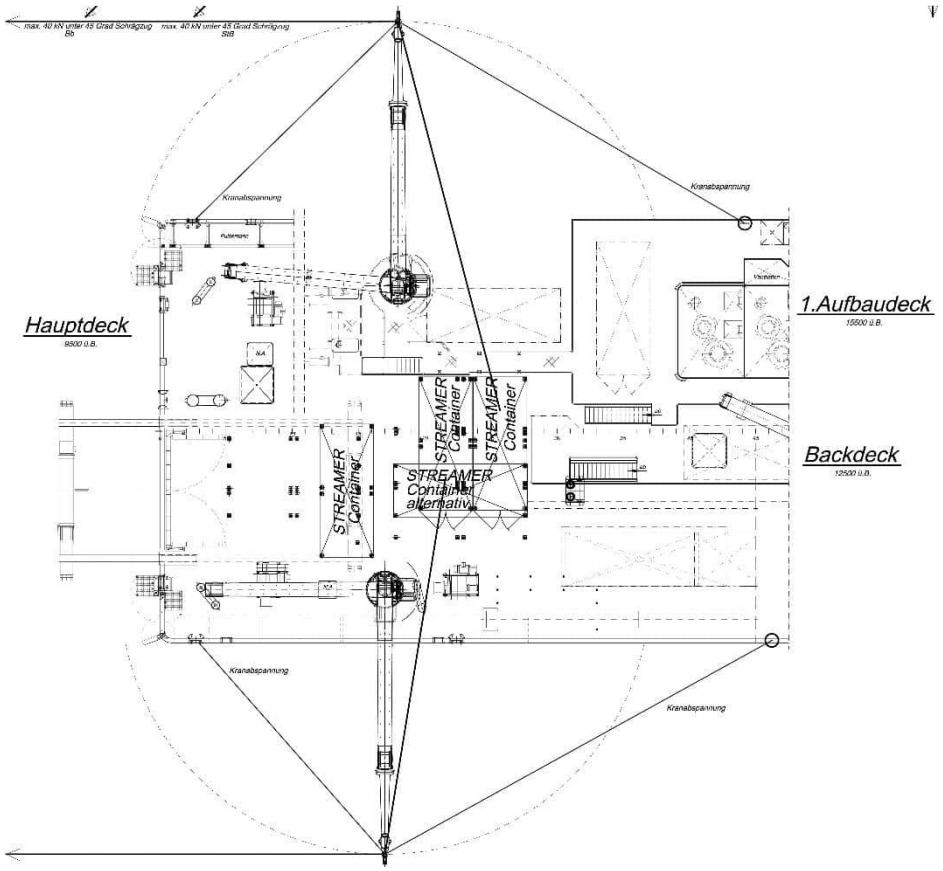


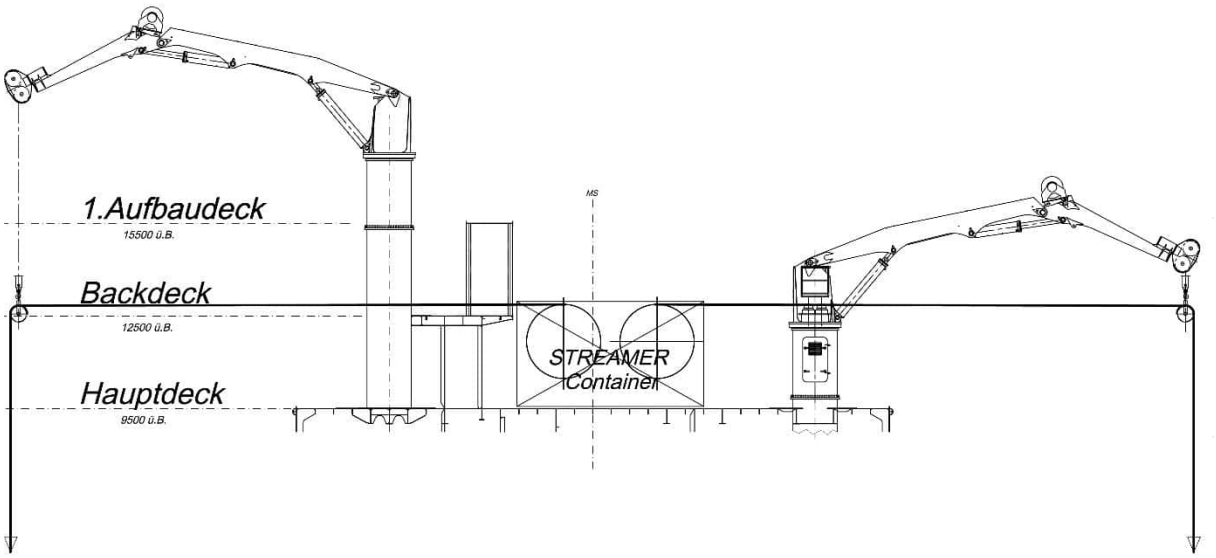
Stowing position



Operational position

Crane 4 and 5 braced for streamer use

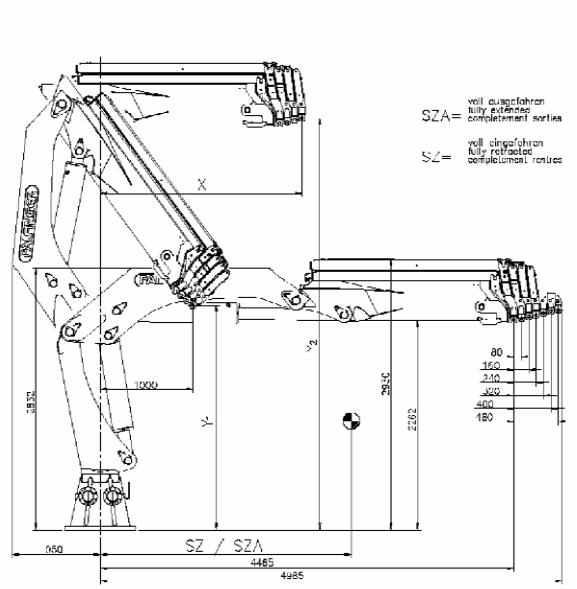




9.6. Assistant crane (crane 2)

Support crane

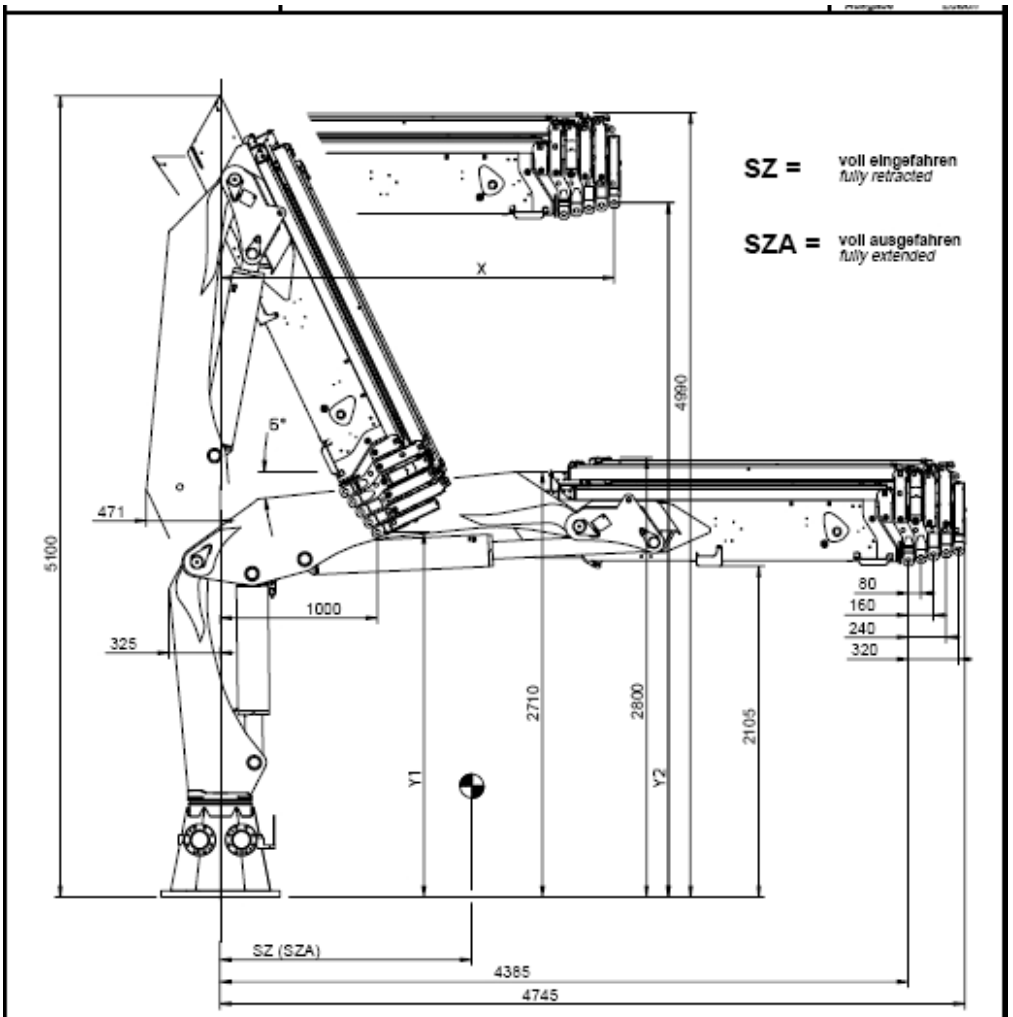
Design:	**Hydraulic folding crane with 4 sliding sections**
Location:	**1. Superstructure deck**
SWL:	**port 19,5kN; off shore 25kN**
Outreach:	**port 11,9m; off shore 6m**
Hight:	**8m above main deck**
Operation:	**remote controle**



	Hydraulische Ausschuebe			
	2(A)	3(B)	4(C)	5(D)
X	1957	2017	2097	2177
Y1	2724	2826	2531	2434
Y2	4401	4419	4457	4457
SZ	1251	1422	1564	1670
SZA	1096	2254	2634	3378

9.7. Provision crane (Crane 1)

Design: Hydraulic folding crane with 4 sliding sections
Location: 1. Superstructure deck
SWL: 12,56kN
Outreach: 12,4m
Hight: 8m above main deck
Operation: remote controle



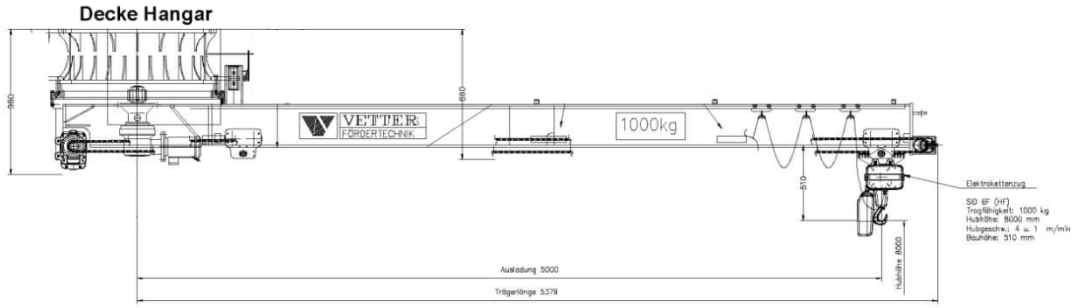
Konstruktionsänderungen vorbehalten, Fertigungstoleranzen müssen berücksichtigt werden.
Subject to change, production tolerances have to be taken into account.

	hydraulische Ausschübe *hydraulic extensions*							
	1 ()	2 (A)	3 (B)	4 (C)	5 (D)	6 (E)	7 (F)	8 (G)
X	2106 mm	2186 mm	2266 mm	2346 mm	2426 mm	2506 mm		
Y1	2646 mm	2581 mm	2516 mm	2451 mm	2386 mm	2321 mm		
Y2	4328 mm	4346 mm	4364 mm	4382 mm	4400 mm	4418 mm		
SZ	860 mm	1040 mm	1300 mm	1430 mm	1540 mm	1630 mm		
SZA	1100 mm	1620 mm	2110 mm	2640 mm	3240 mm	3760 mm		

9.8. Hangar overhead rotating crane

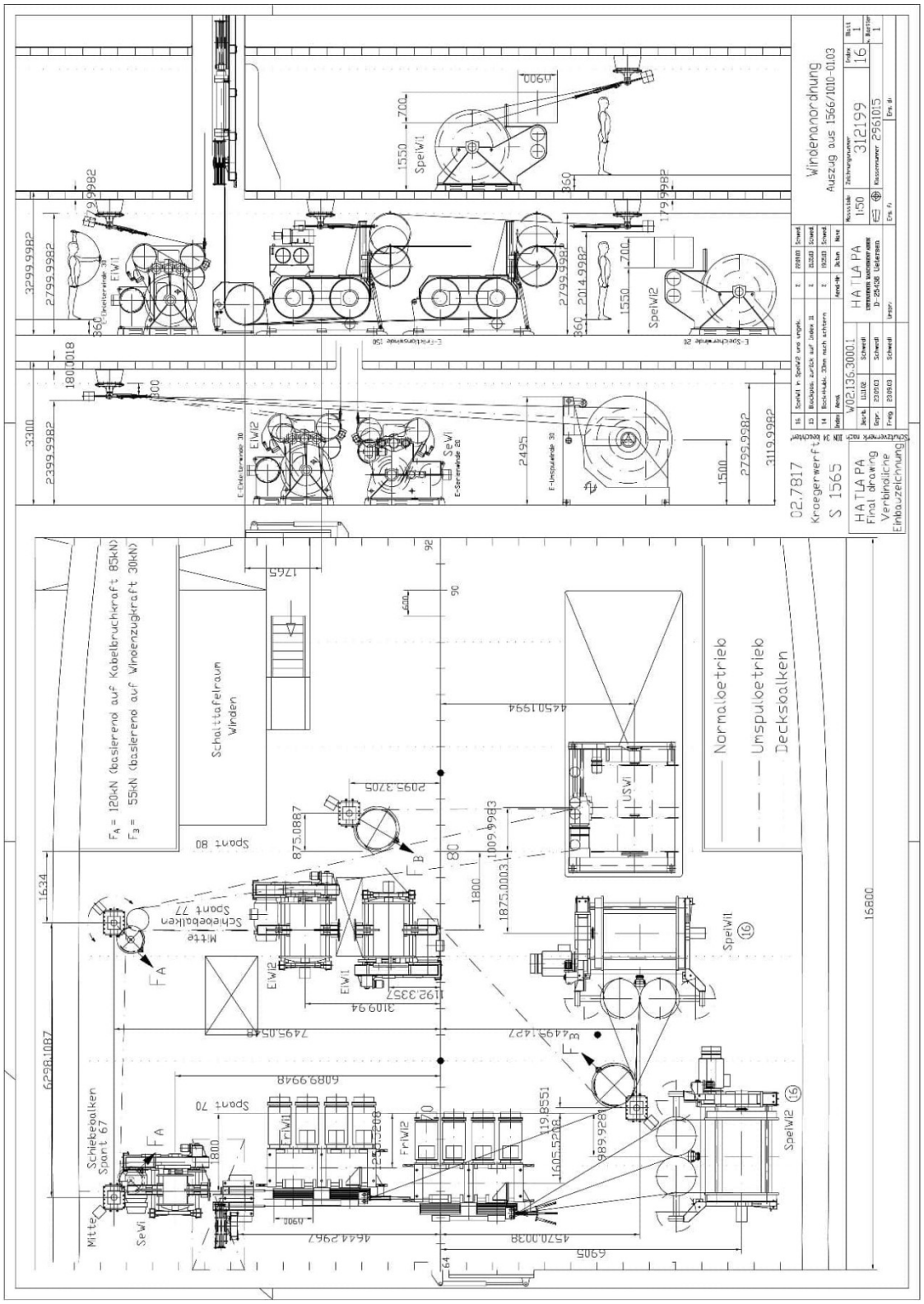
Rotating crane

Design:	**Hydraulic folding crane with 4 sliding sections**
Location:	**Hangar**
SWL:	**12,56kN**
Outreach:	**5m - 136°**
Hight:	**8m above main deck**
Operation:	**remote controle**
Comment:	**For transport of scientific gear from hold to main deck**



10. Scientific winch system

10.1. Winch room



10.2. Scientific winches

10.2. Scientific winches

10.2.1. Friktionswinden 1 + 2

Color:	blue – friction winch 1 grün – friktion winch 2
Rope speed:	0 - 1 m/s (max. bis 2 m/s)
Rope diameter:	18 mm
Tension strength:	150 kN
Remark:	for wire ropes, single-core cables and fiber optic cables

10.2.2. Storage winch 1 + 2

Color:	blue – friction winch 1 grün – friction winch 2
Drum vulume:	7.200 m at 18 mm Ø
Rope speed:	0 - 1 m/s (max. bis 2 m/s)
Tension strength:	20 kN (at 1. Rope leyer)
Remark:	The storage winch 1 can also be used together with the friction winch 2 if necessary. and he storage winch 2 operates the friction winch 1

10.2.3. Single-wire conductor winch 1 + 2

Farbe:	yellow (no.1) violet (no. 2)
Rope diameter:	11mm
Drum vulume:	6.200 m
Rope speed:	0 - 1 m/s (max. 2 m/s)
Tension strength:	30 kN (mittlere Seillage)
Remark:	Normal operation: both Single-wire conductor winches –rope shaft 2 (70kN sliding beam) Emergency operation: both Single-wire conductor – rope shaft 1 (200 kN sliding beam)

10.2.4 Standard winch

Colour:	Brown
Cable diameter:	8 mm Ø (6 mm if necessary)
Drum volume:	3,000 m
Rope speed:	0 - 1 m/s (max. up to 2 m/s)
Tensile strength:	20 kN (middle rope layer)

10.2.5. Working winch (mobile)

Colour:	Red
Cable diameter:	11 mm
Drum volume:	6,000 m
Rope speed:	0 - 1 m/s (max. up to 2 m/s)
Tensile strength:	50 kN (middle rope layer)
Location:	Forecastle deck next to 200 kN sliding beam
Possible spaces:	Main deck below 200 kN sliding beam; below 70 kN sliding

beam

10.2.6 Rewinding winch

Color:	gray
Application:	Winding and unwinding of wires/cables of all other winches of different lengths and diameters
Possible drum size:	900 to 2,000 mm length and 2,000 mm Ø
max. drum volume:	7,200 m at 18 mm Ø
Rope speed:	0 - 1 m/s (depending on tensile force)
max. tensile force:	48 kN

10.2.7. Horizontal capstan (transportable)

Color:	red
Application:	Anchoring work
Tensile force:	25 kN
Rope speed:	0 - 1 m/s
Possible positions:	Main deck under A-frame; Main deck under 200 kN sliding beam

10.2.8. Towing winch (200 kN sliding beam)

Wire diameter:	22 mm
Drum volume:	100 m
Rope speed:	0 - 0.5 m/s (lower rope layer)
Tensile force:	50 kN (lower rope layer)

10.2.9. Auxiliary winch (A-frame)

Wire diameter:	22 mm
Drum volume:	100 m
Rope speed:	switchable 0 - 0.5 m/s (lower rope layer) or 0 - 1.0 m/s
Tensile force:	50 kN (lower rope layer) or 25 kN with double rope layer Speed

10.2.10. Additional winches

- Auxiliary winch for inserting the air pulser at the outer edge of the pulser station (25 kN)
- Two (2) transportable pulse winches (ex FS "Sonne") - if requested in good time during the coordination meetings
- Transportable electric wire rope hoists (four) for positioning the containers in the scientific hold.

11. Wires and ropes of scientific winch system

All load specifications in tons are rounded to 100 kg.
The dead weight of the wires in the water was taken into account.
All safe working loads correspond to 25 % of the breaking load.
The safe working length is the length up to the last layer on the drum, including the distance to the stern A-frame. The current lengths can be found in the current "Merian checklist" on the homepage of the German Research Vessels Control Center!

11.1. 18mm fiber optic hybrid cable (FO) from Rochester

Single conductor wire, storage winch 2 **(green)**,
max. possible length 7,300 m, with a safe working length of 6,880 m

11.2. 18mm Drakoflex

Serial wire, storage winch 1 **(blue)**,
max. possible length 7,400 m, with a safe working length of 6,980 m

11.3. 11mm Drakoflex

Serial wire for mobile working winch **(red)**, currently not spooled, as a single-core cable is spooled here (a reserve cable, length 6,300 m, is on board and can be spooled if required in good time via checklist-MSM).

11.4. 11mm coaxial cable

Single conductor wire, single conductor winch 1 **(yellow)**, single conductor winch 2 (**violet**), working winch (**red**) each max. possible length 6,300 m, then a safe working length of 5,940
m

11.5. 6mm steel wire*)

Serial wire for series winch **(brown)**, max. possible length 3,300 m, safe working length 3,050 m; is currently not spooled up

11.6. 8mm Technora rope

Plastic rope for standard winch **(brown)**, max. possible length 3,000 m, safe working length 2,750 m is currently spooled.

*) The 6mm wire can be spooled onto the series winch (brown) if you register in good time (during the coordinator meeting).

12. Winch measuring system

Usage:	The winch measuring system records the values of the rope length, rope speed and rope tension for both rope winches, friction winches, single conductor winches and for the standard winch and the working winch. When doing this, it checks for adherence to the affected limit values (by means of pre-alarms or emergency stop), displays the measured data in real time and exports them into the DSHIP data distribution system (and therefore into the database).
Manufacturer:	SAM Electronics
Displays:	Bridge (server and printer), winch console (client), sounder room (client), large working deck display (rope length only) and all 27 workplace PCs (APCs) (via DSHIP display)
Protocol:	TCP/IP
Data storage:	Server (bridge), DSHIP database
Limit entry:	Before reaching the defined limits, pre-alarms are triggered (heaving: pre-alarm zero = stop before rope zero position; veering: pre-alarm lower = set distance in relation to working length). Automatic stop function when the set limits are reached.

13. Fiber optic cable (FO) of the wiss. winch system

13.1. Connection plug

All cables of the single-conductor winches and the fiber optic cable of the green storage winch 2 end in the data center. A 'patch panel' is installed there, from which the desired distribution of the transmitted signals is carried out using Lemosa FFA 3e connectors in individual laboratories (Hydroacoustic data center, dry laboratory, hangar, data center), in the electronics workshop, the scientific workroom (1st superstructure deck) and to the container connections (main deck aft and middle). Workroom (1st superstructure deck) and to the container connections (main deck aft and center, as well as scientific hold on the tween deck)

[This only applies to the single-conductor winches; the fiber optic cable signals can be distributed to the laboratories on the main deck via 100 m of fiber optic cable on a cable drum].

Application:	At the "wet" end of the 11 mm coaxial cable (single-core winches 1 and 2) are fitted with underwater plugs that allow the electrical connection of measuring devices/probes (e.g. CTD, multi-net).
Manufacturer:	Sea Connections Systems Ltd.
Types:	Standard SUBCONN IL-2-F (screw connection: DLSA-M)
Counterpart on the device:	Standard SUBCONN IL-2-M (screw connection: DLSA-F)
Counterpart on the on-board:	CTD: Micro-SUBCONN MCIL-2-MSW (screw connection: MCDLS-F) An adapter (IL-2-M to MCIL-2-FSW) for CTD use is available on board.

Pin assignment: Wire no. 2 (White) is the signal line - Wire no. 1 (Black) is ground

The connector for the fiber optic hybrid cable is a Gisma Series 40 standard connection. There is 1 FO single mode fiber, as well as coax screen and center.

Exact Gisma designation of the plugs: Series BR40 Standard
ship-side: 40.06.3.06.2.00
On the device side (science): 40.00.3.06.2.10

The assignment is as follows (see also sketch on next page):

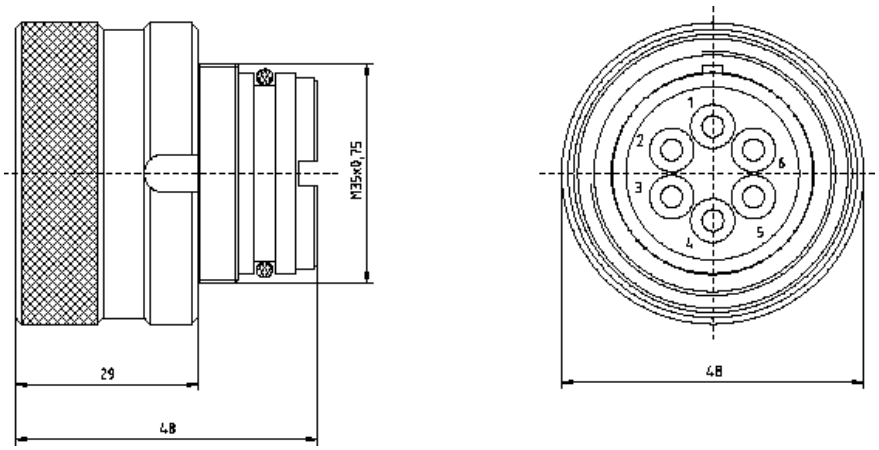
3=LWL (active fiber)
6=not used
1=Center Coax
2=Center Coax
4=Screen Coax
5=Screen Coax

Note: The cable contains only one coaxial connection. To increase flexibility, the screen and center were each connected to 2 pins by simply bridging within the Gisma connector.

An SC connector is required on the connection side of the patch panel in the data center.

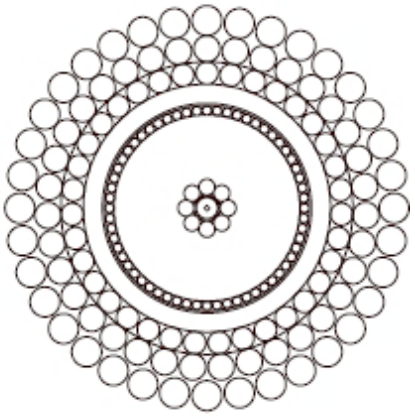
13.2. Characteristic data of the fiber optic cable (top) and the GISMA connector (bottom)

Gisma plug:



Fiber optic wire (properties)t:

Description	Inch	mm
OPTIC WAVEGUIDE		
Fbr: 8.3/125/250 µm SMF	0.010	0.25
Bffr: Hytrel®	0.038	0.97
Belt:: Nylon	0.046	1.17
CONDUCTOR		
8/0.0285" (3.29 mm²) HD Cu	0.103	2.62
INSULATION		
LDPE	0.330	8.38
RETURN		
60/0.0159" (7.69 mm²) HD Cu	0.362	9.19
Tape: Cu/Poly	0.371	9.42
BELT		
HDPE	0.439	11.15
STRENGTH MEMBER		
Layer #1: 35/0.0395" GEIPS void filled and taped.	0.521	13.23
Layer #2: 35/0.0465" GEIPS	0.614	15.60
Layer #3: 36/0.053" GEIPS	0.720	18.29



Hytrel® is a registered trademark of DuPont.

Fiber optic wire (properties):

PERFORMANCE CHARACTERISTICS

Nominal Values @ 20°C	Metric	English
PHYSICAL		
Weight in Air	1,212 kg/km	814 lb/kft
Weight in Seawater	971 kg/km	653 lb/kft
Specific Gravity	5.0	5.0
MECHANICAL		
Breaking Strength	213 kN	48,000 lbf
Working Load (@ 0.40% Strain ref.)	53 kN	12,000 lbf
Recommended Bend Radius	36 cm	14 in
ELECTRICAL		
Voltage Rating	3,000 V	3,000 V
dc Resistance		
inner cdr	5.67 Ω/km	1.73 Ω/kft
outer cdr	2.56 Ω/km	0.78 Ω/kft
Insulation Resistance		
inner cdr - outer cdr	24,000 MΩ•km	80,000 MΩ•kft
outer cdr - armor	1,200 MΩ•km	4,000 MΩ•kft
Capacitance	105 pF/m	32 pF/ft
Characteristic Impedance		
@ 1 MHz	50 Ω	50 Ω
Attenuation		
@ 0.1 MHz	1.7 dB/km	0.5 dB/kft
@ 0.5 MHz	3.8 dB/km	1.2 dB/kft
@ 1.0 MHz	5.4 dB/km	1.6 dB/kft
@ 5.0 MHz	12.0 dB/km	3.7 dB/kft
@ 10.0 MHz	17.0 dB/km	5.2 dB/kft
OPTICAL		
Attenuation Rate		
@ 1310 nm	0.45 dB/km	
@ 1550 nm	0.30 dB/km	

14. Laboratories and rooms used for scientific purposes

(1) The layout of the laboratories and other rooms used for scientific purposes is shown in the figure 'Layout plan of laboratories'.

(2) The size, furnishings and equipment of the individual laboratories and the scientific rooms are shown in illustrations based on the shipyard's furnishing drawings. The right-hand side of the illustrations is forward and the left-hand side aft!

(3) The room temperature in each laboratory room can be regulated individually (± 1°C), in the salinometer and gravimeter room to +15 to 25°C (+/-0.5°C). Some laboratory rooms also have underfloor heating, as they are located above cool tanks, and therefore have two room thermostats.

(4) The electrical supply (on-board network: white sockets; stabilized laboratory network: red sockets) and the network communication are installed in surrounding cable ducts the on top of the walls.

(5) All laboratories (incl. hangar, Hydroacoustic data center, data center) as well as the conference room and the electronics workshop are equipped with TV/radio/video antenna sockets, as well as connection sockets for the CCTV TV monitoring system (except data center). There are also BNC sockets (in/out) for the 1 PPS signal (1 pulse per second) in all laboratories and in the pulser station; it is also planned to connect the '1 pulse per nautical mile' signal there. For the salinometer room, the gravimeter room and the wiss. The above statements do not apply to the salinometer room, the gravimeter room and the scientific cold room. In the dry laboratory there is also an RS 232 connector of the Motion Reference Unit (MRU) for receiving the ship's motion data (roll, pitch, heave, yaw; see chapter 14.5 'Seapath 380').

(6) In the hangar, the deck laboratory, the dry laboratory, the sounder room and in the electronic workshop, signals of the winch grinding rings (currently only applies to the single conductor winches) can be received, which have to be distributed accordingly on the patch panel in the server room beforehand. Connections for winch control can be found in the sounder room and the hangar, from where an extension cable has been routed into the server room. On previous trips, this made it possible to control camera-guided sampling, observation and measuring devices (e.g. OFOS, TV gripper, TV MUC, Lander) from the server room without problems (using patch panel, CCTV and DVS). This method also benefited from the proximity to the Posidonia control unit.

(7) A pure water system (MIELE Professional G7895 Aqua purificator) with conductivity measurement module and an automatic washer-disinfector (MIELE Professional G7883) are available in the chemistry laboratory. With a new/regenerated water demineralization cartridge (E310), the ion exchanger delivers conductivity values <2 µS/cm. The laboratory glassware washer meets the requirements of prEN ISO 15883-1 (thermal disinfection at 80°C / 10 min) or HBV (90°C / 5 min), but not sterilization.

(8) Two Milli-Q systems (Milli-Q® Reference A+ system housing with Millipak® filter) are available in the chemistry laboratory. The water supply comes from the Aquapurificator. Resistance 18.2 MΩ.cm at 25°c; TOC ≤5 ppb; particles >0.22µm <1 particle/mL; bacteria <0.1 CFU/mL; Flow rate 0.05-2 L/min

(9) The pure seawater supply for the laboratories (including the hangar) is usually provided via two suction points in the bottom of the well of the exit unit from a water depth of approx. 6.2 to 6.80 meters. The clean sea water can be pumped into the laboratories using a sine pump and/or a diaphragm pump.

(10) In addition to the small drying cabinets integrated in the digestion cabinet, there is a larger one in the deck and chemistry laboratory. The drying cabinets are Sanyo model MOV-212 with internal dimensions of 730 x 645 x 870 mm and a usable capacity of 157 liters. The temperature can be set in steps of 10°C, from +5 - 250°C.

(11) The floors are resistant to chemicals and seawater (brand name Bolidt). The flooring is raised 150 mm all around the walls (exception: conference room). There is a raised floor in the Hydroacoustic data center/ EDP center. There is a tiled floor in the gravimeter room. All floors are designed for traffic loads of up to 500 kg/m².

(12) The clear ceiling height is generally 2.15 m (see individual drawings for exceptions). The ceiling height is sometimes lower under ventilation openings, lamps and fire alarms.

(13) The laboratory doors generally have a clear width of 1.2 m (2-leaf: 800 and 400 mm). The clear height of the doors is at least 1.95 m.

(14) The fixing system consists of flush-mounted C-rails in the walls, ceilings and table tops.
The C-rails are at intervals of 600 mm. They run along the ceilings in the longitudinal direction of the ship, on the walls from top to bottom and in the table tops in line with the wall C-rails. The C-rails are designed for a tensile force of 1 kN per running meter. For the C-rails, self-clamping sliding nuts (M8 thread) with spring, which can be inserted and removed at any point on the rail, as well as eyebolts and eyebolts in limited quantities are on board. The C-rail system is earthed.

(15) The fastening system consists of grid sockets in the floor areas that are not in the aisle area and have no permanent fixtures.The raster bushes have an M8 thread and can be loaded with 1 kN per bush. The spacing is 600 x 600 mm. The sockets are aligned with the wall and ceiling grid. The sockets are closed with grub screws.

(16) The entire furniture is made of seawater-resistant plywood with table tops made of 20 mm solid plastic (Trespa). The frame construction consists of stainless steel square tubes. All furniture is attached to the C-rail system and the floor sockets and can be easily dismantled.

(17) All laboratory rooms are equipped with waste paper baskets and magnetic boards.

14.1. Laboratory waste water system

All gray and black water from all toilets, showers, washbasins, etc. (but not from the laboratories) is mechanically and biologically purified and passed through microfiltration membranes. This produces service water of a quality similar to fresh water, which can be reused on board (e.g. for the rope washing systems).

In order to prevent this extremely sensitive sewage treatment system from being disabled by slightly biologically or chemically contaminated waste water or undesirable introduction of interfering substances, no laboratory drains are connected to the sewage treatment system. In a normal case, all waste water from the laboratory rooms is discharged outboard. This basically takes place via storage tanks, i.e. no waste water is discharged directly outboard but is first collected in storage tanks and then pumped outboard when the opportunity presents itself. This means that the laboratory waste water system is more or less permanently in “clean ship mode” (= normal condition). The laboratory system is divided into two different systems in order to do this:

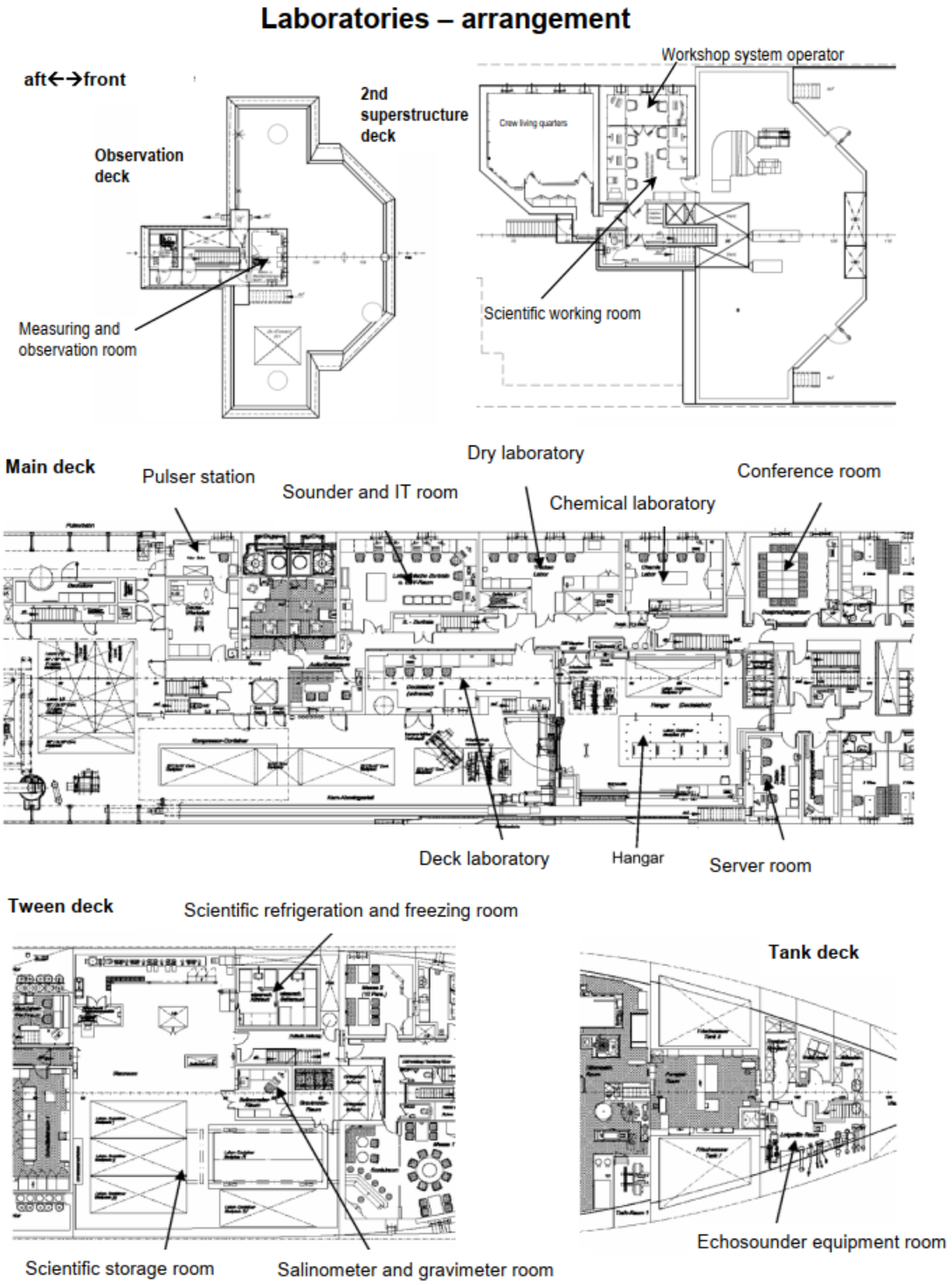
(1) All waste water from the scuppers and approximately half of the laboratory sinks can be temporarily stored in the 'clean-ship' tank. This system is designed in normal piping and is labeled "To laboratory waste water tank" on the valves below the sinks.

(2) Waste water from the other half of the laboratory sinks can be temporarily stored in the chemical waste water tank. This special chemical waste water system is made of inert plastic so that no damage can occur to the system if weak acids and/or alkalis are added unintentionally or in the event of an accident.

For the scientific users on board, this means that all work with chemicals should take place above and at the sinks that are connected to the laboratory waste water system. However, it does not mean that chemicals of any kind can be disposed of there (see chapter 17. Waste disposal). The sinks are marked below with valves "To chemical waste water tank".

All work involving a constant flow of water (e.g. for cooling purposes) should take place above the normal sinks. In any case, the entry of large quantities of sediment into the sinks must be avoided. Two separate sinks are available in the hangar specifically for sediment, as well as a sink table in the deck laboratory.

14.2. Arrangement of laboratories and rooms used for scientific purposes



14.3. Measuring and observation room

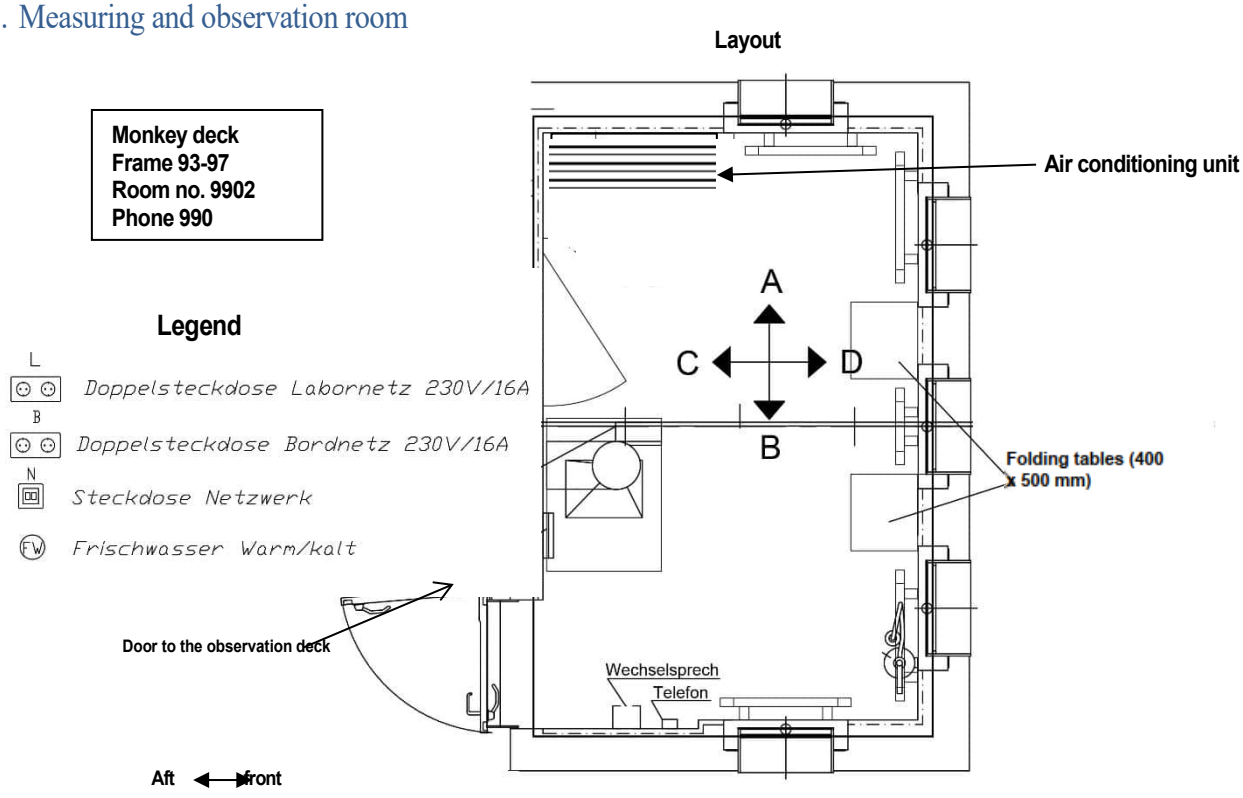


Image A

Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)

Communication:
Junction box Data distribution system
Intercom system Science

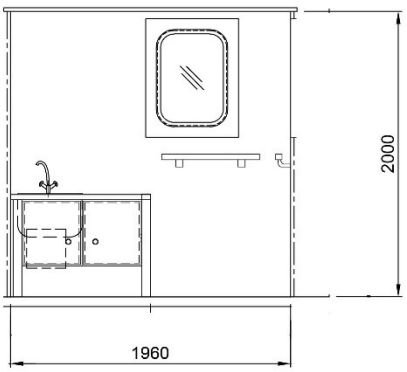


Image B

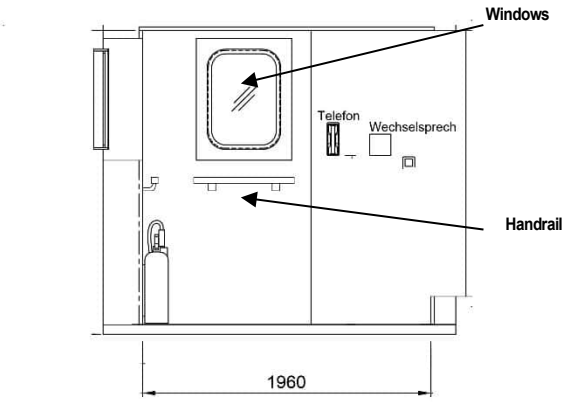


Image C

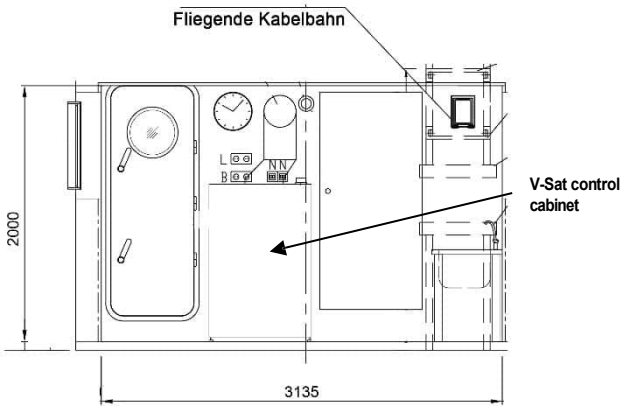
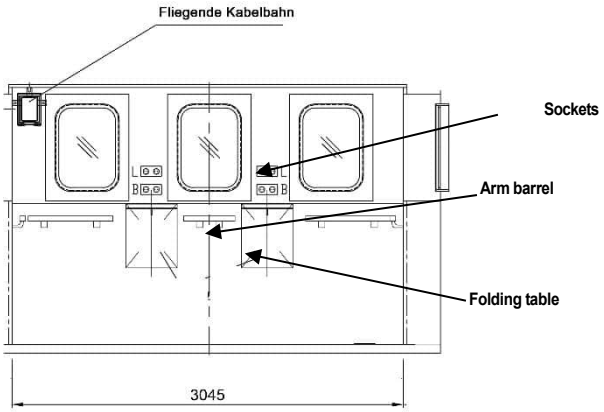
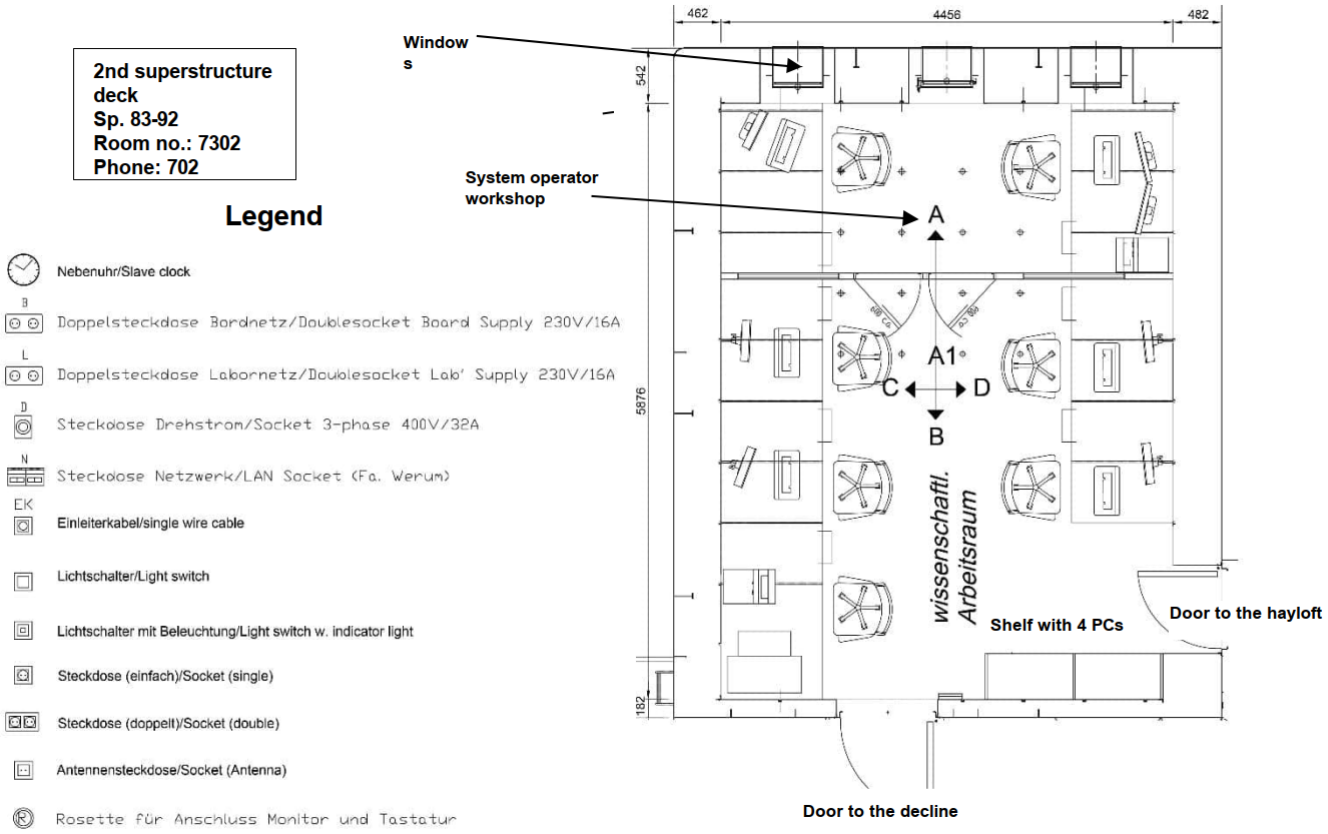


Image D



14.4. Scientific workspace

2nd superstructure deck
Sp. 83-92
Room no.: 7302
Phone: 702



Laboratory equipment

electric:
230 V 50 on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE) 32 A

Communication:
Connection sockets Data distribution system Intercom system Science
Antenna socket (radio/TV/video)
Connection for all single-conductor winches

Other:
4 PCs with monitor
Laser printer color A4

Image A

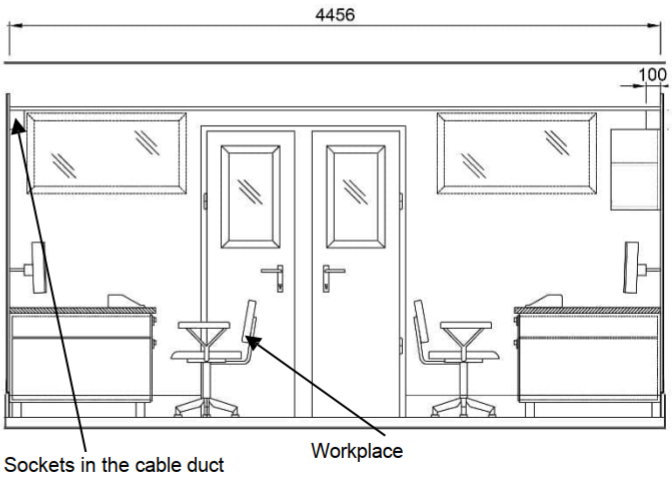


Image B

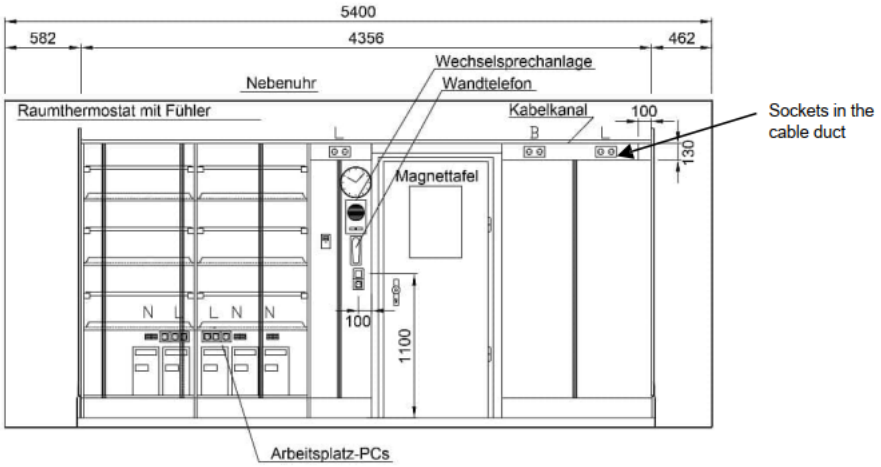


Image C

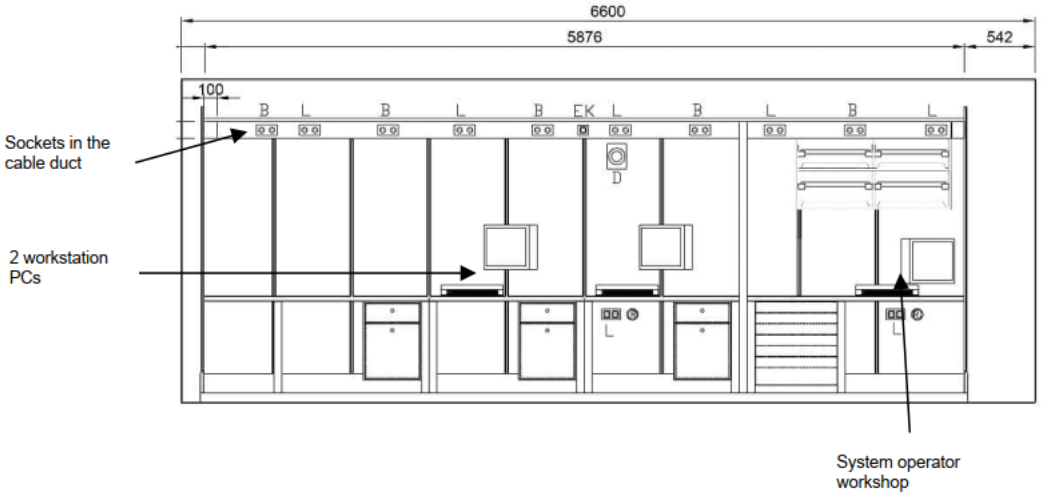
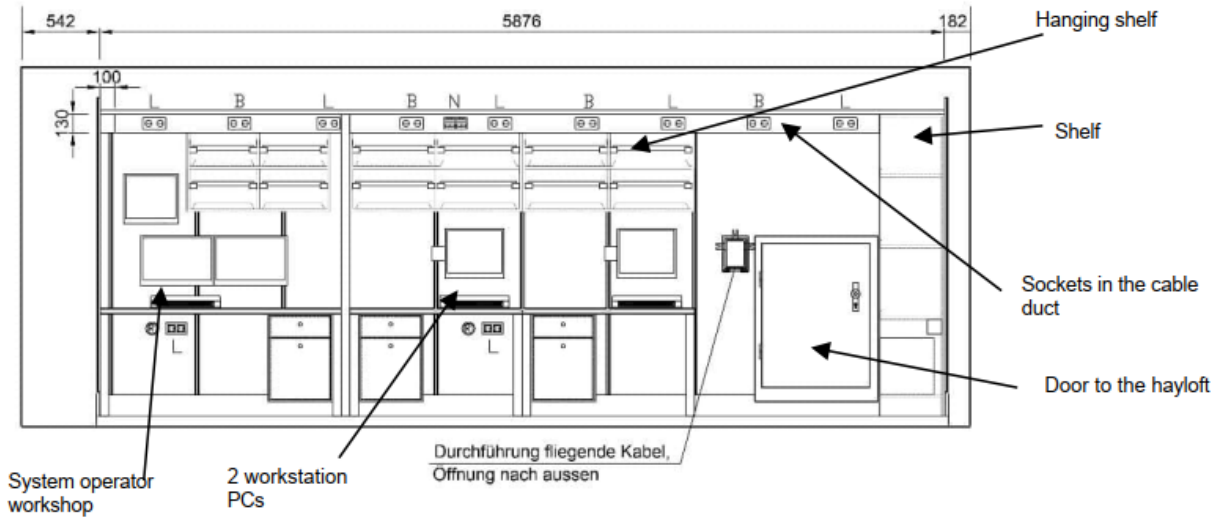


Image D



14.5. Conference room

Main deck, Bb
Sp. 92-102
Room no.: 4216
Phone: 416

Please note: The conference room can also be used as a dry lab

Stuhlmodell: wie bemustert

Nebenuhr Wempe, Diam. 210mm

B Doppelsteckdose Bordnetz 230V/16A

L Doppelsteckdose Labornetz 230V/16A

N Steckdose Netzwerk/ LAN-Anschluß (Fa. Werum)

D Steckdose Drehstrom 400V/32A

FW Frischwasser warm/kalt

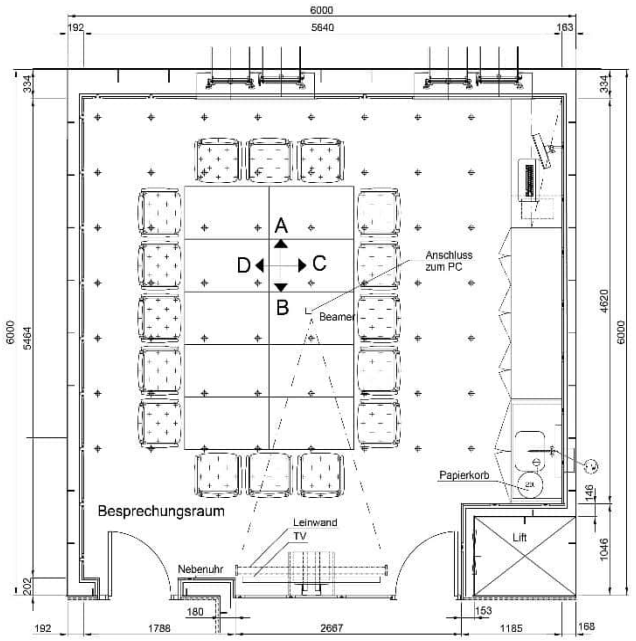
Lichtschalter

Datenverteilsystem-Anschlußdose f. Beamer zum PC

Antennensteckdose

Steckdose (einfach)

Steckdose (doppelt)



aft↔ front

Image A

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE) 32 A

Communication:
Junction box Data distribution system
Intercom system Science Antenna socket (radio/TV/video)

Other:
PC with monitor

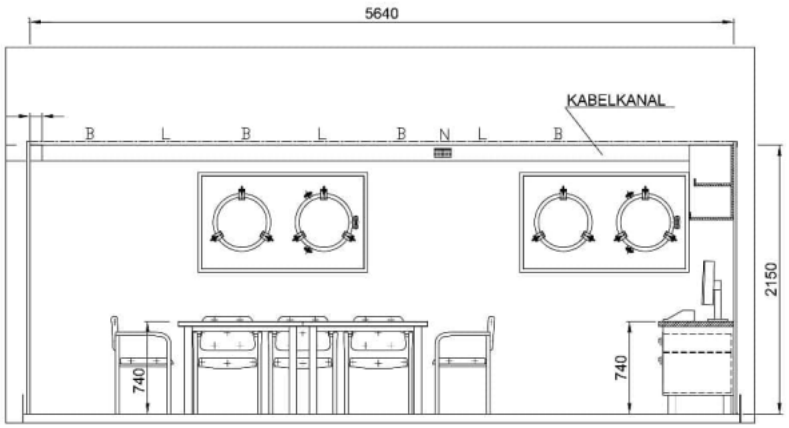


Image B

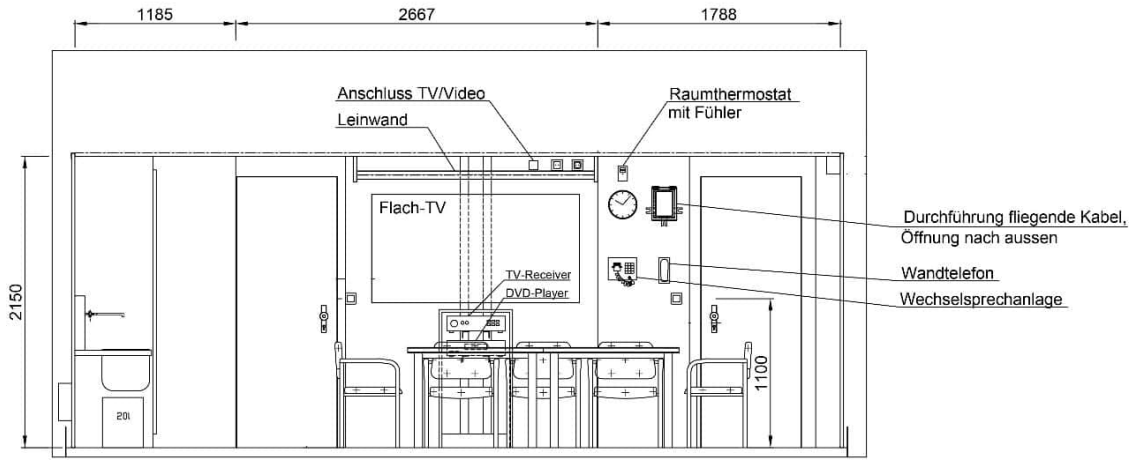


Image C

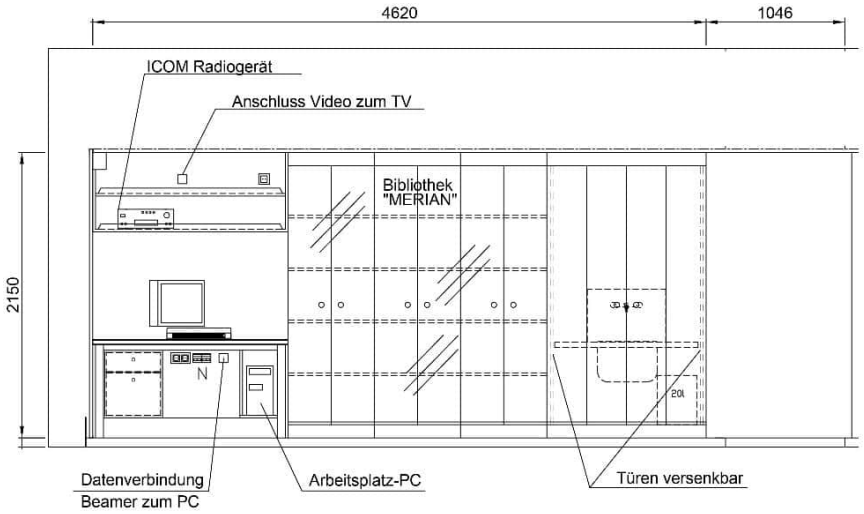
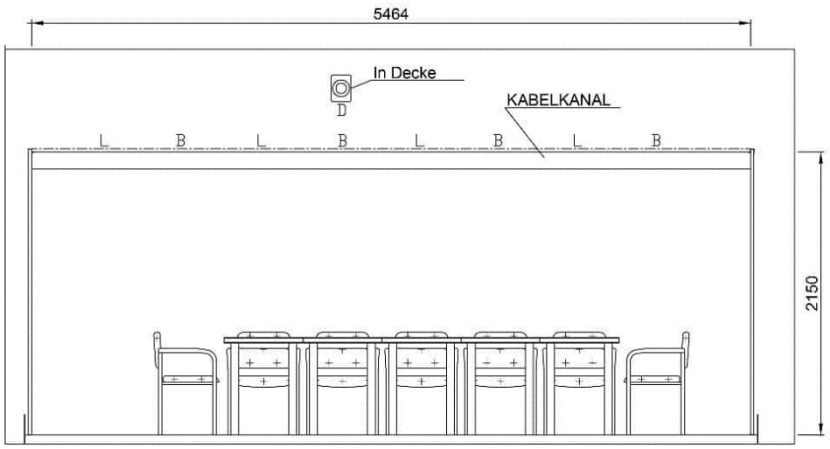


Image D



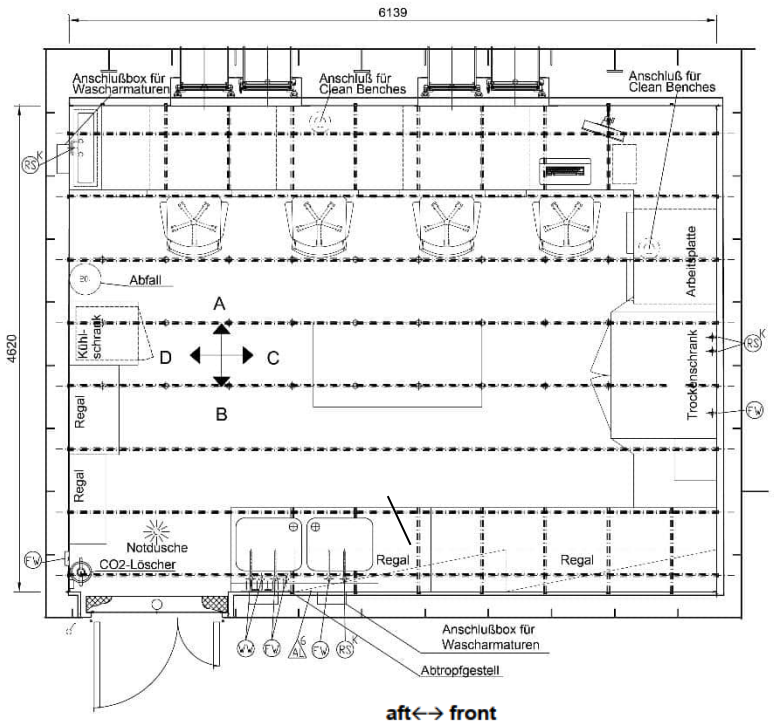
14.6. Chemistry laboratory

Main deck, Bb
Sp. 79-90
Room no.: 4302
Phone: 432

Legend

- Nebenuhr Wempe, 20804/T
- B — Doppelsteckdose Bordnetz 230V/16A
- L — Doppelsteckdose Labornetz 230V/16A
- D — Steckdose Drehstrom 400V/32A
- N — Steckdose Netzwerk/ LAN-Anschluß
- FW — Frischwasser Warm/kalt
- RS K — Reinseewasser K
- WW — Weiches Wasser
- 6 — Arbeitsluft 6 Bar
- Antennensteckdose
- Steckdose (doppelt)
- Lichtschalter
- Container/Labore Video-Anschlussdose CCTV
- EK — Einleiterkabel
- BNC — BNC-Buchse Zeittaktgeber

Layout



Laboratory equipment	
electric: 230 V 50 Hz on-board power supply (white) 230 V 50 Hz laboratory mains (red) 400 V 50 Hz three-phase current (CEE) 32 A	Communication: Junction box Data distribution system Intercom system Science Antenna socket (radio/TV/video) Video junction box CCTV
Water and air supply and disposal Fresh water cold/hot (drinking water) Soft water (pore osmosis) Pure sea water (centrifugal pump) Laboratory waste water Scupper (outflow to outboard) Compressed air 0-10 bar Air extraction system	Other: Digestory cabinet Drying cabinet Refrigerator (+4 °C) Freezer (-18 °C) Aqua purifier Miele G7895 Milli Q Reference Washer-disinfector, Miele Prof.G7883 CD Freezer (-18 °C) PC with monitor

Image A

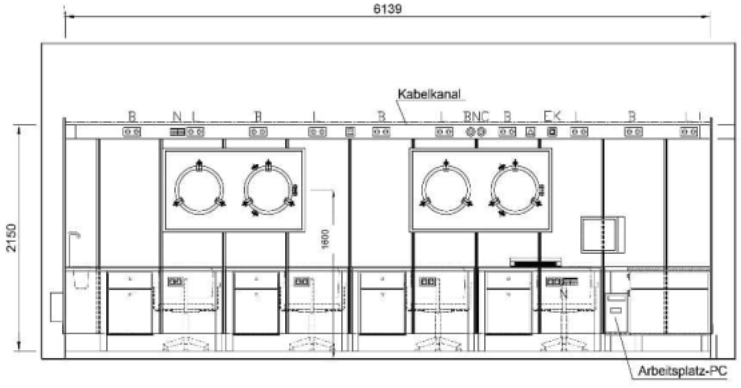


Image B

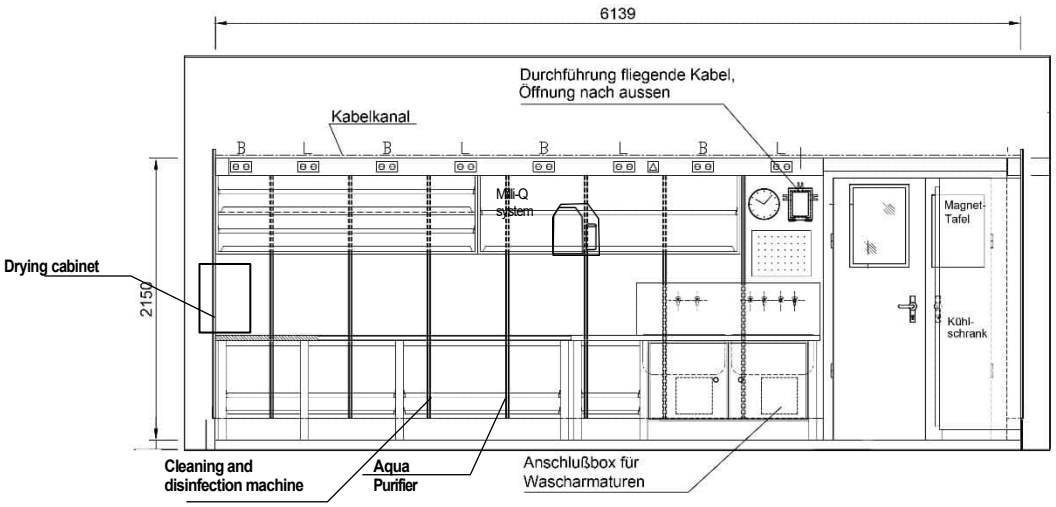


Image C

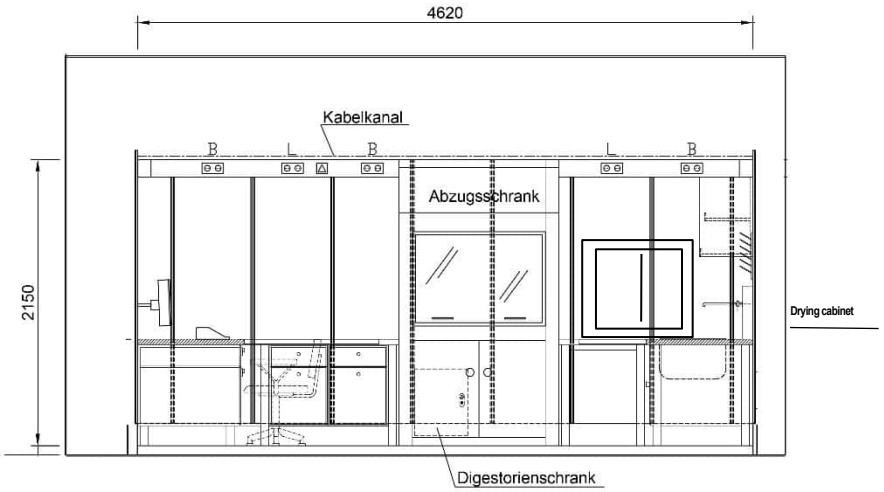
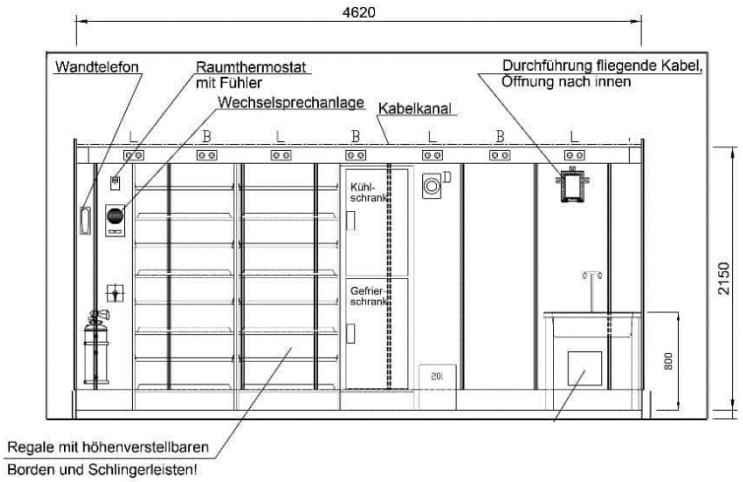


Image D



14.7. Dry laboratory

Main deck, Bb
Sp. 64-79
Room no.: 4308
Phone: 438

Nebenuhr Wempe, 20804/T
Doppelsteckdose Bordnetz 230V/16A
Doppelsteckdose Labornetz 230V/16A
Steckdose Drehstrom 400V/32A
Steckdose Netzwerk/ LAN-Anschluß (Fa. Werum)
Einleiterkabel
Frischwasser Warm/kalt
Reinseewasser M
Weiches Wasser
Arbeitsluft 6 Bar
Laborabwasser
Lichtschalter
Antennensteckdose
Steckdose (doppelt)
Container/Labore Video-Anschlussdose CCTV
BNC Buchse Zeittaktgeber

Layout

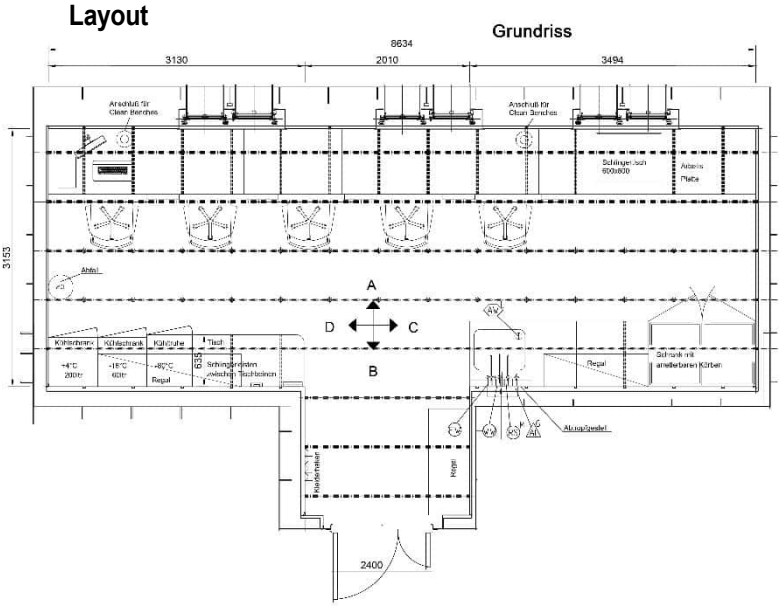
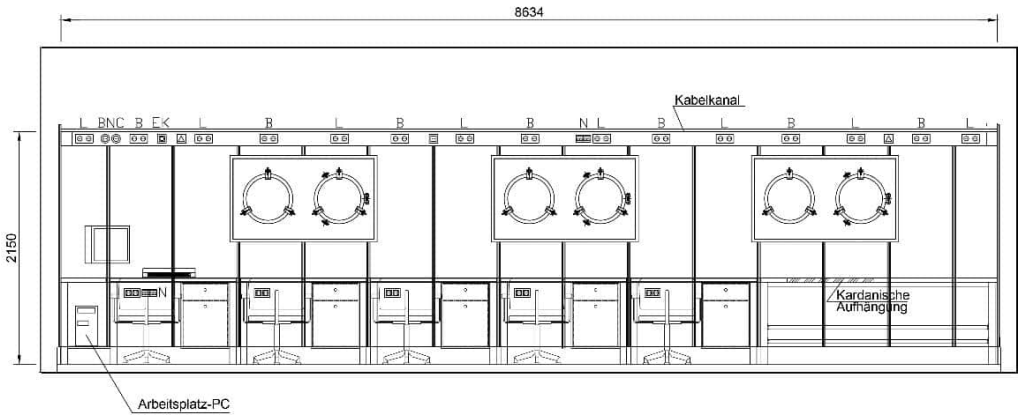


Image A



Laboratory equipment	Communication: Intercom system
electric:	Science Science intercom Antenna socket (radio/TV/video) Video connection box CCTV
230 V 50 Hz on-board power supply (white)	BNC socket Timer connection for all single-wire winches
230 V 50 Hz laboratory mains (red)	
400 V 50 Hz three-phase current (CEE) 32 A	
Water and air Supply and disposal	
Fresh water cold/hot (drinking water)	Miscellaneous:
Soft water (pore osmosis)	Freezer (+4 °C)
Pure seawater (diaphragm pump)	Freezer (-18 °C)
Laboratory waste water	Freezer (-80 °C)
Scupper (drain to outboard	Crusher ice maker
Compressed air 0-10 bar	PC with monitor
Air extraction system	Swing table (600X800 mm)

Image B

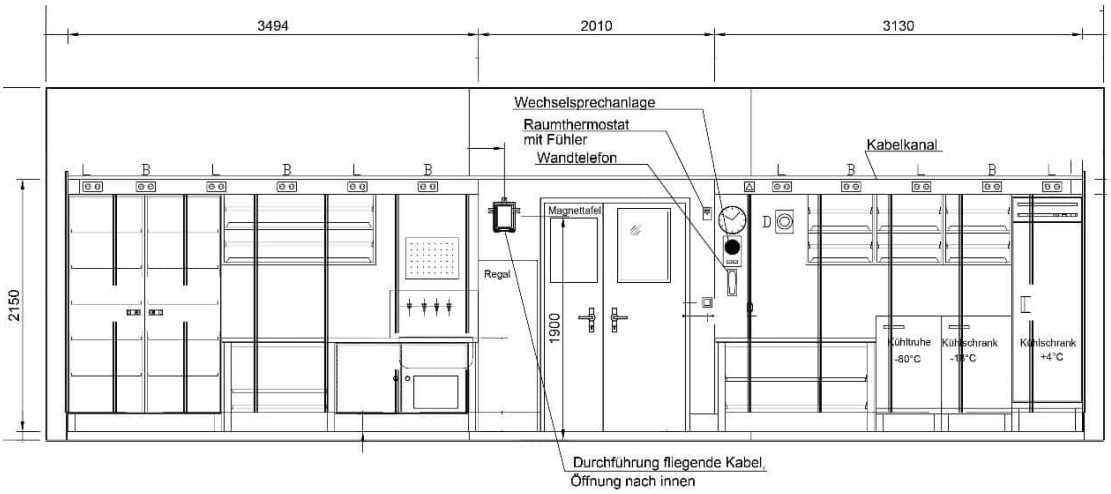


Image C

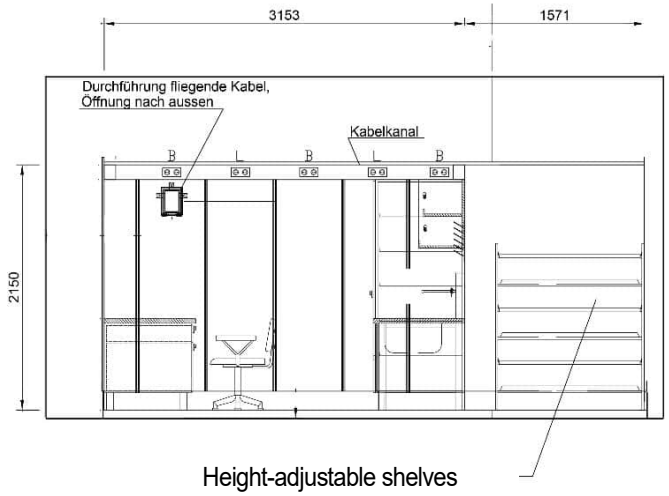
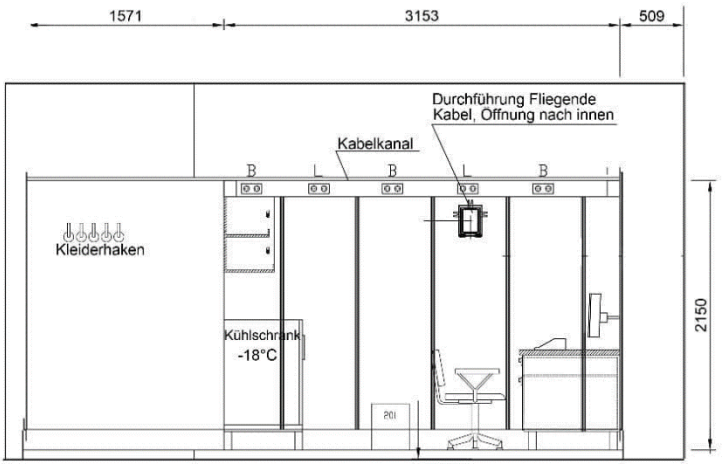


Image D



14.8. Hydroacoustic data center / EDP center

Main deck, Bb
Sp. 49-64
Room no.: 4404
Phone: 404

Legend

Nebenuhr Wempe, Diam. 187mm
B Doppelsteckdose Bordnetz 230V/16A
L Doppelsteckdose Labornetz 230V/16A
D Steckdose Drehstrom 400V/32A
N Steckdose Netzwerk/ LAN-Anschluß (Fa. Werum)
EK Einleiterkabel
EB Erdungsbolzen
Lichtschalter
Antennensteckdose
BNC BNC-Buchse Zeittaktgeber

Layout

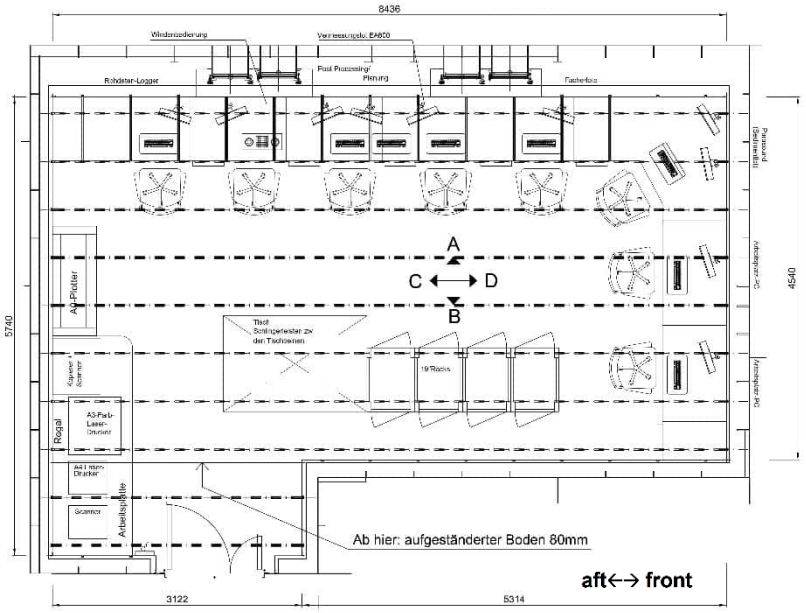
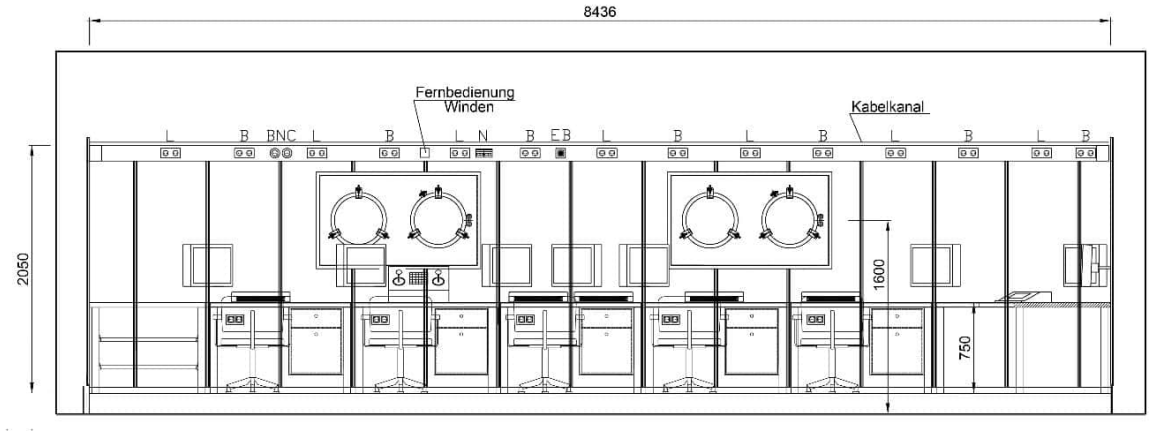


Image A



Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE)
32 A Earthing bolt to ship's ground M10

Communication:
Junction box Data distribution system
Intercom system Science Antenna socket (radio/TV/video) Video junction box CCTV
BNC socket Timer connection for all single-wire winches

Other:
Deep-sea fan plummet (operation, display)
Shallow-water fan plummet (operation, display)
Parasound plummet (operation, display) Vertical plummet ~~with pinger plummet~~ (operation, display) PC with monitor
Copier/Printer/Scanner A4
2 ADCPs (operation, displays)

Laser printer color A4
Laser printer color A3 A0
plotter

Image B

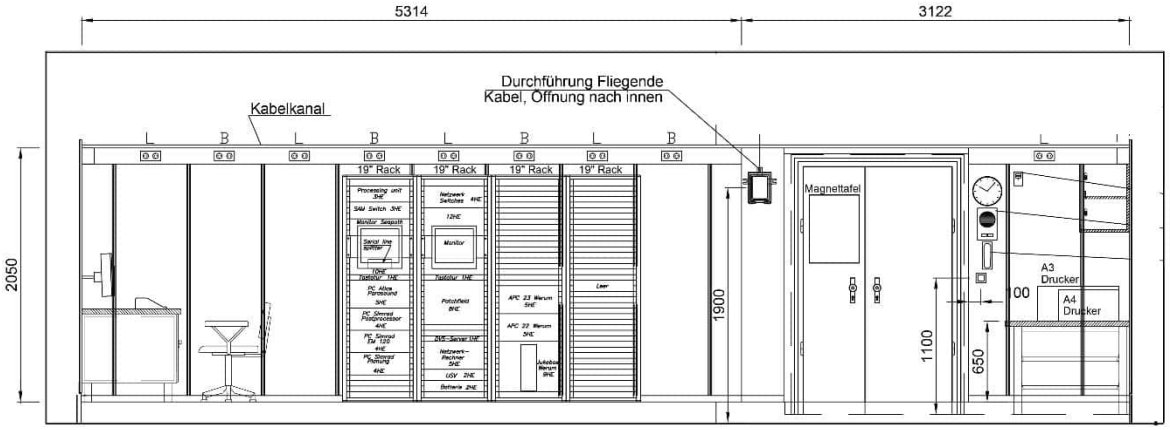


Image C

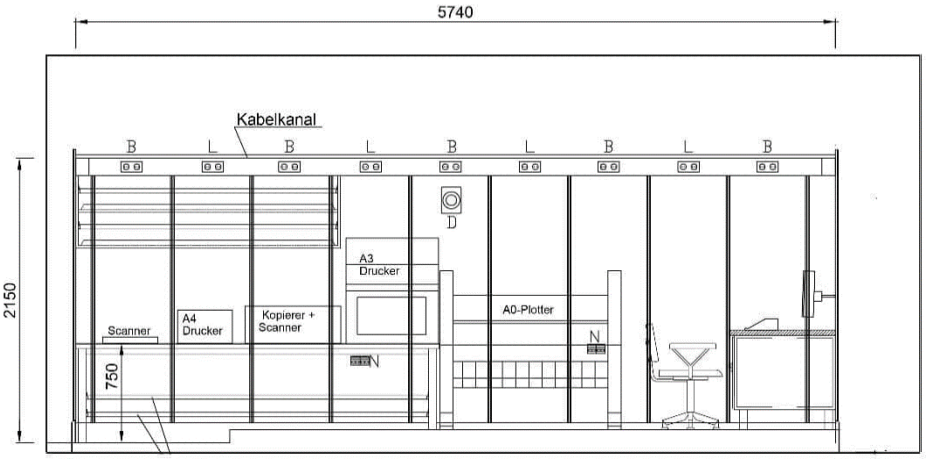
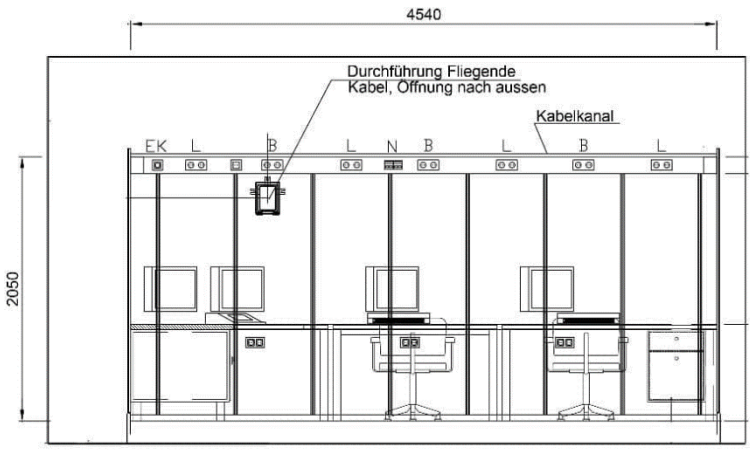


Image D



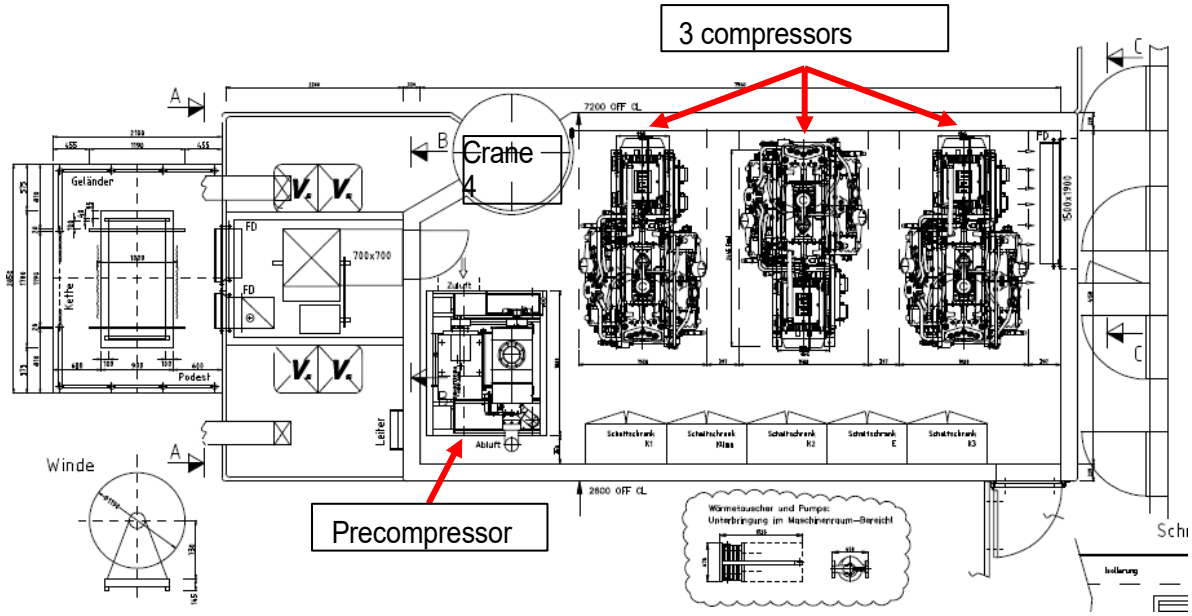
14.9. Seismic compressor system

The fixed compressor system installed during the shipyard period in 2010 is located on the port deck on the port aft side in a newly constructed room (previously slot 8/9 for the isotope laboratory container, which is now stowed under the same number on the roof of the compressor building; 1st superstructure deck.
The permanently installed system consists of three identical WP6442 compressors and an upstream pre-compressor. This allows the compressor system to provide an air volume of up to 37.5m³/min (intake volume) at 207 bar final pressure. If the air requirement exceeds this, the system can be supplemented with a mobile compressor with 10m³/min at 207 bar, installed in a 20' standard container. This is not permanently on board and must be requested in good time during the coordination meetings

The maximum air volume **with mobile compressor** is then 47.5 m³/min.

This container can be placed either on stowing position ***20/21*** or ***23/24***.

Top view of compressor building, back deck:



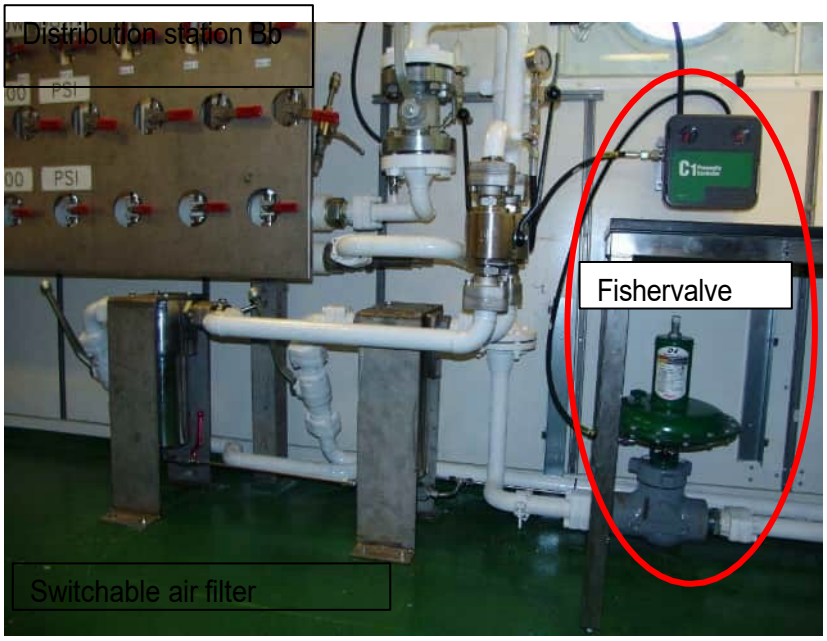
Performance data SAUER AIR COMPRESSOR - 'WP6000 SERIES' WP6442

Capacity as per DIN 1945/ISO 1217	: 600 m³/h
Working pressure	: 207 bar (g)
Air outlet temperature/delta t (compared to cooling water)	: 10 ° C
Residual oil content at air-outlet	: < 5 mg/m³
Max. ambient temperature	: + 5°C up to + 55°C

All capacity data with +/-5 % tolerance related to 20° C and 1013 mbar!

14.10. Pulser station

The pulser station, which had always been located on the port side at the rear of the main deck, is equipped with a second distribution station, 10 buffer air pressure cylinders, 2 air filters and the so-called Fisher control valve.
A frequency-controlled and therefore infinitely variable pulser winch was installed on the outside to the left of the entrance door to the pulser room.

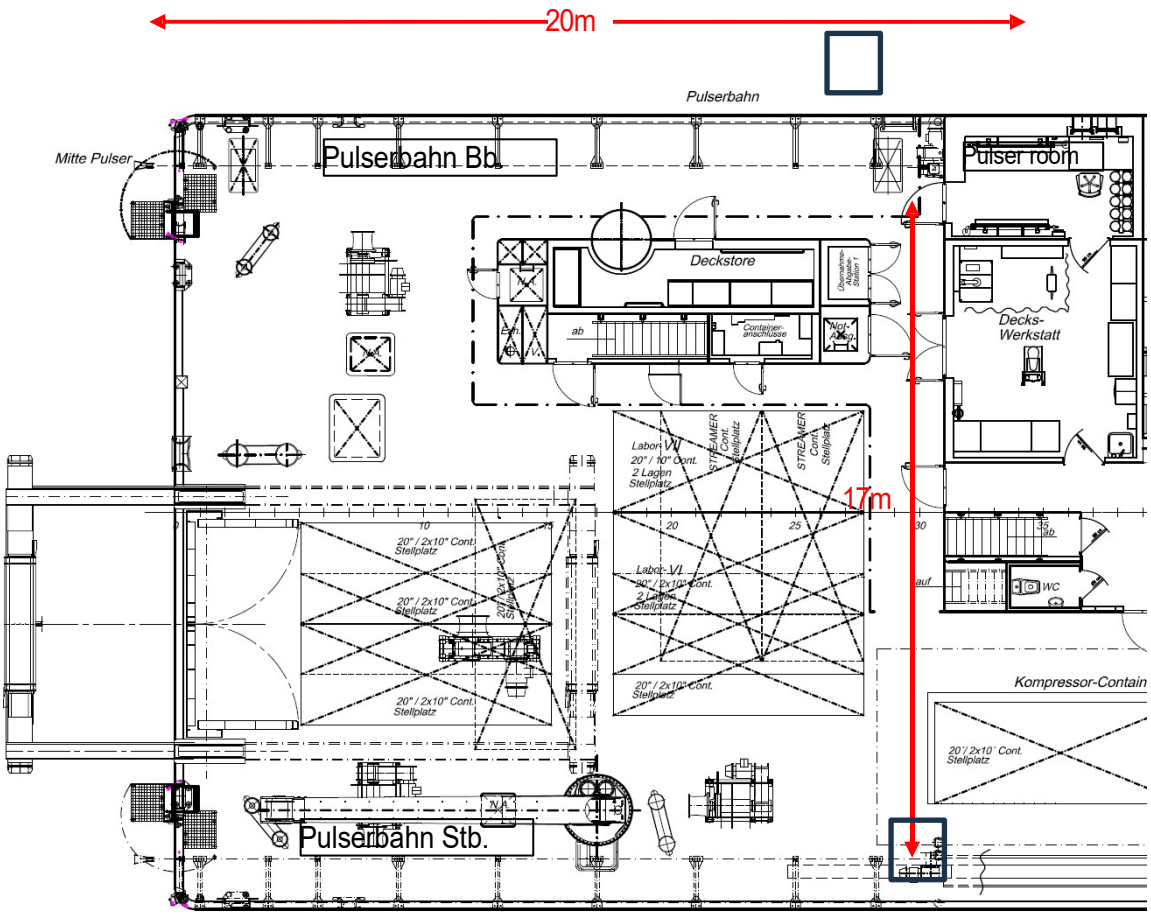


14.10.1. Pulser winch (permanently attached)

Feed-through for pulse hoses Bb

Approximately **17 m longer** lengths of HP air hose are required to supply the airguns attached to the starboard pulser track. The hoses are routed out of the room from the distribution station via a curved pipe mounted on the right above the door to the pulser room and fed to the starboard pulser runway high enough above deck from mid-ship in an elevated metal half-shell.

Distances to the Pulser station:



14.10.2. Air pulser discharge path

The ship has an air pulser discharge lane for each side (starboard and port). For space reasons, both lanes are stored in a 20' open-top container, which can be stored ashore if necessary, if it is determined that they are not required for a longer period of time.
The requirements of the on-board air pulser discharge lane must therefore be announced in good time during the coordination meetings for the respective travel blocks and in the MSM checklist.

14.10.3. Pulse winches (mobile)

On request during the coordination meetings, two (2) mobile pulse winches (ex FS "Sonne") together with adapter plates for attachment to the deck socket grid can be requested. These are not permanently on board. Installation location =


Port side


Starboard

14.10.4. Air volume grading:

		Compressor 1			Compressor 2			Compressor 3			Blower
m³/min	Power range	40Hz	50Hz	60Hz	40Hz	50Hz	60Hz	40Hz	50Hz	60Hz	250mbar
6,5	350kW				Standby			Standby			
8,0					Standby			Standby			
10,0					Standby			Standby			
13,0								Standby			
14,5	550kW							Standby			
16,0								Standby			
18,0								Standby			
20,0								Standby			
21,0											
23,0											
24,0											
26,5	800kW										
28,0											
30,0											
37,5											

The compressors are able to run at different speeds in order to adapt the produced volume even better to the respective requirements of the air guns. This results in a narrower gradation of the individual delivery quantities. For technical reasons, operation with a blower is only possible with 3 compressors at 60Hz. This results in a jump in the produced volume of 7.5m³/h.

Seismic container performance levels

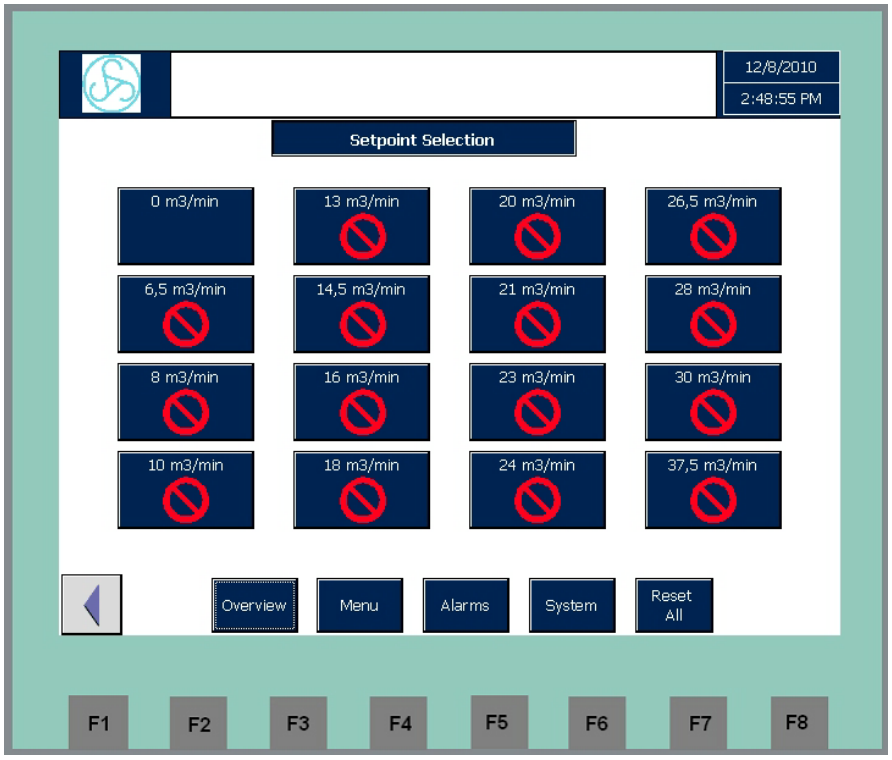
	Power calculation	pressor Container 1x WP		
m³/min	2000 - 3000psi	40Hz	50Hz	60Hz
6,5	116kW - 128kW			
8,0	145kW - 156kW			
10,0	172kW - 186kW			

Including the mobile compressor container, a maximum of **47.5 m³/min** of air can therefore be provided**.**

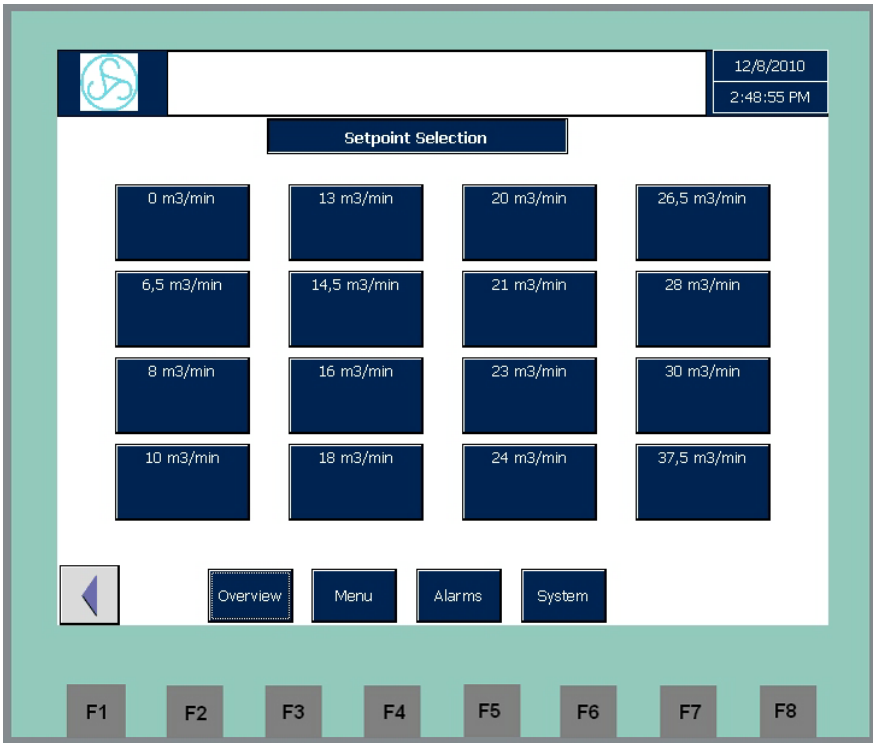
The required air volumes can be preselected by the users via a ***touchscreen monitor*** in the pulser station after consultation with the chief engineer. The pressure is regulated via corresponding settings on the "Fisher valve".

If the air volumes are blocked due to a lack of electrical power, a red warning symbol appears. In this case, more generator power must be requested via the chief engineer.

Image shows ***"blocked selection"*** because not enough electrical power is available.



Picture shows ***"full air volume selection"*** possible

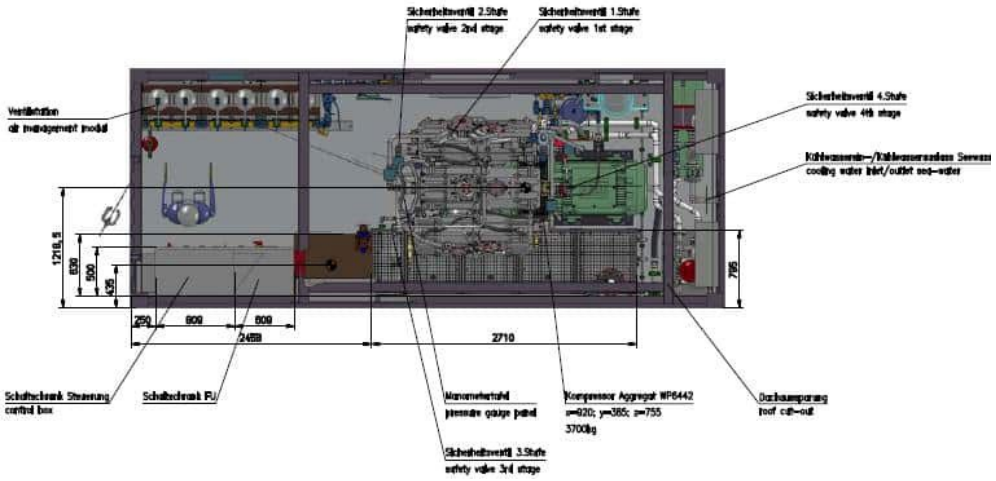


14.10.5. Compressor container

Compressor container
“Leitstelle 1”

Cont. no.:
ROEU 010 012-4
20' - standard size

Top view



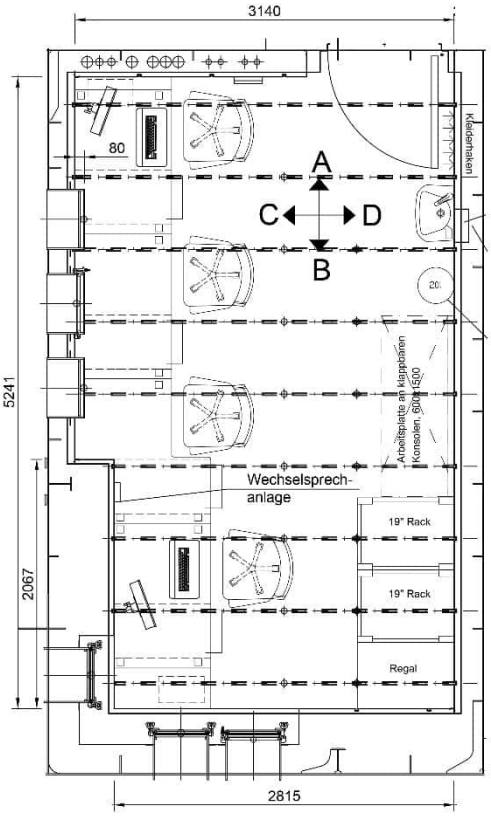
14.11. Data center

Main deck, starboard
Frame. 92-98
Room-N0.: 4223
Phone.: 423

Legend

aft↔ front

Layout



Nebenuhr Wempe, Diam. 187mm
B Doppelsteckdose Bordnetz 230V/16A
L Doppelsteckdose Labornetz 230V/16A
D Steckdose Drehstrom 400V/32A
N Steckdose Netzwerk/ LAN-Anschluß (Fa. Werum)
EK Einleiterkabel
EB Erdungsbolzen
FW Frischwasser Warm/kalt
Lichtschalter
Antennensteckdose
Steckdose (doppelt)
BNC BNC-Buchse Zeittaktgeber

Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white) 230 V
50 Hz laboratory mains (red)

Communication:
Junction box Data distribution system Intercom system Science Antenna socket (radio/TV/video) Video junction box CCTV BNC socket Timer connection for all single-core winches Connection for fiber optic hybrid cable

Other:
PC with monitor Laser printer Color A4 ADCP location CTD calculator and operation

Image A

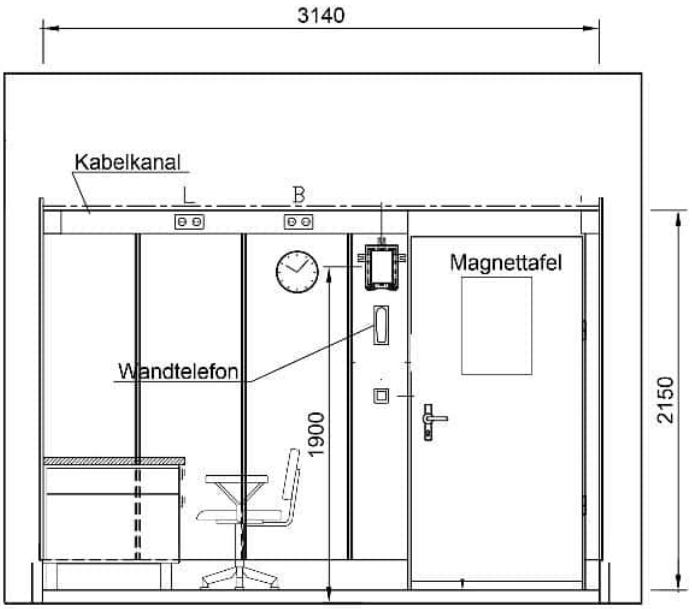


Image B

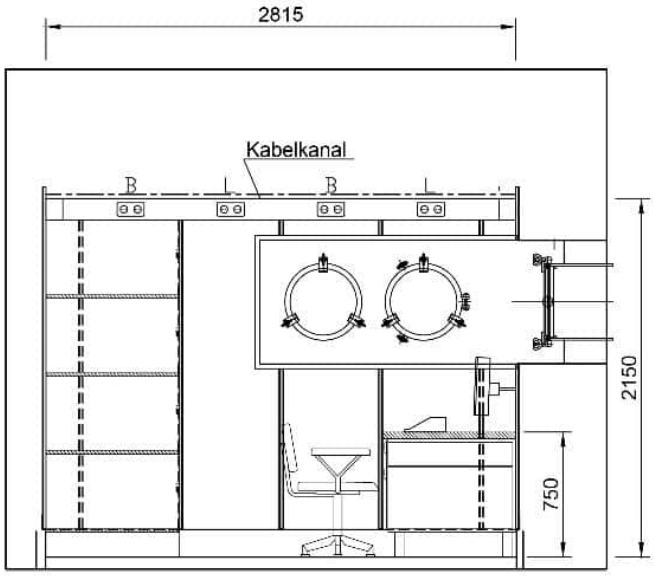


Image C

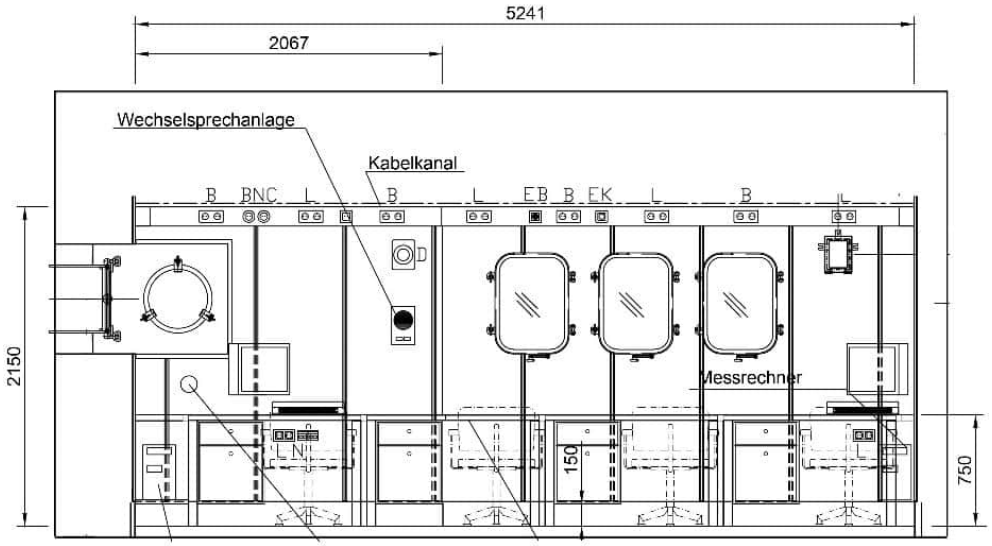
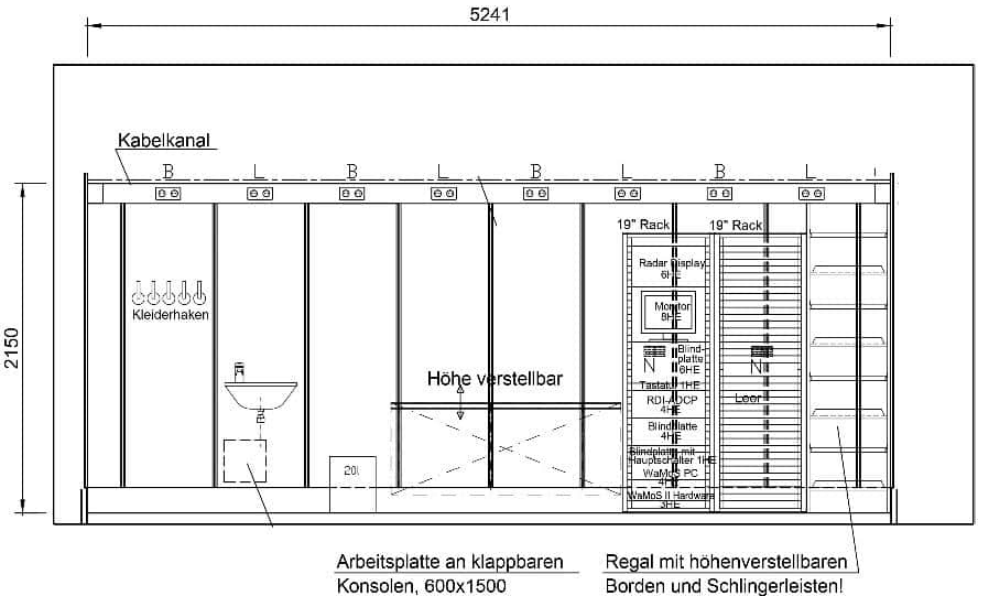


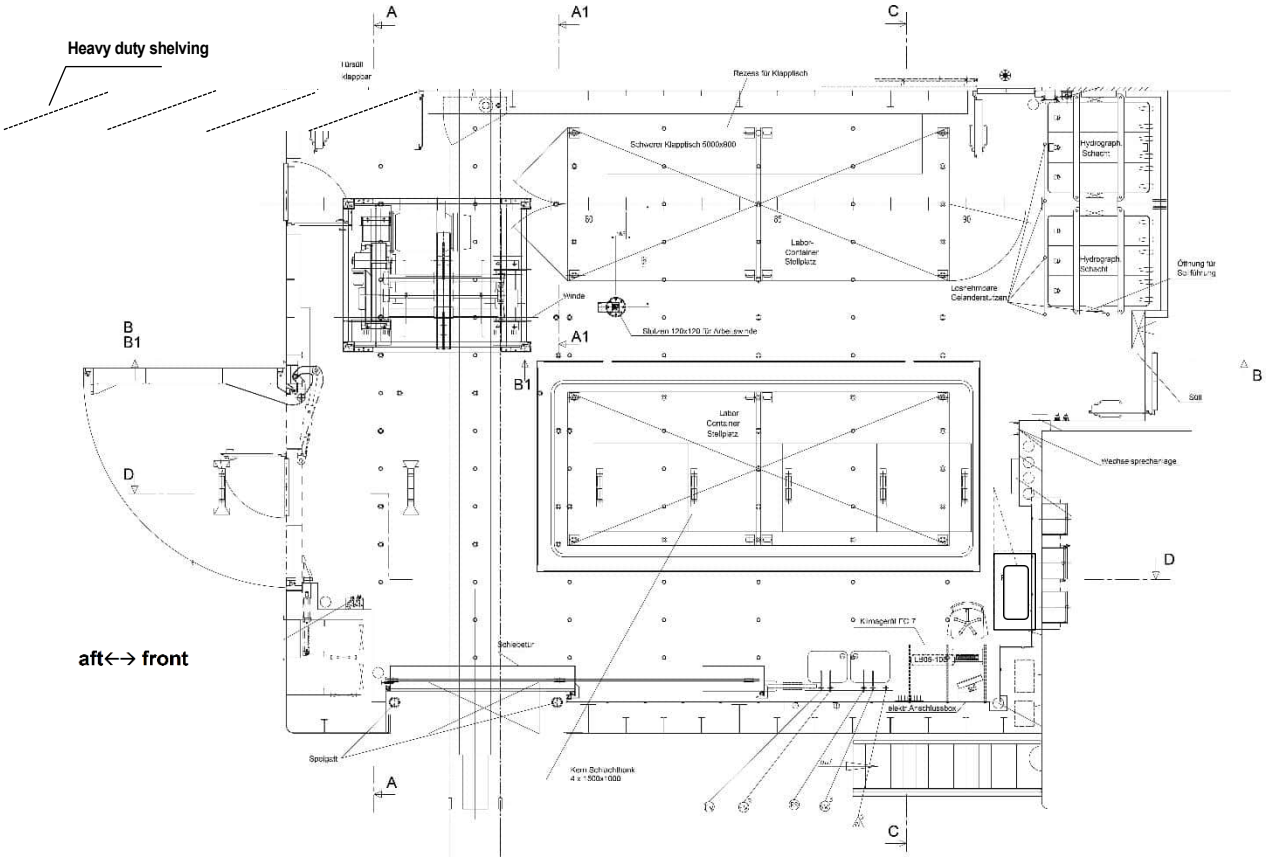
Image D



14.12. Hangar

Main deck, starboard
Frame. 72-95
Room-N0.: 4301
Phone.: 431

Layout main deck

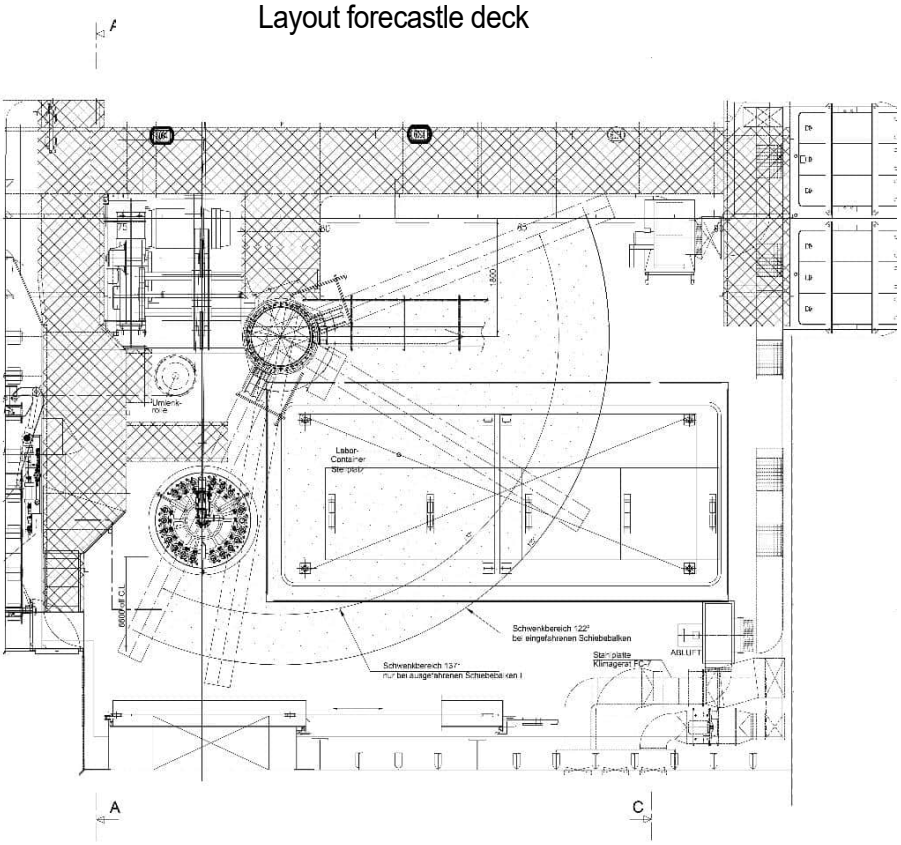


Laboratory equipment	Communication:
electric:	Junction box Data distribution system
230 V 50 Hz on-board power supply (white)	Intercom system Science Antenna socket (radio / TV / video) Video junction box
230 V 50 Hz laboratory mains (red)	CCTV
400 V 50 Hz three-phase current (CEE) 32 A	Connection for all single-wire winches
Water and air Supply and disposal:	Other:
Fresh water cold/hot (drinking water)	PC with monitor Process fresh
water (3/8)	Water sound probe Soft water
from (pore osmosis)	Container connection box
Industrial seawater	Core sludge bank Pure
seawater (centrifugal pump)	Small sliding beam 70 kN
Pure sea water (diaphragm pump)	M24 floor sockets (1500 x 600 mm)
Laboratory waste water	Large door to the working deck
Scupper (drain to outboard)	Sliding door to bulwark
Laboratory compressed air 0-10 bar	

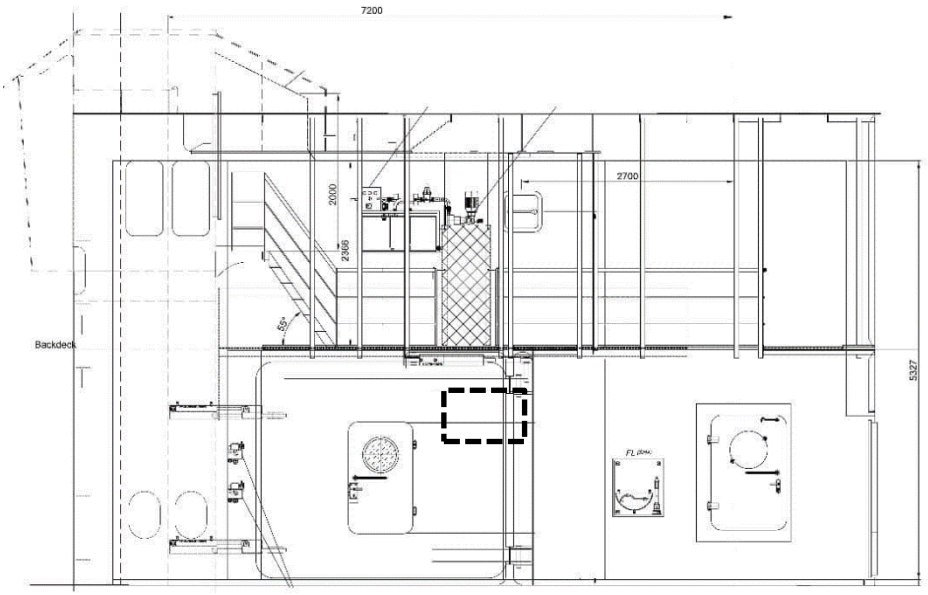
Legend

- B — Doppelsteckdose Bordnetz 230V/16A
- L — Doppelsteckdose Labornetz 230V/16A
- D — Steckdose Drehstrom 400V/32A
- N — Steckdose Netzwerk
- FW — Frischwasser Warm/kalt
- RS — Reinseewasser
- FW B — Brauchfrischwasser
- SW B — Brauchseewasser
- A 6 — Arbeitsluft 6 Bar

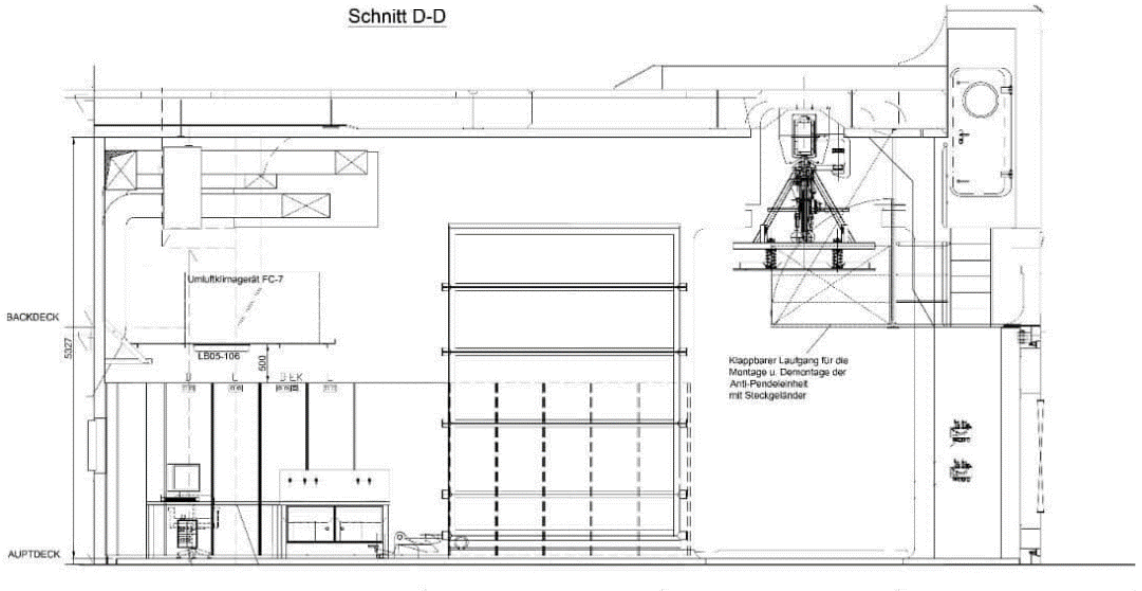
Layout forecastle deck



Segment A-A

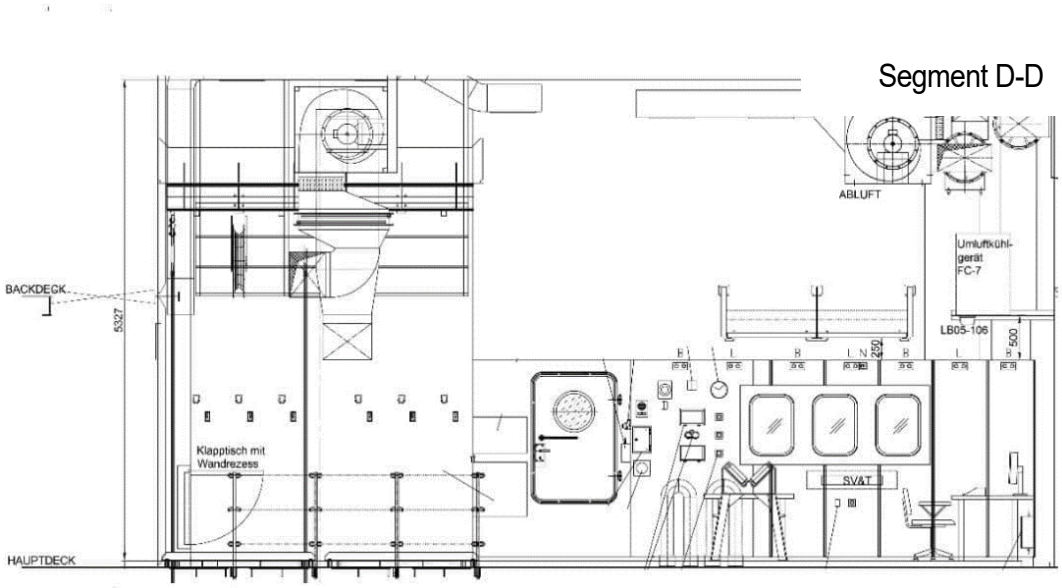


Segment B-B



Segment C-C

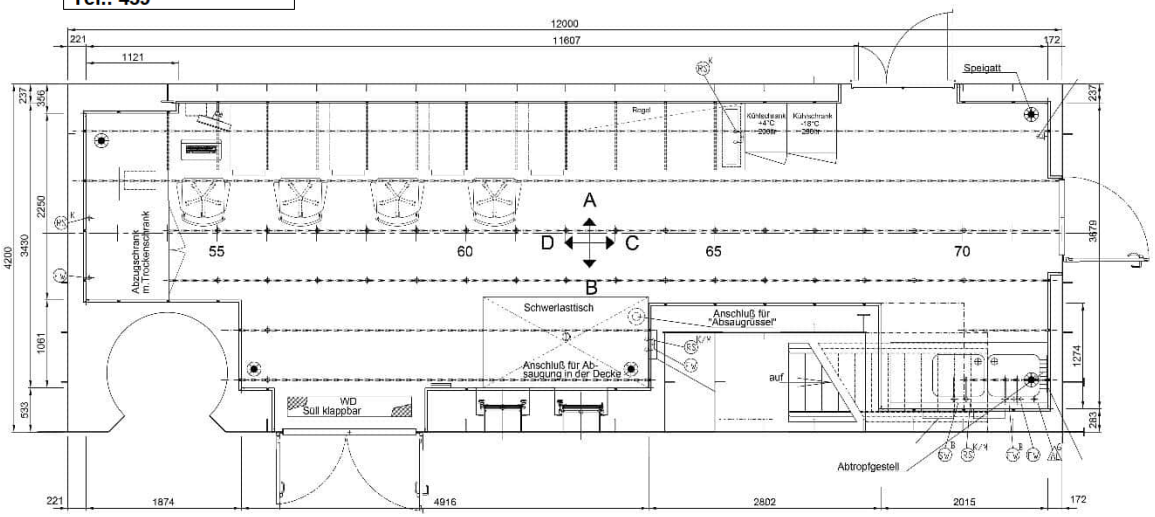
Segment D-D



14.13. Deck lab

Main deck Sp. 52-72
Room no.: 4310
Tel.: 439

Segment C-C



Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE) 32 A

Water and air Supply and disposal:
Fresh water cold/hot (drinking water)
Process fresh water (3/8) Soft water
from (pore osmosis) Process lake water
Pure seawater (centrifugal pump)
Pure seawater (diaphragm pump)
Laboratory wastewater
Scupper (outflow to outboard)
Compressed air 0-6 bar

Communication:
Junction box Data distribution system
Intercom system Science Antenna
socket (radio/TV/video) Video junction
box CCTV connection for all single-wire
winches

Other: Digestion cabinet
Drying cabinet
Refrigerator (+4 °C)
Freezer (-18 °C) Air extraction system
PC with monitor Freezer
-80 °C
Heavy-duty table with inlet and outlet

Legend

Image A

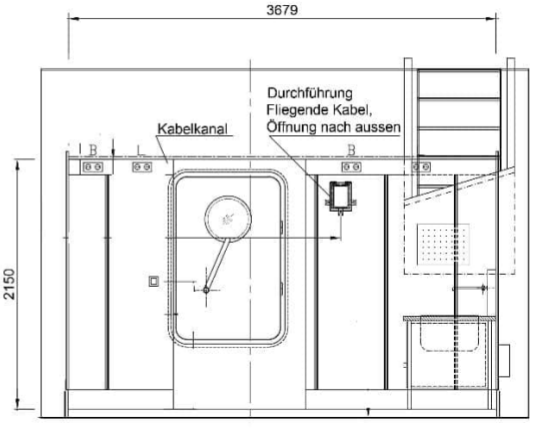


Image A

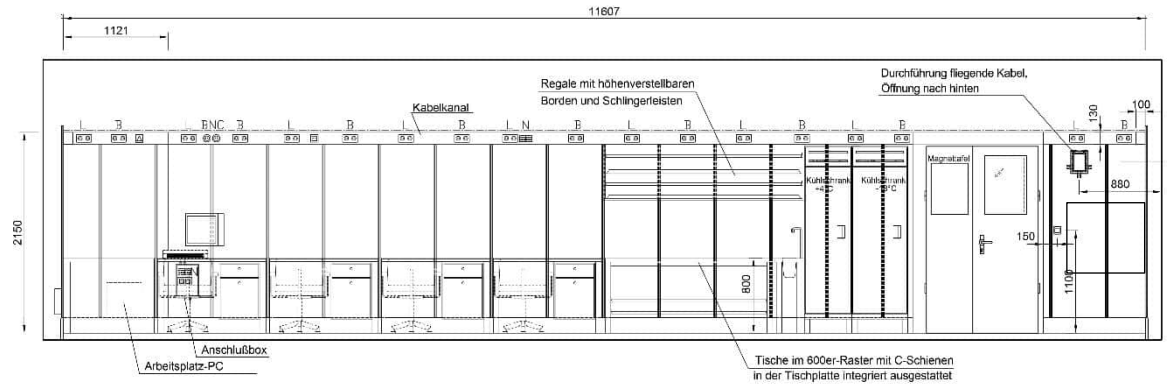


Image B

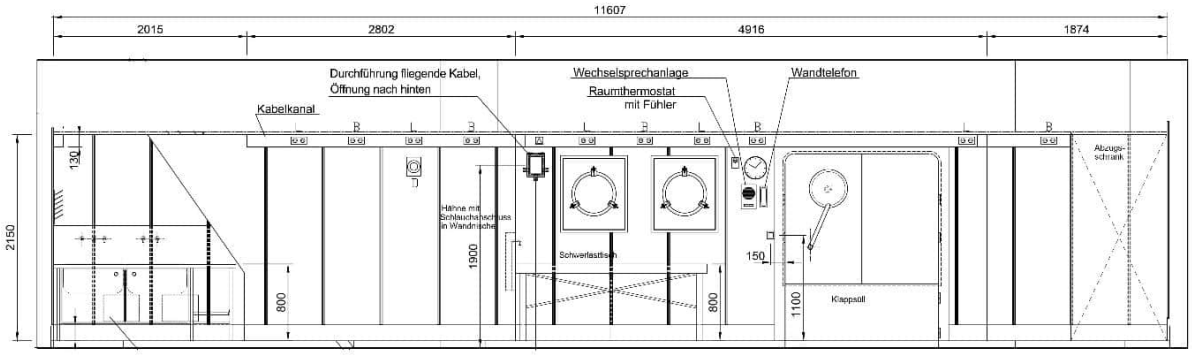
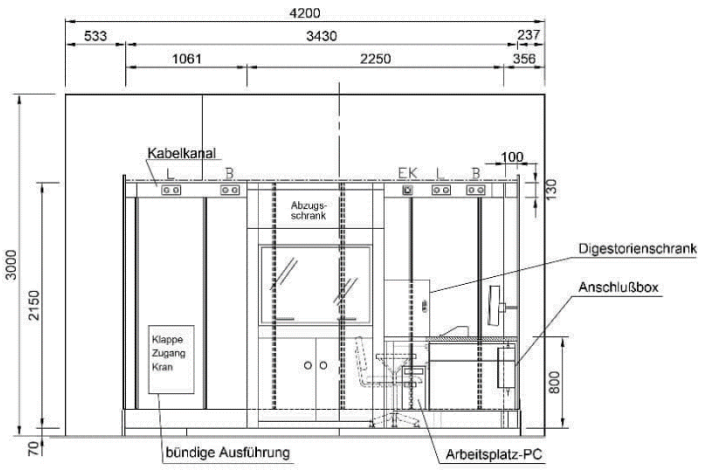


Image D



14.14. Scientific cooling and freezing room

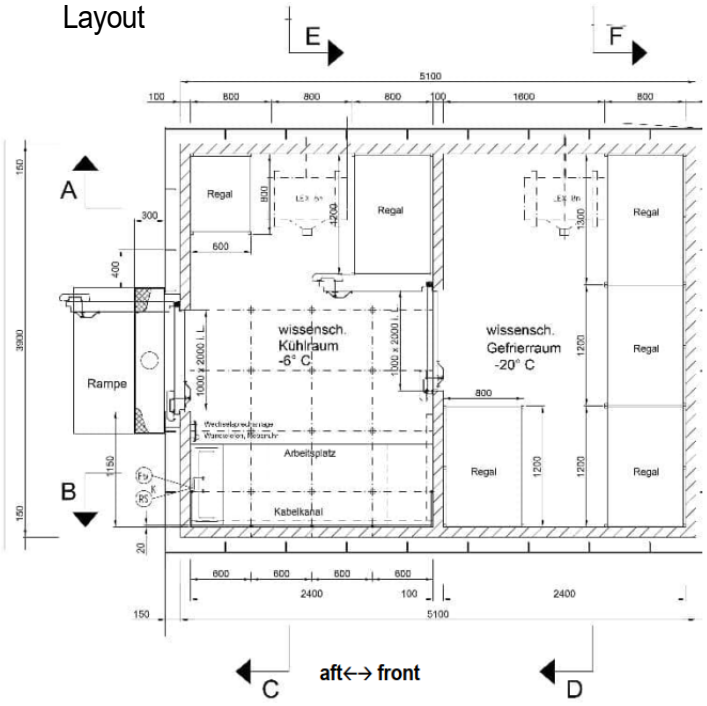
Tweendeck
Frame. 81-90
Room-No.: 3308
Phone.: 338

The scientific cold room can be used as a laboratory. It can be cooled down to -6 °C (+/-0.5 °C)

The scientific freezer room can be used down to -20 °C (+/-0,5 °C)
Coolable.

The temperature is set on the ship by the machine personnel.

Layout



Legend

Doppelsteckdose Bordnetz
B

Doppelsteckdose Labornetz
L

Steckdose Netzwerk
N

Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)

Water and air Supply and disposal: Fresh water cold/hot (drinking water) Pure sea water (diaphragm pump) Laboratory waste water

Communication:
Junction box Data distribution system
Intercom system Science

Image A

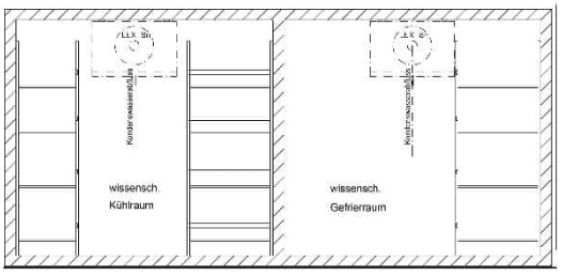


Image B

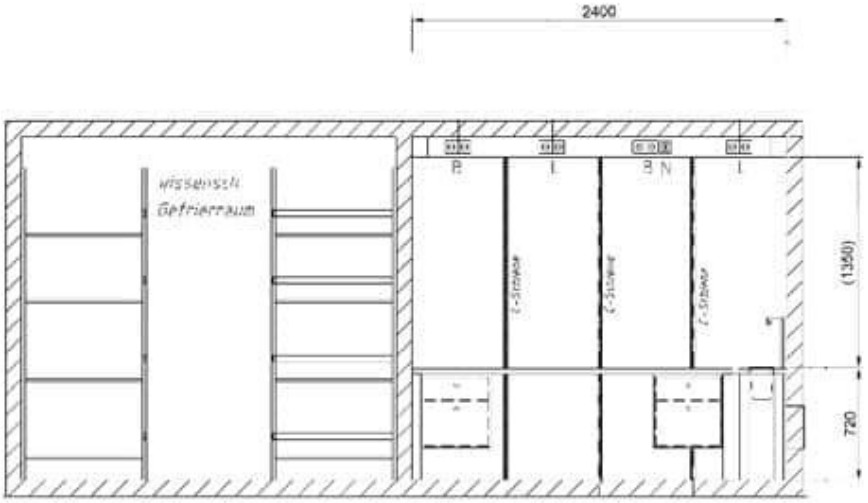
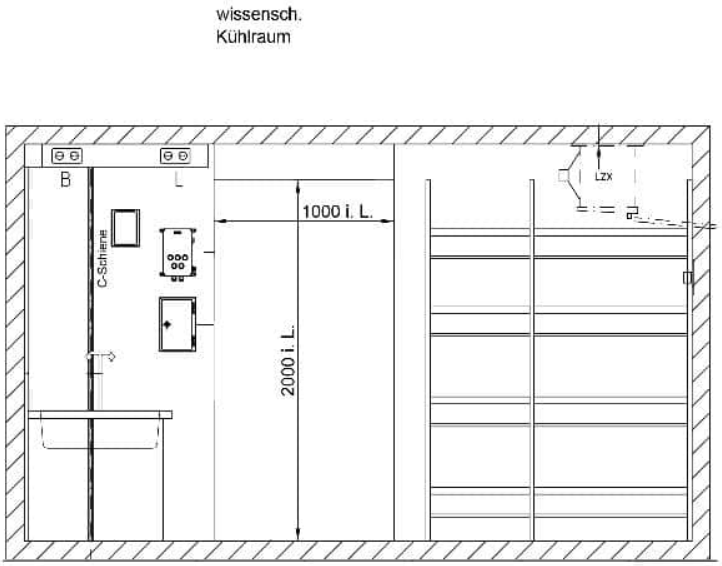


Image C



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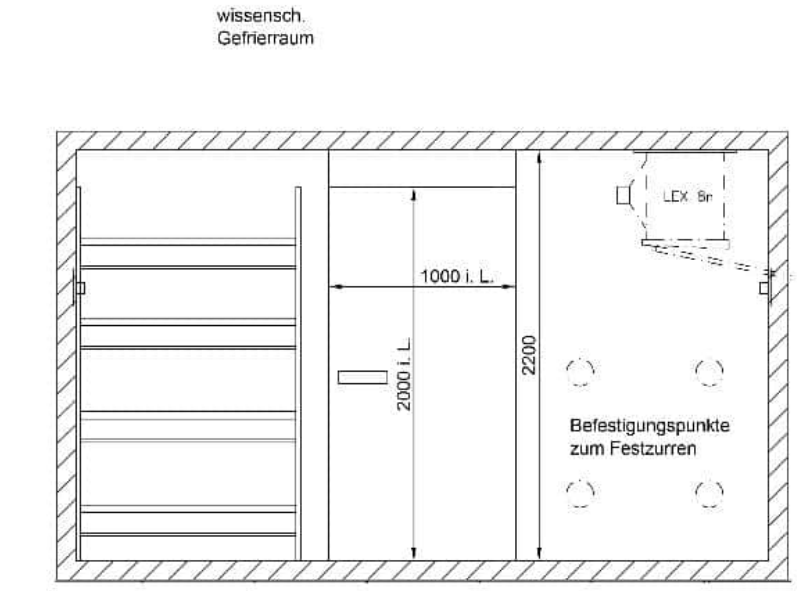

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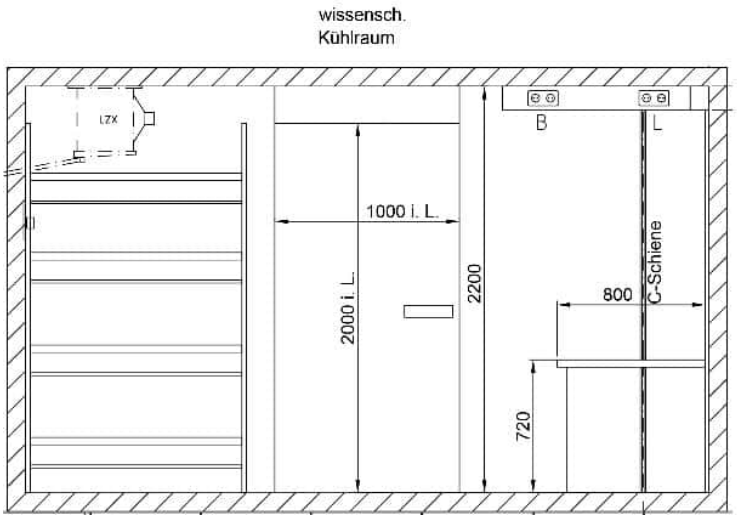
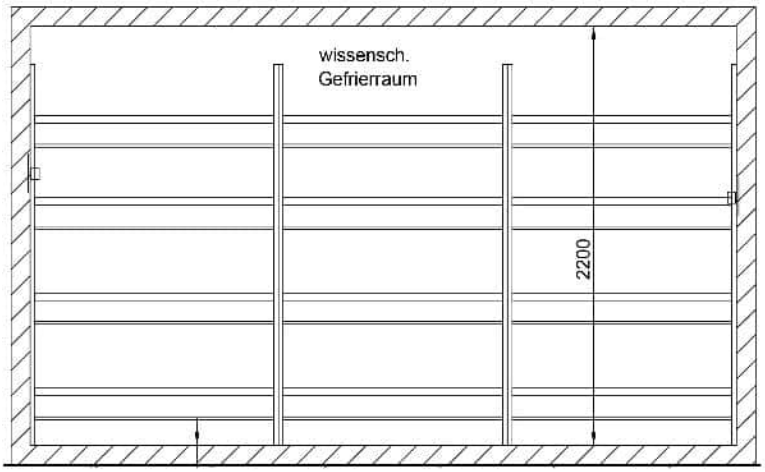


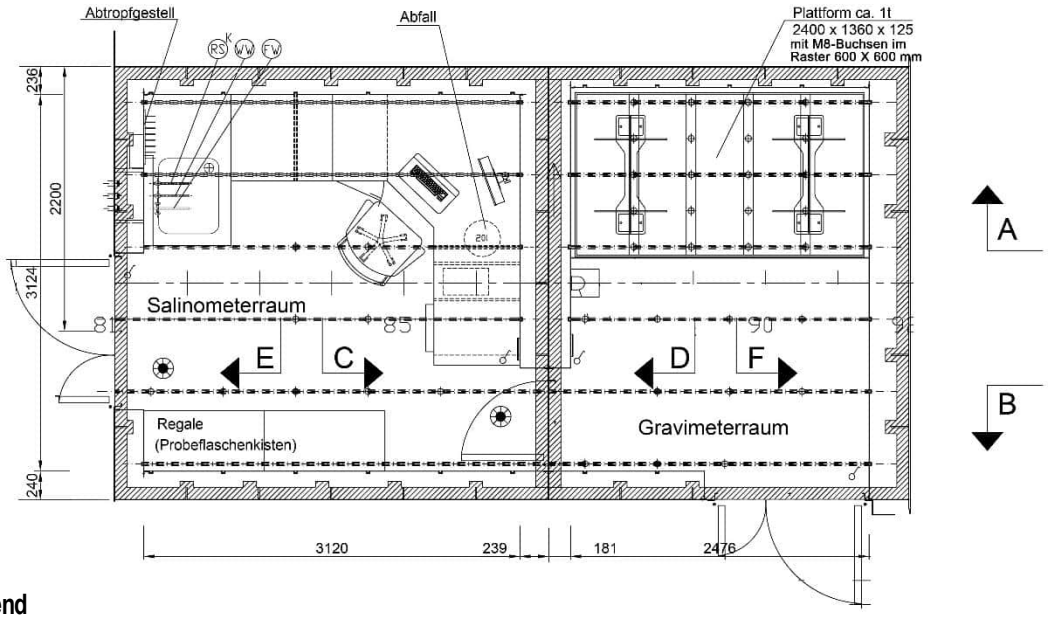
Image F



14.15. Salinometer and gravimeter room

Intermediate deck
Sp. 81-92
Room no.: 3306
+3310
Phone:
306
+310

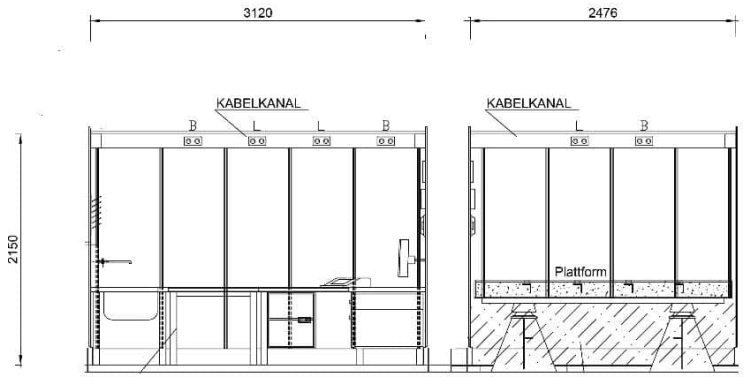
Note: Air conditioning control range for both rooms: 15...25°C!



Legend

- Nebenuhr Wempe, Diam. 187mm
- Doppelsteckdose Bordnetz 230V/16A
- Doppelsteckdose Labornetz 230V/16A
- Steckdose Drehstrom 400V/32A
- Steckdose Netzwerk/ LAN-Anschluß (Fa. Werum)
- Frischwasser Warm/kalt
- Reinseewasser K
- Weiches Wasser
- Lichtschalter
- Antennensteckdose
- Steckdose (doppelt)

Image A



Salinometer room

Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE) 16 A

Water and air Supply and disposal: Fresh water cold/hot (drinking water) Pure sea water (centrifugal pump) Laboratory waste water
Scupper (outflow to the outboard side)

Communication:
Junction box Data distribution system
Intercom system Science Antenna socket (radio/TV/video)

Other:
PC with monitor Temperature control ±0.5 °C

Gravimeter room

Laboratory equipment

electric:
230 V 50 Hz on-board power supply (white)
230 V 50 Hz laboratory mains (red)
400 V 50 Hz three-phase current (CEE) 16 A

Communication:
Junction box Data distribution system
Intercom system Science

Other:
Temperature control ±0.5 °C low-vibration platform (M8 sockets)

Image B

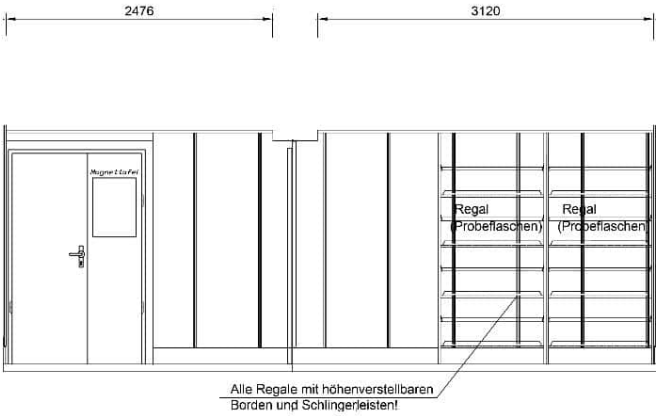
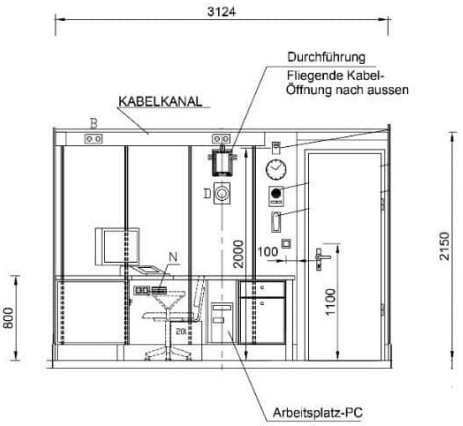


Image C



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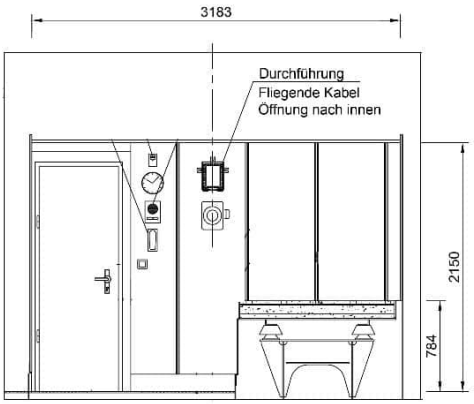
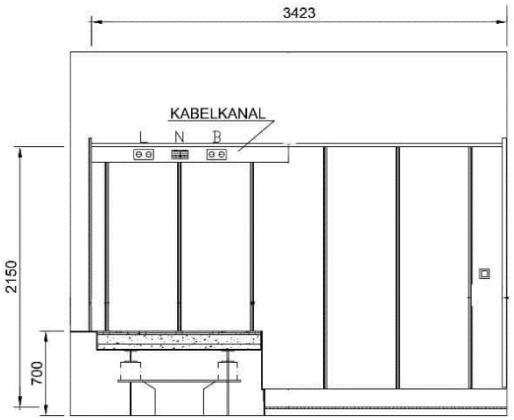
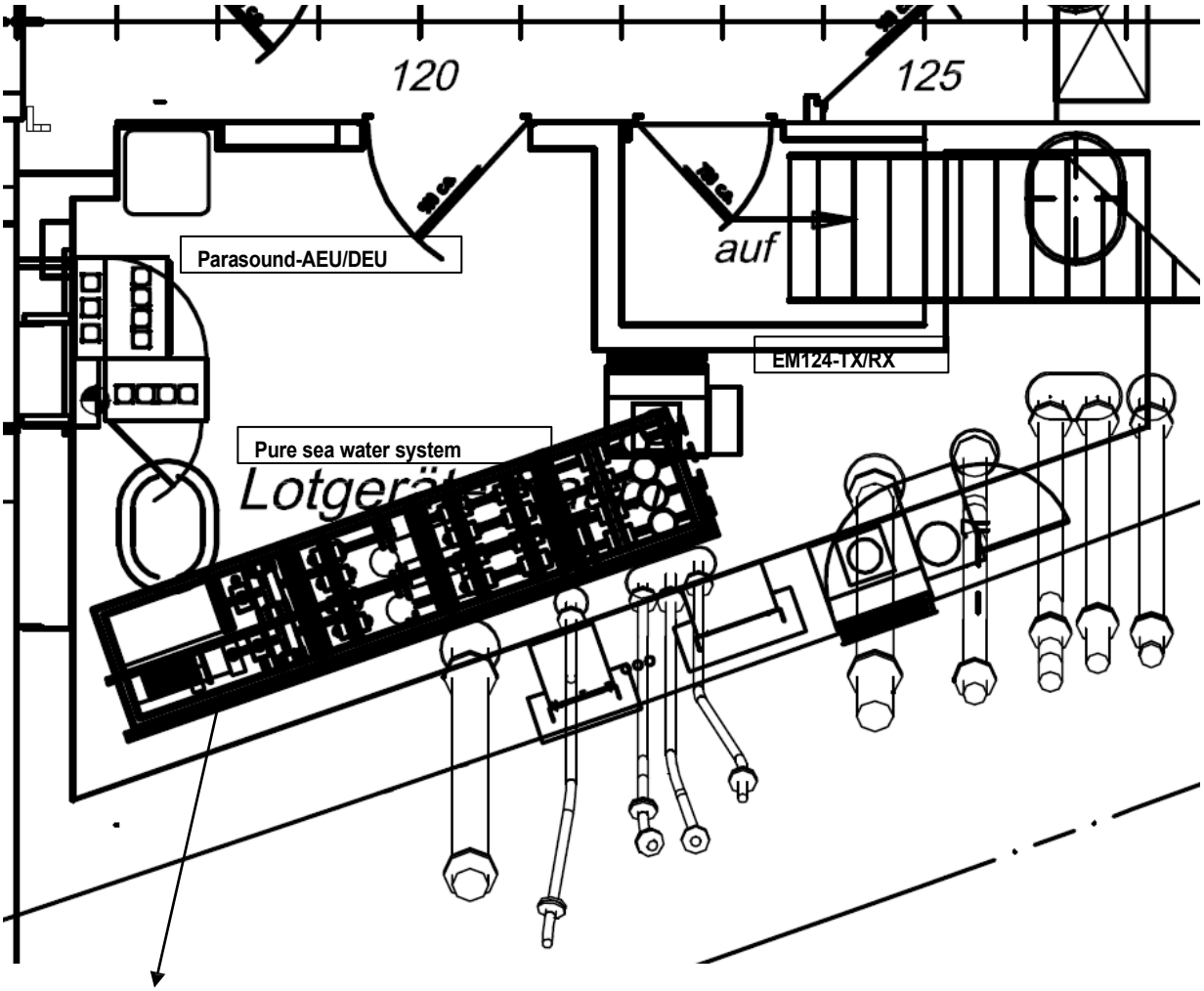


Image E

Image F



14.16. Hydroacoustic echosounder & clean seawater room



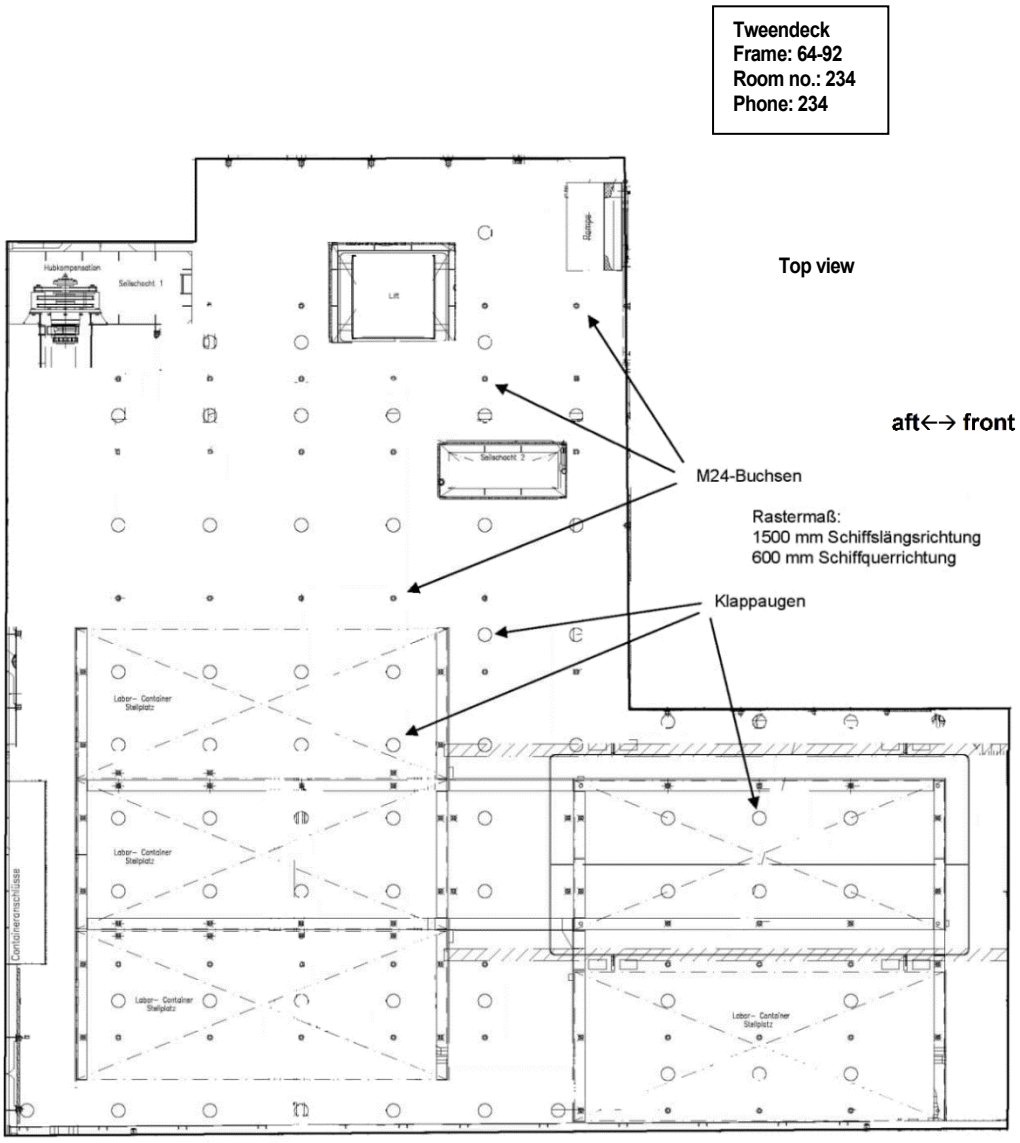
Clean sea Water system

In addition to the pure sea water system, this room also houses the junction boxes for the cables coming in from the individual sounding transducers (EA640; EM124, EM712 and Parasound).

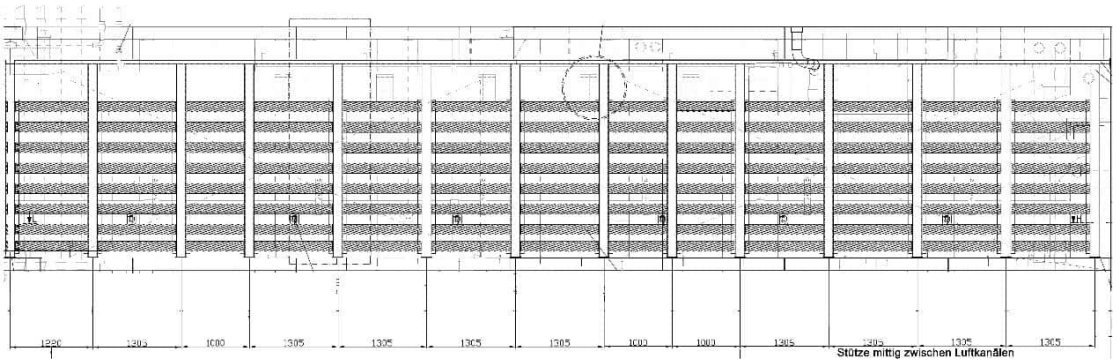
15. Scientific storage spaces

15.1. Scientific storage space

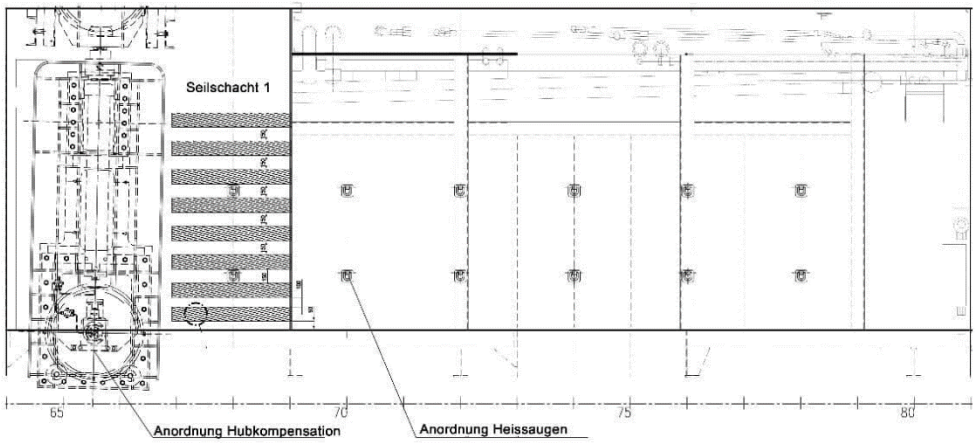
Scientific hold



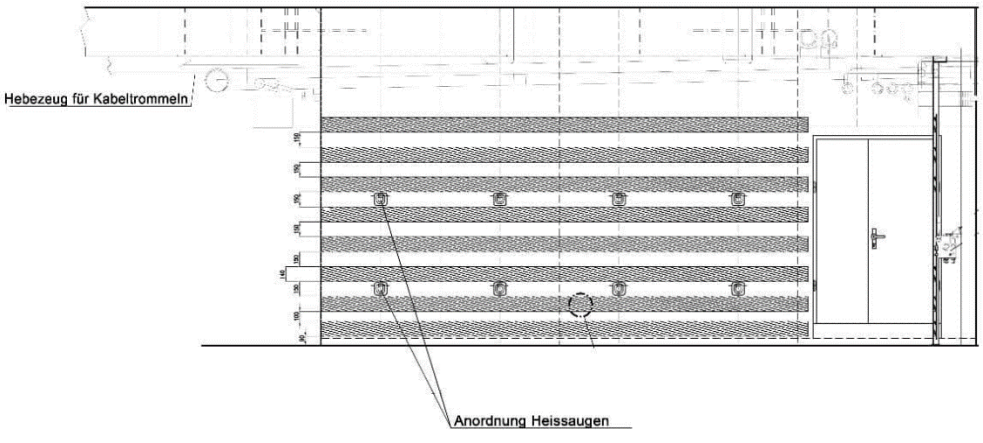
Longitudinal view – starboard side exterior wall



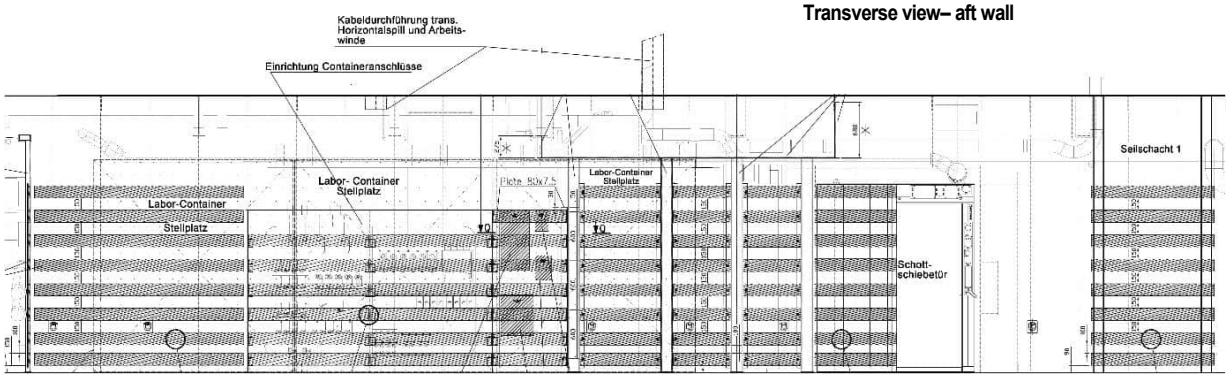
Longitudinal view – port side exterior wall



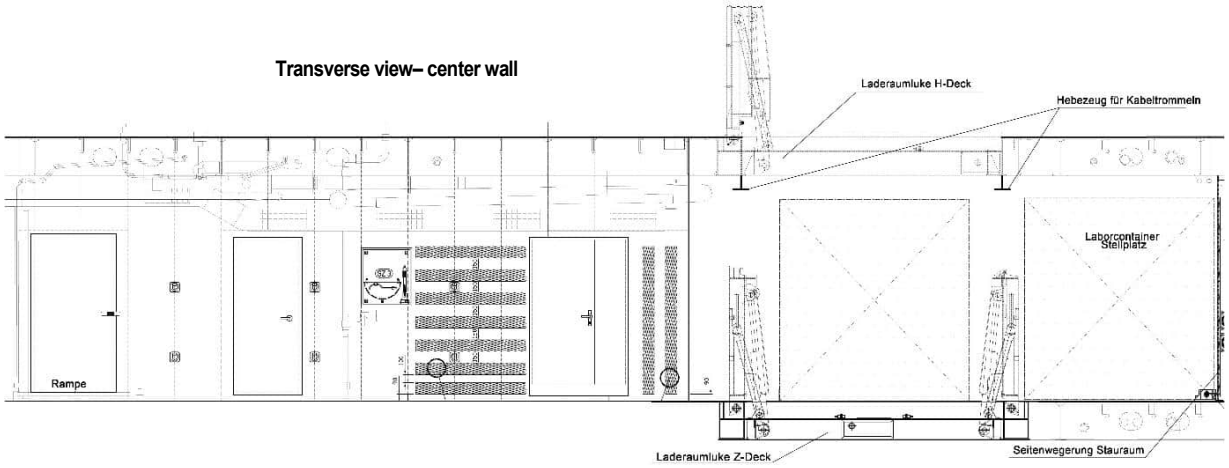
Longitudinal view – port side center wall



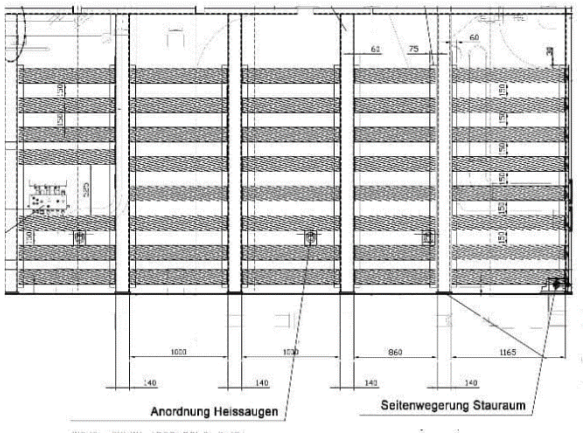
Transverse view– aft wall



Transverse view– center wall



Transverse view– forward wall

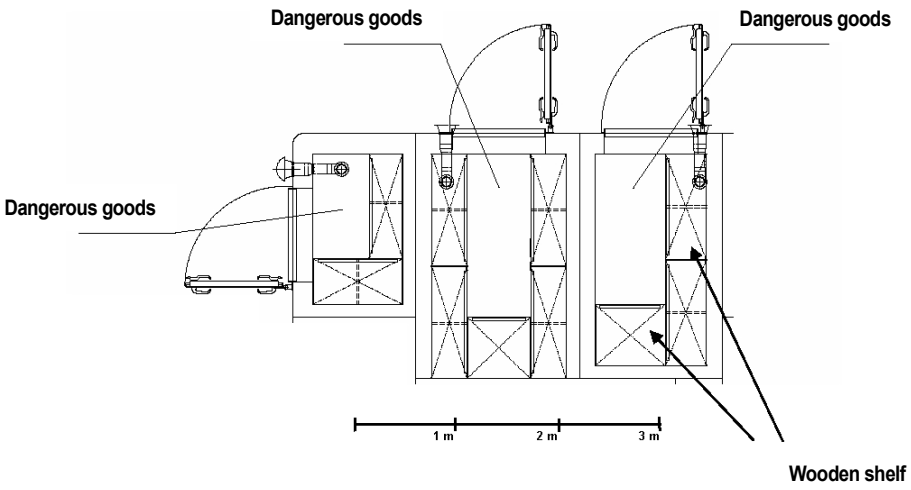


15.2. Storage spaces for hazardous substances

Dangerous good storage

Forecastle deck
Frame: 32-39
Room no.: 5502 & 5504 & 5506

Top view



aft←→ front

Remark
Three dangerous goods stores are situated on port aft part of the forecastle deck

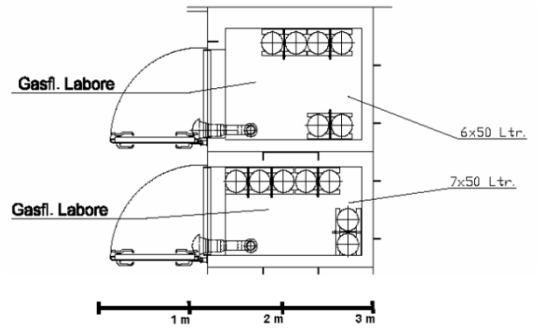
Storage of dangerous goods needs to be coordinated with the chief officer on board

15.3. Scientific gas cylinder stores

Scientific gas cylinder stores

Forecastle deck
Frame: 64-67
Room no.: 5508 & 5510

Aufsicht



aft↔ front

Remark
The two scientific gas cylinder stores stores are lokated on the port part of the forecastle deck

The labs can be yupplied directly from the scientific gas cylinder store

16. Hydroacoustic systems

The Maria S. Merian has ten permanently installed hydroacoustic systems and three additional mobile systems that can be installed as required. The enclosed diagram shows the arrangement of the individual components. In detail, these are

- Teledyne Reson (Atlas) PARASOUND DS P-70 (Parametric sediment echo sounder, 'sub- bottom profiler')
- Kongsberg (Simrad) EM124 (12 kHz deep-sea multibeam sounder, 50-11000 m water depth)
- Kongsberg (Simrad) EM712 (40-100 kHz shallow water multibeam sounder, 3-3600 m water depth)
- Kongsberg (Simrad) EA640 (Vertical plumb 12 kHz)
- Kongsberg (Simrad) EN250 (50 kHz navigation slot, up to approx. 800 m water depth)
- Applied Microsystems AML-3 SV+CT+P (sonic profile+CTD probe, up to 6000 m water depth)
- Applied Microsystems PlusX (sound profile + T-probe, up to 5000 m water depth)
- Applied Microsystems SV (sound velocity probe on the keel)
- Lookhead Martin Sippican deck unit and launcher (all probes possible (XBT, XCTD, XSV), only Tzp XSV on board, up to 2000m water depth)
- Sonardyne Ranger2 (USBL underwater positioning system); permanently installed in the port sounding well (moonpool); with 9 transponders up to 7000 m water depth
- Teledyne RD Instruments current profiler / ADCP (Acoustic Doppler Current Profiler) 75kHz (up to 750m water depth) permanently installed; 38kHz (up to 1500m water depth) mobile in the starboard plumb bob (moonpool)
- Wärtsilä SAM 4682 270 kHz (Doppler log)

A hydrophone is installed on the hydraulic extension unit ('Spargel'), see Chap. 15.7 and 15.8 (can be extended by approx. 40 cm).

Two Kongsberg workstations with SIS are available for the EM124 and EM712. Each of the two workstations can be connected to one of the two echo sounders.

Detailed sea charts can be displayed on the APC-35 "Planning Station" using the 'Global Mapper 16' software (ENC and ARCS). With the Global Mapper, waypoint routes and survey grids can be defined for areas to be mapped or other profile runs (e.g. OFOS) and transferred to the bridge via the route-to-bridge application. The transfer to the bridge is also easily possible from Global Mapper installations. Detailed instructions can be found on the intranet page on board.

An additional operating PC is available for PARASOUND on the bridge, on which Parasound can be used with its full range of functions.
The EM124 and EM712 can be accessed from this computer via VNC. The numerical depth values of all echo sounders can be displayed on-line (1 Hz frequency) on any workstation computer (APC) connected to the Werum data distribution system (DSHIP) in any laboratory and can therefore also be exported from the database over any desired time period.

All scientific sounding systems receive data via the Kongsberg 'Seapath 380' system (Section 13.5) from the two 'Motion Gyro Compass Units' (MGC) in the gravimeter room to compensate for heading (yaw), roll, heave and pitch movements of the ship and are therefore largely insensitive to ship movements.

The EN 250 nav echo sounder on the bridge primarily provides the depth under the keel for nautical purposes and therefore cannot be used for scientific purposes. The same applies to the speeds provided by the SAM DOLOG. However, unlike the ADCP, all parameters for these two sounders are entered in the DSHIP database and can therefore be exported.

The ADCPs (38 kHz and 75 kHz) are operated from the Hydroacoustic data center or from any computer via VNC. The Sonardyne system is operated from the data center, as is the parameterization of the AML sound profile probe and the data transfer of the measured sound profile (as well as the online values of the SV+T probe) from there to all sounding systems in the sounding control center. Alternatively, sound profiles can also be supplied by the CTD on board (or by a third party) and made available for the echo sounders and for Sonardyne.

The Sippican system is operated from the pulser station and the data is made available via a network drive in the plumbing control center.

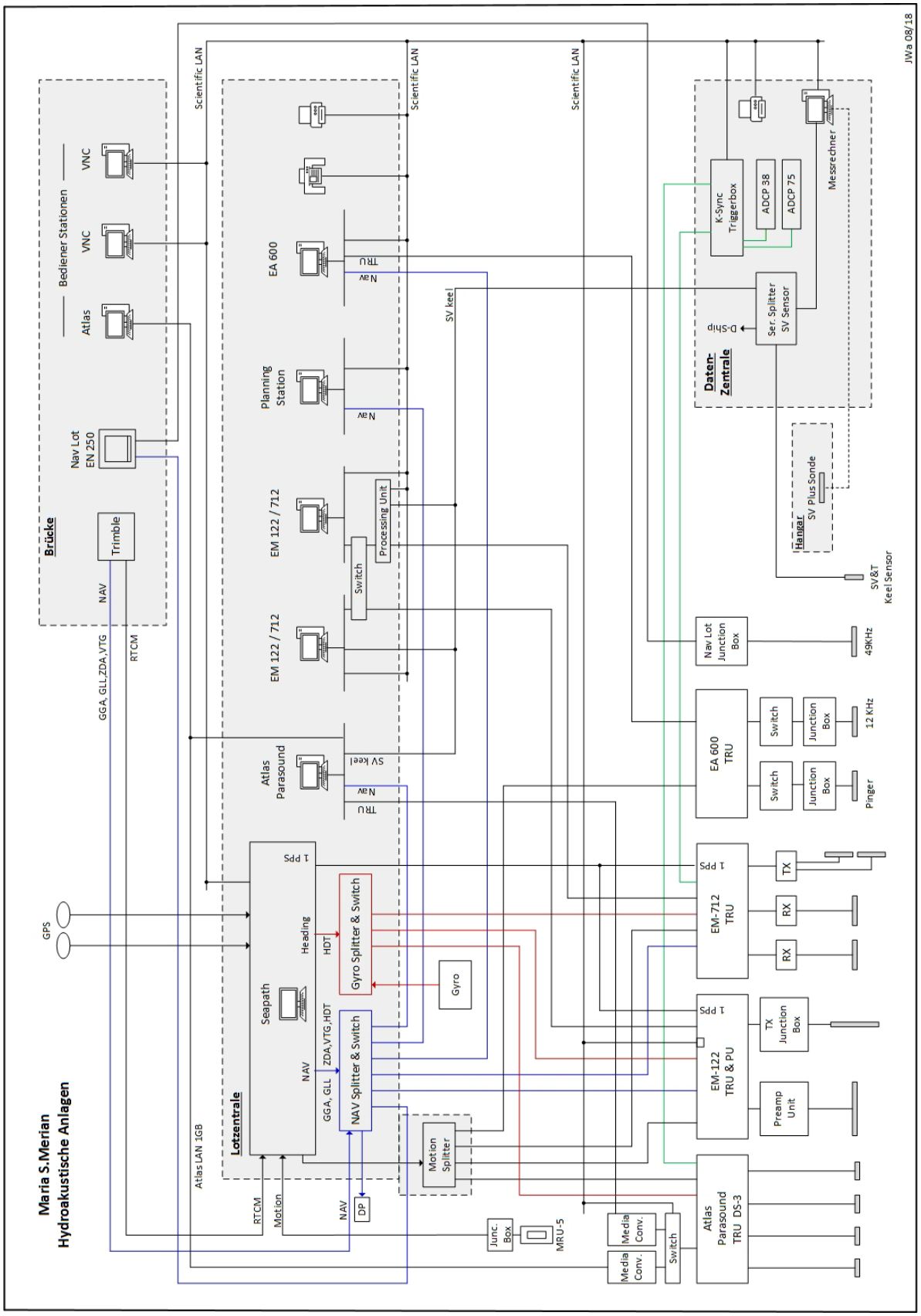
In October/November 2017, a new SONARDYNE underwater positioning system was installed in Emden in the port perpendicular shaft (see also 12.9).
The system consists of the following components:

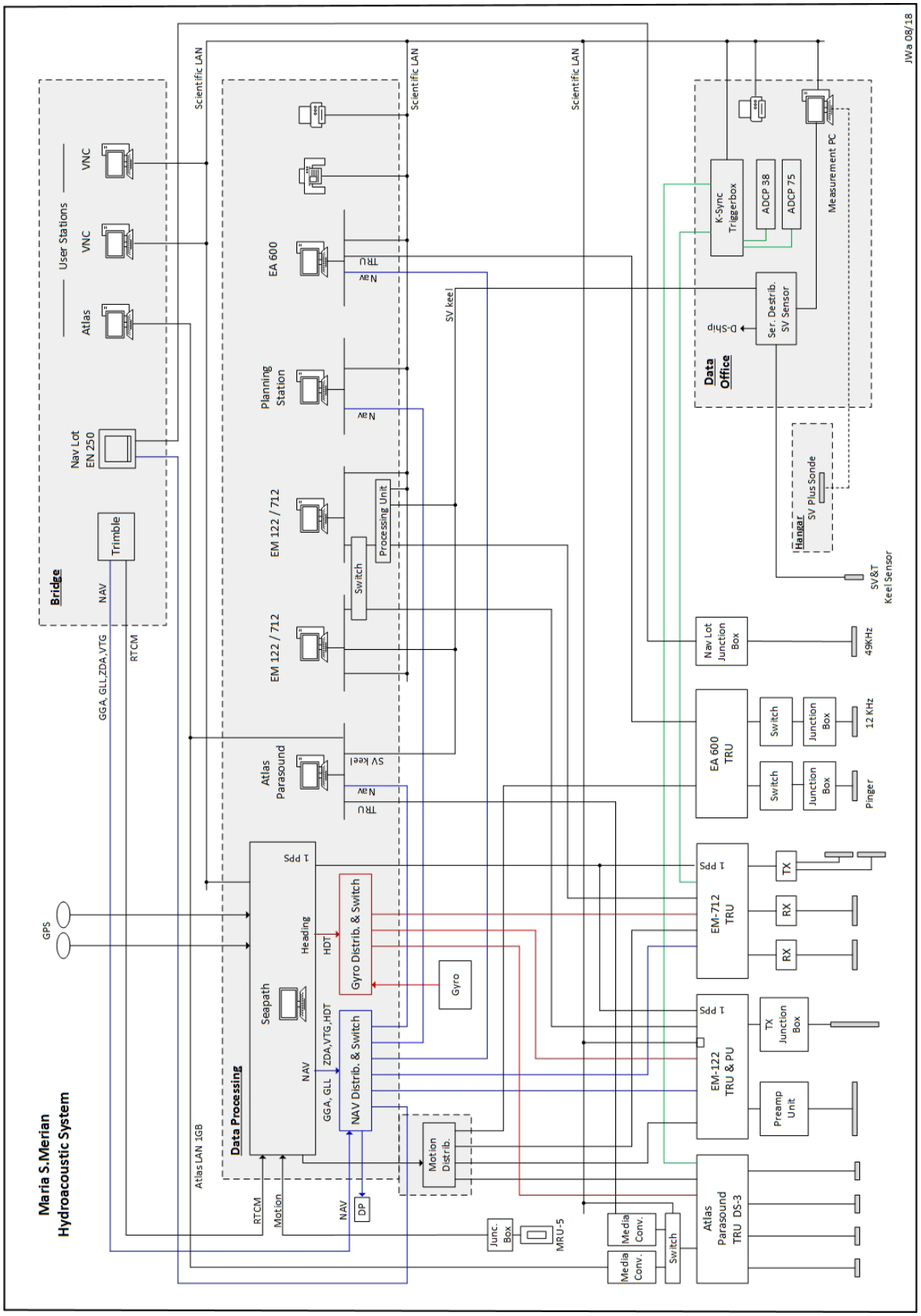
- Hydraulic extension unit, installed in the former port moonpool, can be operated locally at the top of the moonpool and "remotely" at the bottom of the moopool and from the bridge (normal operation)
- Ranger 2 Lodestar GyroUSBL 7000 Transceiver Unit (built-in)
- Ranger 2 HPT 7000 Transceiver Unit (without Gyro/MRU) as reserve
- 2x transponder WSM 6+, up to 4000m WT
- 2x transponder WMT, up to 7000m WT
- 3x transponder WMT with remote transducer, up to 7000m WT
- 1x transponder WSM6+, omnidirectional, up to 1000m WT
- 1x transponder WMT, omnidirectional, up to 3000m WT

The ship's speed should not exceed 6-7 knots with the unit extended (e.g. when moving the ship to a neighboring station); in ice-covered regions, it may only be extended on station, e.g. to release moorings (the shafts must always be closed when moving).

A hydrophone is permanently installed on the extension device ('Spargel').

16.1. Overall presentation




Maria S.Merian
Hydroacoustic System
Bridge
User Stations
VNC
VNC
Atlas
Nav Lot
EN 250
Trimble
NAV
GGA, GLL,ZDA,VTG
RTCM
Scientific LAN
Scientific LAN
Scientific LAN
Data Processing
Seapath
Heading
HDT
Gyro Distrib. & Switch
Gyro
NAV
ZDA,VTG,HDT
GGA, GLL
NAV Distrib. & Switch
Motion Distrib.
RTCM
Motion
NAV
DP
Atlas LAN 1GB
GPS
1 pps
EA 600
TRU
Nav
Planning Station
Nav
EM 122 / 712
Processing Unit
Switch
EM 122 / 712
Atlas Parasound
SV keel
TRU
Nav
SV keel
Junc. Box
MRU-5
Media Conv.
Media Conv.
Switch
Atlas Parasound TRU DS-3
EM-122 TRU & PU
1 pps
TX Junction Box
Preamp Unit
EM-712 TRU
1 pps
TX
RX
RX
EA 600 TRU
Switch
Junction Box
12 KHz
Switch
Junction Box
Pinger
Nav Lot Junction Box
49KHz
SV&T Keel Sensor
Hangar
SV Plus Sonde
Data Office
D-Ship
Ser. Destrib. SV Sensor
K-Sync Triggerbox
ADCP 38
ADCP 75
Measurement PC
JWa 08/18

16.2. Parametric sediment echo sounder (Teledyne Reson PARASOUND DS P-70)

Location: Operator stations in the plumbing control center and on the bridge

Technical data:

Maximum pulse power:	70 kW
Opening angle:	4,5 °
Soil penetration:	up to 200 m (depending on sediment and environmental conditions)
Depth range:	10 m (under keel) -11000 m
max. ship speed:	12 kn (optimum 8 kn)

Frequencies:

Primary high frequency 1:	18...33 kHz
Primary high frequency 2:	18.5...39 kHz
Secondary low frequency:	0.5...6 kHz
Secondary high frequency:	36.5...40 kHz
Primary low frequency:	3...12 kHz

Transmission	P70: 245 (206) dB (primary/parametric)
Source Level	P35: 242 (200) dB (primary/parametric)

16.3. Deep-sea fan plummet (Kongsberg EM 1224)

Location: Operator station in the plumbing control center

Technical data:

Main operating frequency:	12 kHz
(varies from 11.25 to 12.60 kHz for sector coding)	
Beams:	460/Ping (double swath)
Opening angle:	2 x 2 °
Beam distance:	constant angle or constant distance
Coverage:	<=130°
Depth range:	20...11000 m
Depth resolution: 1	0...40 cm
Pulse lengths:	2 ms
	5 ms
	15

System	SL	NF1	PL@NF1	NF2	PL@NF2
Source level					
EM 120/122/124 2°	236	3.5 m	210	110 m	195
Pressure level					
EM 120/122/124 2°	236	3.5 m	210	110 m	195

Ice window attenuation: -5db +/- 2 db

16.4. Shallow water fan plumb bob (Kongsberg EM 712)

Location: Operator station in the plumbing control center

Technical data:

Operating frequency:	40 - 100 kHz
Beams:	1,600/ping (double swath)
Opening angle:	0,5 x 0,5°
Beam distance:	constant angle or constant distance
Cover: max.	140°
Depth range:	3.....3.600m
Pulse lengths:	0.2 - 2ms

Source level

System	SL	NF1	PL@NF1	NF2	PL@NF2
EM 710/712 0.5°	232	0.3 m	213	246 m	184

Pressure level

System	PL @1m	PL @10m	PL @100m	PL @1000m	R @180dB
EM 710/712 0.5°	208	198	185	142	183 m

Important note!
For the shallow water multibeam (EM712) in particular, the scientific community should ensure that regular measurements of the water sound profile are carried out at large aperture angles (> 2*50°) using the SVPlus probe. This ensures that no abrupt vertical offset of 0.5-1.5 m is produced in the bathymetry signals of the outer beams. In this respect, it is strongly recommended that such sound profiles be recorded daily if possible (in brackish water areas and with strong currents, even several times a day).

16.5. Vertical plumb bob (Kongsberg EA640)

Location: Operator station in the plumbing control center

Technical data:

Operating frequencies:	12kHz
Pulse lengths:	16ms
Opening angle:	12/16/60°
Max. Transmission power:	2000W
Maximum depth:	10000m

16.6. Navigation slot (Kongsberg EN250)

Location: Bridge

Technical data:

Frequencies:	50kHz
Depth range:	10...800m

16.7. Flow profiler / ADCP (Acoustic Doppler Current Profiler) Location:

Lottechnical headquarters

Technical data:

Manufacturer: Teledyne RD Instruments	
Operating frequency:	77 kHz & 38.5 kHz
Maximum depth for bottom track:	750 m & 1500 m
Speed range: max.	22 kn
Ping rate:	0.7 Hz

The transducer of the ADCP 38 kHz is mounted on a measuring basket for the moonpool and must be inserted and locked before commissioning (in consultation with the bridge, insertion is carried out by the deck crew).

The transducer of the ADCP 75 kHz is permanently hull mounted.
The transducer of the ADCP 75 kHz was subsequently rotated by 47 degrees clockwise when viewed from above.

This must be taken into account in the configuration file.
The transducer of the ADCP 38 kHz has not been rotated and is installed in the direction of travel.

16.8. AML-3 and AML PlusX (sound profile probe)

Location: Hangar (operator station: data center)

Technical data:

Manufacturer: Applied Microsystems Ltd.	
Maximum depth:	6000m or 5000m
Temperature range: -	2...+32°C
Speed of sound:	1400...1570 m/s
Weight in air:	9.1 kg
Weight in water:	3.5 kg

16.9. Sippican system (for underway measurements):

Location: Pulser station, aft deck

Technical data:

Manufacturer:	Lookhead Martin
Maximum depth:	Depending on probe up to max. 2000 m
Possible probes:	XSV, XBT, XCTD, XBP ATTENTION:
only XSV available on board	

16.10. SV probe C-Keel (fixed sonic probe on the keel)

Location: Hangar (narrow rope shaft)

Technical data:

Manufacturer:	Applied Microsystems Ltd.
Temperature range:	-2...32°C
Speed of sound:	1400...1550 m/s

16.11. Wärtsilä SAM 4682 (Doppler log)

Location: Bridge

Technical data:

Operating frequency:	270kHz
Transmitting power:	50 W
Depth range:	Ground reference: 1-150m

16.12. Sonardyne (USBL underwater positioning system)

In October / November 2017, a Sonardyne ***"7950 Through-Hull Transceiver"*** hydraulic extension unit equipped with a ***"Ranger 2 GyroUSBL 7000 Transceiver"*** was installed in the port moonpool in the hangar.

When retracted, the Ranger 2 is accessible for maintenance and replacement purposes in the moonpool via a so-called sea box with an upstream shut-off valve.

The system is operated remotely from the bridge by the officer on watch. However, there is also the option of on-site operation for maintenance purposes.

When extended, the speed of the vessel is limited to a maximum of 7 knots to prevent damage to the extension unit and the transceiver.

Location of the evaluation unit: Data center (rack 2) Technical

data:

Manufacturer:	Sonardyne
Transceiver frequency range:	19 - 34 kHz
Accuracy:	Range better than 15mm Heading 0.04 to 0.1° Pitch & Roll 0.01° Heave 5 cm or 5%
Transceiver range:	up to 7,000 m
Accessories:	9 Wideband Mini Transponder (see above)
Export formats:	NMEA telegrams $PSONALL, $PSONLLD, $PTSAG (converted) ASCII (.dat-file)
Application examples:	OFOS / TV gripper Position CTD rosette, MOCNESS net JAGO submersible and ROV / AUV lander

Sonar head in the sea chest

Deployment unit

17. Data management system (DavisShip Version 3)

17.1. Overview

The DSHIP (data collection, distribution and storage system; short form DSHIP') from Werum Software & Systems AG acts as a central database system for recording data from numerous scientific sensors. Meteorological and ship-specific data such as position, heading, roll angle, pitch angle, stroke, air and water temperature, wind direction and speed, course, speed over ground and through the water, etc. are also recorded. The system was successfully upgraded to version 3 during the shipyard layover in April 2017.

In total, the data from around 250 individual sensors is displayed and stored. Database extracts are possible via the web interface (homepage 'merian.del DSHIP server) from every ship's APC and from computers brought on board.
The hardware consists of terminal servers distributed throughout the ship, which usually receive the sensor data via serial interfaces and forward it to the two DSHIP servers via the network. The DSHIP servers are installed in the server racks in the control center.
The DSHIP system also provides various other services. These include the sending of NMEA telegrams (also to scientific measuring systems), the provision of an action log to record the processes on stations and the "DSHIP WEB" (called DVS = data distribution system on FS 'Sonne' and 'Meteor') for displaying any selected compilation of sensor data on each ship's APC and all computers connected to the network (display is also possible on smartphones and tablets via WLAN).
The DSHIP WEB contains an extensive ***map viewer*** for viewing the track traveled and the next waypoints. In the map viewer it is also possible to display the position of deployed Sonardyne transponders on the map, as well as a large number of measurement parameters such as air or water temperature along the track.

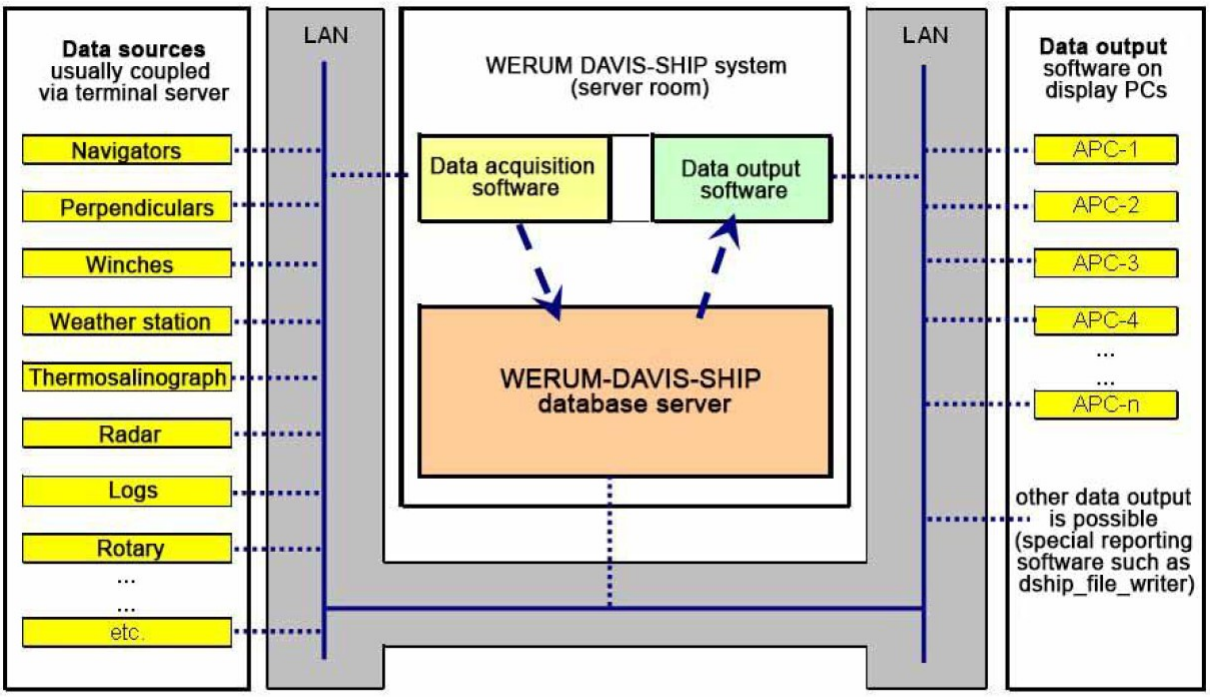


Figure 1: Basic design of the data management system on FS "Maria Sybilla Merian"

17.2. DSHIP WEB

DSHIP WEB is used to display the current values of all sensors on a wide variety of end devices. All you need to use DSHIP Web is a device with a web browser. This means that the DSHIP WEB can be used from the ship's own computers as well as from devices brought on board, such as computers, laptops, smartphones or tablets.
The prerequisite is a connection to the ship's network, either by cable or WLAN.

The DSHIP WEB can be displayed by accessing the address http://dship1:8080/dship-web/. After the call, a user name and password are requested. The user name is **wiss** with the password **12345**.

Within DSHIP WEB, "pages" can be opened or created to display sensor data. Several pages can be combined in a "workspace". Several "displays" of the types Alphanumeric Displays, Action Log Activities, Action Log Events, Bar Graph, Compass, Direction-Thrust, XT-Graph and XY-Graph can be combined as required on one page.

Extensively configured pages are available ('Default Displays' and 'Default Pages'). These can be customized at any time and saved under your own name so that they can be accessed from another device or at a later date. Individual displays, pages and workspaces ('User Displays', 'User Pages', 'User Workspaces') can be saved. After logging in via the above link, an empty workspace is displayed. On board there is a link on the intranet page (homepage) that links directly to the Overview page. Other pages can also be opened from there.

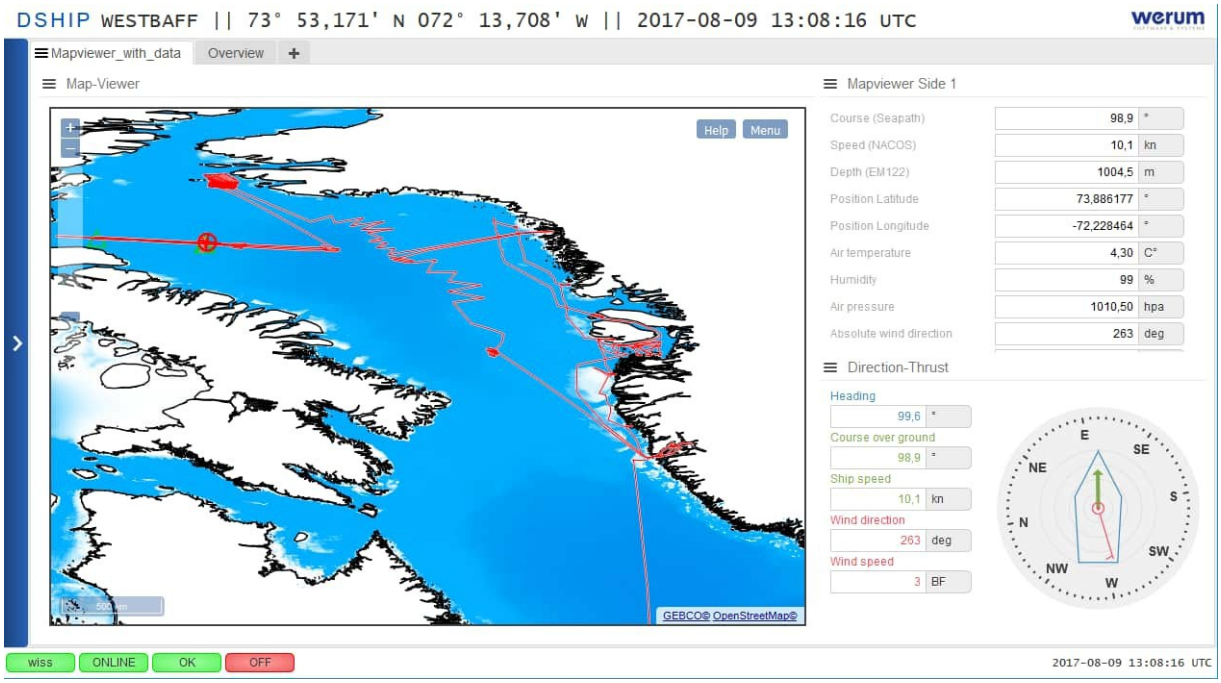


Illustration: Shows the predefined page "Mapviewer_with_data". This page contains a display of the type Map Viewer, Alphanumeric and Direction Thrust.

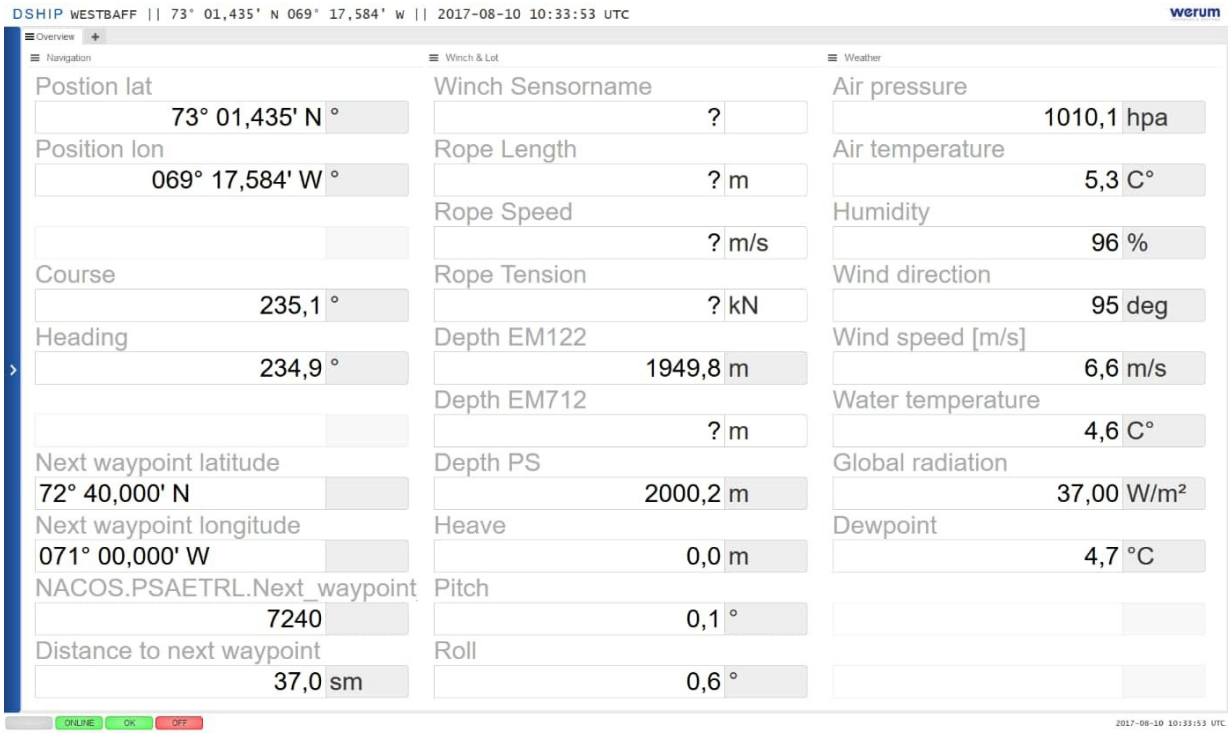


Illustration: Shows the predefined "Overview" page.
This page contains 3 displays of type Alphanumeric.

If a device is not currently supplying any data (e.g. because it has been switched off), a question mark is shown in the corresponding display fields (see above in the illustration, e.g. 'Depth EM712', as this device is not running).

17.3. Main menu

The DSHIP WEB main menu is hidden behind the blue bar on the left-hand side of the window. Click on it to open it.

From the main menu, a user can log out and log in, change the display language from German to English, create a new workspace, open a workspace, switch to DSHIP Extraction or open the user manual.

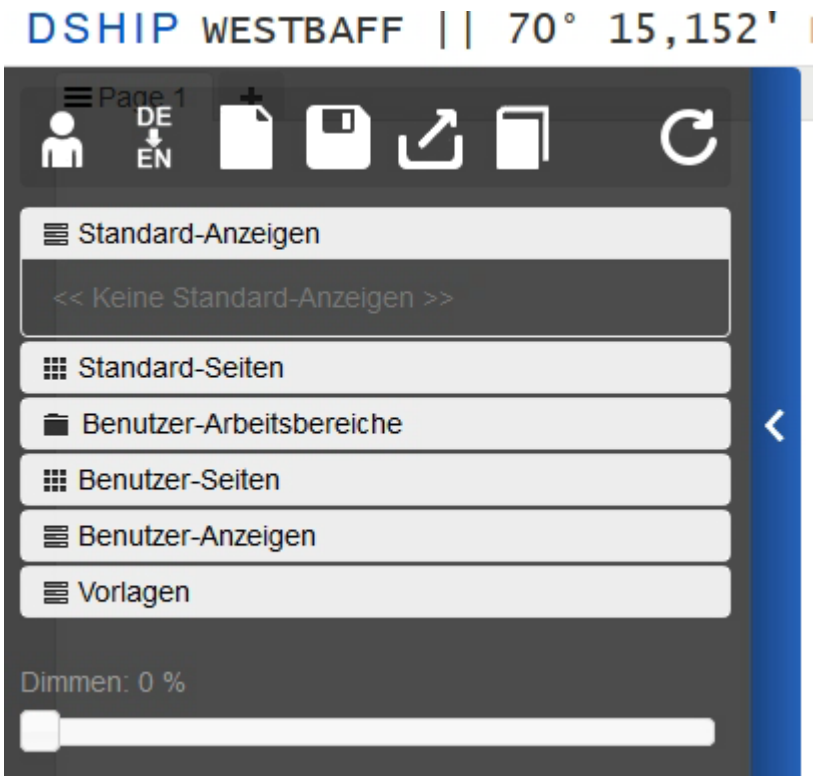


Illustration: Shows the DSHIP WEB menu

The "Standard ads" and "Standard pages" sections contain the ads and pages provided by Bord.

Self-created or customized workspaces, pages or displays can be found in the corresponding areas "User workspaces", "User pages" and "User displays".

The "Templates" area contains empty displays for compiling an entire page.

The display can be darkened using the slide bar at the bottom.

17.4. Pages or "windows"

A ***page*** is an area that takes up the entire browser window and can be filled with displays.

Click on the "+" button at the top to create a new, empty page.

Illustration: At the end of the tab row of open pages, an additional, empty page can be created using the + button.

To open an existing page, the menu must be expanded by clicking on the blue bar on the left-hand side of the window. The "User pages" section contains the pages that were created and saved with the user wiss. The "Standard pages" section contains the pages provided by the ship.

To give a new page a name or to change the name of an existing page, click on the 3 bars next to the page title to open the page menu.

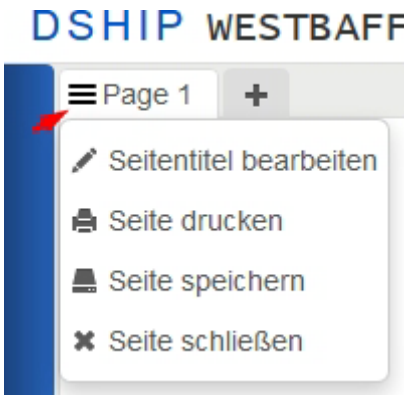


Illustration: Each page has its own menu

Entries in the side menu

Menu item	Function
Edit page title	Changing the page title
Print page	Print the page
Save page	Save the page under "User pages", any existing pages with the same title will be overwritten.
Close page	Closes the page, if necessary existing changes are discarded if they have not been saved.

17.5. Display

Displays show the sensor values or provide a graph.

Ads that can be inserted into an empty page or into an area of a page that is still empty can be found in the main menu in the "Templates" area.
Clicking on an advertisement inserts it into the page.

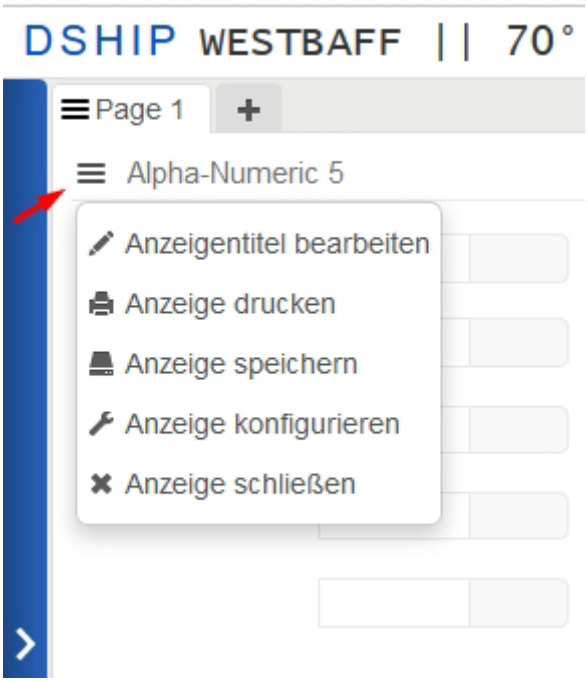


Illustration: Each display has a menu

Display menu entries

Menu item	Function
Edit a title	Changing the title
Print page	Printing the display
Save display	Save the display under "User display", any existing displays with the same title will be overwritten.
Configure display	Allows you to edit the sensors shown in the display.
Close ad	Closes the display, if applicable existing changes are discarded if they have not been saved.

Clicking on "Configure displays" in the display menu switches the displays to configuration mode. In configuration mode, a wrench is displayed behind each widget.

Clicking on "Configure displays" in the display menu switches the displays to configuration mode. In configuration mode, a wrench is displayed behind each widget.

Figure: A widget shows the depth. The display is in configuration mode

The sensor value displayed in the widget can be selected by clicking on the wrench.

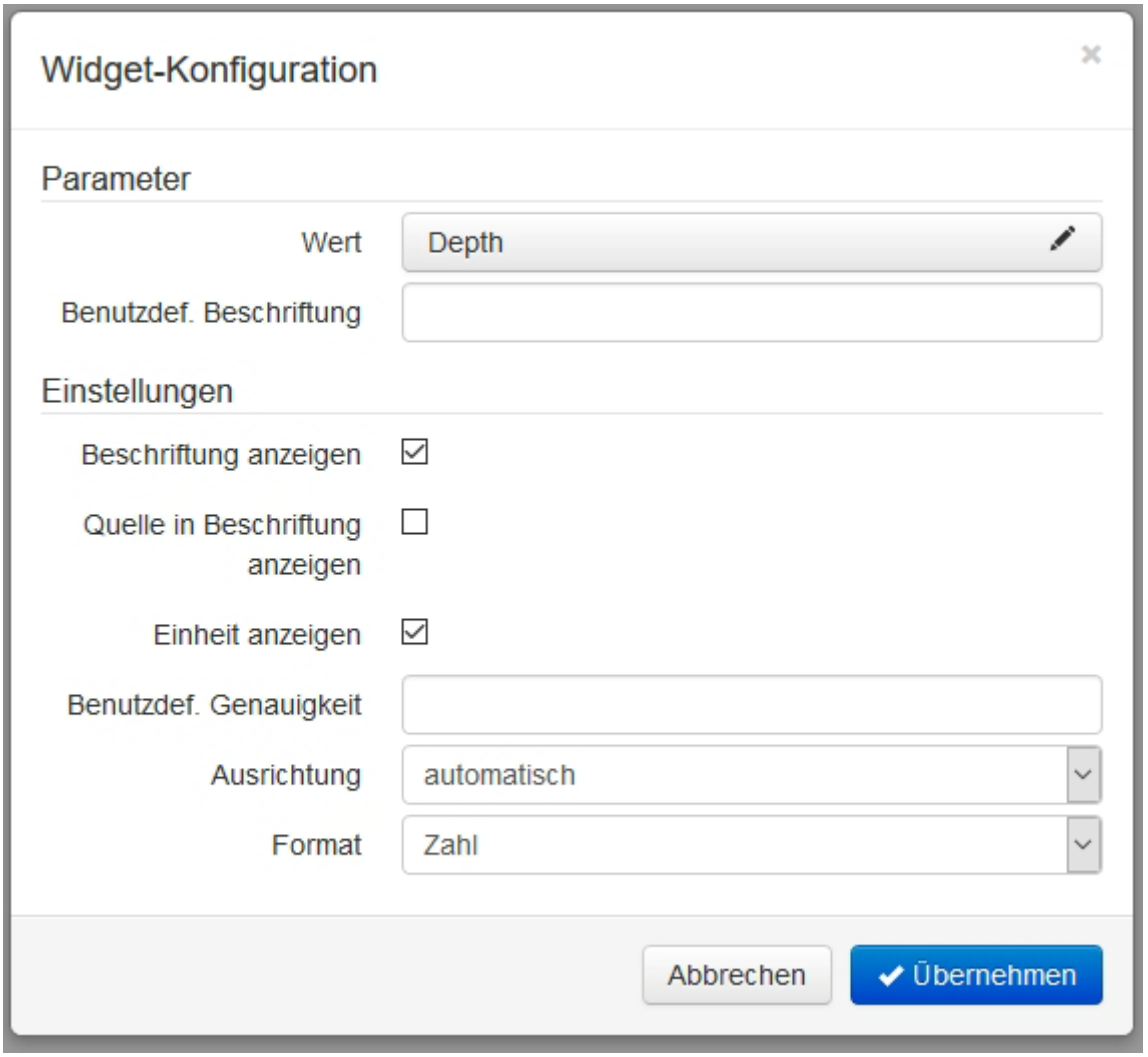


Illustration: The "Widget configuration" allows you to select the sensor value to be displayed

In the upper "Parameter" area, click on "Value" to select the sensor and any subordinate value.
A sensor value selected under "Value" has the appropriate settings for the lower "Settings" area, but they can still be adjusted.

Option	Function
Value	Clicking on the field opens the "Select parameter" dialog for selecting a sensor value
User-defined labeling	Overwrites the name of the sensor value with any text.
Show labeling	If active, the name of the sensor value is displayed.
Source in Show label	Displays the active source for sensor values with multiple sources.
User def. accuracy	Overwrites the number of decimal places stored in the sensor value.
Alignment	Specifies what the sensor value is aligned with.

The "Select parameters" dialog offers 4 view options to make it easier t o find sensor values.

1. according to devices in the list view
2. according to devices in the list view
3. according to short names in the tree view
4. according to short names in the tree view

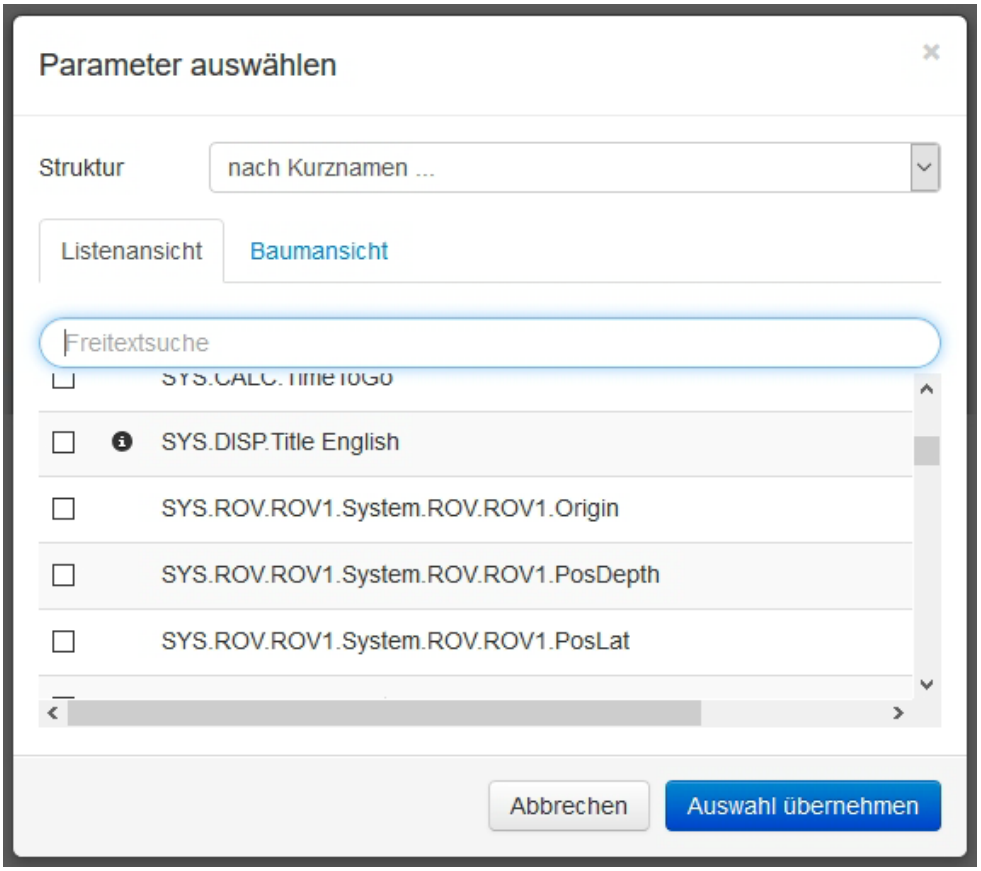


Illustration: The "Select parameter" dialog in the by short name ... in the list view

By using the "Free text search" field, the search can be significantly simplified. Some values are equipped with an info icon, which provides information on the possible states of the value.

The following devices and systems (sensors) are available:

Device name	System name	Description
DGPS1	DGPS1	GPS system DEBEG 4428
DGPS2	DGPS2	GPS system DEBEG 4100
Doppler Log	DoLog	Doppler Log
EA600	EA600	3-frequency single-beam echo sounder
EM-Log	EM-Log	EM Log DEBEG 4675
EM 712/124	EM-Sounder	Shallow water/deep sea multibeam echo sounders
Fluorometer	Fluoro	Fluorometer
GPS-EPIRB	Epirb	Emergency buoy
Global radiation	GR	Global radiation meter
Gyro	Gyro	Gyro compass (FOG)
Inmarsat	SatCom	Satellite communication
Trimbel 855	Trimbel	DGPS measuring system
NACOS	NACOS	Navigation communication system
Nav-Lot	Nav-Lot	Navigation echo sounder
Parasound	PS	Parametric sediment echo sounder

Device name	System name	Description
Rainmeter	Rain	Rain meter
SV&T C-Keel	Ckeel	Water sound probe
SV&T C-Mean	Cmean	Mean water sound speed
Seapath 380	DGPS/	Attitude system (Roll, pitch, heave)
Reinseewasser	RSWS	Surface water measurements (Thermosalinograph)
Wamos	Wamos	Wave height measuring system
Weatherstation	Weather	DWD weather station
Wempe	Wempe	Central clock system
Winch	Winch	Research winches

Only one value can be selected for each widget and accepted with the "Apply selection" button.

17.6. Work areas

A workspace consists of several pages and is useful if the same pages are used regularly.

To start a new workspace without any pages or to save a compiled workspace, the main menu on the left-hand side of the window is required.

Illustration: The menu items required to create and save a workspace.

The left-hand symbol in the red rectangle creates a new workspace and the diskette symbol saves the current workspace under "User workspaces".

17.7. Network

The network contains three separate networks in accordance with the building regulations.

In addition, further networks were created for servers and the WLAN. This requirement is met by logically separate networks with intermediate switches. These switches also handle the routing of the network packets.

A star-shaped network is used to implement the network requirements. The server, switches, patch panel and UPS are installed in a 19" cabinet in the Hydroacoustic data center/ EDP center. This is where all network connections come together.

All network cables from the tank deck up to the main deck are brought together in the Hydroacoustic data center and laid on the patch panels there.

All network cables from the tween deck to the observation deck were brought together on the 1st superstructure deck in a space-saving sub-distribution board installed in the light distribution system.

The twin fiber optic cables laid to connect the network sockets with the sub-distribution board or the switches are duplicated so that the respective spare cable can be used in the event of damage.

All the active components are grouped together in the network cabinet in the hydroacoustic data center. The incoming fiber optic cables are laid in splice and distribution boxes and are routed from there to the respective switches via patch cables. The installed switches are layer 3 switches and allow network packets to be routed based on the IP address. This means that the required logical separation of the three networks and any other networks, such as navigation or bridges, can be achieved simply by configuring these switches, without the need for additional hardware.

The network speed on board is 1 Gbit/s.

A DNS/DHCP server is also used to operate the network on board the ship. To ensure the functionality of the network in the event of a power failure, all active components are supplied with power via a UPS. The UPS is designed for a holding time of approx. 20 minutes at full load. A total of 92 network sockets were installed. Parapet trunking switches were used, which provide a fiber optic uplink and 4 x RJ45 connections each. As these are active components, a 230 V power supply is available at the installation location of these trunking switches.

Wi-Fi is available in most areas of the vessel. The Wi-Fi is only inferior to the cable network in that the connection is sometimes slower (when copying large amounts of data).

17.8. Key data of the network:

Protocol:	TCP/IP Ethernet
Physical connections:	RJ45/WLAN (in large parts of the ship)

In order for computers to be connected to the network, they must fulfill a number of common criteria:

Operating systems:	Windows, Mac OS, Linux, Android, iOS, Free/BSD, ... If the operating system works on land in a "normal" network, it will also work for us.
Physical connection:	The device should have an RJ45 connection. Does it is strongly recommended that you bring a suitable adapter, e.g. to USB. Alternatively, WLAN can be used, but speed losses and spatial restrictions must be expected (applies to the transfer of large amounts of data).
Virus controller and updates:	The computer and laptops must have one virus scanner with up-to-date signatures. The Windows updates must be up to date.

The ship's own computers installed in the laboratories and work areas are equipped with extensive software:

Software:	Windows 10 Pro or Windows 7 Microsoft Office 2013 or 2016 Adobe Acrobat 7.0 Pro / X / Pro Google Chrome Mozilla Firefox Python Perl SBE Data Processing BB-Tools ADCP Processing Globalmapper 16 (network license) OpenCPN GMT Windows Media Player VLC Player IrfanView Notepad++ Links sur DSHIP WEB Display
Peripherals:	2 A4/A3 color laser printers/copiers/scanners 1 A0 color plotter 1 A4 color laser printer

17.9. Configured VLANs:

To separate sensitive data from certain network segments, the individual segments have been configured as VLANs. The "Server" VLAN can be accessed from all configured VLANs. However, direct communication between the other VLANs is not possible, which prevents unauthorized data access between different VLANs.

The 'Ship' VLAN (network 101) networks all the crew's systems.

The VLAN 'wiss' (network 103) contains all the ship's own APCs (DSHIP display clients) (e.g. in the wiss. Workroom, in the hangar, in the data center, in the deck laboratory, in the dry laboratory, in the chemistry laboratory, in the hydroacoustic data center and in the salinometer room). Furthermore, all connections for scientific computers brought on board are in this network.

The VLAN 'Devices/Sensors' (network 104) includes all computers and terminal servers that receive measurement data from the numerous sensors and forward it to the DSHIP system (e.g. the echo sounder operator stations and display clients as well as the measurement computer in the data center).

The 'Server' VLAN (network 100) contains the servers available to all users. Computers from all other VLANs can use data or services from servers in this VLAN. Accordingly, the printers in this VLAN can also be used from other VLANs (via DNS/DHCP server). Data is always exchanged via dedicated services; however, a direct connection between the other VLANs and the 'Server' VLAN is not possible.

17.10. Laptops and user PC

All network sockets on board are designed as 4-way sockets and can each be used locally as standard 10/100/1000 RJ45 plug-in connections for connecting computers. It should be noted that each of these 4-gang sockets allows the connected PCs to be integrated into only one of the 5 VLANs, meaning that the sockets are unalterably bound to one of the VLANs. In other words: The IP address of the PC must therefore be in the VLAN address range assigned to the socket!
24 port access switches are available at neuralgic points with high data volumes. The individual ports can be assigned to the networks as required by the system operator.

There is a DHCP server on board. It automatically assigns certain (unique) network addresses to connected PCs, which should be used wherever possible. If the PC to be connected (brought along) is set to DHCP, the computer automatically receives a corresponding IP address and also receives the important addresses of the gateway, the DNS server and the WINS server.

In any case, you then have access to the VLAN into which you have been "sorted" and to the "100" VLAN. However, the network browser (network environment) of a 'Windows' PC only lists computers that are in the same VLAN. If you want to establish a connection to a PC (or server) in the "100" VLAN, this is only possible by directly entering the UNC name (e.g. \\storage1\public_wiss). Once set up, this connection is then permanently available under the selected drive letter.

17.11. Data storage in the network

A 6TB share is available on the server for the central storage of scientific data (public_wiss). All scientific participants have full access here. The crew has read-only access.

The data is transferred to a backup system every 24 hours.

18. Navigation systems

18.1. Navigation and planning system

NACOS Platinum ECDIS (Manufacturer: Wärtsilä SAM Electronics)
Location: Bridge

Planning Station (APC-35) with Global Mapper 16 and WSAM route transfer application to the ECDIS in the plumbing control center

18.2. Global Positioning System (GPS)

A total of four GPS devices are available on the bridge:

GPS1: DGPS R5 Supreme (Manufacturer: SAAB)
GPS2: JRC-21 GPS Compass (Manufacturer: Japan Radio Co., Ltd) GPS3: Seapath 380 (Manufacturer: Kongsberg SeaTex AS)
GPS4: Trimble GPS SPS855 (Manufacturer: Trimble)

Accuracy: 1-5 m (depending on weather and current conditions)

18.3. Differential GPS (DGPS)

The Trimble SPS855 on the bridge receives correction data worldwide through the OmniSTAR system. The RTCM correction data is made available to the Seapath 380. On request, the correction data can also be distributed to GPS systems on board.
With appropriate receivers, the correction data enables a resolution of less than one decimeter.

18.4. GPS position sensor

see ***Seapath***; is integrated into this system; does not exist as a separate device on board MSM.

18.5. Seapath

Manufacturer	Kongsberg SeaTex AS	
Typ:	Seapath 380	
Function:	2 Einzel-Frequenz 12-Kanal GPS-Receiver für Position und Heading	
Accuracy:	Position:	2 nm/hr (free inertial, GNSS aided)
mit MGC-R3)	Roll, Pitch:	0.01°
	True Heading:	0.04°
	Heave:	0.02 m (delayed), 0.05 m (real time)
Measuring interval:	bis zu 200 Hz	

18.6. Electromagnetic speed measuring system (EM-Log)

Manufacturer:	SAM Electronics
Type:	DEBEG 4275 Electromagnetic Speed Log
Speed range:	-5 … +25 kn
Accuracy:	≤ 0.1 kn Speed ≤ 0.1 % distance traveled

18.7. Wärtsilä SAM 4682 (Doppler log)

Location: Bridge

Technical data:

Operating frequency:	270kHz
Transmitting power:	50 W
Depth range:	Ground reference: 1-150m
Accuracy:	1% of the speed or 0.1kn (whichever is greater)

18.8. Fiber optic compasses

1.5 Technical Data

Performance (under all conditions)

Heading	≦ 0.7° secant latitude*
Roll / pitch angle	≦ 0.5°
Rate of turn	≦ 0.4°/minute
x / y rate	≦ 0.4°/minute

*Secant latitude = $\frac{1}{\text{cosine latitude}}$

Range

Heading	0° to 360°
Roll & pitch	± 45° (±180° with reduced accuracy)
Rates (X,Y,Z)	± 90°/sec.

Settling Time

Static conditions	≦ 30 minutes
Sea conditions	≦ 45 minutes
Rate of turn	≦ 4 minutes

Environmental Conditions

In accordance with EN 60945
(IEC 945+A1)
Ambient temperature

Operation	-15°C to +55°C
Storage	-35°C to +70°C

Signal Outputs

NMEA heading output	12 analogue repeaters
NMEA 0183	2 all data
RS 422	2 all data
NMEA 0183 FAST	1HDG, ROT, ROLL, PITCH
RS 422 SUPER FAST	1 all data (bidirectional)
6 steps/degree	2 heading outputs (24 VDC/0.25 A each)
Analogue ±10 V	3 rate signals
Analogue 4 to 20 mA	1 rate signal
HDLC	1 all data (bidirectional)

Signal Inputs

Position	NMEA 0183 or RS 422
Speed	NMEA 0183 or RS 422 200 pulse/nm (max. 200 kts)
Second gyrocompass	NMEA 0183 or RS 422
Magnetic compass heading	NMEA 0183 or sine/cosine signal

Power Requirements

115/230 VAC 50Hz/60Hz and/or 24 VDC (18 V - 36 V). Includes automatic switchover to 24 V emergency power supply in accordance with GMDSS Rules for INMARSAT/SES Terminals.

18.9. Dynamic positioning

Manufacturer:	GE Power Conversion Rugby (UK)
Type:	Seastream DP1 Duplex
Interfaces:	Gyro compass (2 pcs.), VRU (MRU), GPS (all except GPS1), Doppler log, weather station (wind direction and speed)
Operator Station:	Two workstations and two portable joystick units (with 3 4 docking stations), bridge
Accuracy:	on station optimal approx. 0.2 m (depending on DGPS service as well as weather and current conditions)

19. Other scient. Equipment and facilities

19.1. CTD system

RV "Maria S. Merian" has a complete CTD system with crane water sampler as a backup for scientific systems.
Independently of this, the deck unit and control console can also be used by scientific groups for their own CTD systems.

The scientific users are responsible for the operation and quality control of the data recording.

Type: Seabird SBE911plus with SBE-32 crane water scoop, equipped with 24 OTE bottles, 10L (Niskin type)
Max. Operating depth: 6800 m (without PAR sensor, with fluorometer and nephelometer 6000 m) Sensors and devices in detail:

Type	Max depth	Dual/Single	Information on
2x SBE-11plus (Deckunit)	-	-	installed in the data center
2x SBE-9plus (Underwater Unit)	6800m	Single	0 to 10000 psia Pressure sensor
6x SBE-3plus (Temtemperature)	6800m	Dual	-5° to 35°C
6x SBE-4C (conductivity)	6800m	Dual	0 to 70 mS/cm
6x SBE-5T (pump)	6800m	Dual	-
6x SBE-43 (dissolved oxygen)	6800m	Dual	120% of the surface saturation
2x WETLabs ECO FLNTU(RT)D	6000m	Single	Fluorometer & nephelometer (turbidity)
1x Biospherical PAR light sensor	1000m	Single	on request (note max. depth!) Availability at coordination meeting clarify.
1x Biospherical PAR light sensor	2000m	Single	on request (note max. depth!) Clarify availability at coordination meeting.
2 x Benthos PSA-916		Single	Floor distance detector


The picture shows the MSM rosette in use.

19.1.1. CTD workstation for data acquisition and evaluation

A PC is available in the data center for station work with the CTD probe. This is equipped with the software *Seabird Seasave V7.22, Data-Processing V7.22* and *MS Office*. All CTD data can be made available to the scientific cruise participants via the ship's network. All CTD data can be made available to scientific cruise participants via the ship's network.

Among other things, the surface PAR sensor of the radiation measurement system (SMS) in the foremast is connected to the deck unit. This allows the CTD probe equipped with a PAR sensor to be used for PAR profiles (PAR: photosynthetically active radiation) by comparing the 'surface PAR sensor' as a reference for the surface radiation with the defrosting PAR sensor on the CTD rosette.

19.2. Freezers

Manufacturer: SANYO MDF-C8V Temperature

Range: down to -80°C Cooling compartment

Dimensions: 48 x 37 x 40cm

Locations:

1x dry lab and 1x deck lab (there in the corner between the exit to the hangar and the service corridor).

Manufacturer: National Lab - Thorbi Temperature

Range: down to -80°C Cooling compartment

Dimensions: 5x 60 x 48 x 24cm

Locations:

1x dry lab

19.3. Extension unit

Application: Hydraulic universal extension device for attaching hydroacoustic transducers (hydrophone) or similar. The replacement can be carried out on floating vessels, provided the diameter is <135 mm.

Manufacturer:	Hoppe Bordmesstechnik GmbH
Operation:	The bridge personnel are responsible for retraction/extension
Installation location:	Tank deck (behind the sounding device compartment)
Exit depth:	600 mm below lower edge of keel (total 1,340 mm)
Clear width of extension tube:	135 mm (sufficient for e.g. Oceano-Acoustic Module AM 121)
Maximum probe length:	250 mm

Maximum ship speed with the unit extended: **4 kn**

The extension unit is currently equipped with a hydrophone.

Image
"Asparagus" with hydrophone

19.3.1. Hydrophone (data)

1. A hydrophone is permanently installed on the retractable unit ("Spargel"):
   Transducer: Neptune Sonar T313 (13 kHz) with 4mm banana plug
2. Hydrophon mobile (IXSEA TT801):
   Transducer: PET 801P-30
   Connector (socket) : Souriau 85102E 14-12S 5044 (on TT801)
   Connector (plug): Souriau 85108E 14-12P 5044 (on PET801)

19.4. Isotope container (14C container)

Size: 20" laboratory container

Location: Laboratory container ***parking space 8/9***, 1st superstructure deck, aft (on the roof of the compressor building)

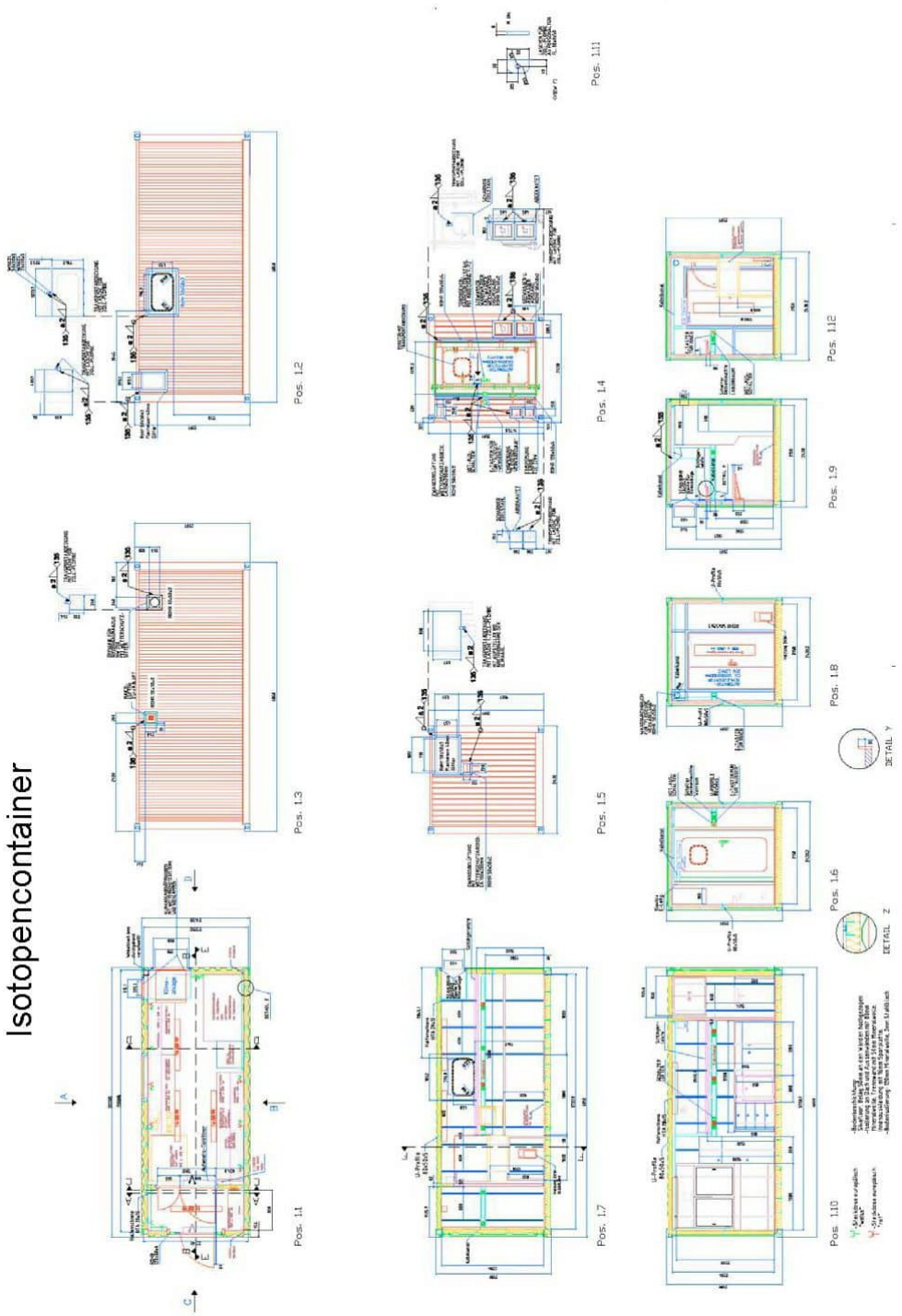
Application: Laboratory containers for handling radioactive materials and sources.

Safety: Since the beginning of 2021, two trained radiation protection officers from the group of scientists must be on board if the isotope laboratory container is to be used for scientific purposes. Their names must be included in the checklist before the voyage.
After completion of the work with radioactive substances and cleaning of the container, wipe tests MUST be carried out! A record of the wipe tests must be kept. A copy of this log (forms on board) is sent to the next safety officer (to be filed in the logbook for the isotope container), to the chief and to Mr. Rabsch (Leibniz Institute of Marine Sciences, Kiel). The next safety officer is required to check the wipe test values passed on to him by his predecessor when taking over the container, as otherwise he will be held responsible for any contamination.

As the current Radiation Protection Ordinance (SSV) prohibits all persons without certified radiation protection training from using the slightly radioactive ^{3}H and ^{14}C reference standards for LSC calibration, only the 'background' standard in the elevator pedestal may be used for monthly WTD maintenance as prescribed in the SSV.
Reference standards are no longer procured by the shipping company and must be brought on board by the scientific community if required. Their stock on board at the beginning of 2025 is as follows:

Test fluid - **H3 Hbz.** Approx. 12,5 years				Test fluid – **C14 Hbz.** Approx.. 12000 years			
Number	**Delivery date / test date**	**Expiry date**	**Quantity [ml]**	**Number**	**Delivery date / test date**	**Expiry date**	**Quantity [ml]**
1	2020-07-13	2025-07-13	15	1	2020-07-13	2025-07-13	15

If you have specific questions regarding container equipment/use, please contact the German Research Vessels Control Center.


Isotopencontainer
Pos. 1.1
Pos. 1.2
Pos. 1.3
Pos. 1.4
Pos. 1.5
Pos. 1.6
Pos. 1.7
Pos. 1.8
Pos. 1.9
Pos. 1.10
Pos. 1.11
Pos. 1.12
DETAIL Y
DETAIL Z

19.5. Hydrograph shaft / moonpool

Installation location:	Hangar
Quantity:	1 (one)
Clear width:	1,300 mm
Application:	Universally applicable measuring cage for the installation of sensors, mobile plumb bob systems, samplers (e.g. water pumps) and other scientific devices. devices. An adapter plate (see illustration of measuring basket), which is screwed under the measuring basket, serves as the device carrier.
Drive:	Electric hoist can be raised and lowered. The measuring basket is hydraulically locked in the lowest position.

Clear width in the measuring cage: 750 x 750 mm (diagonal to the ship's

Direction) Height of measuring cage: 325 mm

Hook height hoist above hangar floor: approx. 4.0 m Clear

Ceiling height hangar: 6.0 m

Height ship floor to hangar floor: 9.5 m

Universally applicable measuring cage for the installation of sensors, mobile echo sounders, samplers (e.g. water pumps) and other scientific devices. An adapter plate (see illustration of measuring basket), which is screwed under the measuring basket, serves as the device carrier.

Important information on the use of hydrographic moonpools:

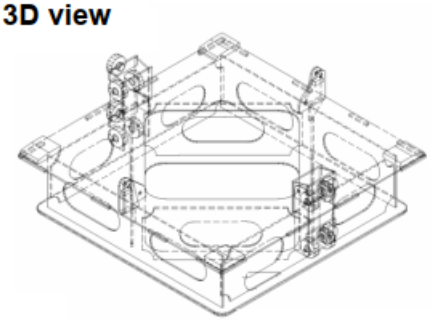
During the transit journey(s) to/from the research area, the moonpool must always be kept closed with the sealing cage provided for this purpose.

In the research area, vessels may travel at speeds of up to approx. 12.5 knots in normal weather conditions with the moonpool open.

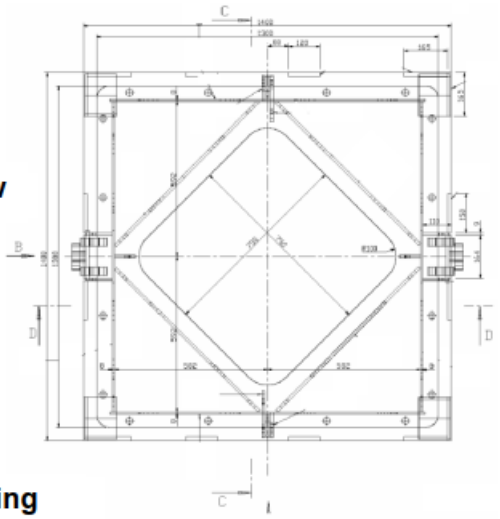
If the moonpool is not requested, it is occupied by the ADCP 38kHz. Simultaneous operation of the ADCP 38kHz with other devices in the measuring cage is not possible.

Measuring basket for hydrograph shaft

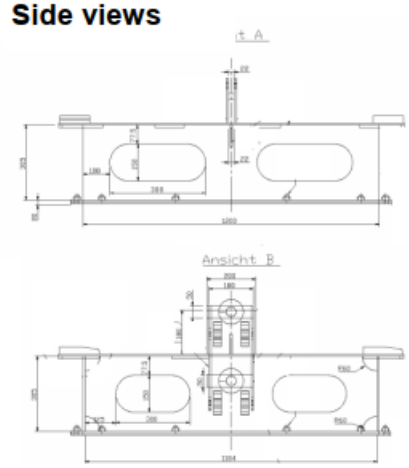
3D view



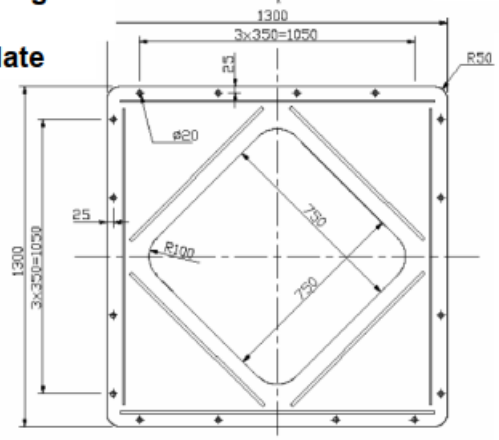
Top view



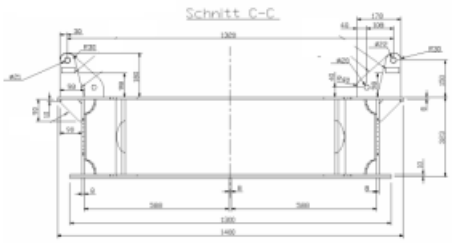
Side views

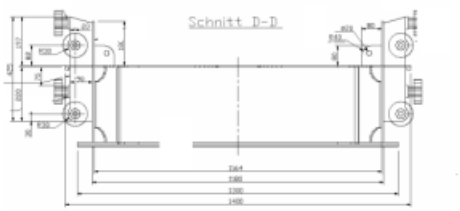


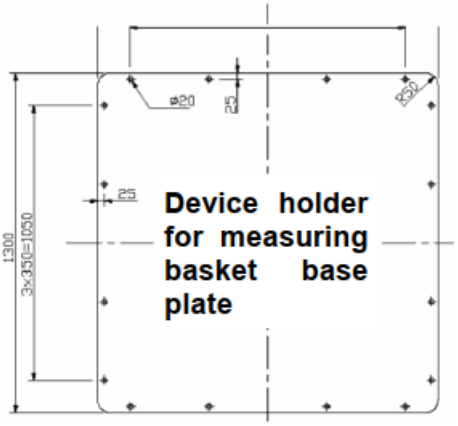
Measuring basket base plate



Sections







19.6. Core support frame

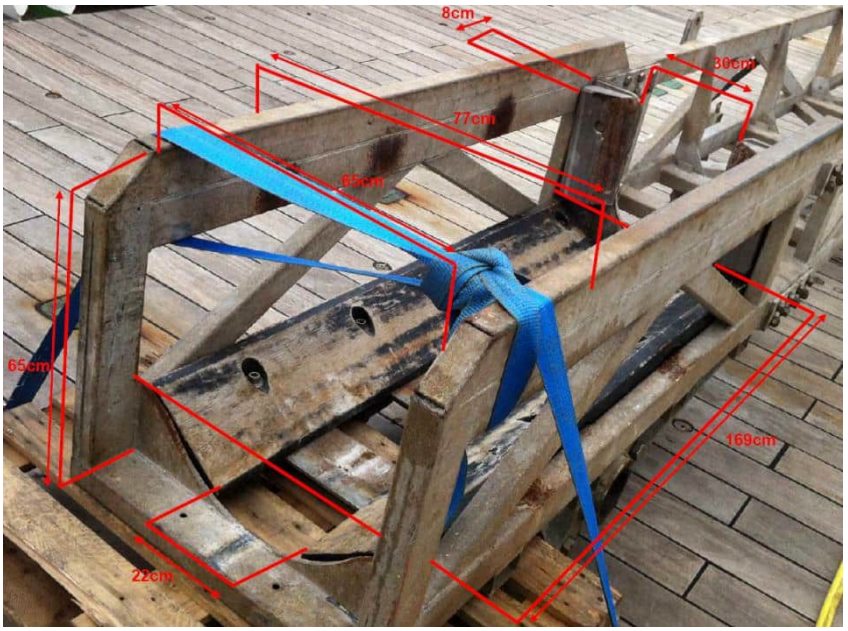
Usage:	Safe and simple bringing of different core unloading appliances with possible core lengths of up to approx. 24 metres on or off the ship.
Note:	The core stacking frame is only on board if requested and if it is not used it will be removed.
Manufacturer:	Hydrowerkstätten GmbH Kiel
Load capacity:	Load capacity of frame max. 6 t
Construction:	Steel square tube construction with hot-dip galvanised surface.
Constituents:	1 weights set holder
Dimensions:	L = 1,820 mm, W = 900 mm, H = 900 mm, weight 450 kg

4 core box / core pipe sensor frame, individual dimensions:
L = 5,700 mm, B = 800 mm, H = 750 mm), individual weight 550 kg

1 end frame with swing arm and wheels, dimensions:
L = 1,200 mm, B = 1,074 mm, H = 770 mm, weight: 250 kg

If the core sales rack is not required for a longer period of time, it is then stored in a 20' container for space reasons. The requirements of the core sales rack on board must therefore be announced in good time during the coordination meetings for the respective sailing blocks and in the Checklist_MSM.

Image
Weight set transducer with dimensions

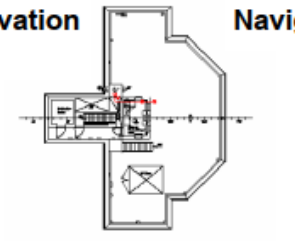


19.7. Flying cableways

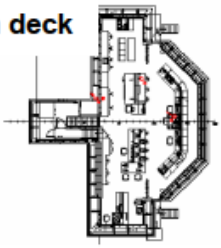
Usage:	"Flying Cableway" is the name for the facility for connecting all laboratories, scientifically used rooms (e.g. gas cylinder rooms) and decks (outer and inner) with each other using flying cables and/or hoses without leaving doors open, for example.
Clearance width:	200 x 150 mm with wall, bulkhead and deck breakthroughs
Gangway area:	100 x 50 mm (aluminium rails)
Deck area:	100 X 50 mm (hooks made from stainless round bars)
Closure:	Galvanised steel covers in some cases (walls, bulkhead, decks) All cushions made from non-flammable material
Comment:	An overview of the "flying cableways" of this ship is hung in the gangway area of the laboratories on the main deck.
Attention:	The openings must ALWAYS be closed with the non-flammable cushions for fire safety reasons, even if there are cables and hoses in the opening. All installed cables and hoses must be removed after each trip.

Flying cableways

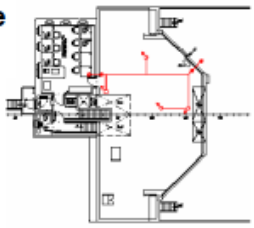
Observation deck



Navigation deck

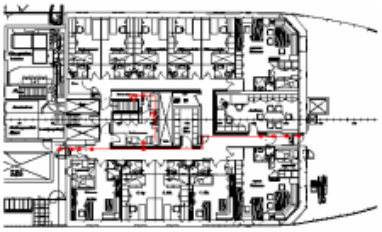


Superstructure deck



Attention: cableway entries in RED

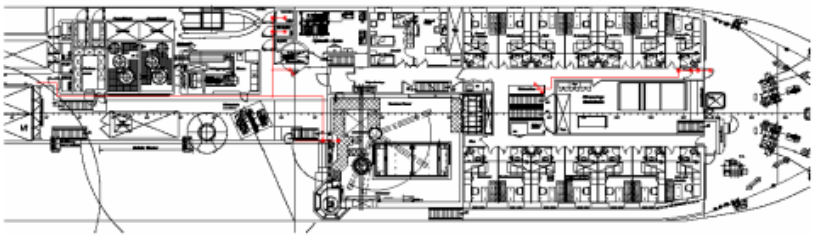
1st superstructure deck

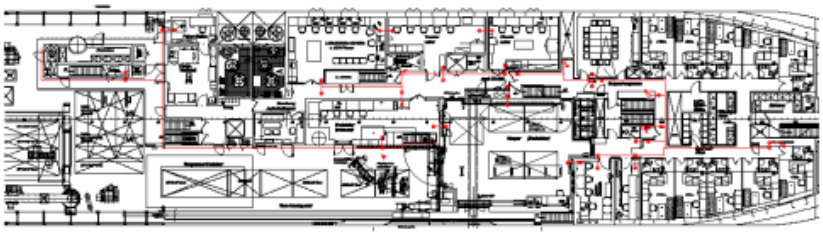


Because of the **"flying cableways"**, all laboratories, scientifically used rooms and decks (outer and inner) can be interconnected. The openings are 200 x 150 mm in size.

Key

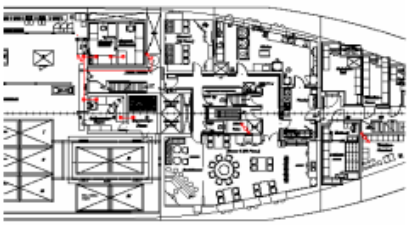
Forecastle deck



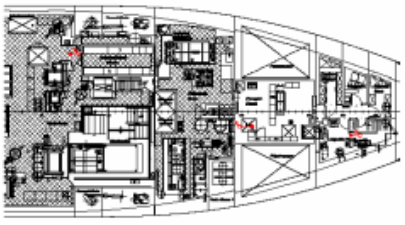


Main deck

Tween deck



Tank deck



19.8. Goods lift

Application:	The freight elevator connects the winch room (tank deck), the scientific stowage area (tween deck) and the aisle area of the laboratories to the hangar (main deck, frames 73-76). It can be operated with pallet trucks and Euro pallets, but is not high enough for a standard pallet cage. It is therefore essential that larger, higher or heavier items of equipment are moved to their intended location via the hangar hatch before departure. At sea, this is only permitted to a limited extent and with the captain's permission.
Load capacity:	500kg
Depth:	1,300mm
Height:	1,200mm
Width:	1,000mm

19.9. Laboratory dishwasher type:

Type: MIELE washer-disinfector G7883 CD

Location: Chemistry laboratory, to the left of the aqua purifier, towards the foredeck

19.10. Soft water and aquapurificator

The fresh water is produced by 2 ROCHEM reverse osmosis systems. Each system produces 15m³ of fresh water in 24 hours.
The fresh water produced (the pure water) is referred to as PERMEAT. This permeate has a conductivity of between 650 and 1000 µS/cm.

NO distillate is produced on the Merian.

The "untreated" permeate is also called soft water.
The soft water is automatically fed into a tank with a capacity of 250 liters. From this tank, the soft water reaches the laboratories via a pressure tank.

The following taps for soft water are available in the laboratory

area:	
Chemistry laboratory :	2 taps
Dry lab :	1 tap

An aquapurifier from Miele (Model G 7895) was also installed in the chemistry laboratory to create a tap for fully desalinated water. A Milli-Q (Model Reference) has also been installed. The system is fed by the Aquapurificator.

The soft water is desalinated here.

Please note that the disposable resins of the Aquapurifikator must be replaced after a maximum flow rate of 1000 liters. There are 4 packs of disposable resins in reserve on board.

If there is a greater need for disposable resins on a trip, it is advisable to bring them with you.

This is the following product.

Disposable resin E 315 (20 ltr.)
Item no. 69431501 D
Manufacturer : Miele

19.11. Aquapurificator (type):

MIELE Aqua Purifier G7895

Capacity at 1.8 mmol/l (=1°dH)
Total salt content: 25,000l to 20 micro S/cm conductivity Cartridge:
E318 for Miele disposable resins

Location: Chemistry lab, next to the sink, towards the foredeck

Usual water quality of the demineralized water from the Aqua-Purificator (not monitored, cannot be guaranteed):

Conductivity:	0-10 µS/cm
TOC:	3-5ppb

Silicate, nitrate, nitrite, ammonium, phosphate content: not detectable

Picture
aquapurificator

19.12. Milli-Q Reference system

Two Milli-Q systems are installed on the shelf above the laboratory sink in the chemistry laboratory.

Data of the plants:

Type: Milli-Q Reference and Milli-Q EQ 7000
Manufacturer: Millipore SAS, France

The water is treated with:

1. Q-Gard T2 Pack
2. UV lamp with 185nm and 254nm
3. Quantum high purification column TEX Cartridge
4. POD Pack Millipak Express 0.22µm

Quality of Milli-Q water:

The water extracted from a POD unit has the following characteristics:

- Resistance 18.2 MOhm.cm at 25°C
- TOC<= 5 ppb
- Particles >0.22µm**< 1 particle/mL
- Bacteria**< 0.1 CFU/mL
- Pyrogens*< 0.001 Eu/mL
- RNases*< 0.01 ng/mL
- DNases* < 4 pg/µL
- Flow rate** 0.05 - 2 L/min
- (*) With BioPak® ultrafiltration module (not available on board) (**) With Millipak® filter or BioPak ultrafiltration moduleThe ultrapure water can be drawn off manually or an exact preset quantity can be drawn off automatically.

Milli-Q Reference

Milli-Q EQ 7000

19.13. Ice crusher

Type:

MIGEL ice line KF75

Volume: approx. 20l; production rate unknown

Location: Drying lab, next to the sink, towards the foredeck

19.14. Ground point

A grounding point is mounted in the **deck laboratory** to the left of the double door to the outside on deck.

19.15. Liquid nitrogen generator

MSM has had a permanently installed nitrogen generator since 24.08.2009:

Type: StirLIN-1 MiniLIN
Manufacturer: Stirling Cryogenics & Refrigeration BV, Netherlands

Storage tank capacity: 200ltr
LN2 production: 5ltr/h

Installation location: Scientific storage room, intermediate deck between freight elevator and entrance to the scientific cold room

19.16. PureSeaWater system in the sounding device room

Preliminary remarks:

The clean sea water supply and measuring system on FS Maria S. Merian was completely renewed in 2010. The system originally installed in the sounding room during construction had shown numerous problems and inadequacies.
Above all, high-altitude intake points proved to be problematic (air ingress/ icing phenomena) and, due to the pipe routing and the difficult to control pressure conditions, there were repeated feedback phenomena between the laboratory supply system and the clean seawater measuring system for salinity, temperature, sonic velocity, chlorophyll fluorescence and turbidity.
Of course, retrofitting a permanently installed intake and pipe system has its limits, especially with regard to the available intake points.
However, the ship could be equipped with two additional suction points (deep 1 and deep 2) in the bottom area at a water depth of approx. 6.5 to 7 m, depending on the draught, which supplemented the unfavorable shallow suction points from approx. 2.3 to 2.6 m water depth in the forecastle and starboard. The high suction points have since been closed, as they were practically unusable.

The new pure seawater supply system was integrated with a new seawater measuring system to form a complex system in the sounding chamber.
Particular attention was paid to the extensive automation of all water supply lines and their flow paths, as well as to a largely redundant design, starting with redundant intake points and pipe routing through to the laboratory outlets and the flow measurement systems with redundant sensors. Innovative valve and venting systems ensure bubble-free water flows.
With regard to the water supply, you can choose between centrifugal and sinusoidal pumps for both the laboratory supplies and the flow measurement systems.
All manual or remote settings are made by the eingine personnel in consultation with the scientists. All current settings and changes are documented in the DSHIP system in a traceable manner.
The redundant approach with multiple paths and multiple sensors results in a wide range of operating options for the new pure seawater supply and measurement system. In particular, pure seawater can be fed into the laboratories and to the flow sensor groups via one supply line, while the other supply line is in an automated cleaning process. This enables, among other things, a regular, automatic changeover from a gradually contaminated supply line to a freshly cleaned one with certain transition times (currently one hour of parallel operation as on FS SONNE), so that the laboratories and measuring systems are supplied without interruption via automatically regenerating supply lines.

The currently active line remains unaffected by the cleaning processes in the passive line. The time regimes for the automated cleaning and switching processes can be set within wide limits (1h to 24h, currently 12h).

If automatic cleaning up to the respective passive aspirator (with compressed air) is undesirable, the laboratories and the measuring systems can also be operated separately via separate aspirators. However, this results in certain restrictions for the flow measuring systems. These only carry out certain internal intermediate cleanings and pipe cleanings up to the suction cup must be initiated manually, which is why this operating mode is only recommended for exceptional cases.

When the entire pure water supply system of the FS Maria S. Merian was overhauled in 2010, the entire clean water measuring system was also redesigned. It was integrated with the new seawater supply system to form a complex system in the sounding device room.

Depending on the operating mode, the new clean sea water measuring system supplies the following surface water measured values (from 6.5-7.0 m depth) to the DSHIP system almost continuously every second:

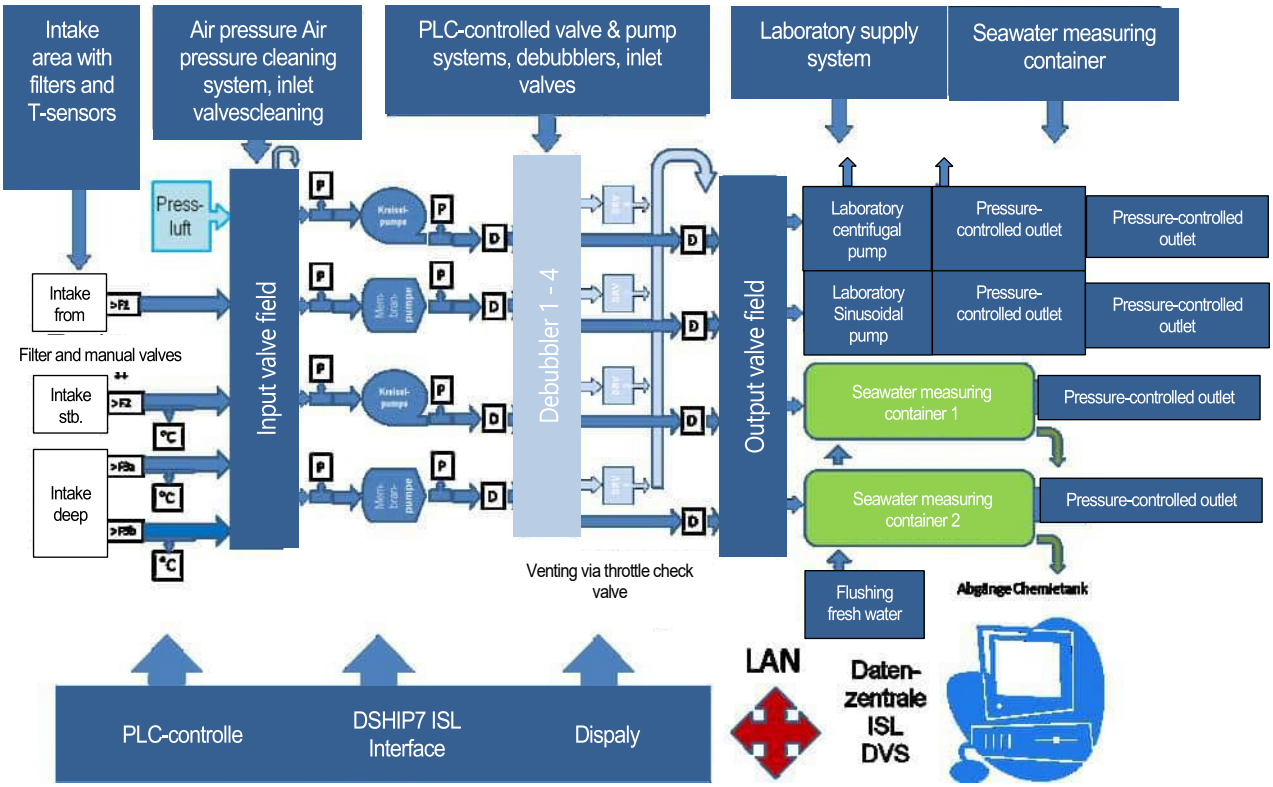
Inlet temperature suction cup low 1	(°C, SBE 38, valid flagged if low 1 active)
Suction inlet temperature low 2	(°C, SBE 38, valid flagged if Low 2 active)
Temperature internal	(°C, SBE 45 Thermosalinograph, device of current syst. valid flagged)
Conductivity internal	(S/m, SBE 45 Thermosalinograph, device of current syst. valid flagged)
Salinity	(PSU, SBE 45 thermosalinograph, device of the current syst. validly flagged)
Speed of sound internal, calculated	(m/s, SBE 45 from Ti, Si)
Internal sound velocity, measured	(m/s, smart SVT, control variable)
Sound velocity at the current aspirator, calculated	(m/s, SBE 45 from Ta, Si)
Chlorophyll A	(µg/l, FLNTUS, WetLabs with shutter and BioWiper)
Nephelometric Turbidity	(NTU, FLNTUS, WetLabs with shutter and BioWiper)

During the development of the new clean sea water measuring system, particular attention was paid to the greatest possible automation of all water supply lines and their flow paths, as well as to a largely redundant design, starting with redundant intake points and pipe guides through to double flow measuring systems in the form of exchangeable mini measuring containers with their own PLC control. With regard to the water supply, a choice can be made between centrifugal and sinusoidal pumps for the laboratory supplies. For the flow measurement systems a choice can be made between sentrifugal and diaphragm pump.

Characteristics of the CSW centrifugal pumps: Max. approx. 50ltr/min (3.2bar), approx. 90ltr/min (2.5bar)
Characteristics of the CSW sine pumps: Max. approx. xxltr/min (3.2bar), approx. xxltr/min (2.5bar)
Characteristics of the CSW diaphragm pumps: Max. approx. 20ltr/min (3.2bar), approx. 30ltr/min (2.5bar)
The entire system is controlled by a higher-level PLC, which in turn is linked to the ship's enigne control system and the DSHIP system.

All manual or remote settings are made by the engine personnel in consultation with the scientists. All measurement data is stored in the DSHIP database every second. All current settings and changes are comprehensibly documented in the DSHIP system. The real-time data and operating status can be displayed on any PC on the ship using special DSHIP templates.
The redundant approach with multiple supply lines and redundant flow measurement assemblies results in a wide range of operating options. Above all, clean seawater can be fed to a flow sensor group via one supply line, while the other line, including suction and mini measuring container, is in a fully automated cleaning process. This enables, among other things, a regular, automatic change from a gradually contaminated supply line to a freshly cleaned one, with certain transition times, resulting in almost seamless data acquisition via quasi-automatically regenerating water supply lines.
The currently active line remains unaffected by the cleaning processes in the passive line. The time regimes for the automated cleaning and switching processes can be set within wide limits (1h to 24h).
The following illustrations show the structure of the overall system and the recommended settings for the system in alternating operation via the two deep vacuum cleaners.

19.16.1. Block diagram:



The pure sea water supply and measuring system as of 09/2010: (FA Rochem, Development IOW-MT/Briese)

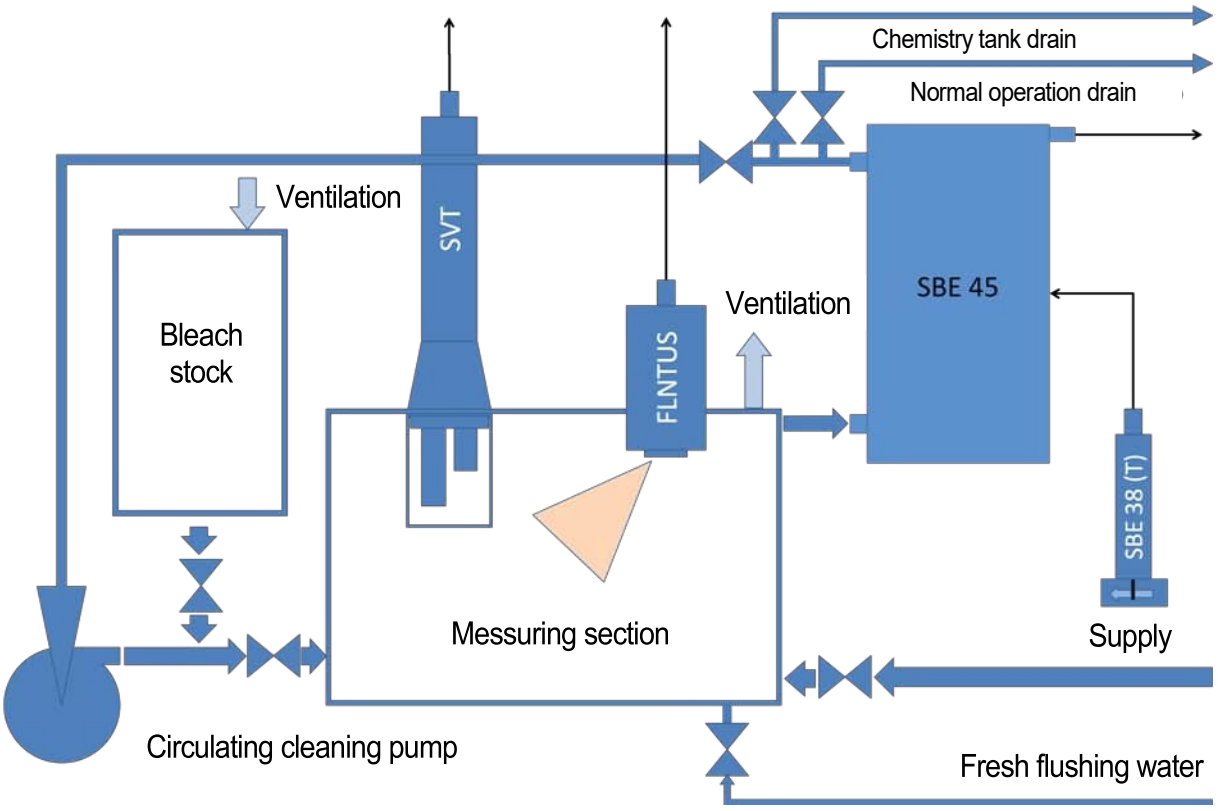
Recommended settings for the system in alternating operation via the two deep vacuum cleaners:

Recommendations for recruitment of MSM CSW (MC1/ 2- alternating operation			Low contamination		Medium algea contamination in the surface area		Medium contamination		Heavy contamination		Very heavy contamination	
Settings I SWMC		Modus	"24/8/8		"24/6/3		"12/4/1		"6/1/10min		"3/1/5min	
"01	**Operation until general cleaning**	Min.	1440	24h	1440	24h	720	12h	360	6h	180	3h
"21	**Time measuring mode until short cleaning**	Min.	480	8h	360	6h	240	4h	60	1h	60	1h
"22"	**Warmup for general cleaning**	Sec.	230		20		20		20		20	
"23	**Parallel operation when switching**	Sec.	400		400		400		400		400	
"24	**Measurement mode identification on DVS Delay**	Sec.	180		180		180		180		180	
"25	**Trigger time for FLNUT to DVS**	Min.	480	8h	180	3h	60	1h	10	10min	5	5min

19.16.2. Redundant seawater mini measuring containers

The central element of the actual flow measurement is the seawater measuring container, also known as a mini measuring container. They were designed as compact, interchangeable and independently functioning units. They are identical in construction, contain their own power supply, the entire measuring sensor system, a chlorine bleach purification system and a fresh water rinsing system. They can be controlled via a control panel or external control lines and carry out various operating modes, e.g. standby, general cleaning, short cleaning, flow measurement mode. They can therefore be operated separately for commissioning and maintenance or execute commands from the higher-level control system when integrated into the system. The integrated measuring sensors are equipped with their own intelligence and are programmed to output their data every second independently of the control system, provided they are supplied with power. For the bio- optical sensors (FLNTUS for Chl-a / NTU), an interval can also be preset after which the integrated copper shutter/BioWiper (wiper) is activated and mechanically cleans the optical windows. This interval is also specified in the main PLC and the DSHIP system triggers the measuring devices according to this specification.
A special feature of the DSHIP system is that it monitors the measured and calculated sound velocity of the flow water and issues alarm messages in the event of major deviations, thus providing quasi-automatic quality control.

Layout diagram



Only internationally proven, intelligent and programmable sensors with digital output were selected as the throughput measuring sensors for the mini measuring containers.

The following devices are used at the intake points and in the mini measurement containers:

19.17. Digital Oceanographic Thermometer SBE 38

With RS-232 interface

Sea-Bird Electronics, Inc.
13431 NE 20th Street
Bellevue, Washington 98005 USA

Measurement Range	-5 tot +35 °C
Initial Accuracy	+/- 0.001 °C
Typical Stability	0.001 °C in 6 month
Resolution	0.00025 °C
Calibration	-1 to +32 °C
Response Time	500 milliseconds

19.18. Flow temperature / conductivity / salinity, sound velocity (calculated) SBE 45

MicroTSG
(Thermosalinograph)
Conductivity and Temperature Monitor
with RS-232 Interface

Sea-Bird Electronics, Inc.
13431 NE 20th Street
Bellevue, Washington 98005 USA

Parameter	**Temperature (°C)**	**Conductivity (S/m)**	**Salinity PSU**
Measurement Range	-5 to +35	0 to 7	
Initial Accuracy	0.002	0.0003	0.005
Typical Stability (per month)	0.0002	0.0003	0.003
Resolution	0.0001	0.00001	0.0002

19.19. Sound velocity probe (control sensor)

AML Smart SV+T Xchange

AML Oceanographic Ltd.
2071 Malaview Avenue
Sidney, B.C. Canada V8L5X6

SV				
Range	Precision	Accuracy	Resolution	Response
1375 to 1625 m/s	+/- 0.006 m/s	+/-0.025 m/s	0.001 m/s	47 microseconds
T				
Range	Precision	Accuracy	Resolution	Response
-2 to +32 °C	+/- 0.003 °C	+/- 0.005 °C	0.001 °C	100 milliseconds

19.20. WETLabs Fluorometer / Nephelometer ECOView FLNTUS with BioWiper

With RS-232 interface

Sea-Bird Electronics, Inc.
13431 NE 20th Street
Bellevue, Washington 98005 USA

Sensitivity Chl-a	bis 0.015 ug/L
Turbidity sensitivity	bis 0,005 NTU
Data resolution	14 bit
Digital output (max.)	16380 counts
Analog output (max.)	5 V
Sampling rate	Up to 8 Hz

19.21. Test basin for glider preparation

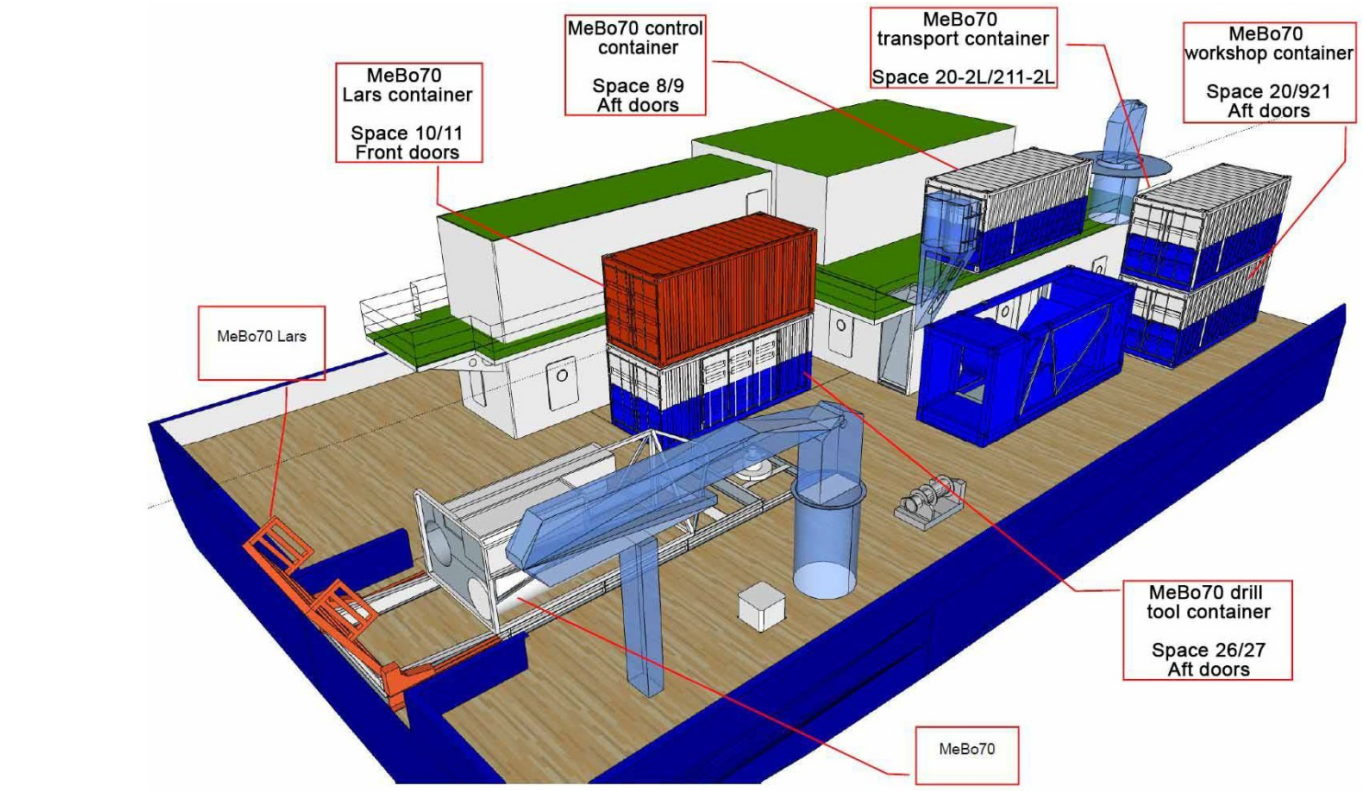
A removable water basin with the dimensions (6m x 2.5m x 1.5m or 3m x 2.5m x 1.5m) is available on board MSM for glider and float preparations.

The pool can be installed variably on the working deck (= main deck) using the so-called "deck socket grid".

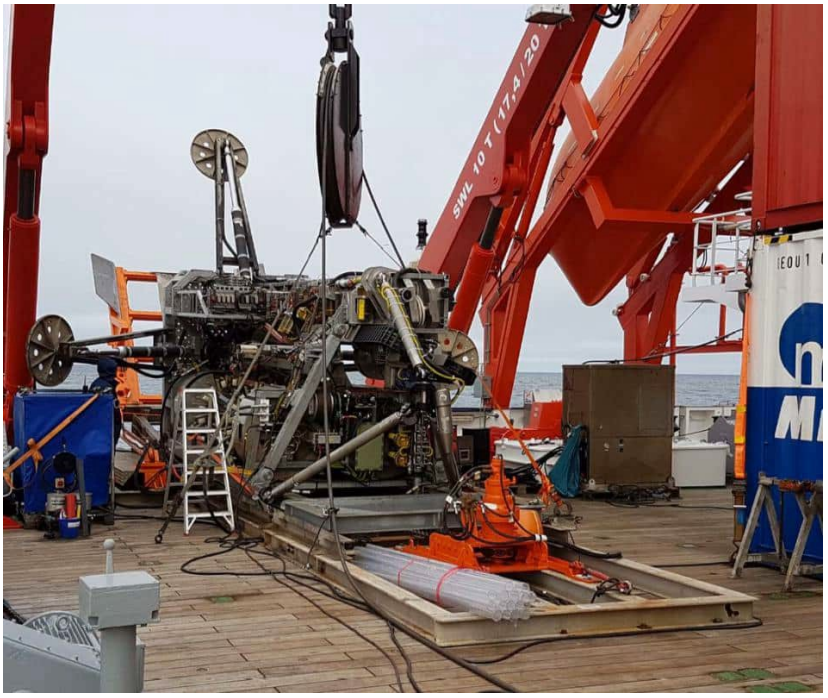
The need for this pool should be announced in good time via the "checklist".

20. Large and heavy devices

20.1. MeBo 70



20.1.1. Adapter frame with LARS and MeBO 70



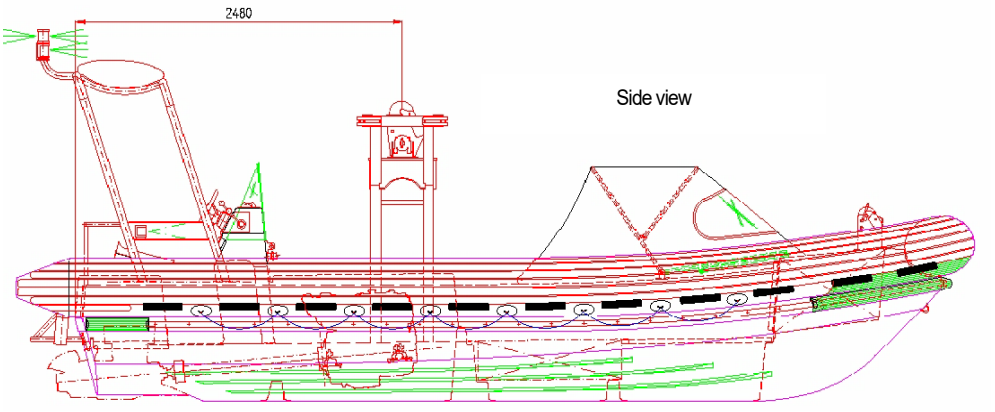
20.2. MeBo 200

in progress (please request from MARUM - Tim Freudenthal / Markus Bergenthal!)

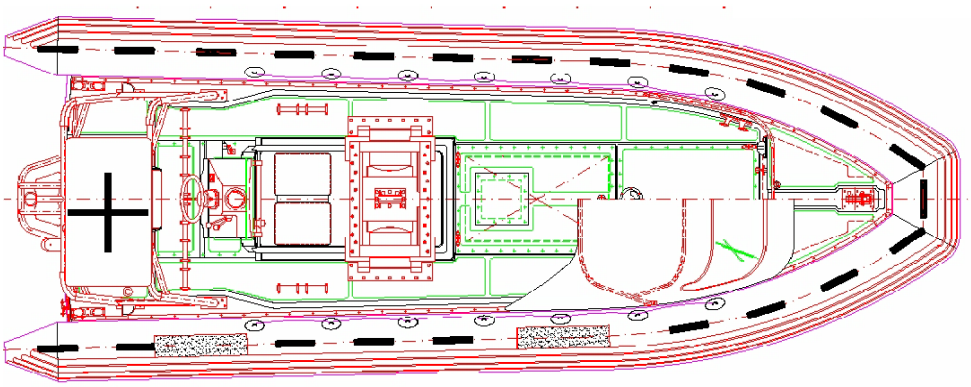
21. Boats for support of scientists

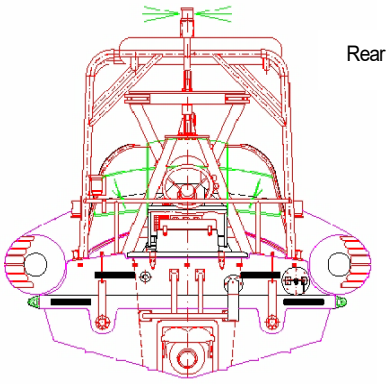
21.1. Fast rescue boat (fast rescue boat)

Fast Rescue Boat



Top View

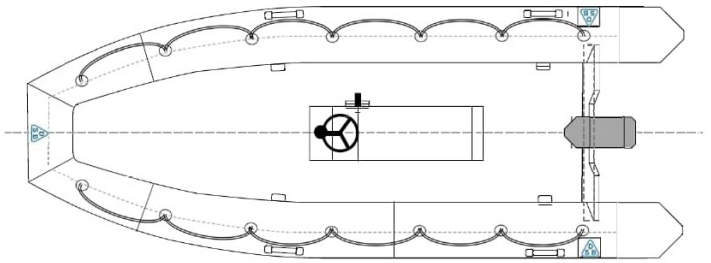


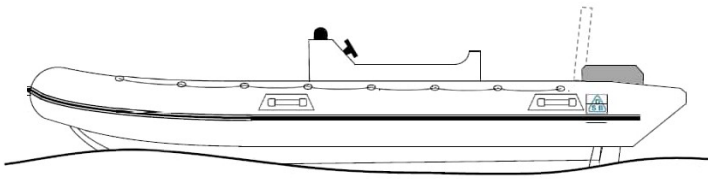


Dimensions	
Length over all:	7,25m
Breadth:	2,75
Draft:	0,4cm
Weight of the boat including equipment and fuel	2165kg

21.2. Work dinghy

There is also a DSB-6.5 SR inflatable boat on board to support science (e.g. deploying and retrieving gliders, etc.).





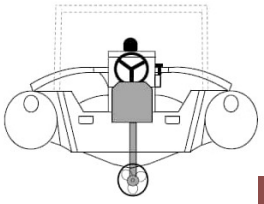


Image
Dinghy in stowed position

The dinghy is equipped with a 60 hp Yamaha 4-stroke outboard motor.
It is stored on the roof of the cabin extension behind the bridge on the port side and can be moved quickly and easily using auxiliary crane no. 2 (hangar roof).

22. Communication

22.1. Scientific intercom system

Application: The scientific intercom system is used for direct communication in a maximum of three independent speech circuits, one of which can be dialed at a time (broadcast system, everyone can listen in, addressee must be called). Speech is made using a hand-held microphone (also possible with a 25 m extension cable) or in hands-free mode. Handheld radios are therefore no longer necessary for station work (example: laboratory - winch control stand - bridge).

Connections can be made between two or more intercom stations by dialing the same circuit. The call stations are mounted at all user-relevant locations and installed on deck in water-protected boxes (see below).

Locations: All laboratory rooms (incl. hangar, data center, plumbing center/EDP room) Bridge
Captain's cabin
Chief scientist cabin
Winch control room
Scientific workroom
Conference room
Electronics workshop
Hydroacoustic data center / EDP center
Salinometer room Gravimeter room
Pulser station
Engine watch room (MWR)
Working deck
- aft Working deck -
amidships
Container connection boxes (5 pieces)
Scientific hold
Measuring and observation room

22.2. Telephone system

Deck	Room no.	Room designation	Telephone number
Observation deck	9902	Measuring and observation room	902
Bridge	8200	Bridge	111
Bridge	8200	Bridge radio console	112
Bridge	8200	Bridge PC station	114
2nd superstructure deck	7302	Scientific working room	702
2nd superstructure deck	7308	System operator	708
2nd superstructure deck	7310	Electronic engineer	710
1st superstructure deck	6200	Ship's office	600
1st superstructure deck	6202	Chief engineer	444
1st superstructure deck	6203	Captain's quarters	333
1st superstructure deck	6204	2 x scientists	604
1st superstructure deck	6205	Leading officer	555
1st superstructure deck	6208	2 x scientists	608
1st superstructure deck	6209	1st Officer	609
1st superstructure deck	6210	2 x scientists	610
1st superstructure deck	6211	2nd Officer	611
1st superstructure deck	6213	Converter room	613
1st superstructure deck	6214	2nd Engineer	614
1st superstructure deck	6215	Expedition leader	666
1st superstructure deck	6218	Electrician	618
1st superstructure deck	6300	Climate equipment room laboratories	622
1st superstructure deck	6301	Dockside connection	601
1st superstructure deck	6400	Ventilator room	621
Forecastle deck	5200	Living quarters air conditioning system	500
Forecastle deck	5201	Ship's mechanic	501
Forecastle deck	5203	Ship's mechanic	503
Forecastle deck	5204	Ship's mechanic	504
Forecastle deck	5205	Ship's mechanic	505
Forecastle deck	5206	Fitter	506
Forecastle deck	5207	Ship's mechanic	507
Forecastle deck	5209	Ship's mechanic	509
Forecastle deck	5210	Ship's mechanic	510
Forecastle deck	5211	Ship's mechanic	511
Forecastle deck	5212	3rd engineer	512
Forecastle deck	5213	Bosun	513
Forecastle deck	5214	1st Cook	514
Forecastle deck	5218	Steward(ess)	518
Forecastle deck	5220	Cook's mate	520
Forecastle deck	5301	Winch console	531
Forecastle deck	5302	Treatment room	999
Forecastle deck	5304	Hospital	534
Forecastle deck	5306	Hydraulic room	536
Forecastle deck	5308	Emergency equipment room	538
Forecastle deck	5309	Seismic compressor room	539
Main deck	4101	Leisure room	464

Main deck	4106	Sauna anteroom	465
Main deck	4201	1 x scientist	401
Main deck	4202	1 x scientist	402
Main deck	4205	1 x scientist	405
Main deck	4206	1 x scientist	406
Main deck	4207	2 x scientists	407
Main deck	4210	2 x scientists	410
Main deck	4211	2 x scientists	411
Main deck	4212	2 x scientists	412
Main deck	4214	2 x scientists	414
Main deck	4215	2 x scientists	415
Main deck	4216	Conference room	416
Main deck	4217	Electronics workshop	417
Main deck	4223	Server room	423
Main deck	4301	Hangar	431
Main deck	4302	Chemical laboratory	432
Main deck	4308	Dry laboratory	438
Main deck	4310	Deck laboratory	439
Main deck	4401	Crew lounge	441
Main deck	4404	Hydroacoustic / IT room	404
Main deck	4500	Deck workshop	450
Main deck	4502	Pulser station	452
Main deck	4503	Container connection 1	453
Main deck	4604	Container connection 2	454
Main deck	4604	Container connection 3	455
Main deck	4902	Bunker station	492
Tween deck	3207	Pantry	307
Tween deck	3208	Gally	308
Tween deck	3209	Mess 1	309
Tween deck	3213	Social room (bar)	313
Tween deck	3216	Mess 2	316
Tween deck	3306	Salinometer room	306
Tween deck	3308	Scientific refrigeration room	338
Tween deck	3310	Gravimeter room	310
Tween deck	3312	Scientific hold	312
Tween deck	3312	Container connection 4	314
Tween deck	3312	Container connection 5	318
Tween deck	3401	Switch panel room 1	341
Tween deck	3402	Machine watch room	222
Tween deck	3500	Machine room 2	350
Tween deck	3505	Switch panel room 2	355
Tween deck	3506	Machine workshop 1	356
Tween deck	3602	Electrician workshop	362
Tween deck	3605	Welding workshop	365
Tween deck	3607	POD room 1 (starboard)	367
Tween deck	3608	POD room 2 (port)	368
Tween deck	3609	Store room (starboard)	369
Tween deck	3612	Waste incineration & stores	363

Tank deck	2203	Echosounder equipment room	203
Tank deck	2204	Laundry	204
Tank deck	2205	Auxiliary engine room	205
Tank deck	2208	Pump jet room (TD - Equip.)	208
Tank deck	2208	Pump jet room (TD -Tanks)	209
Tank deck	2302	Winch switch panel room	232
Tank deck	2304	Winch room	234
Tank deck	2400	Machine room 1	240

22.3. Satellite communication and Internet access (VSAT, Starlink, Iridium)

Since April 2009, all passengers have been able to make phone calls, exchange emails, use search engines, surf the Internet, increasingly use 'social media', download music and films, etc. via the Internet.

This is made possible by a VSAT system with two Intellian antenna radomes of
180 cm in diameter, which use the KU frequency band with geostationary satellites above the equator and provide up to 7 Mb/s (download) and 3 Mb/s (upload) bandwidth depending on the connected satellite. The range (in northern latitude) has increased from initially up to approx. 70°N to approx. 80°N, meaning that the system has also been fully usable when traveling to Spitsbergen since around 2018. Thanks to a flat-rate contract with the provider MediaMobil (Bremen), VSAT use on board is free of charge.

Since around 2017, all passengers have been able to access the internet via VSAT from practically anywhere on board using LAN and/or WLAN, i.e. not only from the PC pool in the scientific workroom as before, but also from all living quarters, laboratories, hangar, storage room, work deck, observation deck and conference room. Since 2021, the latter can be used very well for all kinds of video conferences, online lectures/exams and telepresence events (e.g. in Bremen's 'Universum' or Kiel's 'Arena') with the help of the 76" TV monitor.

This applies all the more to general Internet access since a Starlink system with two antennas was installed on board in 2023, which allows bandwidths of over 200 Mb/s (download) and over 15 Mb/s (upload) to be used in parallel with the VSAT system (but only in a WLAN that is completely separate from the ship's network). As the total monthly volume is contractually limited to 1000 GB, all passengers are given vouchers with the individual usage volume at the start of their journey, which they can use to dial into the relevant WLAN. However, once this volume has been used up, you have to wait until the next billing month.

Voice-over-IP telephony is possible free of charge from every telephone on board with a VSAT flat rate to all networks worldwide (since 2021). However, only three calls can be made in parallel. Redundancy for telephony and email transfers is provided by an Iridium Certus satellite communication system, which can only be used from the bridge or via the ship's mail server. Instructions on how to use the systems are given to the scientists at the beginning of each voyage during the safety briefing and on the ship's homepage.

22.4. Ship-to-shore / shore-to-ship connections

Callsign: DBBT

Telephone numbers: +49 421 944 024 3911 (V-Sat)*
+88 167 712 0041 (Iridium Certus)*
+88 164 170 5396 (Iridium 2k)*
+49 171 697 5433 (GSM, cell phone) only in port

Notes: The numbers marked with an * can only be reached when the bridge is manned (i.e. continuously at sea - but only sporadically in port between 08:00 and 17:00).

Ship email: **merian@merian.briese-research.de**

E-mail: Each cruise participant (incl. captain and ship's crew) receives an individual e-mail address consisting of the first letter of the first name, a dot and the last name; e.g. Hein Mück receives the addresses:

h.mueck@merian.briese-research.de

The cruise leader also receives the official email account:

chiefscientist@merian.briese-research.de

Each participant should install their own password in their account.
E-mails can be sent and received (via POP3, IMAP e.g. with MS Outlook, Mozilla, Thunderbird) from any workstation PC (via webmailer from the homepage) as well as from private notebooks (e.g. from the cabins). The standard limit is 500 kB; (chiefscientist: 2 MB), but can be increased on request. The system operator is responsible for e-mail communication.
E-mails are exchanged continuously **every 10 minutes** during VSAT operation.

If the V-Sat system (and now also the Starlink system) **fails** and **north of approx. 80°N**, e-mail communication is only possible via Iridium-Certus (backup system). Due to the significantly lower data rate (max. 512 kbit/s) and the associated high transmission times and **costs**, the limit for all users is restricted to 50 kB.
In this case, it is necessary to inform the chi9ef scientist or system operator before sending larger e-mails (50 kB or more in volume), not least because of the costs incurred. The costs for business emails remain free.
The switchover of the V-Sat system to the Iridium-Certus backup system will be announced by the SysOp.

22.5. Phone calls when an Internet connection is available:

In the coverage area of the KU band via V-Sat (i.e. as long as there is Internet access from the ship's LAN), it is possible to make private telephone calls ashore very inexpensively from the cabin via the wall-mounted telephone set (or any other telephone set on board). Three telephone calls (Voice over IP) can be made simultaneously. If no line is free, you will receive the familiar *"busy"* signal.
The scientists receive instructions on how to use the telephone system currently installed on board during their briefing at the start of the trip. The instructions are also available on the intranet site and can therefore be viewed at any time.

It is **NOT** possible or desirable to make calls from the country to the individual telephones (time difference etc.).

22.6. Telephone calls when no Internet connection is possible or available:

In the meantime, an internet connection via KU band is possible in all cruising areas of the 'Maria S. Merian' and is therefore generally implemented. Since around 2022, however, experience has shown that most private phone calls made by persons on board are made from their own smartphone using a messenger app (e.g. WhatsApp, Signal, Threema). Video calls and Facetime are also easily possible via Starlink connection.

If both the VSAT and Starlink systems should fail, telephone calls via Iridium Certus are only possible from the bridge and must be registered with the captain. In exceptional cases, it is also possible to make calls via Certus in the chief scientists cabin by entering the code 929 and then the country code (e.g. +49 or 0049) plus the extension (status of March 2025).

22.7. Virus problem

With regard to optimal data supply and data processing in all areas on board, it must be ensured for the benefit of all cruise particpants that all data carriers brought on board for business or private purposes (servers, PCs, laptops, tablets, external hard disks, USB sticks, etc.) are virus-free.

Since it is not possible in terms of time and data protection law to check all the above-mentioned data carriers of all onsigners on board for viruses before the start of a research cruise, the duty of care in this respect lies with the persons concerned (onsigners) and the scientific cruise management. Chief scientist!

Proof of intent or gross negligence in this context may result in sanctions by the ship's command (e.g. confiscation of the relevant computers and data carriers, shutdown of network access in the living quarters), particularly in the event of severe impairment of the optimal data supply on board.

Since viruses, Trojans, etc. can quickly and uncontrollably settle via the ship's VLANs, especially on data carriers that are not permanently connected, and can become active again at a later date, all passengers are expected to check that all data carriers on board are virus-free using suitable, updated and effective virus scanning programs before the start of the voyage as part of their voluntary self- regulation.

If there are reasonable grounds for suspicion, the system operator has the option of carrying out spot checks in the presence of the owner of the computers and data carriers brought along and confiscating infected devices.

In the two sousand twenties, the risk of uncontrolled access to computers by third parties via the Internet using phishing emails and other fraudulent methods (e.g. identity theft through SIM swapping) has risen sharply. In this context, all scientists are expressly warned not to open any unknown emails and especially links or attached files during their time on board in order to prevent possible contamination of the on- board network.

22.8. PC workstations

There is a PC in every laboratory and every room used for scientific purposes except the refrigeration and freezing room, the measurement and observation room and the gravimeter room. There are 4 PCs in the scientific workroom.

The computers are connected to central file servers via the network, so data transfer with other computers (including those you bring with you) is no problem.

Network: Ethernet connection 1000 Mbit/sec, TCP/IP

Connection: External computers can be connected to the network in the laboratories and living rooms via the connections described in chapter 12. If possible, the required network cables and adapters should be brought along. Cat5e cables can also be borrowed on board. Furthermore, the ship's WLAN DBBT can be received well everywhere (but cannot usually be used on PCs).

Software: The permanently installed ship PCs have Windows 10 or 11 as the standard operating system. Other software can be installed temporarily after consultation with the system operator

The computers installed in the scientific workroom are also equipped with MS Office (Word, Excel, Power Point etc.), graphics software, Acrobat Reader etc.

Accessories: Color scanner, laser printer, plotter.

22.9. TV surveillance system (CCTV)

Description:

It is used to monitor all important working areas of the ship, especially the winches, the sliding beams and the working deck.
All outdoor cameras are equipped with a standard 0.05 lux sensitivity to improve light sensitivity in the dark.

The main mast camera, the working deck camera and the closed back camera are equipped with a zoom/focus lens and a pan/tilt head. The aft port side, both sliding beams and on the tank deck in the winch room, the single-line winch 2 and series winch (2 cameras can be optionally switched), both storage winches and the single-line winch 1 are monitored by a total of 10 permanently installed, wide-angle cameras. Both friction winches are additionally monitored by a camera with zoom/focus lens (adjustable on site, as required).

All cameras are combined in a microprocessor-controlled video router with integrated control panel, in the converter room on the 1st superstructure deck, and recorded in the long term on a network- compatible HDD recorder.

Each camera image, including possible remote control functions, can be selected as often as required by the operating sequence with each of the specified remote control panels and displayed together with the camera number and plain text installation location on the associated monitor/output.

The system is monitored in the front bridge console (port side), at the starboard control station, in the winch control station and in the crew's watch room and controlled via a panel.

Any two camera images can be preselected from the forward bridge control panel (output 07 & 08) for distribution via corresponding video connection sockets in the data center, chemistry lab, dry lab, deck lab, hangar and plumbing center/EDP room (via bridge cables from the dry lab) as well as via four container connections to lab containers. The required monitors are already installed on site.

22.10. ARGOS radio direction finder

Manufacturer: SERPE-

IESM Type: GONIO 400

Description: The device is used to locate and locate scientific devices equipped with an ARGOS transmitter.

The direction finding equipment consists of a receiver, an antenna with preamplifier and a reference PTT.

The antenna is mounted on the radar mast and can be easily removed.

The reference PTT (Platform Transmitter Terminal) must be installed according to the operating instructions during operation.

The direction finder has two tasks:

- Analysis of ARGOS PTT and Sarsat Epirb (Emergency Positioning Indicating Radio Beacon) data
- Bearings from ARGOS PTT and Sarsat Epirb transmissions.

Installation location: Bridge

Antenna position: Main mast, approx. 29 m

height Frequencies: 401.650 Mhz
406.025 MHz

Accuracy: ± 15°

Further details in the documentation IESM GONIO 400, ARGOS and SARSAT Direction Finder.

22.11. VHF - VHF direction finder Arcus-M

Description: The VHF marine radio direction finder ARCUS M is used in conjunction with an H- Adcock direction finding antenna installed on the foremast to display the direction of incidence of direction-finding transmitters in the VHF marine radio range and on the emergency frequency of civil aviation radio, 121.5 MHz.

The direction finder is also used on the ship to locate research equipment and for this reason has a different channel programming (Software Vers V1.4) These are the channels Ch30L, Ch31L, Ch32L and Ch33L.

Installation location: Bridge

Antenna position: front mast, mast top approx. 21.5 m height

Frequency: 156,025 - 158,000 MHz in 25 kHz raster
158.000 - 158.950 MHz in the 50 kHz raster
160.625 - 162.600 MHz in 25 kHz raster
162,600 - 163,550 MHz in the 50 kHz raster

Deviating from the above scheme, the following frequencies are programmed:

154.575 MHz instead of 157.500 MHz
159.475 MHz instead of 157.550 MHz
160.725 MHz instead of 157.600 MHz
160.775 MHz instead of 157.650 MHz

In addition, the emergency call frequency 121.500 MHz can also be homed in on

For the future, beacons that fall within the 25 kHz grid should be used

Miscellaneous:

Modulation types	F3E, A3E (121.5 MHz) Bearing angle display digital: 4-digit, 0.5° resolution quasi-analog, 10° resolution Scan operation via 10 channels possible

The transmitters must have the following data:

Transmission frequencies:	see above.
Transmission time:	2 seconds
Repetition rate:	15 seconds
Transmitting power:	100 mW
Modulation type:	NBFM
Modulation freq:	1 kHz
Frequency deviation:	5 kHz

Further details in the ARCUS M VHF marine radio direction finder documentation

23. Ship waste

23.1. Waste treatment

The ship has a certified *waste management plan (Garbage Management Plan)* which regulates the treatment of waste and must be adhered to by everyone. Notices on board provide information about the contents of the waste treatment plan.

23.2. Waste separation

There are separate bins throughout the ship for glass, tin/cans, cardboard/paper, plastics, oily waste and residual waste. As cardboard and paper can be treated in the on-board shredding and briquetting system (compliance with the 'Blue Angel' criterion), cardboard and paper should be separated as completely as possible in order to keep the remaining waste volumes low.

23.3. Waste disposal

! In principle, no waste of any kind may be thrown over board !

Cardboard and paper are compressed in the shredding and briquetting plant and disposed of properly ashore in port. As storage capacity on board is limited, care should always be taken to keep waste quantities small. Therefore, please compress the 1.5L plastic bottles and tin cans before putting them in the garbage can!

23.4. Packaging

When packing scientific equipment, please use material that can be easily shredded.

23.5. Batteries

Old small batteries and rechargeable batteries from normal ship operations are collected on board in the scientific hold and disposed of in accordance with regulations in port. Small quantities (up to approx. 20 per voyage) can also be handed in directly to the electronics technician.

Larger quantities of used batteries in the course of scientific operations (e.g. after seismic cruises) can be stored properly on board until reaching the next port, but must then either be disposed of properly ashore in the port or taken back ashore by the scientific community, in the same way as chemicals brought on board.

Up to approx. 70 lithium batteries and/or lithium-ion batteries can be stored on board in fireproof padded crates in the scientific hold until they are delivered ashore (please contact the WTD beforehand).

23.6. Chemicals

In principle, all chemicals brought on board must be taken back at the end of the voyage and disposed of. Proof of this must be provided.
Solid and liquid chemicals must be disposed of properly, e.g. after return transportation.

Please note for larger quantities:

- Collecting chemicals in plastic canisters separated by substance
- Return transportation together with the scientific equipment by the users, taking into account the IMDG regulations with regard to designation and packaging

The following documents are required:

- Safety data sheet for each substance; to be obtained from the manufacturer
  Certificate for dangerous goods (responsible declaration)
- Container packing certificate Designation with IMDG label:
- or container marking: 4 pcs. large labels
- Container marking: 2 small labels

24. Automatic weather station of the DWD

24.1. Sensors and their position on board

24.1.1. Wind direction and wind speed

Company Luft, Type: Ventus Ultrasonic Sensor (roofed, on the main mast top, approx. 38 m above sea level) Output format: One measured value per second, True Wind is calculated from vectors of the hea- ding (NMEA $HDT from the gyro) as well as the speed and the course over ground (NMEA $RMC from DGPS1).

24.1.2. Air temperature and humidity

Company E+E, type EE33 (PT 100 sensor on the raised sounding deck, each in a labyrinth hut on the railing on the starboard side)
Output format: One measured value every 2 seconds

24.1.3. Water temperature

Friedrichs company: PT-100 weld-in diver. Accuracy according to 1/3 DIN B (1/sec). Temperature is measured in the water tank, approx. two meters below the waterline, in the sounding device room.

24.1.4. Air pressure

Company AIR, type AIR-DB-1A. Smallest air pressure change to be measured 0.1 Hpa. Data output via serial RS-232 interface. Accuracy 0.5 Hpa max. deviation over the entire measuring range. Data repetition rate 10 sec. Calculated according to QFN (air temperature is included in the air pressure calculation). The sensor is installed in the central data acquisition unit of the on-board weather station. This is located in the converter room. The air pressure sensor has a separate air inlet located outside the ship in order to avoid possible interference such as overpressure or underpressure conditions caused by air conditioning systems in the ship, for example.

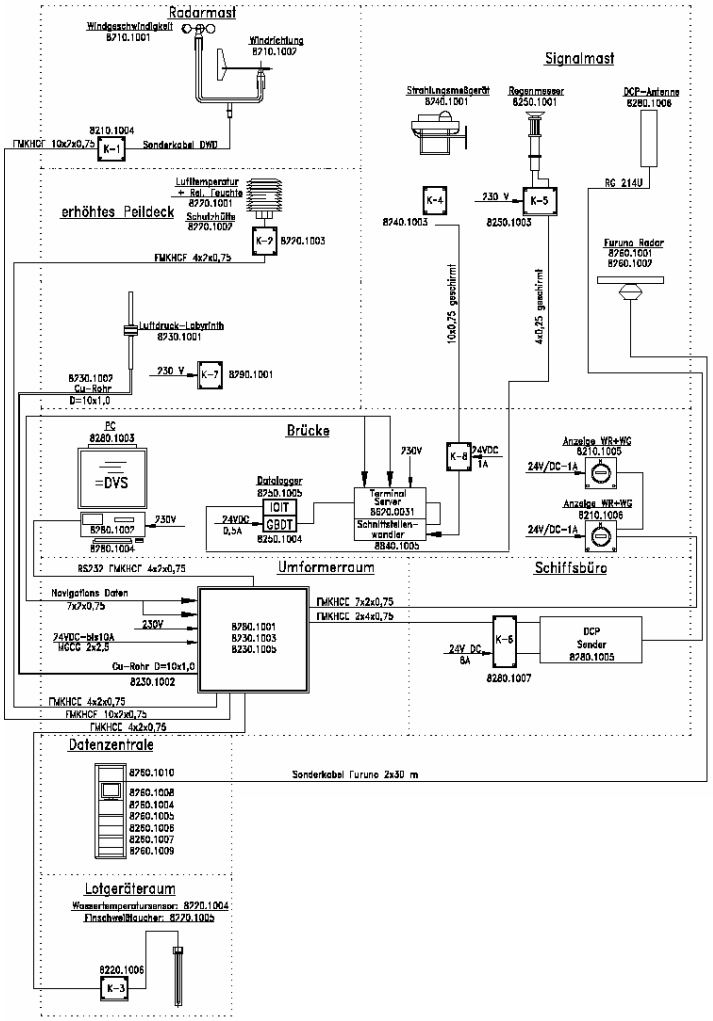
24.2. Data management and dissemination

The central data acquisition unit (European Common Automatic Weather Station EU- CAWS) creates the following data telegram from the collected sensor data:

24.2.1. DWD Synop Telegram

This telegram contains the DWD weather data encoded according to WMO specifications. These are one-hour averages of the measured weather data. This telegram is generated once an hour and transmitted on board via the DWD's own Iridium transmitter. The corresponding antenna is located on the railing of the 'Kapitänswiese'.

Weather station Leyout



25. What I should know

25.1. Intranet

The on-board intranet ("homepage") is very clearly laid out and structured and provides answers / information on the following important topics / questions, among others:

- **Security role (sample list) and ISPS information**
- **Port plans and timetables**
- **Cabin occupancy with telephone directory**
- **Crew and science posters (cruise participants)**
- **Station plans and survey plans**
- **Menus and canteen lists**
- **Internet access status**
- **Travel medical recommendations**
- **Live views on EM124, EM712 and Parasound displays**
- **Security**
- **Social affairs**
- **Global Mapper**
    - *Load workspace with nautical charts*
    - *Import routes into Global Mapper*
    - *Send route to bridge*
- **Frequent error messages when "surfing" the Internet**
- **Allow network connections with Bitdefender**
- **How do I connect to the network?**
- **How can I access network shares?**
- **Dealing with large mails (ship → land)?**
- **How does the ship email system work?**
- **How can I print?**
- **How does the phone work?**
- **All broadcast NMEA telegrams in the on-board network**
- **Manuals of all scientific ship devices on board (echo sounders, CTD, etc.)**

25.2. Security

Before the start of each trip, there is a comprehensive **safety briefing** by the safety officer. **Safety and ship rules** are **displayed** in all cabins and should be read carefully by everyone.
Two **alarms**, which should be known in advance, require all persons on board to proceed immediately (preferably in protective clothing, with headgear and lifejacket) to the assembly point (1) or to the free-fall lifeboat (2):

(1) General alarm: **seven short and one long tone (in succession)**

(2) Leaving the ship: **One short one long tone (in sequence)**

Safety drills take place after the start of the trip and during the trip. Participation in all safety events is **mandatory** for all passengers.

(Further information on the topics of "Safety" and "Conduct on board" can be found in a clear slide presentation entitled "Familiarization MSM", which can be accessed on the ship's intranet. The safety officer will refer to this as part of the mandatory "familiarization" of new user groups).

25.3. Health

The following applies to all voyages, regardless of the cruise area: a ***blood group identification card*** or ***emergency passport*** and, if available, an ***allergy passport*** should be taken on board for your own safety and for rapid treatment in emergencies. Vaccination certificates are required by port health authorities in many countries. It is therefore generally necessary to carry your ***vaccination card*** with you. The limited stocks in the on-board pharmacy include necessary emergency and standard medication. Passengers who need to take medication regularly should bring ***sufficient quantities of*** the required medication with them. Sometimes there is no **ship's doctor** on board **the Maria S. Merian**. Personal caution and precautions, e.g. preventive visits to the dentist, are an important part of travel preparations.

25.4. TV

German television can be received in the mess rooms, the hangar and the conference room. The programs are fed in by a tracking satellite system as long as the ship is traveling within the European satellite coverage (only ASTRA 1 west to Ireland or the Canary Islands).

25.5. Batteries

Watch, photo and other important batteries have a tendency to stop working at sea at some point. The spare batteries on board are intended for use on board. Please bring sufficient reserves with you. Old batteries are collected on board and disposed of in accordance with regulations (including lithium batteries and lithium-ion batteries).

25.6. Glasses

A lot can be repaired on board, and a lot is often repaired, but a spare pair of glasses is certainly more comfortable.

25.7. Washing machine

Two washing machines and two dryers are available at any time in the tank deck at the front (below the provision loads). The washing machines are operated with a liquid dosing system. Please clean the lint filter of the dryer yourself after use. The on-board staff are always available to answer questions.

25.8. Chambers

If nobody is in the cabin, the cabin door should remain open at sea. For safety reasons, the compartments should never be locked at sea. However, the compartments should be locked during a port laytime because non-board personnel will be present. Cabin keys can be obtained from the officer in charge against signature.
There is no cabin crew on the **Maria S. Merian**. **Cleaning work** during the voyage and especially at the end of the voyage must therefore be carried out by the scientists themselves. It is therefore advisable not to enter the cabins with dirty clothes and work shoes!

25.9. Conference room

The conference roomcan be used at any ime for video conferences, lectures, meetings, workshops, online lectures and examinations as well as for leisure activities (e.g. television, YouTube ideos, card games). The room should be prepared for the respective use by the scientists themselves, i.e. the table arrangement and seating should be adjusted in good time, the presentation options should be tested using a notebook connection to the existing 76" monitor/TV set, etc. If necessary, the electronics technician and system operator can help.

25.10. ID cards

Please bring a **passport** and **check** for any necessary **visas**! To simplify entry procedures, it is advisable to hand in your passport to the officer in charge on arrival. The immigration authorities will come on board each time you enter the country. Passports must then be presented on request.

25.11. Library

The library on MSM is constantly being expanded. If you want to find out more before you set off, you can find out about the contents of the on-board library on the control center's website. It goes without saying that everyone is free to leave books they have "read" on board and thus further replenish the library.

25.12. Magazines / Newspapers

The daily newspaper "Die Welt" can be accessed daily as an e-paper on the intranet. As a rule, the daily edition of "Tagesschau" is also downloaded to the homepage in the evening.
Otherwise, the supply of magazines and newspapers on board is understandably not very good.

25.13. Beverage dispenser

Since 17.04.2025, there have been two drinks dispensers on board to significantly reduce the plastic waste generated by empty water bottles and Tetra packs.

There is a system in the hangar where you can tap still and sparkling water.

The other facility is located in Mess room 1, where you can also tap apple and orange juice.
It is advisable to bring your usual drinking bottle from home. However, PET bottles can also be borrowed on board and stainless steel bottles are available for a fee.

in the hangar

in fair 1

25.14. Meal times

Meals are taken by the scientists and officers in the large mess room, where the food counter is also located. It may **not** be entered with dirty work clothes, overalls and work shoes, and smoking is prohibited there (as is now the case everywhere in the ship's superstructure).
The small mess should be reserved for the rest of the crew (with work clothes). The following serving times apply:

Meals	***at sea***	***in the harbor***
Breakfast:	07.30 - 08.30 a.m.	07.30 - 08.00 a.m.
Lunch:	11.30 - 12.15 h	11.30 - 12.00 a.m.
Dinner:	17.30 - 18.15	17.00 - 17.30
Coffee break:	10.00 - 10.20 a.m. and 3.00 - 3.20 p.m.	

If possible, please do not arrive for meals five minutes before the end of the meal service. Hot food can be set aside for duty staff on request.

25.15. Canteen

During the voyage, cigarettes, drinks, sweets and snacks as well as merchandise (e.g. sweatshirts, baseball caps etc.) are available from the stewardess. For customs and safety reasons, it is strictly forbidden to bring alcohol and cigarettes on board without the captain's permission.

25.16. Fastening material

As most walls are made of metal, magnets in a wide variety of designs have proved very useful for attaching plans, notes and other information material. This is why there is always a great demand (which cannot be met on board). A sufficient quantity should be brought along by the users themselves. Adhesive strips and tapes leave residue on the walls and damage the paintwork. Therefore the use of the mentioned items is not permitted. Magnetic sheets (A4 and A3) are also available from the WTD.

25.17. Payment canteen

There is a card reader on board which accepts EC cards and all major credit cards (Master Card, Visa, etc.) so that payment can be made ***"cashless"***.