RESEARCH VESSEL
SONNE

Handbook
for
Scientists

0. Overview of Changes

Chapter	Editor	Date
7.4; 8.3.10; 10.7	Leppin	16.11.2015
Coverpage and all Chapters	Bergmann	01.11.2016
4.3 Antenna arrangement	J. Fokken Meyer Werft	20.10.2017
3.1 Involved parties	J. Fokken Meyer Werft	20.10.2017
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8.3.21 CleanSeaWaterlab	Bergmann	26.11.2018
13.9 Thermosalinograph	Bergmann	26.11.2018
3.1, 3.2, 10.2 bis 10.4	Bergmann	26.01.2021
3.3 Radius of action and endurance	Bergmann	25.01.2022
3.8 Seismic Compressors, overview “power” added	Bergmann	25.01.2022
7.7.7. UCTD deleted	Bergmann	25.01.2022
13.1 OFOS and 13.10 UCTD added	Bergmann	25.01.2022
3.3 Radius of action adjusted based on op. experience	Bergmann	06.12.2022
7.2 Single Core Winch II usable length adjusted	Bergmann	06.12.2022
10.3 EM122 – additional info	Bergmann	04.01.2023
10.5 EK60 – Calibration by users	Bergmann	04.01.2023
10.7 IXBLUE (IXSEA) Posidonia - Calibration	Bergmann	04.01.2023
13.17 Milli-Q-Device – 2. Installation	Bergmann	04.01.2023
13.19 Deepest Freezer (-80°C) – Replacement device	Bergmann	04.01.2023
3.8. Seismic compressors – correction to m³/min	Narawitz	08.09.2023
3.1 Involved parties	WTD Sonne/Bergmann	23.06.2025
8.3.15 Scientific Electronics Laboratory	WTD Sonne/Bergmann	23.06.2025
10.2 Atlas PARASOUND DS P-70	WTD Sonne/Bergmann	23.06.2025
10.7 USBL Sonardyne RANGER 2 ACOUSTIC POSI-TIONING SYSTEM	WTD Sonne/Bergmann	23.06.2025
10.8 On-board releaser	Bergmann	23.06.2025
10.10 Hydrophones	Bergmann	23.06.2025
11.11 PC workstations	WTD Sonne/Bergmann	23.06.2025
12.4 Radio direction finder	WTD Sonne/Bergmann	23.06.2025
13.1 Ocean Floor Observation System (OFOS)	WTD Sonne/Bergmann	23.06.2025
13.12 Sound profile probe	WTD Sonne/Bergmann	23.06.2025
14.2.3 Internet	WTD Sonne/Bergmann	23.06.2025
3.1 Involved Parties	Bergmann	30.06.2026
3.2 Communication to vessel	Bergmann	30.06.2026
3.12 Information Seawater supply	WTD Sonne/Bergmann	30.06.2026
4.1.3 Bow – View / Stern – View	WTD Sonne/Bergmann	30.06.2026
4.3 Antenna arrangement (Index)	WTD Sonne/Bergmann	30.06.2026
4.4 Antenna Configuration (Views)	WTD Sonne/Bergmann	30.06.2026
4.4.2 Front view of the Main Mast	WTD Sonne/Bergmann	30.06.2026
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4.4.4 Top view of the Main Mast	WTD Sonne/Bergmann	30.06.2026
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10.11 Hydrophone	WTD Sonne/Bergmann	30.06.2026
11.4.2 Schematic representation of the navigation data online distribution	WTD Sonne/Bergmann	30.06.2026
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13.20 Flake ice machine	WTD Sonne/Bergmann	30.06.2026
13.26. Mobile cabin for rock saw	WTD Sonne/Bergmann	30.06.2026
13.26 Mobile Kabine für Gesteinssäge	WTD Sonne/Bergmann	30.06.2026
14. Meteorology	WTD Sonne/Bergmann	30.06.2026
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14.1.3 Quantum Scalar Irradiance PAR Sensor	WTD Sonne/Bergmann	30.06.2026
15.1 Alarms and emergency calls	WTD Sonne/Bergmann	30.06.2026
3.9 Angaben zum Arbeitsluftkompressor	WTD Sonne/Bergmann	27.08.2026

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2. Research Vessel SONNE
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2. Research Vessel SONNE

2.1. Informations regarding the "first" RV SONNE (DFCG)

The SONNE was built in 1968-69 as a stern trawler on the Rickmers-Werft Bremerhaven (building no .: 350) for the "deep-sea fishing North Sea".
The RF Reederei Community Forschungsschifffahrt bought the ship in 1977 and it was a collaboration between the shipyards Schichau Unterweser and Rickmers shipyard on the research ship, mainly converted to marine resource exploration.
In 1991 a further modification to the Schichau Seebeck Werft Bremerhaven. The ship was, among others, extended to 10.8 m and received an additional superstructure deck. The machinery was renewed, brought the scientific equipment up to date.
In September 2014 the “first” RV SONNE finished all research activities and was sold to Argentina. The new name of the “first” RV SONNE now is “RV “Austral”.

http://www.defensa.com/frontend/defensa/ara-austral-incorporo-agrupacion-buques-hidrograficos-armada-vn17523-vst330

http://www.lacapitalmdp.com/noticias/La-Ciu-dad/2015/11/07/290729.htm/https://es.wikipedia.org/wiki/Buque_oceanogr%C3%A1fico_ARA_Austral

2.2. Informations regarding the newbuilding RV SONNE (DBBE)

In 2008, the Federal Ministry of Education and Research, together with the coastal states of Niedersachsen, Mecklenburg-Vorpommern and Schleswig-Holstein and the Hanseatic cities of Hamburg and Bremen agreed to build a new deep-sea research vessel.
Following a Europe-wide competitive tendering process, a merger of the Meyer Werft Papenburg and the shipping company RF Forschungsschifffahrt Bremen received the Deep Sea Research Vessel GmbH & Co. KG, the surcharge. In August 2011, the contract was signed to build and ship management of the new research vessel.

04.12.2012	First steel cut at the Meyer Werft Papenburg
12.04.2013	Keel laying
05.04.2014	Undocking
10.05.2014	Ems Conveyance to Emden
11.07.2014	Launching ceremony. at Neptun Werft Rostock-Warnemünde The ship's godmother: Bundeskanzlerin Dr. Angela Merkel
17.11.2014	Handover to the client in Wilhelmshaven Signing transfer agreement between Federal Republic of Germany, country Lower Saxony, University Oldenburg, Shipping company Briese Schiffahrt, Abteilung Forschungsschifffahrt and University Hamburg The Control Station *“German research Vessels”* is assigned to be responsible for the logistic execution.

Origin:
Pressemitteilungen der Meyer Werft Papenburg
Wikipedia

3. General information

3.1. Involved Parties

Name of ship	SONNE
Call signal	DBBE
IMO-Number	9633927
Flag	German flag (German State Service Flag)
Owner	Federal Republic of Germany represented by the Federal Ministry of Education and Research
Representative Owner Scientific Scheduling	Lower Saxony Research Center Jülich GmbH PtJ, Sector MGS Branch Office Rostock-Warnemünde PO Box 30114 18112 Rostock Phone: +49-381-5197 291 Homepage: http://www.fz-juelich.de
Logistics/Supervision	German research fleet coordination centre University of Hamburg Institute for Oceanography Bundesstraße 53 D-20146 Hamburg Tel.: +49-40-23952 3640 E-Mail: leitstelle.ldf@uni-hamburg.de Homepage: http://www.ldf.uni-hamburg.de
Shipping company	Briese Schiffahrts GmbH & Co. KG Dept. Research shipping Hafenstraße 12 D-26789 Leer Tel.: +49-491-92520-160 E-Mail: research@briese.de Homepage: http://www.briese-research.de

3.2. Communication to vessel

Ship-shore and shore ship communications	V-Sat (C- / KU-Band) +47 224 09509 Fax: +47 236 72593 MOB: +49 171 4102977 (in port only) FBB 500 Phone:+870 773 925 590
E-Mail (Ship)	master@sonne.briese-research.de
E-Mail (chief scientist)	chiefscientist@sonne.briese-research.de

The e-mail addresses of the cruise participants (scientists and crew) have the following pattern:

first letter of the ***F***irstname**.** ***Surname.p***rivat

E-Mail (privat/busines) *f.surname*@sonne.briese-research.de

Each participant should install his own password in his account. Emails can be sent and received from any workstation PC as well as from private notebooks (for example, from the living quarters) (via POP3, IMAP, for example, with MS Outlook, Mozilla, Thunderbird). The standard limit is 500 kB; (Chiefscientist: 2 MB), but can be increased on request. Responsible for e-mail communication is the system operator.

The e-mail exchange takes place continuously every 15 minutes during VSAT operation.

Ship-Shore / Shore-ship connections

Since 2023, a Starlink system has been installed on board, allowing bandwidths of more than 200 Mb/s (download) and 15 Mb/s (upload) to be used in parallel with the C-Band system. However, this service is available only through a Wi-Fi network that is completely separate from the ship's main network.
As the total monthly data allowance is contractually limited to 600 GB, all participants receive vouchers at the beginning of the research cruise specifying their individual data allocation. The voucher codes can be used to access the dedicated Wi-Fi network. Once the allocated data volume has been exhausted, users must wait until the start of the next billing month before additional usage is possible.
During the preparatory meetings, additional data allowances for a particular voyage may be requested, provided that a well-founded justification is submitted.
In the event of a **failure** of both the Starlink system and the C-Band installation, email communication is only possible via the FBB 500 backup system. Due to its significantly lower data rate (maximum 384 kbit/s), communication may become considerably slower when network utilization is high.

Telephone calls, if an internet connection exists

In the coverage area of the KU band via V-Sat / C-Band or FBB 500 (ie, as long as Internet access exists), it is possible to make very costeffective private

calls from the chamber via the wallmounted telephone set (or any other telephone on board) Lead country (price currently about 13 Ct / min to German landline or about 35Ct / min in the German mobile network).

To this end, the WTD awards personal PIN codes worth US $ 10 at the beginning of each research trip. If this is used up, further PIN codes can be purchased.
There is a line for telephone calls (Voice over IP) available.

For each expedition, the first PIN code - value US $ 10 – is for free. Additional amounts must be paid by the respective user on board at the end of the voyage in cash or by debit card / credit card.

A call from land to the individual telephone sets is **NO**T possible and **NOT** wanted (time shift, etc.).

3.3. General Data of Vessel

Shipyard	MEYER WERFT GmbH Papenburg
Year built	2012 - 2014
Construction numbe	S 530
Class	DNVGL
Service Area	World wide
Safety / Environment	Environmental standards for innovative ship design (Blue Angel) Redundant Propulsion 50%, Safe Return to Port “ Inventory of Hazardous Materials“ certified acc. „Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships“ (SR/CONF.45) „Guidelines for the Preparation of Inventory of Hazardous Materials (MEPC Res. 197(62)).
Overall length -- LOA	116,00m
Length between perpendiculars	104,86 m (acc. tonnage certificate)
Moulded breadth	20,60 m
Draught	6,40 m
Height of main deck	9,80 m
Total heigh	42,40 m
Tonnage, London Rules	8.554 BRZ / 2.566 NRZ
Empty ship weight	6.844,8 t

Scientific dead weight	430 t
Speed	12 kn; max. 15 kn
Radius of action (at 12 kn)	app. 11.500 nm (based on operational experience)
Endurance at sea	app. 52 days (dependent on weather conditions and speed profile)

3.4. Details of the safety devices

Lifeboats	2	80 persons each
Liferaft	8	20 persons each
Recue Star	1	for the recovery of persons from the water
High-pressure water mist fire extinguishing system	number of pumps output delivery pressure	5 6,9 m³/h 140 bar
Emergency fire pump	output head	80 m³/h 80 m
Radar transponder	SAFELINK AIS SART	
Radar transponder	Kannad Marine Res-cuer 2 SART	
Satellite distress beacon	SAT- distress beacon SAFELINK Auto GPS	

3.5. Information Engine and drive system

Engine	Diesel-electric propulsion system	
Main engines	Manufacturer:	Wärtsila
	Model:	9L20CR
	Power Rating:	1.620 kW
	Rotation:	1.000 rpm
	Number:	4
Total installed capacity	6480 kW	
Generators	Manufacturer:	Anhaltische Elektromotorenwerke Dessau GmbH
	Power Rating:	1.555 kW
	Number:	4
Emergency power generator	Manufacturer:	Caterpillar
	Model:	C32ACERT
	Performance:	874 kW
	Number:	1
Drive	2 x 1 traction motor via shaft on a fixed propeller	
Traction motors	Manufacturer:	VEM Sachsenwerk GmbH Dresden
	Performance:	2.350 kW
	Number:	2
Propeller	2 Fixed propeller each 3.25 m in diameter	

3.6. Information maneuvering aids

Manoeuvring	1 retractable thrusters at frame 156 SCHOTTEL 860 kW 1 pump jet at frame 119 SCHOTTEL 2.990 kW 1 retractable thrusters at frame 21 SCHOTTEL 860 kW

3.7. Information Electrical power

Three-phase network	400 V, 50 Hz, with neutral conductor
Normal network (white socket)	230 V, 50 Hz
Uninterruptible power supply (red socket)	230 V, 50 Hz, 125 kVA, cos phi 0,8 (Bridging time approx 20 min)

3.8. Information Seismic compressors (high pressure air compressors)

Manufacturer Sauer & Sohn
Performance each 12 m³/min – 208 bar
Number 4

Optional compressors,
Installation in containers on deck

Manufacturer Sauer & Sohn
Performance each 12 m³/min – 208 bar
Number 2

Power Range RV "Sonne" Rev.1

			Compressor 1			Compressor 2			Compressor 3			Compressor 4			Blower 1	Blower 2
m³/min	Power Range	Leistungsan-forderung [kW]	40Hz	50Hz	60Hz	40Hz	50Hz	60Hz	40Hz	50Hz	60Hz	40Hz	50Hz	60Hz	250mbar	250mbar
6,5	1	128	6,5													
8,0		156		8												
10,0		186			10											
13,0		256	6,5			6,5										
14,5		284		8		6,5										
16,0	2	312		8			8									
19,5		384	6,5			6,5			6,5							
21,0		412		8		6,5			6,5							
24,0		468		8			8			8						
26,0		512	6,5			6,5			6,5			6,5				
27,5	3	540	6,5			6,5			6,5				8			
29,0		568	6,5			6,5				8			8			
30,5		596	6,5				8			8			8			
32,0		624		8			8			8			8			
34,0		654		8			8			8				10		
36,0	4	684		8			8				10			10		
38,0		714		8				10			10			10		
40,0		744			10			10			10			10		
44,0		840			10			10			10			10	4	
44,0		840			10			10			10			10		4
48,0		936			10			10			10			10	4	4

The compressors are selected depending on the operating hours. (e.g. compressor 2-4 can also be used for a performance level of 6m³/h.)

Power Seismic-Container

	Power Range	Compressor Container 1x WP6442		
m³/min	2000 - 3000psi	40Hz	50Hz	60Hz
6,5	116kW - 128kW			
8,0	145kW - 156kW			
10,0	172kW - 186kW			

3.9. Information Working air compressor

The compressed air is supplied by compressors, dried by refrigerated air dryers, and stored in compressed-air storage cylinders.
The laboratories are equipped with pressure regulators (0–6 bar), each fitted with two quick-connect couplings for hoses with an internal diameter (ID) of 12 mm and ½", respectively.

Manufacturer	Sauer & Sohn
Model	WP121L
Working pressure	6 bar
Air flow at working pressure	121 m³/h

3.10. Information Fresh water supply

Vacuum evaporator 1	15 m³/d	
Vacuum evaporator 2	15 m³/d	
Reverse Osmosis System	15 m³/d	
Tank capacity	TK 07	134,4 m³
	TK 57	62,3 m³
Operating pressure	6 bar	

3.11. Information Soft water supply (laboratory freshwater / distillate)

The laboratories are supplied via a pressure tank system (600 l / 6 bar) from the distillate tanks.
The distillate production takes place via 2 vacuum evaporators (15m³ / d), these are part of the fresh water production.
In wet laboratory 1, a high-purity water plant of the type Milli-Q® Integral 10 is available.
See also Milli-Q system

3.12. Information Seawater supply

	Sinus pump	Centrifugal pump
Number	1	2
Performance	4 m³/h	3 m³/h 1,2 m³/
Operating pressure	4 bar	4 bar

Suction depth and intake location optionally:

Portside	2100mm above baseline (BL)
Midships	3900 above BL
Starboardside	3900 above BL
Extending device frame 148	BL

3.13. Information Clean-Ship

The "Clean Ship" operation is guaranteed for 48 hours.

3.14. Ship crew complement

Function	Number
Captain (Master)	1
Senior Deck Officer (Chief-mate)	1
Deck Officer	2
Senior Engineer (Chief)	1
Engineer	2
Electrician	2
Electronics technician	2
System-Operator	1
Surgeon	1
1st Cook	1
Assistant cook	1
Steward (mess)	4
Boatswain	1
Ship mechanic (Deck)	7
Ship mechanic (Engine)	3
Deck fitter	1
Crew total	**31**

3.15. Scientific crew complement

Chief Scientist	1	single cabin 3. Structure deck (deck 06)
Senior-Scientist	1	single cabin 3. Structure deck (deck 06)
2 single cabins	2	3. Structure deck (deck 06)
2 double cabins	4	4. Structure deck (deck 07)
12 single cabins	12	Main deck (deck 03)
12 single cabins	12	Tween deck (deck 02)
4 double cabins	8	Tween deck (deck 02)
scientists total	**40**	

3.16. Details Scientists Cabins

The cabins are outside cabins with windows.

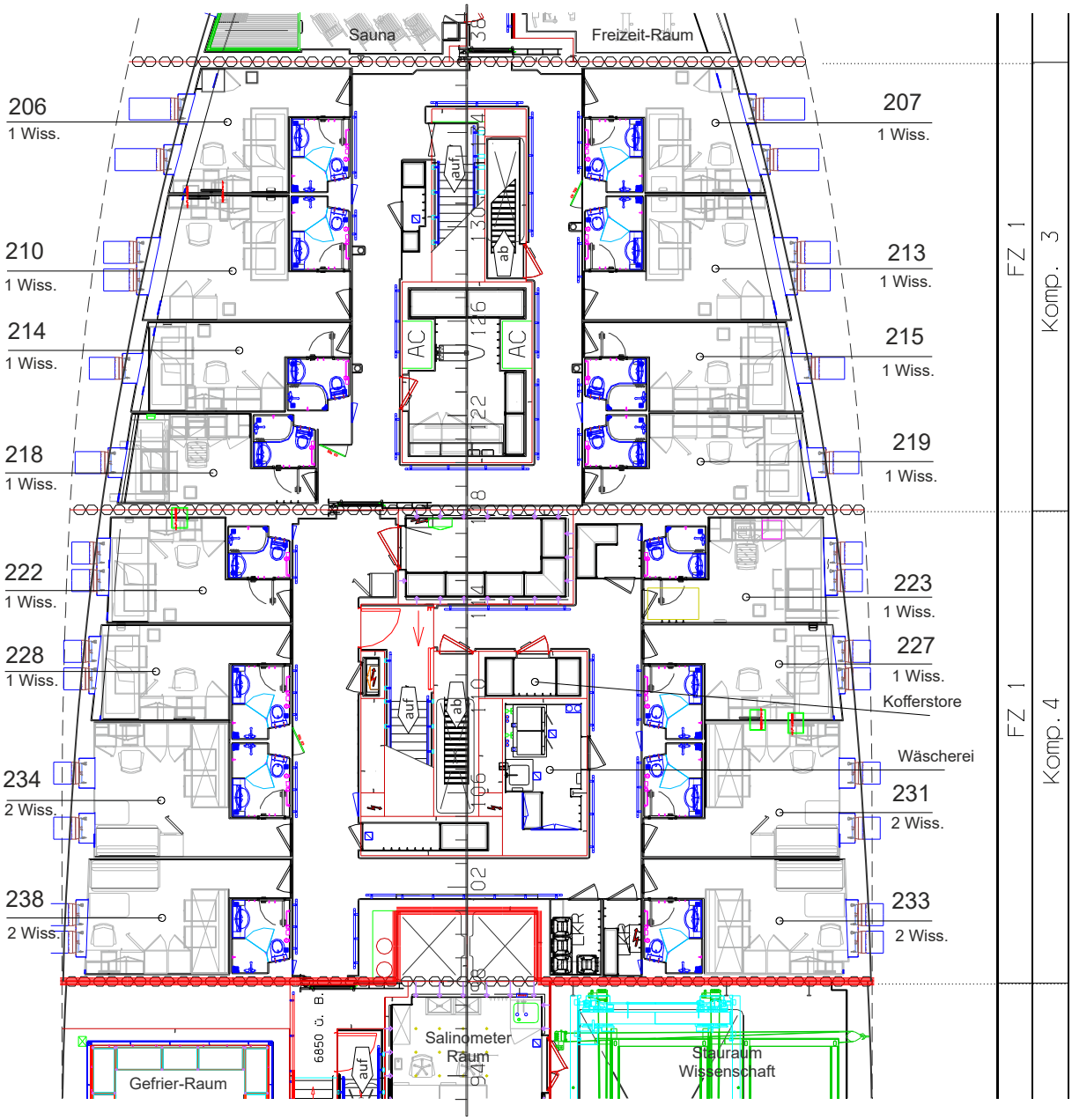
The device consists of bed, lockable wardrobe, a small table or desk with chair. Some cabins are equipped with an additional couch.
The upper bunk at the double cabin is designed as Pullmann berth.

Each cabin has a sanitary unit with washbasin, shower and toilet.
The cabins have LAN (2xRJ45), telephone, radio and TV.

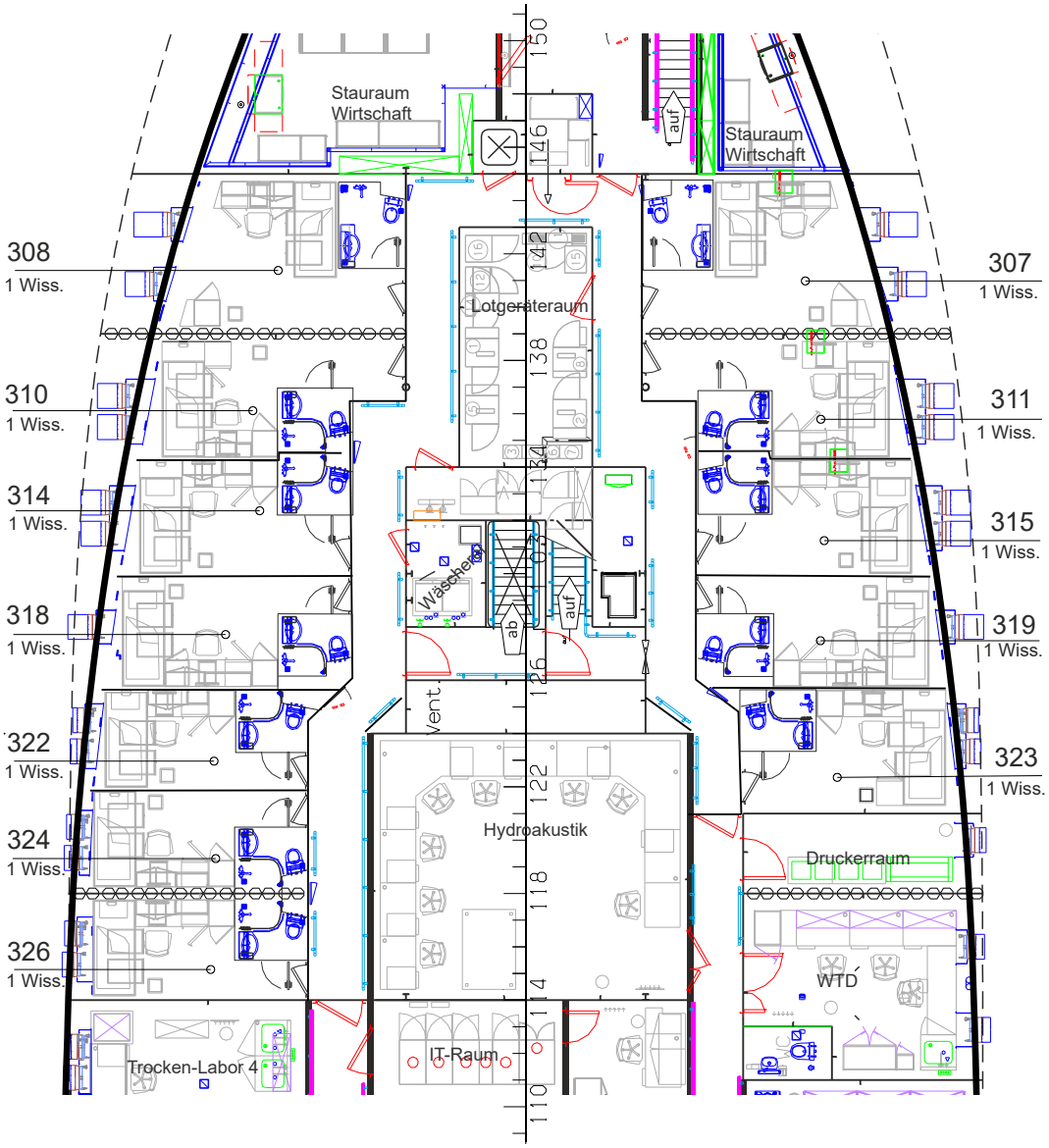
3.16.1. Cabins plan

Cabine-No.	Phone-No.	Occupancy
642	610+611	Chief-Scientist
648	612	Senior-Scientist
646	613	1 Scientist
640	614	1 Scientist
704	615	2 Scientist
710	616	2 Scientist
307	624	1 Scientist
308	623	1 Scientist
310	622	1 Scientist
311	625	1 Scientist
314	621	1 Scientist
315	626	1 Scientist
318	620	1 Scientist
319	627	1 Scientist
322	619	1 Scientist
323	628	1 Scientist
324	618	1 Scientist
326	617	1 Scientist
206	636	1 Scientist
207	637	1 Scientist
210	635	1 Scientist
213	638	1 Scientist
214	634	1 Scientist
215	639	1 Scientist
218	633	1 Scientist
219	640	1 Scientist
222	632	1 Scientist
223	641	1 Scientist
227	642	1 Scientist
228	631	1 Scientist
231	643	2 Scientist
233	644	2 Scientist
234	630	2 Scientist
238	629	2 Scientist

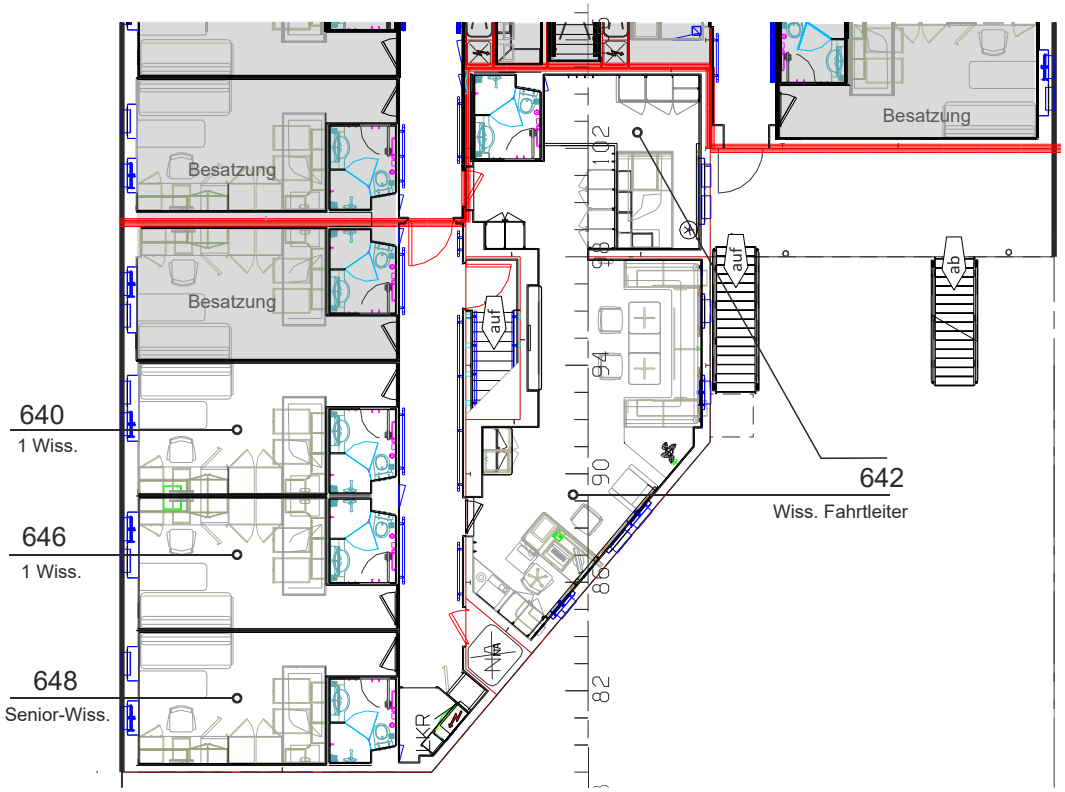
3.16.2. Cabins Deck 02 (Tween deck)



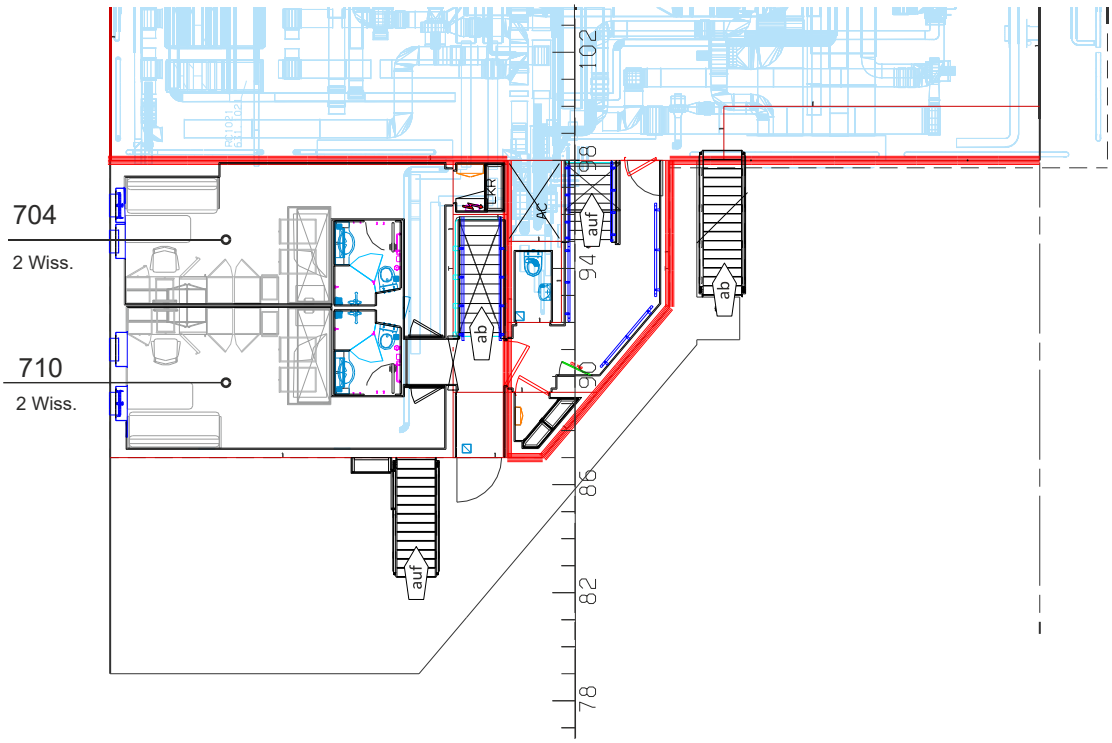
3.16.3. Cabins plan Deck 03 (Main deck)



3.16.4. Cabins plan Deck 06 (3. Structure deck)



3.16.5. Cabins plan Deck 07 (4. Structure deck)



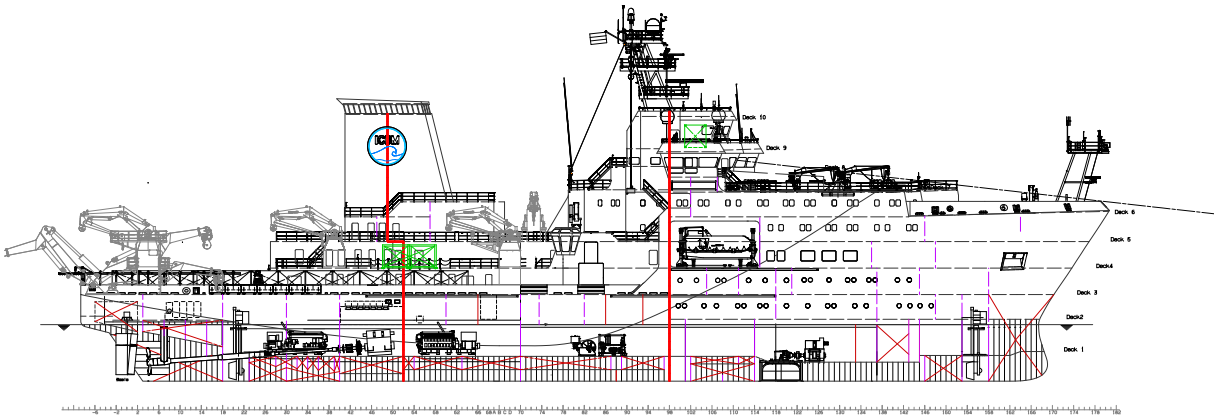
4. Ship plans

For orientation in the ship different door colors are assigned to the decks:

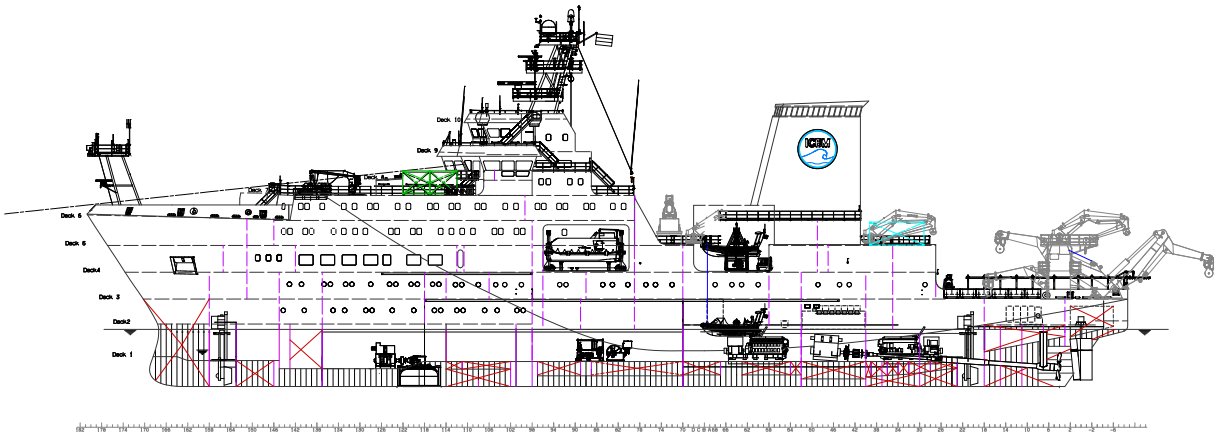
Deck 02 – Tween deck	Dark Green
Deck 03 – Main deck	Blue
Deck 04 – 1. Structure deck	Red
Deck 05 – 2. Structure deck	Orange
Deck 06 – 3. Structure deck	Yellow
Deck 07 – 4. Structure deck	Lime Green

4.1. General arrangement

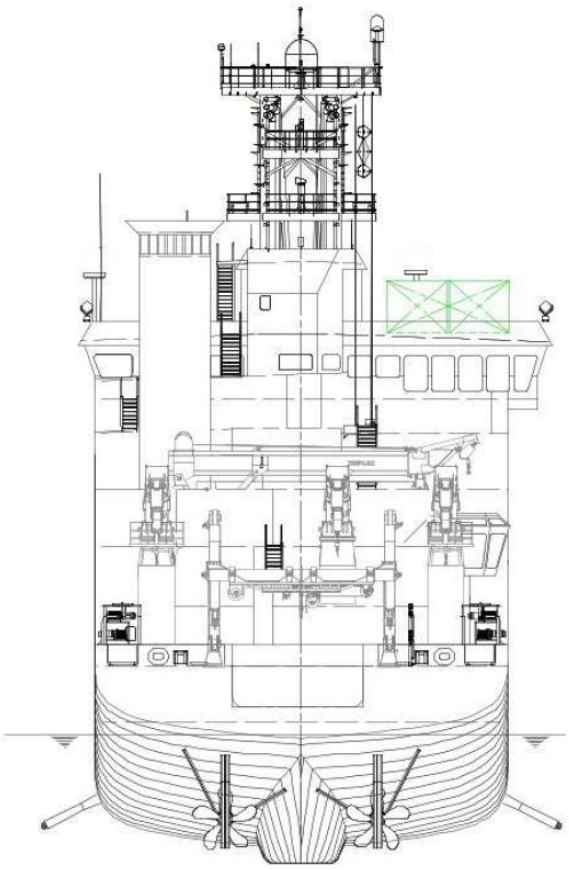
4.1.1. Starboard – View



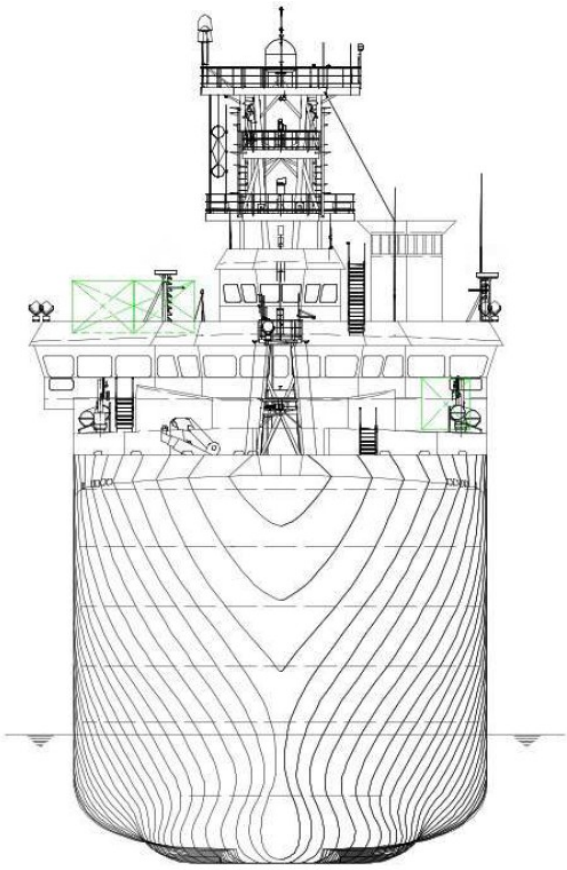
4.1.2. Port – View



4.1.3. Bow – View / Stern – View

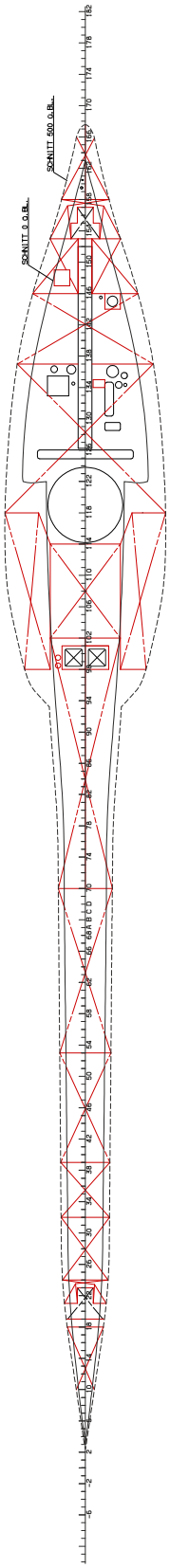


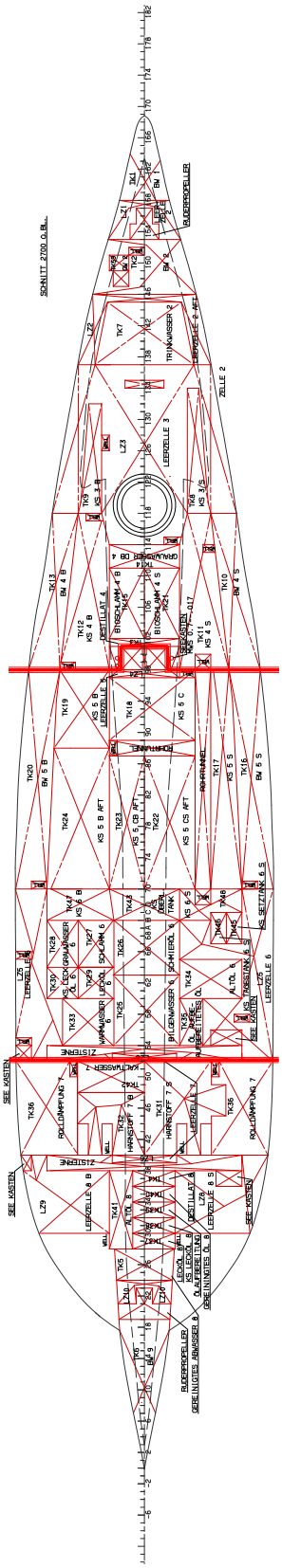
HECKANSICHT



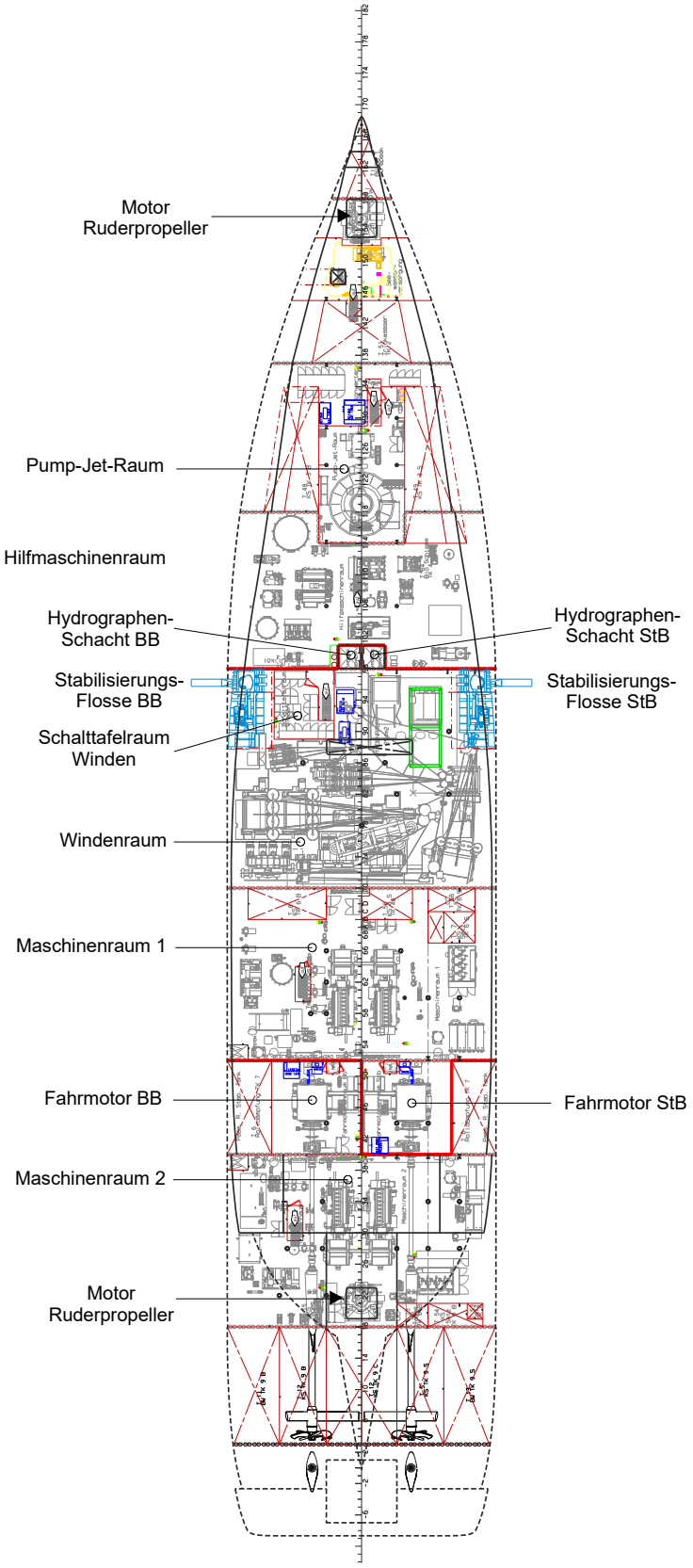
BUGANSICHT

4.1.4. Tank bottom / Tank divsion

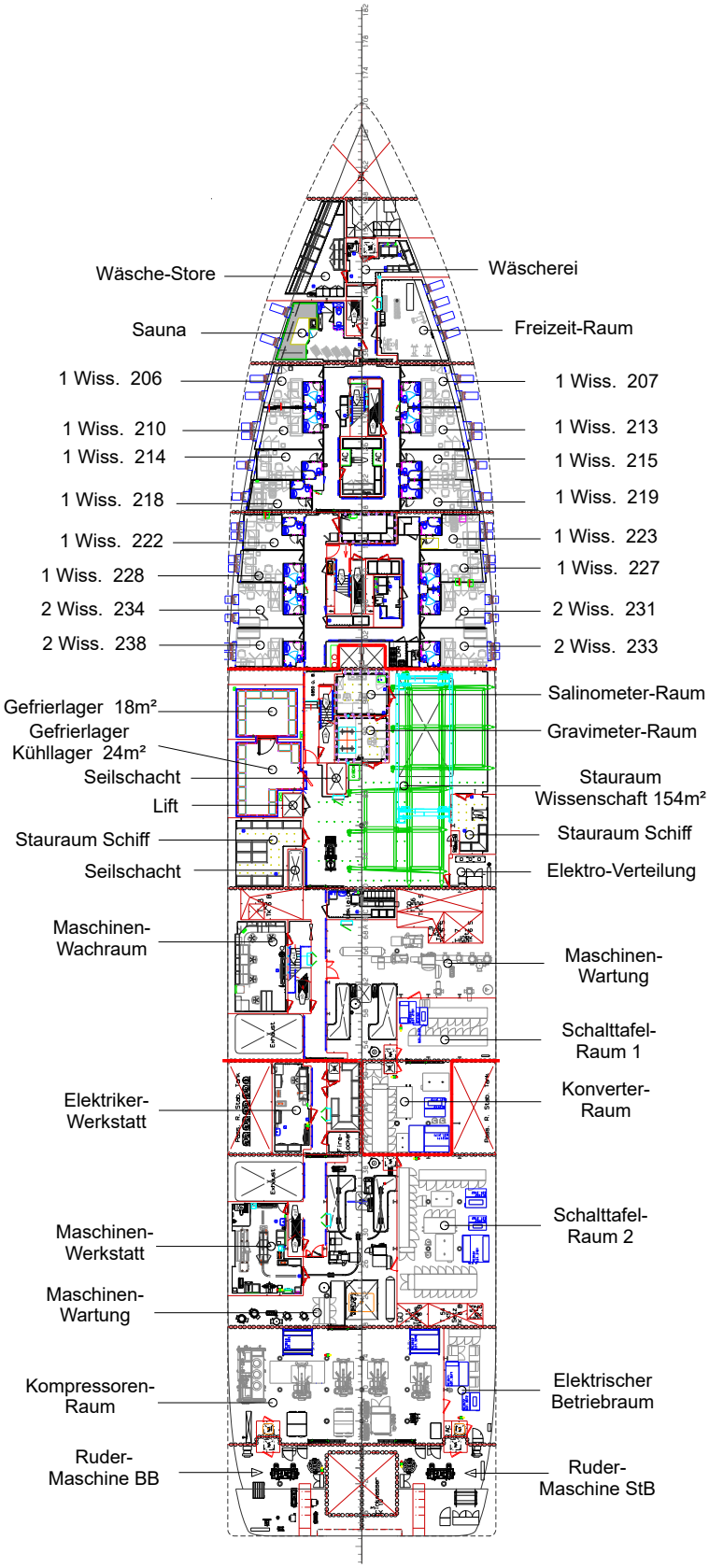




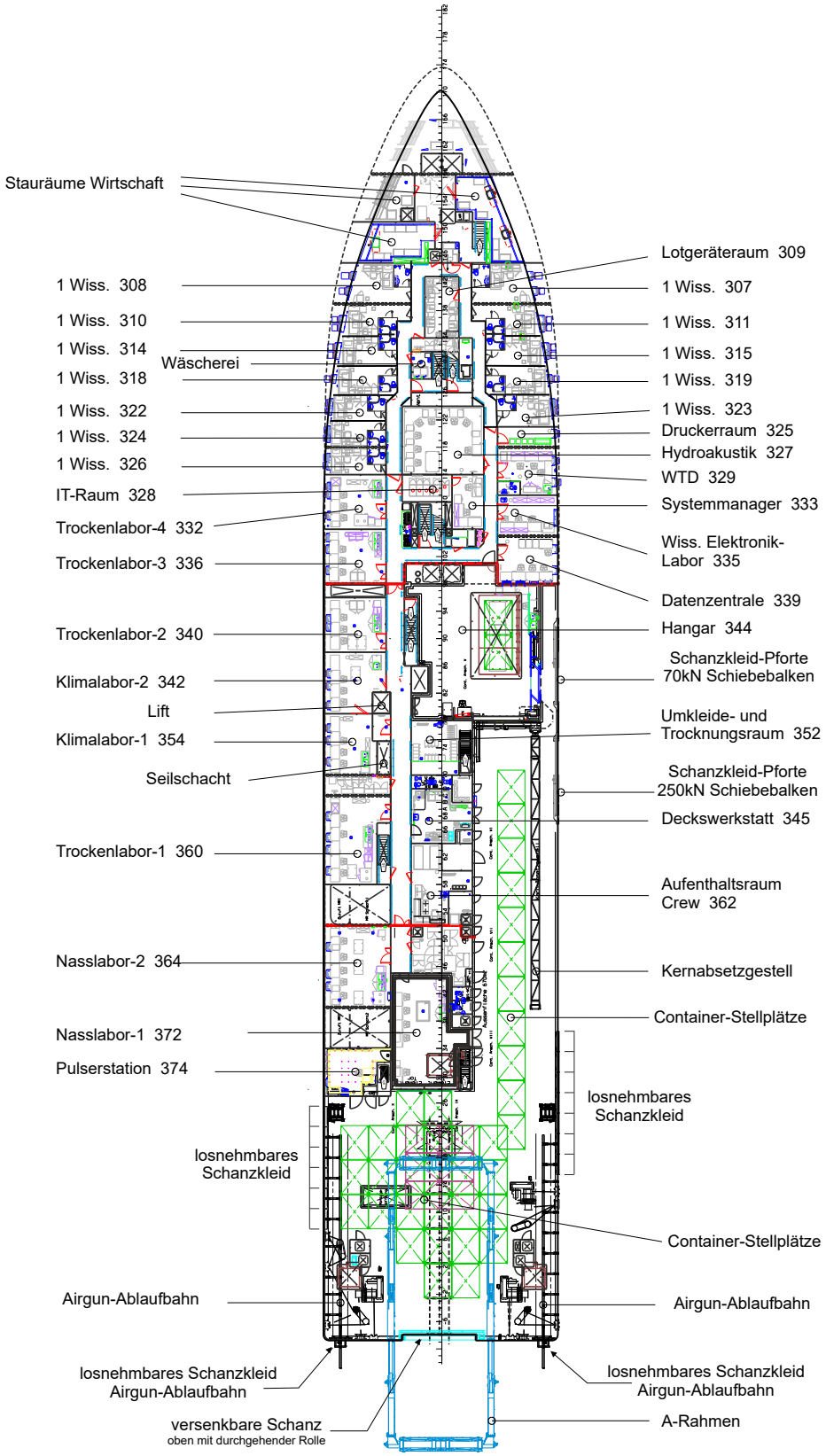
4.1.5. Deck 01 – Tank deck



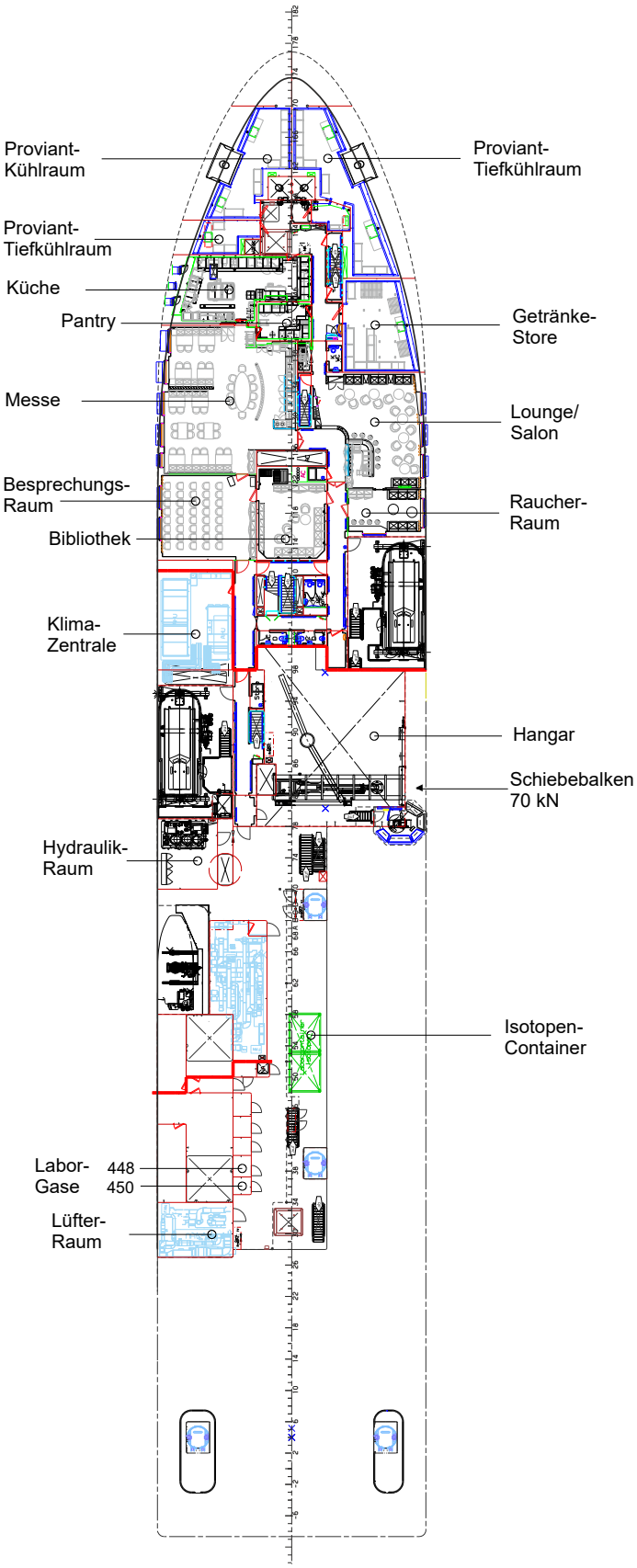
4.1.6. Deck 02 – Tween deck



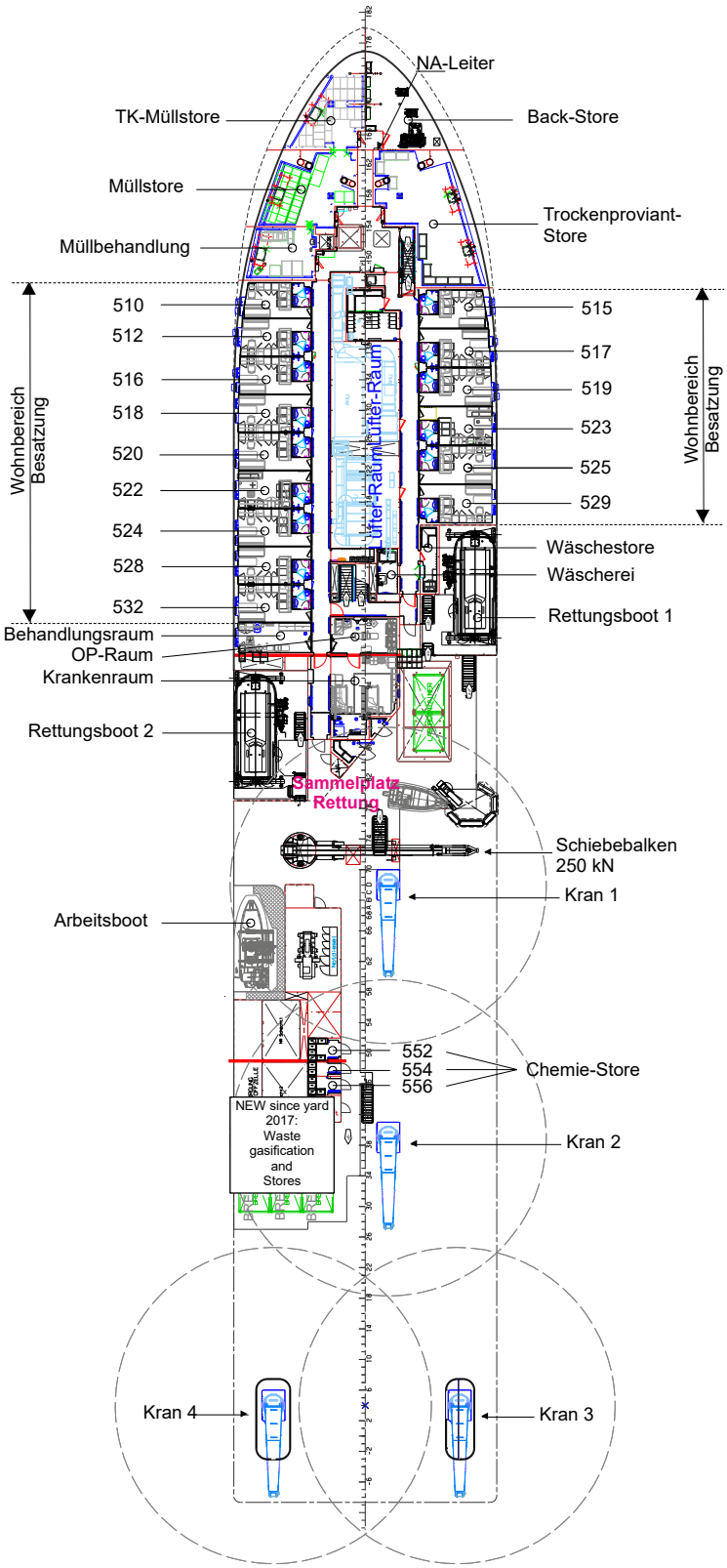
4.1.7. Deck 03 – Main deck



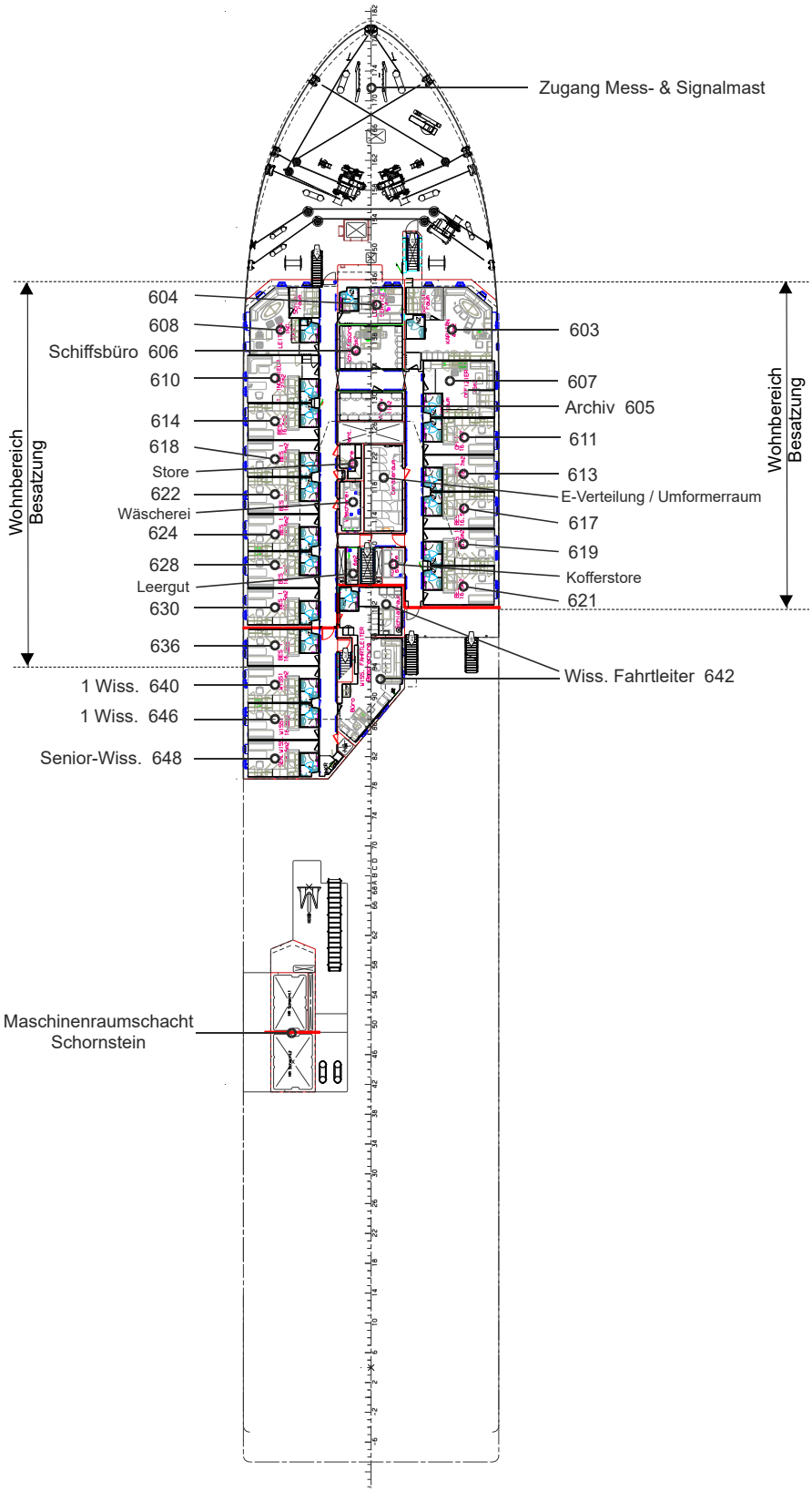
4.1.8. Deck 04 – 1. Structure deck



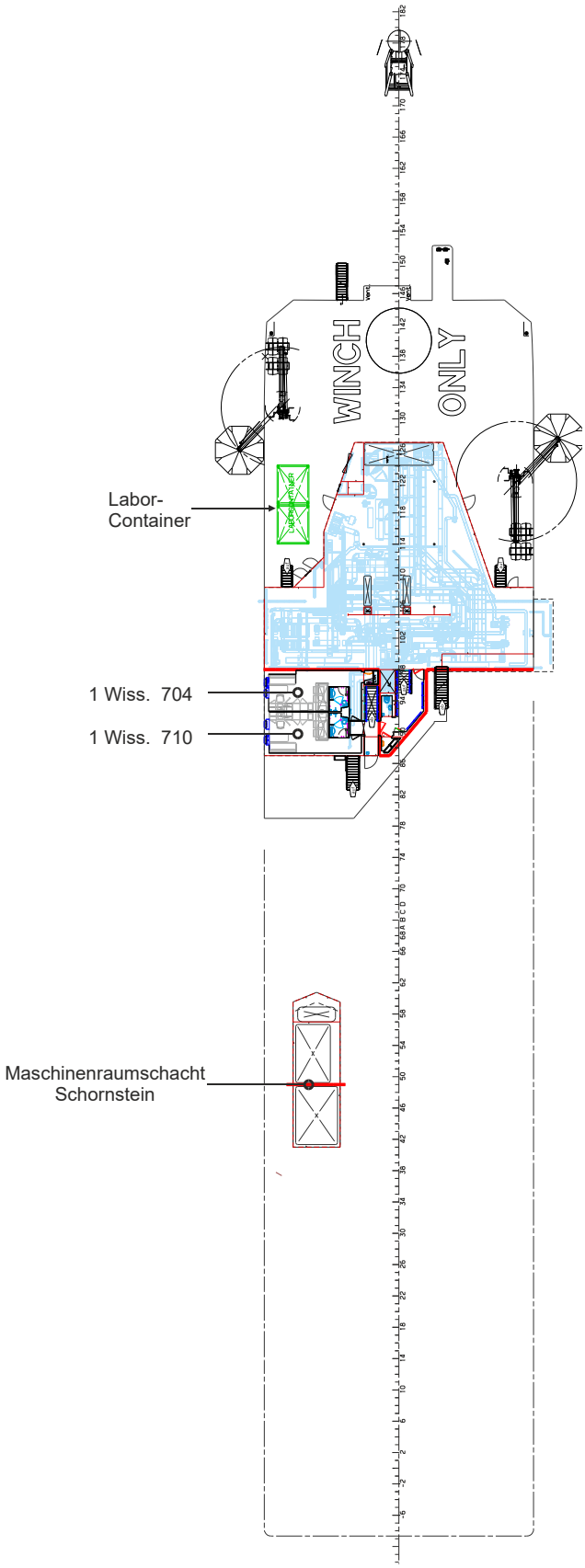
4.1.9. Deck 05 – 2. Structure deck



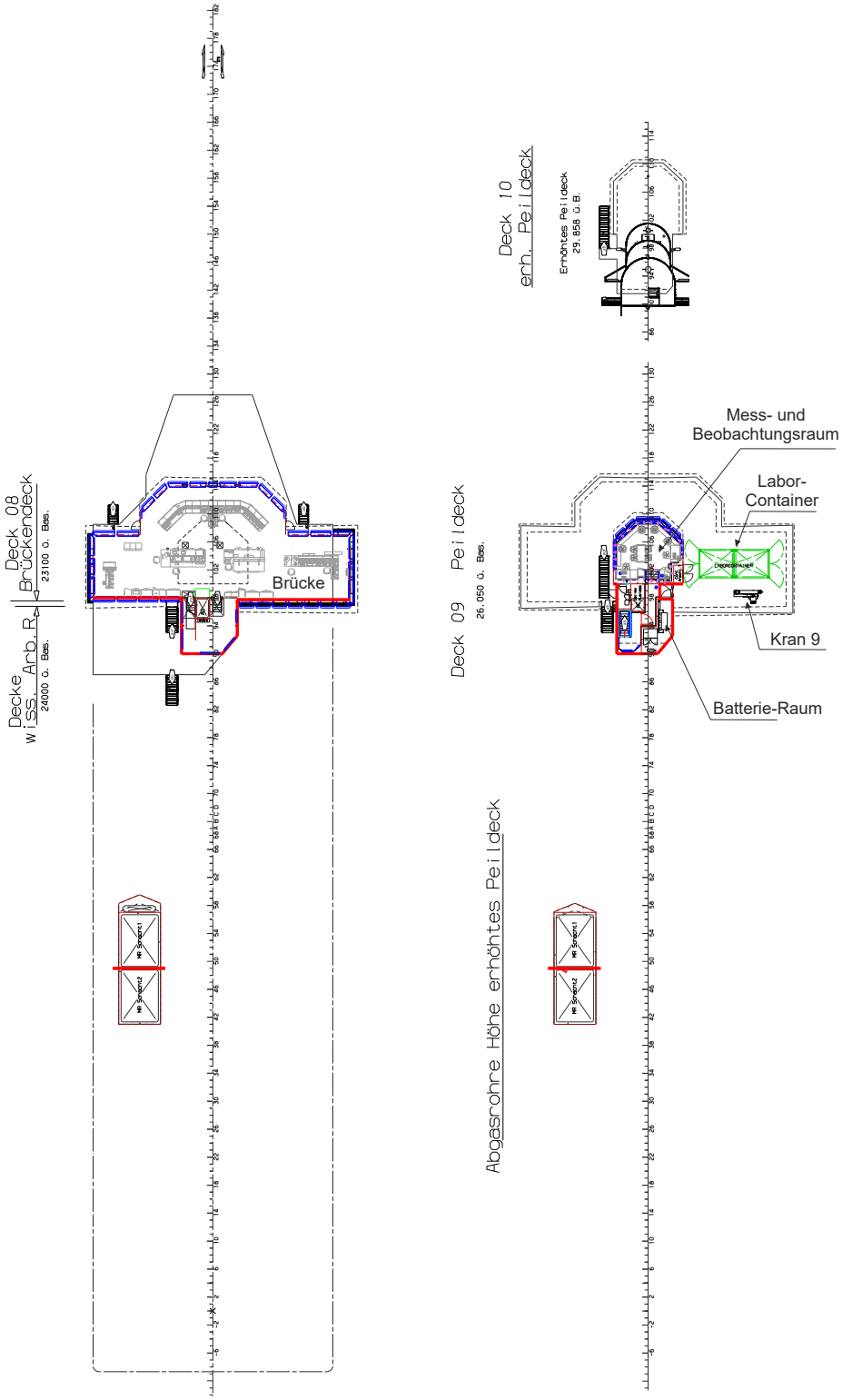
4.1.10. Deck 06 – 3. Structure deck



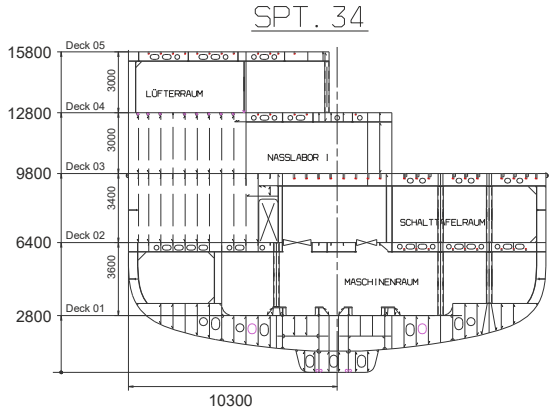
4.1.11. Deck 07 – 4. Structure deck

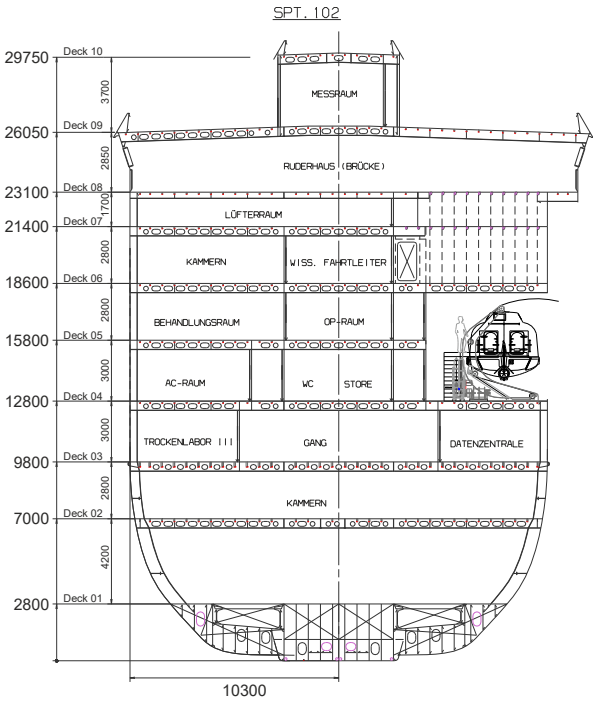


4.1.12. Deck 08 – Bridge deck; Deck 09 – Observation deck; Deck 10 – Elevated observation deck

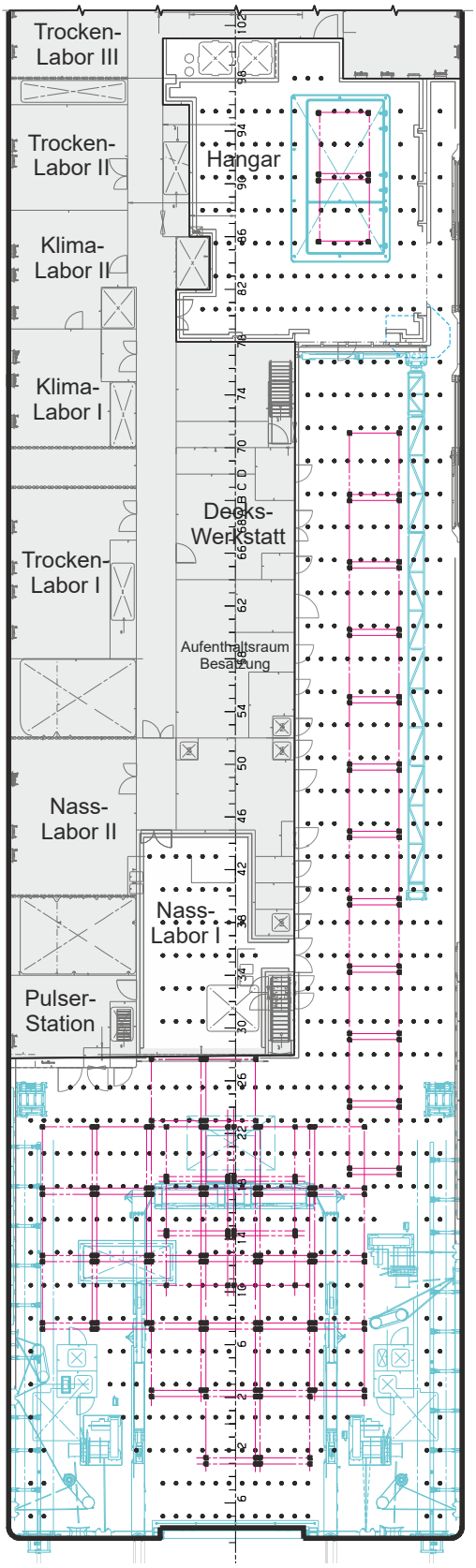


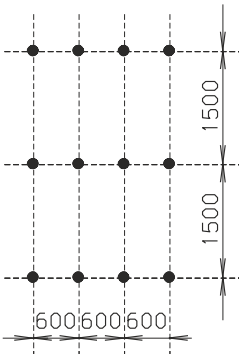
4.1.13. Cut-frame 34; Cut-frame 102



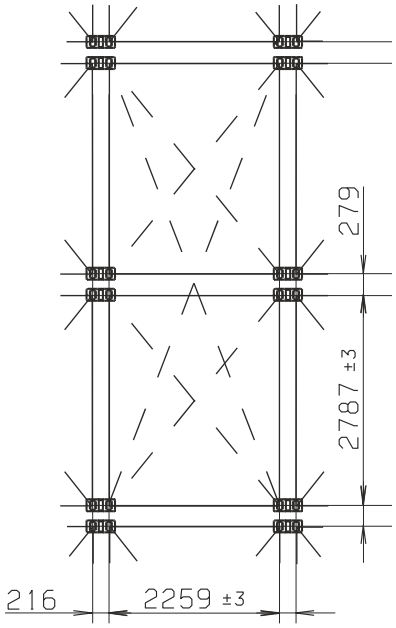


4.1.14. Deck 03 (Main deck) – Container foundations and M24 lashing elements





M24-Zurrbuchsen



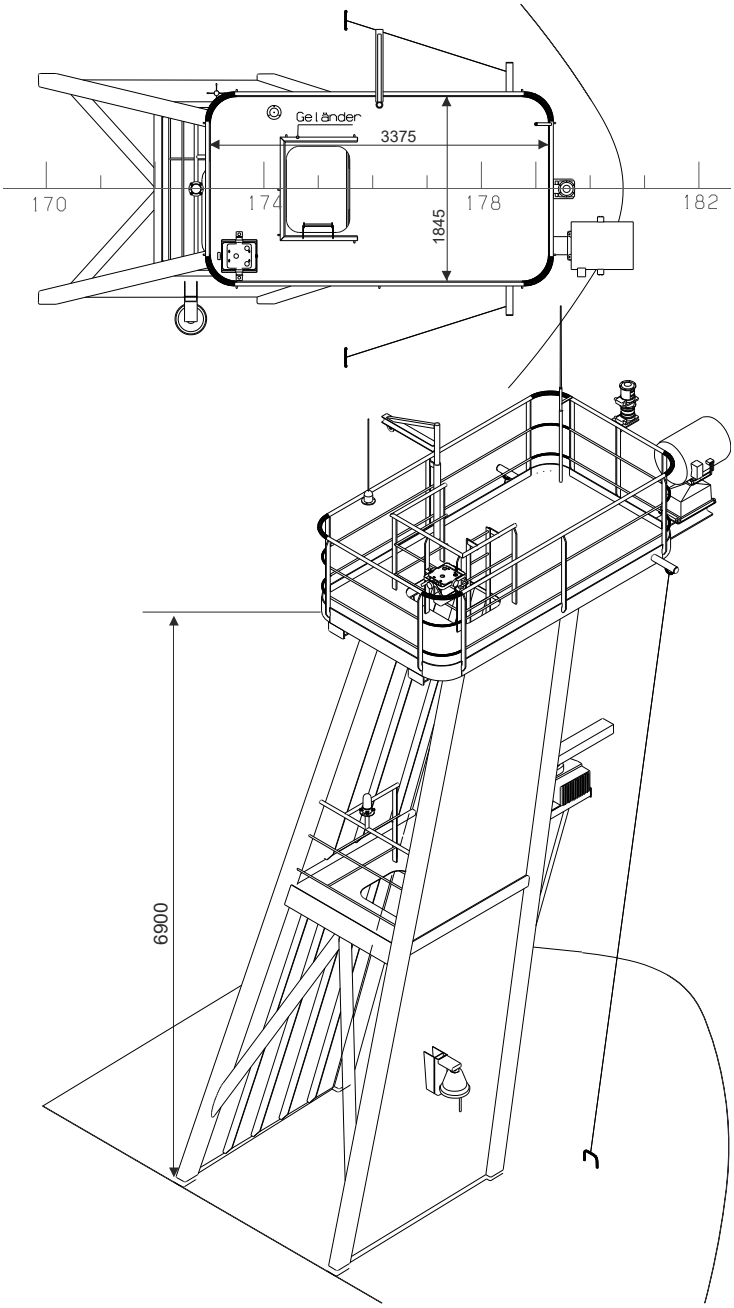
Containerfundamente

Maximum tensile force per 24 mm lashing bush: 5t

4.2. Measurement and signal mast forecastle

On the forecastle deck of 06 (3 superstructure deck) is a measurement and signal mast.

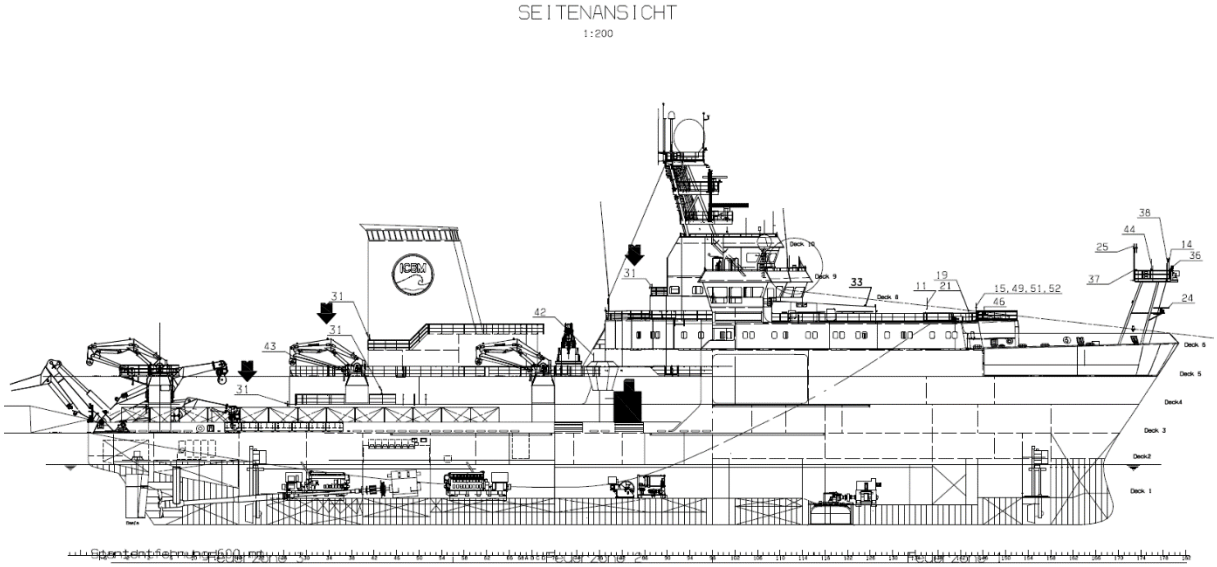
- The measurement platform is arranged such that uncontaminated air flows past the leading edge.
- The size of the platform is 3375 x 1845 mm.
- 230 V AC Normal
- LAN port 1
- A radar antenna wave height meter is installed
- Access is via an internal conductor
- Access and work on the platform for security reasons only after consultation with the guard officer.



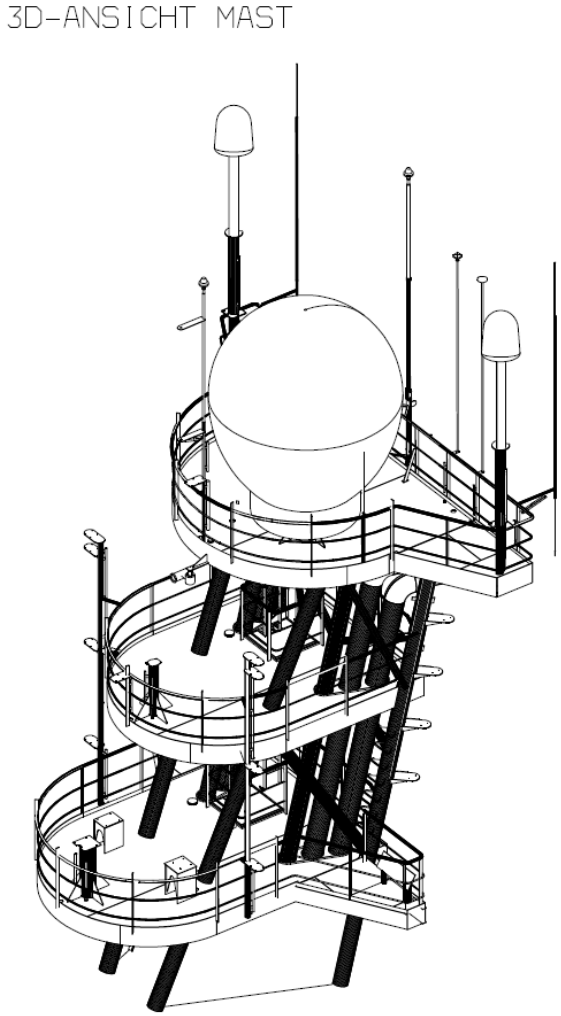
4.3. Antenna arrangement (Index)

Pos.	Bezeichnung	Typ	Bemerkungen	Gerätenummer
55	C-BAND VSAT ANTENNE	v240C		
54	LUFTDRUCKEINLASS		DWD	
53	ENTFÄLLT			
52	Bewegungssensor GNSS Antenne 2		KONGSBERG	993.1020
51	Bewegungssensor GNSS Antenne 1		KONGSBERG	993.1010
50	MF/HF TX/RX Reserveantenne	Draht (Vorbereitet)	SAM	971.1035
49	IALA Beacon	AR10A-300K	Kongsberg/ Comrod	993.1000
48	Leica DGPS Antenne	AS10	Kongsberg/ AeroAntenne	993.1050
47	Fleet Broadband 500 Antenne	TT-3050A	SAM/ Thrane&Thrane	972.1100
46	Geräteträger Strahlungsmesssonden	--	4hJena/ Messen Nord	957.3040
45	Sensor Luftfeuchte/ Lufttemperatur		DWD	957.2035
44	Seefunk Aktiv-Empfangsantenne	STA 10 A	AAS	975.3000
43	GPS Repeater Antenne Nr.2	--	--	993.1502
42	GPS Repeater Antenne Nr.1	--	--	993.1501
41				
40	Magnetkompass	Reflecta 1	Raytheon-Anschütz	951.1220
39	COSPAS-SARSAT EPIRB	KANNAD SAFELINK	SAM	975.2010
38	Windsensor (Ultrasonic Sensor)	--	Kongsberg /Gill	832.1090
37	Bewegungssensor GNSS Ant.Reserve		Kongsberg	
36	Bewegungssensor GNSS Ant.Reserve		Kongsberg	
35				
34	Schallsignalempfang Microphoneeln.	SRD 414 / 2	SAM/ Zöllner	964.1000
33	VDR Datenschutzkapsel	FRM	SAM/ Interschalt	958.1160
32	Windsensor	Ultrasonic 2D-a	DWD / Thies	957.xxxx
31	UHF Paging Antenne	UHF Typ 1, Outdoor	SAM/ Kathrein	976.1001/1003/1010/4002/4102
30				xxx.xxxx
29	UKW Antenne Nr.6	CXL2-1	SAM/ Procom	973.1630
28	UKW Antenne Nr.5	CXL2-1	SAM/ Procom	973.1530
27	Sat TV Antenne	Seatel 5004A	SAM/ Combham-Seatel	935.1000
26				
25	UKW-Funkpeilantenne Adcock	EA-351A	"SAM/ Taiyo TD-A1630	953.1190
24	Radarantenne 3, 5"X-Band	GR 3050 mit GR 3020	SAM (mit Wellenrader)	952.1560/1570
23	Radarantenne 2, 8"X-Band	GR 3050 mit GR 3020	SAM	952.1510/1520
22	Radarantenne 1, 14"S-Band	GR 3051 mit GR 3021	SAM	952.1460/1470
21	SAT LOG GPS Antenne	MGL 4 / Saab R4	SAM/ Hemishere	954.1090
20	DGPS Antenne Nr. 2	MGL 4 / Saab R4	SAM/ Hemishere	953.1090
19	DGPS Antenne Nr. 1	MGL 4 / Saab R4	SAM/ Hemishere	953.1000
18	Starlink Nr. 2			
17	Starlink Nr. 1			
16	Fleet Broadband 500 Antenne	TT-3050A	SAM/ Thrane&Thrane	972.1000
15	AIS GPS Antenne	GPS 4	SAM/ Procom	959.1010
14	AIS UKW Antenne	CXL2-1	SAM/ Procom	959.1040
13				
12	Navtex Antenne	ANT-2K-ROD	SAM	978.1710
11	UKW Antenne Nr.4 (SrtP)	CXL2-1	SAM/ Procom	973.1430
10	UKW Antenne Nr.3	CXL2-1	SAM/ Procom	973.1330
9	UKW-DSC Antenne Nr.2	CXL2-1	SAM/ Procom	973.1290
8	UKW Antenne Nr.2	CXL2-1	SAM/ Procom	973.1280
7	UKW-DSC Antenne Nr.1	CXL2-1	SAM/ Procom	973.1140
6	UKW Antenne Nr.1	CXL2-1	SAM/ Procom	973.1130
5	Inmarsat C Antenne Nr.2	TT-3027C	SAM/ Thrane&Thrane	972.1600
4	Inmarsat C Antenne Nr.1	TT-3027C	SAM/ Thrane&Thrane	972.1500
3	MF/HF DSC Antenne	AR72	SAM/ Comrod	971.1040
2	MF/HF Antennen Koppler	6381	SAM/ Thrane&Thrane	971.1010
1	MF/HF TX/RX Antenne	AT 100 D	SAM/ Comrod	971.1030

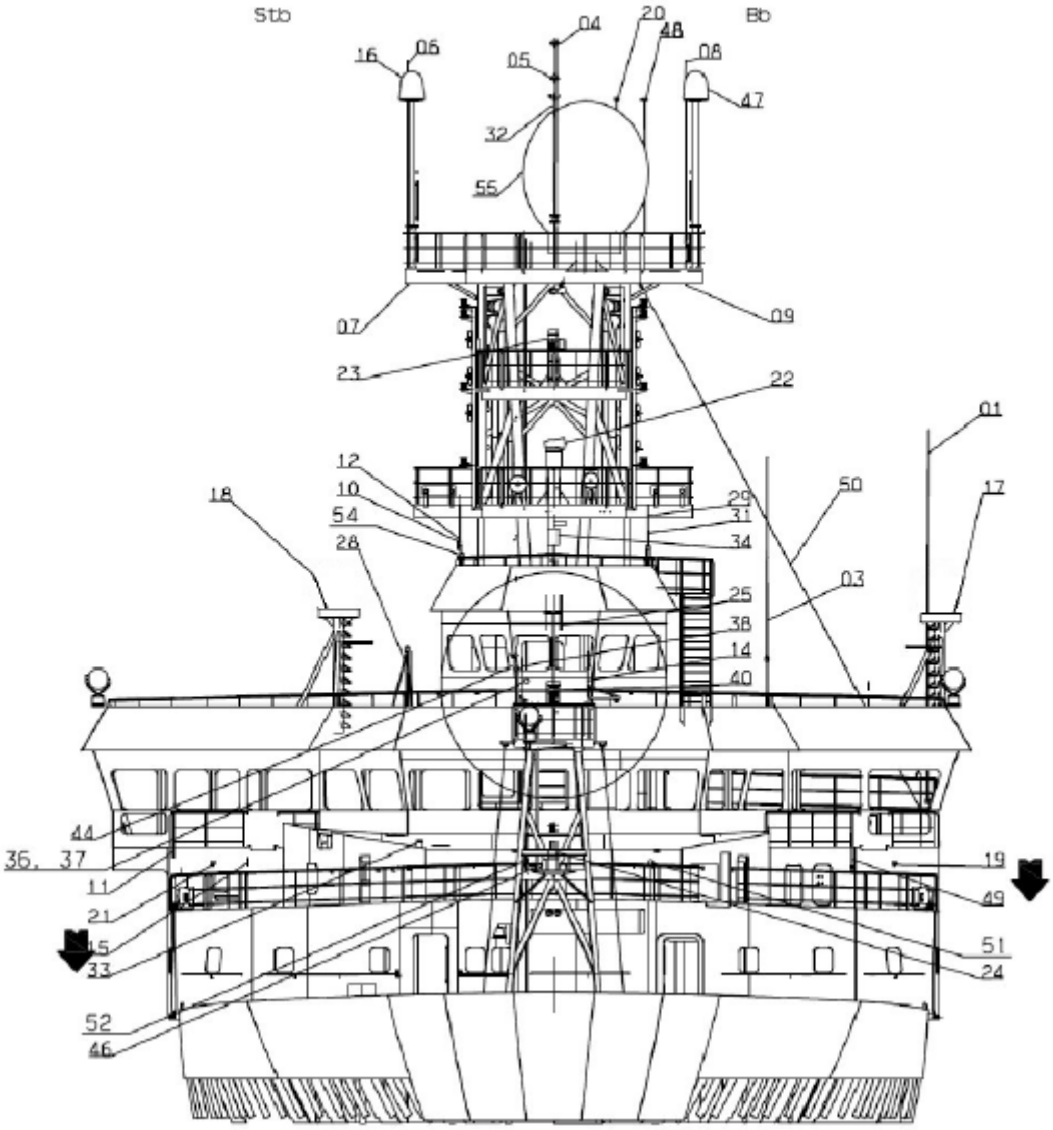
4.4. Antenna Configuration (Views)



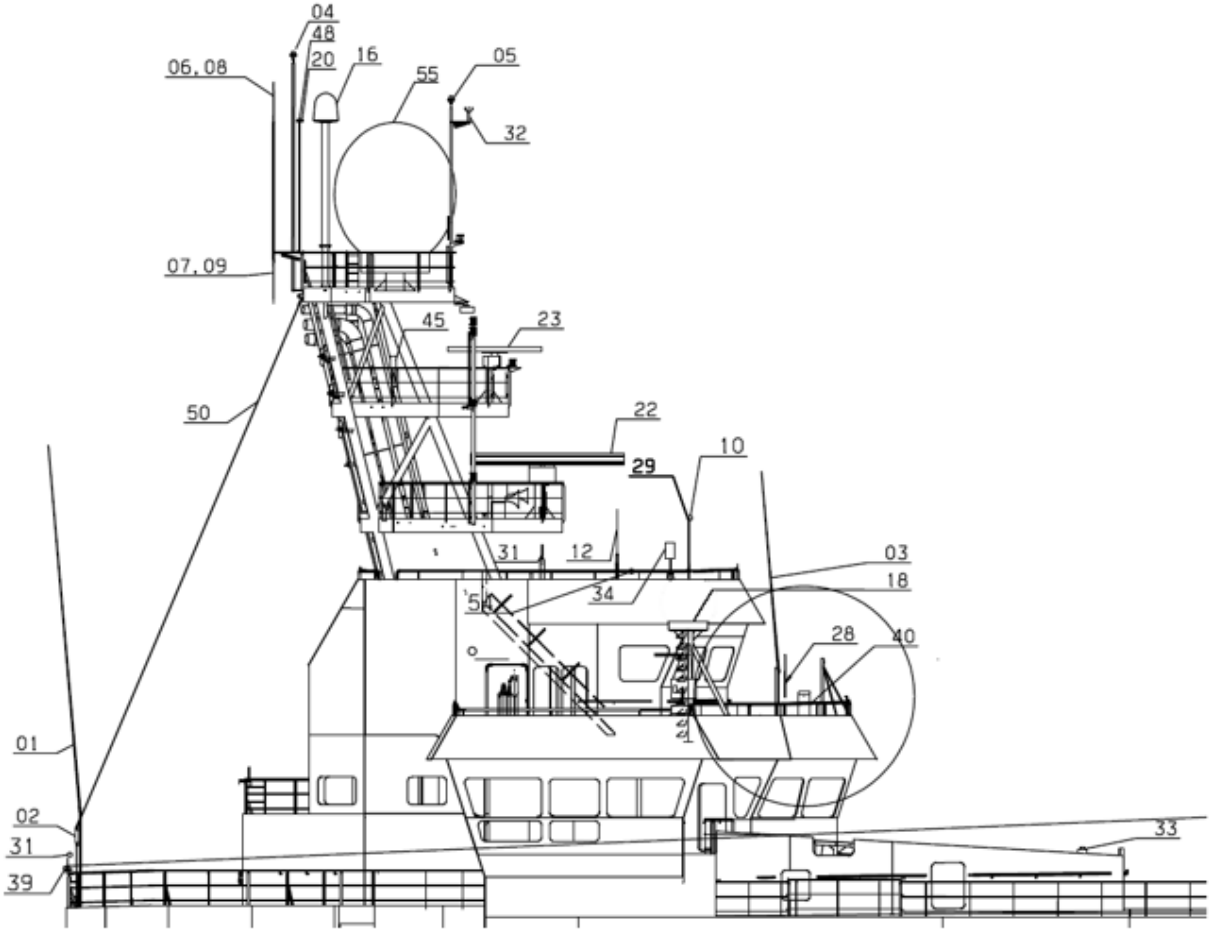
4.4.1. 3D-View Main Mast



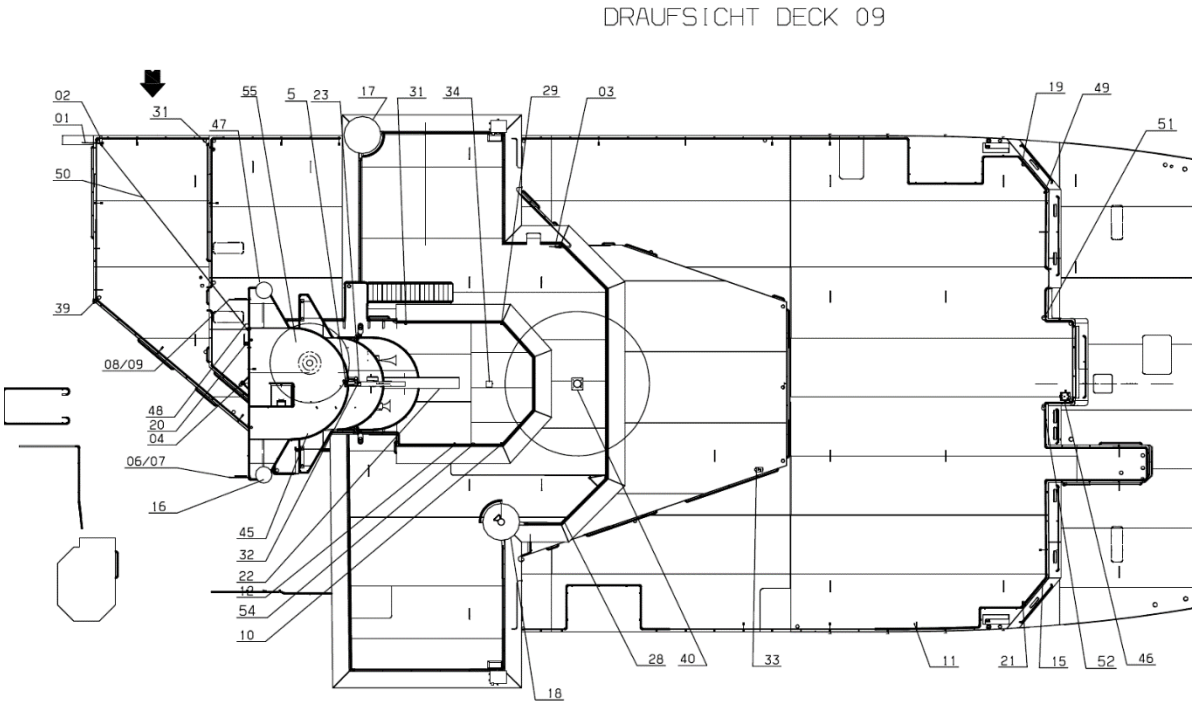
4.4.2. Front view of the Main Mast



4.4.3. Side view of the Main Mast



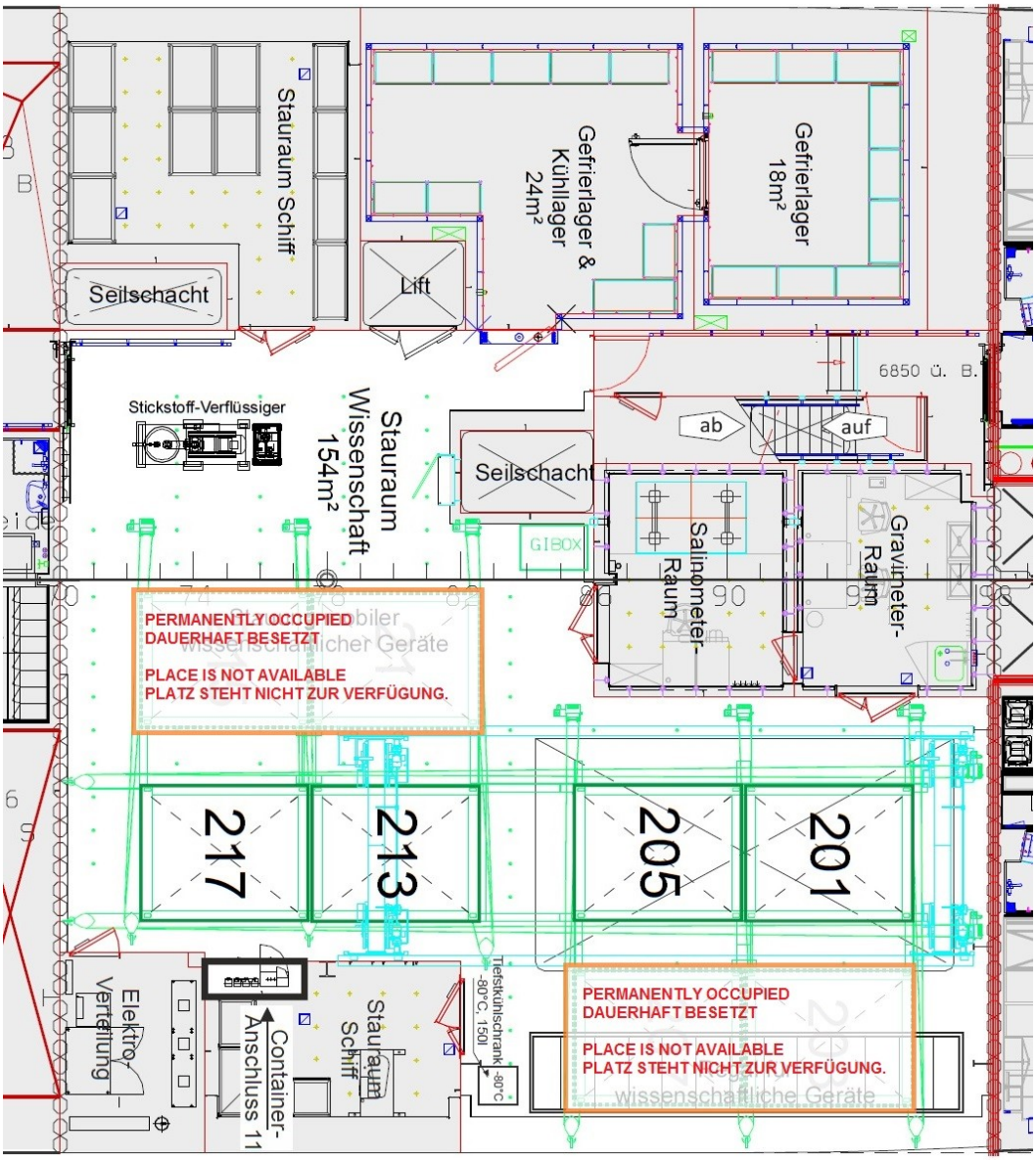
4.4.4. Top view of the Main Mast



5. Container

5.1. Container storage areas

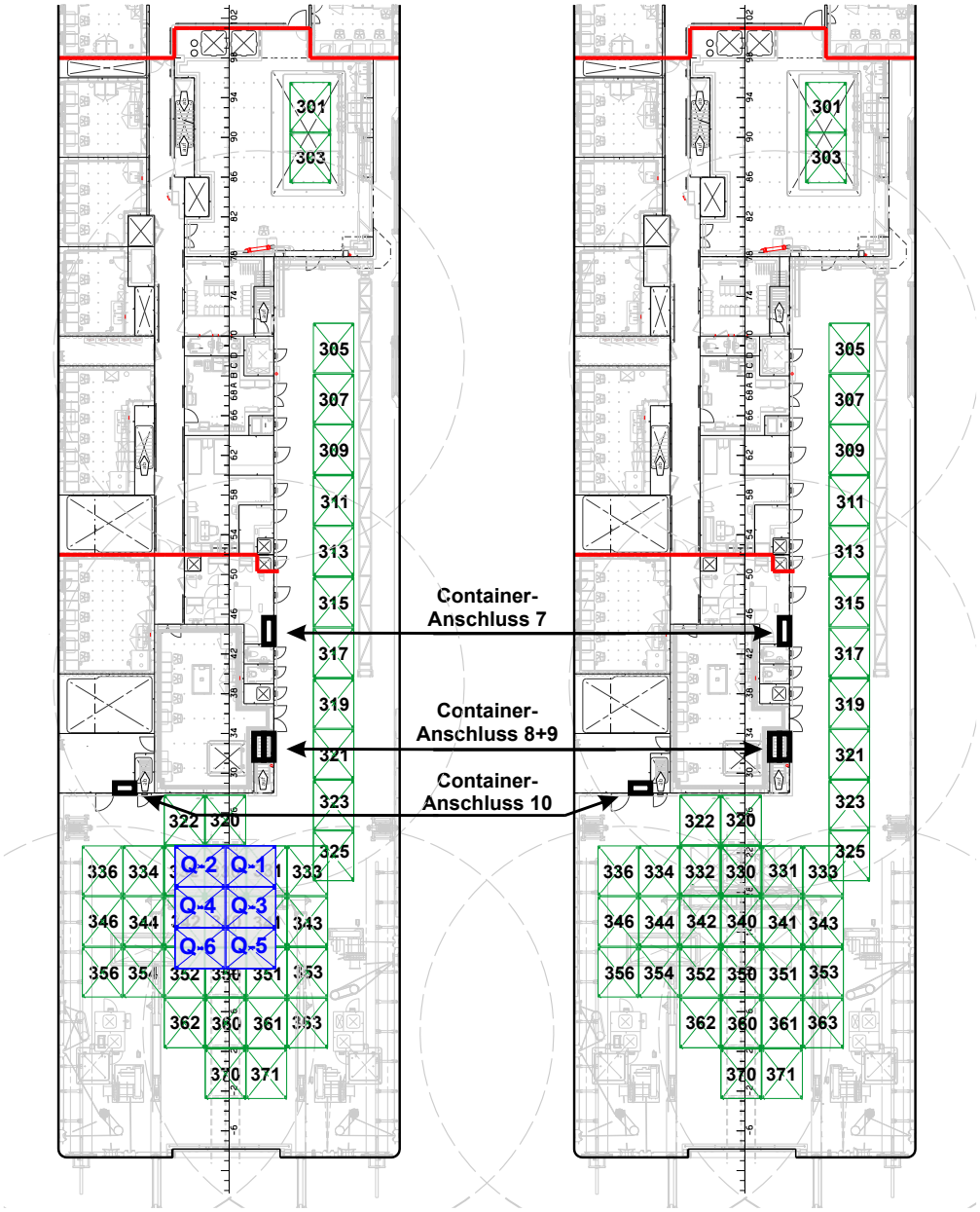
5.1.1. Container storage areas Deck 02



Maximum Stackloads : 4x 10´-Container each 6t or 2x 20´-Container each 12t

Maximum traction lashing bushes : 5 to

5.1.2. Container Deck 03 (Main deck)



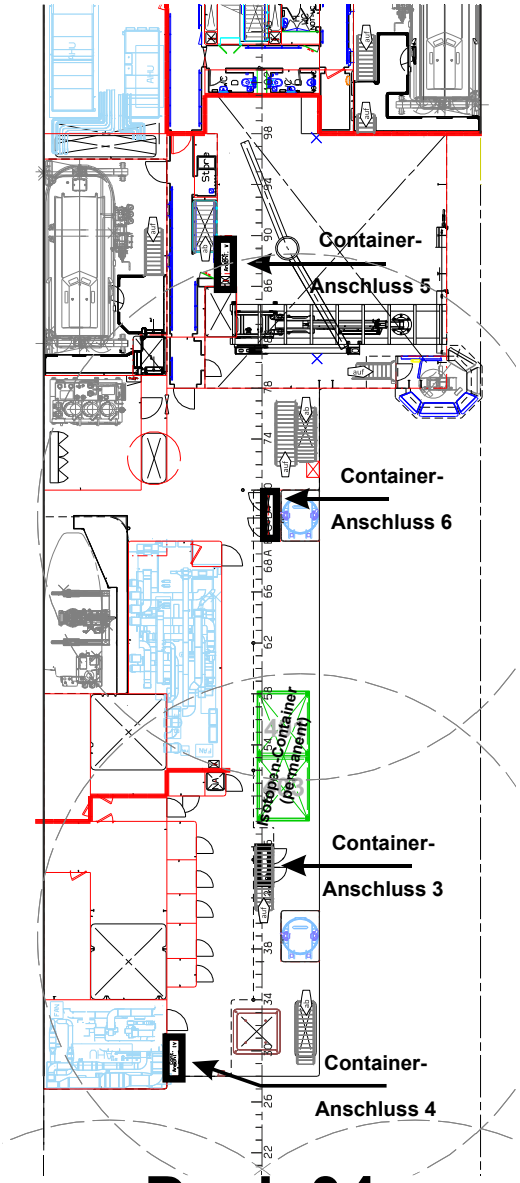
Maximum Stackloads:

In Hangar on hatch cover: 2x 10´-Container each 6t or 1x 20´-Container 12t.

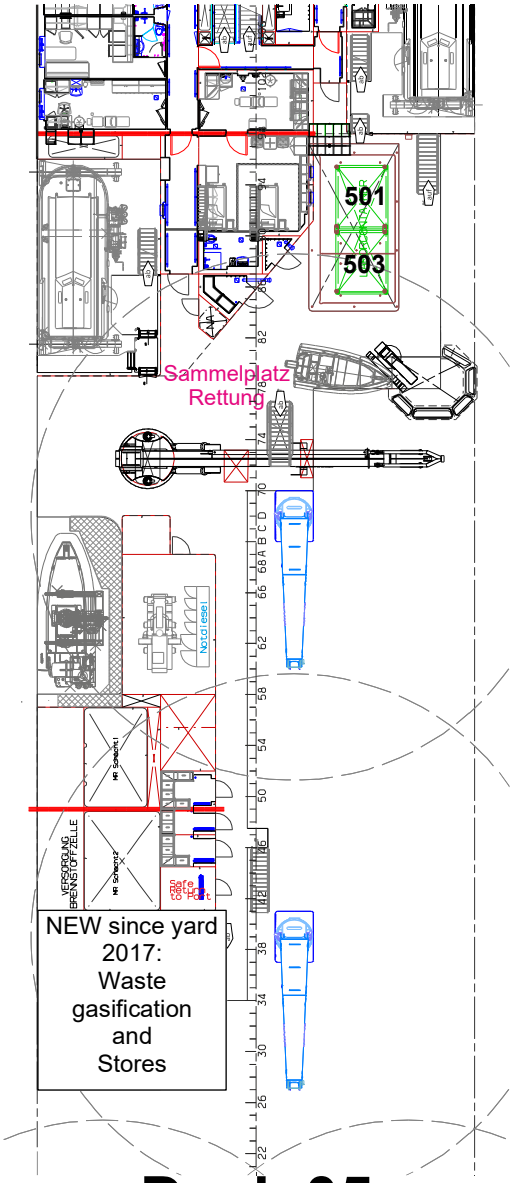
Outside: 10´-Area each 22,5t (= max 2x 10´-Container each max. 11,25t one above the other).
20´-Area each 45t (= max 2x 20´-Container each max. 22,5t one above the other).

Maximum traction lashing bushes: 5t

5.1.3. Container storage areas Deck 04 and Deck 05



Deck 04



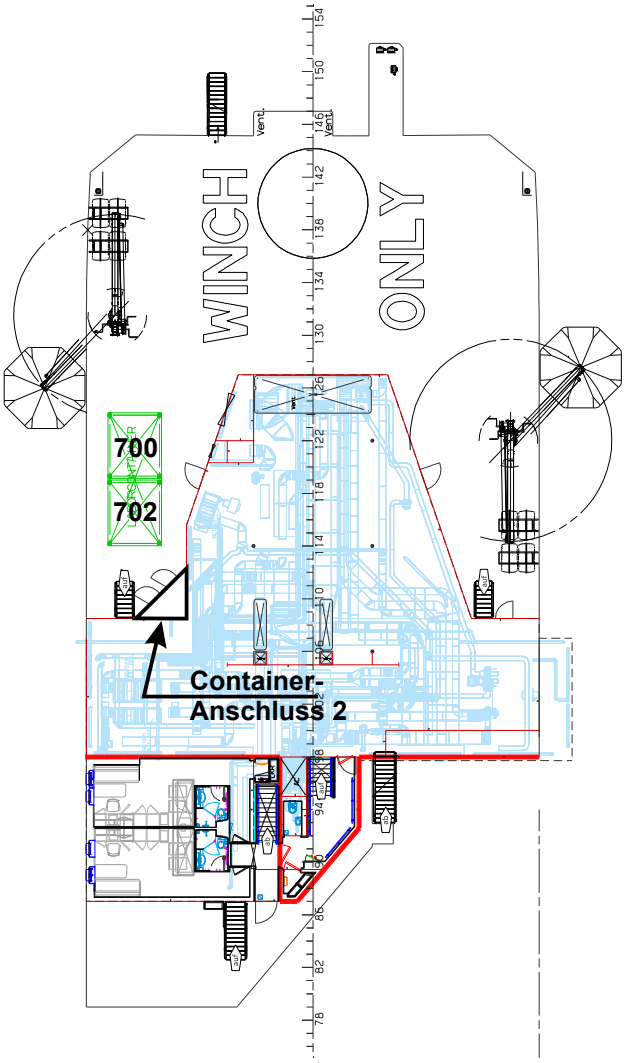
Deck 05

Maximum Stackloads Deck 04: 2x 10´-Container each 6t or 1x 20´-Container each 12t

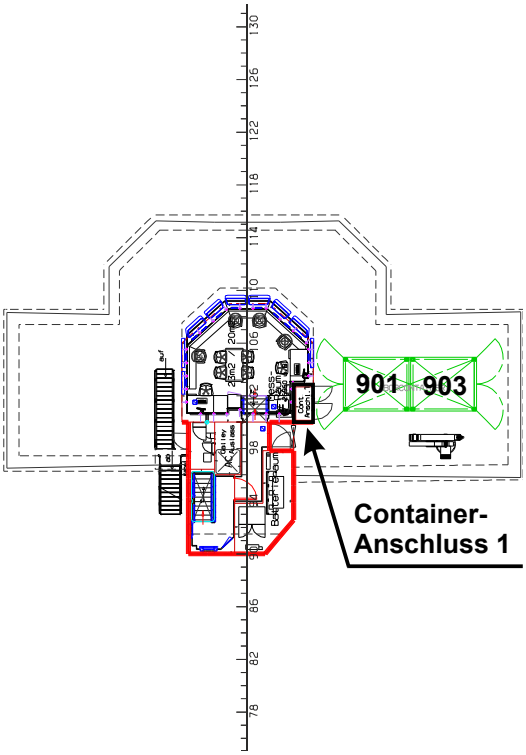
Maximum Stackloads Deck 05: 2x 10´-Container each 6t or 1x 20´-Container each 12t. on the hatch cover.

Maximum traction lashing bushes: 5t

5.1.4. Container storage areas Deck 07 and Deck 09



Deck 07



Deck 09

Maximum Stackloads Deck 07:	2x 10´-Container each 5t or 1x 20´-Container each 10t These places can not be reached with the ship's crane
Maximum Stackloads Deck 09:	2x 10´-Container each 3t or 1x 20´-Container each 10t These places can not be reached with the ship's crane
Maximum traction lashing bushes:	5t

5.2. Lab-Container terminal boxes

Container terminal box	01	02	03	04	05	06	07	08	09	10	11
Deck Frame	09 102 StB	07 110 BB	04 38 MS	04 29 BB	04 88 MS	04 69 MS	03 44 StB	03 32 StB	03 32 StB	03 28 BB	02 76 StB
230V 16A Network white	3		3	3	4	3	2	2	1	2	4
230V 16A Network red	3	4	3	3	3	3	2		1	2	4
400V 16A Three-phase	1				2			2	1	2	3
400V 32A Three-phase	1	1	2	2	2	2	2	1	2	2	3
400V 63A Three-phase						1	2	1		1	
LAN 1	4	4	4	4	4	4	4	4	4	4	4
Fire alarm system Public address system Intercom Phone (LAN2)	1	1	1	1	1	1	1	1	1	1	1
Connections for single-core cable winches					1			1		1	1
Connector for cable entry	1	1	1	1		1	1	1		1	
Cold water	1	1	1	2	1	2	2	1	1	1	3
Warm water	1	1	1	2	1	2	2	1	1	1	3
Destillat			1								
Seawater/Centrifugal pump	1	1	1	1	1	2	1	1	1	1	2
Seawater/Diaphragm pump	1	1	1	1	1	2	1	1	1	1	2
Grey water (waste water)	1	1	1	1	1	1	1	1	1	1	1
Laboratory waste water.			1	1	1	1	1	1	1	1	1
Scupper	**1**	1	1	1		1	1	1	1	1	
Laboratory compressed air	2	2	2		2	2	2	2	2		2
Compressed air 0-6 bar	4	4		2			2	2		2	6
High pressure air 208 bar							2				
Overproduction							2				
Condensate drain							2				
Sea cooling water / feed							2				
Sea cool water / drain							2				
Fire water	1					3		2		2	
Sewage blind flange							2	2		2	

Container terminal box 07 = connection Seismik-Container
Container terminal box 03 = connection Isotopen-Container

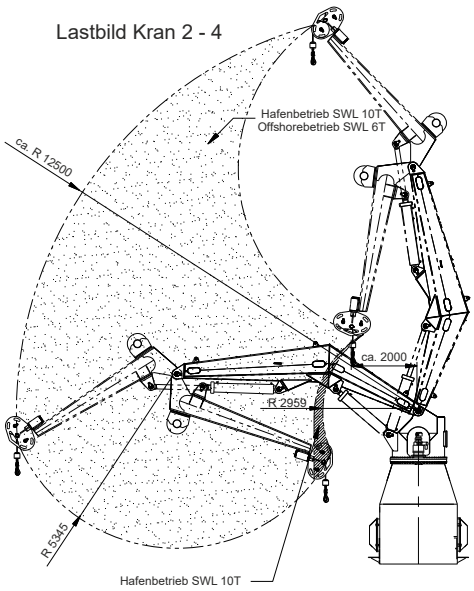
6. Hoisting equipment

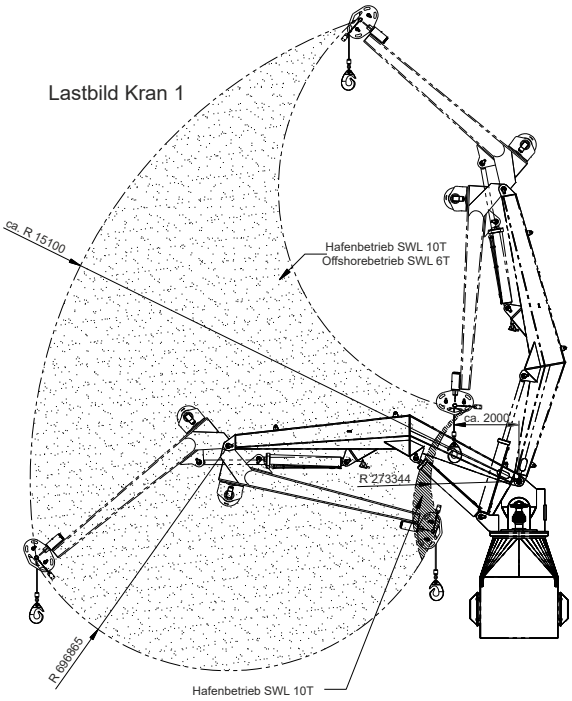
6.1. Crane 1 – 4 / Working cranes

6.1.1. Specifications

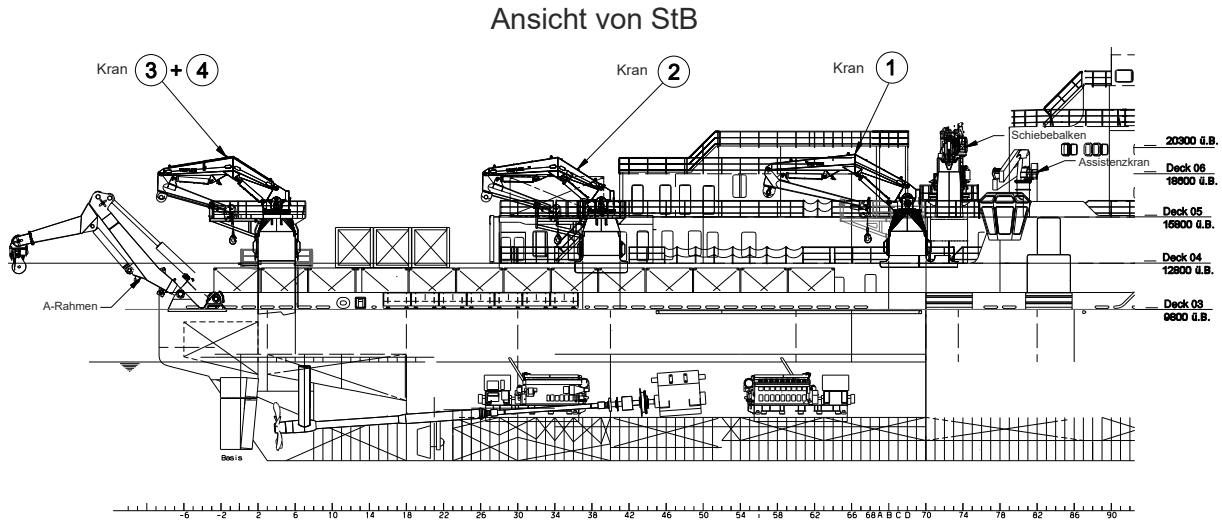
	Kran 1	Kran 2-4
Lifting capacity	150,0 Tm	124,0 Tm
Working load port operation	SWL 10t	SWL 10t
Working load offshore operation	SWL 6t	SWL 6t
Effective rope length of winch approximately	60 m	60 m
Hoist speed	0 … 25 m/min	0 … 25 m/min
Winch capacity rapid	25 kN	25 kN
Hoist speed rapid	0 … 60 m/min	0 … 60 m/min
Max. swing radius hook	15,1 m	12,5 m
Min. swing radius hook	2,0 m	2,0 m
Slewing torque	715 kNm	500 kNm
Slewing angle	360°	360°
Slewing speed	0 … 1,0 rpm	0 … 1,0 rpm
Luffing time up / in	55 / 50 s	55 / 50 s
Jib time out / in	55 / 50 s	40 / 35 s
Max. heel / trim when slewing	10° / 3°	10° / 3°

6.1.2. Load pictures crane 1 to 4

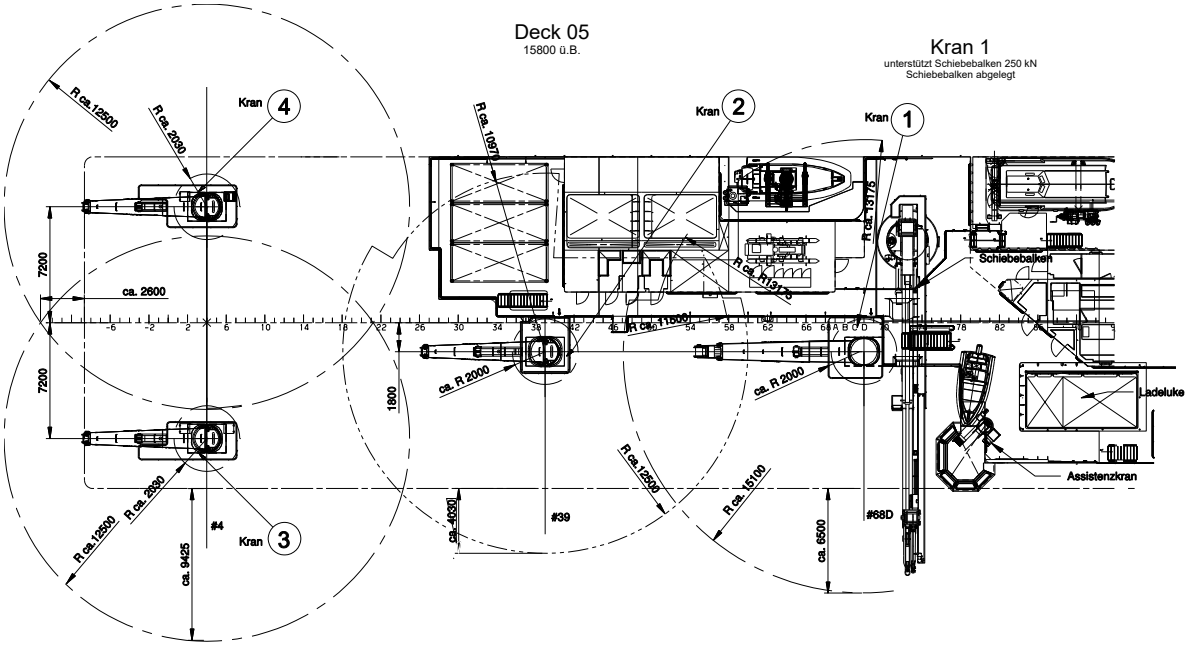




6.1.3. Crane Arrangement

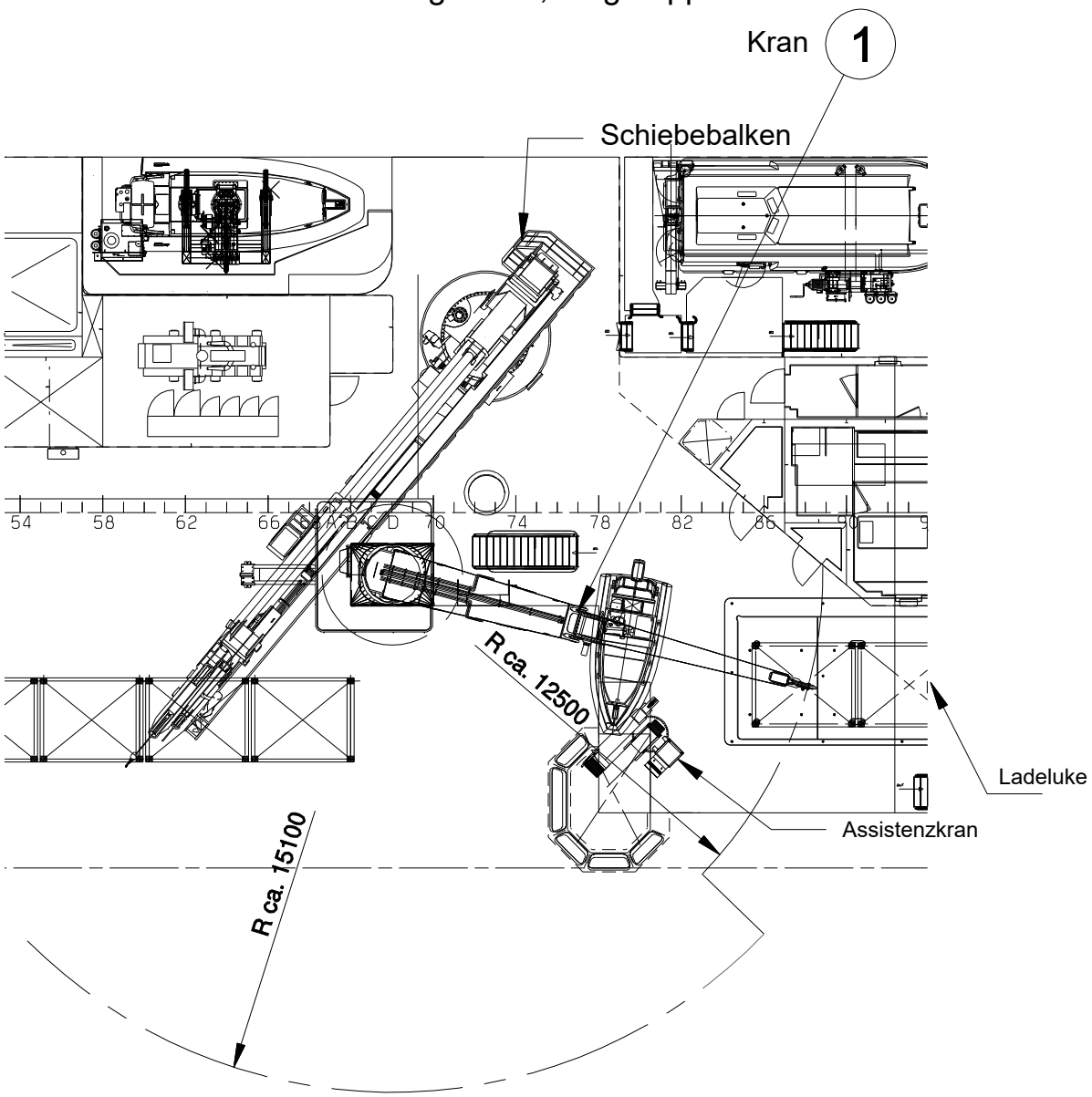


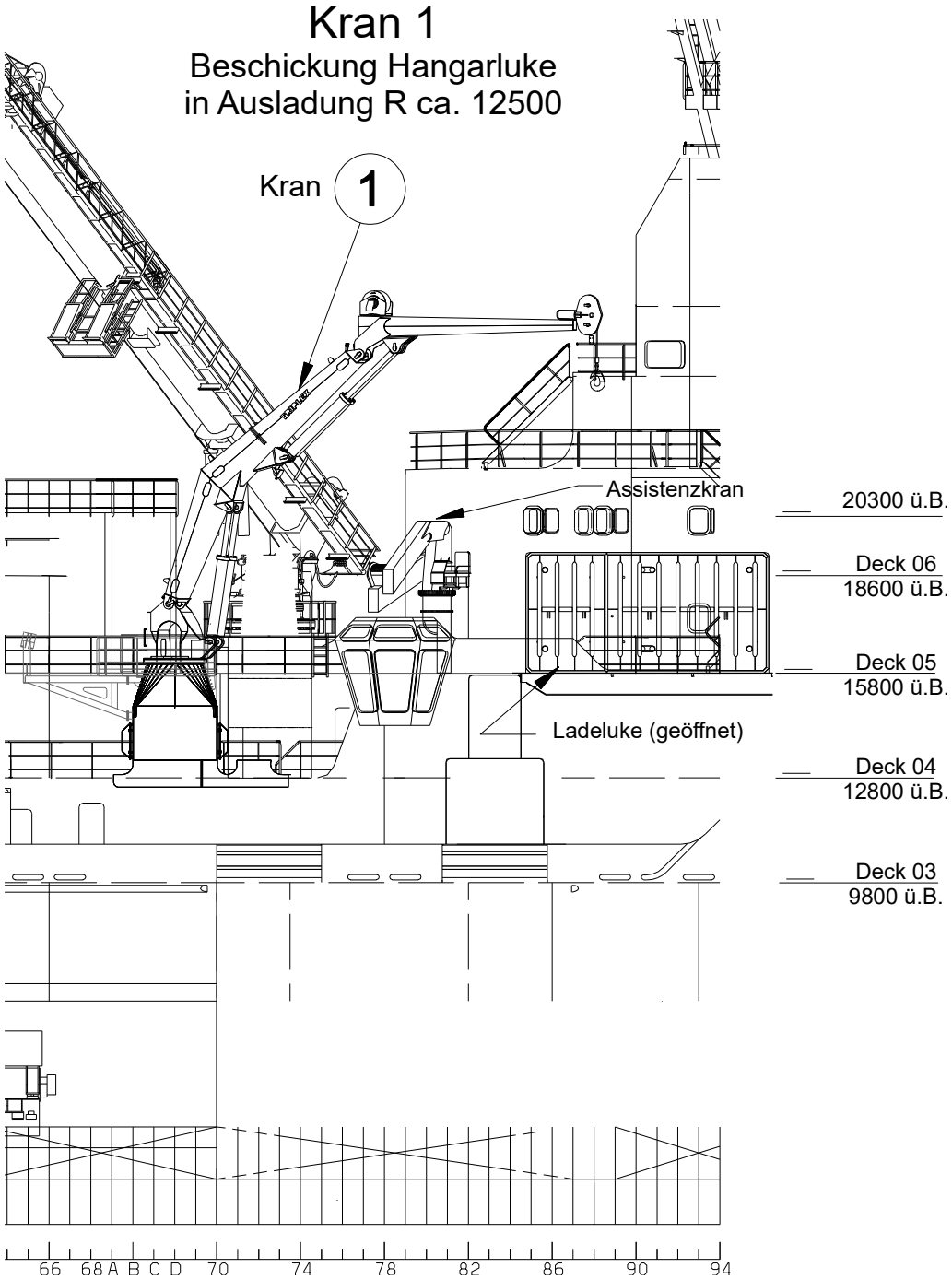
6.1.4. Outreach of Cranes



6.1.5. Crane 1

Kran 1
Beschickung Hangarluke
Schiebebalken nach hinten gedreht, aufgetoppt




Kran 1
Beschickung Hangarluke
in Ausladung R ca. 12500
Kran 1
Assistenzkran
20300 ü.B.
Deck 06
18600 ü.B.
Deck 05
15800 ü.B.
Ladeluke (geöffnet)
Deck 04
12800 ü.B.
Deck 03
9800 ü.B.
66 68 A B C D 70 74 78 82 86 90 94

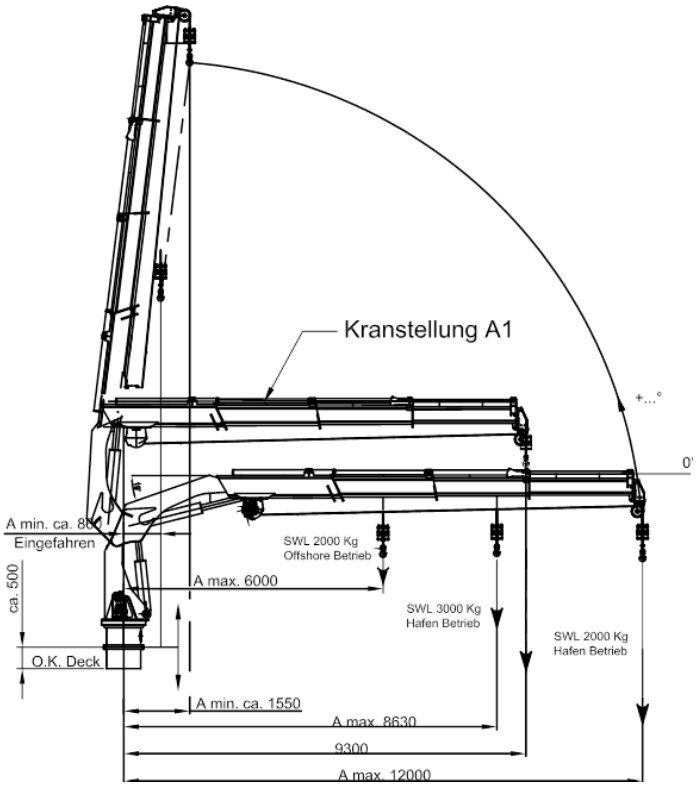
6.2. Assistant Cranes

6.2.1. Crane 5 / Assistant crane work boat

6.2.1.1. Technical Data

Operation	Radio remote and from the central control station
Laid lifting capacity at maximum reach	24 Tm
Workig load port operation	2000 kg SWL at 12,00m outreach
At 220 bar hydraulic pressure (Workig load port operation)	3000kg SWL at 8.63m outreach
Workig load offshore operation Significant wave height 2 meter (SWH) to H ⅓	2000 kg SWL at 6,00m outreach
Max. swing radius hook	12000 mm
Telescopic prolongation	3 each
Telescopic speed	0 - 9 m/min
Min. swing radius hook	ca. 860/ 1550 mm
Rope length	60 m
Slewing tourque	107910 Nm
Slewing speed	0 ..... 1,0 1/min
Slewing angle	unlimited
Luffing time	30 sec
Buckling time	45 sec
Lifting speed	0 - 30 m/min
Heel / trim	10°/ 3°

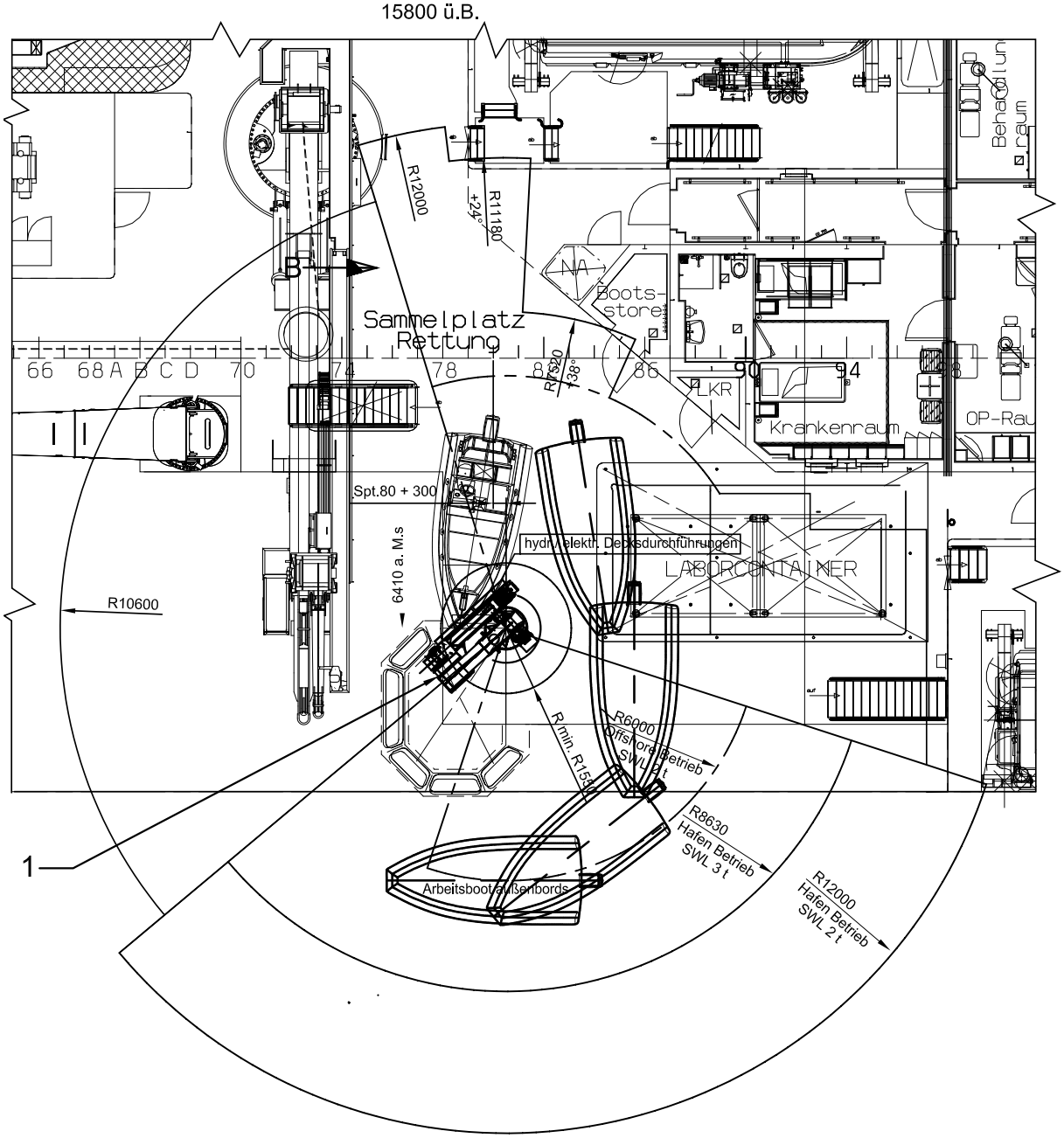
6.2.1.2. Outreach



6.2.1.3. Handling work boat

Draufsicht Deck 05

15800 ü.B.

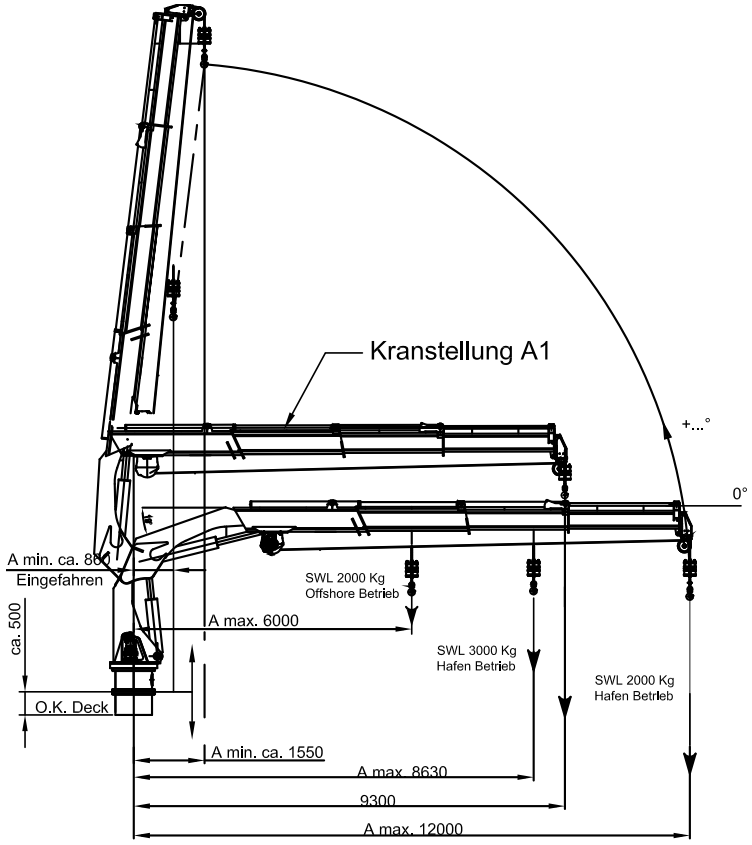


6.2.2. Crane 6 / Assistant crane deck 06 forecastle (provisions crane)

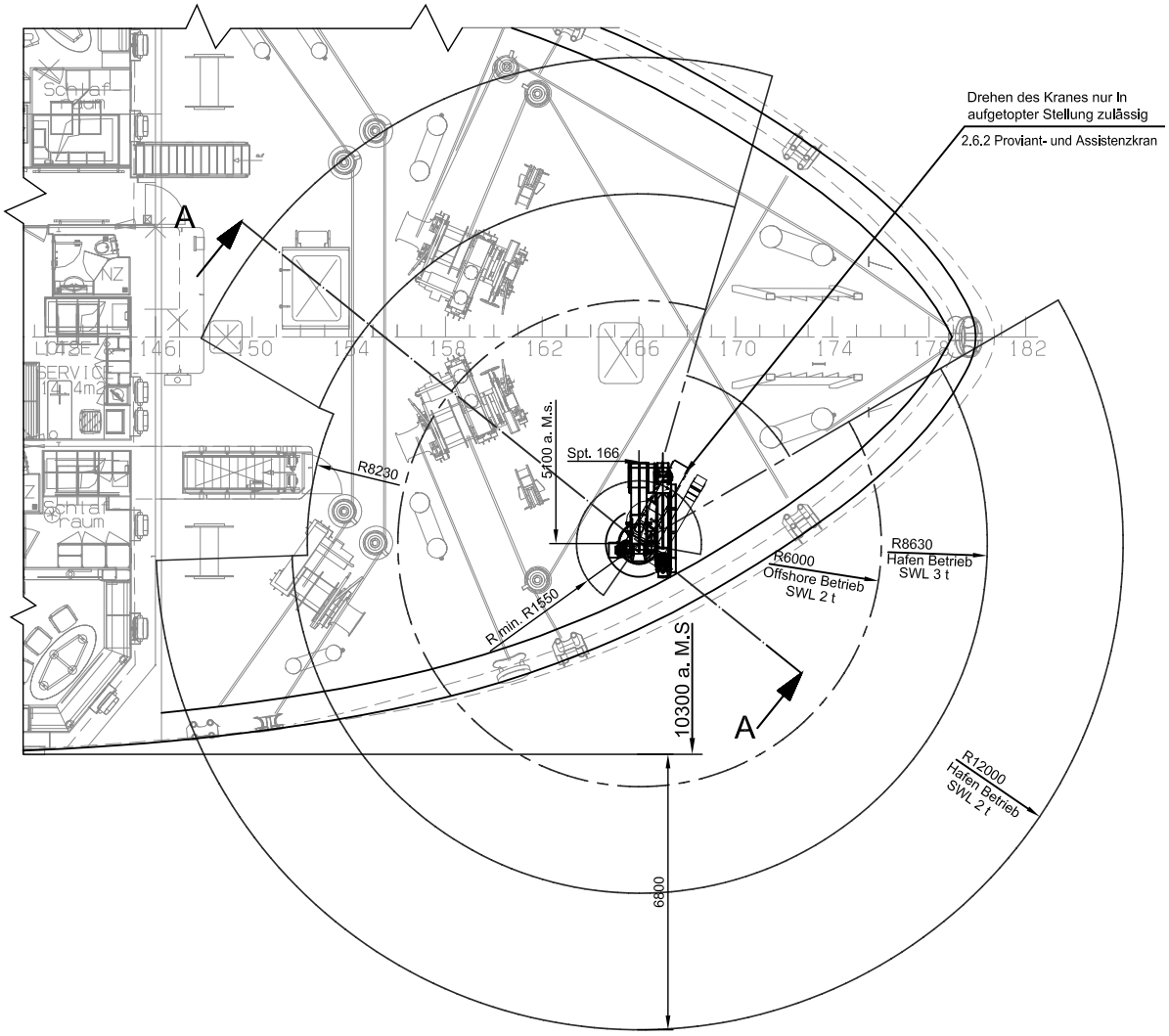
6.2.2.1. Technical Data

Operation	Radio remote and from the central control station
Laid lifting capacity at maximum reach	24 Tm
Workig load port operation	2000 kg SWL at 12,00m outreach
At 220 bar hydraulic pressure (Workig load port operation)	3000kg SWL at 8.63m outreach
Workig load offshore operation Significant wave height 2 meter (SWH) to H ⅓	2000 kg SWL at 6,00m outreach
Max. swing radius hook	12000 mm
Telescopic prolongation	3 each
Telescopic speed	0 - 9 m/min
Min. swing radius hook	ca. 860/ 1550 mm
Rope length	60 m
Slewing tourque	107910 Nm
Slewing speed	0 ..... 1,0 1/min
Slewing angle	unlimited
Luffing time	30 sec
Buckling time	45 sec
Lifting speed	0 - 30 m/min
Heel / trim	10°/ 3°

6.2.2.2. Outreach



Draufsicht Deck 06
18600 ü.B.

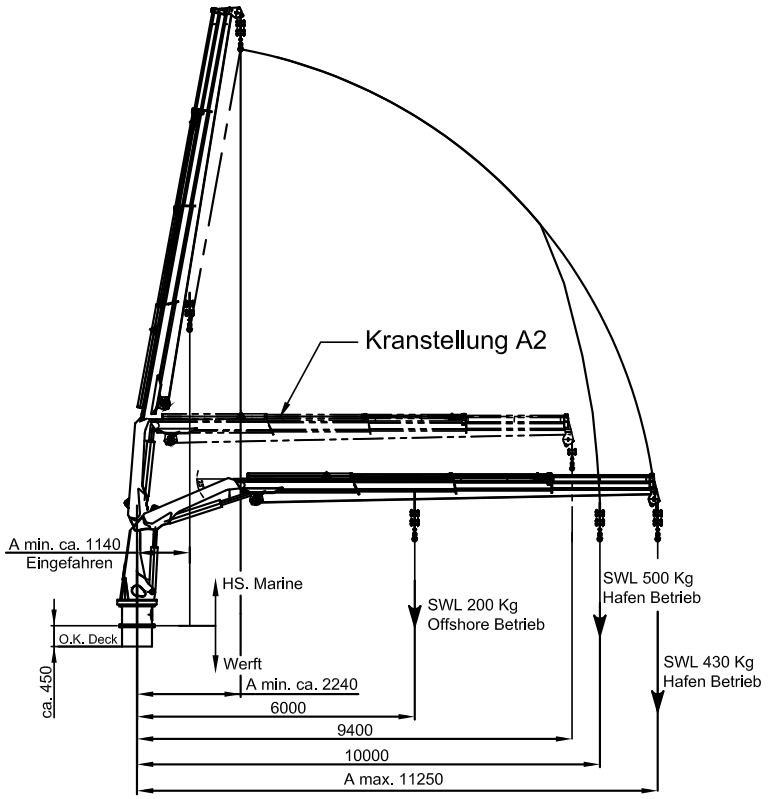


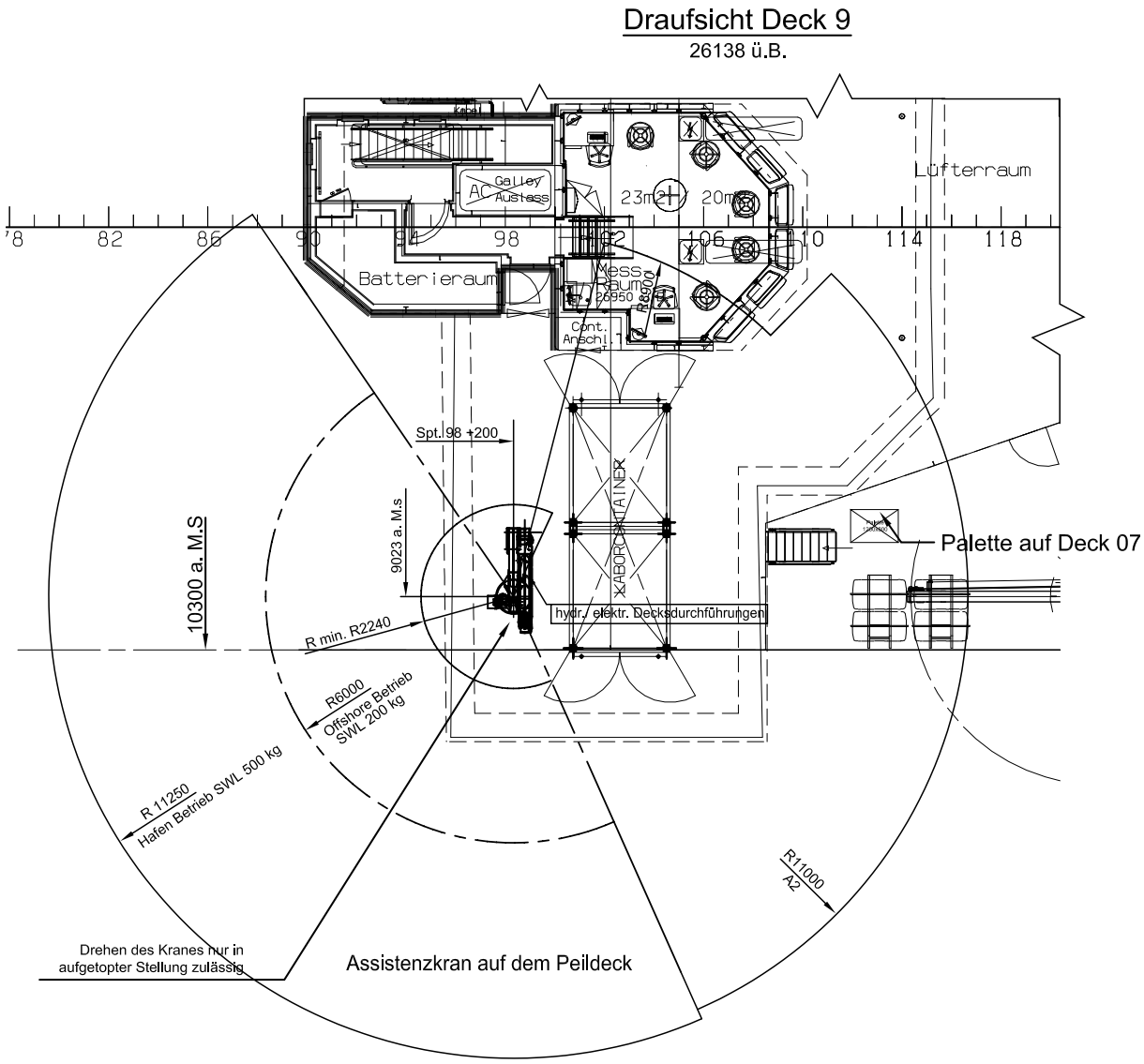
6.2.3. Crane 9 / Assistant crane observation deck

6.2.3.1. Technical Data

Operation	Radio remote
Laid lifting capacity at maximum reach	4,83 Tm
Workig load port operation	430 kg SWL at 11,25m outreach 500kg SWL at 10,00m outreach
Workig load offshore operation Significant wave height 2 meter (SWH) to H ⅓	200 kg SWL at 6,00m outreach
Max. swing radius hook	11250 mm
Telescopic prolongation	3 each
Telescopic speed t	0 - 9 m/min
Min. swing radius hook	ca. 1140 / 2240 mm
Rope length	60 m
Slewing tourque	20601 Nm
Slewing speed	0 ..... 1,0 1/min
Slewing angle	unlimited
Luffing time	20 sec
Buckling time	27 sec
Lifting speed	0 - 40 m/min
Heel / trim	10°/ 3°

6.2.3.2. Outreach



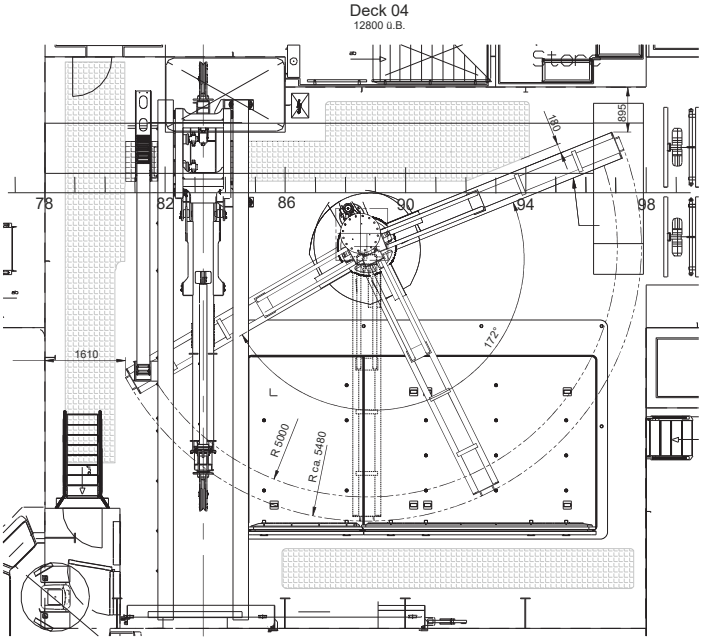

Draufsicht Deck 9
26138 ü.B.
Lüfterraum
Galley Austass
23m²
20m²
Batterieraum
Messraum
26950
Cont. Anschl.
Spt.98 +200
9023 a. M.s
10300 a. M.S
XLABORCONTAINER
Palette auf Deck 07
hydr./ elektr. Decksdurchführungen
R min. R2240
R6000
Offshore Betrieb SWL 200 kg
R 11250
Hafen Betrieb SWL 500 kg
R11000
A2
Drehen des Kranes nur in aufgetopter Stellung zulässig
Assistenzkran auf dem Peildeck

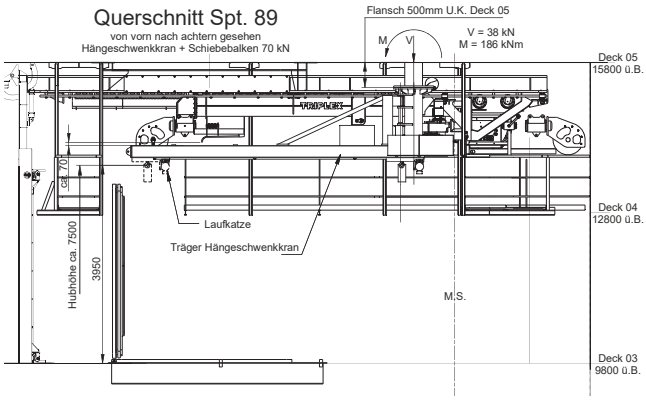
6.2.4. Hangar-hanging jib crane

6.2.4.1. Technical Data

Operation	Radio remote, Emergency directly control
Drive	electric
Crane type	GL crane type A
Heel / trim	10° / 3°
Significant wave height 2 meter (SWH) to H ⅓	2,0 m
Workig load SWL	1,5 t
max. reach	5,0 m
min. reach	ca. 0,5 m
Lifting speed	4 m/min
Lifting height	7,5 m
Turning speed	0,26 1/min
Turning range	172°

6.2.4.2. Arrangement and Outreach





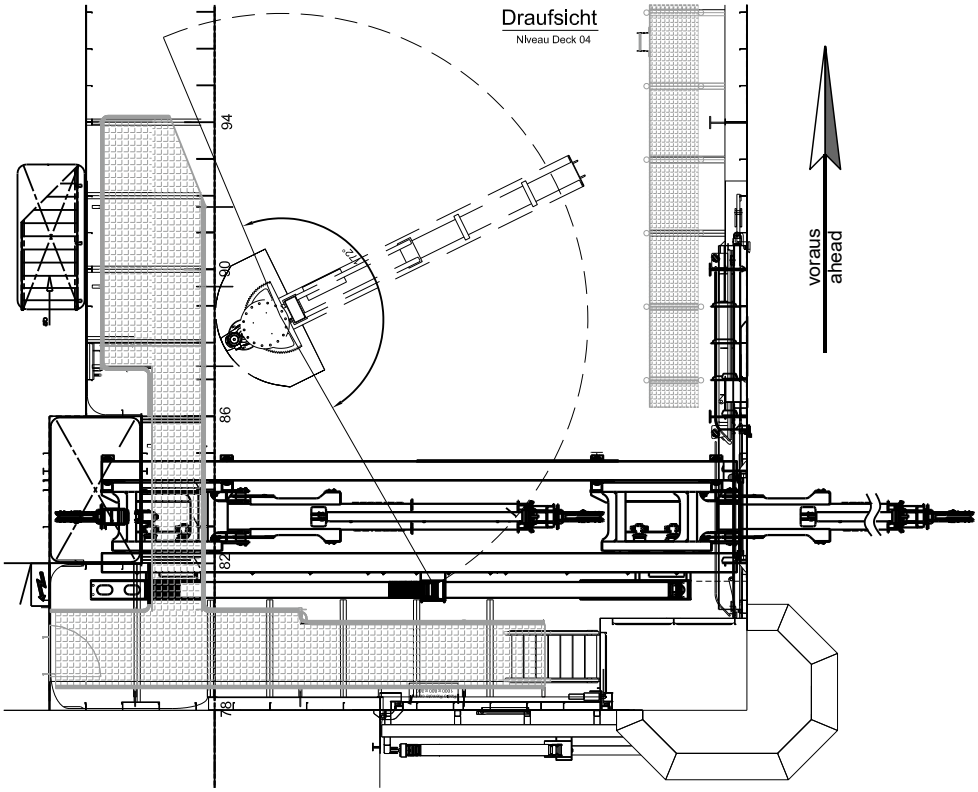
6.3. Hoisting Equipment for scientific puposes

6.3.1. Sliding Beam 70kN

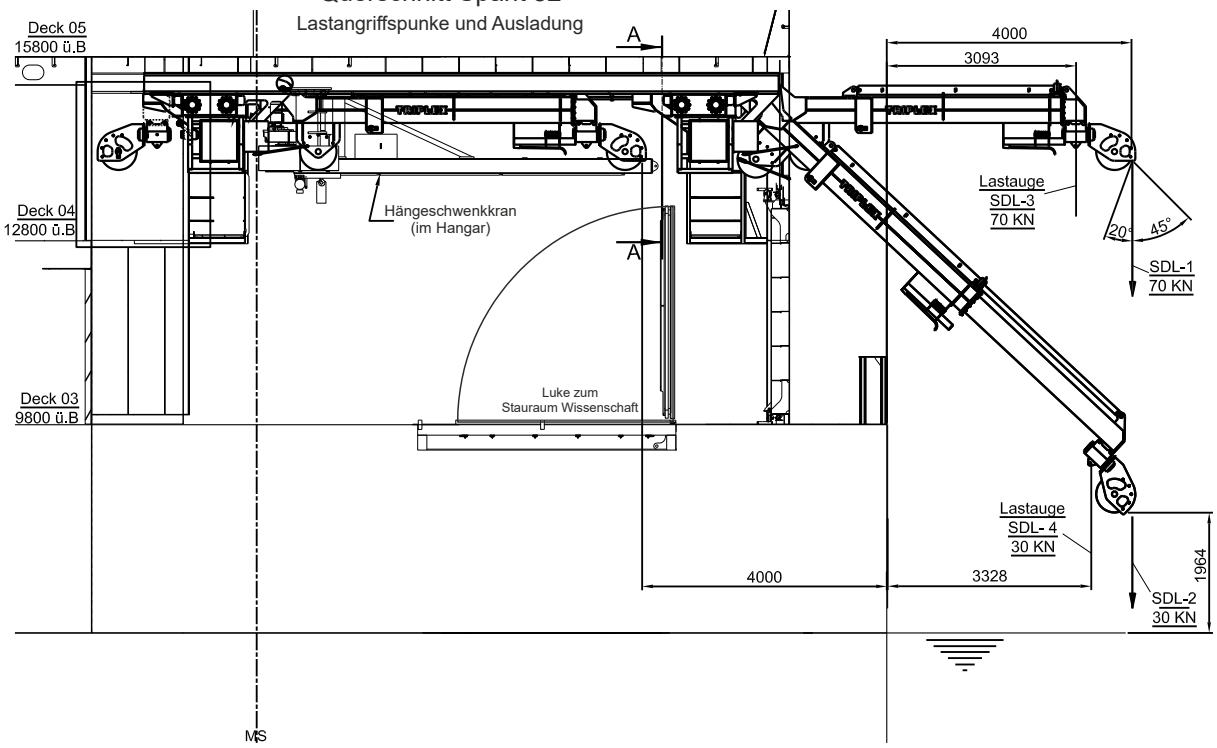
6.3.1.1. Technical Data - according to data sheets hoists REV. 4

Drive	hydraulic
Operation	Radio remote and from the central control station
Breaking strength of the rope used	max. 70 kN
SDL 1 when extended, horizontal position	70 KN
SDL 3 when extended, horizontal position load eye	70 KN
SDL lowered 2 telescopic jib, about 45 °	30 KN
SDL lowered 4 telescopic jib, load eye about 45 °	30 KN
Perm. Rope diameter coming from the cable winch	11 mm cable
Perm. Rope diameter coming from the series winch	8 mm cable
max reach	4,0 m outboard
min. reach	4,0 m inboard
Track car speed - Extend	0-11m/min
Luffing time / Buckling time	35/ 30 s
Telescoping time out / in	45 /40 s
Telescopic jib	lowered to 1.96 m above the water line

6.3.1.2. Views and Outreach

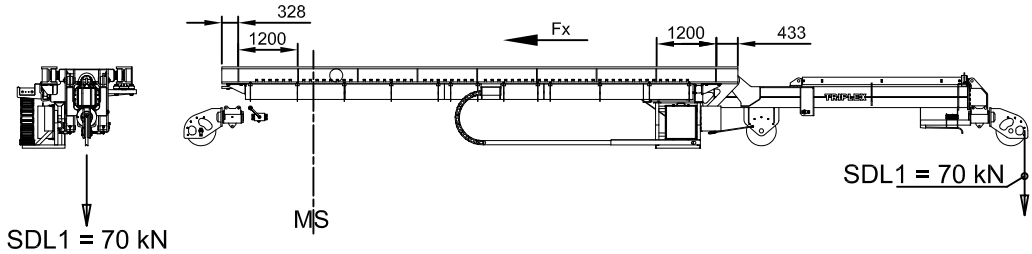


Schiebebalken 70kN
Querschnitt Spant 82
Lastangriffspunke und Ausladung

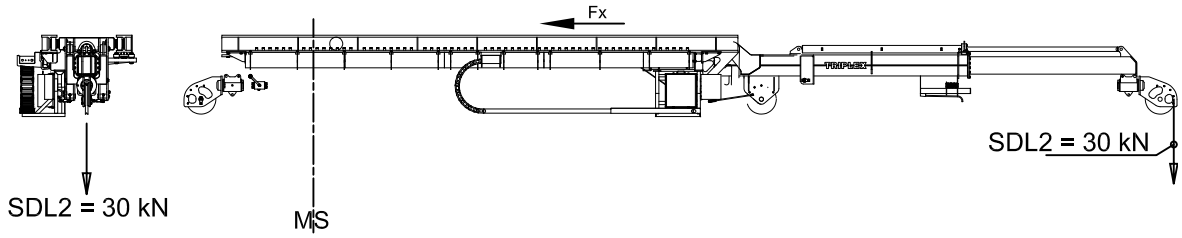


6.3.1.3. Working positions

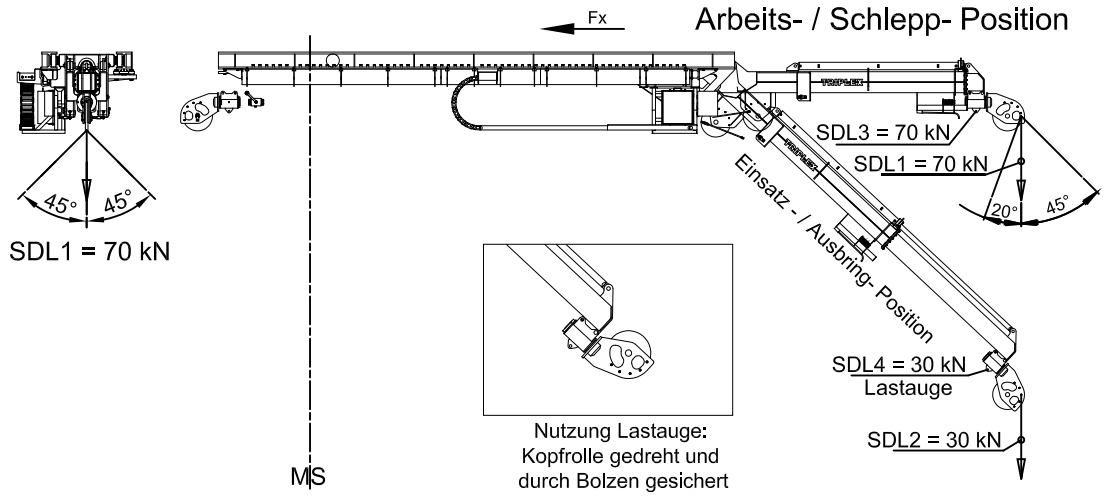
ARBEITSPOSITION ausgefahren



MAX. AUSTELESKOPIERTE POSITION



Arbeits- / Schlepp- Position



6.3.2. Sliding Beams 250kN

6.3.2.1. Technicla Data Sliding Beams 250 kN

Drive	hydraulic 16t winch for crane operation 10 t winch assistant
Operation	Radio remote and from the central control station

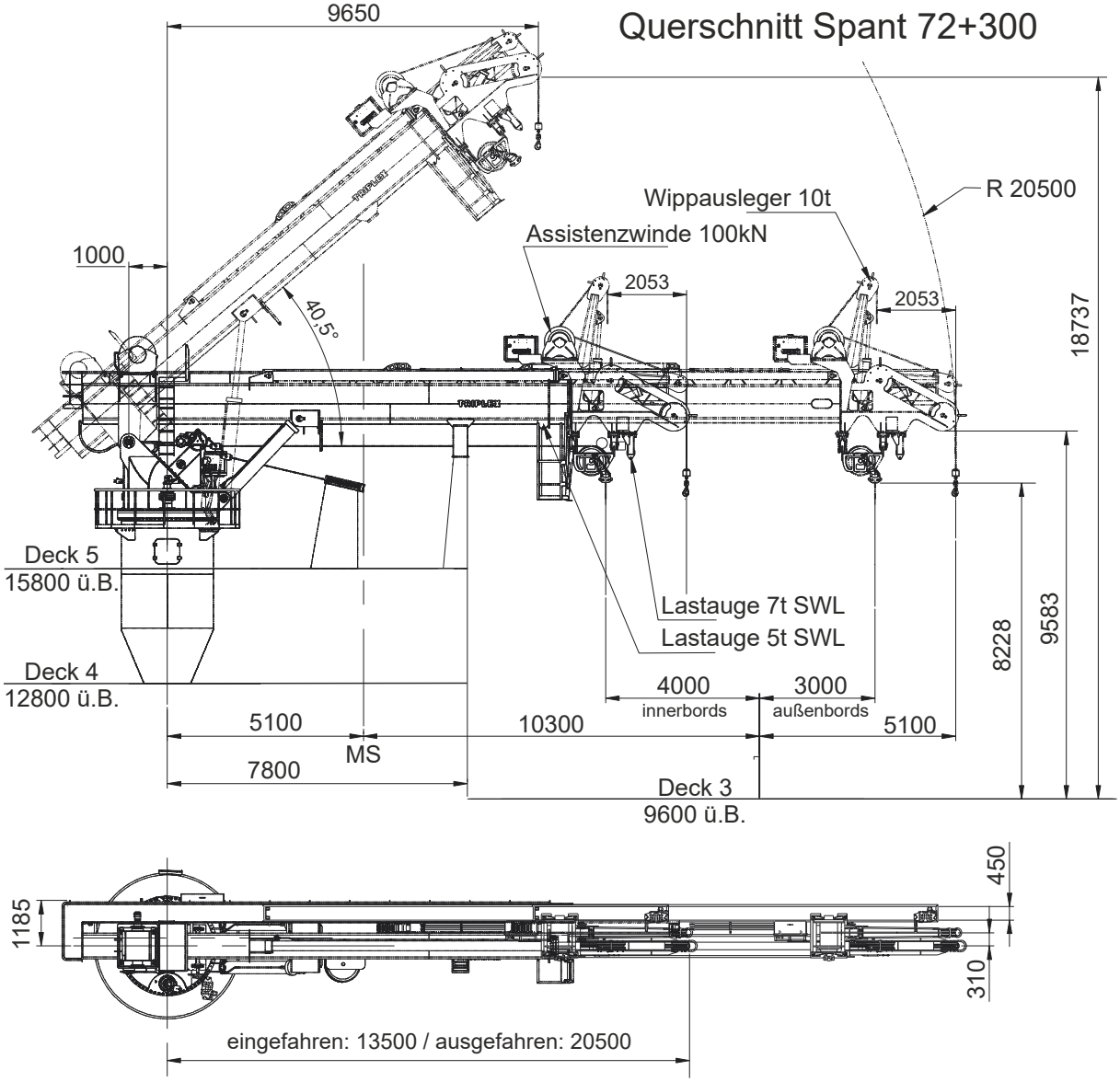
6.3.2.2. Operating case I: Working as a crane with SWL 16t

Crane type	GL crane type A, Interpretation by crane type B
Heel / trim	10° / 3° port and offshore operation
Capacity SWL	160 kN port operations 100 kN offshore operation
Significant wave height (SWH) of H ⅓	2,0 m offshore operation
max. reach	ca. 20,5 m
min. reach	ca. 9,7 m
Lifting speed	0 … 30 m/min
Swing speed	0 … 1,0 1/min
Lifting boom up / down	60s / 50s
Telescoping time out / in	50s / 30s
Lifting jib up / down	35s / 25s
environmental conditions	-20°C / +45°C
rotation range	90° (40° abaft / 50° ahead)
hook height	about 15 m above the main deck
Cable length 16t winch	100 m (maximum three layers)
max. Cable speed at half the nominal tensile	0 … 30 m/min

6.3.2.3. Operating Case II: Working as sliding beam up to rope breaking strength of 250 kN SDL; Beam resting on foundation

diagonal pull	45 ° from vertical
Breaking strength of the rope used (SDL)	max. 250 kN
Permissible cable diameter of the single core winch I / II	11 mm cable (Hybrid / coax / fiber)
Permissible cable diameter of traction winch I / II	18 mm wire 18 mm Hybrid / coax / fiber
Permissible cable diameter coming from the serial winchs	8 mm wire
max. reach	3,0 m outboard
min. reach	4,0 m inboard
Telescoping speed up to 250 kN	0 … 10 m/min
Telescoping speed up to 250 kN	0 …15 m /min
Spherical roller head (+/- 90 ° tilt)	hydraulic motor, adapted to the rope course
Lower edge caster telescopic beam	min. 5,3 m above the working deck
10 t winch assistance P3	hydraulically, increased board plate for chains and shackles
capacity	50 m (max. 2-ply)
Rope speed 1st layer	0 … 30 m/min

6.3.2.4. Views, Outreach and Load Limits



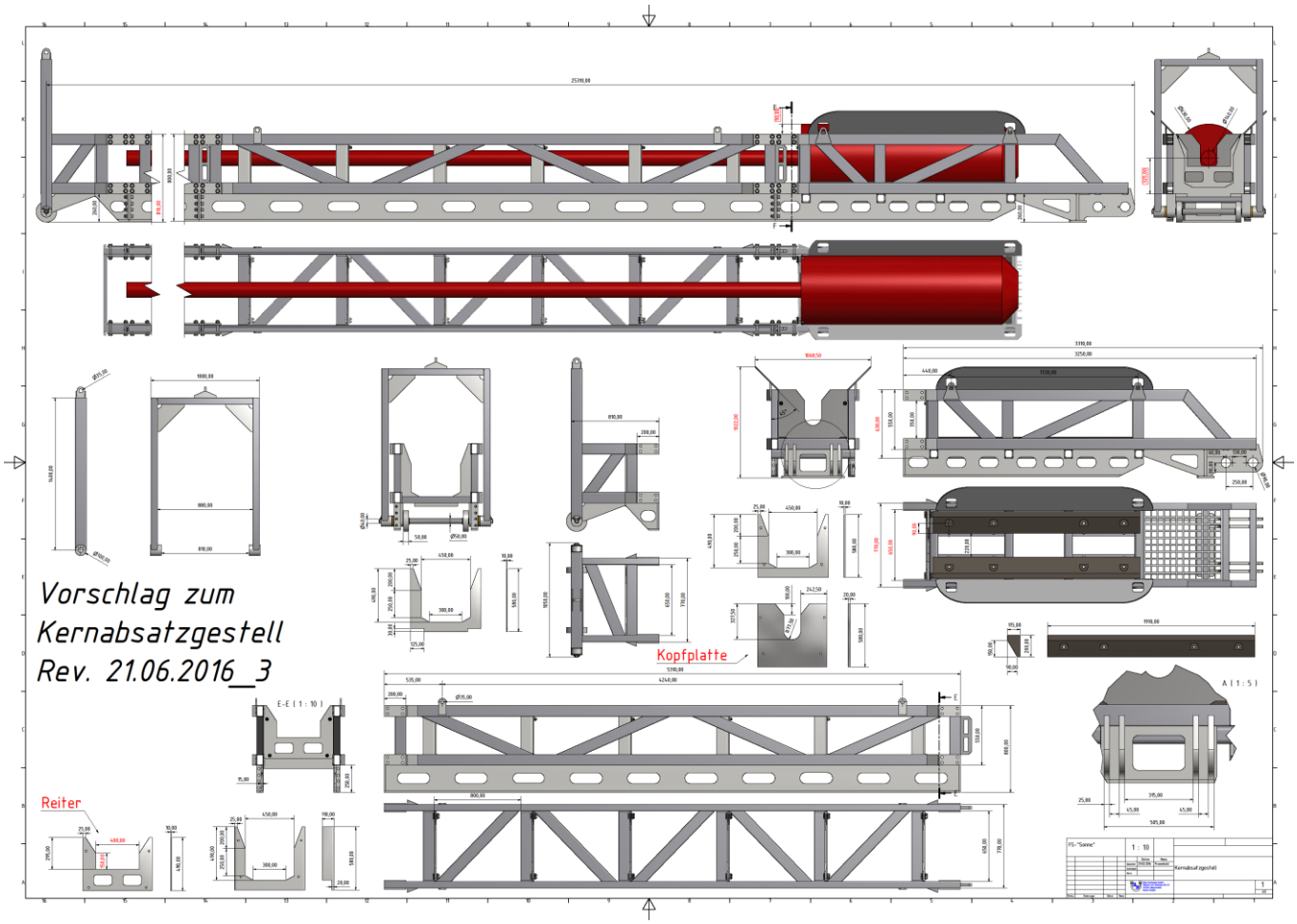
Note:
Since the shipyard lay time 2017 in Emden, it is now possible by modification of the deflection block in the same way as RV "Maria S. Merian", to change quickly and safely between 18mm working wire and 18mm fiber optic wire.

6.4. Core pipe handler

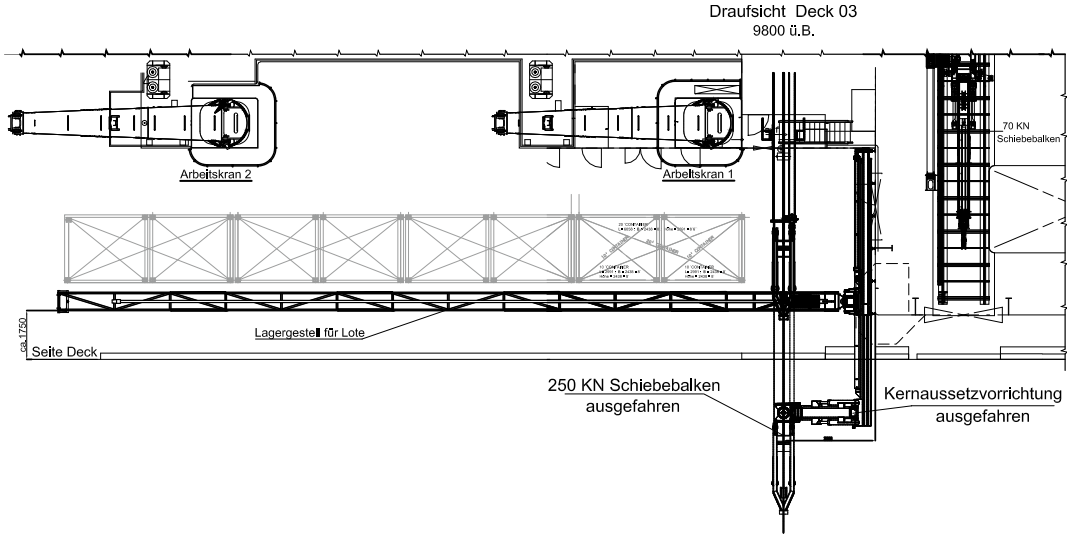
6.4.1. Technical Data

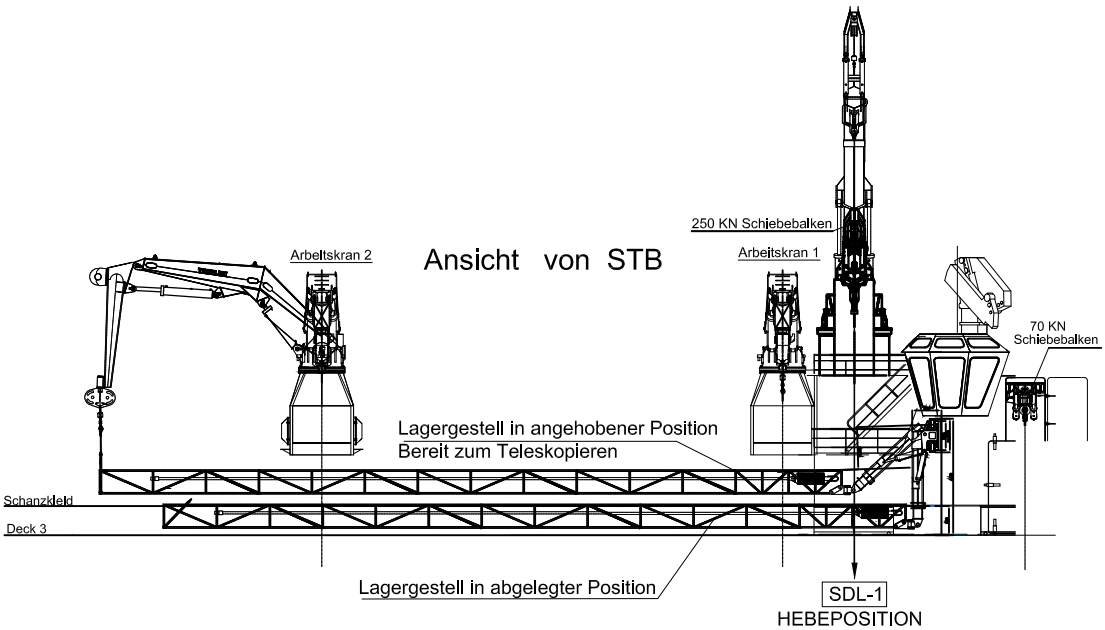
Drive	hydraulic
Operation	Radio remote and from the central control station
Crane type	A
Capacity remove unit SDL 1	100 kN
max. Equipment load in a vertical position SDL 2	180 kN
max reach	1,92 m outboard
min. reach	2,08 m inboard
Lifting time up / down	25 / 30 s
Driving time retract / extend	50 / 55 s
Lifting height	1,24 m
Angle during lifting	53°
Heel / trim	10° / 3°
Signfikante wave height swh H1 / 3	2.0 m

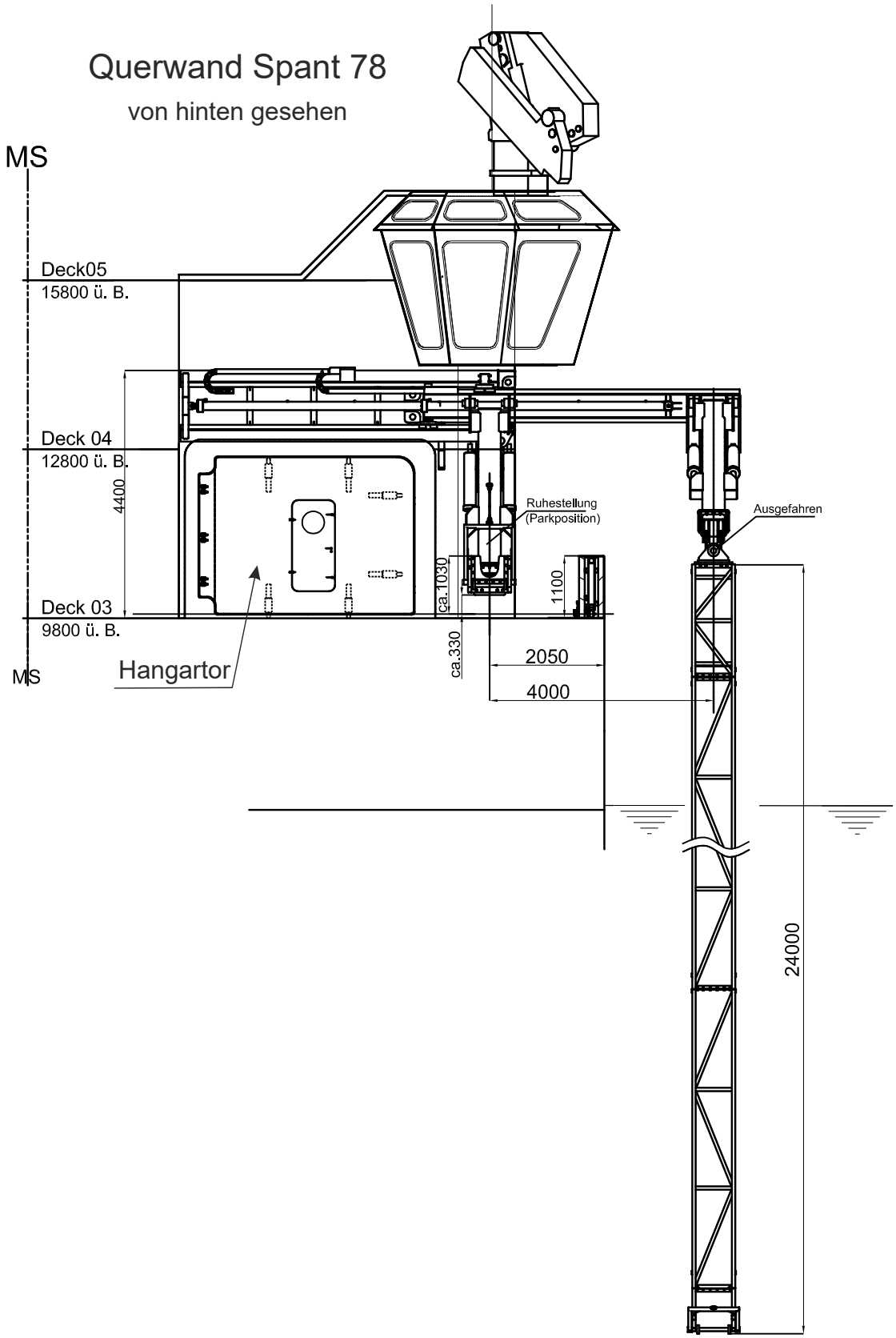
6.4.2. Sketch of the modified frame



6.4.3. Stowage and Working Position(s)






Querwand Spant 78
von hinten gesehen
MS
Deck05
15800 ü. B.
Deck 04
12800 ü. B.
4400
Deck 03
9800 ü. B.
MS
Hangartor
Ruhestellung
(Parkposition)
Ausgefahren
ca.1030
1100
ca.330
2050
4000
24000

6.5. A-Frame

Auxiliary winches at crosshead:
5t auxiliary winch 2 pieces
10t auxiliary winch 1 piece

6.5.1. Operating Case I: 30t SWL on center cross head without lateral forces

Crane type		A, Interpretation by Crane type B
Heel / trim		10° / 3°
Signfikante wave height swh ⅓		2 m
Capacity		30t (180° Wrap the block possible)
Reach		
max. stretched		7,5 m outboard at -40° Tilt Angle footer
max. Jib 78 ° lowered		9,0 m outboard at -40° Tilt Angle footer
min.		12,5 m inboard at 64° Tilt Angle footer
Working speed		both movements one by one (combined with reduced speed)
Footer	Rotation time 104°	120 s
Telescopic jib	Rotation time 78°	90 s

6.5.2. Operating Case II: 10t SWL on center cross head Launch and recovery tow bodies

Crane type		A, Interpretation by Crane type B
Heel / trim		10° / 3°
Signfikante wave height swh ⅓		2 m
Capacity SWL		max. 10t
10t Winch		hydraulic drive
Speed 1st layer		0 … 42 m/min
max. speed with SWL / 2		59 m/min
Capacity		60 m
Driving power		90 kW, 25% ED
Reach		
max. stretched		7,5 m outboard at -40° Tilt Angle Footer
max. Jib 78 ° lowered		9,0 m outboard at -40° Tilt Angle Footer
min.		12,5 m inboard at 64° Tilt Angle Footer
Working speed		both movements one by one (combined with reduced speed)
Footer	Rotation time 104°	120 s
Telescopic jib	Rotation time 78°	90 s

6.5.3. Operating Case III SWL 10t lifted by auxiliary winches at crosshead

Crane type		A, Interpretation by Crane type B
Heel / trim		10° / 3°
Signfikante wave height swh ⅓		2 m
Capacity SWL		max. 10t (lifted by 10 t winch or winch 2x5t)
Winches		
5t Winch		hydraulic drive
Speed 1st layer		0 … 15 m/min
max. Speed atSWL/2		30 m/min
Capacity		40 m drum in two layers
Driving power		15 kW
10t Winche		hydraulic drive
Speed 1st layer		0 … 42 m/min
max. Speed atSWL/2		59 m/min
Capacity		60 m
Driving power		90 kW, 25% ED
Reach		
max. stretched		7,5 m outboard at -40° Tilt Angle Footer
max. Jib 78 ° lowered		9,0 m outboard at -40° Tilt Angle Footer
min.		12,5 m inboard at 64° Tilt Angle Footer
Working speed		both movements one by one (combined with reduced speed)
Footer	Rotation time 104°	120 s
Telescopic jib	Rotation time 78°	90 s

6.5.4. Operating Case IV: Hole strip for attachment of additional blocks and shackles SWL each hole max. 30t or max. 10t; Pivot lug on the footer and jib 10t SWL each hole

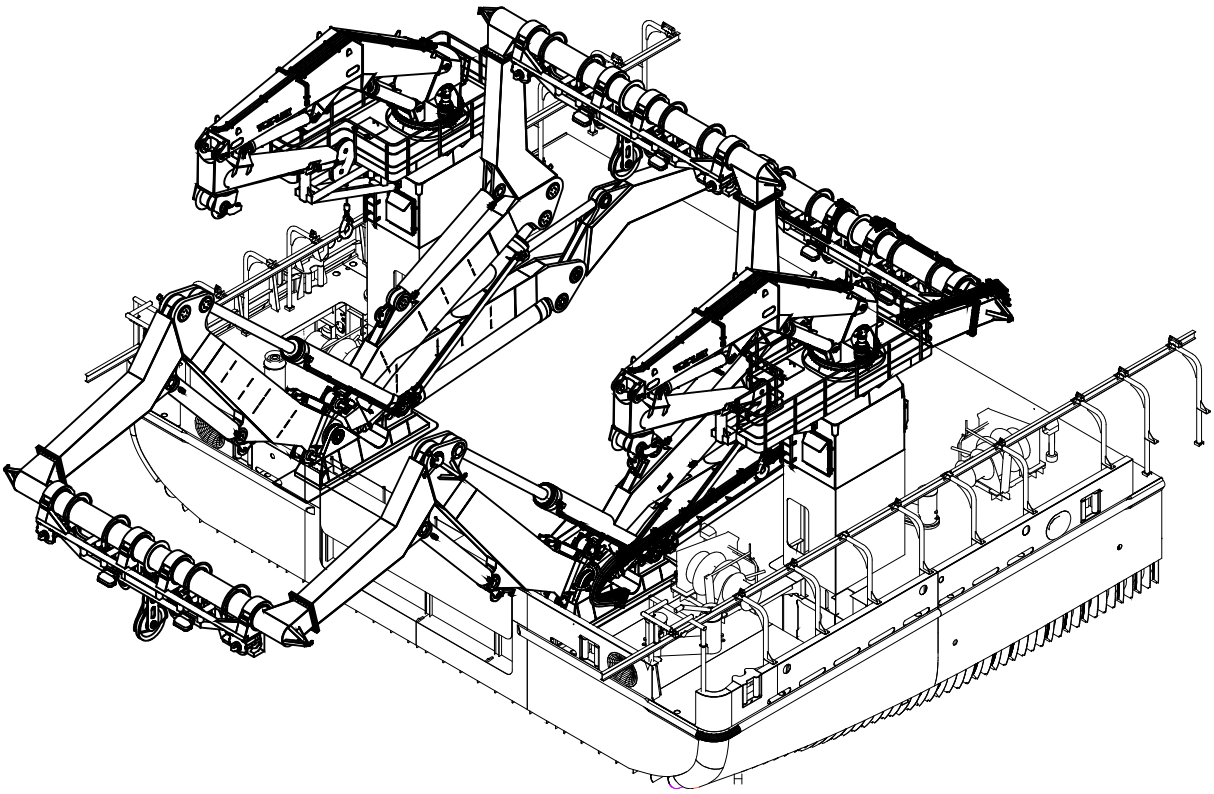
Crane type		A, Interpretation by Crane type B
Heel / trim		10° / 3°
Signfikante wave height swh ⅓		2 m
Hole strip 5 – 30t		
Capacity SWL		30t each hole
permissible load		max. 30t distributed crosshead
Hole strip 10t		
Capacity SWL		10t each hole
permissible load		max. 10t distributed crosshead
Pivot lug		
Capacity SWL		10t each hole
permissible load		max. 30t distributed crosshead
Concomitant use of holes in the hole strip at crosshead and pivot eye is only possible while maintaining a defined load combination		
Reach		
max. stretched		7,5 m outboard at -40° Tilt Angle Footer
max. Jib 78 ° lowered		9,0 m outboard at -40° Tilt Angle Footer
min.		12,5 m inboard at 64° Tilt Angle Footer
Working speed		both movements one by one (combined with reduced speed)
Footer	Rotation time 104°	120 s
Telescopic jib	Rotation time 78°	90 s

6.5.5. Operating Case V: Towing winches case research (fixed or foreign); Rope comes from working winch in the winch room or winch stands on deck amidships

Breaking strength of the rope used (SDL)		max. 300 kN
exit angle		22,5° horizontally from amidships to port and starboard 45° from vertical
angle of arrival		± 4° from the winch room as well as container position on amidships with full width
Reach		
max. stretched		7,5 m outboard at -40° Tilt Angle Footer
max. Jib 78 ° lowered		9,0 m outboard at -40° Tilt Angle Footer
min.		12,5 m inboard at 64° Tilt Angle Footer
Working speed		both movements one by one (combined with reduced speed)
Footer	Rotation time 104°	120 s
Telescopic jib	Rotation time 78°	90 s

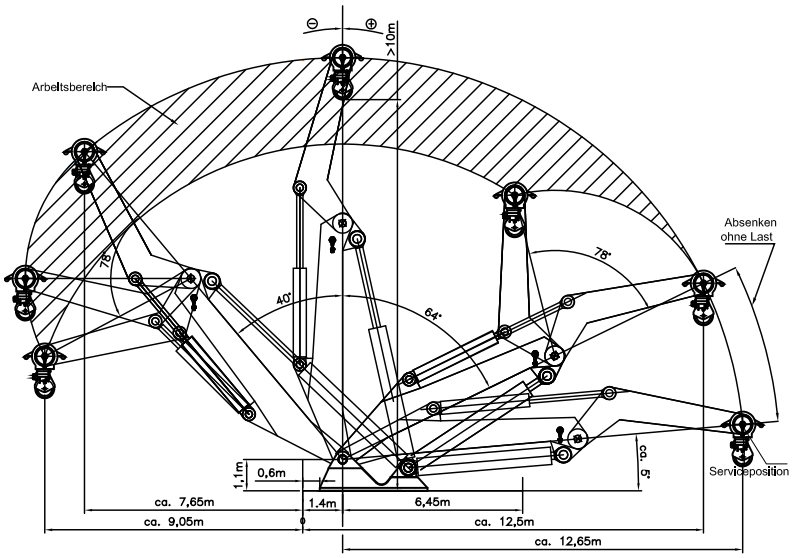
6.5.6. 3D-View Working Positions

Ansicht Achterdeck
Isometrie



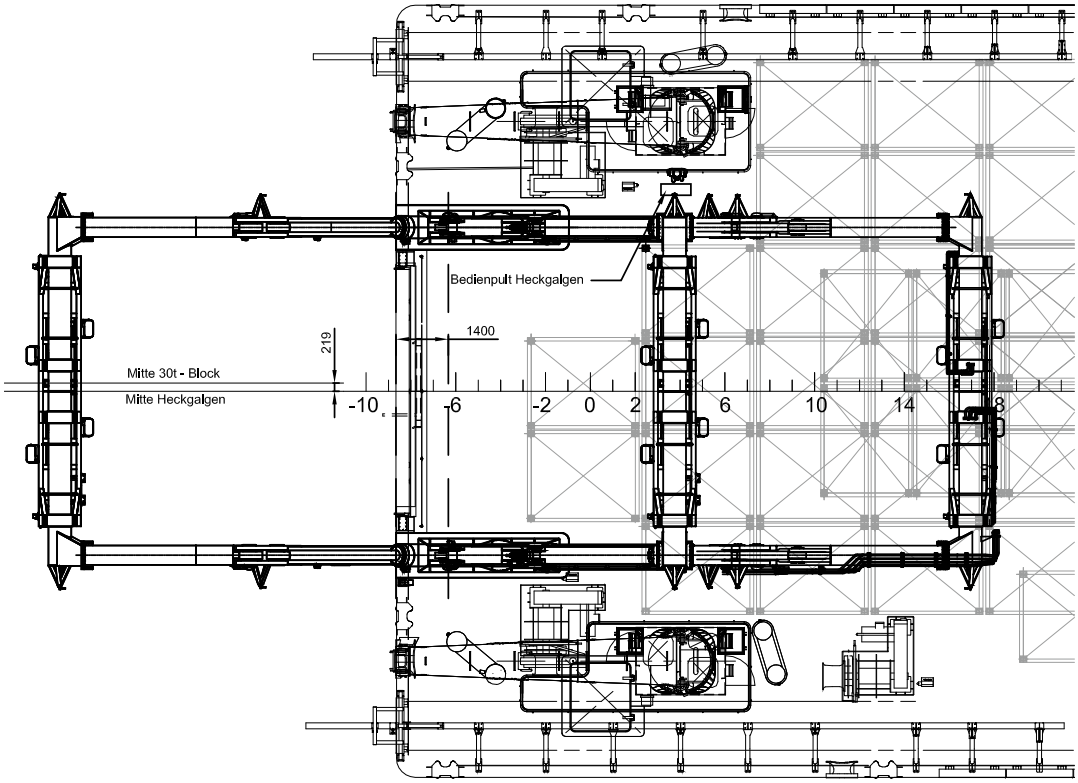
6.5.7. Working Positions and Outreaches

Kinematik

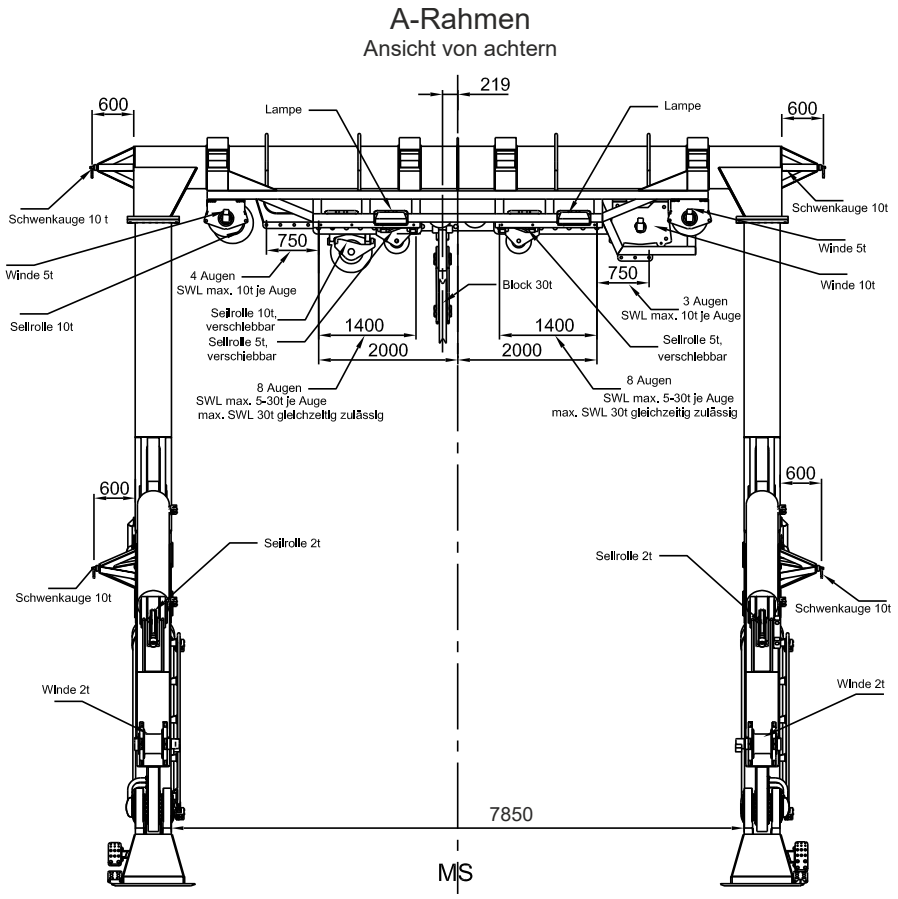


Draufsicht - Deck 3

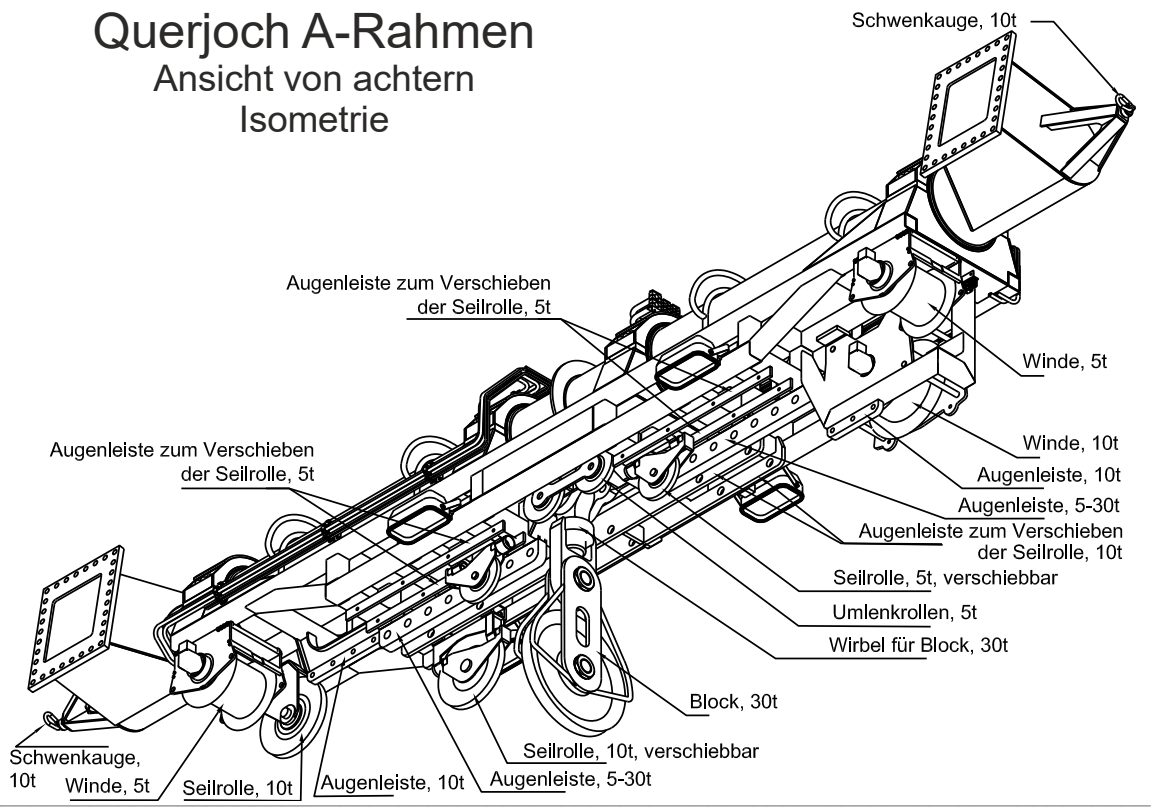
9800 über Basis



6.5.8. View Crosshead



6.5.8.1. Detailed View Crosshead

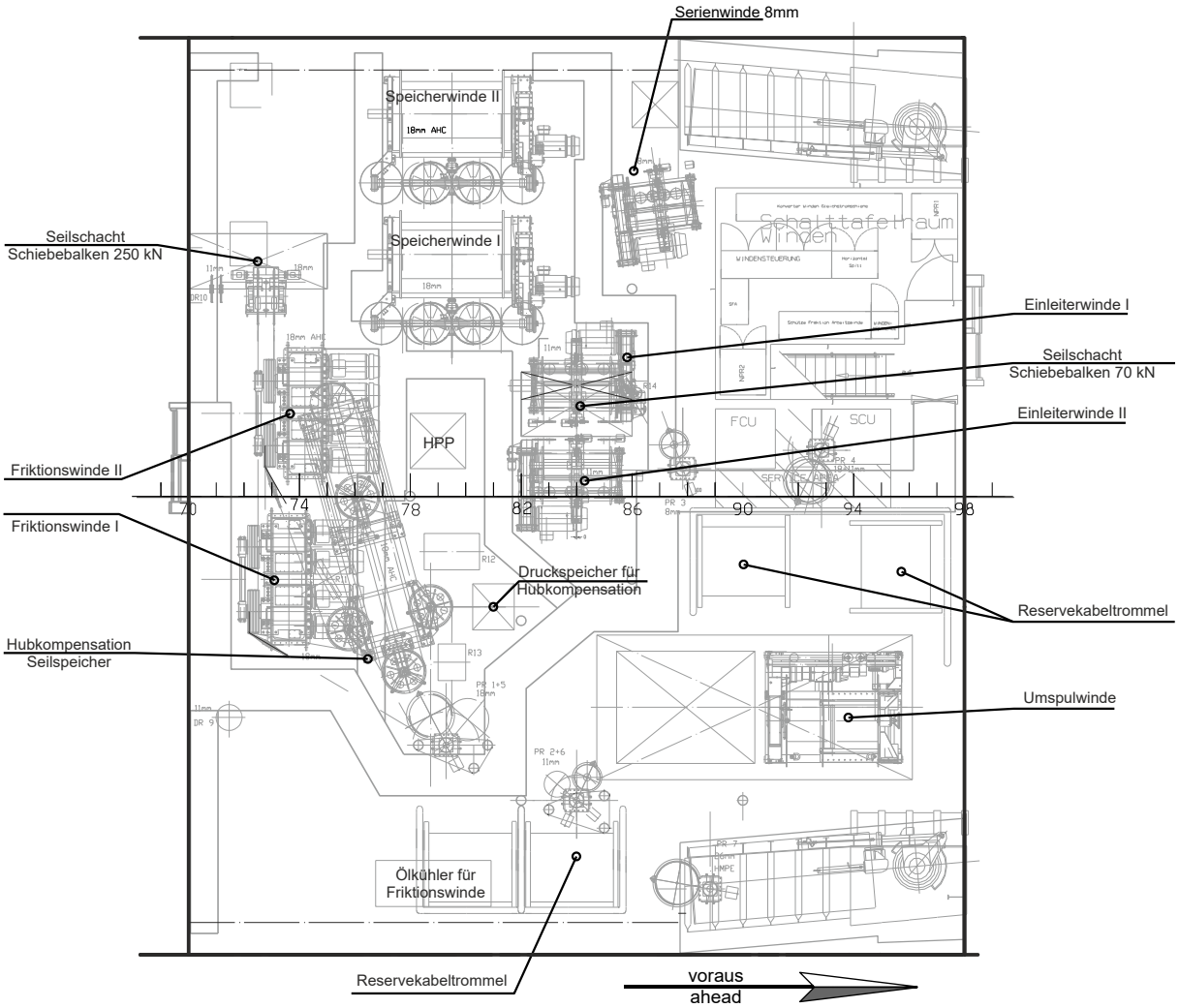


7. Scientific winches

7.1. Winchroom

Location	Deck 01 (Tank deck amidships), Frame 70 – 98
Room-No.	112
Phone	205

Windenanordnung im Windenraum



7.2. Scientific winches

7.2.1. Single-core cable winches I

- Cable drum for single core coaxial and hybrid fiber optic cable 11 mm, usable cable length 8000 m
- Measuring current transformers (2-pole and 2x optical)
- Nominal traction and speed approx mittlere Seillage: 30 kN / 0- 120 m/min

7.2.2. Single-core cable winches II

- Cable drum for single core coaxial and hybrid fiber optic cable 11 mm, usable cable length 5700 m
- Measuring current transformers (2-pole and 2x optical)
- Nominal traction and speed approx mittlere Seillage: 30 kN / 0- 120 m/min

7.2.3. Storage winch I

- Cable drum for 18 mm wire or 18 mm hybrid fiber, usable cable length 12000 m
- Nominal traction and speed approx 2.Seillage: 20 kN / 0- 120 m/min
- Measuring current transformers (3-pole and 2x optical)

7.2.4. Storage winch II

- Cable drum for 18 mm wire or 18 mm hybrid fiber, usable cable length 12000 m
- Nominal traction and speed approx 2.Seillage: 20 kN / 0- 120 m/min
- Measuring current transformers (3-pole and 2x optical)

7.2.5. Friction winch I for 18mm rope

- 2 Friction drums, 1x6 and 1x7 rope grooves rope grooves for 18 mm ropes
- Groove base diameter 900 mm for cable Ø 18 mm
- Nominal tensile force / velocity 150 kN / 0 – 120 m / min,
- Short-time operation to 90% rope breaking load.
- Deflection block with hydraulically driven pressure roller for rope slack prevention and measuring device for cable length, cable speed and line pull
- Hydraulically operated clamping device for compensating About moments between friction and storage winches
- Alternative operation with the storage winch I and II is easy and simple.

7.2.6. Friction winch II for 18mm rope

- 2 Friction drums, 1x6 and 1x7 rope grooves rope grooves for 18 mm ropes
- Groove base diameter 900 mm for cable Ø 18 mm
- Nominal tensile force / velocity 150 kN / 0 – 120 m / min,
- Short-time operation to 90% rope breaking load.
- Deflection block with hydraulically driven pressure roller for rope slack prevention and measuring device for cable length, cable speed and line pull
- Hydraulically operated clamping device for compensating About moments between friction and storage winches
- Alternative operation with the storage winch I and II is easy and simple.

7.2.7. Serial winch

- Cable drum for series wire 8 mm, effective length 6000 m
- Nominal traction and speed approxmittlere Seillage: 30 kN / 0- 120 m/min

7.2.8. Stroke compensation / cable run

The stroke compensation for the 18 mm cable / wire is made with the friction winch, shaft balancing beträt than ± 3m.
The cable outlet is either via the A-frame or slide bar 250 kN.

7.2.9. Tuckerwinch Sliding beam 250 kN

- Max. 100 kN
- Drum for 50 Meter wire in maximum 2 LayersPulser
- 0 – 30 m/min

7.2.10. Pulserwinches

- Drum for wire 16 mm; 50 Meter
- 22 kN tension 1. Layer by 20 m/min
- 11 kN tension 1. Layer by 40 m/min
- Holding power 33 kN

7.2.11. A-Frame

- SWL 30 t bis 2000 mm from midships right and left
- SWL 10 t von 2000 mm to 2750 mm from midships right and left
- Swivel eyes SWL 10 t

7.2.12. A-Frame winches

1x 10 t:
- Synthetic fiber 28 mm
- 50 Meter
- 0 to 42 m/min

2x 5 t:
- Synthetic fiber 20 mm
- each 60 Meter
- 0 to 30 m/min

2x 2 t:
- Synthetic fiber 12 mm
- each 40 Meter
- 0 to 40 m/min

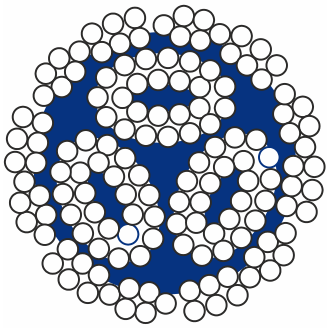
7.3. Cable and Wire

7.3.1. Deep Sea Working wire 18 mm

Manufacturer: Pfeifer Drako
Drahtseilerei Gustav Kocks GmbH & Co
D-45479 Mühlheim an der Ruhr
http://www.drako.de

PFEIFER DRAKO

DRAKOFLEX



Seildurchmesser	8 - 22 mm
Gesamtzahl der Drähte	144
Gesamtanzahl der Litzen	15
Anzahl der Außenlitzen	12
Anzahl der tragenden Drähte in den Außenlitzen	72

Charakterisierung	Hochflexibles, nahezu drehungsfreies Seil für besondere Einsätze. Schlagart: Gleichschlag
Einsatzgebiete	Freileitungsbau (Einziehseil), Forschungsschiffe (Tiefseesondenseil), Hafen-Umschlagkrane (Hubseil), Turmdrehkrane (Hubseil).
Anwendungshinweise	Abschnitt „Seilauflegen“ besonders beachten!

Bestimmung der Ablegereife nach DIN 15020 BL 2

Seil-Nenn-Ø –0 + 5%	Gewicht	Mindestbruchkraft bei einer Nennfestigkeit der Drähte von 1770 N/mm²	1960 N/mm²
mm	kg/100 m	kN	kN
8	26	42,7	47,4
10	37	61,5	68,1
11	44	72,5	80,0
12	58	96,4	107
13	63	102	114
14	75	124	137
15	85	139	153
16	94	154	171
18	126	207	229
20	150	247	272
22	176	289	320

DRAKOFLEX - 11/04

7.3.2. Deep Sea 18 mm Fiber-Coaxial Cable

Manufacturer: Rochester Wire and Cable, LLC
751 Old Brandy Rd, Culpeper, VA 22701, USA
http://www.rochestercables.com

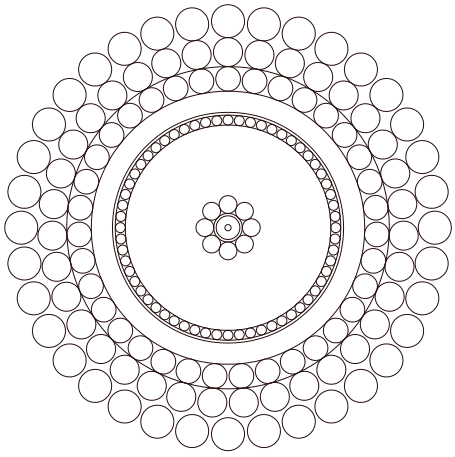
Model: Dataline A303717

751 Old Brandy Road
Culpeper, Virginia 22701

Tele: 540 825-2111
Fax: 540 825-2238

DATALINE

Description	Inch	mm
OPTIC WAVEGUIDE		
Fbr: 8.3/125/250 Πm SMF	0.010	0.25
Bffr: Hytrel®	0.038	0.97
Belt:: Nylon	0.046	1.17
CONDUCTOR		
8/0.0285" (3.29 mm^2) HD Cu	0.103	2.62
INSULATION		
LDPE	0.330	8.38
RETURN		
60/0.0159" (7.69 mm^2) 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.

PROPRIETARY; Use Pursuant to Company Instructions

Tyco Electronics *The Rochester Corporation*

Instrumentation and Control Cable
Code: IM0030373PO00

Date	Page	Revision	Part No.
06/23/2009	1	G	A303717

PERFORMANCE CHARACTERISTICS

Nominal Values @ 20θC	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 : /km	1.73 : /kft
outer cdr	2.56 : /km	0.78 : /kft
Insulation Resistance		
inner cdr - outer cdr	24,000 M: •km	80,000 M: •kft
outer cdr - armor	1,200 M: •km	4,000 M: •kft
Capacitance	105 pF/m	32 pF/ft
Characteristic Impedance		
@ 1 MHz	50 :	50 :
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	

PROPRIETARY; Use Pursuant to Company Instructions

Tyco Electronics *The Rochester Corporation*

Instrumentation and Control Cable
Code: IM0030373PO00

Date	Page	Revision	Part No.
06/23/2009	2	G	A303717

7.3.3. 11mm Single-core coaxial cable

Manufacturer: Rochester Wire and Cable, LLC
751 Old Brandy Rd, Culpeper, VA 22701, USA
http://www.rochestercables.com

Model: Dataline A303613

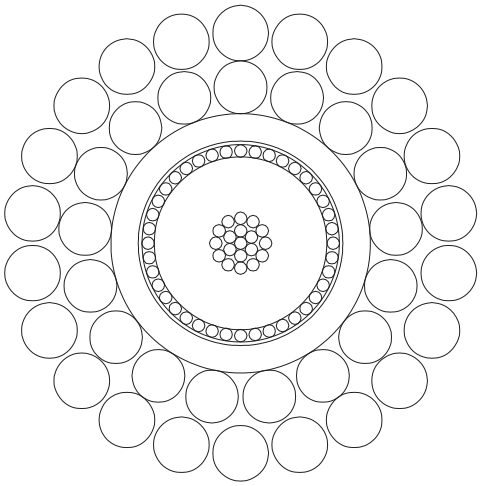
751 Old Brandy Road
Culpeper, Virginia 22701

Tele: 540 825-2111
Fax: 540 825-2238

DATALINE

Description

	Inch	mm
ELEMENT A; Coax		
Cdr: #16 AWG (1.23 mm^2) Cu	0.054	1.37
Ins: EPC	0.157	3.99
Rtrn: #13 AWG (2.59 mm^2) Cu	0.179	4.55
Tape: Copper Polyester	0.186	4.72
Belt: EPC	0.236	5.99
ARMOR		
Layer #1: 17/0.048" GEIPS	0.332	8.43
Layer #2: 22/0.0505" GEIPS	0.433	11.00



PROPRIETARY; Use Pursuant to Company Instructions

Tyco Electronics *The Rochester Corporation*

Signal Transmission Cable
Code: SC0010192CO00

Date	Page	Revision	Part No.
07/01/2010	1	N	A303613

PERFORMANCE CHARACTERISTICS

Nominal Values @ 20℃	Metric	English
PHYSICAL		
Weight in Air	466 kg/km	313 lb/kft
Weight in Seawater	384 kg/km	258 lb/kft
Operating Temperature	-20℃ to 90℃	-5℉ to 200℉
MECHANICAL		
Breaking Strength	85 kN	19,100 lbf
Working Load @ 0.4% Strain	21.3 kN	4,800 lbf
Torque Ratio	1.7	1.7
Recommended Bend Radius	23 cm	9 in
Minimum Bend Radius[1]	15 cm	6 in
ELECTRICAL		
Voltage Rating	1,500 V	1,500 V
dc Resistance		
cdr	14.8 ? /km	4.5 ? /kft
return	7.6 ? /km	2.3 ? /kft
loop	22.4 ? /km	6.8 ? /kft
Insulation Resistance		
cdr - return	16,000 M? •km	55,000 M? •kft
return - armor	4,000 M? •km	13,000 M? •kft
Capacitance	115 pF/m	35 pF/ft
Characteristic Impedance @ 1 MHz	45 ?	45 ?
Attenuation		
@ 0.5 MHz	7.9 dB/km	2.4 dB/kft
@ 1.0 MHz	11.5 dB/km	3.5 dB/kft

[1]The relationship between sheave diameter and cable diameter is a critical factor used to establish a product's fatigue resistance or relative serviceability. Operation over smaller than recommended diameters may adversely affect service life.

PROPRIETARY; Use Pursuant to Company Instructions

Tyco Electronics *The Rochester Corporation*

Signal Transmission Cable
Code: SC0010192CO00

Date	Page	Revision	Part No.
07/01/2010	2	N	A303613

7.3.4. Kevlarrope, 8mm

GleisteinRopes
The Perfect Line

Werkszeugnis
nach EN 10 204 2.2

Empfänger:	Briese Schiffahrts GmbH & Co. KG Abtlg. Forschungsschifffahrt Hafenstraße 12 26789 Leer
Belegnummer:	WZ15-0763
Auftrags-Nr. Empfänger:	DBRBL00114905
Auftrags-Nr. Gleistein:	V-AU15-1740
Lieferschein Gleistein:	V-LI15-5896
Lieferdatum:	15.07.15
Liefermenge:	1 x 4.000 M
Seiltype:	689080333 GeoSpecial Technora® / Technora® 8 mm Ø schwarz, umextrudierter Mantel
Werkstoff:	

Prüfergebnis

Seilbruchkraft:	3.500 daN
Gewicht kg/100 m:	4,4 kg
Bemerkungen:	

28777 Bremen, 15.07.15

Gleistein Ropes Qualitätssicherung zertifiziert nach DIN EN ISO 9001 : 2008

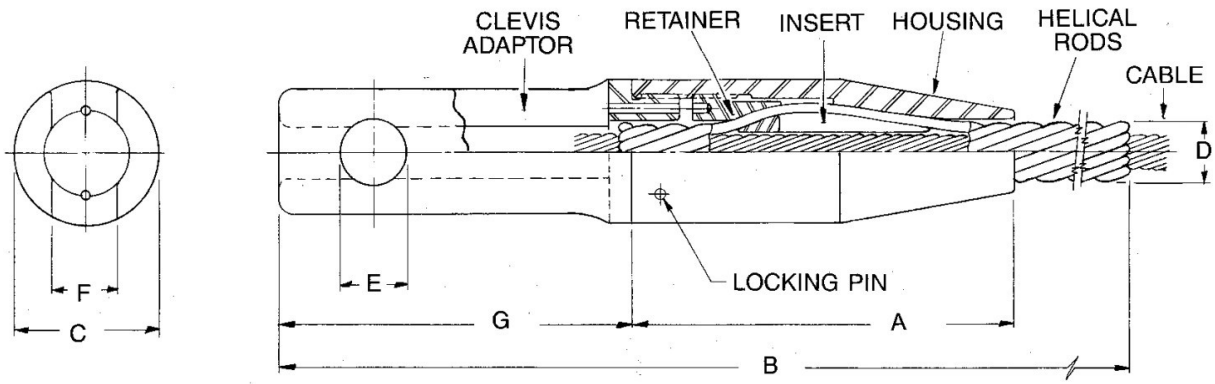
7.4. Mechanical, electrical amd fiberoptical Termination

7.4.1. Mechanical Termination

The mechanical completion of the 11mm single core coaxial and hybrid fiber optic cable and the 18 mm hybrid fiber optic cable is a "EVER GRIP ™ Termination"

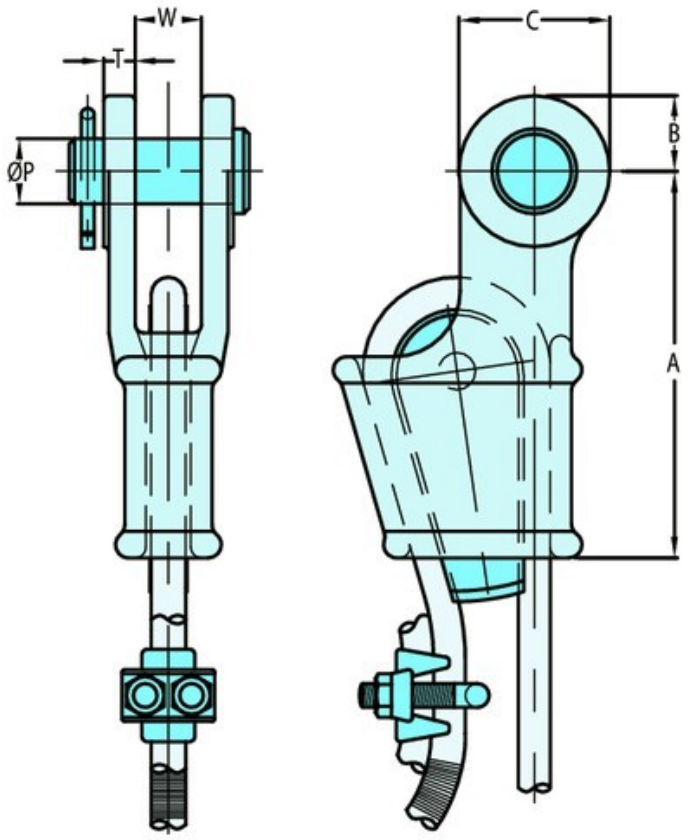
Manufacturer: PMI INDUSTRIES, INC.
5300 St. Clair Avenue▪ Cleveland, Ohio 44103

http://www.pmiind.com



Cable	11 mm	18 mm
Model-No.	124	130
Rated Load (kN)	100,5	222,0
A (mm)	174,5	262,1
B (mm)	1041,4	1600,2
C (mm)	54,0	85,7
D (mm)	18,7	28,7
E (mm)	22,2	31,7
F (mm)	21,4	34,7
G (mm)	167,6	256,5

The mechanical termination of the 18mm rope wire is a wedge end clamp of the company Crosby, Typ S-421WT

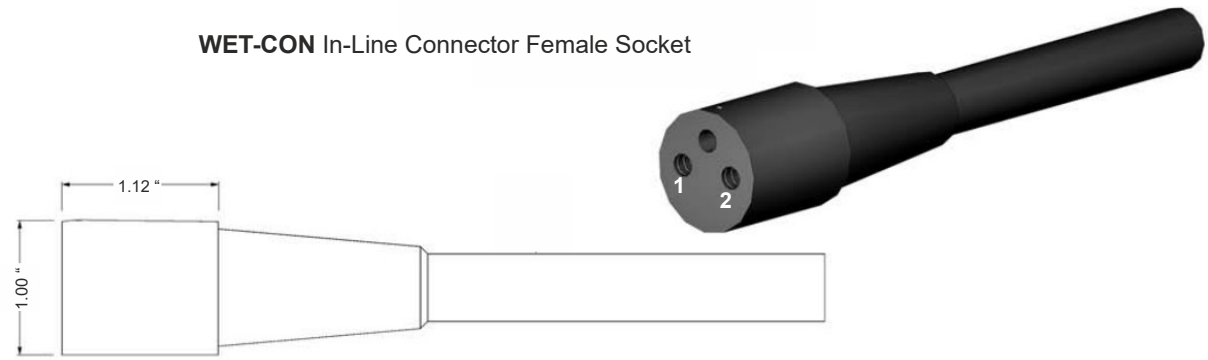


	A	B	C	P	T	W
mm	251	35,6	66,8	35,1	16,8	38,1
inch	9,88	1,40	2,63	1,38	0,66	1,50

7.4.2. Single-core coaxial cable 11mm

The single-core coaxial cable 11mm will be completed on the "wet end" with the following underwater connector.

Manufacturer	SubConn Inc. http://www.macartney.com	
Model	Standard SUBCONN IL-2-F	
Pin assignment	1 black	Screen Coax (Masse)
	2 white	Center Coax

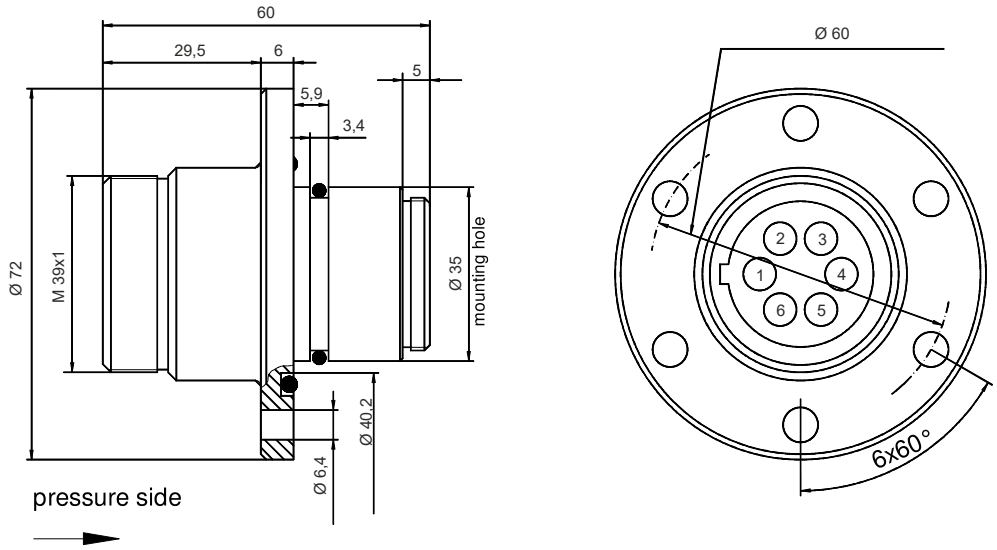


7.4.3. Fiber coaxial cable 18 mm

The hybrid fiber optic cable 18mm will be completed on the "wet end" with a "GISMA Underwater Connector Series 40".

Manufacturer	GISMA Steckverbinder GmbH http://www.gisma-connectors.de	
Model	Underwater Connector Series 40	
Pin assignment	1 + 2	Center Coax
	3	optical fiber
	4 + 5	Screen Coax (Masse)
	6	nc

FLANGE RECEPTACLE



The connection between the cable and conclusion of the devices is via a corresponding patch cable.

7.4.4. Laboratory connection

The electrical and fiber optic connection of the winches installed in the data center.

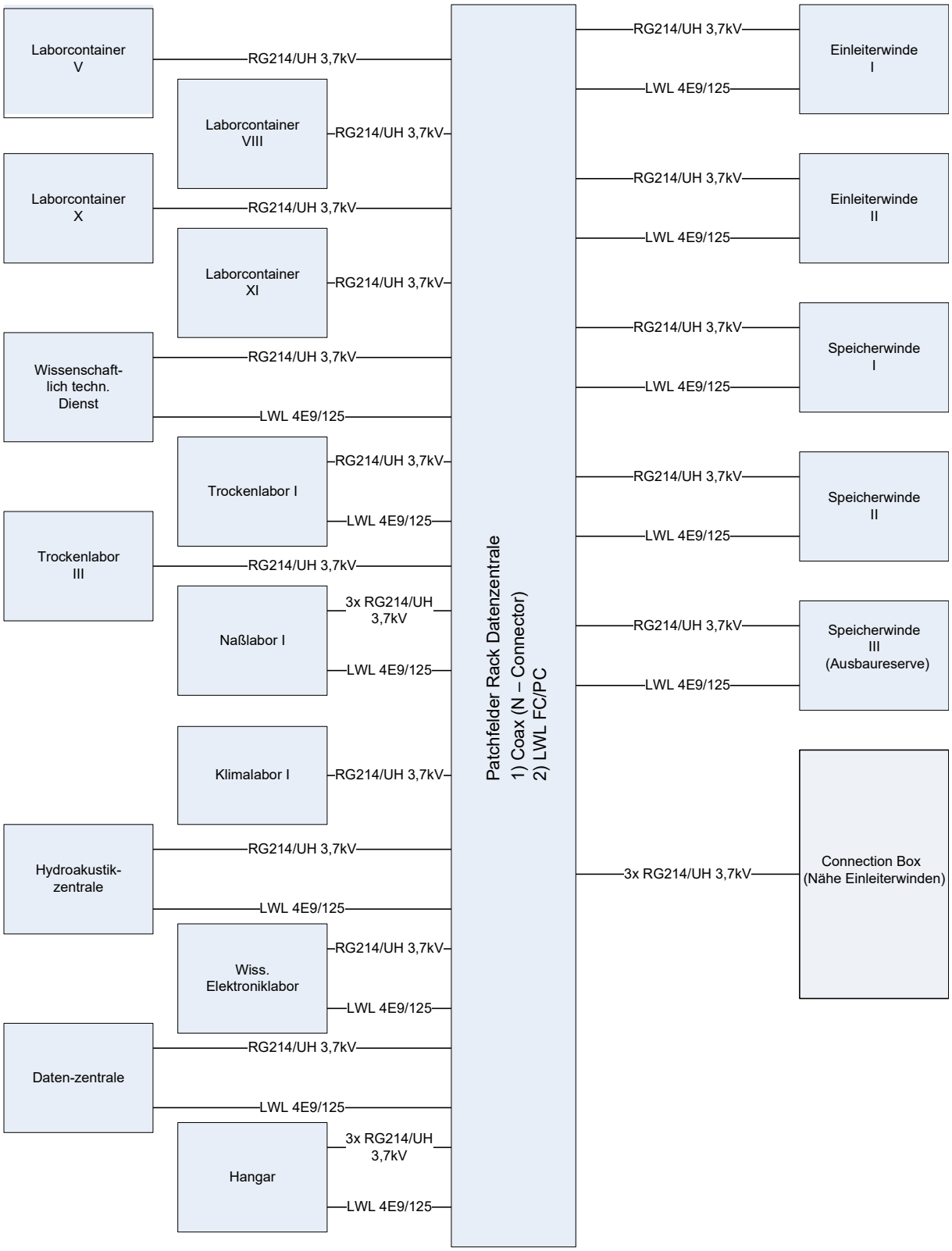
Electrical connection	7/16 connector (female) according to DIN 47223
Fiber optic connector	FC/PC connector

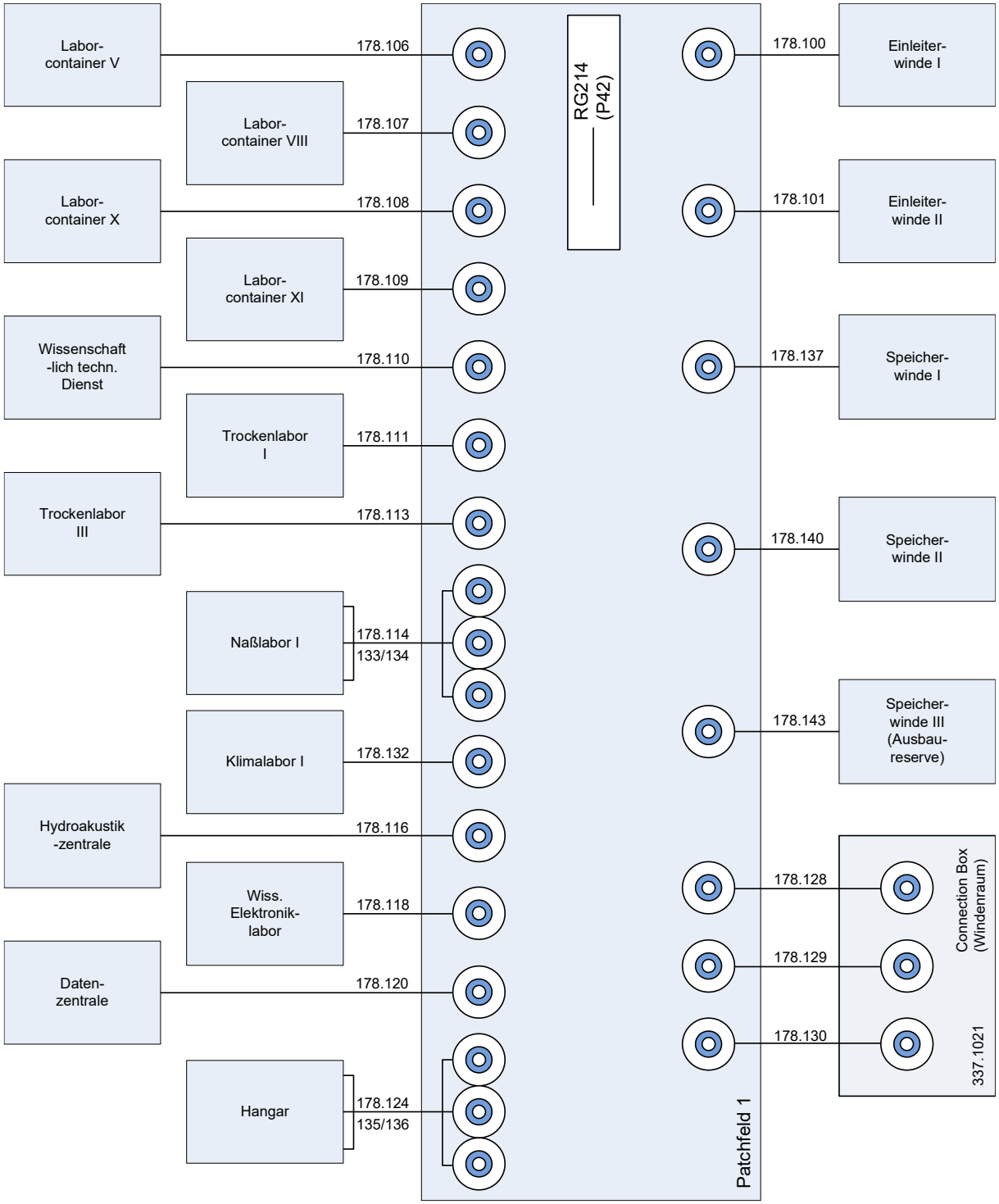
7/16 coaxial connector:

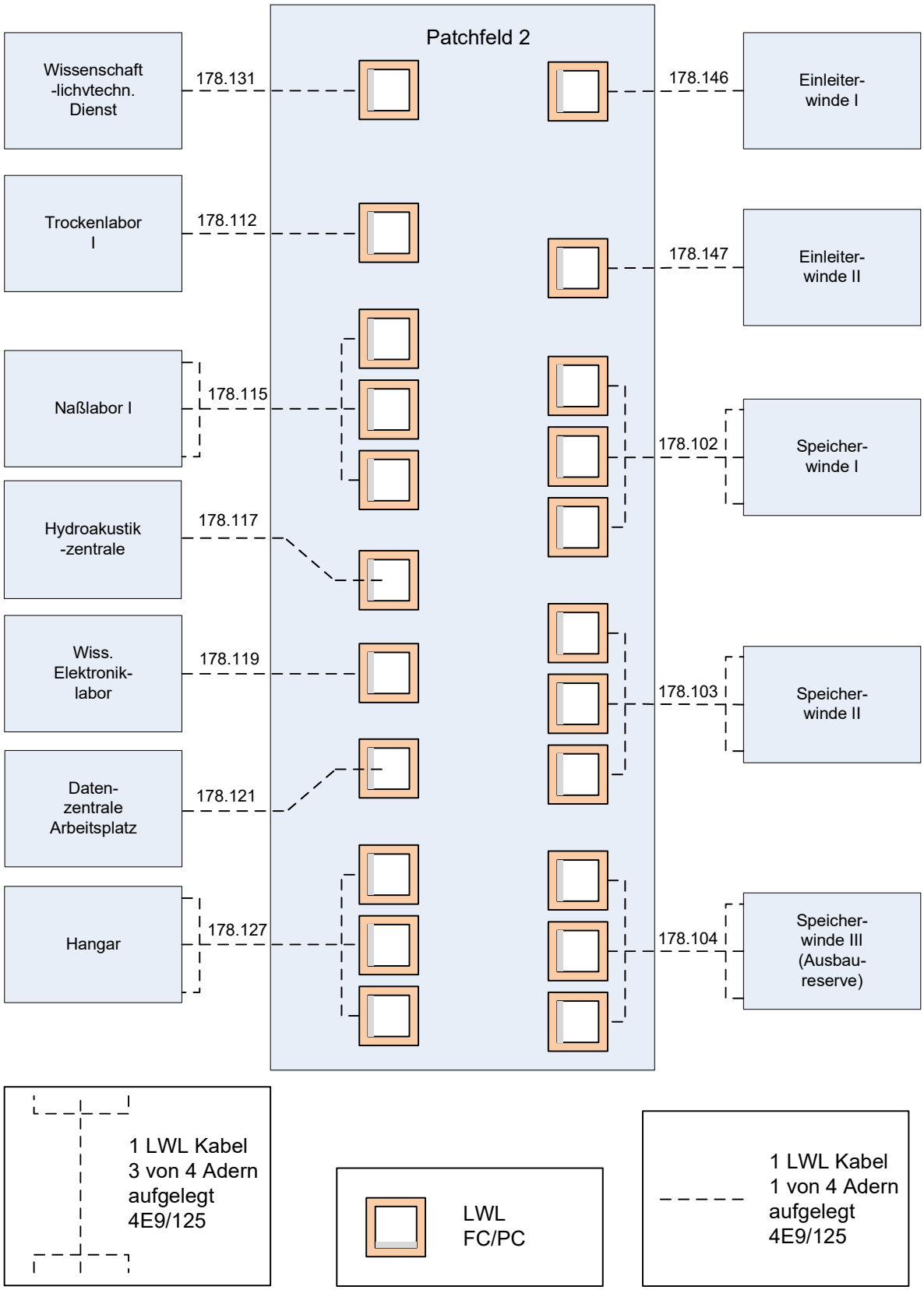
Impedance	50 Ohm
Inner contact	ø 7mm
External contact	ø 16mm
Contact-power	3 KVA

The electrical and optical fiber can be passed in the following laboratories:

Overview scheme see next three pages!


Laborcontainer V
RG214/UH 3,7kV
Laborcontainer VIII
RG214/UH 3,7kV
Laborcontainer X
RG214/UH 3,7kV
Laborcontainer XI
RG214/UH 3,7kV
Wissenschaft-lich techn. Dienst
RG214/UH 3,7kV
LWL 4E9/125
Trockenlabor I
RG214/UH 3,7kV
LWL 4E9/125
Trockenlabor III
RG214/UH 3,7kV
Naßlabor I
3x RG214/UH 3,7kV
LWL 4E9/125
Klimalabor I
RG214/UH 3,7kV
Hydroakustik-zentrale
RG214/UH 3,7kV
LWL 4E9/125
Wiss. Elektroniklabor
RG214/UH 3,7kV
LWL 4E9/125
Daten-zentrale
RG214/UH 3,7kV
LWL 4E9/125
Hangar
3x RG214/UH 3,7kV
LWL 4E9/125
Patchfelder Rack Datenzentrale
1) Coax (N – Connector)
2) LWL FC/PC
RG214/UH 3,7kV
LWL 4E9/125
Einleiterwinde I
RG214/UH 3,7kV
LWL 4E9/125
Einleiterwinde II
RG214/UH 3,7kV
LWL 4E9/125
Speicherwinde I
RG214/UH 3,7kV
LWL 4E9/125
Speicherwinde II
RG214/UH 3,7kV
LWL 4E9/125
Speicherwinde III (Ausbaureserve)
3x RG214/UH 3,7kV
Connection Box (Nähe Einleiterwinden)


Labor-container V
Labor-container VIII
Labor-container X
Labor-container XI
Wissenschaft-lich techn. Dienst
Trockenlabor I
Trockenlabor III
Naßlabor I
Klimalabor I
Hydroakustik-zentrale
Wiss. Elektronik-labor
Daten-zentrale
Hangar
178.106
178.107
178.108
178.109
178.110
178.111
178.113
178.114
133/134
178.132
178.116
178.118
178.120
178.124
135/136
RG214 (P42)
Patchfeld 1
178.100
178.101
178.137
178.140
178.143
178.128
178.129
178.130
Einleiter-winde I
Einleiter-winde II
Speicher-winde I
Speicher-winde II
Speicher-winde III (Ausbau-reserve)
Connection Box (Windenraum)
337.1021


Patchfeld 2
Wissenschaft -lichvtechn. Dienst
178.131
Trockenlabor I
178.112
Naßlabor I
178.115
Hydroakustik -zentrale
178.117
Wiss. Elektronik-labor
178.119
Daten-zentrale Arbeitsplatz
178.121
Hangar
178.127
178.146
Einleiter-winde I
178.147
Einleiter-winde II
178.102
Speicher-winde I
178.103
Speicher-winde II
178.104
Speicher-winde III (Ausbau-reserve)
1 LWL Kabel 3 von 4 Adern aufgelegt 4E9/125
LWL FC/PC
1 LWL Kabel 1 von 4 Adern aufgelegt 4E9/125

7.5. Winch measurement system

7.5.1. Components

- 1 PLC for the detection of cable lengths and wire rope hoists winches
- 2 PC systems for operation and display, with arrangement on the bridge and in the winch operator room
- LAN network networking components
- Interfaces to control winch and to exchange data with the data distribution
- Large display on the working deck on the unplugged cable length, cable speed and water depth
- Specification of the allowable tensile values and the working length with appropriate warnings for the work cable length. From the winch operator unacknowledged alerts the winch will stop automatically.
- The rope diary, winch journal, faults and limit values can be printed on demand.
- Input for Portable "foreign winches.

7.5.2. Hardware:

  - Switchgear room winches
  - Supply 230V with failure protection via UPS
  - PLC for data collection winches with clear operating circuit
  - Control station with 19 "flat screen TV
- Bridge:
  - Control station with PC and 19 "flat screen TV
  - Flat screen with winch data (parallel display to the winch helm) on Nockfahrstand tr.
  - Protocol printer
- Winch operator room
  - PC with 15 "touch screen
- Control functions
  - Towing with stop
  - Deep automatic via external control signal of a towed unit
- Interfaces
  - Winch Control
  - Data distribution system (DVS)
  - Inputs: water depth / speed of the ship.
  - Output: winch data / log data / images (eg driving Scoreboards for winch operation of the laboratories.)
  - Clock System
  - Connecting an external winch

7.5.3. Indicators of the winch measurement system

- Driving Scoreboards
- Overview display winches
- Presentation of the main inverter data
- "Tableau" Winch selection of bridge
- System Overview
- System Diagnostics
- Overview arrangement emergency stop button with trip indicator
- Failure reports
- Stroke compensation (Optional step)
- Clear working image for winch operator / bridge control dc / DVS.

7.5.4. Working image winch operator

- Winch name and color icon view
- "Large" Display Cable length 0.1 m resolution
- "Large " display resolution rope speed of 0.1 m / s
- "Large " display resolution cable 0.1 kN
- Display working length (m)
- Display resolution 0.1 m water depth
- Message "alarm 40m above"
- Message "early warning below" 40 m
- Alarm "max. load"
- Fault displays (single message)
- Stop / alarm acknowledgment
- Insertion of operations and monitoring during operation circuits of the control functions and switched stroke compensation
- menu navigation

7.5.5. Winch image selection

- Operating Clear display
- Winch selecting friction winch I with coupled storage winch I / II
- Winch selecting friction winch II with coupled storage winch I / II
- Winch selecting cable winch I
- Winch selecting cable winch II
- Winch selecting series winch
- Display Operation winch control / remote control / remote control laboratory
- Display inverter circuit
- Display switched service operation
- stroke compensation

7.5.6. Image fault indicator

- Distinction in fault messages and alarm / limit releases
- Single interferences of the converters
- Motor temperatures
- Failure brake supply
- Function monitoring load measurement (wire break)
- Group alarm each winch for display on the "control panel"
- Cable slack message between friction and storage winch
- Rope limit alarms with pre-alarms

7.5.7. Settings from the bridge:

- Input protection via Password (except for changing the rope working length)
- Travel data automatically from DVS (
- Date
- Time
- Travel with section number
- Station number

7.5.8. Protocols

- Individually selectable printout with choice of polling rate between 0.3 and 10 sec.
- Winch data to the DVS for logging "Station Protocol" and the Protocol for "inserts of equipment and winches"

- Analog load on screen and writer on the bridge and in laboratories for online evaluation (improved detection of ground contact / release)
- Rope protocol for individual expression and participants by the end of the journey

Display panel working deck
- Water depth (m)
- Lifted cable length (m)
- Line speed

7.6. Research Assistant winch

7.6.1. Cable transfer winch

Manufacturer MacGregor Germany GmbH & Co. (before Hatlapa)
D-25436 Uetersen, Germany
http://www.macgregor.com

General information:

- The winch is used to replace all the wires / cables in the winch space.
- Required deflection rollers are permanently installed.
- The winch is portable.
- The base frame is designed to fit the container grid and M 24 grid.

Specifications:

- Receiving device for cable drums and reels of installed cable types and lengt
  Tensile / Speeds:
  - 88 kN is 0 - 36 m / min
  - 60 kN at 0 - 60 m / min
  - 22 kN is 0 - 120 m / min
- Infinitely variable speed and load setting from a mobile controller (Hawker)
- Spooling device via electrically driven acme screw with manual or automatic, adjustable from the mobile controller (Hawker)

7.6.2. A-Frame Winches

see Chapter #A-Frame

7.6.3. Load / auxiliary winch sliding beams 250kN

see Chapter #Sliding Beams 250kN

7.6.4. Portable horizontal capstan

Manufacturer MacGregor Germany GmbH & Co. (before Hatlapa)
D-25436 Uetersen, Germany
http://www.macgregor.com

Design:

- The base frame is designed to fit the container grid and M 24 grid.
- Capstan head: 630 * 630 mm Ø, according to DIN 84154
- Driven by Electric motor and 3-stage helical gearbox

Specifications:

- Nominal tensile force and speed:
- 30 kN / 0 30 m / min

- 5 kN / 0-120 m / min

E Drive:

- AC motor with mounted electric magnetic brake, motor protection, space heater mode S2-60, 30 kW
- Speed control of the drive motor continuously over a AFE inverter.
- Control via joystick, situated on the winch foundation

Picture: Mobile horizontal capstan

7.6.5. Portable storage winch

Manufacturer MacGregor Germany GmbH & Co. (before Hatlapa)
D-25436 Uetersen, Germany
http://www.macgregor.com

The transportable storage winch serves to receive a timber reel up to a max. Diameter of 1600 mm and a max. Total length of 1000 mm. The winch is used in conjunction with the transportable horizontal capstan.

Design:

- Mounted on a sturdy frame, matching the M24 grid.
- Driven by Electric motor and 3-stage planetary gear angle

Specifications:

- Tensile force of 5 kN with 0-60 m / min based on 500mm diameter
- Empty rope 0-120 m / min

E Drive:

- AC, S1 mode, 5 kW of protection IP 56, mounted electric brake, anti-condensation heater, motor protection, encoders

- Infinitely variable speed control via frequency converter with braking resistor
- Control via joystick, situated on the winch foundation

Picture: Portable storage winch with wooden empty drum

7.6.6. Airgun-Winches

Manufacturer HATLAPA Uetersener Maschinenfabrik GmbH & Co.
D-25436 Uetersen, Germany
www.hatlapa.de

General information:

- Compact design
- Arrangement on the port side and starboard side respectively 2 winches
- The winch of port side are fixed
- The winch of the starboard side are functionally positioned to the end frame and running degradable in the same manner as the flow structure.

Specifications:

- Electric drive with infinite speed adjustment via frequency inverter and braking resistors.
- On-site operation
- Spring-loaded roller to support the rope spooling
- Multi-disc brake
- Limit at least 3 safety turns on the drum.

- Line pull 1st layer	22 kN
- Nominal rope speed 1st position at nominal tensile force	21 m/min
- Maximum Rope Speed at½ nominal tensile force	40 m/min
- Steel rope	16 mm
- Mind. Drum Capacity in 2 layers	50 m
- Drive power	9,8 kW 25% ED

8. Scientific work spaces

8.1. Overview

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	29
	Raum Nummer	900	408	360	340	336	332	372	364	354	342	374	309	327	325	335	329	339	344	242	246	241	239	243	337	556 554 552	224	101	333
1	Raumbezeichnung Anforderungskatalog	Mess + Beobachtungsraum	Besprechungsraum	Trockenlabor 1	Trockenlabor 2	Trockenlabor 3	Trockenlabor 4	Nasslabor 1	Nasslabor 2	Klimalabor 1	Klimalabor 2	Pulserstation	Lotgeräteraum	Hydroakustikzentrale	Druckerraum	wiss. Eletroniklabor	Wiss. Techn. Dienst WTD	Datenzentrale	Hangar	Gefrierlager -20°C	Gefrier-/Kühllager +2°C	Salinometerraum	Gravimeterraum	wiss. Stauraum	Eletronikstore	Chemiestore	EDV-Store	Seewasserversorgung	Arbeitsraum Systemmanager
2	Fläche (m²)	20	35	32	15	20	19	45	15	20	20	12	11	52	9	15	15	16	115	16	20	9	8	160	4	9	9	12	15
3	Türbreite in m	1,2	1	1,2	1,2	1,2	1,2	2	1,2	1,2	1,2	1	1	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1	1	1	1,2	1
4	Arbeitsplätze	2	1	6	3	4	4	6	4	4	2	1	0	10	0	3	3	4	2	0	1	2	1	1	0	0	0	1	2
5	Telefon	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x					x	x
6	Frischwasser w/k	x		x	x	x	x	x	x	x	x	x		x		x	x	x	x			x						x	
7	Reinseewasser	K		M	K	K	M	K/M	K	M	K								K/M			K						K/M	
8	weiches Wasser			x	x	x	x		x	x																			
9	Ausgüsse (Becken)	1		2	2	2	2	2	2	2	1	1		1		1	1	1	2			1						´1	
10	Laborabwasser			1	1	1	1	1	1	1									1										
11	Speigatte, direkt					x		x	x	x									x										
12	Arbeitsluft 6 bar	1		1	1	1	1	1	1	1	1	1				1	1	1	3										
13	230/16 A Bordnetz	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
14	230V/16 A Labornetz- USV	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x	x	x
15	400V/ 32 A Drehstrom	1		1	1	1	1	1	1	1		1		1		1	1	1	2				1	2				1	
16	Erdungsbolzen	x		x	x	x	x	x	x	x		x	x	x		x	x	x	x				x						x
17	Netzwerkanschluss DVS	12	12	16	12	12	12	12	12	12	8	8	12	16	12	12	12	24	16		4	12	12	12				12	12
18	Einleiterkabelanschluss			x		x		x		x				x		x		x	x										
19	Multikabel/LWL (Winde)			x				x						x		x		x	x										
20	Wechselsprechanlage	x		x	x	x	x	x	x	x	x	x		x		x	x	x	x			x						x	
21	Wandschienen	x		x	x	x	x	x	x	x	x	x	X4	x	x	x	x	x	x	X4	X4	x	x		x		x	X4	x
22	Deckenschienen	x		x	x	x	x	x	x	x	x	x		x		x	x	x				x	x						
23	Bodenbuchsen			M 8	M 8	M 8	M 8	M24	M 8	M 8	M 8	M 8				M 8		M 8	M24			M 8	M 8	M24					
24	indiv. Temperatur 0-28°C									x	x																		
25	indiv. Temperatur 18-28°C	x	x	x	x	x	x	x	x	x	x	x		x		x		x				x	x						x
26	Abzugsstutzen			2		2	2		2	1																			
27	Abzug			1			1	1	1																				
28	Kühlschrank +4°C	1		1	1	1	1	1	1					1		1	1	1	1					1					
29	Kühlschrank -18°C			1	1	1	1	1	1										1					1					
30	Kühlschrank -80°C						1	1																1					
31	Laborspülmaschine			1		1																							
32	Trockenschrank			1			1		1							1													
33	kardanisch aufgehängter Tisch			1			1																						
34	Eismaschine							1																					
36	GPS, ZDA, PPS direkt	x		x	x	x	x	x	x	x	x	x		x		x	x	x	x			x	x					x	x
37	GPS-Repeater							x											x										
38	Wanduhr	x		x	x	x	x	x	x	x	x	x		x		x	x	x	x			x	x	x					x
39	Sonstiges													X2		X3	X3												

X4 C-tracks as surface mount variant
K Clean sea water centrifugal pump
M Clean seawater diaphragm pump

8.2. Laboratory Equipment

8.2.1. C-Rails

For holding devices and other equipment wall and ceiling construction are installed in all laboratories, a C-track system.
The C-tracks are perpendicular to the walls, mounted to the ceiling fore and aft.
The pitch of the C-rails is 600 mm.
The C-tracks are designed for use with self-locking nuts M8 slip, with 1000 N per running meters strong and grounded (ie with the ship's mass electrically connected).

8.2.2. Grid Plug System

In the floor open space is built depending on the location a M8 jacks grid system.
The grid size is 600 x 600 mm and is in agreement (escape) to the wall and the ceiling grid.
The grid jacks to 1000 N per jack resilient and grounded (ie, electrically connected to the ship's ground).

In the wet lab 1, hangar and scientific storage space are M24 jacks fitted grid

8.2.3. Seating

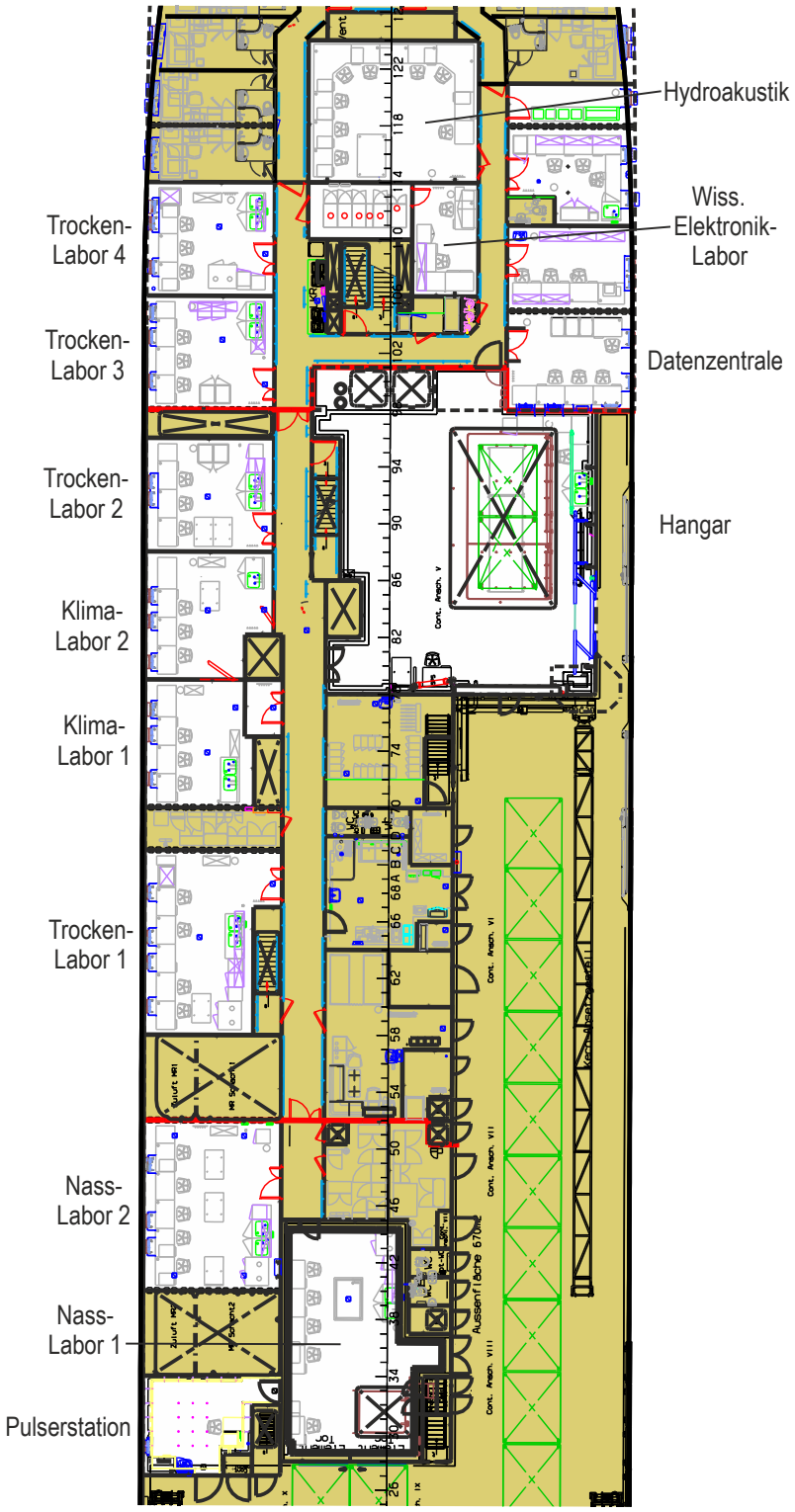
The jobs are with normal laboratory swivel chairs (seat height approx 400-560mm) and partly with laboratory swivel chairs with foot (foot rest) and elevated seating position
(Seat height ca.480-660mm).

8.2.4. Drawing Legend

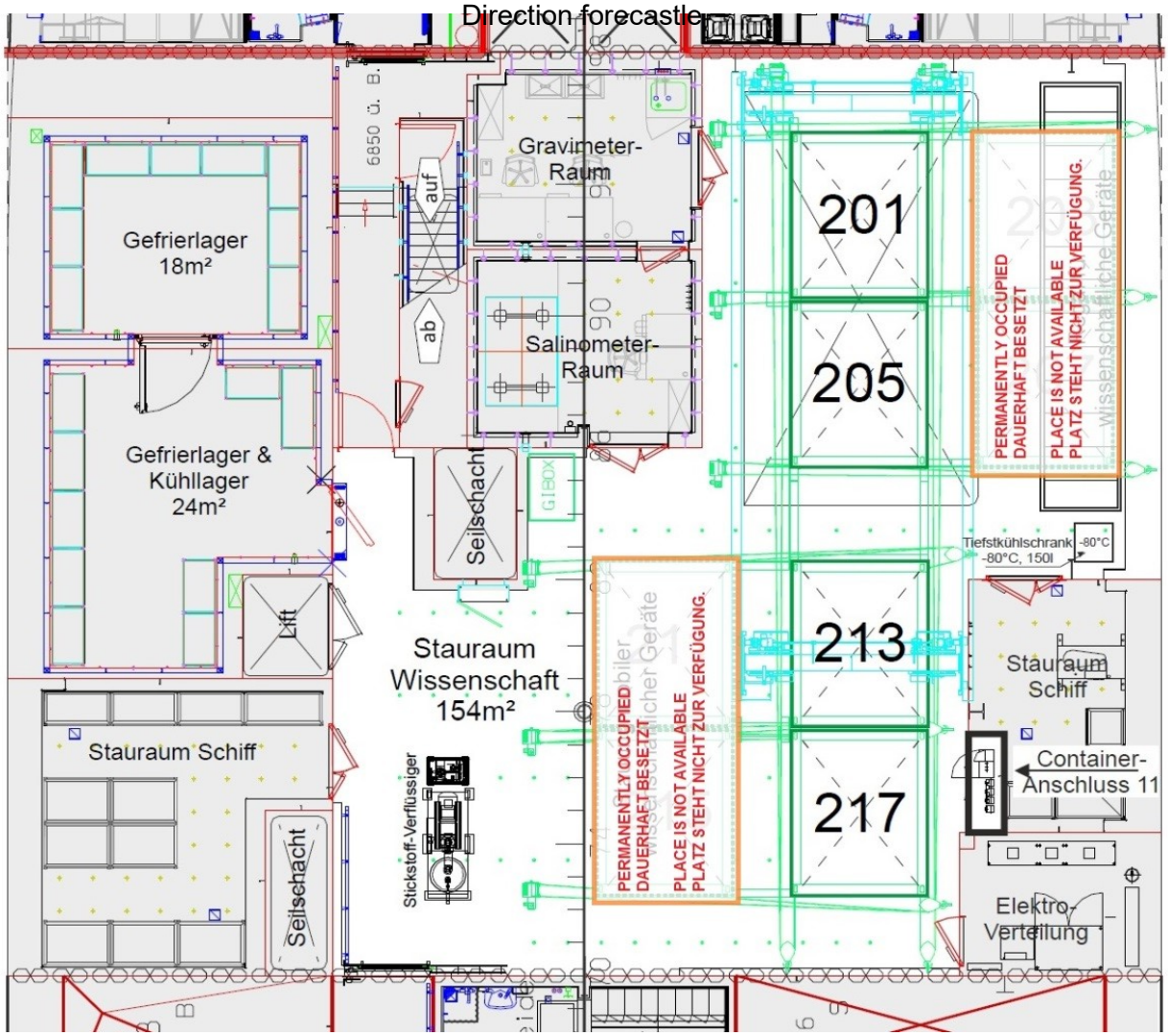
B B	230 V AC board power (White) Double socket IP20, cable duct	6 AL	Working air 6 bar
L L	230 V AC laboratory power (red) Double socket IP20, cable duct	FW W K	Fresh water hot / cold
W	Socket 230V / 32A AC CEE standard construction	RS K	clean seawater (Centrifugal pump)
D	Outlet 400V / 32A three-phase CEE Norm, construction, 5pin. with switch lock	1" RS K	clean seawater (Centrifugal pump, 1 "connection)
	Single outlet Recessed IP20	RS M	Clean seawater pump (diaphragm pump)
2	double button Recessed IP20	WW	soft water
	double switch Recessed IP20	GW	gray water
N	LAN network socket RJ45	AW L	laboratory wastewater
SW	4 Port Network Switch Built-in cable duct		scupper
EK	Single core Outlet in the cable duct		floor drain according outboard
MK	Multi cable / fiber optic Outlet in the cable duct		Ground socket M8 or M24
	double switch		
	GPS, CSP, PPS directly, loose in the cable duct Wiss. Intercom, telephone, clock Free cable entry		

8.3. Overview Laboratories

8.3.1. Laboratories deck 03 (main deck)



8.3.2. Laboratories deck 02 (tween deck)



8.3.3. Measurement and observation room

Location	Deck 09 (observation deck), Frame 100 – 110
Room-No.	900
Phone	501

Area (m²)	20		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	2		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	1		Wall C-tracks	x		gimbal left off. table	
lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

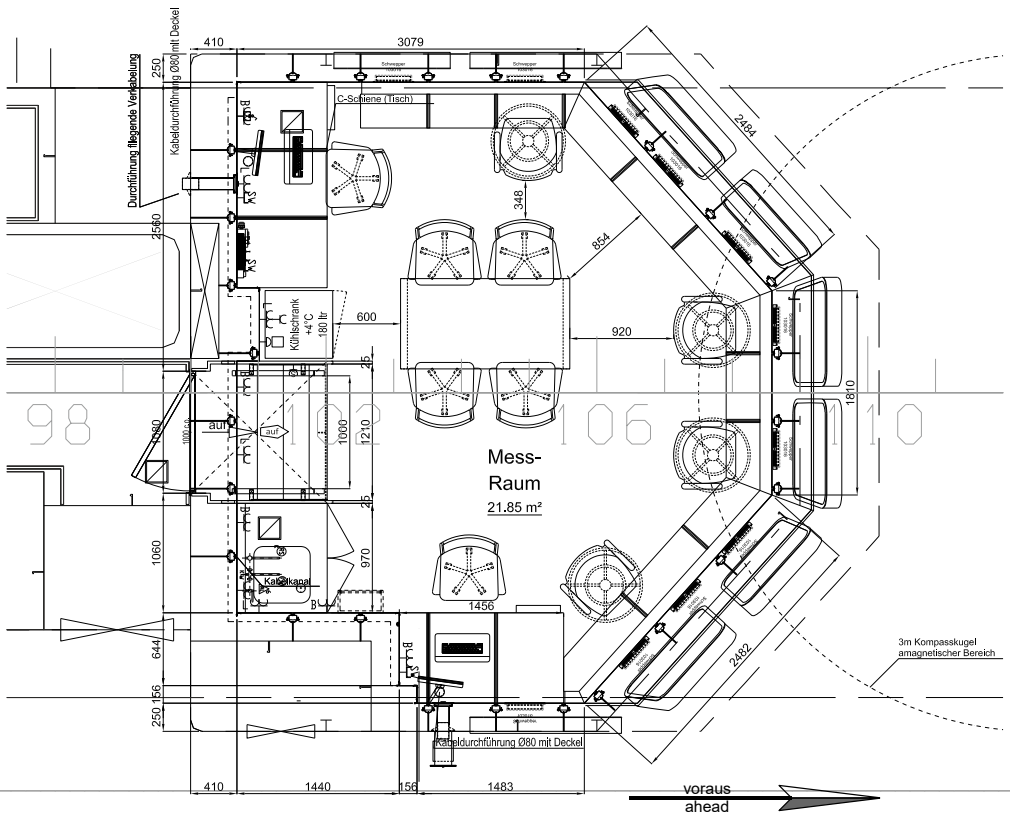
Function definition:

- The measurement and measurement and observation room room on the top deck is mainly used for air chemistry and the visual observation of the environment.

Equipment:

- Refrigerator +4 °C

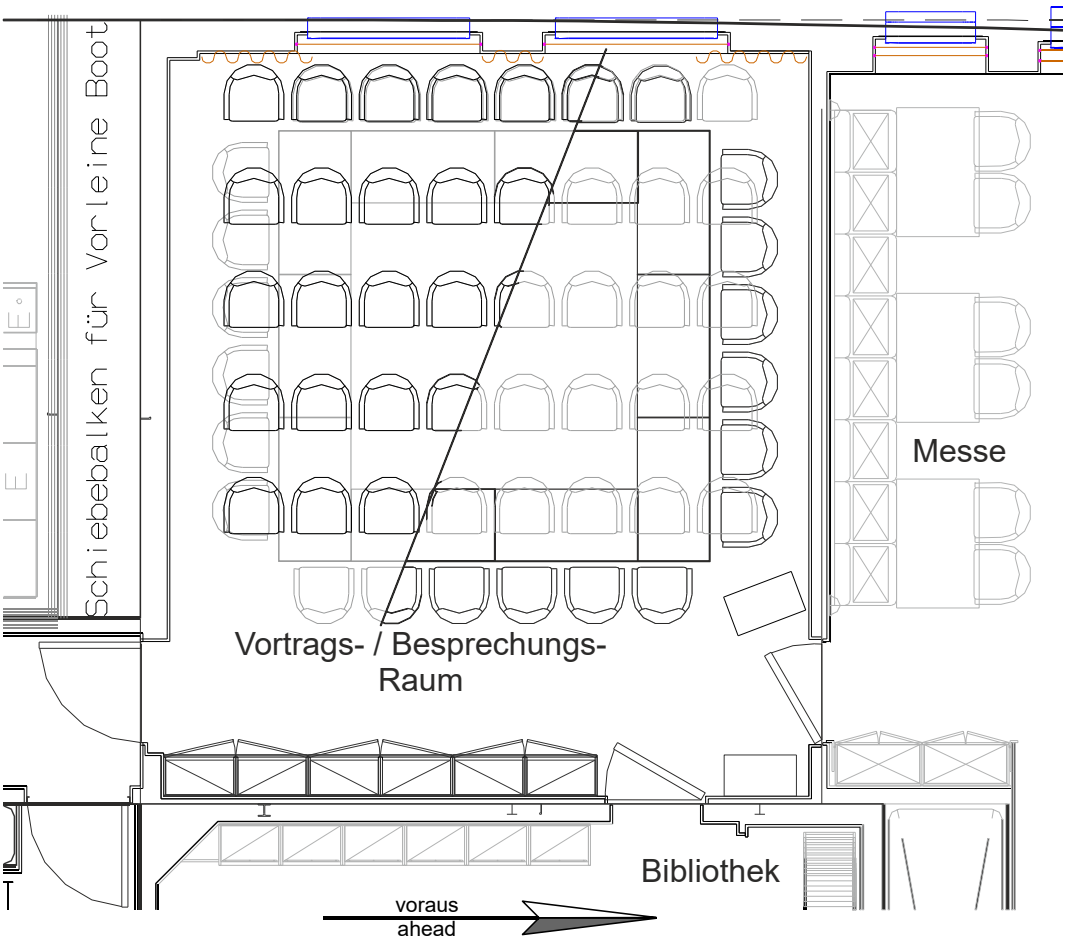
Grundriss



8.3.4. Meeting room

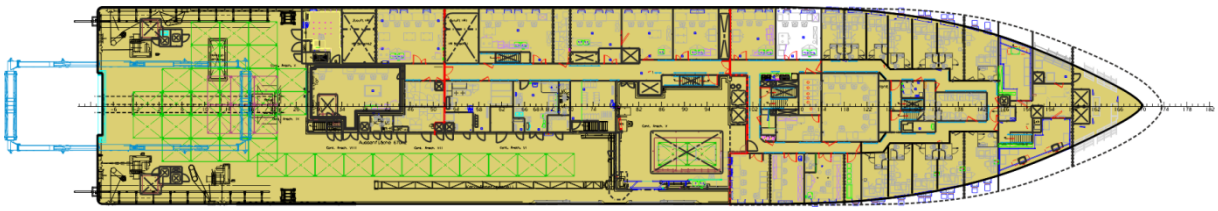
Location	Deck 04 (1. Structure deck PORT), Frame 112 – 123
Room-No.	408
Phone	404

Area (m²)	35		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,0		400V/ 32 A Three-phase			Outlet	
Workplaces	1		Ground stud			Refrigerator +4°C	
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c			Single-core cable			Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom			Drying oven	
Drains (basin)			Wall C-tracks			gimbal left off. table	
Lab wastewater			Ceiling C-tracks			Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	



8.3.5. Dry lab 4

Location	Deck 03 (Main deck PORT), Frame 106 – 114
Room-No.	332
Phone	503



Area (m²)	19		230V/16 A Lab power UPS	x		Suction	2
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	1
Workplaces	4		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	1
Clean seawater	M		Multi cable / fiber optic			Lab dishwasher	
soft water	x		Intercom	x		Drying oven	1
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	1
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

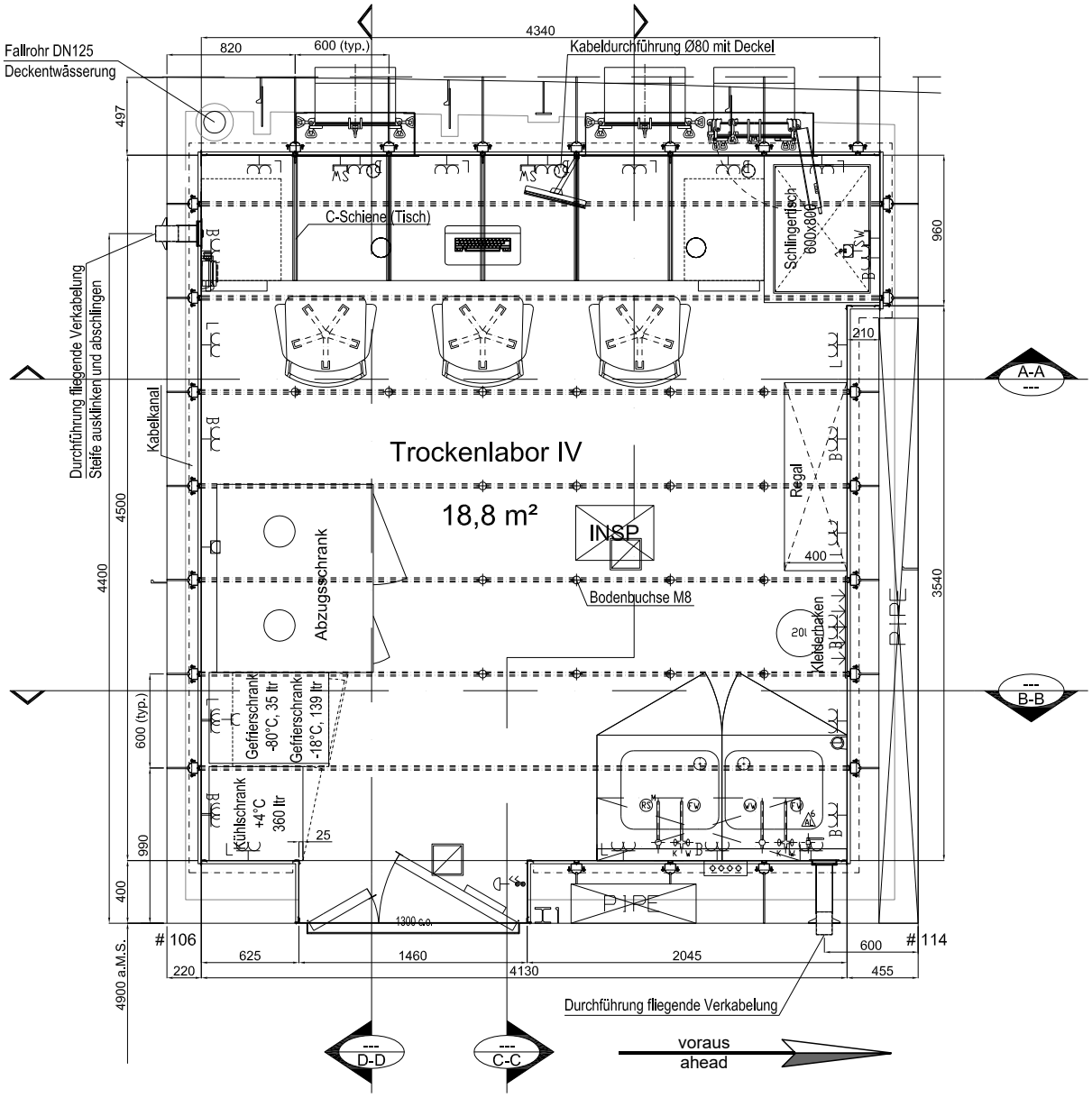
Function definition:

- Universal lab for all "dry work" from many different disciplines

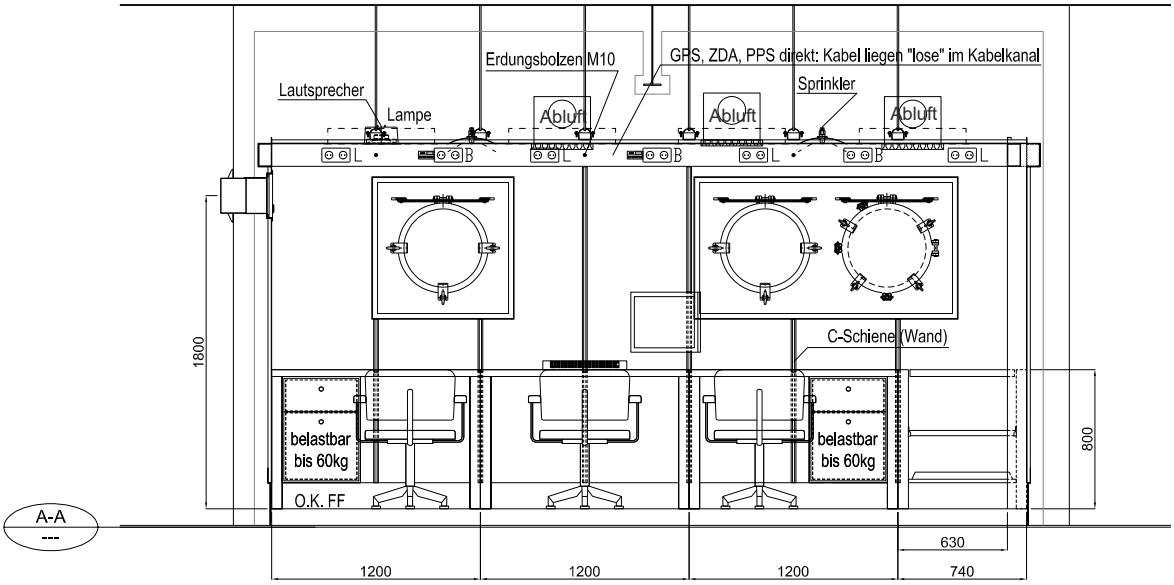
Equipment:

- Refrigerator 360 l +4°C
- Freezer 139 l -18°C
- Freezer 35 l -80°C
- Drying oven
- Digestor
- Yaw table 600 x 800 mm

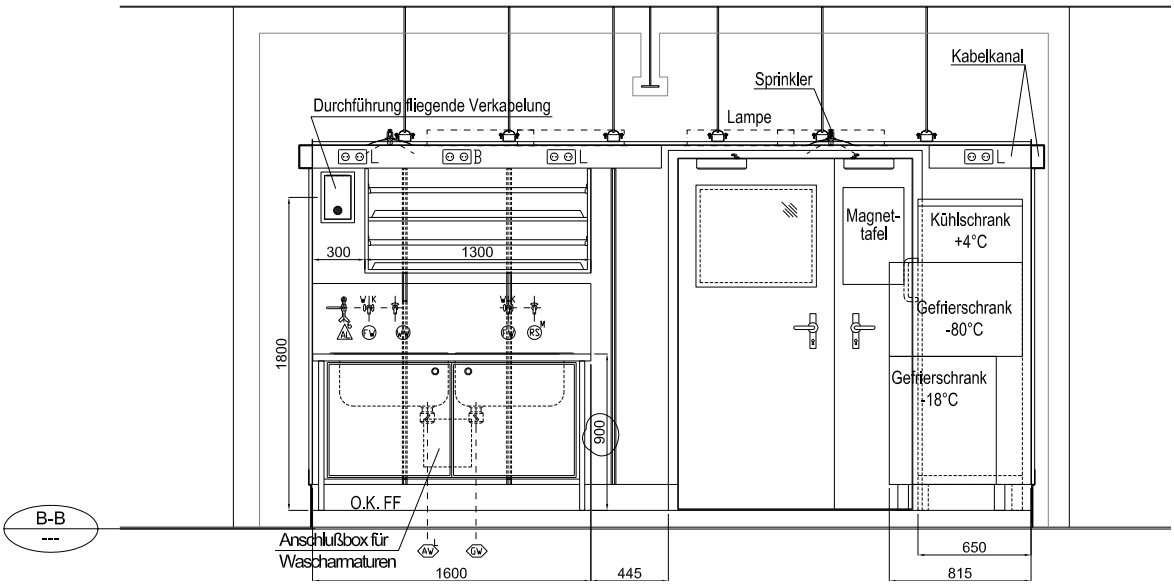
View:


Fallrohr DN125
Deckentwässerung
820
600 (typ.)
4340
Kabeldurchführung Ø80 mit Deckel
497
C-Schiene (Tisch)
Schlingentisch 800x800
960
Durchführung fliegende Verkabelung
Steife ausklinken und abschlingen
Kabelkanal
210
A-A
Trockenlabor IV
18,8 m²
INSP
Regal
400
4500
4400
Abzugsschrank
Bodenbuchse M8
Kletterhaken
20t
3540
PIPE
B-B
600 (typ.)
Gefrierschrank -80°C, 35 ltr
Gefrierschrank -18°C, 139 ltr
Kühlschrank +4°C 360 ltr
25
990
400
1300 c.c.
PIPE
106
114
600
625
1460
2045
220
4130
455
4900 a.M.S.
Durchführung fliegende Verkabelung
D-D
C-C
voraus
ahead

View:

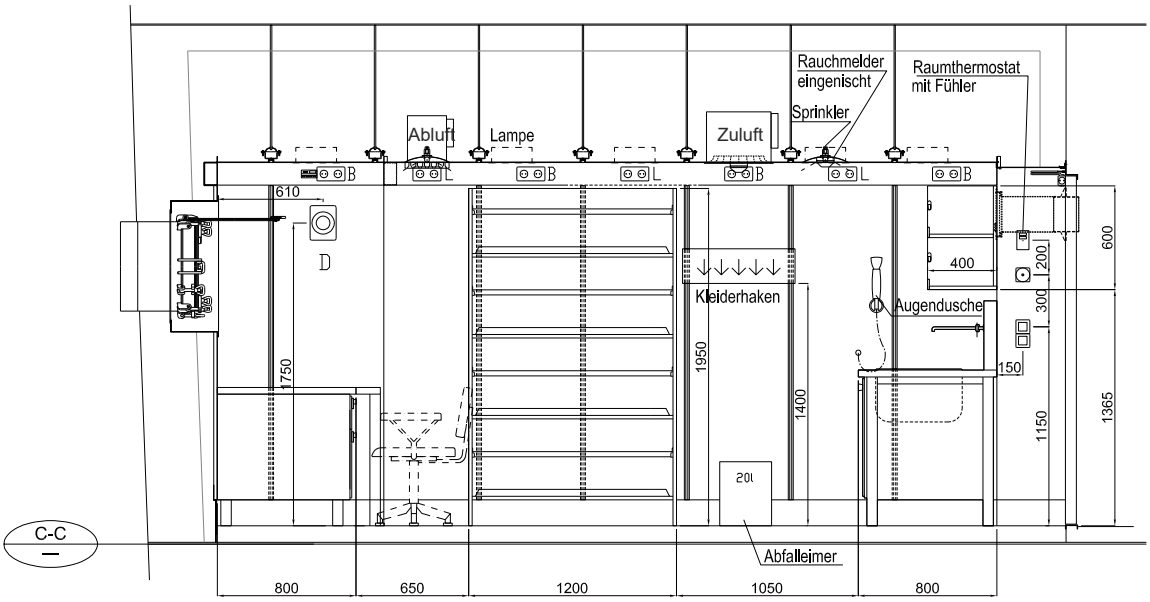

Erdungsbolzen M10
GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Lautsprecher
Lampe
Sprinkler
Abluft
Abluft
Abluft
C-Schiene (Wand)
1800
800
belastbar bis 60kg
belastbar bis 60kg
O.K. FF
A-A

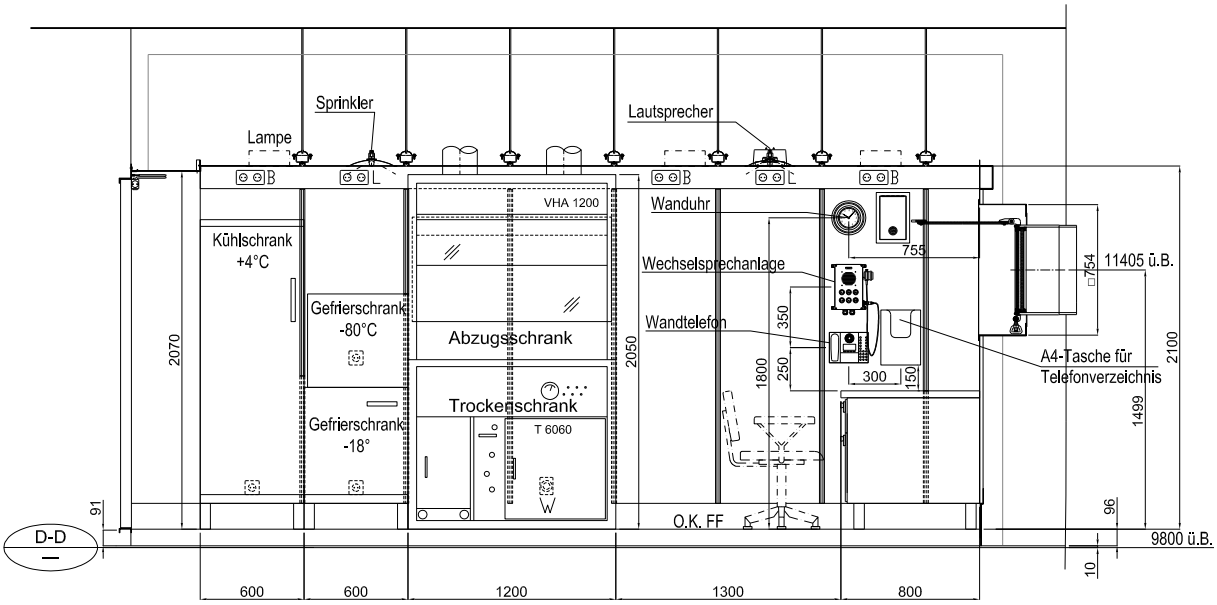
630
1200
1200
1200
740


Kabelkanal
Sprinkler
Durchführung fliegende Verkabelung
Lampe
Magnet-tafel
Kühlschrank +4°C
Gefrierschrank -80°C
Gefrierschrank -18°C
300
1300
1800
900
O.K. FF
B-B

Anschlußbox für Waschamaturen
650
1600
445
815

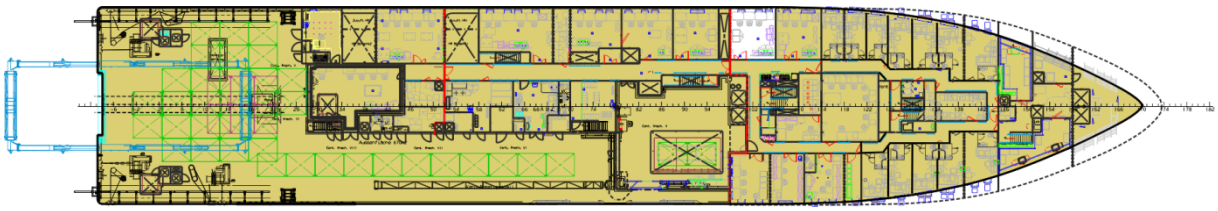
View:


Rauchmelder eingenischt
Raumthermostat mit Fühler
Sprinkler
Abluft
Lampe
Zuluft
610
D
Kleiderhaken
Augendusche
400
200
300
150
600
1750
1950
1400
1150
1365
Abfalleimer
C-C
800
650
1200
1050
800


Sprinkler
Lampe
Lautsprecher
VHA 1200
Wanduhr
Kühlschrank +4°C
Wechselsprechanlage
Gefrierschrank -80°C
Wandtelefon
Abzugsschrank
A4-Tasche für Telefonverzeichnis
Trockenschrank
T 6060
Gefrierschrank -18°
755
11405 ü.B.
2070
2050
2100
1499
350
250
1800
300
150
91
96
10
O.K. FF
9800 ü.B.
D-D
600
600
1200
1300
800

8.3.6. Dry lab 3

Location	Deck 03 (Main deck PORT), Frame 96 – 106
Room-No.	336
Phone	504



Area (m²)	20		230V/16 A Lab power UPS	x		Suction	2
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	4		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	1
soft water	x		Intercom	x		Drying oven	
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly	x		Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

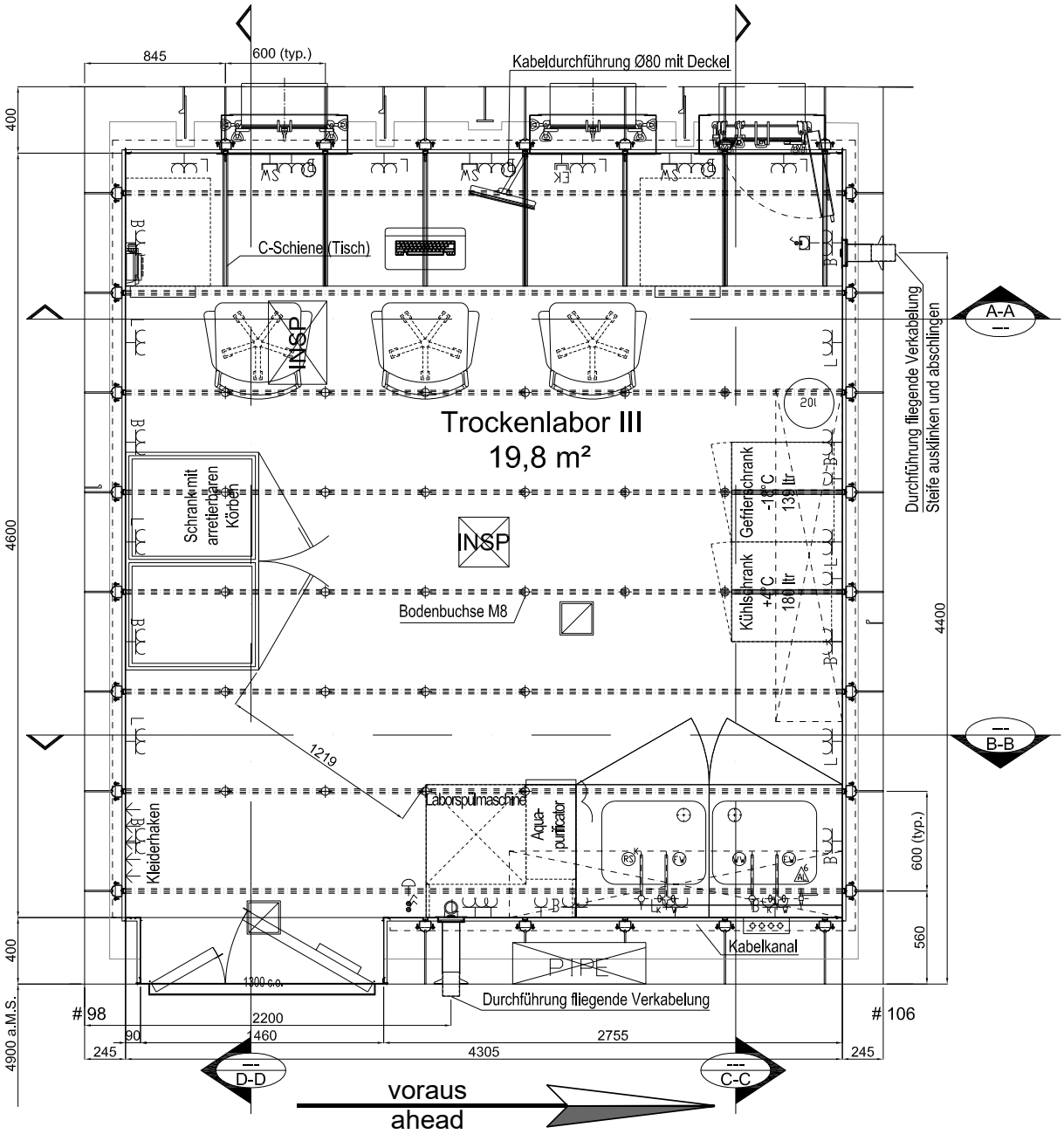
Function definition:

- Universal lab for all "dry work" from many different disciplines

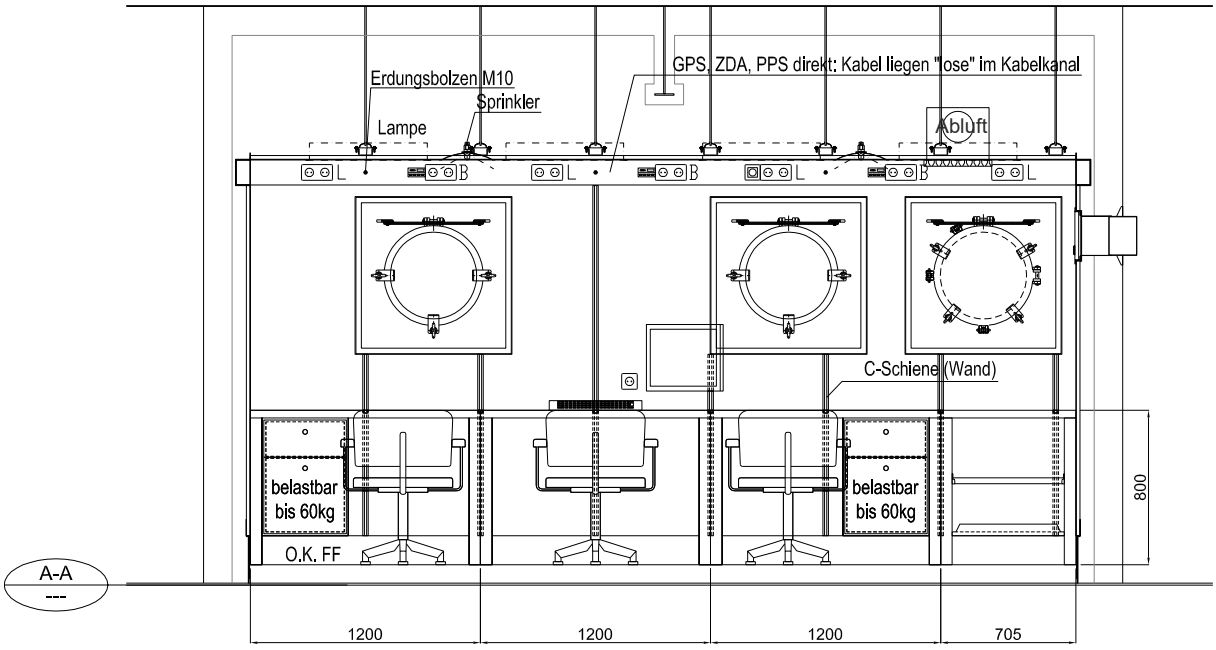
Equipment:

- Refrigerator 180 l +4°C
- Freezer 139 l -18°C
- Lab dishwasher

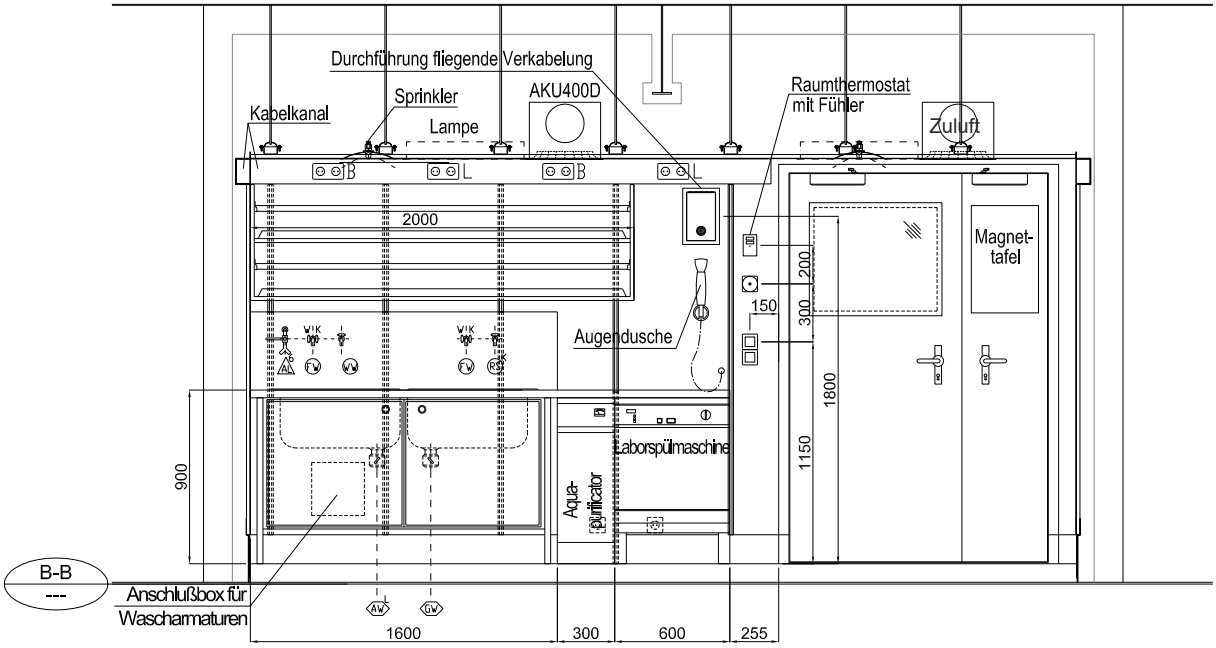
View:


845
600 (typ.)
Kabeldurchführung Ø80 mit Deckel
C-Schiene (Tisch)
INSP
Trockenlabor III
19,8 m²
Schränke mit arretierbaren Körben
Bodenbuchse M8
Gefrierschrank
-18°C
139 ltr
Kühlschrank
+4°C
186 ltr
Durchführung fliegende Verkabelung
Steife ausklinken und abschlingen
A-A
B-B
1219
Laborspülmaschine
Aqua-purificator
Kleiderhaken
Kabelkanal
PIPE
1300 c.c.
Durchführung fliegende Verkabelung
98
106
2200
460
2755
90
245
4305
245
4900 a.M.S.
400
4600
4400
600 (typ.)
560
D-D
C-C
voraus
ahead

View:

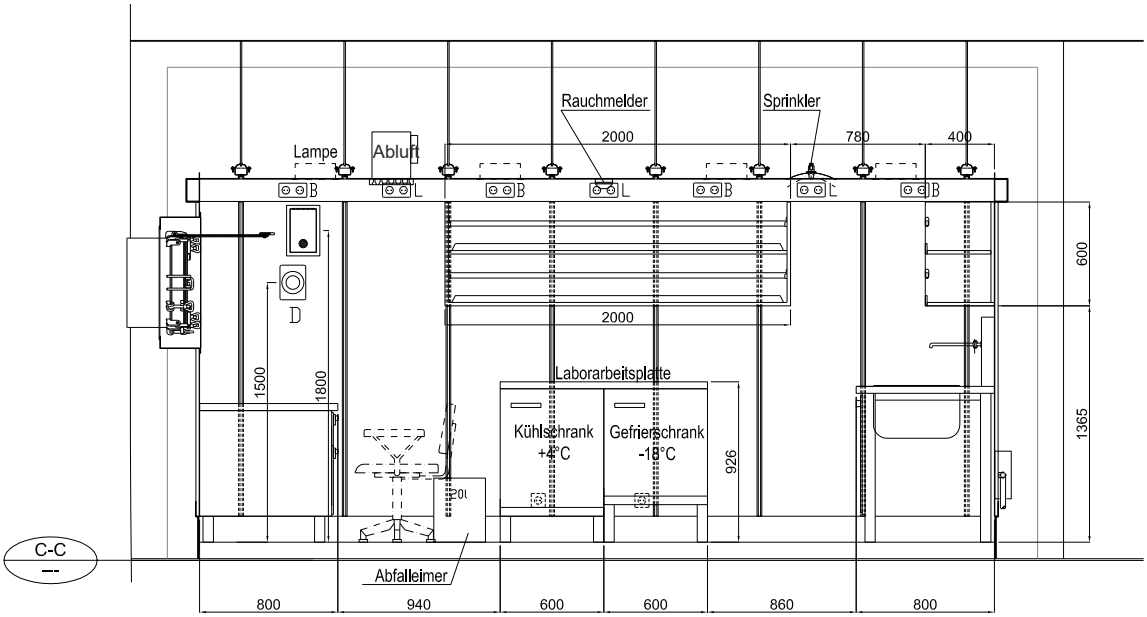

Erdungsbolzen M10
Sprinkler
Lampe
GPS, ZDA, PPS direkt; Kabel liegen "lose" im Kabelkanal
Abluft
C-Schiene (Wand)
belastbar bis 60kg
belastbar bis 60kg
O.K. FF
800
A-A

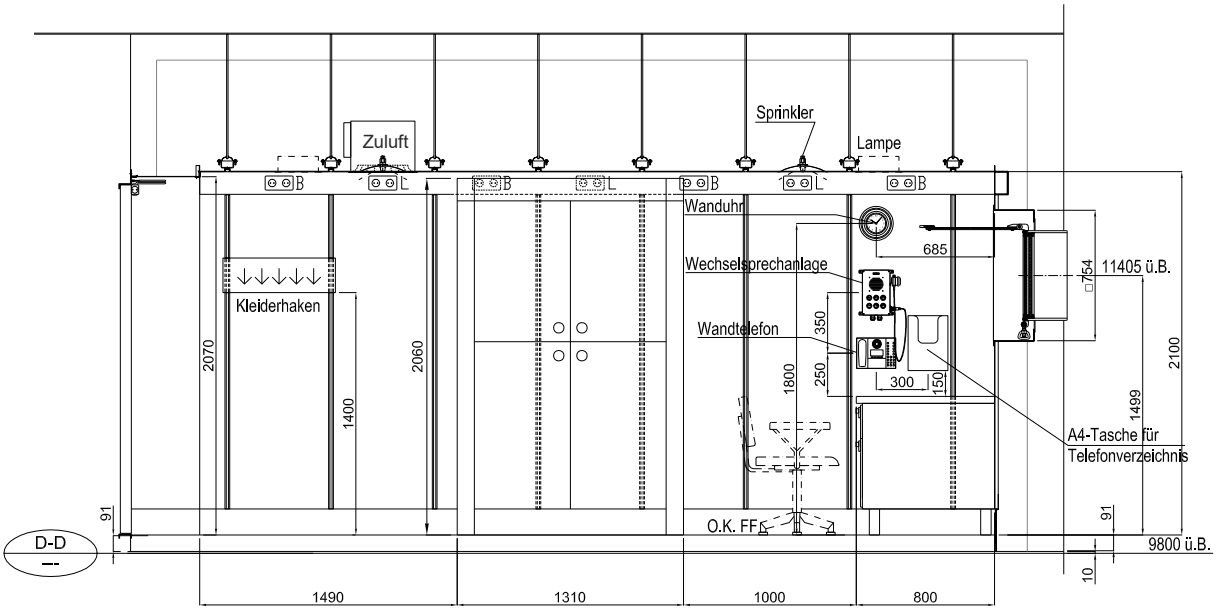
1200
1200
1200
705


Durchführung fliegende Verkabelung
Kabelkanal
Sprinkler
Lampe
AKU400D
Raumthermostat mit Fühler
Zuluft
2000
Augendusche
Magnet-tafel
200
150
300
1800
1150
900
Aqua-purificator
Laborspülmaschine
B-B

Anschlußbox für Wascharmaturen
1600
300
600
255

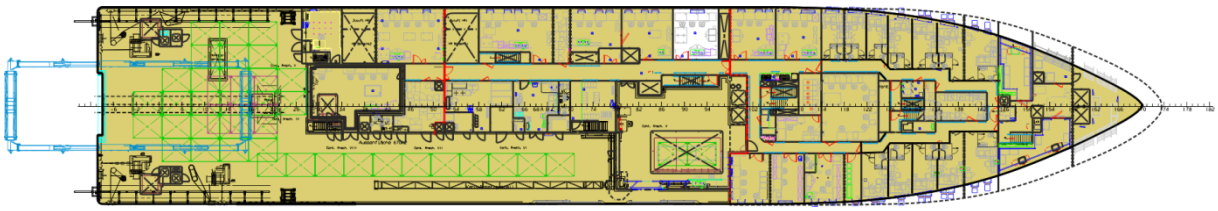
View:


Rauchmelder
Sprinkler
Lampe
Abluft
2000
780
400
600
2000
1500
1800
Laborarbeitsplatte
Kühlschrank
+4°C
Gefrierschrank
-18°C
926
1365
C-C
Abfalleimer
800
940
600
600
860
800


Zuluft
Sprinkler
Lampe
Wanduhr
685
Wechselsprechanlage
754
11405 ü.B.
Kleiderhaken
Wandtelefon
350
2070
2060
1800
250
300
150
2100
1400
1499
A4-Tasche für
Telefonverzeichnis
91
O.K. FF
91
D-D
9800 ü.B.
10
1490
1310
1000
800

8.3.7. Dry lab 2

Location	Deck 03 (Main deck PORT), Frame 88 – 96
Room-No.	340
Phone	505



Area (m²)	15		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	3		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	
soft water	x		Intercom	x		Drying oven	
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

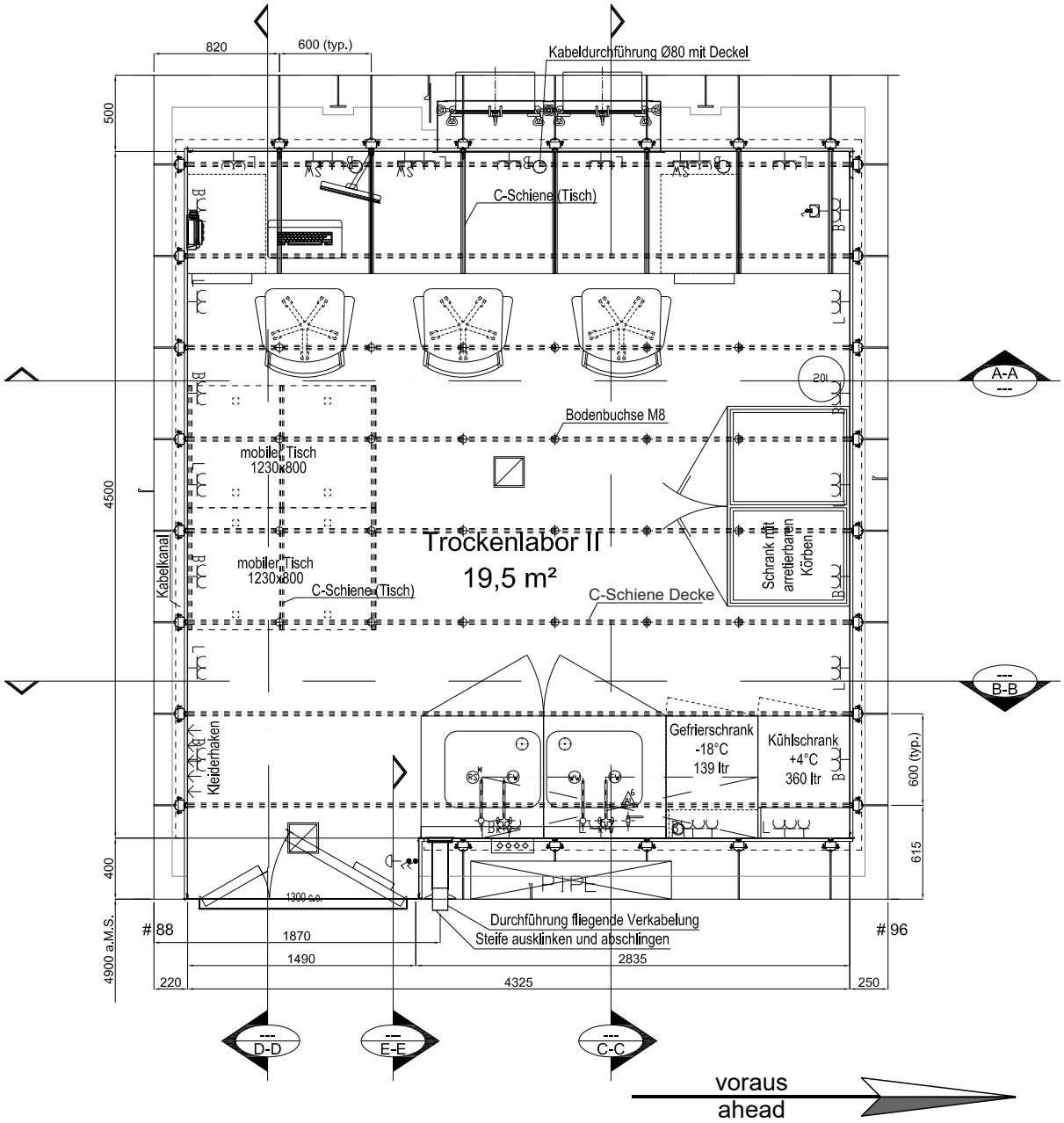
Function definition:

- Universal lab for all "dry work" from many different disciplines

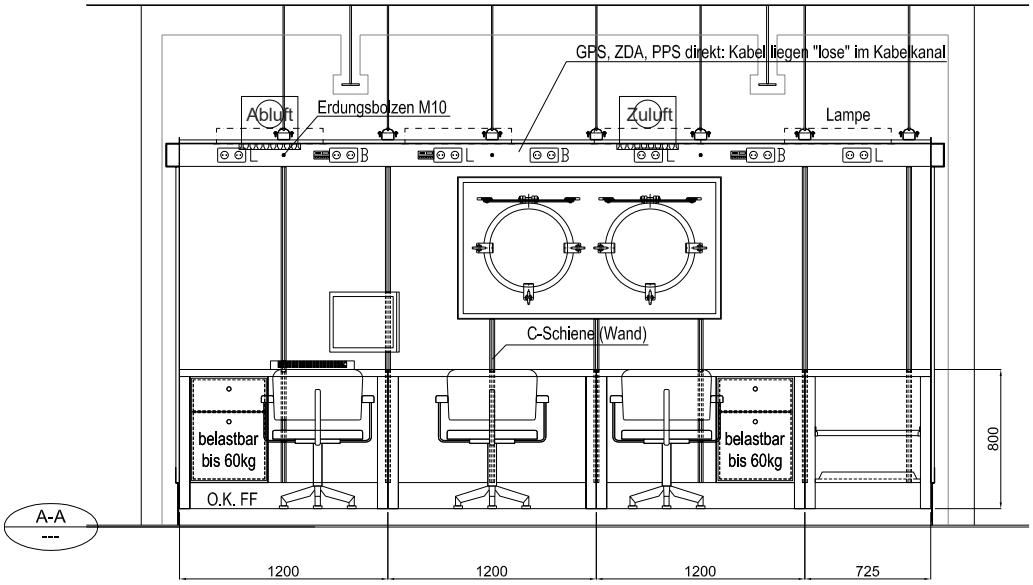
Equipment:

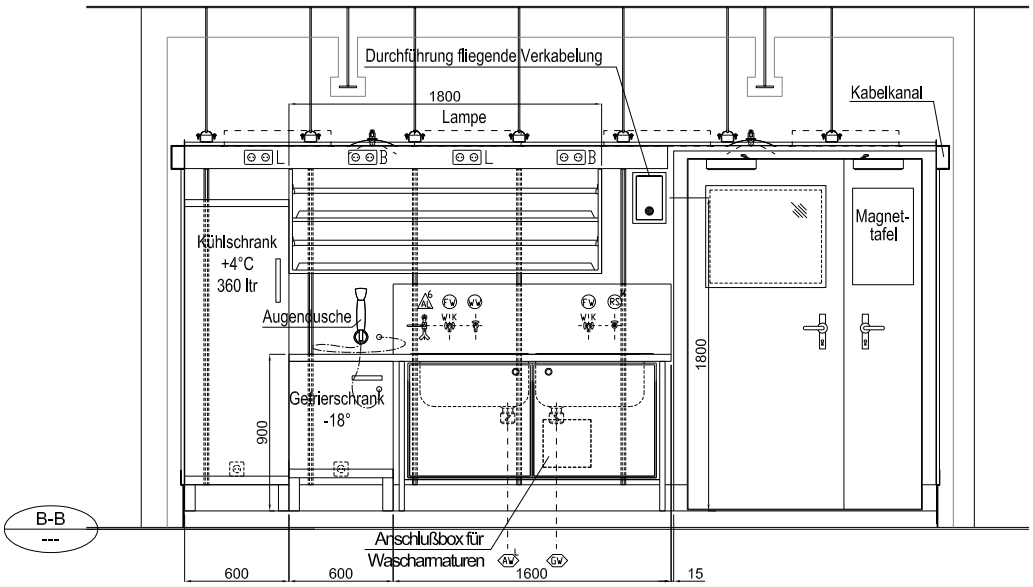
- Refrigerator 360 l +4°C
- Freezer 139 l -18°C
- 2 mobile tables 1230 x 800

View:

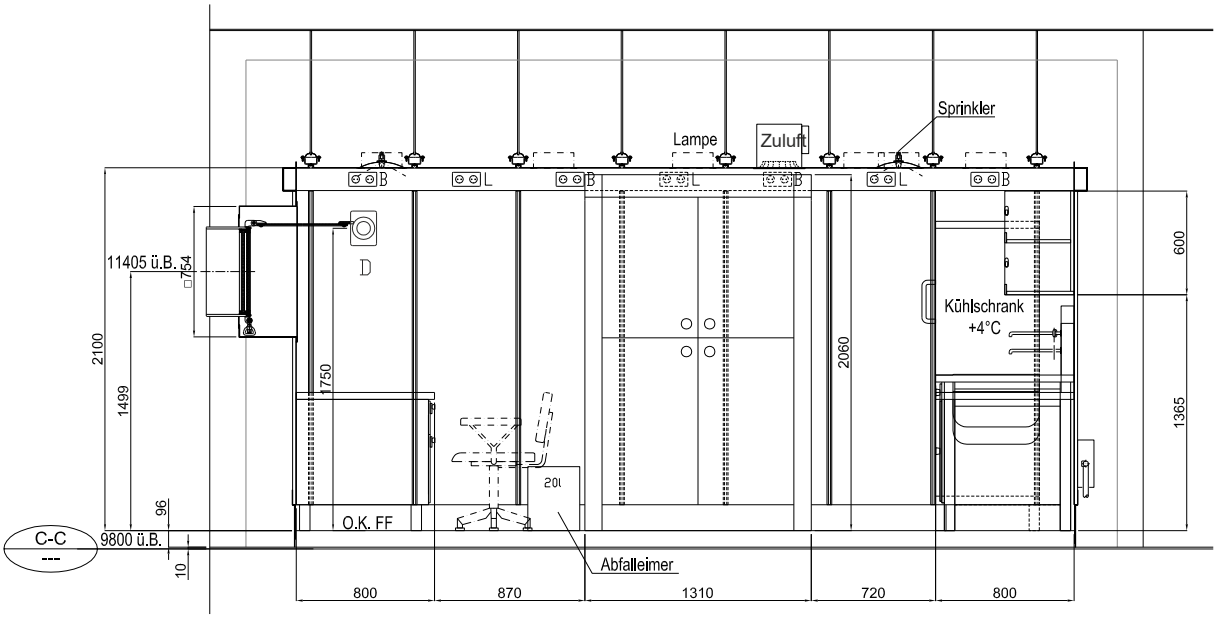

820
600 (typ.)
Kabeldurchführung Ø80 mit Deckel
500
C-Schiene (Tisch)
A-A
Bodenbuchse M8
mobiler Tisch
1230x800
4500
Kabelkanal
Trockenlabor II
19,5 m²
mobiler Tisch
1230x800
C-Schiene (Tisch)
C-Schiene Decke
Schrank mit arretierbaren Körben
B-B
Kleiderhaken
Gefrierschrank
-18°C
139 ltr
Kühlschrank
+4°C
360 ltr
600 (typ.)
615
400
1300 c.c.
PIPE
Durchführung fliegende Verkabelung
Steife ausklinken und abschlingen
88
96
4900 a.M.S.
1870
1490
2835
220
4325
250
D-D
E-E
C-C
voraus
ahead

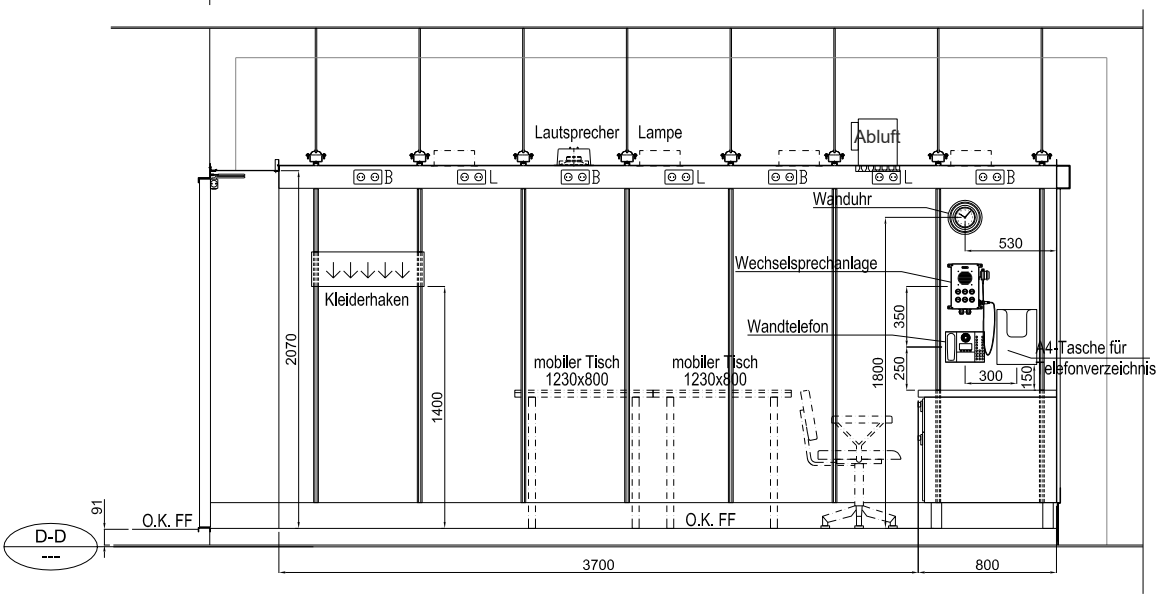
View:


GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Abluft
Erdungsbolzen M10
Zuluft
Lampe
C-Schiene (Wand)
belastbar bis 60kg
belastbar bis 60kg
O.K. FF
800
A-A
1200
1200
1200
725


Durchführung fliegende Verkabelung
1800
Lampe
Kabelkanal
Kühlschrank
+4°C
360 ltr
Augendusche
Gefrierschrank
-18°
900
1800
Magnet-
tafel
B-B
Anschlußbox für
Waschamaturen
600
600
1600
15

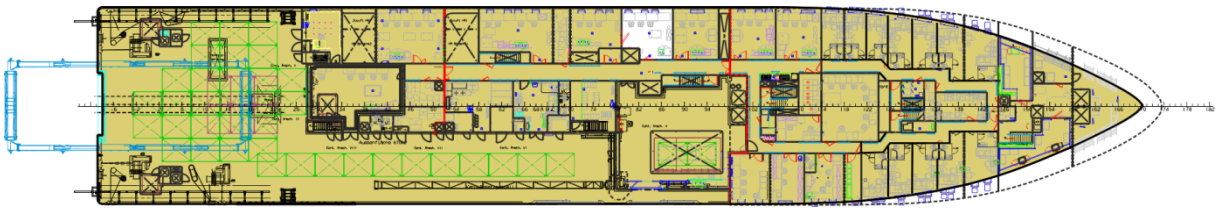
View:


Sprinkler
Lampe
Zuluft
11405 ü.B.
754
2100
1499
1750
2060
600
1365
Kühlschrank
+4°C
96
C-C
9800 ü.B.
10
O.K. FF
Abfalleimer
800
870
1310
720
800


Lautsprecher
Lampe
Abluft
Wanduhr
530
Wechselsprechanlage
Kleiderhaken
Wandtelefon
350
2070
1400
mobiler Tisch
1230x800
mobiler Tisch
1230x800
1800
250
300
150
A4-Tasche für
Telefonverzeichnis
91
O.K. FF
O.K. FF
D-D
3700
800

8.3.8. Climate lab 2

Location	Deck 03 (Main deck PORT), Frame 55 – 70
Room-No.	342
Phone	506

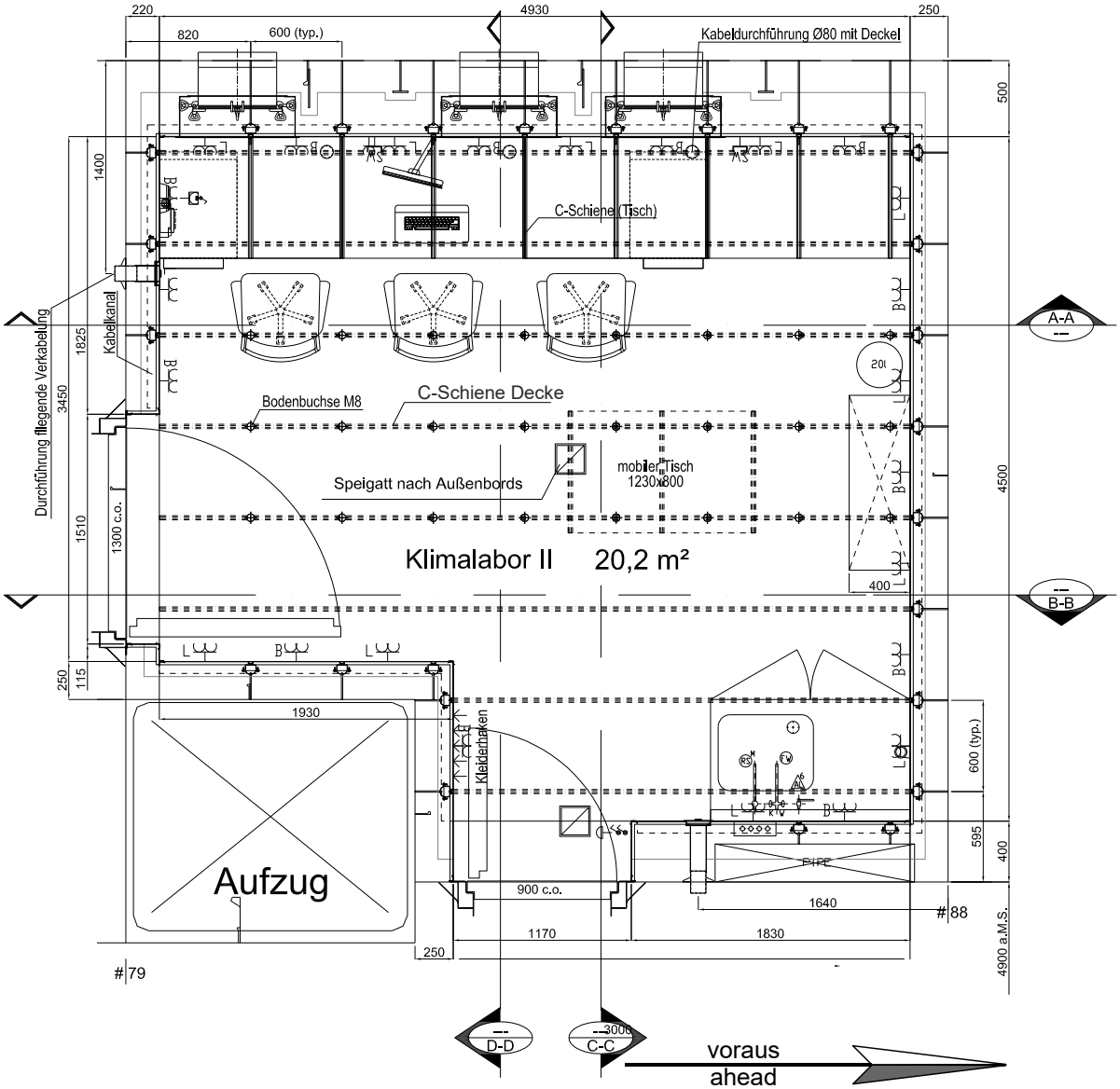


Area (m²)	20		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase			Outlet	
Workplaces	2		Ground stud			Refrigerator +4°C	
Phone	x		LAN	8		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	1		Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C	x		GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

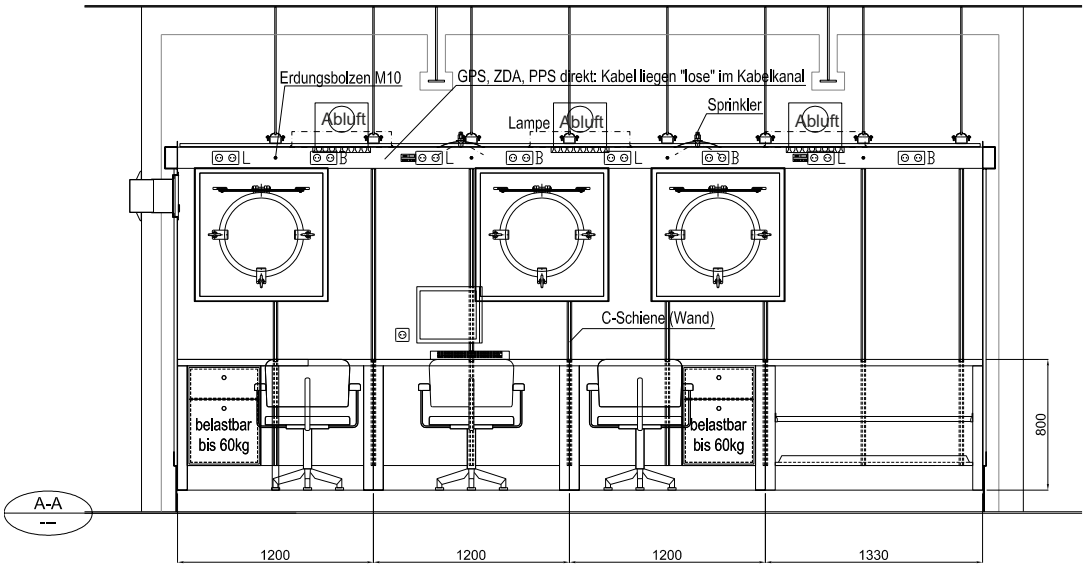
Function definition:

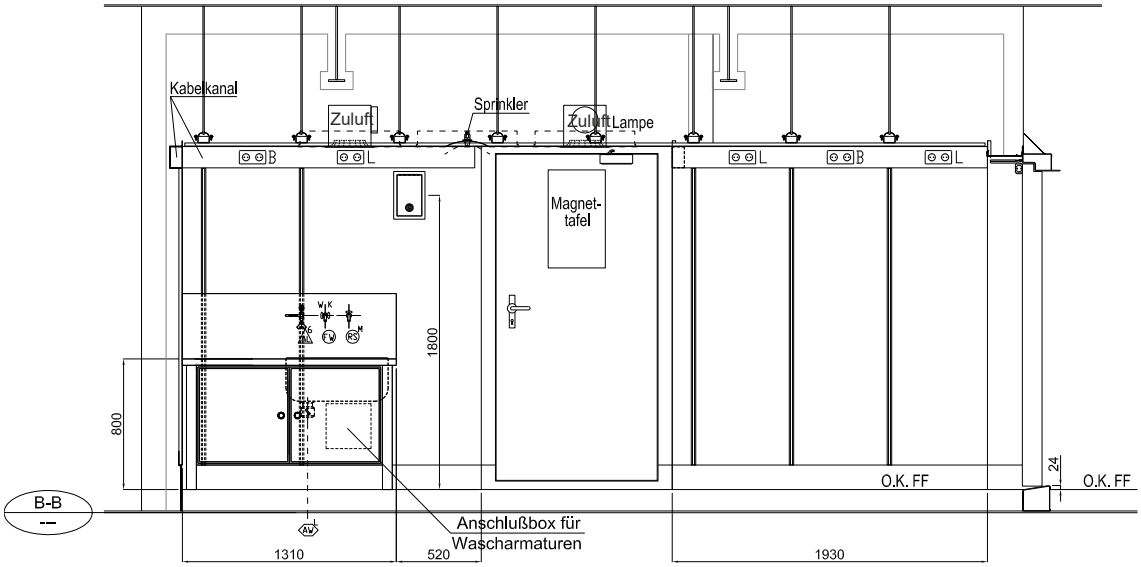
- Climate Laboratory 2 is a 'multi-functional lab' in which a temperature range from the 'normal' room temperature, the labs can be adjusted down to 0 ° C.
- It can be used as normal lab and as a cooling lab for example, the caging and investigation of the deep sea organisms are used.
- Temperature is selected individually in the laboratory. The temperature tolerance is ±0.5K.
- Climate Laboratory 2 is connected by a door with the Climate Laboratory 1.
- In the room no refrigeration units may be operated.

View:

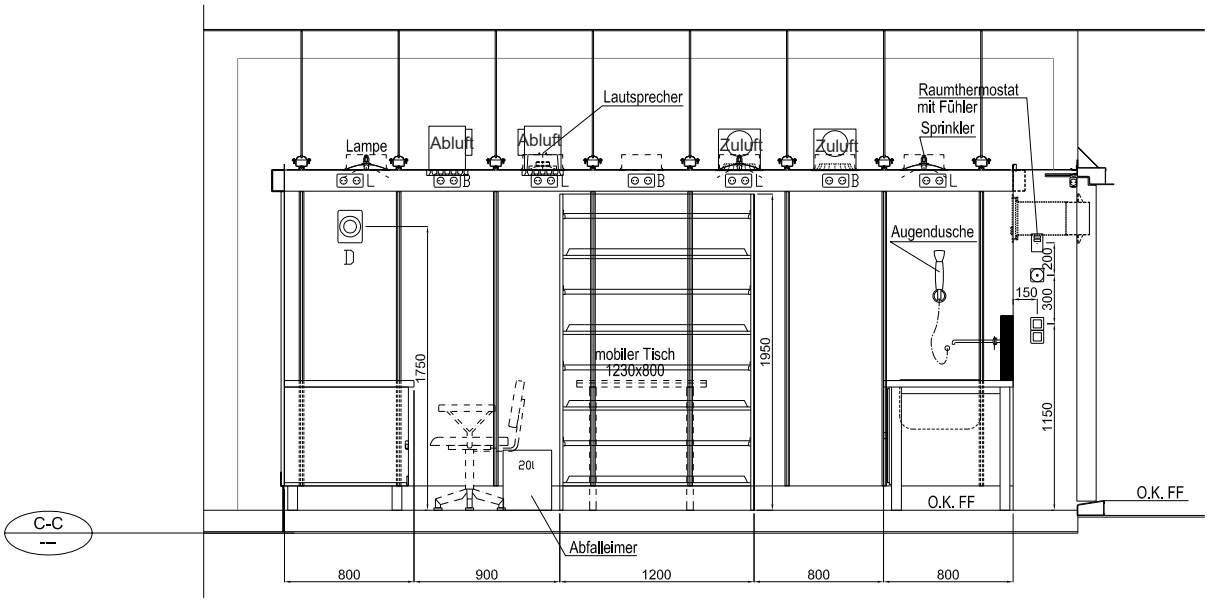

220
4930
250
820
600 (typ.)
Kabeldurchführung Ø80 mit Deckel
500
1400
C-Schiene (Tisch)
Kabelkanal
Durchführung fliegende Verkabelung
1825
3450
1510
1300 c.o.
Bodenbuchse M8
C-Schiene Decke
Speigatt nach Außenbords
mobiler Tisch
1230x800
Klimalabor II 20,2 m²
4500
400
A-A
B-B
250
115
1930
Kleiderhaken
600 (typ.)
595
400
Aufzug
900 c.o.
1640
#88
1170
1830
250
4900 a.M.S.
#79
D-D
C-C
voraus
ahead

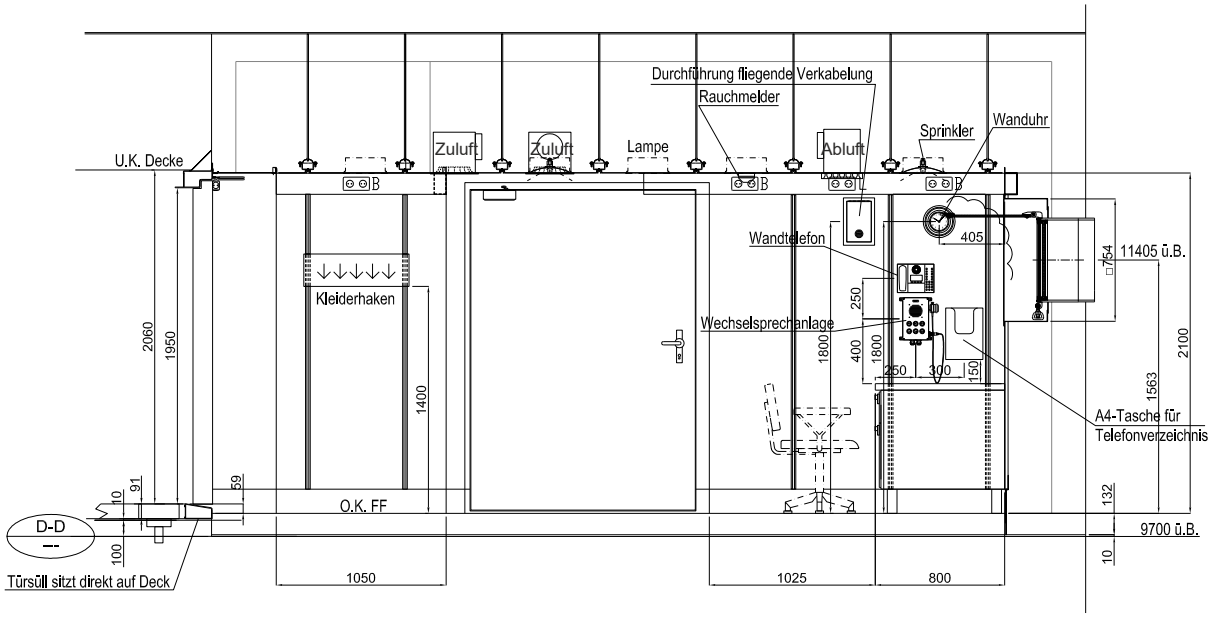
View:


Erdungsbolzen M10
GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Abluft
Lampe
Abluft
Sprinkler
Abluft
C-Schiene (Wand)
belastbar bis 60kg
belastbar bis 60kg
800
A-A
1200
1200
1200
1330


Kabelkanal
Zuluft
Sprinkler
Zuluft
Lampe
Magnet-tafel
1800
800
O.K. FF
24
O.K. FF
B-B
Anschlußbox für Wascharmaturen
1310
520
1930

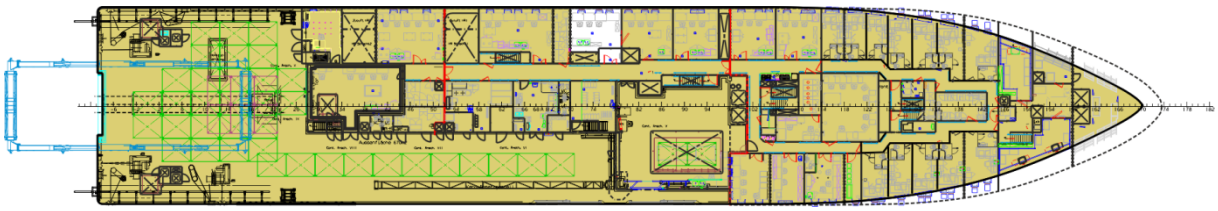
View:


Lautsprecher
Raumthermostat
mit Fühler
Sprinkler
Lampe
Abluft
Abluft
Zuluft
Zuluft
Augendusche
mobiler Tisch
1230x800
1750
1950
1150
O.K. FF
O.K. FF
C-C
Abfalleimer
800
900
1200
800
800


Durchführung fliegende Verkabelung
Rauchmelder
Sprinkler
Wanduhr
U.K. Decke
Zuluft
Zuluft
Lampe
Abluft
Wandtelefon
Kleiderhaken
Wechselsprechanlage
11405 ü.B.
A4-Tasche für
Telefonverzeichnis
O.K. FF
9700 ü.B.
D-D
Türsüll sitzt direkt auf Deck
1050
1025
800

8.3.9. Climate lab 1

Location	Deck 03 (Main deck PORT), Frame 55 – 70
Room-No.	354
Phone	507

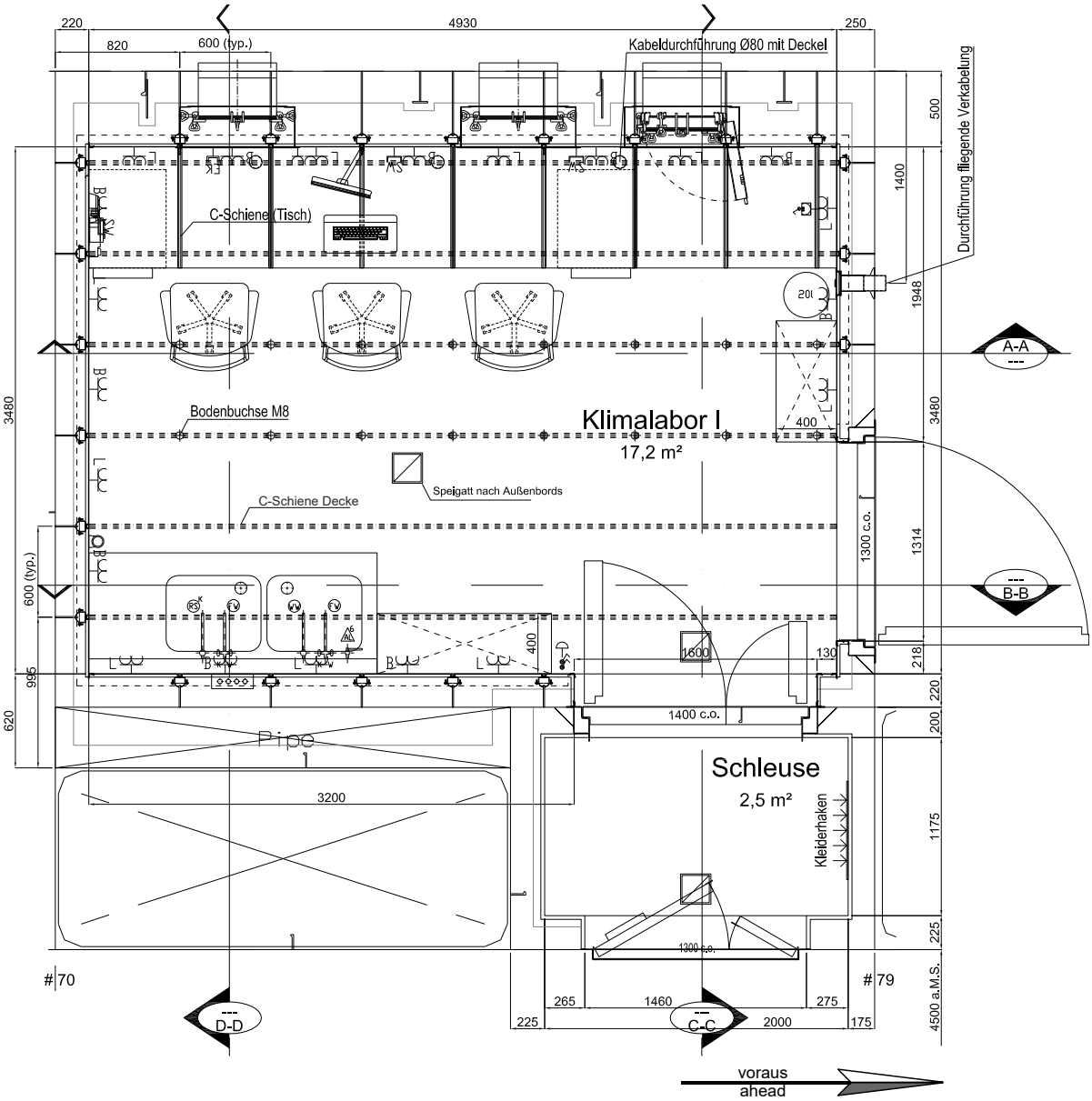


Area (m²)	20		230V/16 A Lab power UPS	x		Suction	1
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	4		Ground stud	x		Refrigerator +4°C	
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	
Clean seawater	M		Multi cable / fiber optic			Lab dishwasher	
soft water	x		Intercom	x		Drying oven	
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly	x		Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C	x		GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

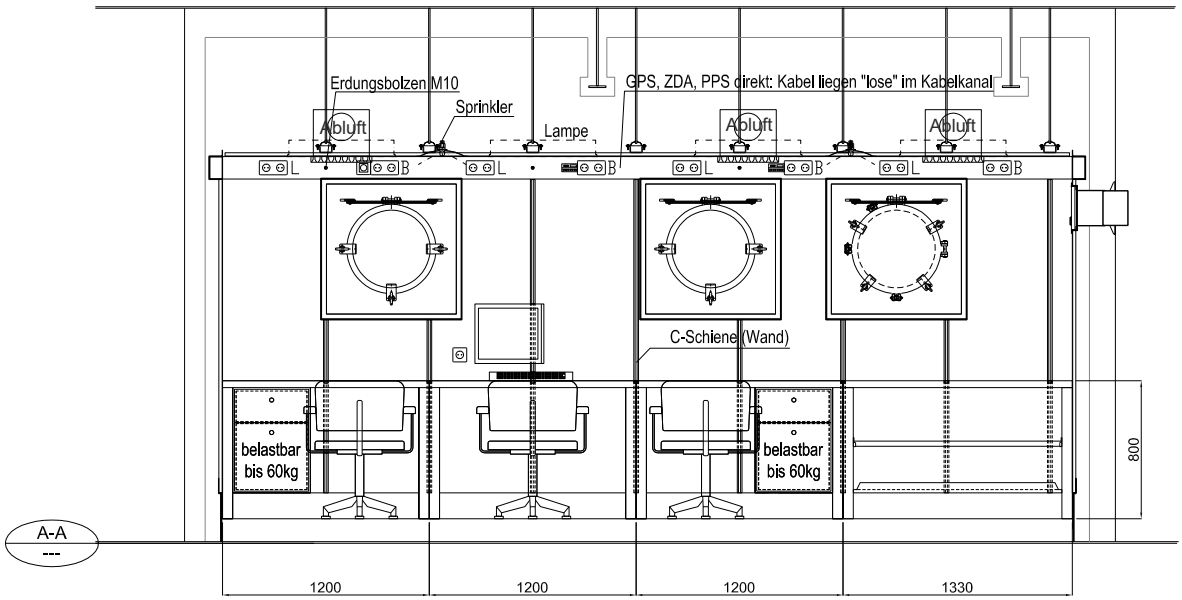
Function definition:

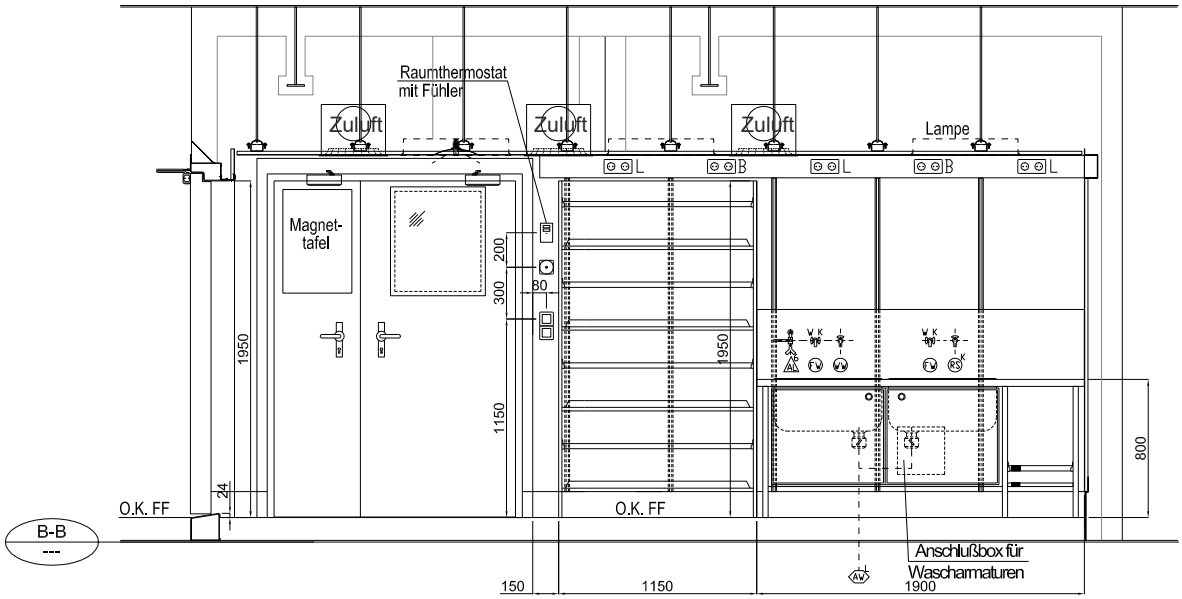
- Climate Laboratory 1 is a 'multi-functional lab' in which a temperature range from the 'normal' room temperature, the labs can be adjusted down to 0 ° C.
- It can be used as normal lab and as a cooling lab for example, the caging and investigation of the deep sea organisms are used.
- Temperature is selected individually in the laboratory. The temperature tolerance is ±0.5K.
- Climate lab 1 is provided in the entrance with a lock and is connected by a door with the Climate Laboratory 2.
- In the room no refrigeration units may be operated.

View:

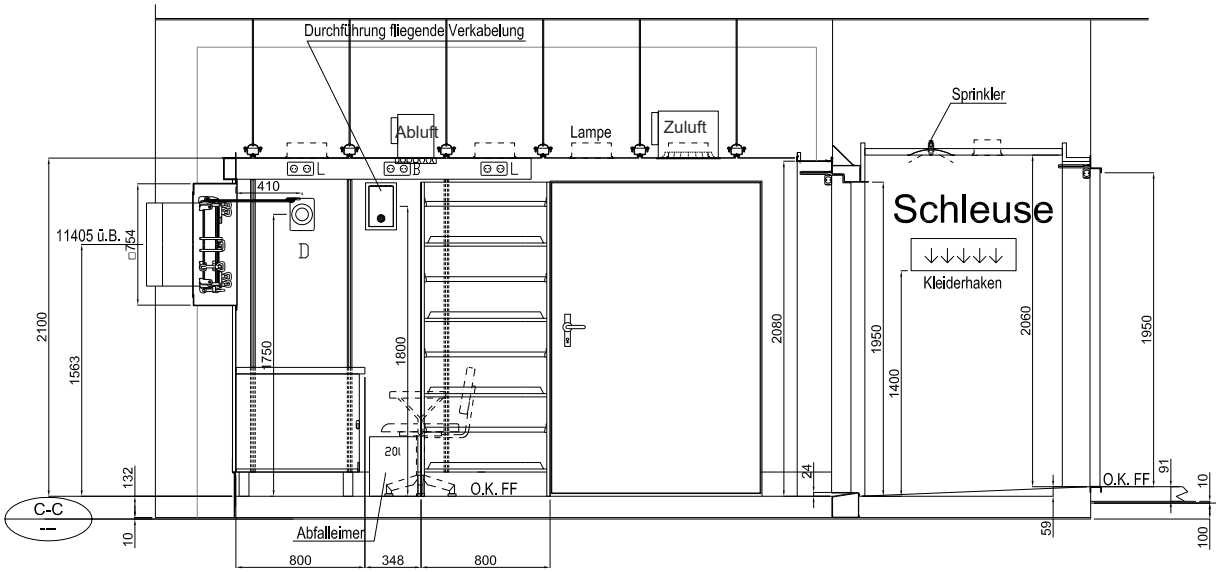

220
4930
250
820
600 (typ.)
Kabeldurchführung Ø80 mit Deckel
Durchführung fliegende Verkabelung
C-Schiene (Tisch)
Bodenbuchse M8
Klimalabor I
17,2 m²
Speigatt nach Außenbords
C-Schiene Decke
A-A
B-B
C-C
D-D
Schleuse
2,5 m²
Kleiderhaken
Pipe
3200
1400 c.o.
1300 c.o.
1600
130
400
265
1460
275
225
2000
175
#70
#79
4500 a.M.S.
voraus
ahead

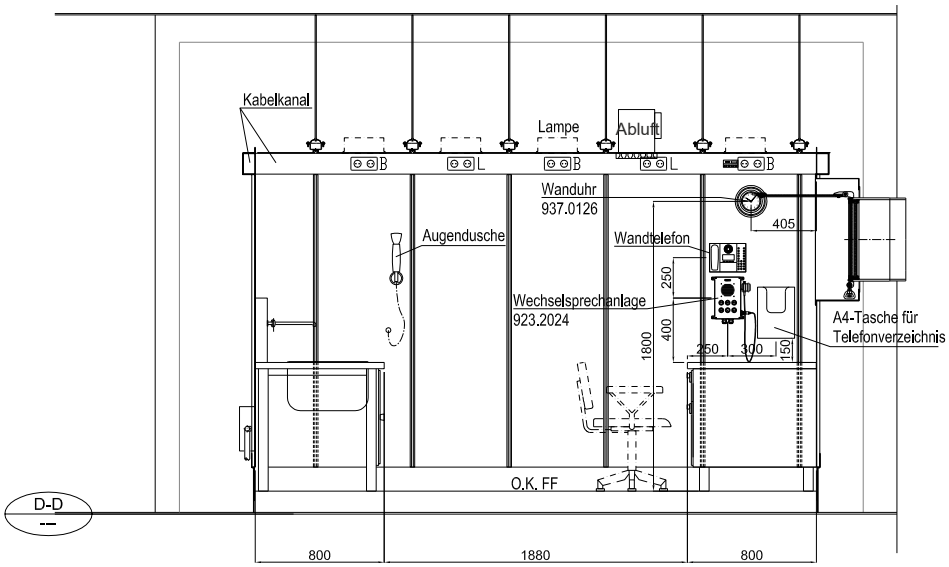
View:


Erdungsbolzen M10
Sprinkler
GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Abluft
Lampe
Abluft
Abluft
C-Schiene (Wand)
belastbar bis 60kg
belastbar bis 60kg
800
A-A
1200
1200
1200
1330


Raumthermostat mit Fühler
Zuluft
Zuluft
Zuluft
Lampe
Magnet-tafel
200
300
80
1950
1950
1150
800
24
O.K. FF
O.K. FF
B-B
Anschlußbox für Wascharmaturen
150
1150
1900

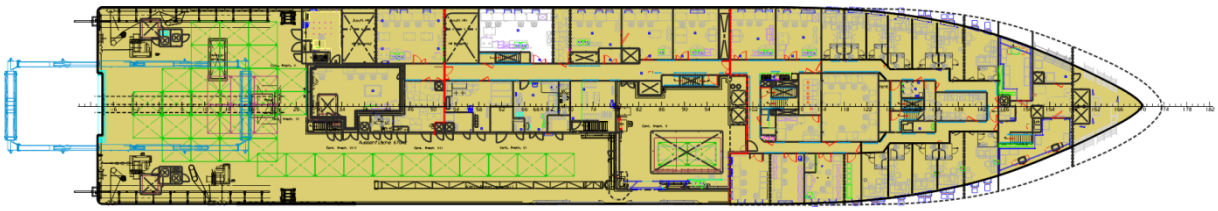
View:


Durchführung fliegende Verkabelung
Abluft
Lampe
Zuluft
Sprinkler
Schleuse
Kleiderhaken
11405 ü.B.
O.K. FF
Abfalleimer
C-C
800
348
800


Kabelkanal
Lampe
Abluft
Wanduhr
937.0126
Augendusche
Wandtelefon
Wechselsprechanlage
923.2024
A4-Tasche für
Telefonverzeichnis
O.K. FF
D-D
800
1880
800

8.3.10. Dry lab 1

Location	Deck 03 (Main deck PORT), Frame 55 – 70
Room-No.	360
Phone	508



Area (m²)	32		230V/16 A Lab power UPS	x		Suction	2
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	1
Workplaces	6		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	16		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	
Clean seawater	M		Multi cable / fiber optic	x		Lab dishwasher	1
soft water	x		Intercom	x		Drying oven	1
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	1
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

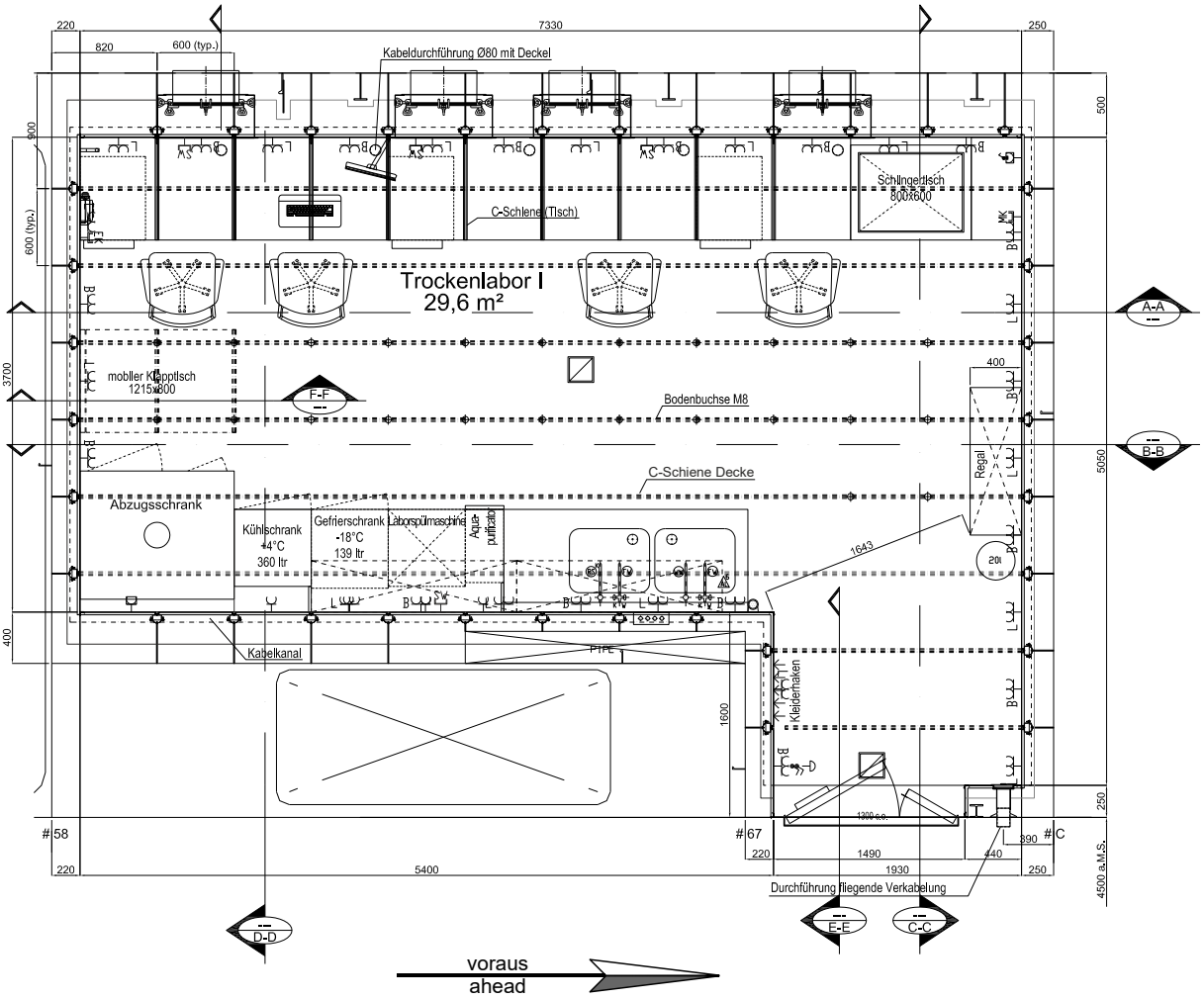
Function definition:

- Universal lab for all "dry work" from many different disciplines.
- The location is disposed close to the Pulserstation and the aft working deck. Cable connections between devices and installations by example seismic or other equipment on the aft deck can be kept relatively short.

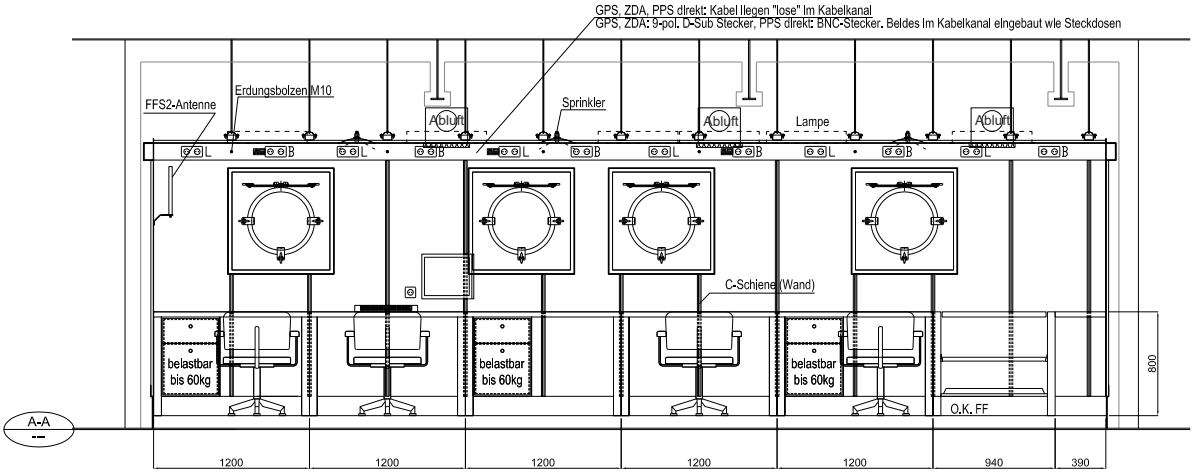
Equipment:

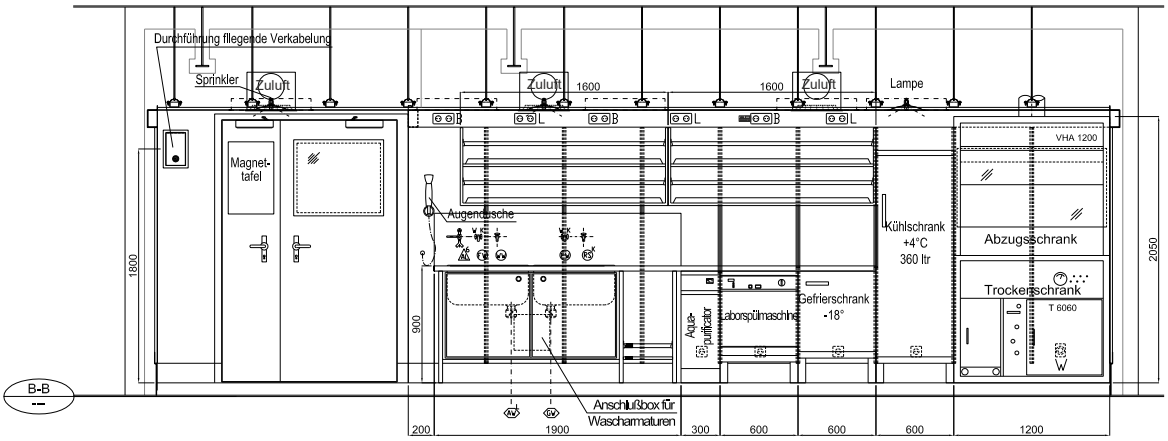
- Refrigerator 360 l +4°C
- Freezer 139 l -18°C
- Lab dishwasher
- Milli-Q-Device
- Drying oven
- Digestor
- Yaw table 600 x 800 mm
- Heat refrigeration cabinet (+180°C / -40°C)

View:

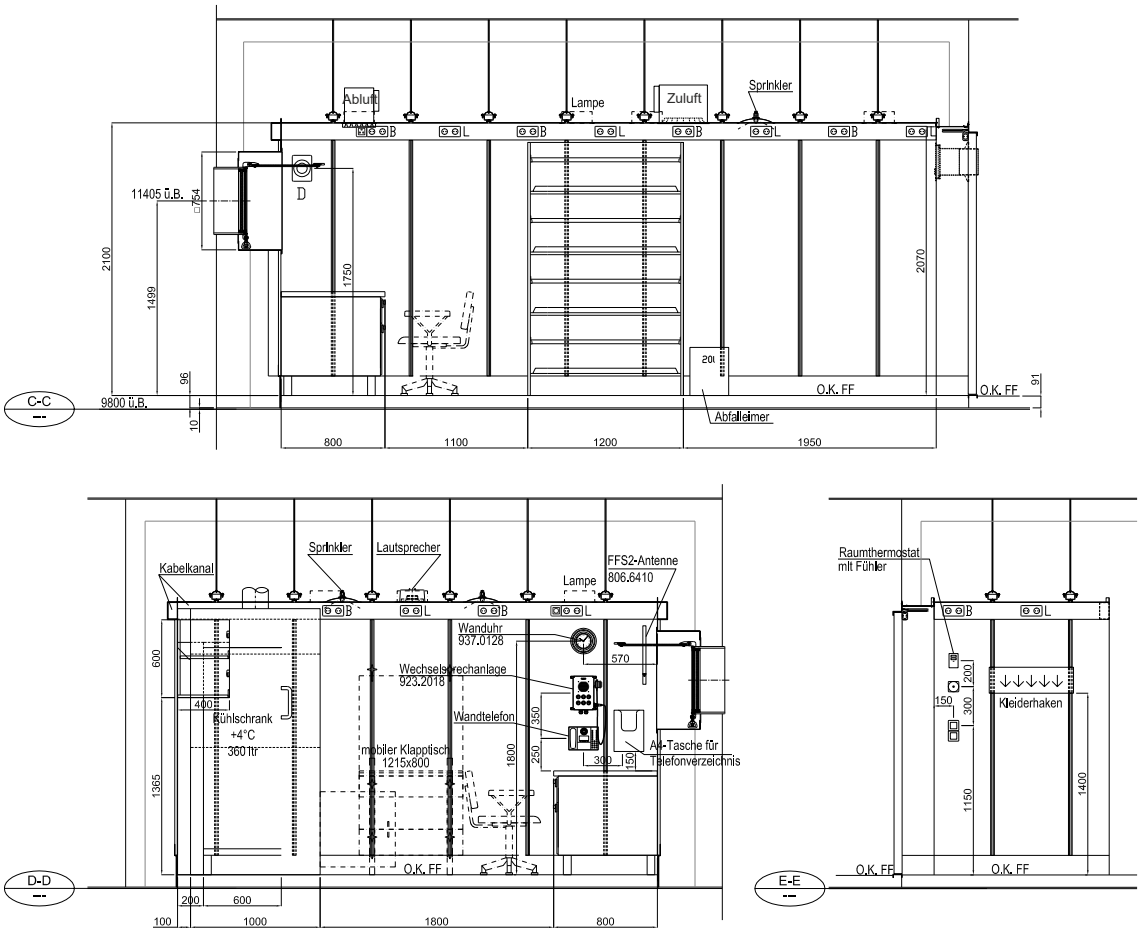

Kabeldurchführung Ø80 mit Deckel
C-Schiene (Tisch)
Schlingentisch 800x600
Trockenlabor I
29,6 m²
mobiler Klapptisch 1215x800
Bodenbuchse M8
C-Schiene Decke
Abzugsschrank
Kühlschrank +4°C 360 ltr
Gefrierschrank -18°C 139 ltr
Laborspülmaschine
Aqua-purificato
Regal
Kabelkanal
Kleiderhaken
Durchführung fliegende Verkabelung
A-A
B-B
C-C
D-D
E-E
F-F
voraus
ahead

View:


GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
GPS, ZDA: 9-pol. D-Sub Stecker, PPS direkt: BNC-Stecker. Beides im Kabelkanal eingebaut wie Steckdosen
FFS2-Antenne
Erdungsbolzen M10
Abluft
Sprinkler
Lampe
C-Schiene (Wand)
belastbar bis 60kg
O.K. FF
800
A-A
1200
940
390

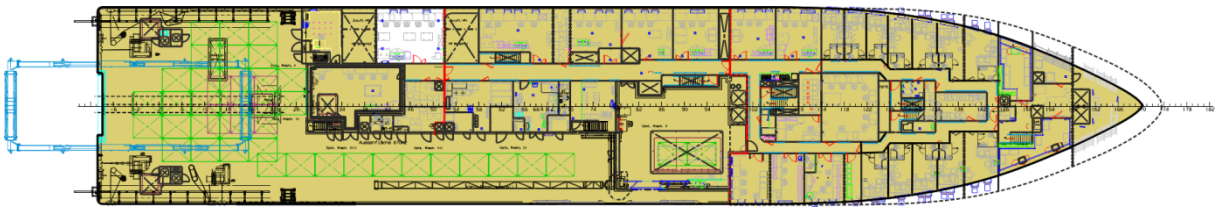

Durchführung fliegende Verkabelung
Sprinkler
Zuluft
1600
Lampe
Magnet-tafel
Augendusche
Kühlschrank +4°C 360 ltr
VHA 1200
Abzugsschrank
Trockenschrank
T 6060
Gefrierschrank -18°
Aqua-purificator
Geschirrspülmaschine
Anschlußbox für Waschamaturen
1800
900
2050
B-B
200
1900
300
600
1200

View:


Abluft
Lampe
Zuluft
Sprinkler
11405 ü.B.
D
2100
1499
1750
2070
96
C-C
9800 ü.B.
10
O.K. FF
91
Abfalleimer
800
1100
1200
1950
Kabelkanal
Sprinkler
Lautsprecher
Lampe
FFS2-Antenne
806.6410
Wanduhr
937.0128
570
Wechselsprechanlage
923.2018
Wandtelefon
Kühlschrank
+4°C
360 ltr
mobiler Klapptisch
1215x800
A4-Tasche für
Telefonverzeichnis
600
400
1365
350
1800
250
300
150
D-D
200
600
100
1000
1800
800
Raumthermostat
mit Fühler
Kleiderhaken
200
150
300
1150
1400
E-E

8.3.11. Wet lab 2

Location	Deck 03 (Main deck PORT), Frame 40 – 52
Room-No.	364
Phone	509



Area (m²)	15		230V/16 A Lab power UPS	x		Suction	2
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	1
Workplaces	4		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	
soft water	x		Intercom	x		Drying oven	1
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	
Scuppers, directly	x		Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

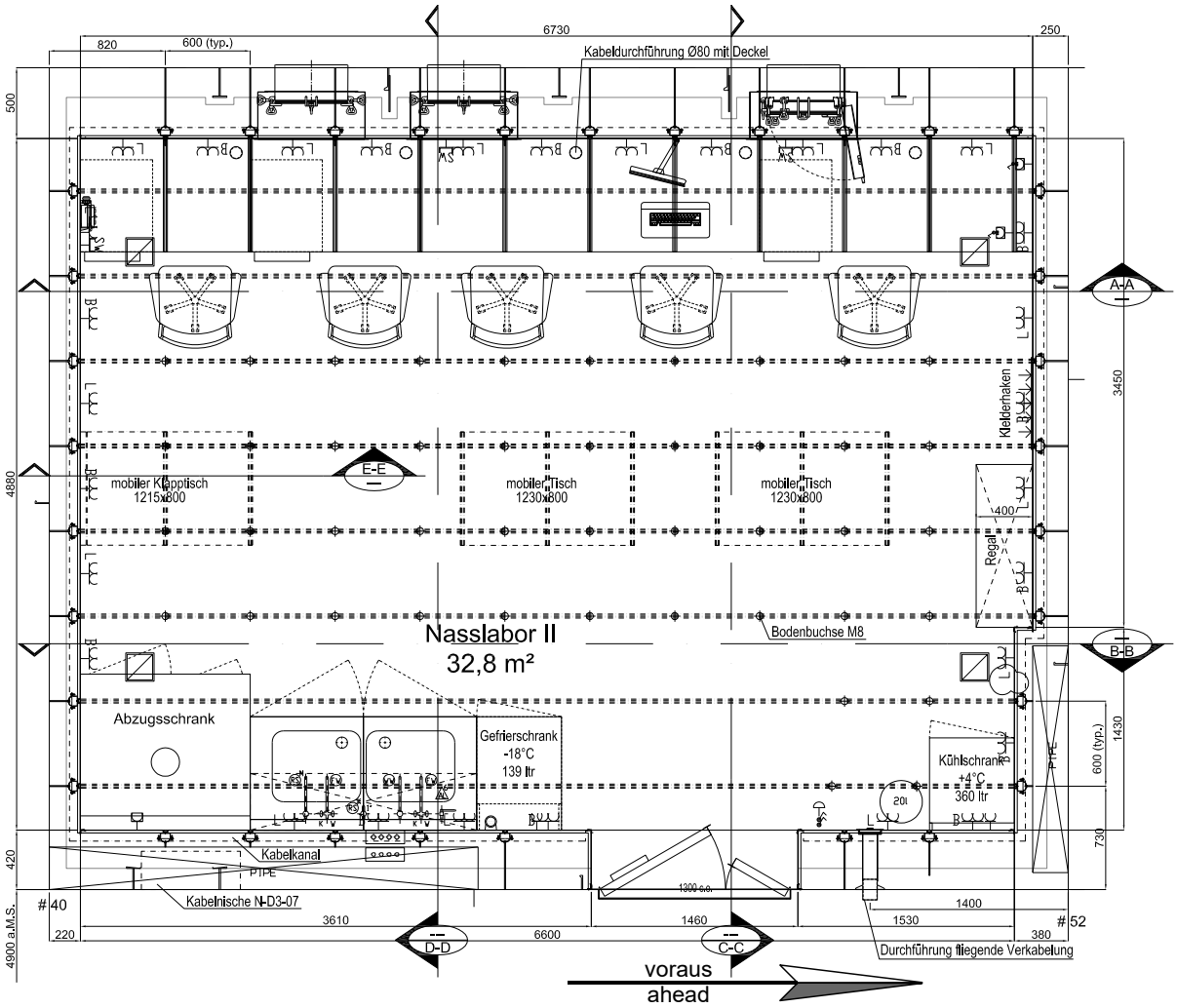
Function definition:

- Universal lab for many different disciplines

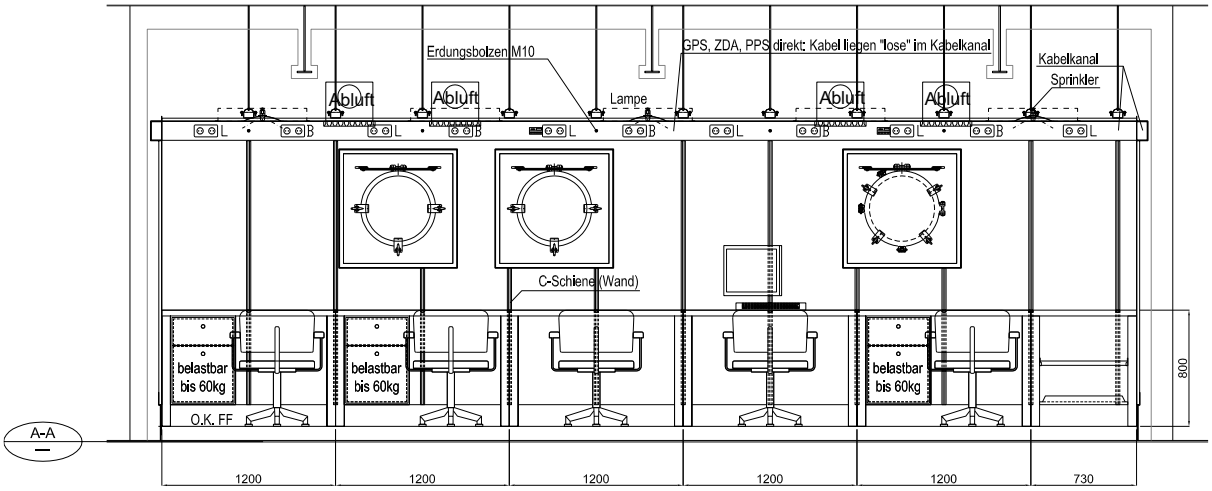
Equipment

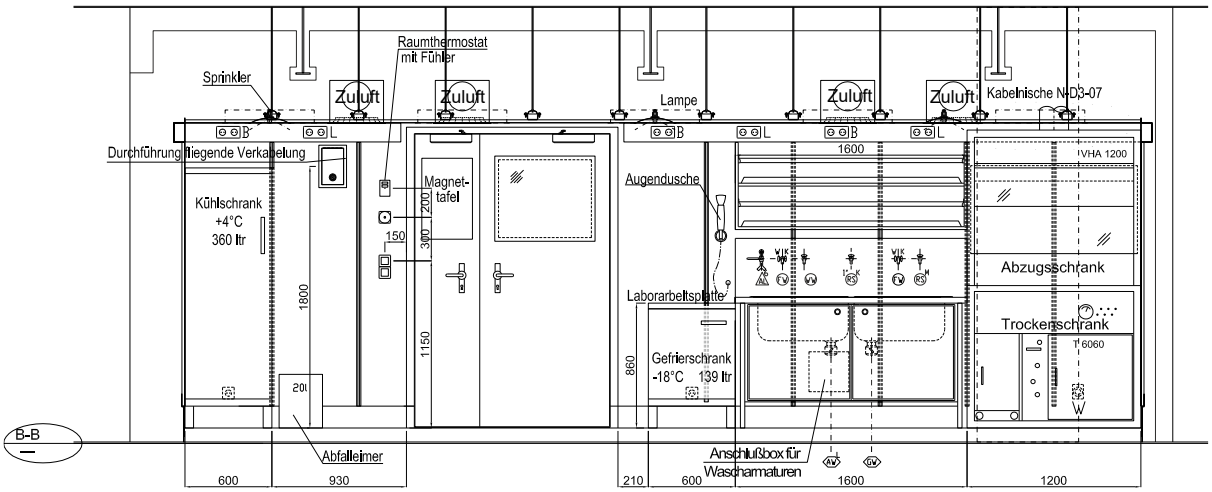
- Refrigerator 360 l +4°C
- Freezer 139 l -18°C
- 1 folding table
- Drying oven
- Digestor
- 2 mobile tables

View:

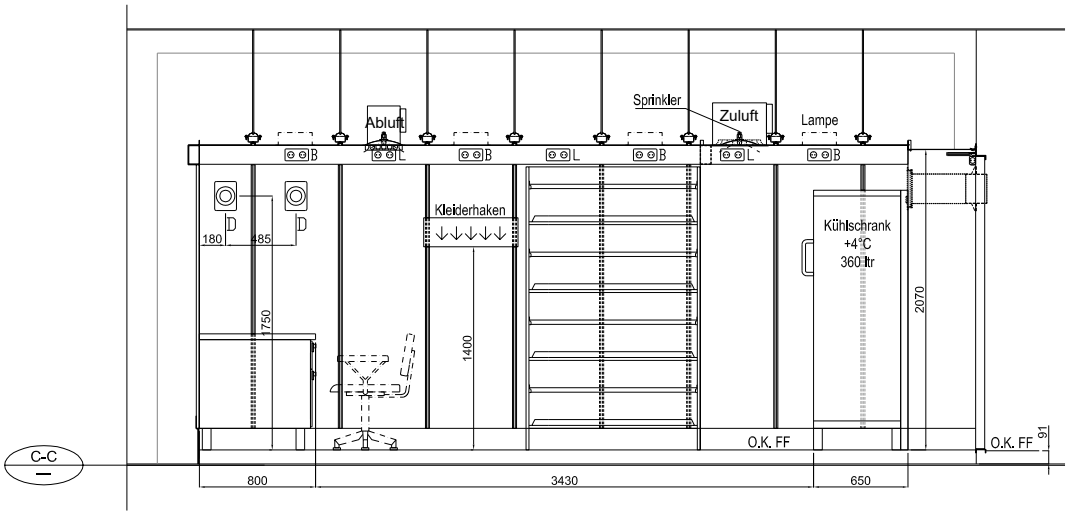

6730
250
820
600 (typ.)
Kabeldurchführung Ø80 mit Deckel
500
A-A
3450
Kletterhaken
4880
mobiler Klapptisch
1215x800
E-E
mobiler Tisch
1230x800
mobiler Tisch
1230x800
1400
Regal
Nasslabor II
32,8 m²
Bodenbuchse M8
B-B
Abzugsschrank
Gefrierschrank
-18°C
139 ltr
Kühlschrank
+4°C
360 ltr
PTFE
600 (typ.)
1430
730
420
Kabelkanal
PTFE
Kabelnische N-D3-07
#40
4900 a.M.S.
3610
1460
1530
1400
#52
220
6600
380
D-D
C-C
Durchführung fliegende Verkabelung
voraus
ahead

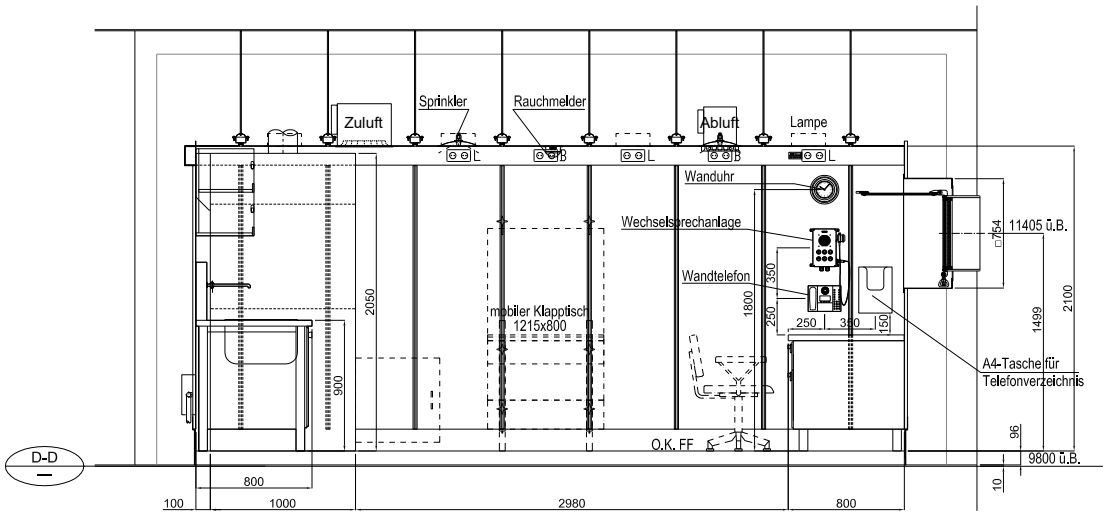
View:


Erdungsbolzen M10
GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Kabelkanal
Sprinkler
Abluft
Lampe
C-Schiene (Wand)
belastbar bis 60kg
O.K. FF
800
A-A
1200
730


Raumthermostat mit Fühler
Sprinkler
Zuluft
Lampe
Kabelnische N-D3-07
Durchführung fliegende Verkabelung
Kühlschrank +4°C 360 ltr
Magnet-tafel
Augendusche
Laborarbeitsplatte
Gefrierschrank -18°C 139 ltr
Abzugsschrank
Trockenschrank
IVHA 1200
1600
1800
1150
860
B-B
Abfalleimer
Anschlußbox für Waschamaturen
600
930
210
1200

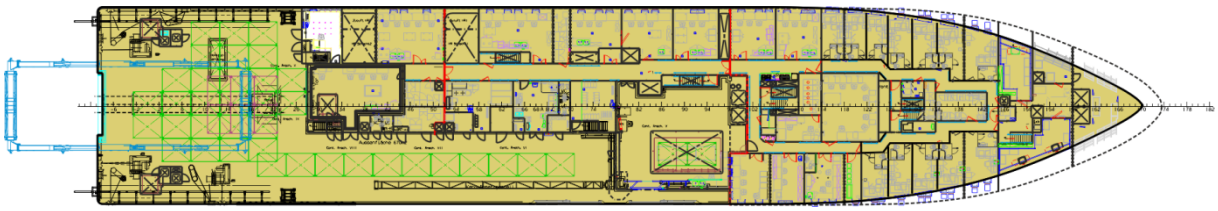
View:


Sprinkler
Zuluft
Abluft
Lampe
Kleiderhaken
Kühlschrank
+4°C
360 ltr
180
485
1750
1400
2070
O.K. FF
O.K. FF
91
C-C
800
3430
650


Zuluft
Sprinkler
Rauchmelder
Abluft
Lampe
Wanduhr
Wechselsprechanlage
Wandtelefon
mobiler Klapptisch
1215x800
A4-Tasche für
Telefonverzeichnis
11405 ü.B.
9800 ü.B.
2050
900
1800
350
250
250
150
754
1499
2100
96
10
O.K. FF
D-D
800
100
1000
2980
800

8.3.12. Pulser station

Location	Deck 03 (Main deck PORT), Frame 28 – 34
Room-No.	374
Phone	511



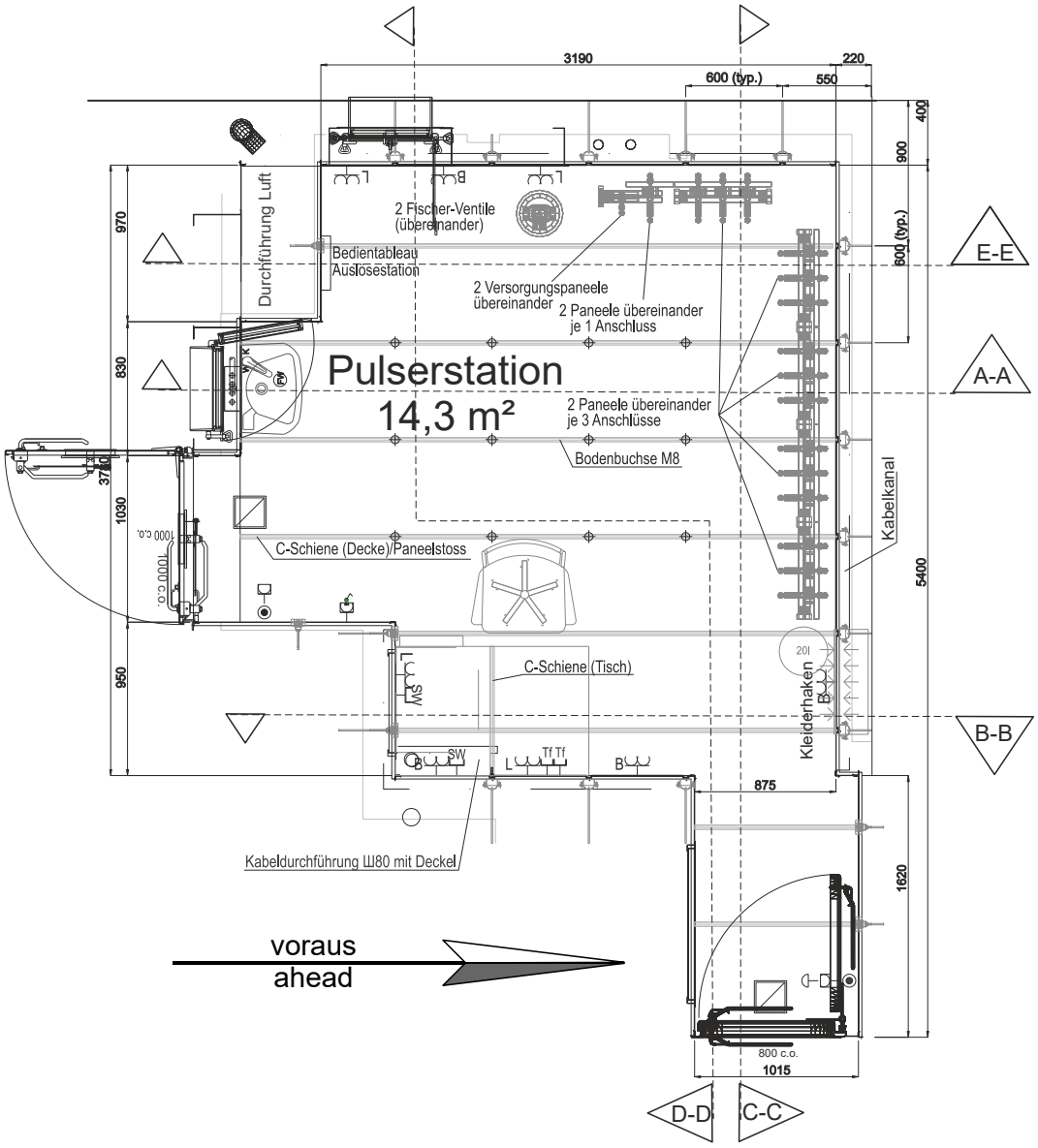
Area (m²)	12		230V/16 A Lab power UPS	x		Suction	
Door width in m	1		400V/ 32 A Three-phase	1		Outlet	
Workplaces	1		Ground stud	x		Refrigerator +4°C	
Phone	x		LAN	8		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	1		Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

Function definition:

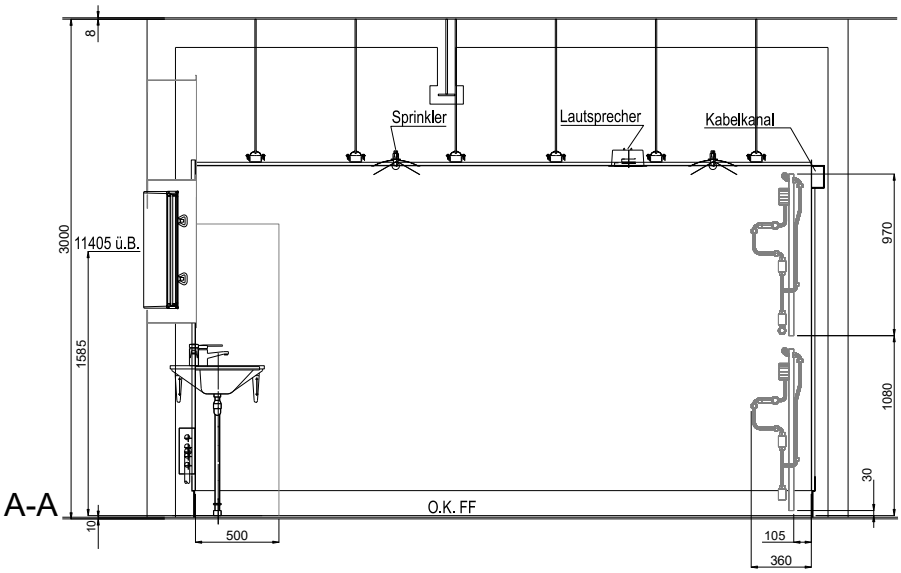
- two release stations for each 16 Airguns port and starboard
  each release station is equipped with pressure gauges and trip valves

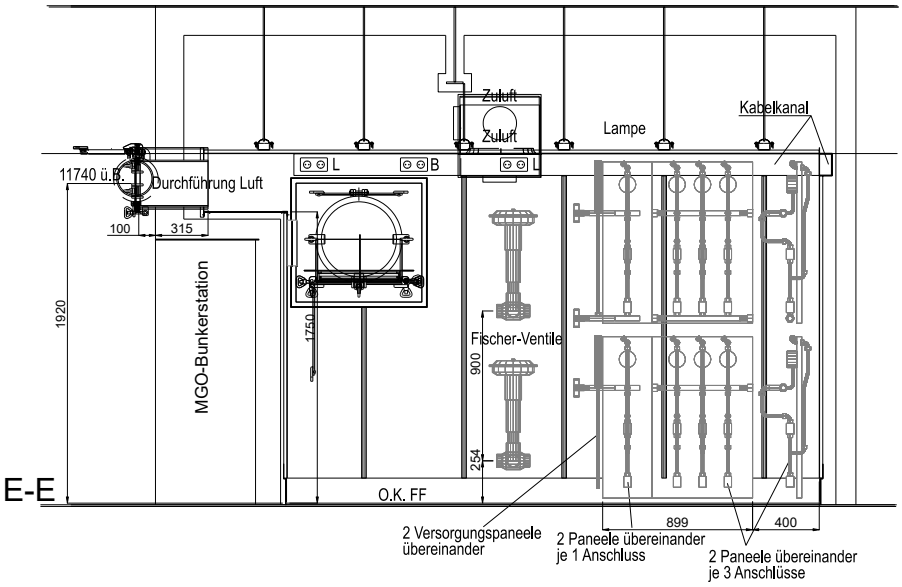
Four compressors and two compressor containers are to generate high-pressure air for seismic research available.
The high-pressure compressors and the 10 reservoir-air cylinders with 50 l at 208 bar are located on the tween deck (aft).
The reservoir-air cylinders are connected with manifold, pressure gauges and safety valves on the system. On reservoir-air cylinders at the Pulserstation a pressure sensor is installed, the system measures the pressure in the bottles.

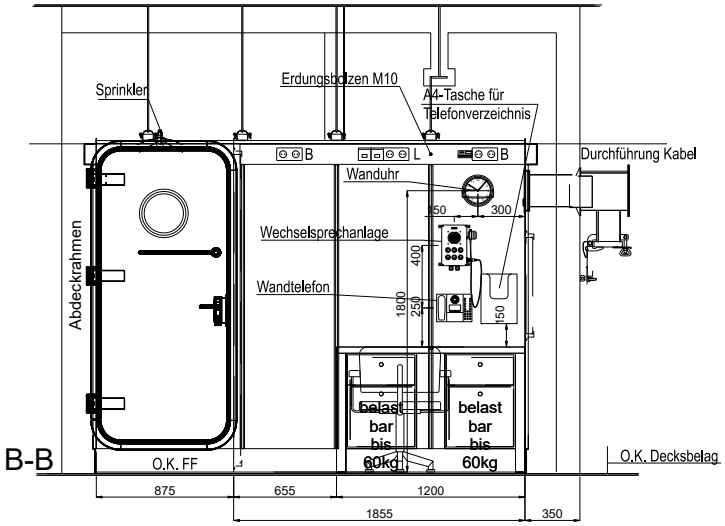
View:


3190
220
600 (typ.)
550
400
900
600 (typ.)
970
830
370
1030
850
5400
1620
875
1015
800 c.o.
1000 c.o.
Durchführung Luft
2 Fischer-Ventile
(übereinander)
Bedientableau
Auslösestation
2 Versorgungspaneele
übereinander
2 Paneele übereinander
je 1 Anschluss
Pulserstation
14,3 m²
2 Paneele übereinander
je 3 Anschlüsse
Bodenbuchse M8
C-Schiene (Decke)/Paneelstoss
C-Schiene (Tisch)
Kabelkanal
Kleiderhaken
20l
Kabeldurchführung Ш80 mit Deckel
voraus
ahead
E-E
A-A
B-B
D-D
C-C

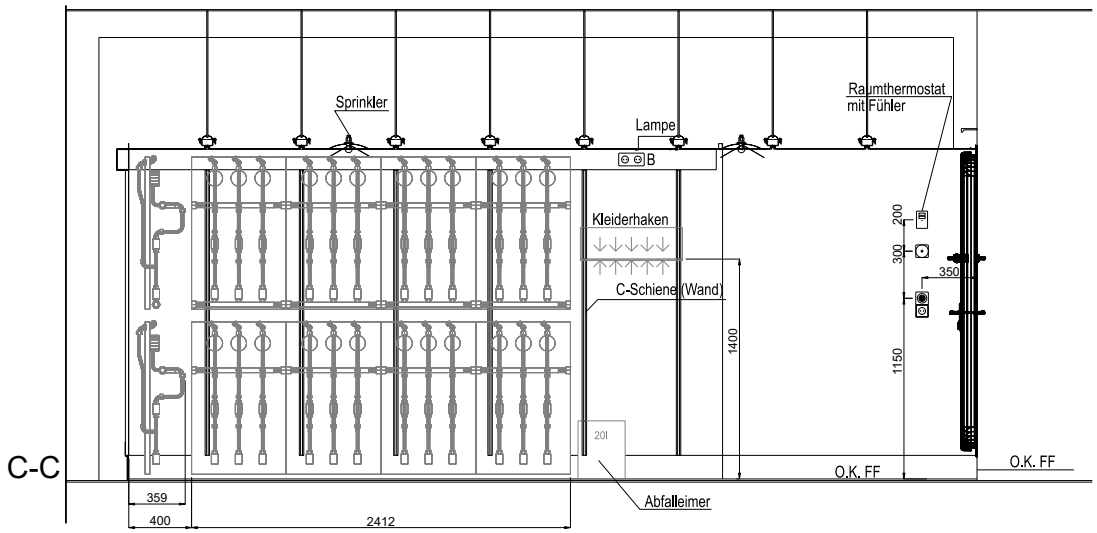
View:

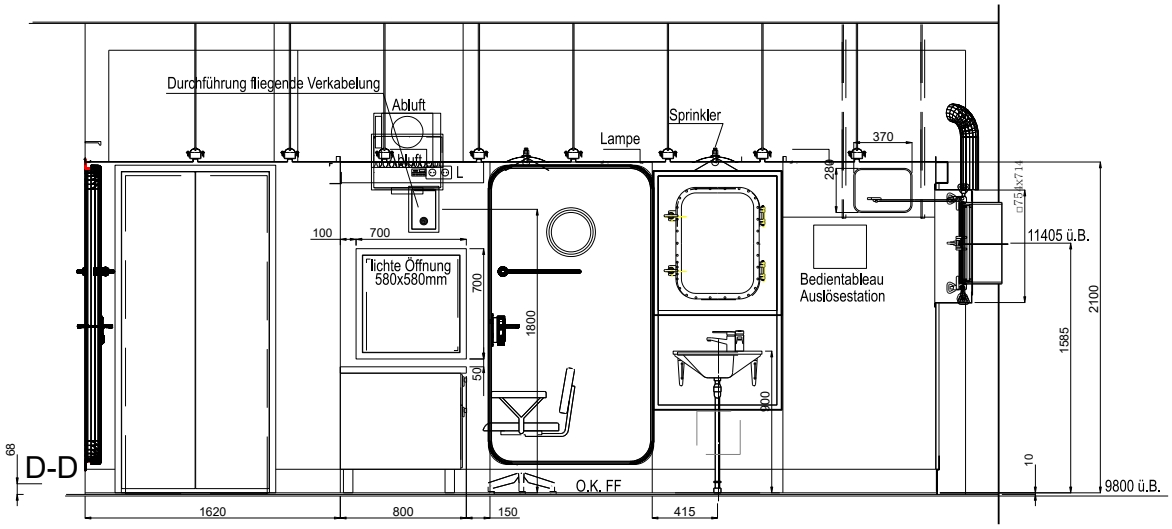

A-A
Sprinkler
Lautsprecher
Kabelkanal
11405 ü.B.
3000
1585
970
1080
30
10
O.K. FF
500
105
360


E-E
Zuluft
Zuluft
Lampe
Kabelkanal
11740 ü.B.
Durchführung Luft
100
315
1920
MGO-Bunkerstation
1750
Fischer-Ventile
900
254
O.K. FF
899
400
2 Versorgungspaneele übereinander
2 Paneele übereinander je 1 Anschluss
2 Paneele übereinander je 3 Anschlüsse


B-B
Sprinkler
Erdungsbolzen M10
A4-Tasche für Telefonverzeichnis
Durchführung Kabel
Wanduhr
150
300
Wechselsprechanlage
400
Wandtelefon
1800
250
150
Abdeckrahmen
belast bar bis 60kg
belast bar bis 60kg
O.K. FF
O.K. Decksbelag
875
655
1200
1855
350

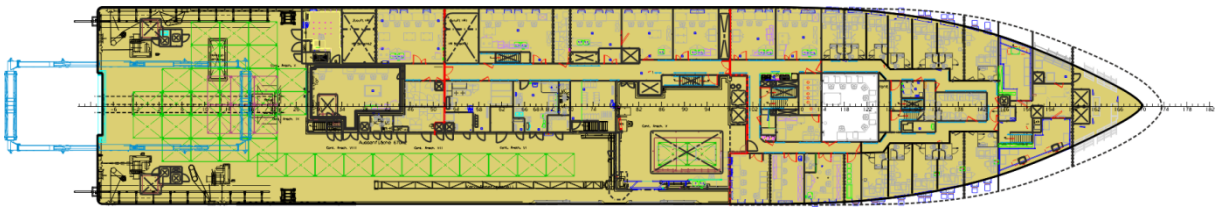
View:


Sprinkler
Lampe
B
Raumthermostat
mit Fühler
Kleiderhaken
C-Schiene (Wand)
200
300
350
1400
1150
20l
C-C
O.K. FF
O.K. FF
Abfalleimer
359
400
2412


Durchführung fliegende Verkabelung
Abluft
Abluft
L
Lampe
Sprinkler
370
280
100
700
lichte Öffnung
580x580mm
700
1800
50
800
Bedientableau
Auslösestation
11405 ü.B.
2100
1585
10
9800 ü.B.
68
D-D
O.K. FF
1620
800
150
415

8.3.13. Hydroacustic central

Location	Deck 03 (Main deck amidships), Frame 114 – 124
Room-No.	327
Phone	502



Area (m²)	52		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	10		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	16		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic	x		Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	1		Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	x
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

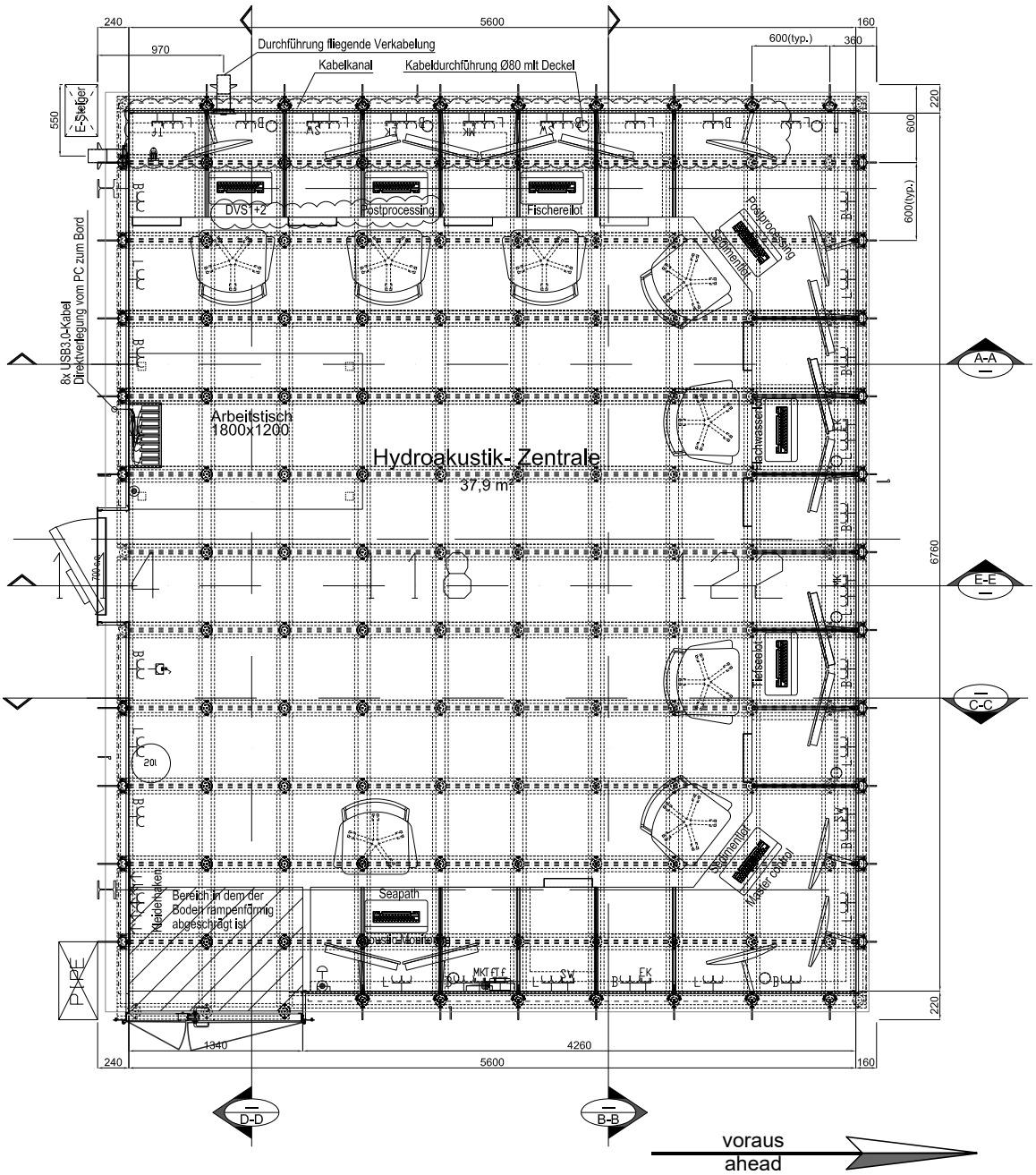
Function definition:

- Control and operating room of hydroacoustic systems

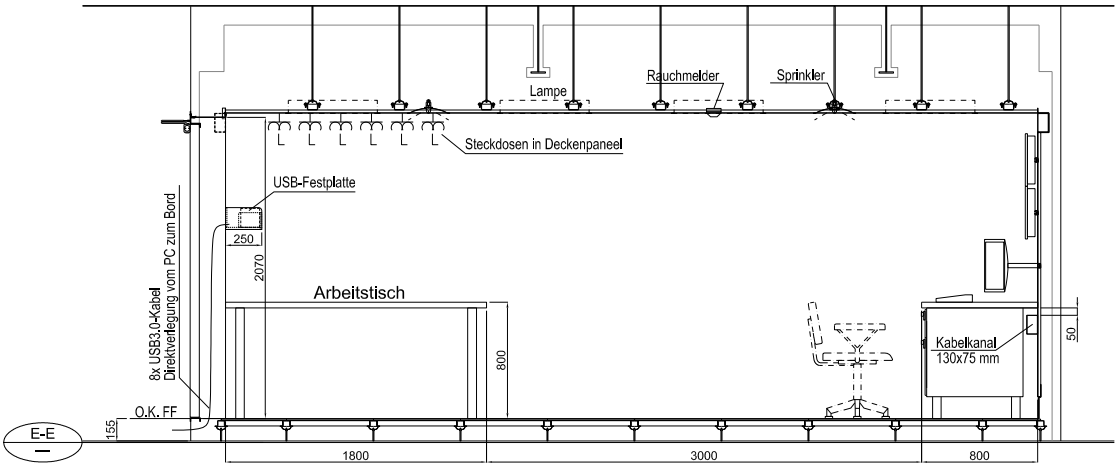
Equipment

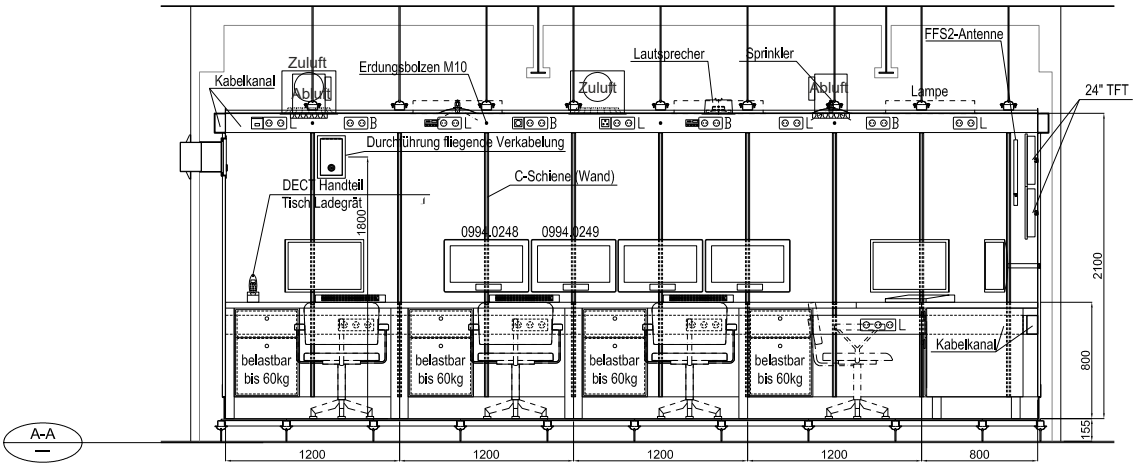
- DIN A0 Plotter
- DIN A3 Color Multifunction Printer
- DIN A4 Color-Laser Printer

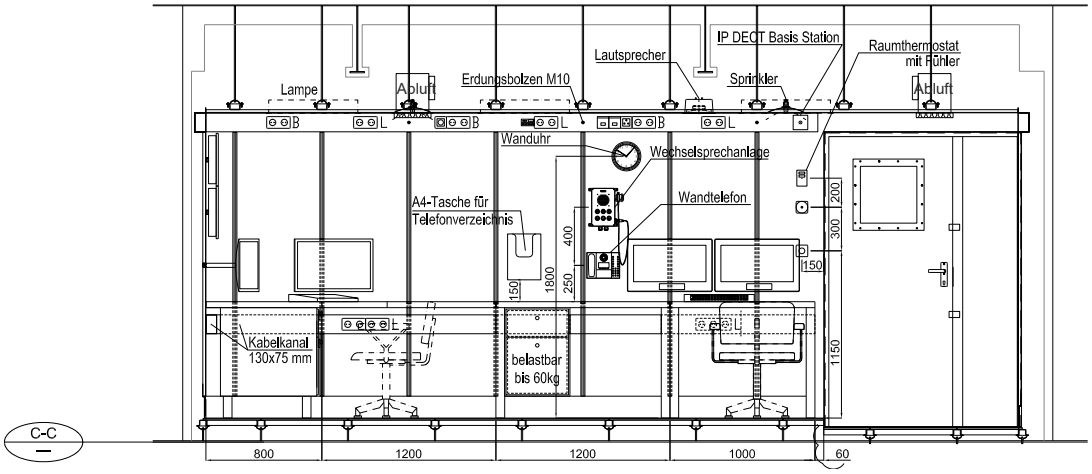
View:


Durchführung fliegende Verkabelung
Kabelkanal
Kabeldurchführung Ø80 mit Deckel
E-Steiger
DVS 1+2
Postprocessing
Fischereilot
Postprocessing
Sonnenlot
8x USB3.0-Kabel
Direktverlegung vom PC zum Bord
Arbeitstisch
1800x1200
Hydroakustik- Zentrale
37,9 m²
Flachwasserlot
Tiefseelot
Sonnenlot
Marker Lotlot
Seapath
Bereich in dem der Boden rampenförmig abgeschrägt ist
A-A
E-E
C-C
D-D
B-B
voraus
ahead

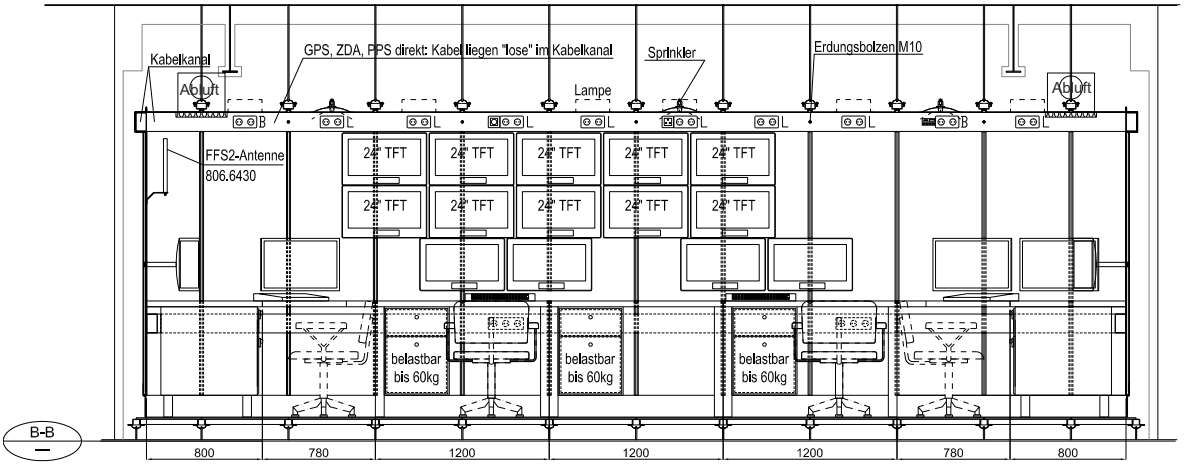
View:

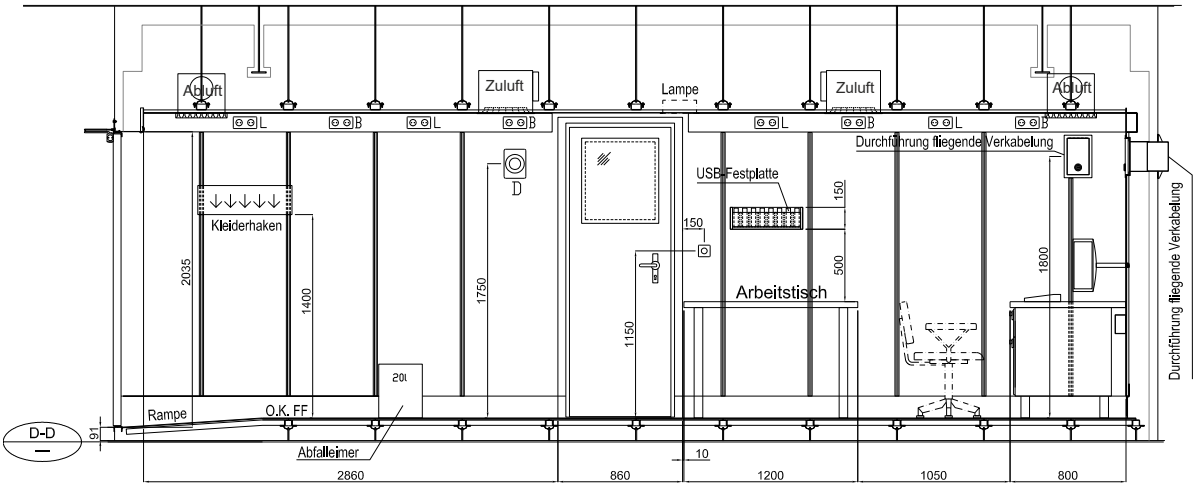

Lampe
Rauchmelder
Sprinkler
Steckdosen in Deckenpaneel
USB-Festplatte
250
2070
8x USB3.0-Kabel
Direktverlegung vom PC zum Bord
Arbeitstisch
800
Kabelkanal
130x75 mm
50
O.K. FF
155
E-E
1800
3000
800


Zuluft
Kabelkanal
Abluft
Erdungsbolzen M10
Zuluft
Lautsprecher
Sprinkler
Abluft
Lampe
FFS2-Antenne
24" TFT
Durchführung fliegende Verkabelung
DECT Handteil
Tisch Ladegerät
C-Schiene (Wand)
1800
0994 0248
0994 0249
2100
belastbar
bis 60kg
belastbar
bis 60kg
belastbar
bis 60kg
belastbar
bis 60kg
Kabelkanal
800
155
A-A
1200
1200
1200
1200
800


IP DECT Basis Station
Raumthermostat
mit Fühler
Lautsprecher
Lampe
Abluft
Erdungsbolzen M10
Sprinkler
Abluft
Wanduhr
Wechselsprechanlage
A4-Tasche für
Telefonverzeichnis
Wandtelefon
400
1800
250
150
200
300
150
Kabelkanal
130x75 mm
belastbar
bis 60kg
1150
C-C
800
1200
1200
1000
60

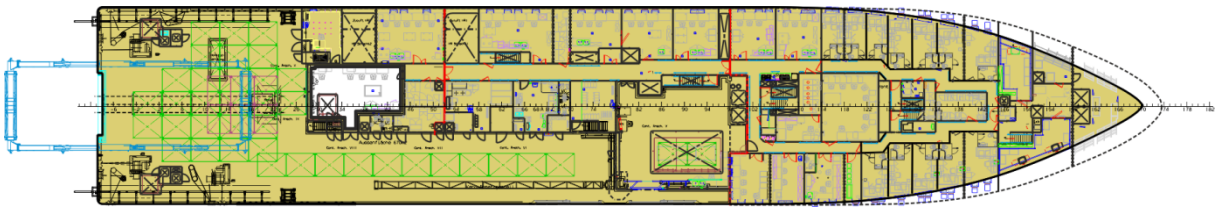
View:


Kabelkanal
GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Sprinkler
Erdungsbolzen M10
Abluft
Lampe
Abluft
FFS2-Antenne
806.6430
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
22" TFT
belastbar bis 60kg
belastbar bis 60kg
belastbar bis 60kg
B-B
800
780
1200
1200
1200
780
800


Abluft
Zuluft
Lampe
Zuluft
Abluft
Durchführung fliegende Verkabelung
USB-Festplatte
Kleiderhaken
D
150
150
500
1800
2035
1400
1750
1150
Arbeitstisch
Durchführung fliegende Verkabelung
Rampe
O.K. FF
91
Abfalleimer
10
D-D
2860
860
1200
1050
800

8.3.14. Wet lab 1

Location	Deck 03 (Main deck amidships), Frame 28 – 45
Room-No.	372
Phone	510



Area (m²)	45		230V/16 A Lab power UPS	x		Suction	
Door width in m	2		400V/ 32 A Three-phase	1		Outlet	1
Workplaces	6		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	12		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	1
Clean seawater	K/M		Multi cable / fiber optic	x		Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks	x		Ice maker	1
Scuppers, directly	x		Ground socket	M24		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	x
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

Function definition:

- Deck lab (Universal lab) for all wet scientific work such as biology and geology
- Access from the work deck there is a 2m wide double doors.
- At the aft side of two large element gates are arranged in size of container end sides to integrate laboratory containers in the wet lab I can
- The flooring is made of wood with integrated M24 jacks.

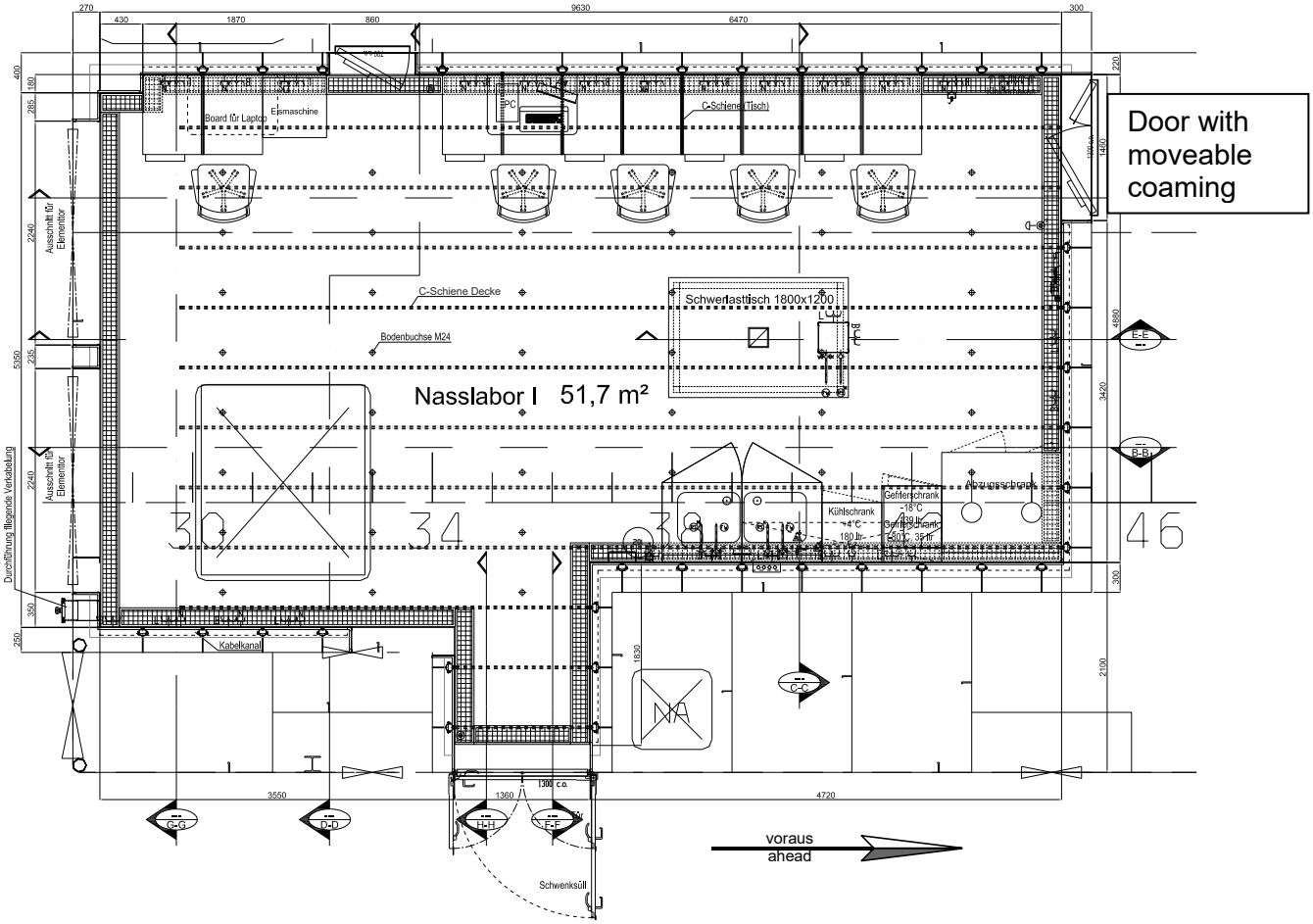
Equipment

- Heavy duty table (1200 x 1800 mm) with removable Niro tub. Above the table leads for fresh and sea water (pure and service water), 4 double sockets (onboard and laboratory network) and under the table a scuppers are installed

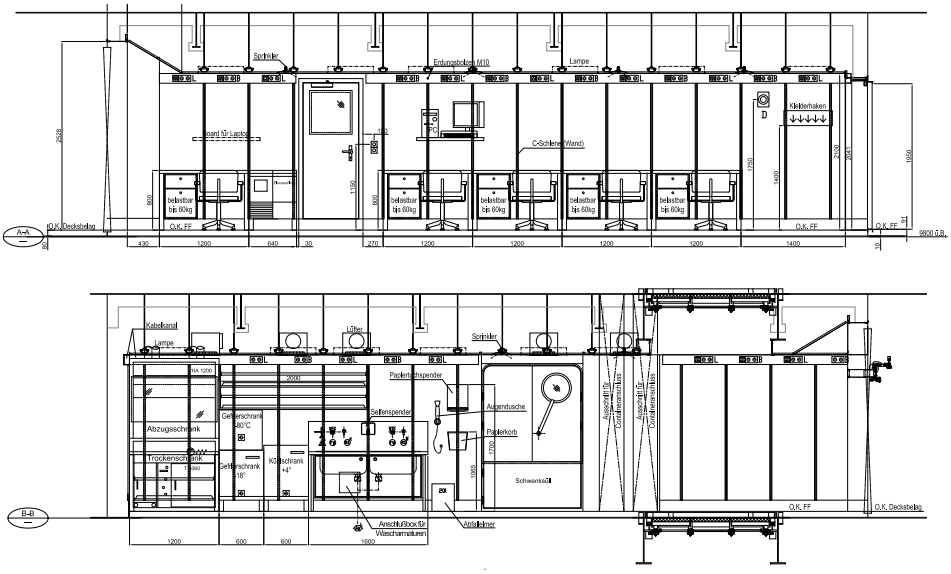
- Refrigerator 360 l +4°C
- Freezer 139 l -18°C
- Freezer 35 l -80°C
- Ice Machine
- Digestor
- Yaw table 600 x 800 mm
- GPS-Repeater

Attention:

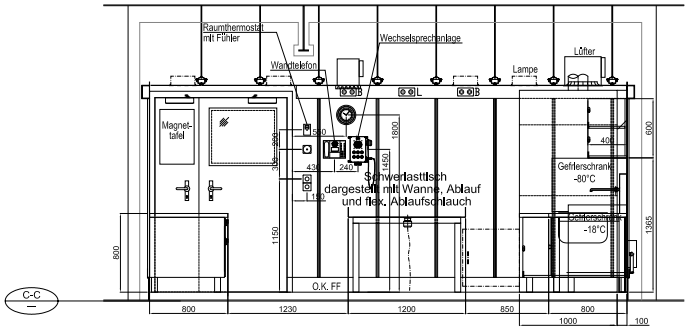
Smooth lid hatch for transporting heavy, bulky parts into the engine room; may not be opened at sea

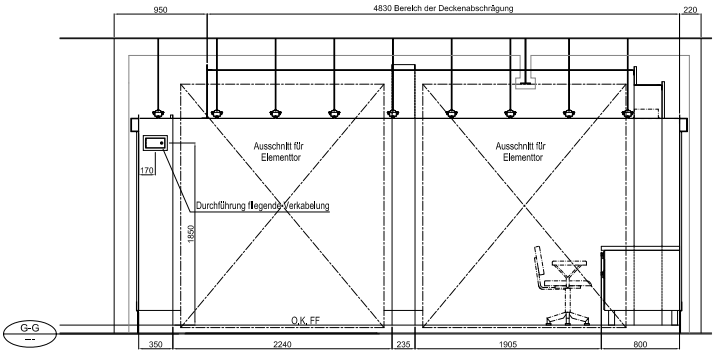


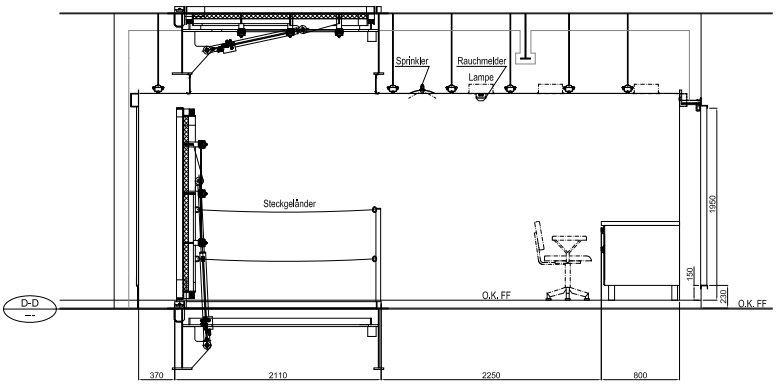
Attention:
The moveable coaming of the door to the operation aisle inside ship must be firmly closed at sea, since the "wet lab I" according to the freeboard rule is considered as a free deck space!



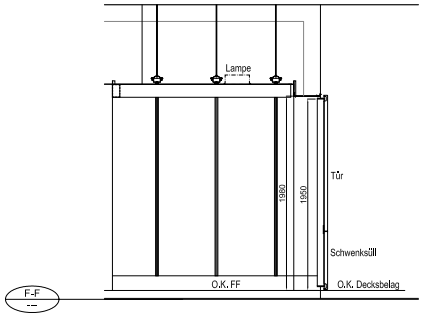
View:

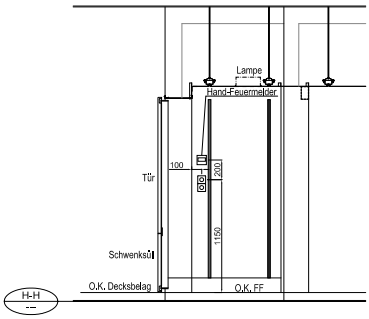

Raumthermostat mit Fühler
Wechselsprechanlage
Wandtelefon
Lampe
Lüfter
Magnet-tafel
Schwerlasttisch dargestellt mit Wanne, Ablauf und flex. Ablaufschlauch
Gefrierschrank -80°C
Gefrierschrank -18°C
O.K. FF
C-C
800
1230
1200
850
800
1000
100

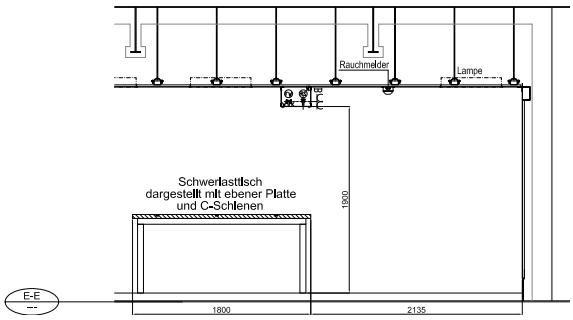

950
4830 Bereich der Deckenabschrägung
220
Ausschnitt für Elementtor
Ausschnitt für Elementtor
Durchführung fliegende Verkabelung
O.K. FF
G-G
350
2240
235
1905
800


Sprinkler
Rauchmelder
Lampe
Steckgeländer
O.K. FF
D-D
370
2110
2250
800

View:

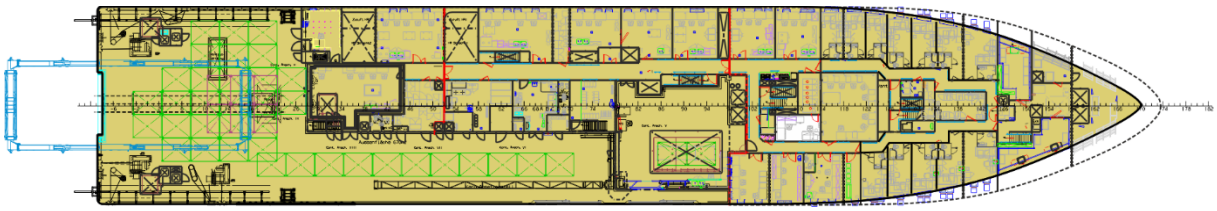

Lampe
1990
1950
Tür
Schwenksüll
O.K. FF
O.K. Decksbelag
F-F


Lampe
Hand-Feuermelder
100
2000
Tür
1150
Schwenksüll
O.K. Decksbelag
O.K. FF
H-H


Rauchmelder
Lampe
Schwerlasttisch
dargestellt mit ebener Platte
und C-Schienen
1900
1800
2135
E-E

8.3.15. Scientific Electronic Lab

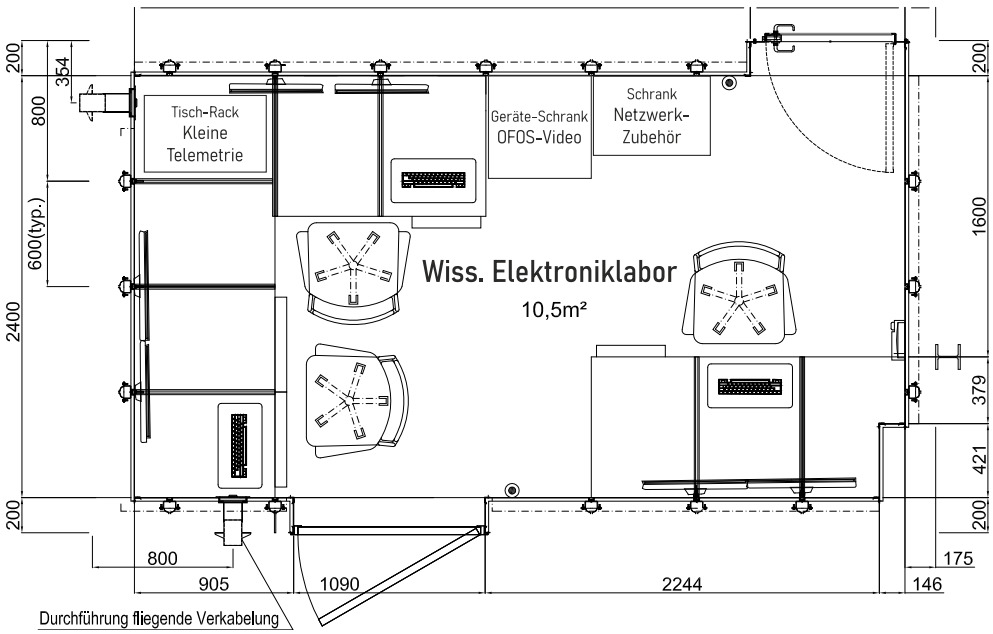
Location	Deck 03 (Main deck midships), Frame 105 – 111
Room-No.	333
Phone	512



Area (m²)	14		230V/16 A Lab power UPS	X		Suction	
Door width in m	1,2		400V/ 32 A Three-phase			Outlet	
Workplaces	2		Ground stud	X		Refrigerator +4°C	
Phone	X		LAN Connection DVS	12		Refrigerator -18°C	
Fresh water w / c			Single-core cable			Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom			Drying oven	1
Drains (basin)			Wall C-tracks	X		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	X		Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	X
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	X		Wall clock	X

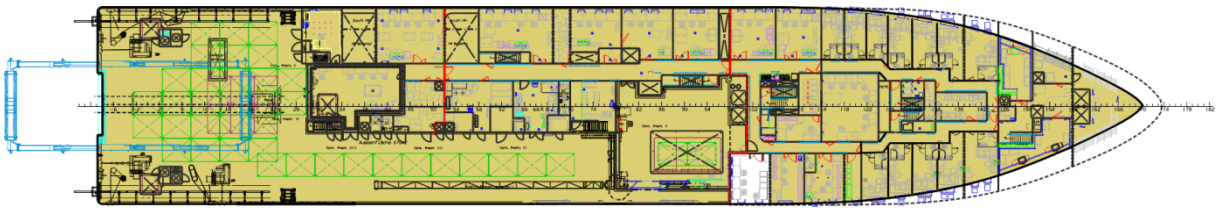
Function definition:

- Operating station for OFOS (Ocean Floor Observation System), see there
- Electronics workroom for scientific purposes (depending on OFOS deployment)



8.3.16. Data center

Location	Deck 03 (Main deck starboard), Frame 98 – 105
Room-No.	339
Phone	303



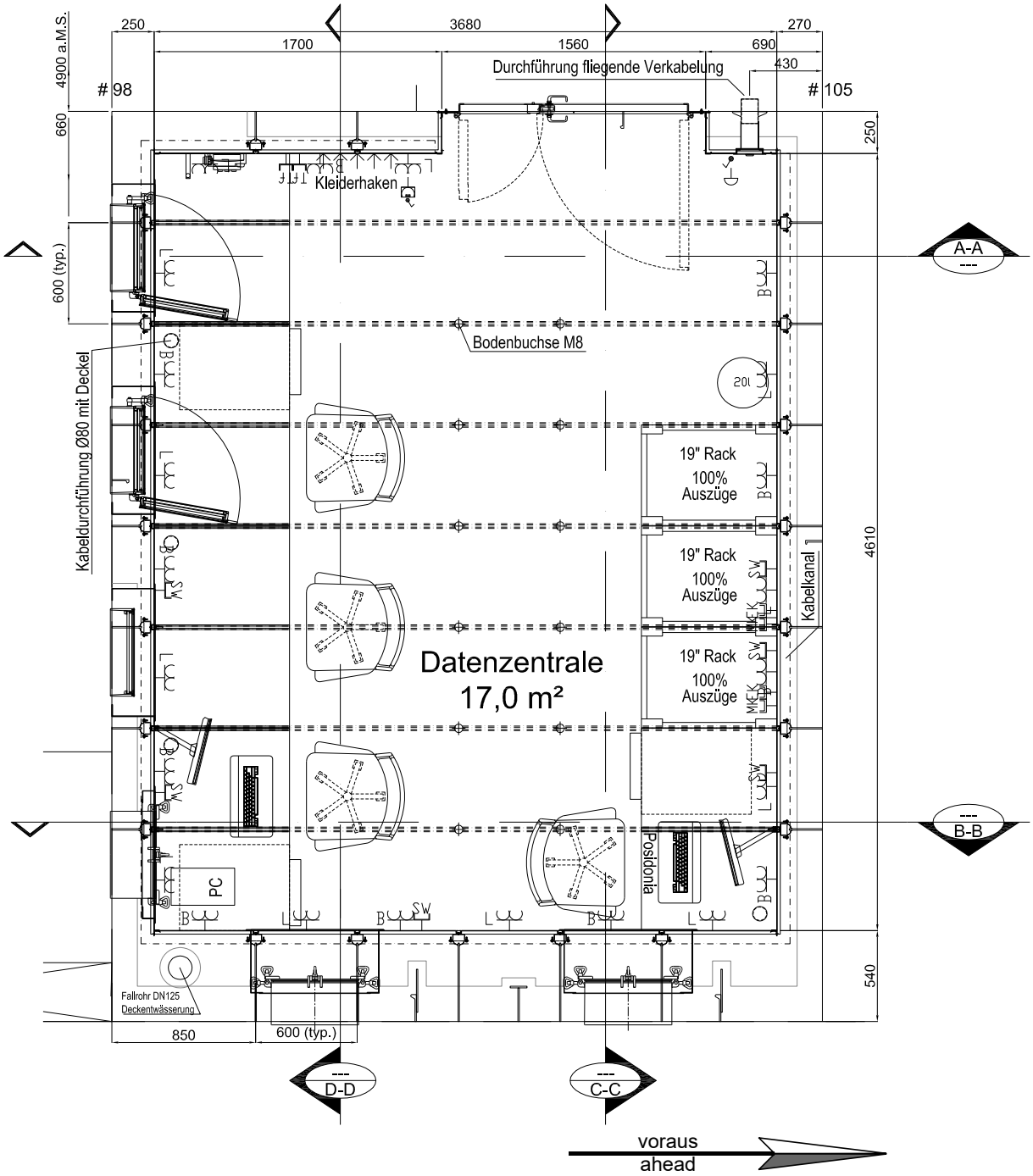
Area (m²)	16		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	4		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	24		Refrigerator -18°C	
Fresh water w / c	0		Single-core cable	x		Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic	x		Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	0		Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar	1		indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

Function definition:

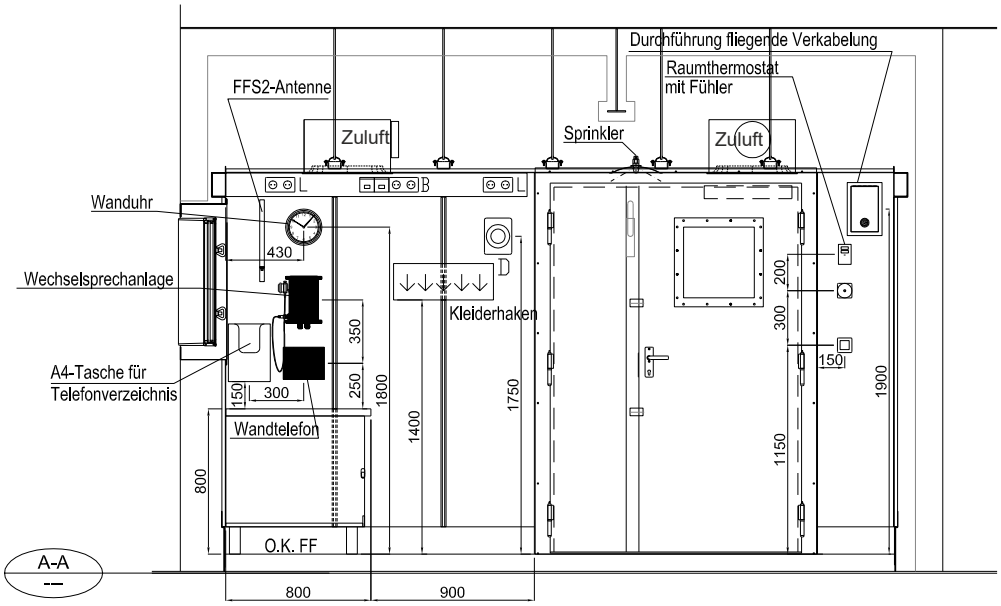
Control of the following devices:

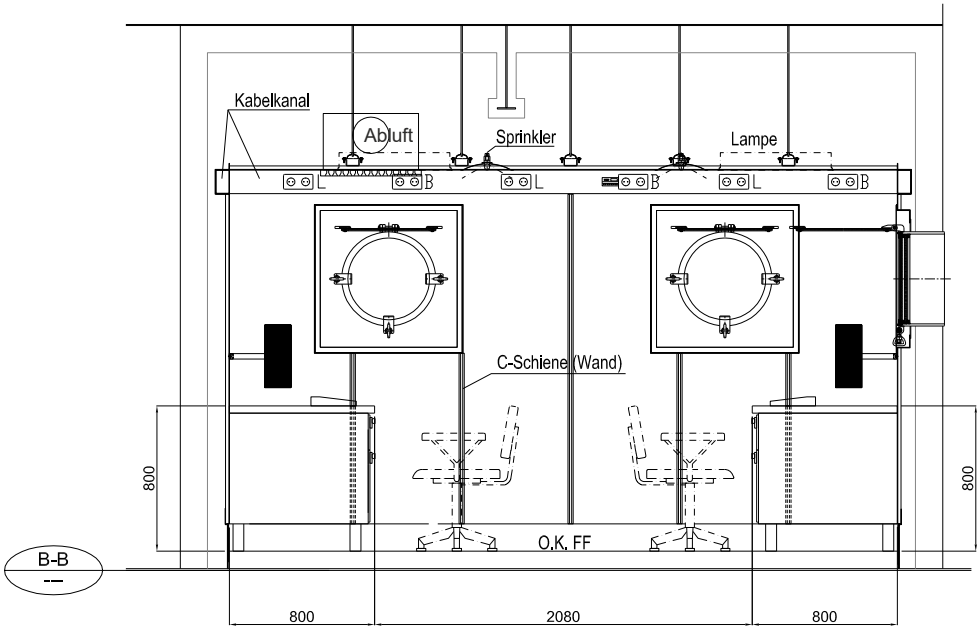
- WAMOS
- CTD

View:

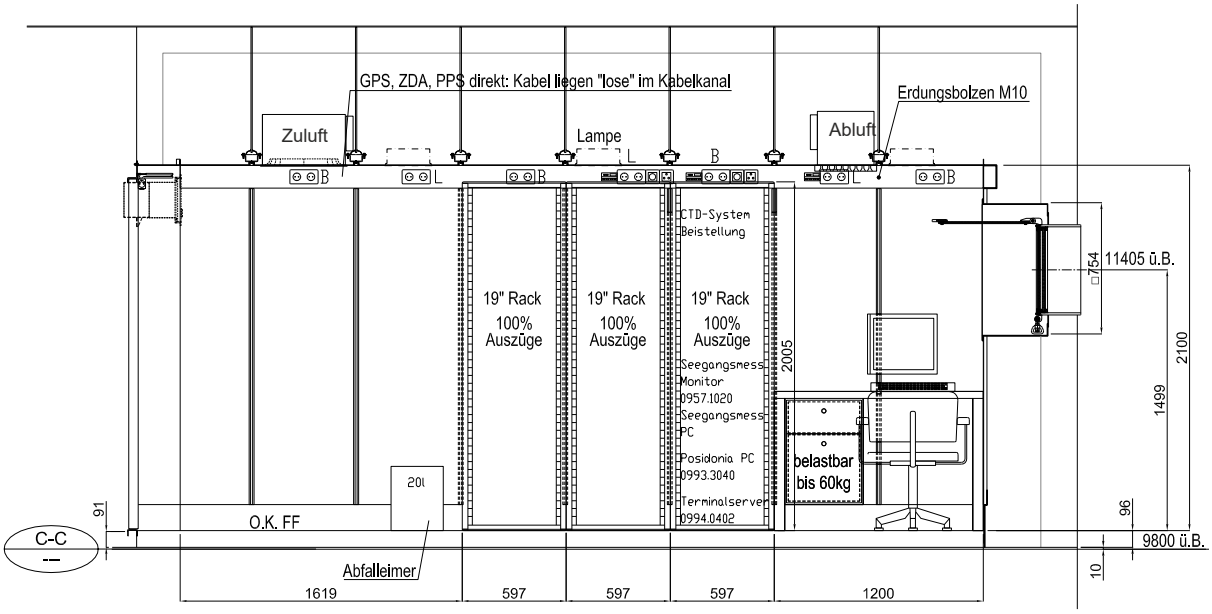

250
3680
270
1700
1560
690
430
4900 a.M.S.
98
105
Durchführung fliegende Verkabelung
660
250
Kleiderhaken
A-A
600 (typ.)
Bodenbuchse M8
Kabeldurchführung Ø80 mit Deckel
19" Rack
100%
Auszüge
4610
Kabelkanal
Datenzentrale
17,0 m²
B-B
PC
Posidonia
540
Fallrohr DN125
Deckentwässerung
850
600 (typ.)
D-D
C-C
voraus
ahead

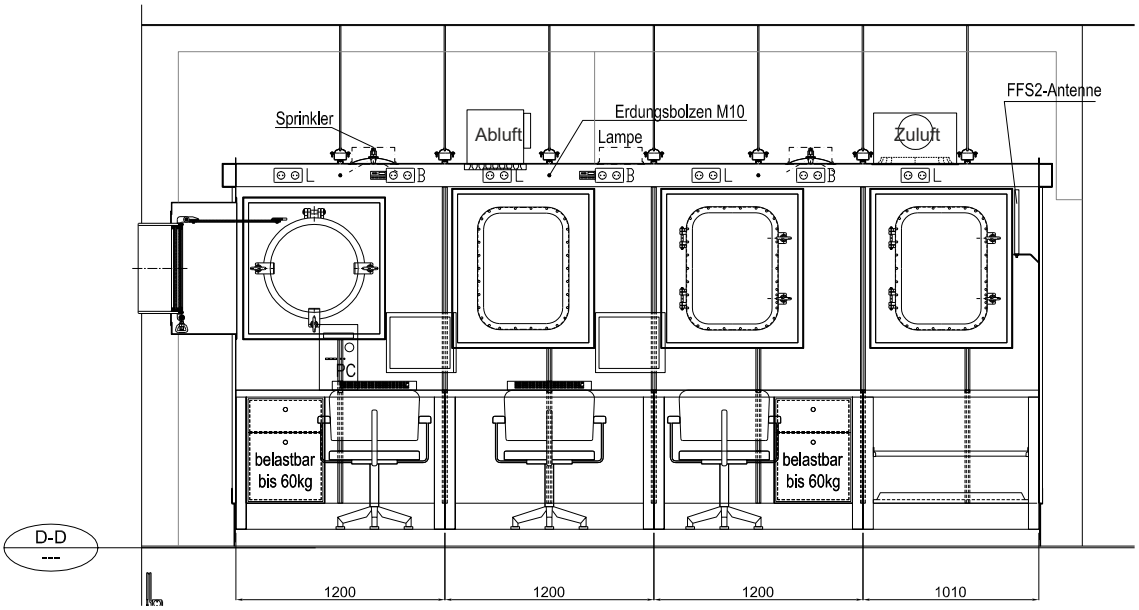
View:


Durchführung fliegende Verkabelung
Raumthermostat mit Fühler
FFS2-Antenne
Zuluft
Sprinkler
Zuluft
Wanduhr
430
Wechselsprechanlage
Kleiderhaken
A4-Tasche für Telefonverzeichnis
150
300
350
250
1800
1400
1750
200
300
150
1900
1150
Wandtelefon
800
O.K. FF
A-A
800
900


Kabelkanal
Abluft
Sprinkler
Lampe
C-Schiene (Wand)
800
800
O.K. FF
B-B
800
2080
800

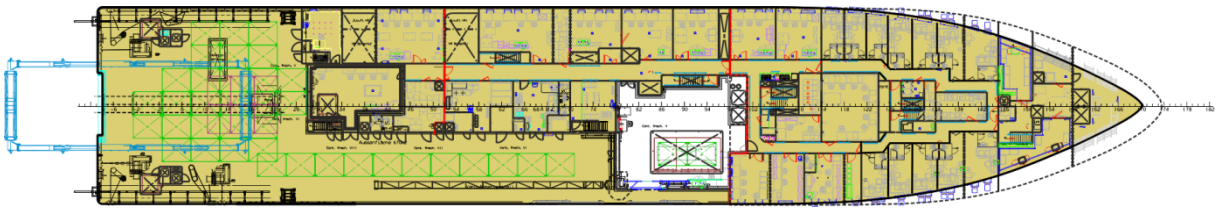
View:


GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Erdungsbolzen M10
Zuluft
Lampe
Abluft
CTD-System Beistellung
19" Rack 100% Auszüge
19" Rack 100% Auszüge
19" Rack 100% Auszüge
Seegangsmess-Monitor 0957.1020
Seegangsmess-PC
Posidonia PC 0993.3040
Terminalserver 0994.0402
2005
754
11405 ü.B.
2100
1499
96
9800 ü.B.
10
91
20l
O.K. FF
C-C
Abfalleimer
belastbar bis 60kg
1619
597
597
597
1200


Sprinkler
Abluft
Erdungsbolzen M10
Lampe
Zuluft
FFS2-Antenne
PC
belastbar bis 60kg
belastbar bis 60kg
D-D
1200
1200
1200
1010

8.3.17. Hangar

Location	Deck 03 (Main deck starboard), Frame 79 – 98/101
Room-No.	344
Phone	500



Area (m²)	115		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	2		Outlet	
Workplaces	2		Ground stud	x		Refrigerator +4°C	1
Phone	x		LAN	16		Refrigerator -18°C	1
Fresh water w / c	x		Single-core cable	x		Refrigerator -80°C	
Clean seawater	K/M		Multi cable / fiber optic	x		Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	2		Wall C-tracks	x		gimbal left off. table	
Lab wastewater	1		Ceiling C-tracks			Ice maker	
Scuppers, directly	x		Ground socket	M24		GPS, ZDA, PPS directly	x
Working air 6 bar	3		indiv. Temperature0-28°C			GPS-Repeater	x
230/16A power	x		indiv. Temperature18-28°C			Wall clock	x

Function definition:

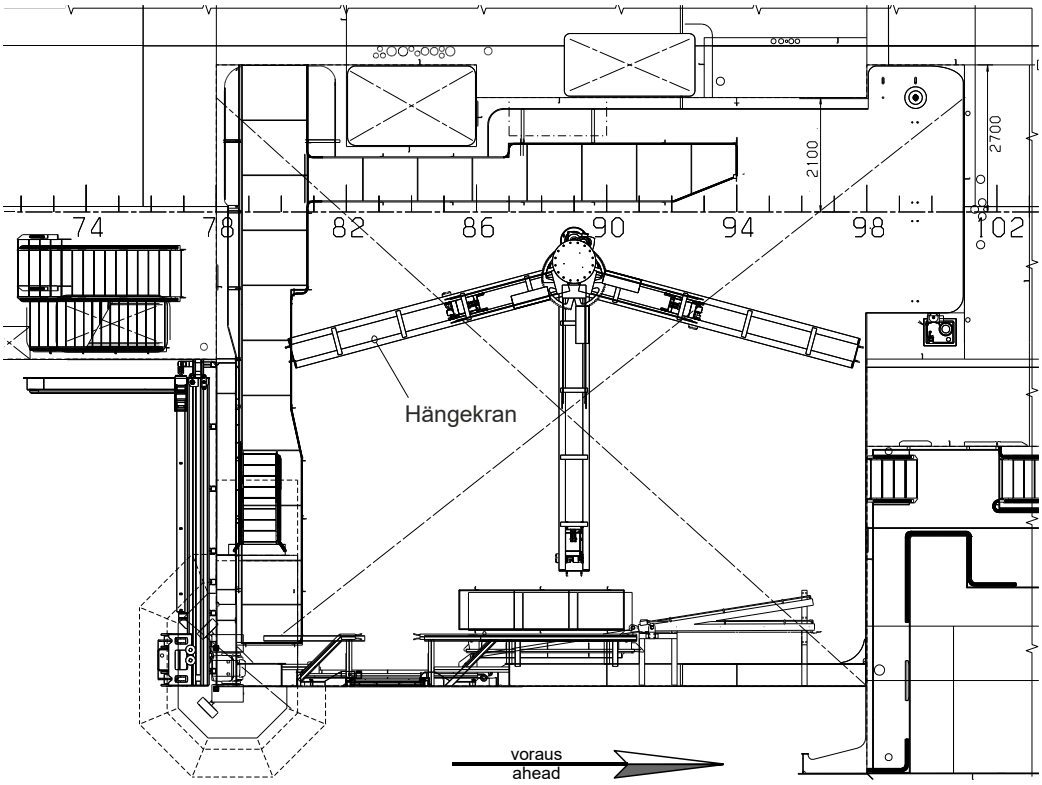
- The hangar provides secure as possible working conditions in all weather conditions. It is designed with 2 deck heights.
- Extension and retraction of large rosette water samplers using the slide beam 70kN with filling option in the hangar
- Preparation of mooring work
- Working in combination with the Hydrographic tubes
- Wet work Geology
- Stowage of large equipment
- Protected work on the slider with portable winches
- Protected to handle work on deck.
- Monitoring ISPS

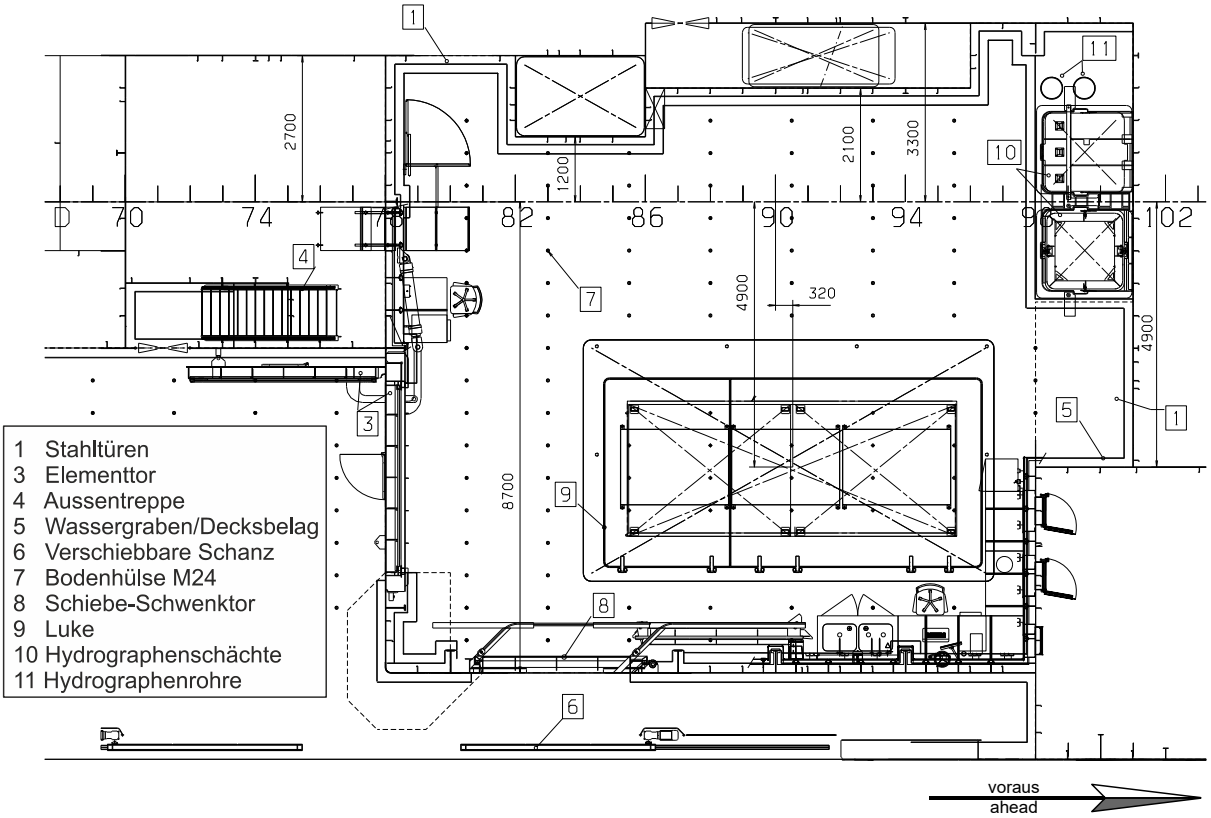
Attention:

Smooth deck hatch (split) for transporting 20 'containers and other heavy objects; may not be opened at sea!

The **moveable coaming** of the doors to the operation aisle inside ship must be firmly closed at sea, since the "Hangar" according to the freeboard rule is considered as a free deck space!

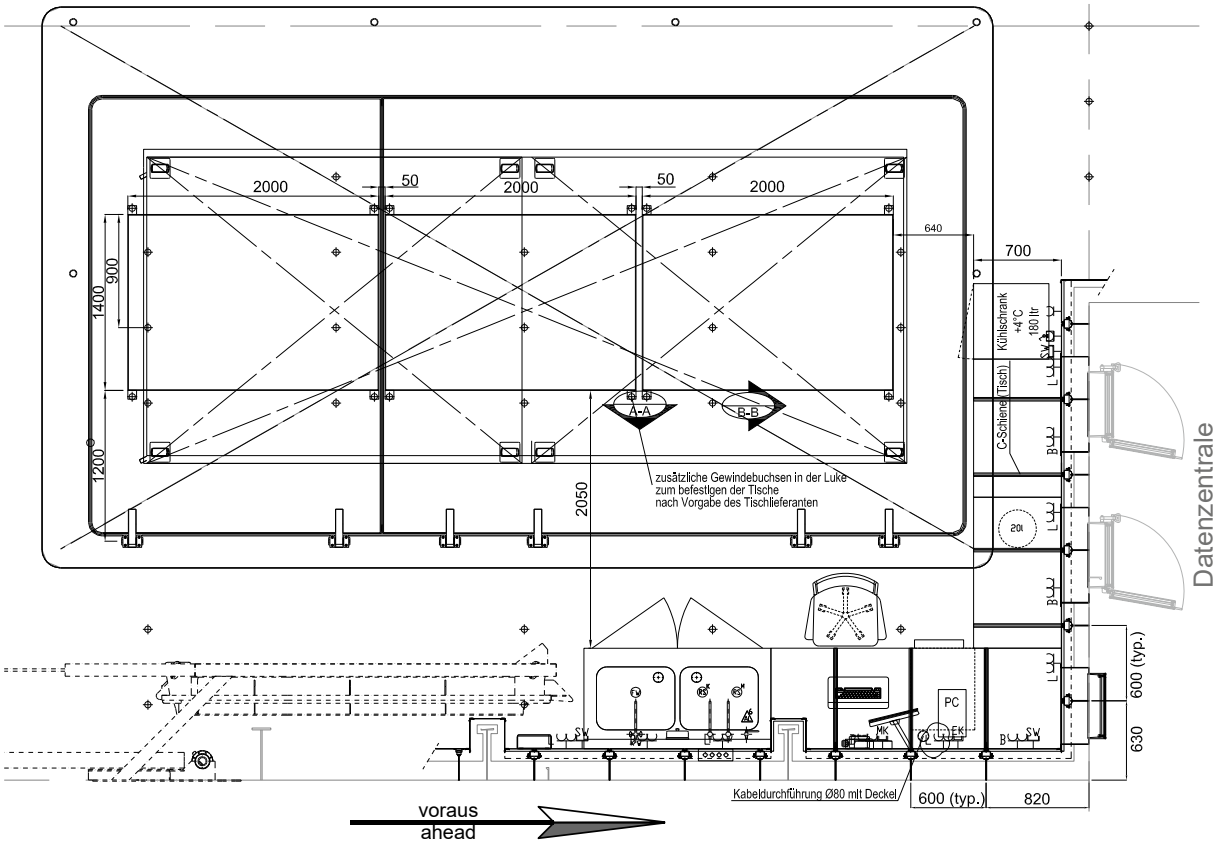
View:


74
78
82
86
90
94
98
102
2100
2700
Hängekran
voraus
ahead

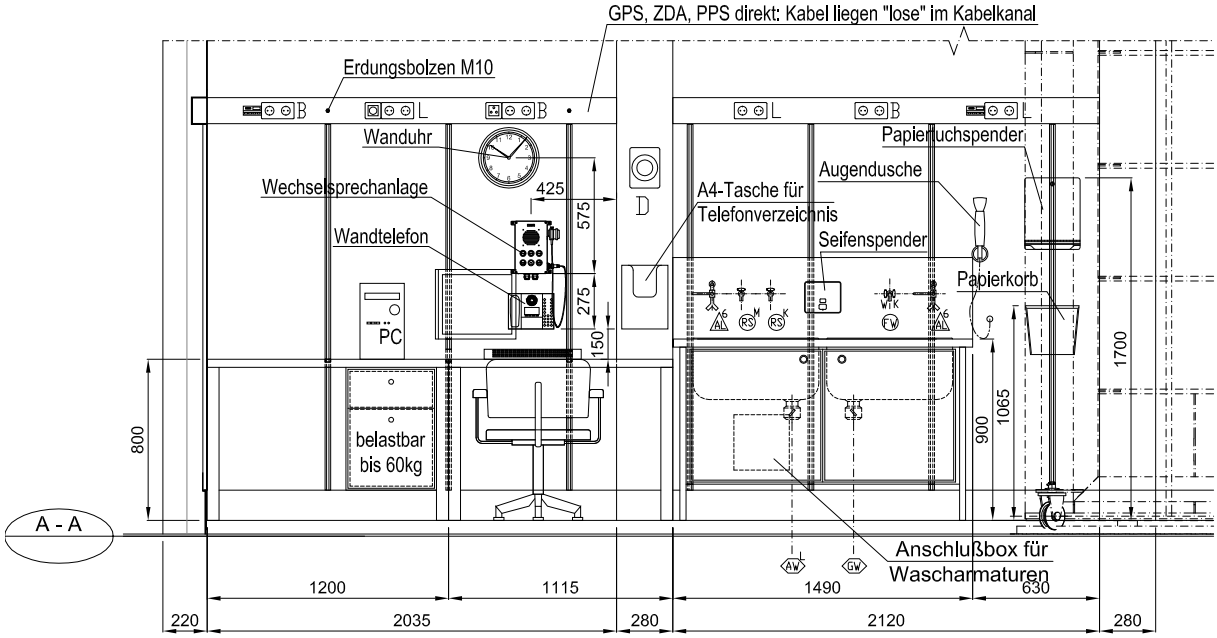

1 Stahltüren
3 Elementtor
4 Aussentreppe
5 Wassergraben/Decksbelag
6 Verschiebbare Schanz
7 Bodenhülse M24
8 Schiebe-Schwenktor
9 Luke
10 Hydrographenschächte
11 Hydrographenrohre
70
74
78
82
86
90
94
98
102
2700
1200
2100
3300
4900
320
8700
voraus
ahead

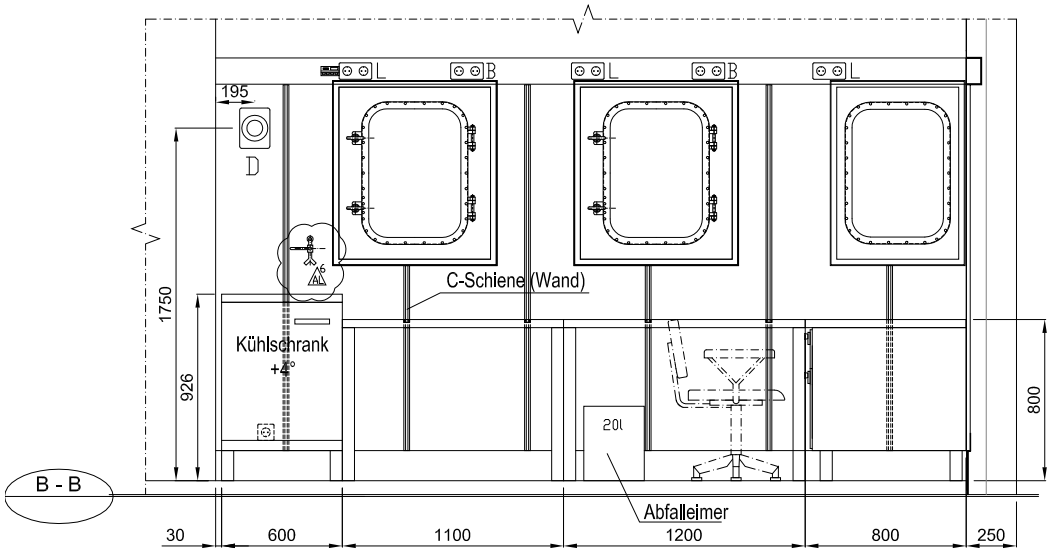
View:

Grundriss Hangar Labor-Arbeitsplatz



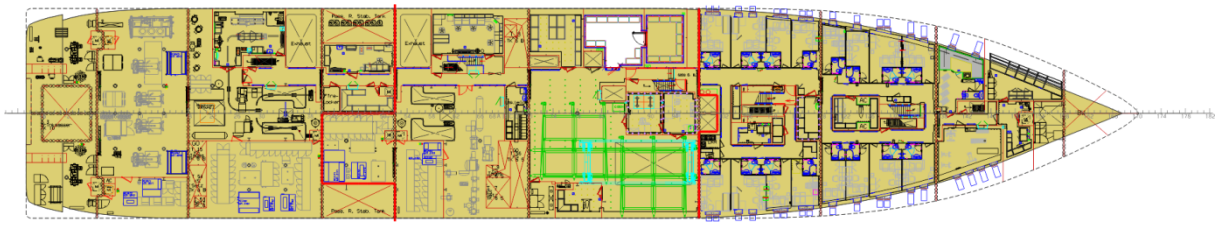
View:


GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Erdungsbolzen M10
Wanduhr
Wechselsprechanlage
Wandtelefon
425
575
275
150
PC
belastbar bis 60kg
800
A - A
A4-Tasche für Telefonverzeichnis
Papierluchspender
Augendusche
Seifenspender
Papierkorb
1700
1065
900
Anschlußbox für Wascharmaturen
1200
1115
1490
630
220
2035
280
2120
280


195
C-Schiene (Wand)
1750
926
Kühlschrank
+4°
20l
800
B - B
Abfalleimer
30
600
1100
1200
800
250

8.3.18. Freezing / cold storage +2°C

Location	Deck 02 (Zwischendeck PORT), Frame 77 -- 88
Room-No.	246
Phone	513



Area (m²)	20		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase			Outlet	
Workplaces	1		Ground stud			Refrigerator +4°C	
Phone	x		LAN	4		Refrigerator -18°C	
Fresh water w / c			Single-core cable			Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom			Drying oven	
Drains (basin)			Wall C-tracks Aufputz	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks			Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C			Wall clock	

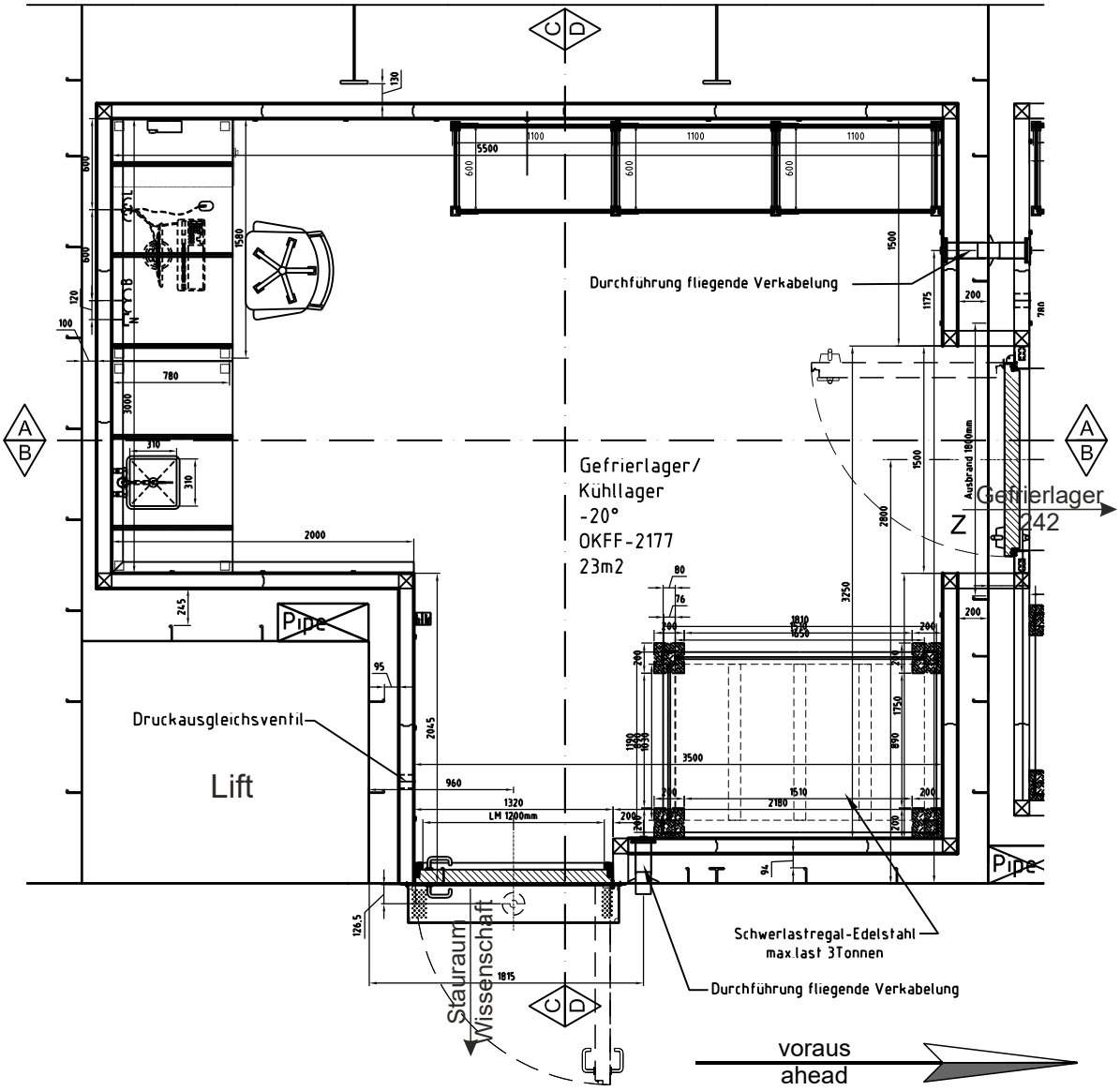
Function definition:

- The refrigerated storage is used as storage space and cooling lab for example, Biologists and geologists.
- It is to be cooled to -6 ° C and has a finely adjustable temperature control tolerance of ± 0.5 K

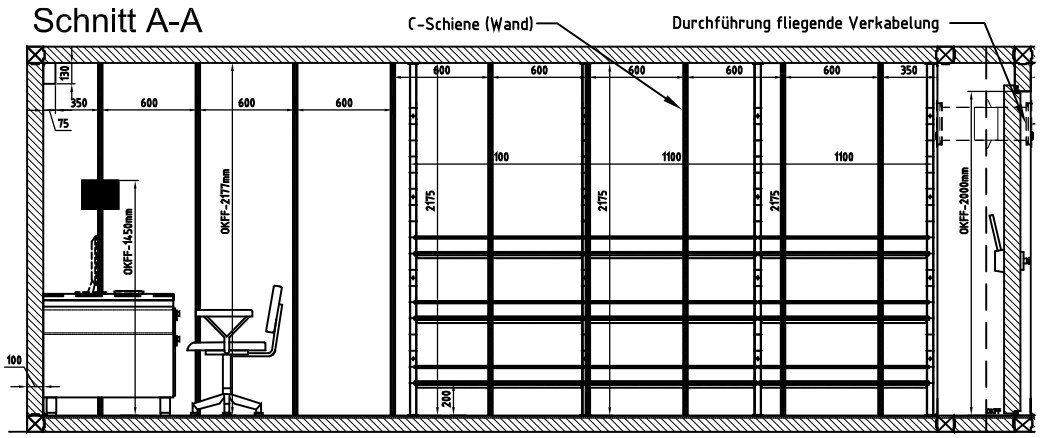
Equipment

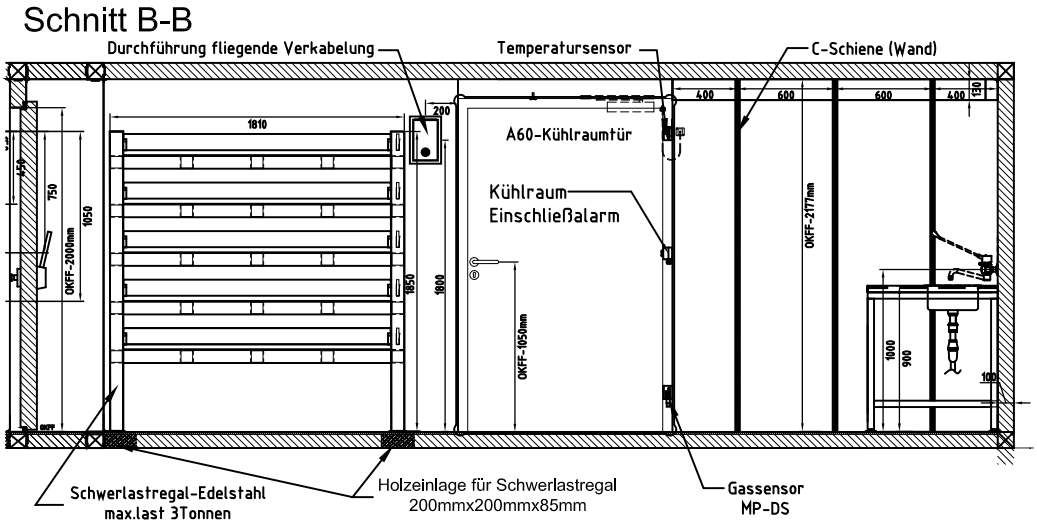
- 1 work place
- Shelves for conventional aluminum boxes

View:


Durchführung fliegende Verkabelung
Gefrierlager/
Kühllager
-20°
OKFF-2177
23m2
Gefrierlager
242
Z
Pipe
Druckausgleichsventil
Lift
Schwerlastregal-Edelstahl
max.last 3Tonnen
Durchführung fliegende Verkabelung
Stauraum
Wissenschaft
voraus
ahead

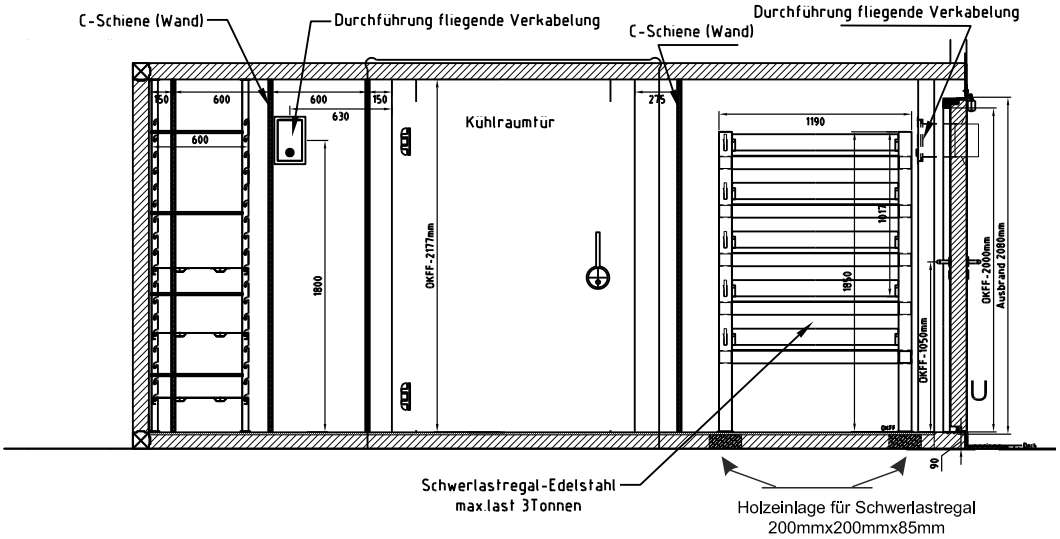
View:


Schnitt A-A
C-Schiene (Wand)
Durchführung fliegende Verkabelung
OKFF-1450mm
OKFF-2177mm
OKFF-2000mm

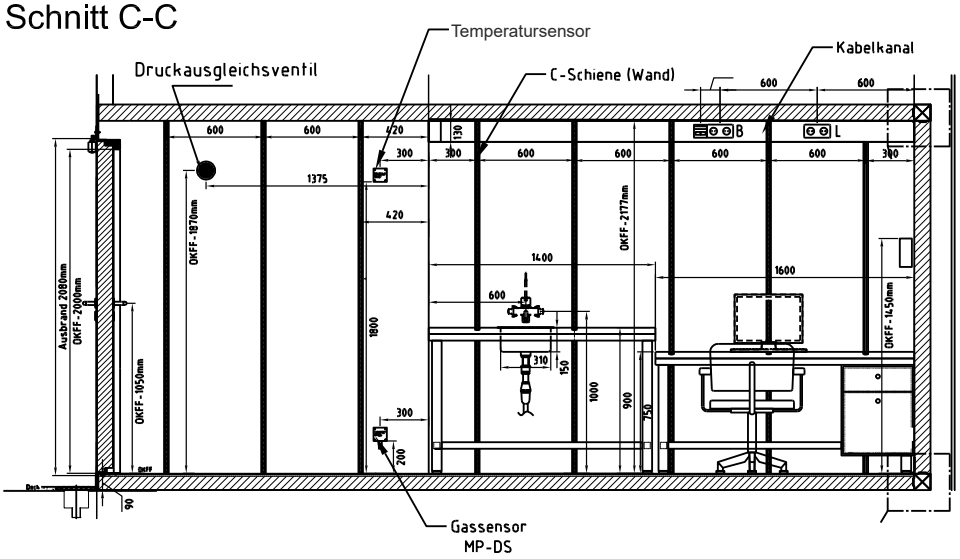

Schnitt B-B
Durchführung fliegende Verkabelung
Temperatursensor
C-Schiene (Wand)
A60-Kühlraumtür
Kühlraum
Einschließalarm
OKFF-2000mm
OKFF-1050mm
OKFF-2177mm
Schwerlastregal-Edelstahl
max.last 3Tonnen
Holzeinlage für Schwerlastregal
200mmx200mmx85mm
Gassensor
MP-DS

View:

Schnitt D-D

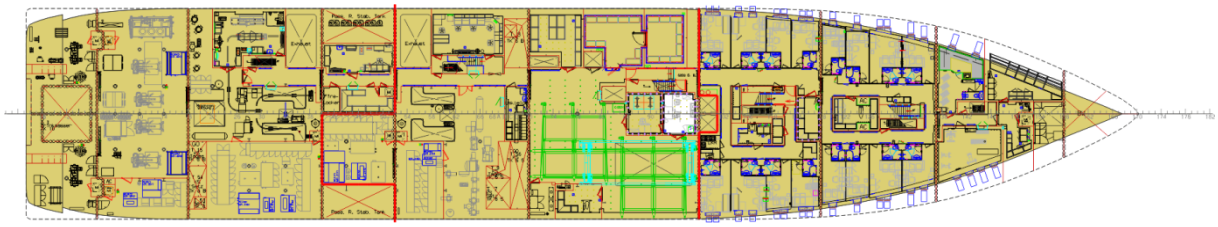


Schnitt C-C



8.3.19. Salinometer room

Location	Deck 02 (tween deck), Frame 86 – 92
Room-No.	241
Phone	514

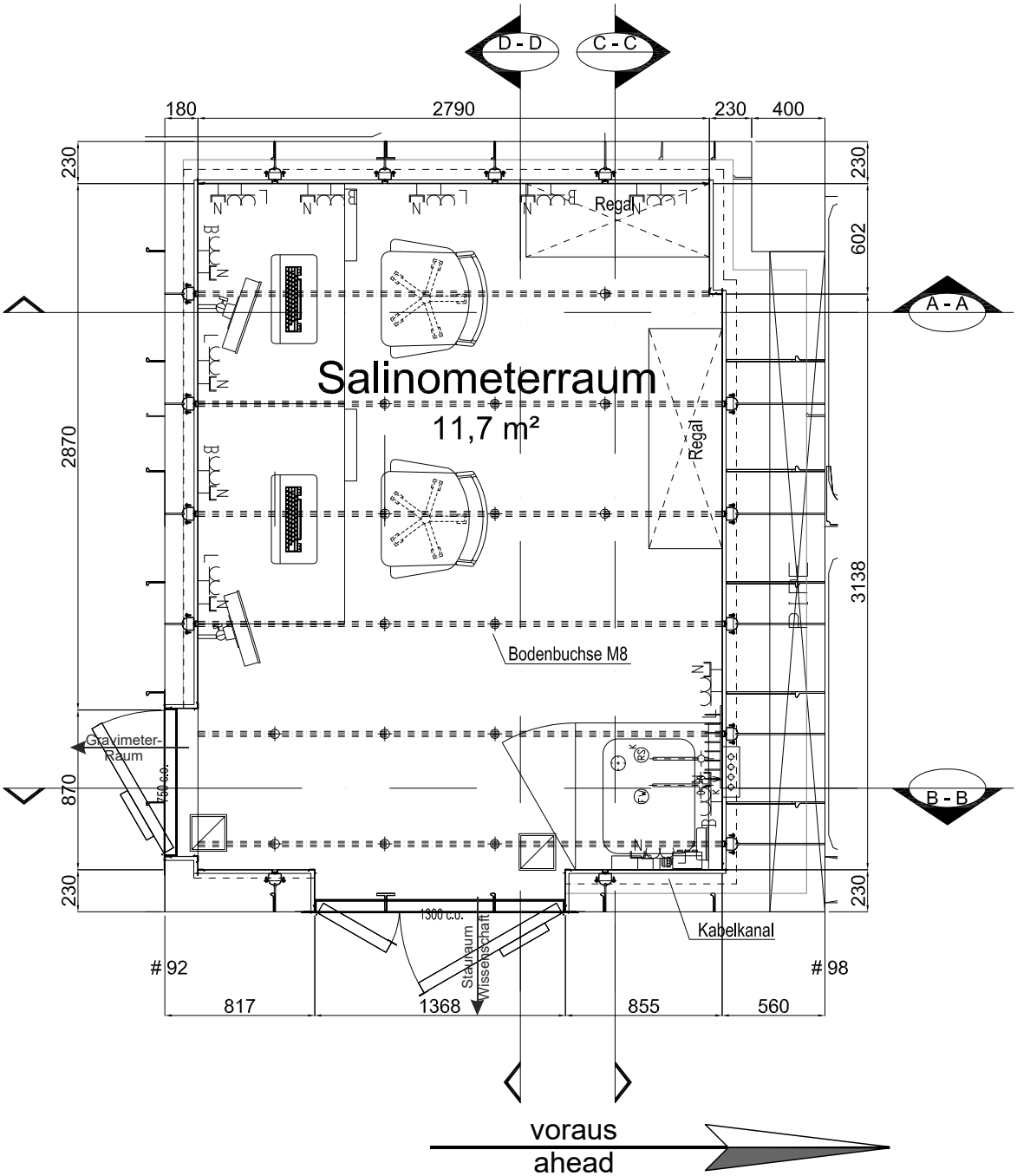


Area (m²)	9		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase			Outlet	
Workplaces	2		Ground stud			Refrigerator +4°C	
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K		Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	1		Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

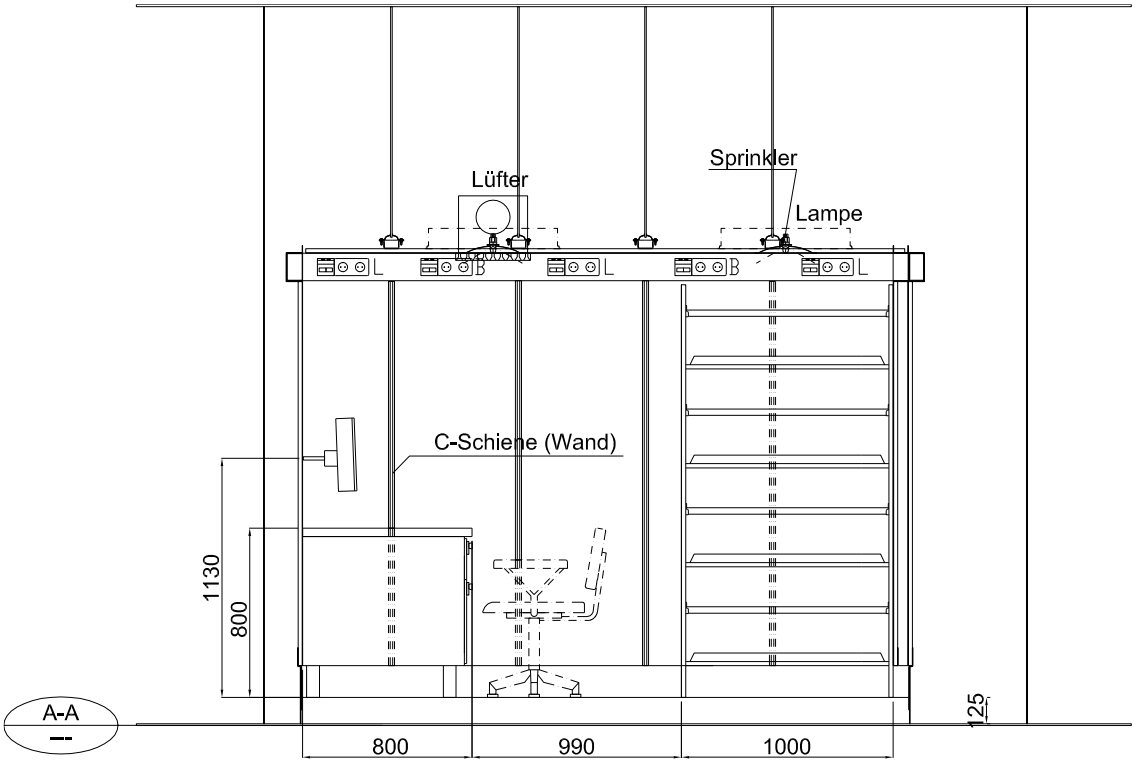
Function definition:

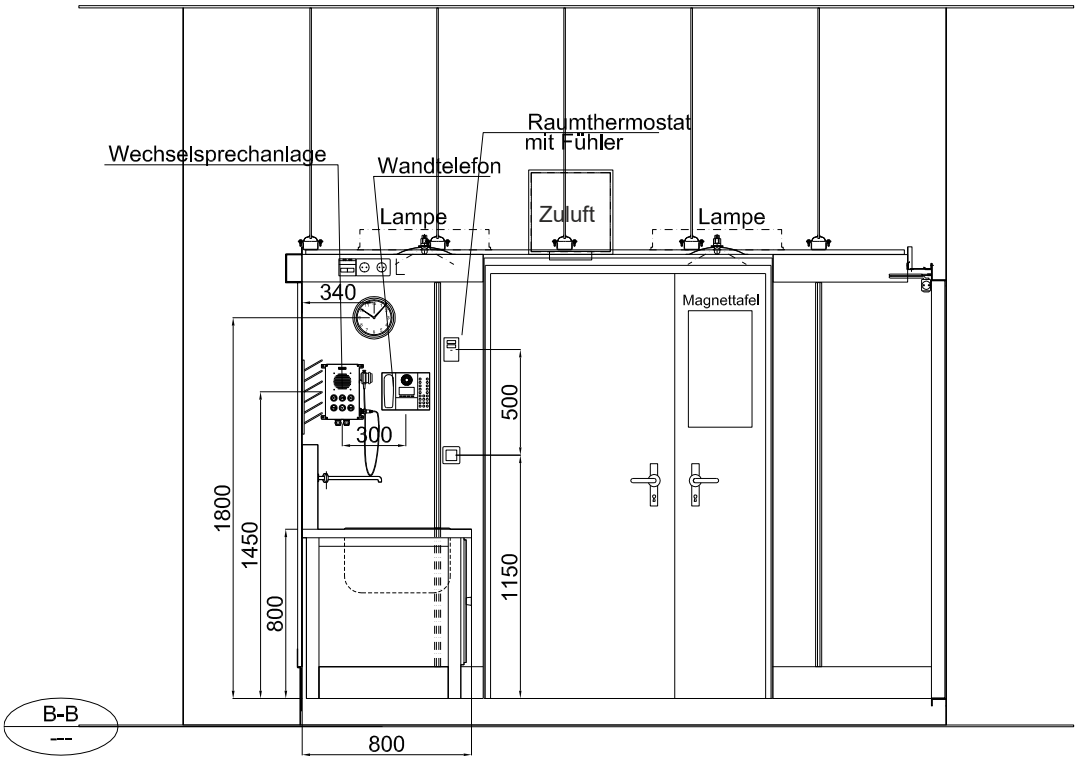
- Working on clean seawater

View:

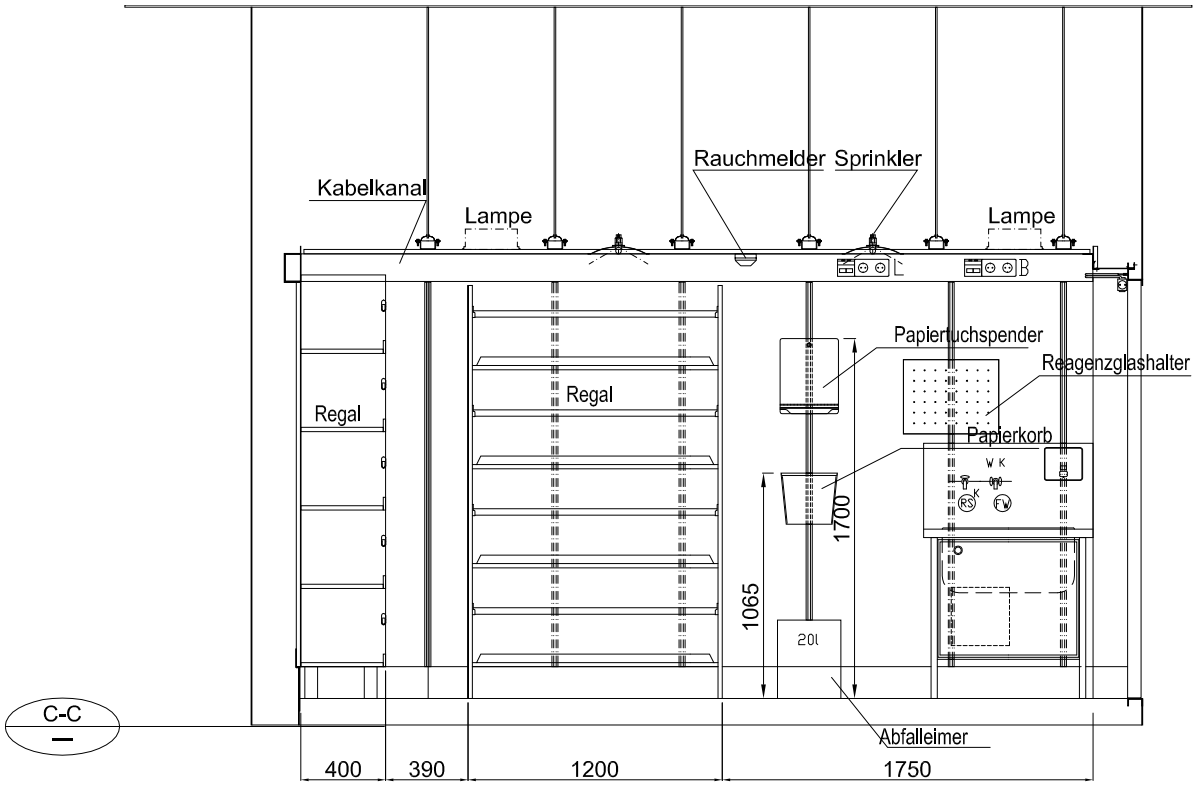

D - D
C - C
A - A
B - B
180
2790
230
400
230
602
2870
3138
870
230
Regal
Salinometerraum
11,7 m²
Regal
Bodenbuchse M8
Gravimeter-Raum
750 c.c.
1300 c.c.
Staurauum Wissenschaft
Kabelkanal
92
98
817
1368
855
560
voraus
ahead

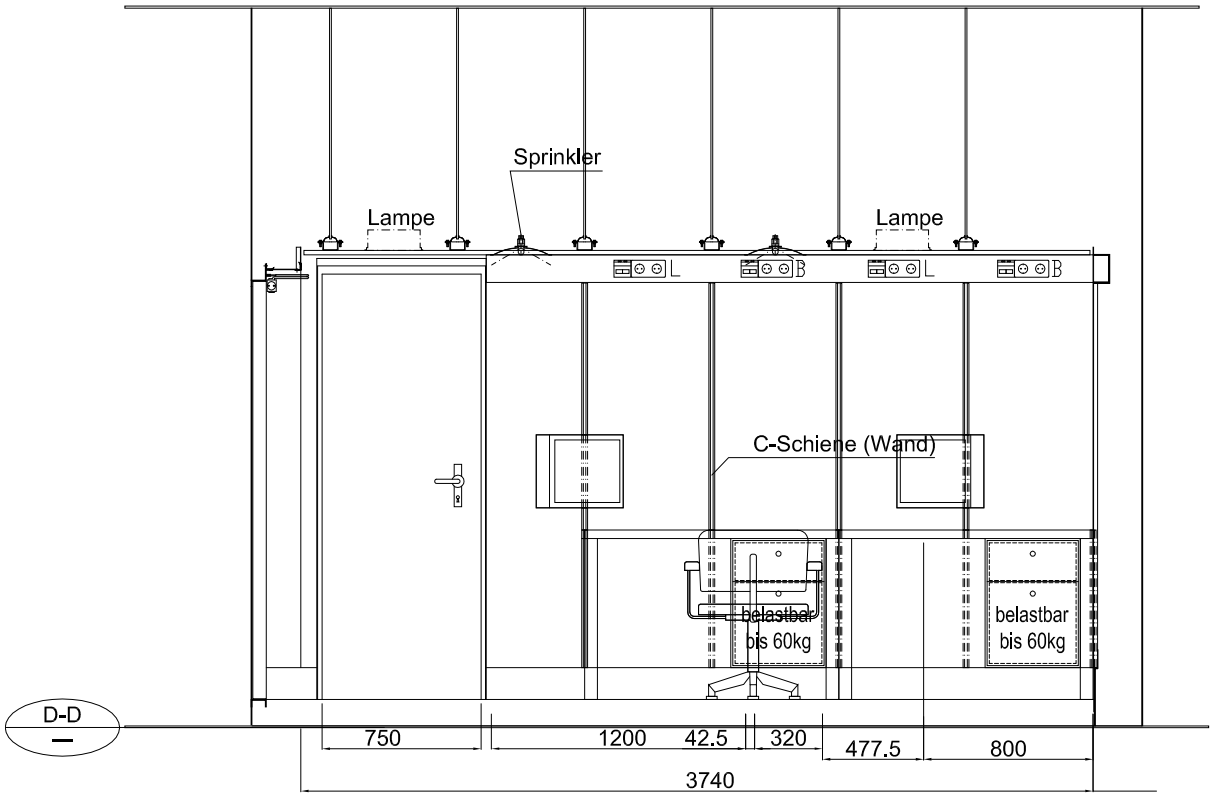
View:


Lüfter
Sprinkler
Lampe
C-Schiene (Wand)
1130
800
125
A-A
800
990
1000


Raumthermostat
mit Fühler
Wechselsprechanlage
Wandtelefon
Lampe
Zuluft
Lampe
340
Magnettafel
500
300
1800
1450
1150
800
B-B
800

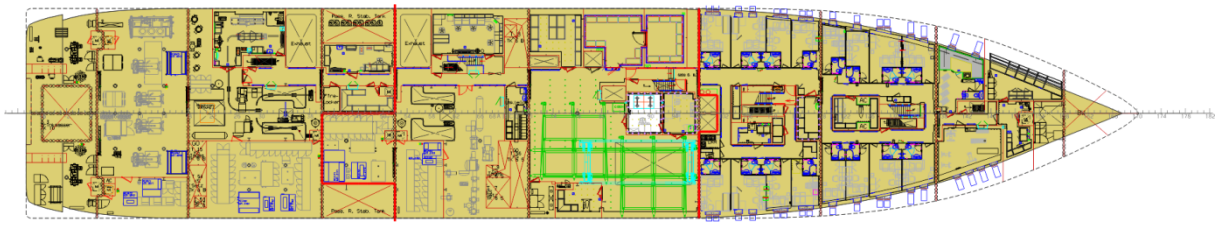
View:


Kabelkanal
Lampe
Rauchmelder
Sprinkler
Lampe
Papiertuchspender
Reagenzglashalter
Regal
Regal
Papierkorb
1700
1065
20l
Abfalleimer
C-C
400
390
1200
1750


Sprinkler
Lampe
Lampe
C-Schiene (Wand)
belastbar bis 60kg
belastbar bis 60kg
D-D
750
1200
42.5
320
477.5
800
3740

8.3.20. Gravimeter room

Location	Deck 02 (tween deck), Frame 92 – 97
Room-No.	239
Phone	515



Area (m²)	8		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	1		Ground stud	x		Refrigerator +4°C	
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c			Single-core cable			Refrigerator -80°C	
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom			Drying oven	
Drains (basin)			Wall C-tracks	x		gimbal left off. table	
Lab wastewater			Ceiling C-tracks	x		Ice maker	
Scuppers, directly			Ground socket	M8		GPS, ZDA, PPS directly	x
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C	x		Wall clock	x

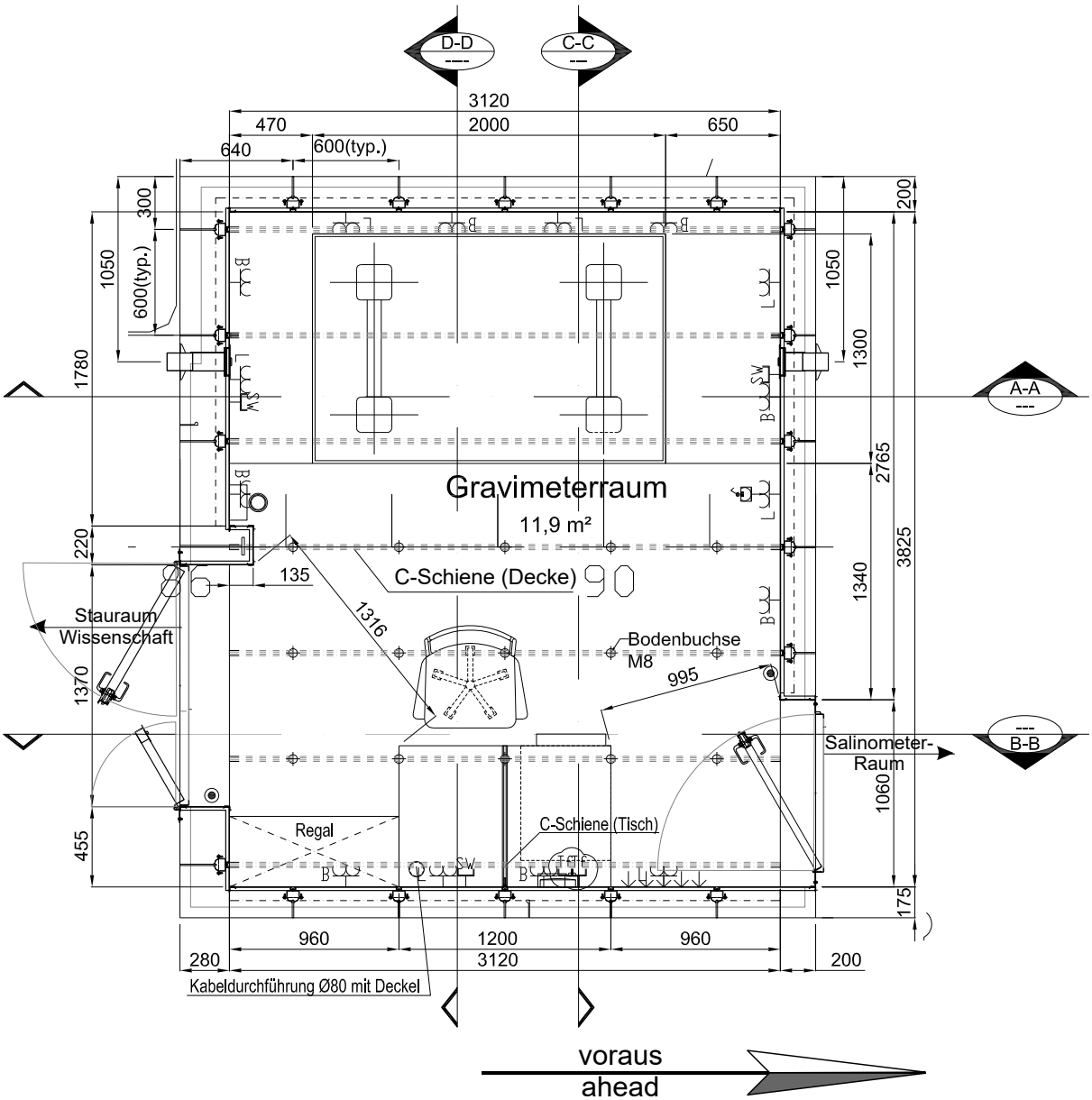
Function definition:

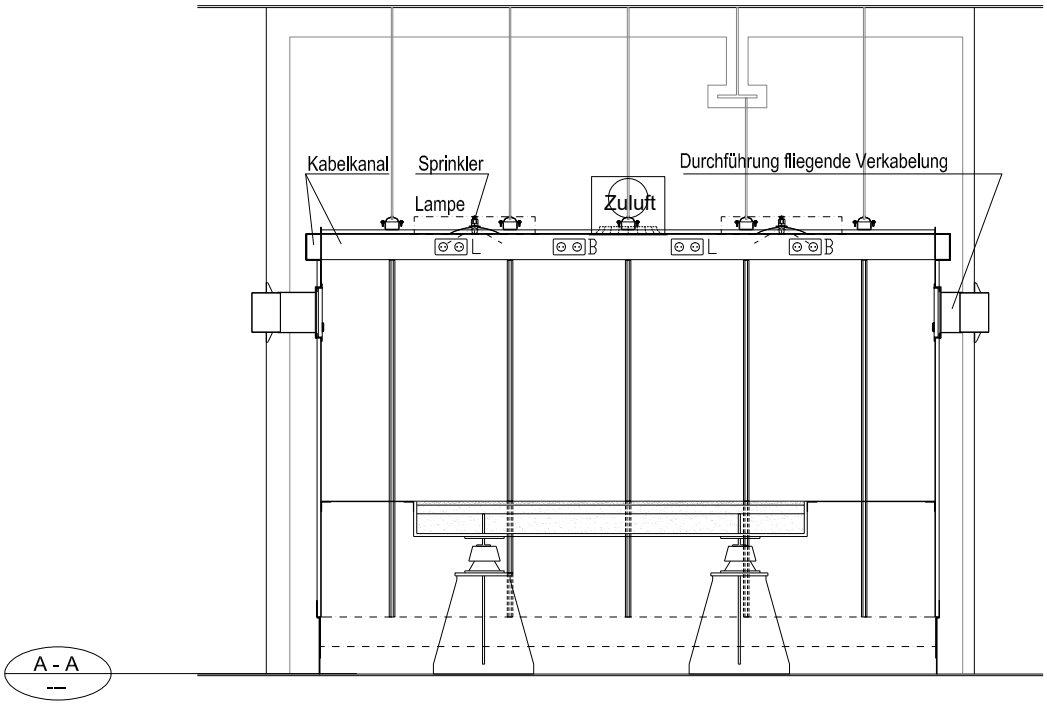
- Working with Gravimeter

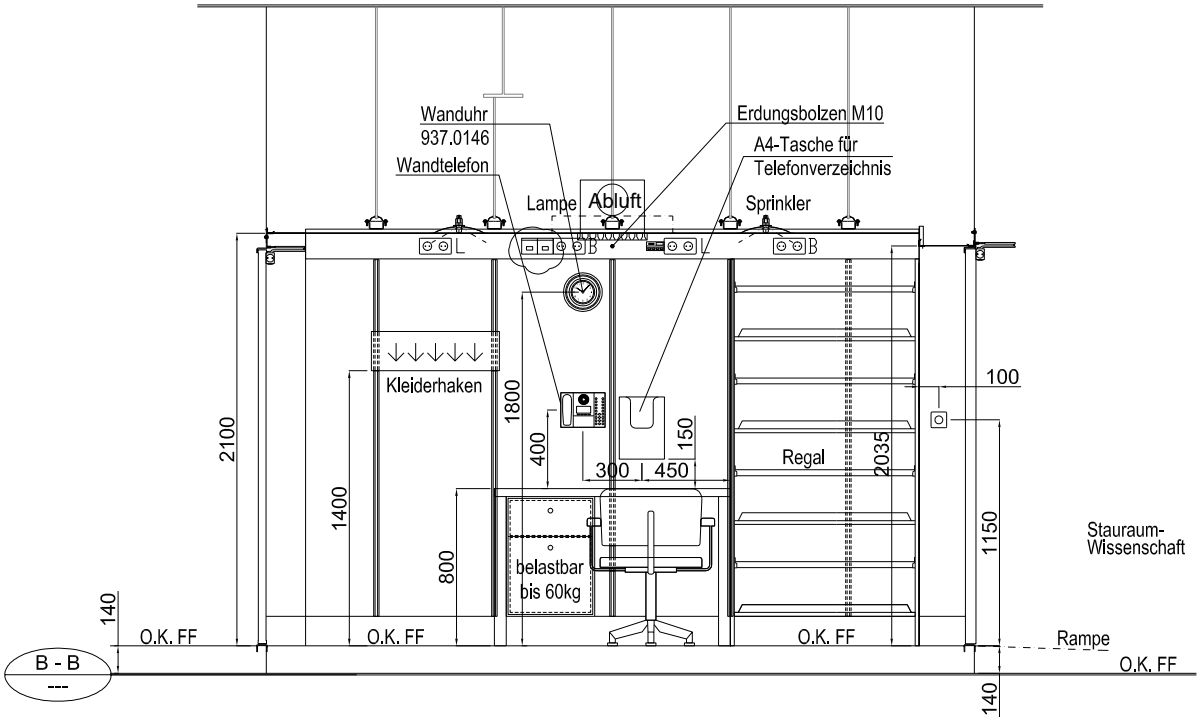
Equipment:

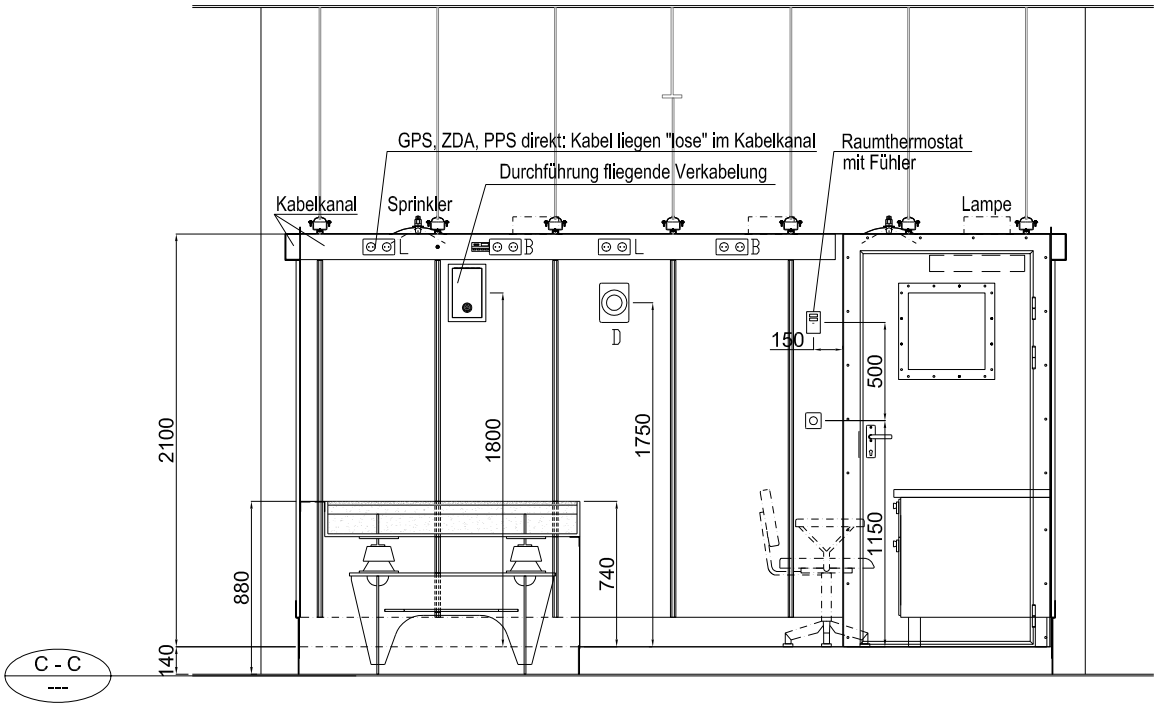
- Foundation for Gravimeter

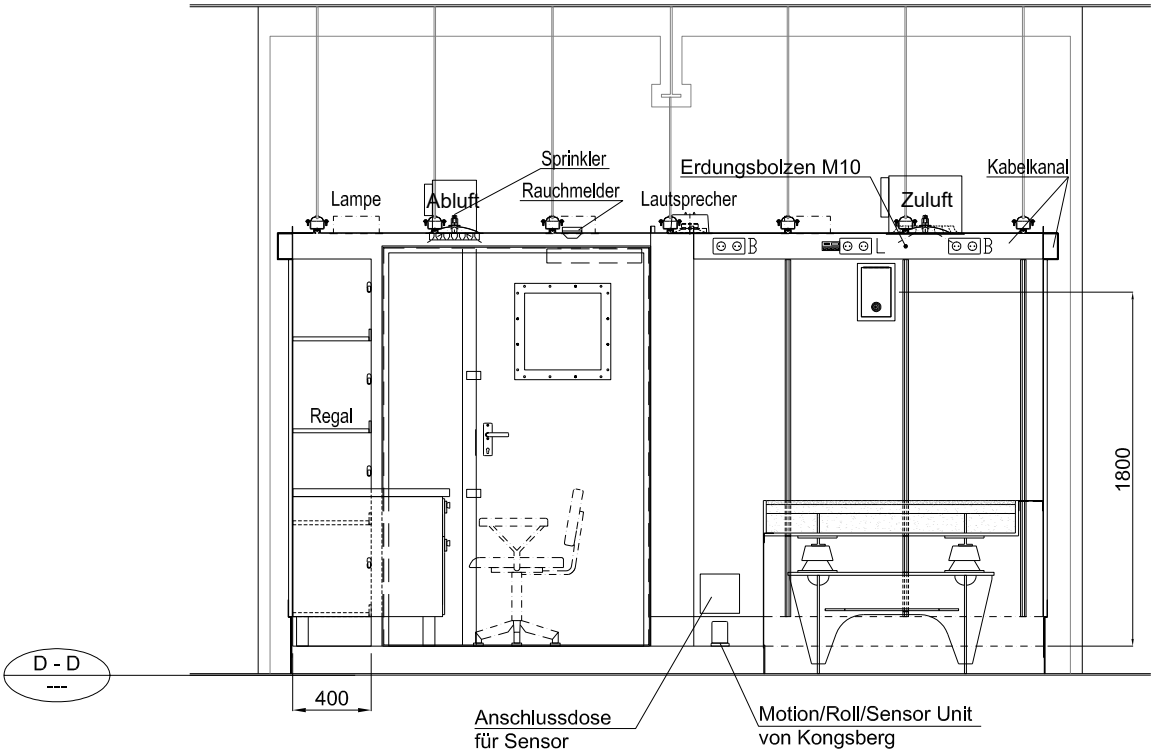
View:


D-D
C-C
A-A
B-B
3120
470
2000
650
640
600(typ.)
300
1050
600(typ.)
1780
200
1050
1300
2765
3825
1340
220
135
1316
995
Gravimeterraum
11,9 m²
C-Schiene (Decke)
Bodenbuchse
M8
Stauraum
Wissenschaft
1370
Salinometer-
Raum
1060
Regal
C-Schiene (Tisch)
455
175
960
1200
960
280
3120
200
Kabeldurchführung Ø80 mit Deckel
voraus
ahead


Kabelkanal
Sprinkler
Lampe
Zuluft
Durchführung fliegende Verkabelung
A - A

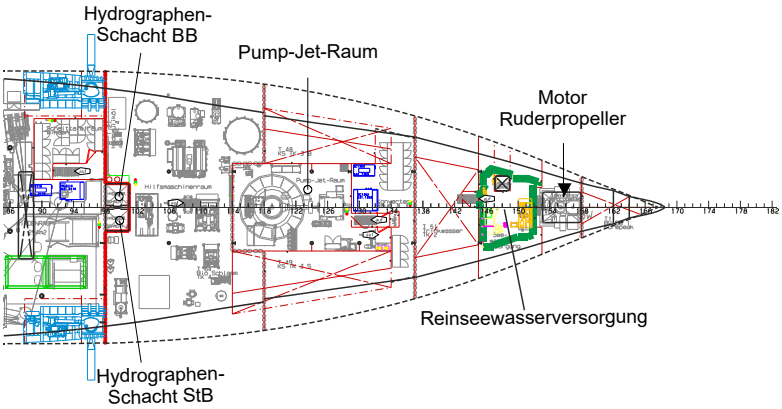

Wanduhr
937.0146
Wandtelefon
Lampe
Abluft
Erdungsbolzen M10
A4-Tasche für
Telefonverzeichnis
Sprinkler
Kleiderhaken
1800
400
150
300
450
Regal
2035
100
2100
1400
800
belastbar
bis 60kg
1150
Stauraum-
Wissenschaft
140
O.K. FF
O.K. FF
O.K. FF
Rampe
O.K. FF
140
B - B


GPS, ZDA, PPS direkt: Kabel liegen "lose" im Kabelkanal
Raumthermostat mit Fühler
Durchführung fliegende Verkabelung
Kabelkanal
Sprinkler
Lampe
L
B
D
150
500
2100
1800
1750
1150
880
740
140
C - C


Sprinkler
Erdungsbolzen M10
Kabelkanal
Lampe
Abluft
Rauchmelder
Lautsprecher
Zuluft
B
L
Regal
1800
D - D
400
Anschlussdose für Sensor
Motion/Roll/Sensor Unit von Kongsberg

8.3.21. Clean SeaWater Lab (data collection and supply)

Location	Deck 01 (Tankdeck Mittschiffs), Frame 145 -- 151
Room-No.	101
Phone	209



Area (m²)	12		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	1		Outlet	
Workplaces	1		Ground stud			Refrigerator +4°C	
Phone	x		LAN	12		Refrigerator -18°C	
Fresh water w / c	x		Single-core cable			Refrigerator -80°C	
Clean seawater	K/M		Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom	x		Drying oven	
Drains (basin)	´1		Wall C-tracks	X4		gimbal left off. table	
Lab wastewater			Ceiling C-tracks			Ice maker	
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly	x
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C			Wall clock	

Equipment

- Clean seawater supply and data collection
- 2x Self-cleaning Monitoring Box (SMB)
- extending apparatus

Note on CleanSeaWater supply:

The plant was rebuilt in 2017 during the vessels stay in shipyard in Emden.
The original measurement technique (SBE21 / BBE fluorometer) was removed and replaced with two SMBs (***S***elfcleaning ***M***onitoring ***B***ox). The flow line for this SMB was completely decoupled from the other lines of the CleanSeaWater system for laboratory supply.
A new outlet was installed over which this line of the system discharges the seawater outboard after passing through the measuring device.
Since the SMBs can be removed from the system by their construction in a frame, the supply lines for seawater inlet, fresh water inlet, rinsing liquid, process water return and seawater return are each provided with a shut-off valve to prevent the leakage of remaining seawater from the system.

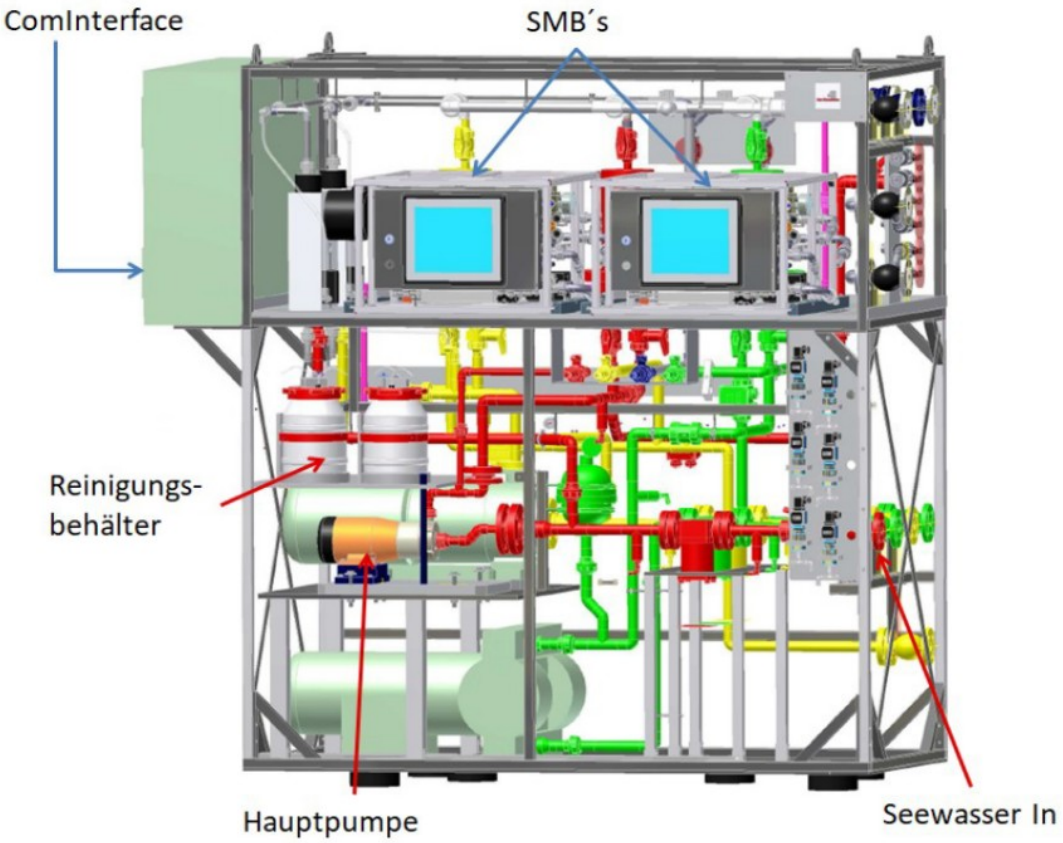
Note on SMB:

The Self-cleaning Monitoring Box (SMB) is a special form of flow-through system, similar to a FerryBox. It consists of a flow measuring section, fixed in an Item frame with PVC base plate and an Industrial Panel PC in an electronics housing.

The SMB measures the following standard parameters:
- Sound Velocity
- Conductivity
- Salinity
- chlorophyll
- Turbidity
- Pressure
- Flow

To ensure continuous data recording, two systems are coupled and controlled via a ComInterface.
The operation of the overall system is controlled so that one SMB continuously records data in the measurement cycle while the other system is being cleaned or remains in cleaning mode.
To ensure that the data is valid, the SMBs are controlled so that there is extensive parallel operation before switching the SMB.
The SMB is part of the complex CleanSeaWater system.

Structure of the plant



8.3.22. Clean SeaWaterLab (Sensors)

The SMB incorporates the following sensors for continuous data logging:
- MicroX SV - Sound Velocity from the company AML
- SBE 45 from the company Seabird (see chapter ***13.9 Thermosalinograph***)
- FLNTU from the company Wetlabs

There are also sensors for housekeeping and for controlling the system:
- Pressure Cerabar PMP11
- Flow sensor Kobold MIK

8.3.23. Sound Velocity Sensor

AML MicroX SV - Sound Velocity

The SV Xchange™ sensor from AML Oceanographic is the only one Field-exchangeable sonic speed sensor of the oceanographic industry. Each sensor head contains embedded electronics, in which calibration coefficients are stored. The sensor heads can move from device to device without effects on accuracy are exchanged.

Technical specifications of the sensor:

Range	Accuracy	Precision	Resolution	Response Time
1375 -1625 m/s	+/- 0,025m/s	+/-0,006 m/s	0,001 m/s	47 µs

8.3.24. Fluorometer

WetLabs FLTNU

FLNTUS analog and serial (RS-232) output with 4000 Counting range, sensor operates autonomously as soon as it is supplied with voltage.

Properties
optical: haze

Wavelength	700 nm
Sensitivity	0.013 NTU
Range, typically	0-25 NTU

optical: fluorescence

Wavelength ex / em	470/695 nm
Sensitivity	0.025 µg / l Chl
Range, typically	0-50 µg / l Chl
Linearity (each)	99% R2

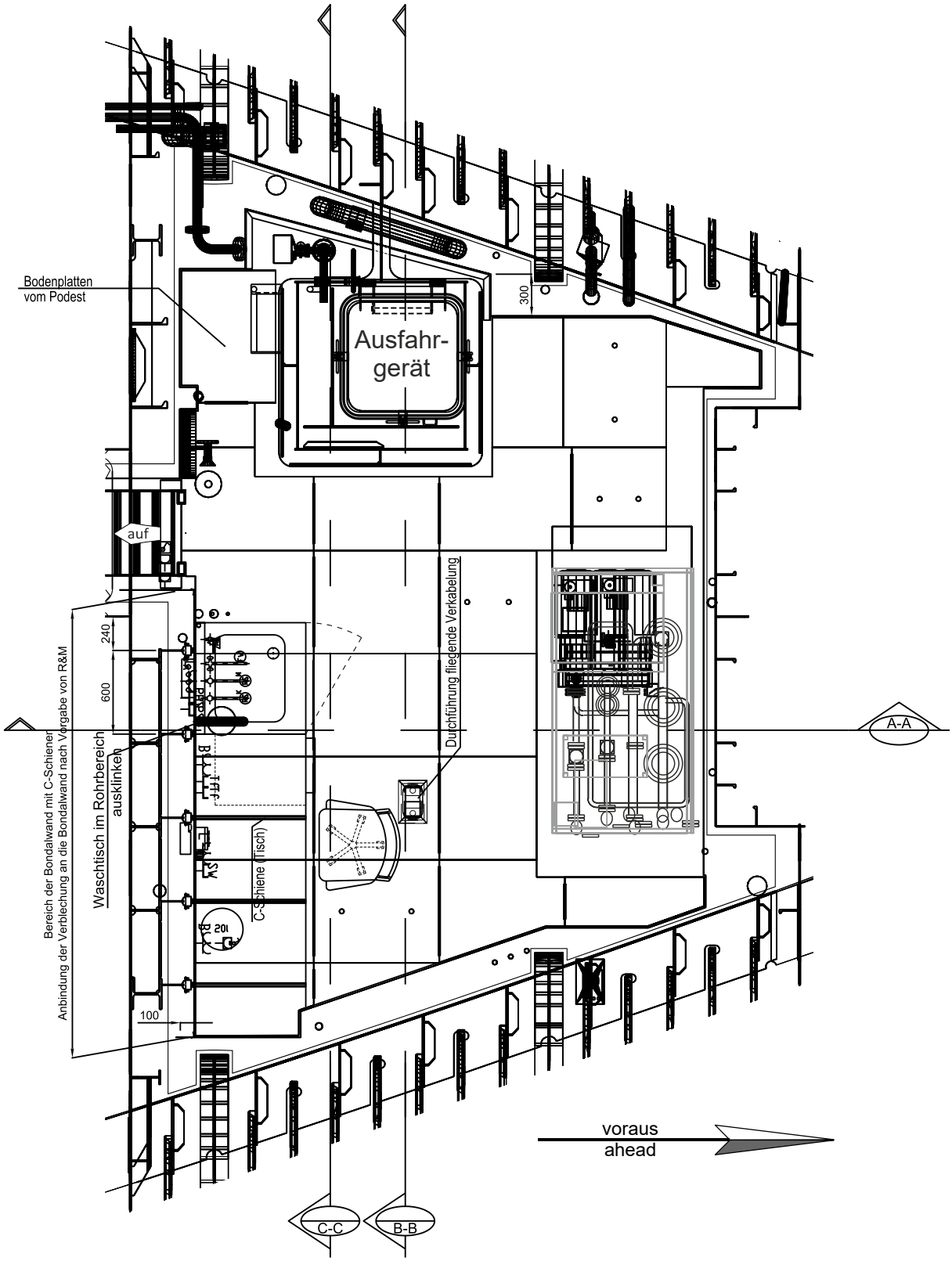
electrical:

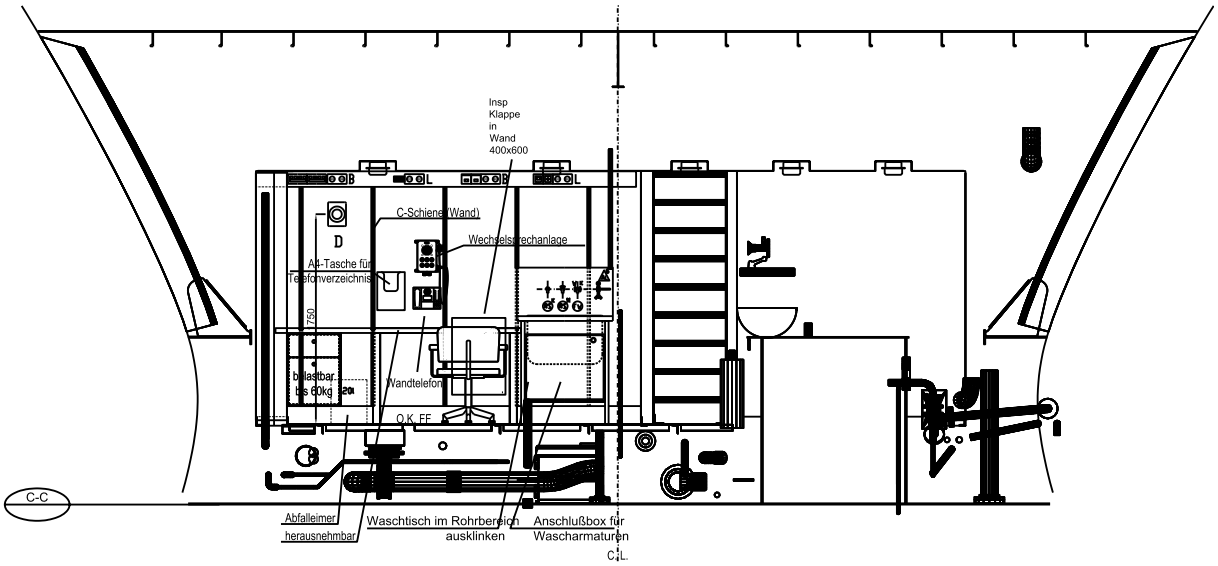
Digital output	resolution 12 bit
RS-232 output	19200 baud

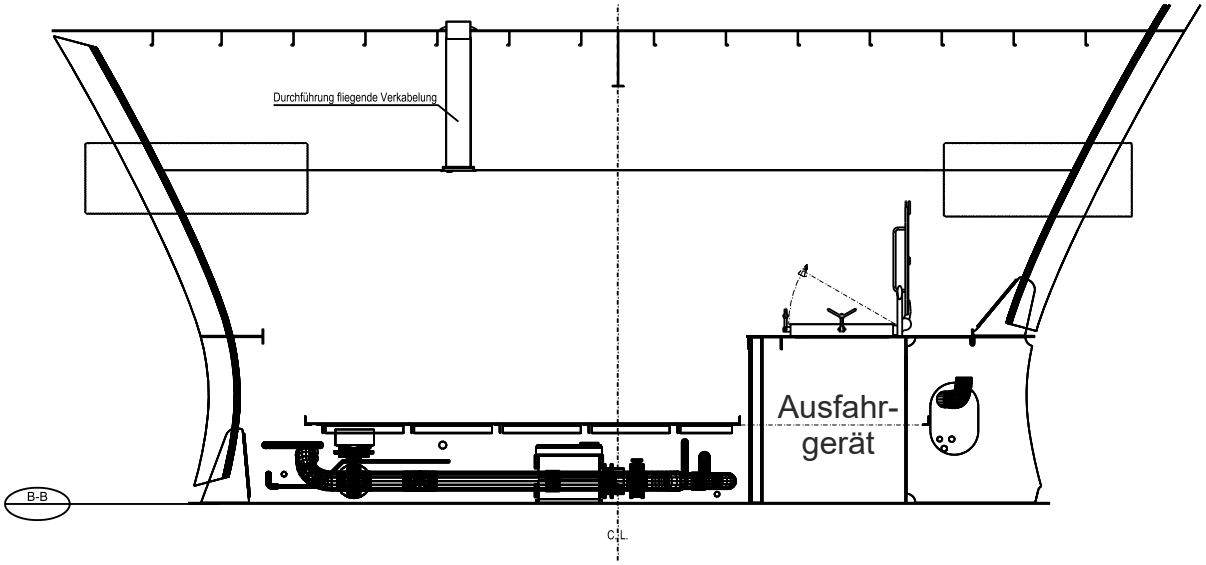
Analog output signal	0-5 V
Connector	MCBH 6MP
Input	7-15 VDC
Current consumption typically	60 mA
Power consumption, sleep mode	140 µA
Current consumption, scraper active	140 mA
Sampling rate up to	8 Hz
Anti-fouling bio-wiper ™	integratetd

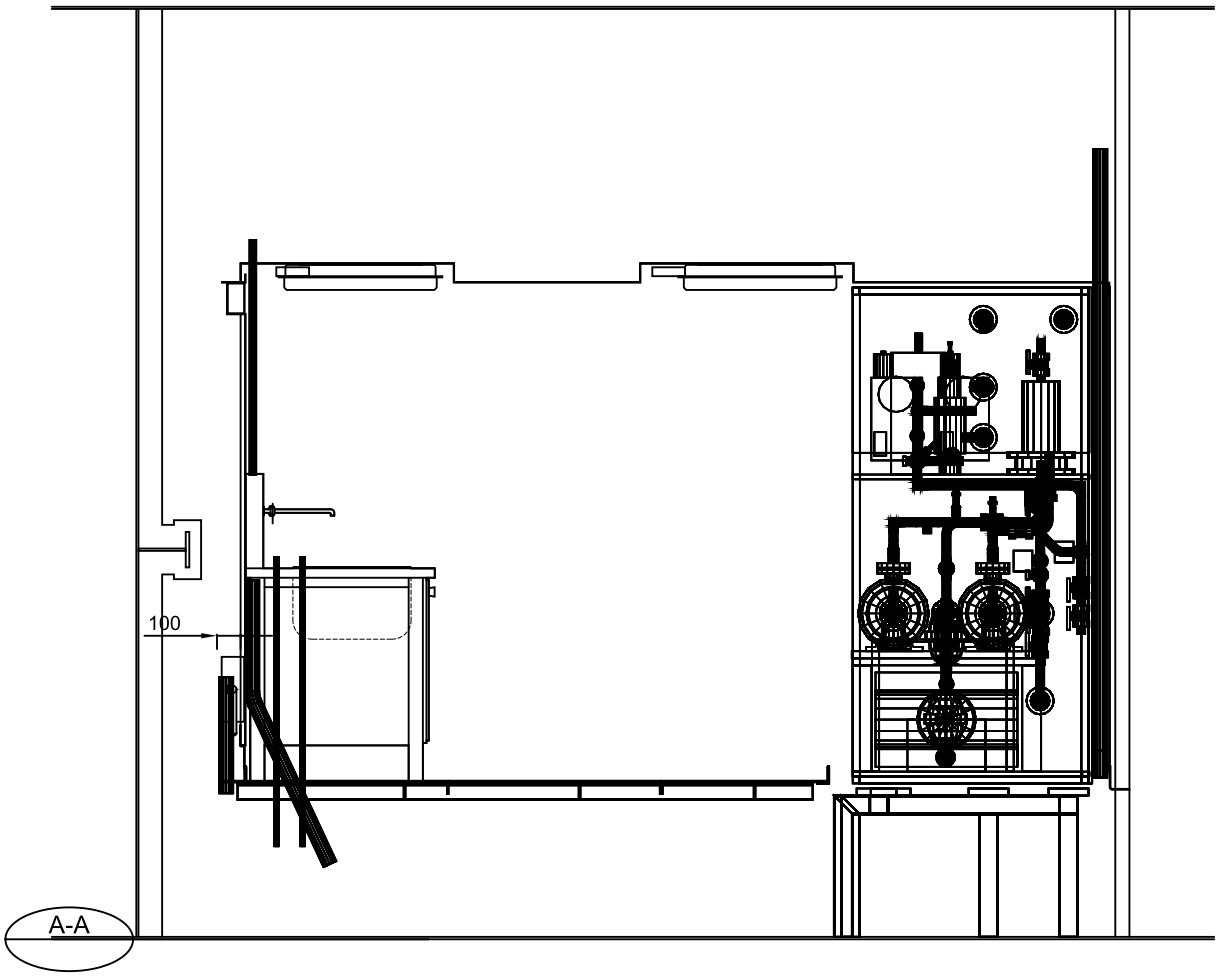
Structure of the plant

8.3.25. Clean SeaWaterLab (View)




Insp
Klappe
in
Wand
400x600
C-Schiene (Wand)
Wechselsprechanlage
A4-Tasche für
Telefonverzeichnis
750
ballastbar
bis 60kg
Wandtelefon
O.K. FF
C-C
Abfalleimer
herausnehmbar
Waschtisch im Rohrbereich
ausklinken
Anschlußbox für
Wascharmaturen
C.L.


Durchführung fliegende Verkabelung
Ausfahr-
gerät
B-B
C.L.

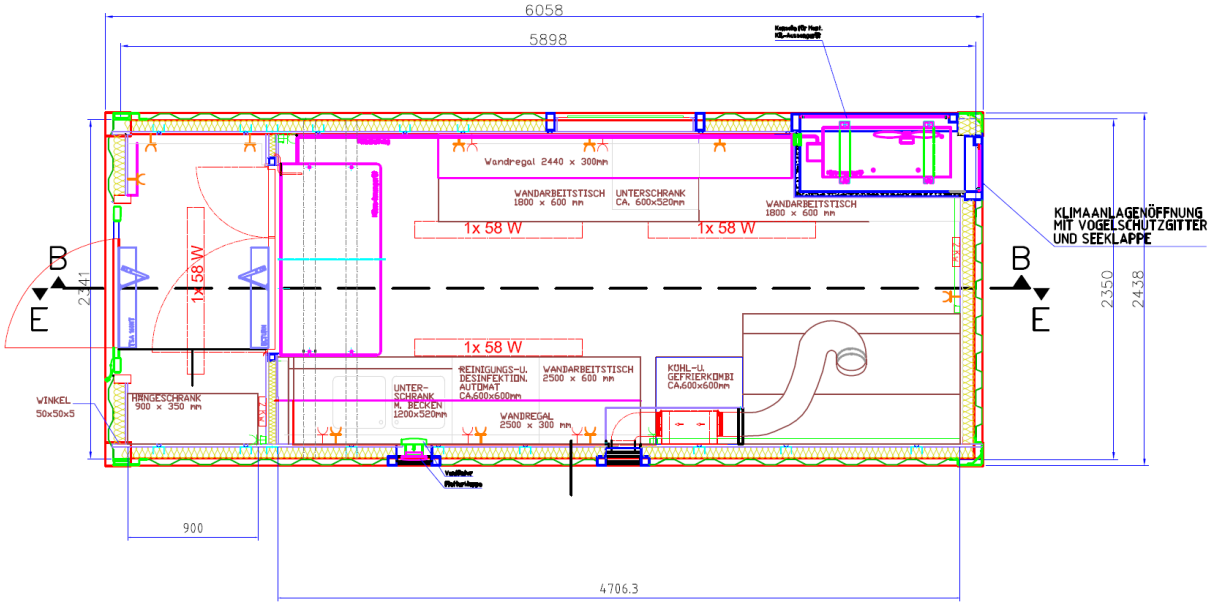

100
A-A

8.3.26. Isotopencontainer

Location	Deck 04 (1. Structure deck amidships), Frame 48 -- 58 Container storage areas 401-403
Room-No.	
Phone	441 (Container terminal box 3) 445 (Container terminal box 6)

The isotope container is permanently installed on the ship.

Top View



Isotopenlabor-Container

See next page for mor pictures

View from the front door into the container

View from the inside to the front door

TriCarb

Work area with laboratory dishwasher

Digistorie cabinet

Anteroom

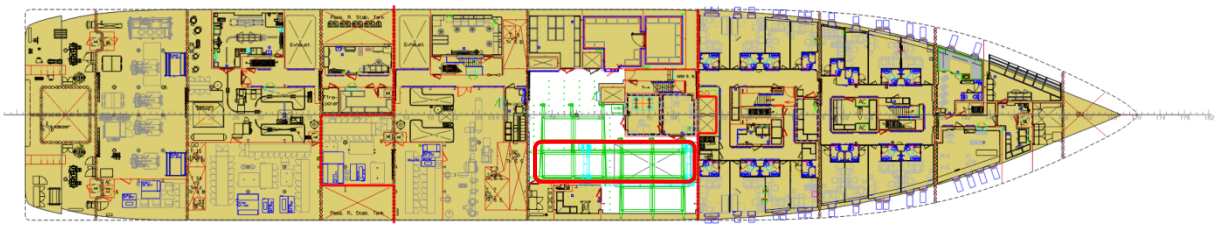
Water connections

Power supply

9. Other Rooms

9.1. Storage space science

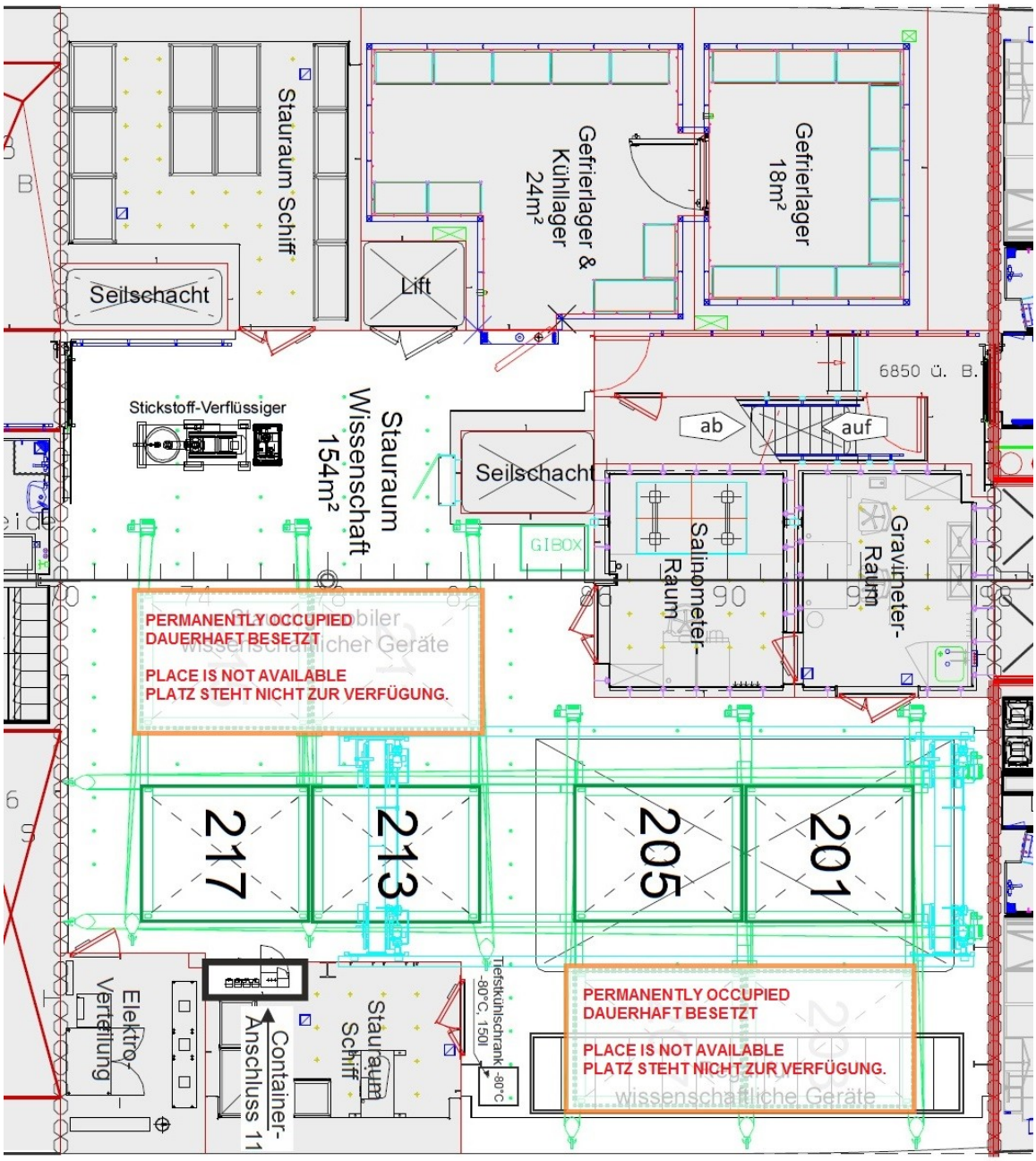
Location	Deck 02 (tween deck), Frame 70 – 98
Room-No.	243
Phone	-



Area (m²)	160		230V/16 A Lab power UPS	x		Suction	
Door width in m	1,2		400V/ 32 A Three-phase	2		Outlet	
Workplaces	1		Ground stud			Refrigerator +4°C	0
Phone			LAN	12		Refrigerator -18°C	0
Fresh water w / c			Single-core cable			Refrigerator -80°C	1
Clean seawater			Multi cable / fiber optic			Lab dishwasher	
soft water			Intercom			Drying oven	
Drains (basin)			Wall C-tracks			gimbal left off. table	
Lab wastewater			Ceiling C-tracks			Ice maker	
Scuppers, directly			Ground socket	M24		GPS, ZDA, PPS directly	
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater	
230/16A power	x		indiv. Temperature18-28°C			Wall clock	x

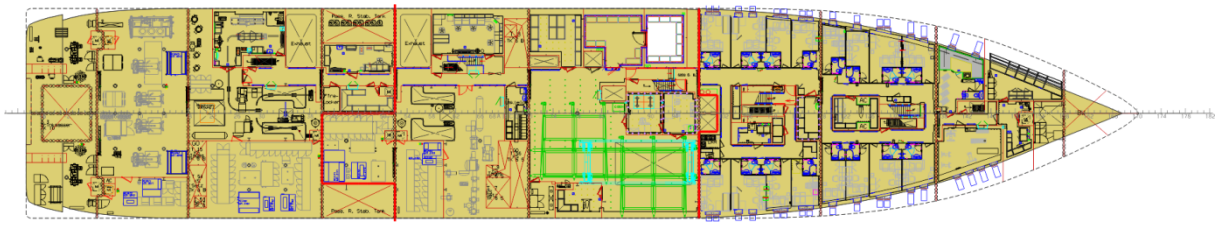
The scientific storage space is also used for the stowage of ships equipment.
Only the container storage spaces 201/205 and 213/217 are available for science (red encircled area)

Birdview


Stauraum Schiff
Seilschacht
Lift
Gefrierlager & Kühllager 24m²
Gefrierlager 18m²
6850 ü. B.
ab
auf
Stickstoff-Verflüssiger
Stauraum Wissenschaft 154m²
Seilschacht
GIBOX
Salinometer-Raum
Gravimeter-Raum
PERMANENTLY OCCUPIED
DAUERHAFT BESETZT
PLACE IS NOT AVAILABLE
PLATZ STEHT NICHT ZUR VERFÜGUNG.
217
213
205
201
Elektro-Verteilung
Container-Anschluss 11
Stauraum Schiff
Tiefkühlschrank -80°C, 150l
-80°C
PERMANENTLY OCCUPIED
DAUERHAFT BESETZT
PLACE IS NOT AVAILABLE
PLATZ STEHT NICHT ZUR VERFÜGUNG.
wissenschaftliche Geräte

9.2. Frozen storage -20°C

Location	Deck 02 (tween deck), Frame 89 – 96
Room-No.	242
Phone	



Area (m²)	16		230V/16 A Lab power UPS			Suction
Door width in m	1,2		400V/ 32 A Three-phase			Outlet
Workplaces	0		Ground stud			Refrigerator +4°C
Phone			LAN			Refrigerator -18°C
Fresh water w / c			Single-core cable			Refrigerator -80°C
Clean seawater			Multi cable / fiber optic			Lab dishwasher
soft water			Intercom			Drying oven
Drains (basin)			Wall C-tracks Aufputz	x		gimbal left off. table
Lab wastewater			Ceiling C-tracks			Ice maker
Scuppers, directly			Ground socket			GPS, ZDA, PPS directly
Working air 6 bar			indiv. Temperature0-28°C			GPS-Repeater
230/16A power			indiv. Temperature18-28°C			Wall clock

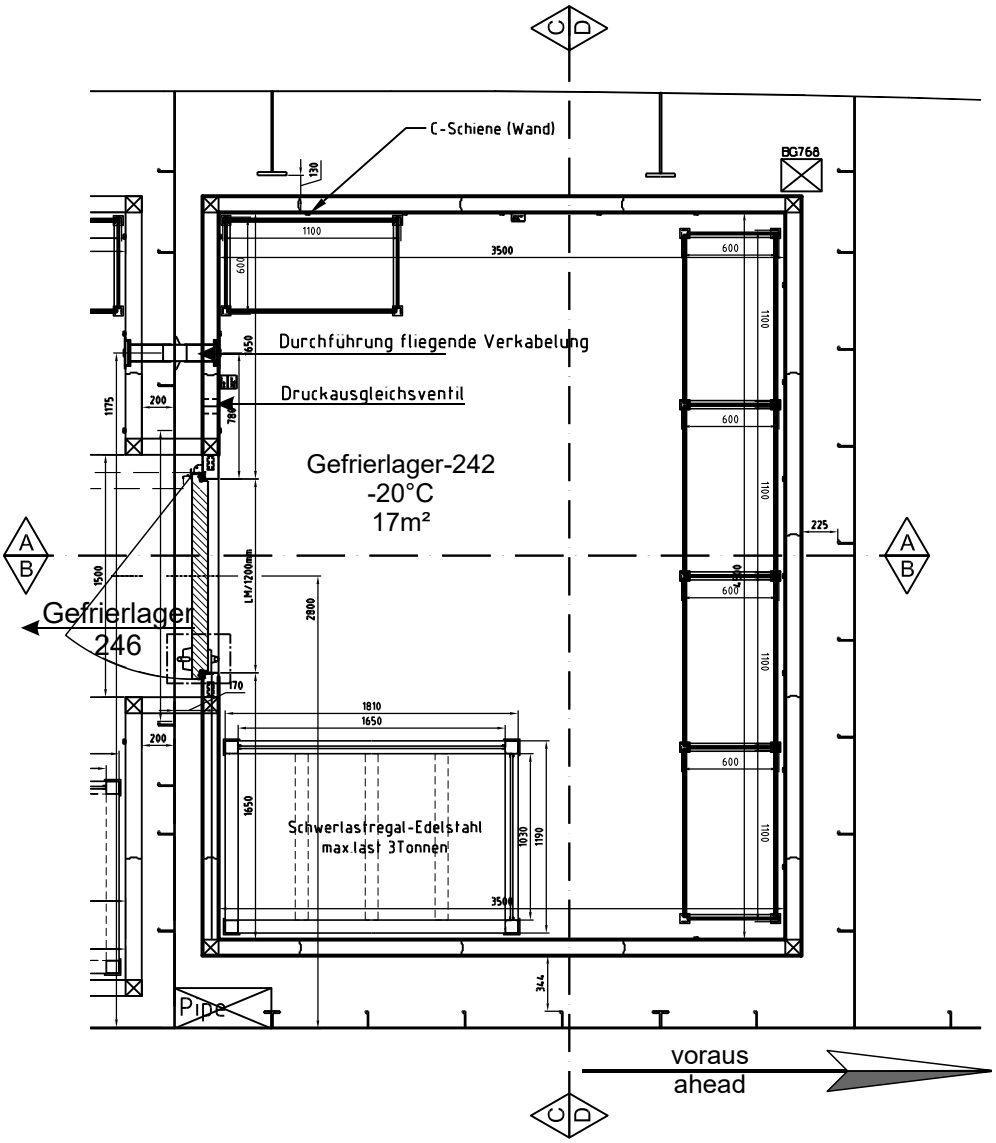
Function definition:

- The freezer / refrigerator stock serves as storage space for scientific asset.
- It is cooled to -20 ° C and with a finely adjustable temperature control with a control tolerance of ± 0.5 K

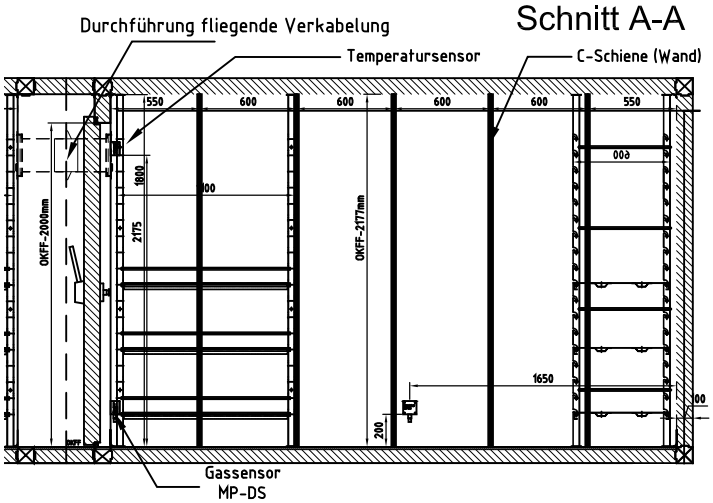
Equipment

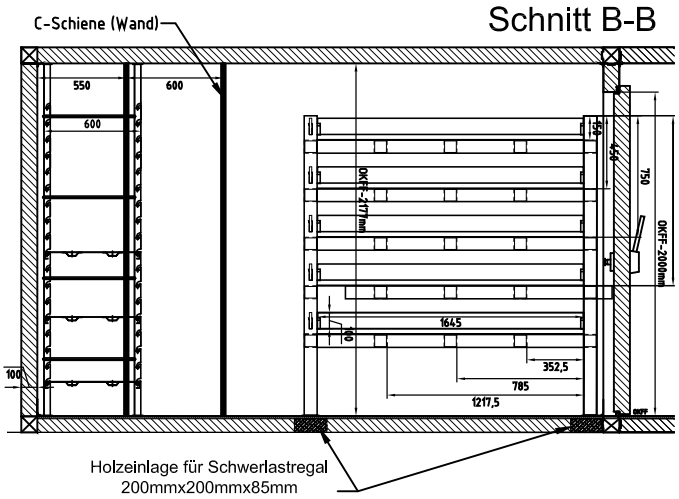
- Shelves for conventional aluminum boxes

View

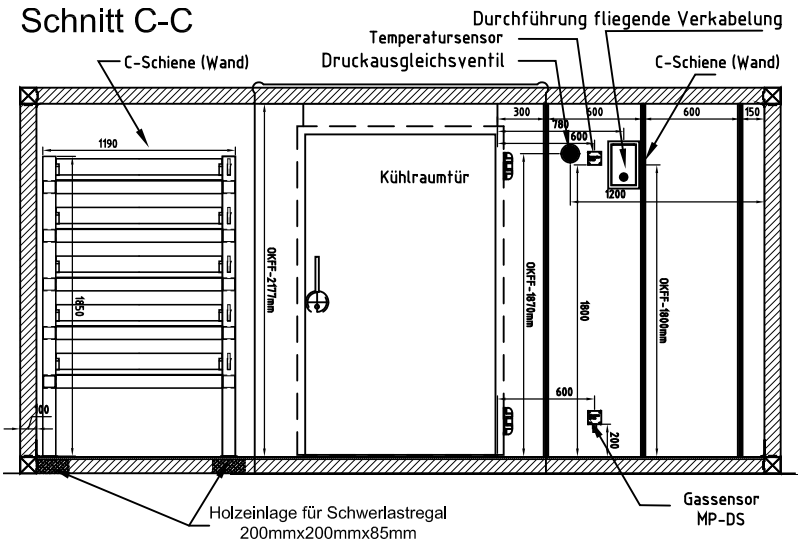

C-Schiene (Wand)
BG768
Durchführung fliegende Verkabelung
Druckausgleichsventil
Gefrierlager-242
-20°C
17m²
Gefrierlager
246
Schwerlastregal-Edelstahl
max.last 3Tonnen
Pipe
voraus
ahead

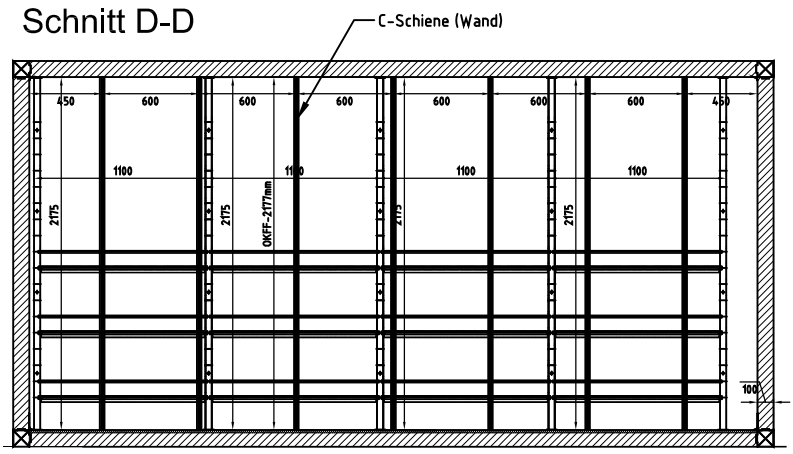
View


Schnitt A-A
Durchführung fliegende Verkabelung
Temperatursensor
C-Schiene (Wand)
550
600
600
600
600
550
1800
2175
OKFF-2000mm
OKFF-2177mm
1650
200
Gassensor
MP-DS


Schnitt B-B
C-Schiene (Wand)
550
600
600
OKFF-2177mm
OKFF-2000mm
750
1645
352,5
785
1217,5
100
Holzeinlage für Schwerlastregal
200mmx200mmx85mm

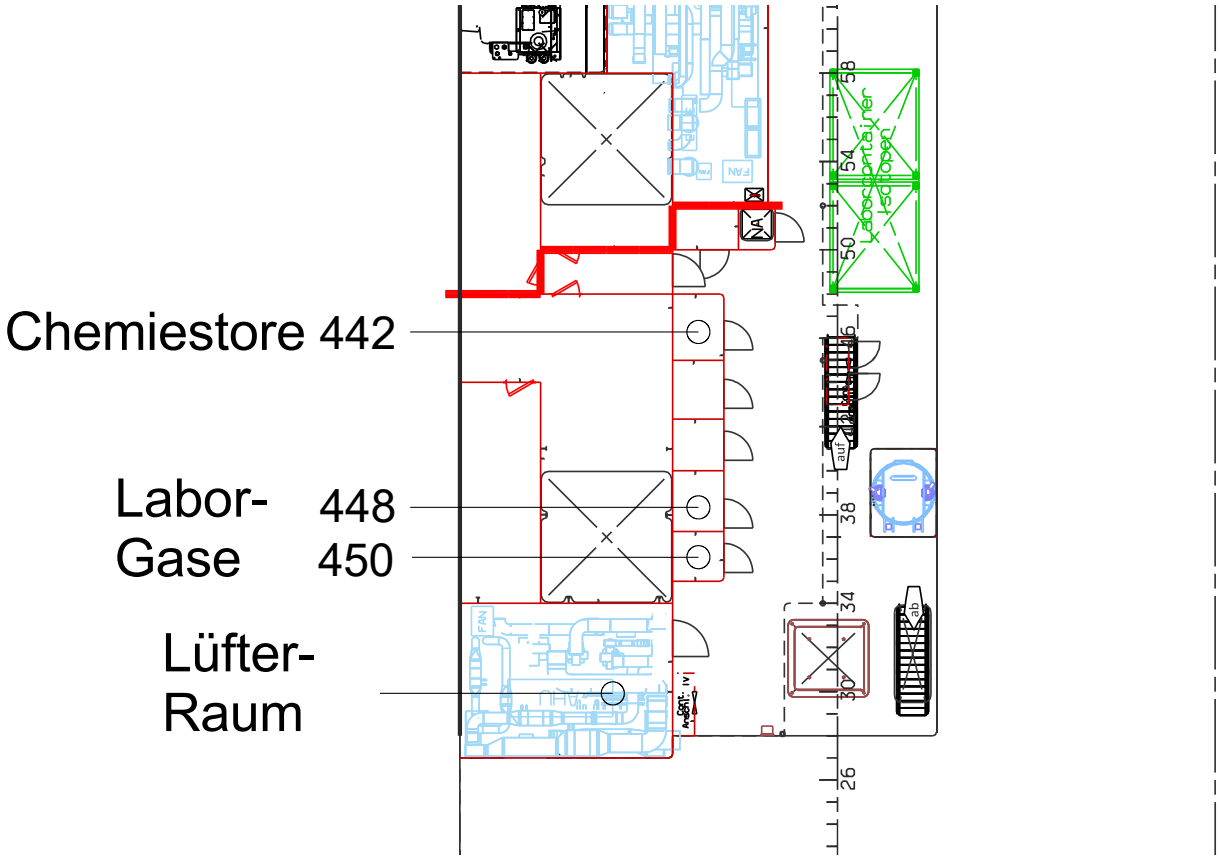
View


Schnitt C-C
Durchführung fliegende Verkabelung
Temperatursensor
Druckausgleichsventil
C-Schiene (Wand)
C-Schiene (Wand)
Kühlraumtür
Holzeinlage für Schwerlastregal
200mmx200mmx85mm
Gassensor
MP-DS


Schnitt D-D
C-Schiene (Wand)

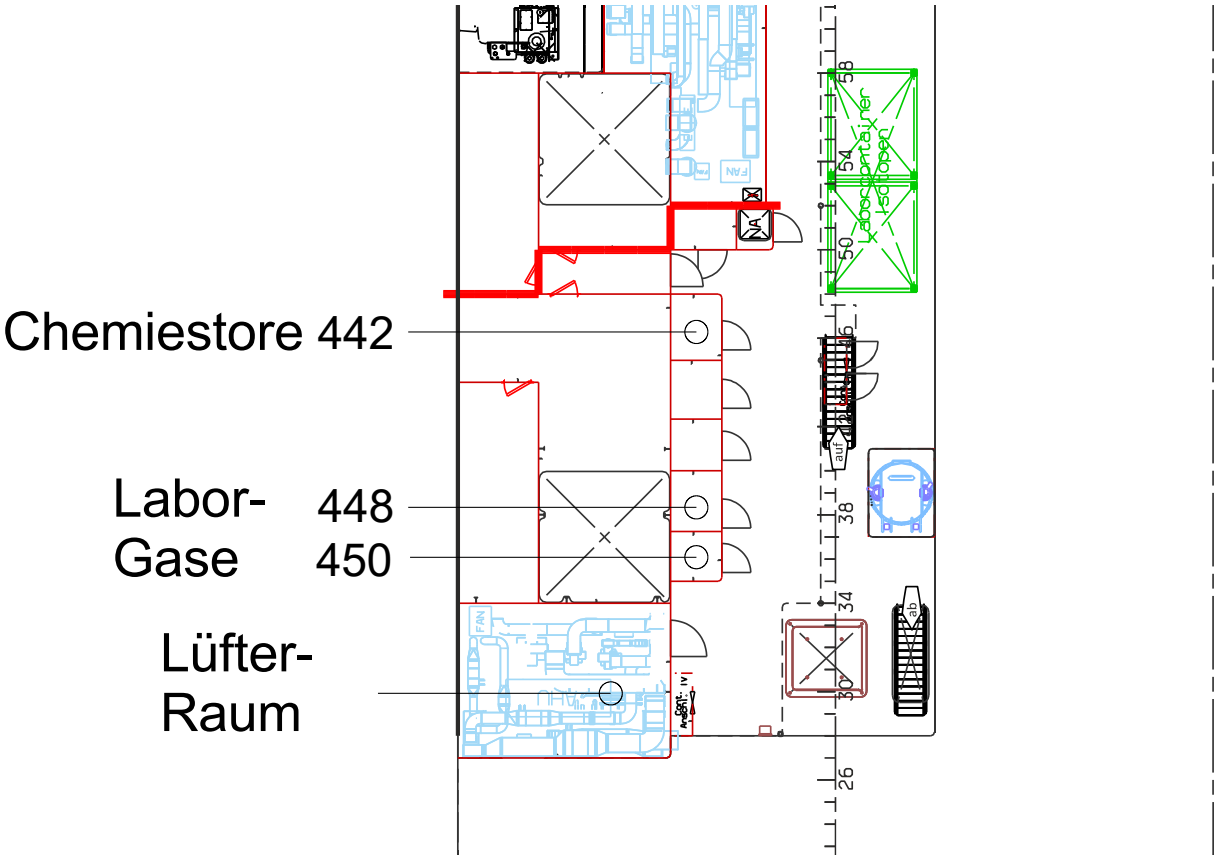
9.3. Laboratory gas storage

Location	Deck 04 (1. Structure deck), Frame 35 – 40
Room-No.	448; 450
Phone	
Room size	
Door width	0,85 m



9.4. Chemistry Store

Location	Deck 05 (2. Structure deck), Frame 45 – 52
Room-No.	552; 554; 556
Phone	
Room size	4,7 m²; 3,1 m²; 3,9 m²
Door width	0,85 m



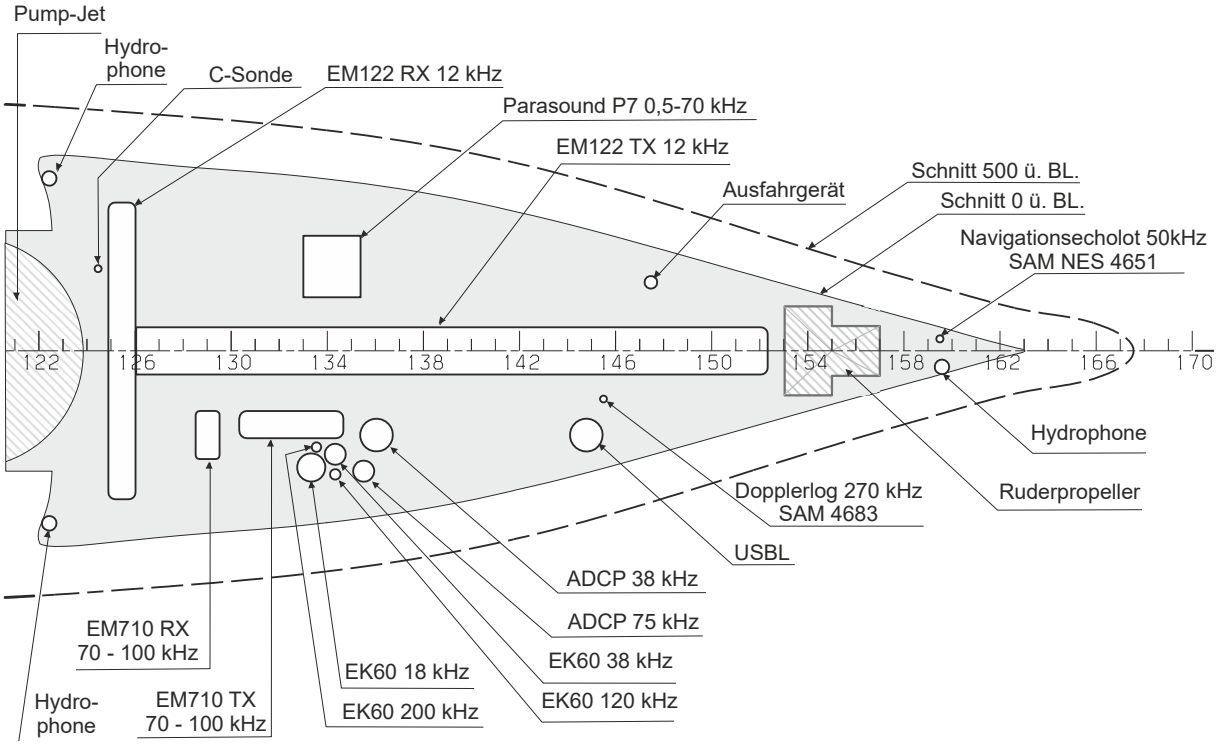
10. Hydroacustic Systems

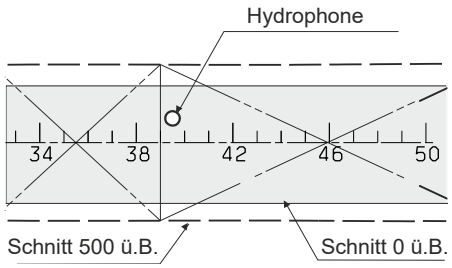
10.1. Overview

Permanently installed hydroacoustic systems

- Atlas PARASOUND DS P-70
- EM 122 Multibeam echo sounder - Kongsberg Maritime
- EM 710 Multibeam echo sounder - Kongsberg Maritime
- EK60 - Echo sounder for fisheries research - Kongsberg Maritime
- RD Instruments Acoustic Doppler Current Profiling / ADCP
- USBL / IXBLUE
- Dual-axis doppler speed log SAM 4683
- Atlas Navigations-echo sounder NES 4651
- EA 640 Intrinsic level measuring system

The data necessary for the operation of the Hydrographic tubes-acoustic systems converter (transmitter, receiver, processing electronics) are installed in the echosounder room. The operation is the navigation solders is from the bridge, the scientific plummets installed in scientific work area workstations.





10.2. Atlas PARASOUND DS P-70

The Parasound DS P-70 is a parametric deep-sea sediment echosounder.

Manufacturer	ATLAS HYDROGRAPHIC GmbH D 28211 Bremen, Germany http://www.teledynemarine.com
Depth range	10 m (under keel) – 11.000 m
Penetration depth	until 200 m depending on environmental conditions and sediment
Maximum pulse power	70 kW
Opening angle	4,5° x 5,0° (along x transverse)
Frequenzbereich:	
High frequency	18 – 33 kHz
Parametric frequency	0,5 – 6,0 kHz
Pulse length	0,17 – 25 ms

Features:

- Multi-pulse operation
- Multi-Beam ability
- **No** unmanned operation
- Water column analytical
- Barker, chirp or user-defined pulses

Motion stabilization:
- Roll ± 15°
- Pitch ± 10°
- Yaw ± 10°
- Heave Korrektur

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

For more information, see http://www.teledynemarine.com

10.3. EM 122 multibeam echo sounder - Kongsberg Maritime

The EM 122 multibeam echo sounder is for the areal hydrographic surveying in deep waters.

Manufacturer	Kongsberg Maritime AS NO-3601 Kongsberg, Norway http://www.km.kongsberg.com
Beam-Opening Angle	0.5°x1°
Amount of Soundings per Beam	432
Max. Amount of Beams per Ping	2
Max. Amount of Soundings per Ping	864
Opening angle	max. 150°
Beam width	6 x depth, max 30.000 m, depentend on seabed
Main Frequency	12 kHz Frequencies in range 10.5 to 13.5 kHz are used to encode the various transmit sectors
Motion stabilization	- Roll ± 15° - Pitch ± 10° - Yaw ± 10° - Heave Korrektur
Pulse-Form	CW and FM
Pulse-Length	2ms, 5ms and 15ms CW as up to 100ms FM

System	SL	NF1	PL@NF1	NF2	PL@NF2
Source level					
EM 122/124 0.5°	245	3.5 m	207	1749 m	180
Pressure level					
EM 122/124 0.5°	207	203	192	182	1331 m

For more information, see http://www.km.kongsberg.com

10.4. EM 710 multibeam echo sounder - Kongsberg Maritime

The EM 710 multibeam echo sounder is for the areal hydrographic surveying in waters up to 2,000 meters.

Manufacturer	Kongsberg Maritime AS NO-3601 Kongsberg, Norway http://www.km.kongsberg.com
Depth range	3 m (unter Schwinger) – 2.000 m
Number of Beams	288
Opening angle	max. 140°
Beam width	5,5 x depth, max 30.000 m
Frequency	70 - 100 kHz
Motion stabilization	- Roll ± 15° - Pitch ± 10° - Yaw ± 10° - Heave Korrektur

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

For more information, see http://www.km.kongsberg.com

10.5. EK60 - Echo sounder for fisheries research - Kongsberg Maritime

The Simrad EK60 is a scientific echo sounder, mainly for the Fisheries Research and analysis of the water column.
The operation can be carried out with up to seven frequencies in the range 18 to 710 kHz simultaneously.

Manufacturer	Kongsberg Maritime AS NO-3601 Kongsberg, Norway http://www.km.kongsberg.com

Features:
- High dynamic range
- Raw data storage
- Low self-noise
- High ping rate
- Multi-frequency application for species identification
- Simultaneous transmission of all frequencies
- Remote control
- Storage and retrieval of personal settings
- Data server interface for raw data recording

For more information, see http://www.km.kongsberg.com

Note on calibration:

A basic calibration of the system was carried out when the ship was commissioned in 2014.
For a voyage-specific calibration, special setting parameters tailored to the measurement campaign must be known, which are used to calibrate or set the system.
The calibration is time-consuming (plan one day) and can only be done in port under optimal sea conditions and must be carried out by the user with the appropriate know-how.
The necessary calibration equipment (balls and rods) are on board.

10.6. RD Instruments Acoustic Doppler Current Profiler / ADCP

The RD Instruments Acoustic Doppler Current Profiler (ADCP) Type Ocean Surveyor measures using the Doppler effect, the flow profile of the water column (direction and speed) from the moving ship.
There are each a 38 kHz and 75 kHz ADCP installed.

Manufacturer

Teledyne RD Instruments
Poway, CA 92064 USA
http://www.rdinstruments.com

	38 kHz Range	38 kHz Precision	75 kHz Range	75 kHz Precision t
Long Range Mode	800-1000 m	20 cm/s	560-700 m	16 cm/s
High Precisions Mode	730-780 m	10 cm/s	350-450 m	7 cm/s

For more information, see http://www.rdinstruments.com

10.7. USBL Sonardyne RANGER 2 ACOUSTIC POSTIONING SYSTEM

Ranger 2 is an acoustic Ultra-Short BaseLine (USBL) positioning system for tracking underwater targets over long distances in the deep sea. The system calculates the position of an underwater target, e.g. an ROV, by measuring the distance and bearing from a transmitter-receiver mounted on the ship to an acoustic transponder on the target.
The positions of multiple underwater targets at different water depths can be detected virtually simultaneously.

Manufacturer Sonardyne International Limited
Blackbushe Business Park | Yateley | Hampshire GU46 6GD | UK
https://www.sonardyne.com/ for further information

Properties

depth of deployment:	6000m
accuracy:	0.2% of 'slant range' (2 m at 1000 m object distance (transponder) to the Sonardyne transmitter under optimal conditions
Position-Update-Rate:	1 second, regardless of the water depth
Ausgabe-Telegramme:	Industrie Standard (NMEA0183, binary), u.a.: • $PSONLLD - Sonardyne Lat, Long, Depth Report • $PSONALL - Sonardyne General Position Report

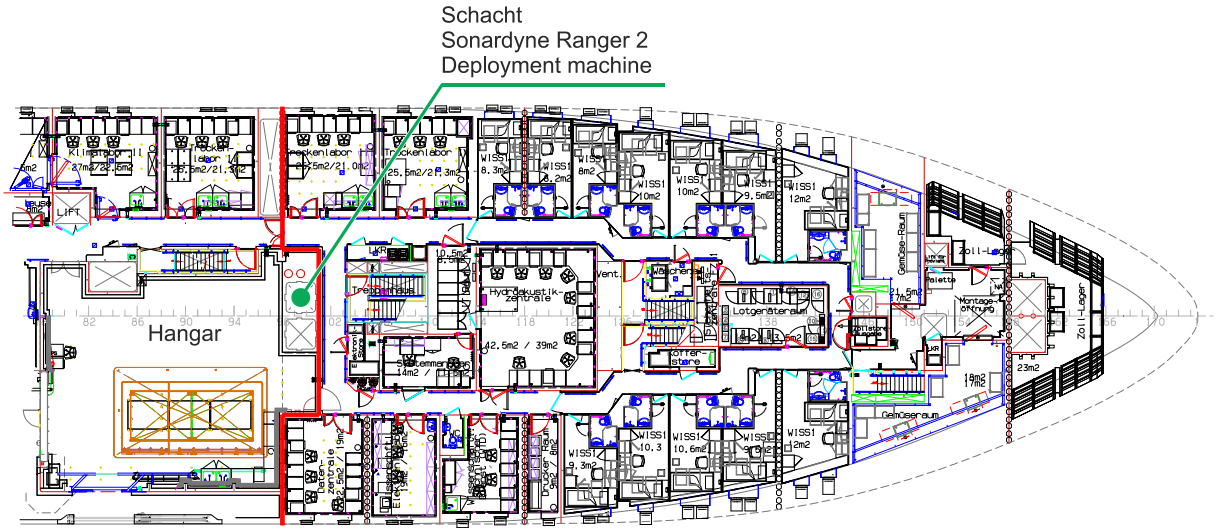
10.7.1. Gyro USBL Transceiver (Transmitter/Receiver)

The Sonardyne Ranger 2 transmitter/receiver is permanently mounted on an extension device and is extended downwards beyond the ship's hull when in use. The end position of the active transducer surface is approximately 2.6 m below the ship's hull.

The following image shows the transceiver being extended in the shipyard.

When extended, the ship's speed is limited to 7 knots.

The acoustic transmitter/receiver combo, including the deployment device, is on the port side next to the big hydrographic shaft.



10.7.2. Sonardyne Surface Equipment

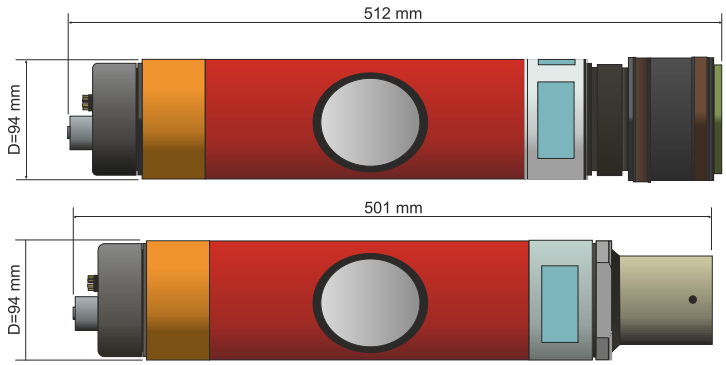
Lfd.-Nr.	Stock Code	
1	8026-300	Marine Computer
2	8098-000-02	NSH - Navigation Sensor Hub
3	8142-000-01	HPT 7000 Gyro USBL Transceiver
4	8315-000-0002	iWAND (HPR) PORTABLE TESTER

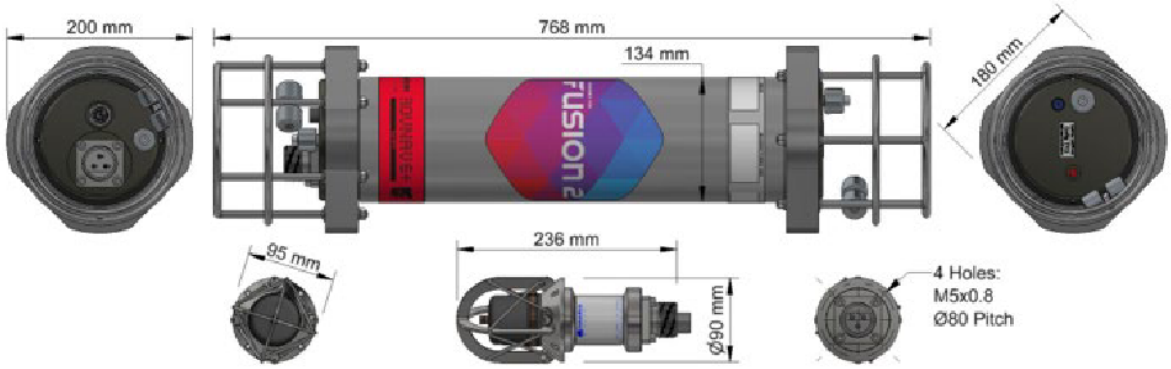
10.7.3. Sonardyne Subsea Equipment (Transponder)

Lfd.-Nr.	Typ	Stock Code	Transducer	Housing Rating	Battery
1	WMT6	8190-000-7211	MF Omni	7000m	Li-Ion rechargeable
2	WMT6	8190-000-7211	MF-Omni	7000m	Li-Ion rechargeable
3	WMT6	8190-000-7212	MF Directional	7000m	Li-Ion rechargeable
4	WSM6+	8370-000-4112	MF Directional	4000m	NiMH rechargeable
5	RovNav 6+	8310-003-02	MF Omni	7000m	Li-Ion rechargeable
6	RovNav 6+	8310-00302	MF Omni	7000m	Li-Ion rechargeable

10.7.4. The dimensions of the WMT6 transponders

- (MF Directional, top)
- (MF Omni, bottom):
- (MF Omni, extended, down)

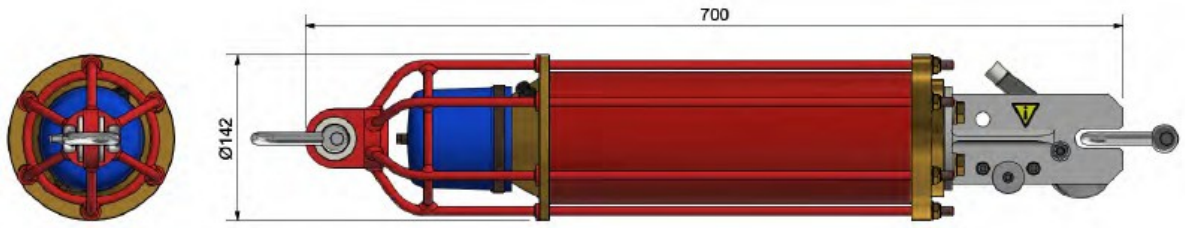




10.8. On-board Releaser

Two releaser types are available for the Sonardyne Ranger 2 system.

Typ: RT6-6000 LMF release



Weight in Air / Water:	20 / 15kg
Working Load Limit (4:1):	1275kg
Proof Load:	2550kg
Breaking Load:	5100kg
Maximum Safe Release Load:	1700kg

There is also the following equipment available on board:

1 x Recoverable Releaser
Manufacturer: IXBLUE
Type: RT 861 CS-R-TR
Weight: 26.5 kg
Weight in water: 18.5 kg
SWL: 2,500 kg
RL: 500 kg

Attention: This releaser cannot be interrogated or controlled by the Sonardyne system.

The IXBLUE releaser can only be triggered via the vessel's own hydrophone using a release unit brought by the scientific party (backup option for deployed IXBLUE or KUM releasers).

10.9. Dual-axis doppler speed log SAM 4683

The SAM 4683 is a dual-axis doppler speed log.
It is part of the ship's navigation system.

Manufacturer	SAM Electronics GmbH Products Automation, Navigation and Communication D-22763 Hamburg, Germany http://www.sam-electronics.de
Bottom Track: Speed over ground	1 –150 m
Water Track Speed through the water	from 3 m below keel
Speed measuring range	along: ± 40 kn transverse: ± 40 kn
Opening angle	3 x 5,3°
Frequency	270 kHz
Transmission power	up to 100 W (adjustable)
Installation location	Frame 145 Stb

The control panel is located on the bridge, repeater via the DVS DSHIP

For more information, see http://www.sam-electronics.de

10.10. SAM Navigational echo sounder NES 4651

The SAM navigational echo sounder NES 4651 is the water depth measurement.
It is part of the ship's navigation system.

Manufacturer	SAM Electronics GmbH Products Automation, Navigation and Communication D-22763 Hamburg, Germany http://www.sam-electronics.de
Depth range	0,5 – 2.000 m ± 1%
Frequency	50 kHz
Transmission power	up to 1000 W RMS (adjustable)
Installation location	Frame 159 Stb

The control panel is located on the bridge, repeater via the DVS DSHIP

For more information, see http://www.sam-electronics.de

10.11. Hydrophone

Manufacturer

Kongsberg Maritime AS
NO-3601 Kongsberg, Norway
http://www.km.kongsberg.com

S4009isc
Low noise hydrophone

KONGSBERG

Frequency range from 1 to 90 kHz
Low noise
High performance
Titanium housing
High dynamic range
Low self noise

Description
The S4009isc is an integrated underwater acoustic hydrophone system.
The hydrophone is designed with a 1-inch spherical sensor unit, and offers integrated pre-amplifier and cable driver circuitry.
The hydrophone housing is made of Titanium.
The interface is made using a 7-pin M-Series flange receptacle.
The S4009isc is available in two versions.
- with a bulkhead mounting plate,
- with a cable penetrator.

The S4009isc offers a high dynamic range. It uses balanced differential signal transmission, this allows you to use long low capacitance cables.
The self-noise of the S4009isc is very low, well below Wenz' minimum in the frequency range from 6 Hz to 90 kHz.
For calibration purposes, the S4009isc has a built-in calibration- and test input.

Technical specifications

- Supply voltage: 18 to 30 Vdc
- Quiescent current drain: 70 mA
- Supply protection: Diode protection for reversed polarity and overvoltage
- Output protection: Sustains shorting of either output lead
- Sensitivity referred to output: -157 dB rel. 1 V/µPa (@ 1 kHz and with high Z load)
- Output impedance: 110 Ω
- Frequency range: 1 Hz to 90 kHz (±2 dB)
- Calibration input signal: Balanced with respect to ground
- Calibration input impedance: 1 kΩ
- Calibration input gain: -11 dB (@ 1 kHz)
- Maximum recommended operational depth: 1000 m
- Mechanical dimensions (including connector):
- Length:24 cm
- Diameter: 4.3 cm
- Material in housing: Titanium, grade 2
- Material in connector shell (Souriau): Nickel aluminium bronze
- Insulation material over sensor: Neoprene rubber

11. Data Management

11.1. Networks and Servers

The on-board network is a star, "switched ethernet" on FOC basis.
The physical interface to the desktop PC is an RJ45 socket, the connection cables according to standard CAT5.
The network is divided into four sub-secured networks:
- Sensors
- MDS (measurement-data-server internally)
- Ship management
- Science

The following network services are available:
- DHCP
- DNS
- File Server services

The central database system is that of the company "WERUM Software & Systems AG" developed DavisShip system (short form, DSHIP 'or colloquially, DVS').
The DSHIP system consists of a powerful server with software for data import / export, back-up and management of networks. The server components are redundant to minimize data loss and worked in a client / server structure.

Wi-Fi is available in individual areas. Information is provided by the WTD on site.

11.2. Data acquisition and sensor systems

On the ship's sensors are installed to detect navigational, meteorological, hydro-acoustic and ship-specific data.
The list of sensors is "sensors" included in the Annex.

Standard interfaces of the sensors:
- NMEA 0183
- NMEA 2000
- LAN (TCP / IP and UDP)
- Device-specific serial ports

Serial data is converted by means of distributed on-board terminal servers and transmitted over the LAN interface to the server.
Sensors with a LAN interface (TCP / IP or UDP) to pass the data directly over the network their data to the server.

11.3. 11.3. Data processing

- The data collected will be converted according to specific configuration in the actual measured parameter.
- Calculation of additional data derived from the measured variables
- Plausibility check with appropriate error status information from the sensors
- Preparation of data for online viewing
- Preparation of data for the standard and custom data export

11.4. Data distribution

11.4.1. Online-data in the laboratories

In the laboratories of the NMEA strings RMC, ZDA, PSXN23 and the 1 PPS signal in real time are available.

RMC - Recommended Minimum Navigation Information

```
                                                                12
        1          2 3        4 5         6 7   8   9    10  11|
        |          | |        | |         | |   |   |    |   | |
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxx,x.x,a*hh<CR><LF>
```

Field Number:
1) UTC Time
2) Status, V = Navigation receiver warning, P = Precise
3) Latitude
4) N or S
5) Longitude
6) E or W
7) Speed over ground, knots
8) Track made good, degrees true
9) Date, ddmmyy
10) Magnetic Variation, degrees
11) E or W
12) Checksum

ZDA - Time & Date - UTC, day, month, year and local time zone

```
        1          2  3  4    5  6  7
        |          |  |  |    |  |  |
$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>
```

Field Number:
1) Local zone minutes description, same sign as local hours
2) Local zone description, 00 to +- 13 hours
3) Year
4) Month, 01 to 12
5) Day, 01 to 31
6) Universal Time Coordinated (UTC)
7) Checksum

PSXN23 – Roll, Pitch, Heave, Motion-Sensor MRU-5 im Binär-Format

Seatex MRU: EIVA 203
“q<length><type><RRRR><PPPP><HHHH>C” q is ASCII and the rest binary coded. RRRR and PPPP are given in radians and heave in m. As default roll is read from byte number 3, pitch from number 7 and heave from number 11. If needed, this can be changed in the INI file, where MRUrollIndex says where to find roll etc.

The EM attitude format is a 10-bytes long message defined as follows

- Byte 1: Sync byte 1 = 00h, or Sensor status = 90h-AFh
- Byte 2: Sync byte 2 = 90h
- Byte 3: Roll LSB
- Byte 4: Roll MSB
- Byte 5: Pitch LSB
- Byte 6: Pitch MSB
- Byte 7: Heave LSB
- Byte 8: Heave MSB
- Byte 9: Heading LSB
- Byte 10: Heading MSB

where LSB = least significant byte, MSB = most significant byte.
All data are in 2' s complement binary , with 0.01_ resolution for roll, pitch and heading, and 1 cm resolution for heave.

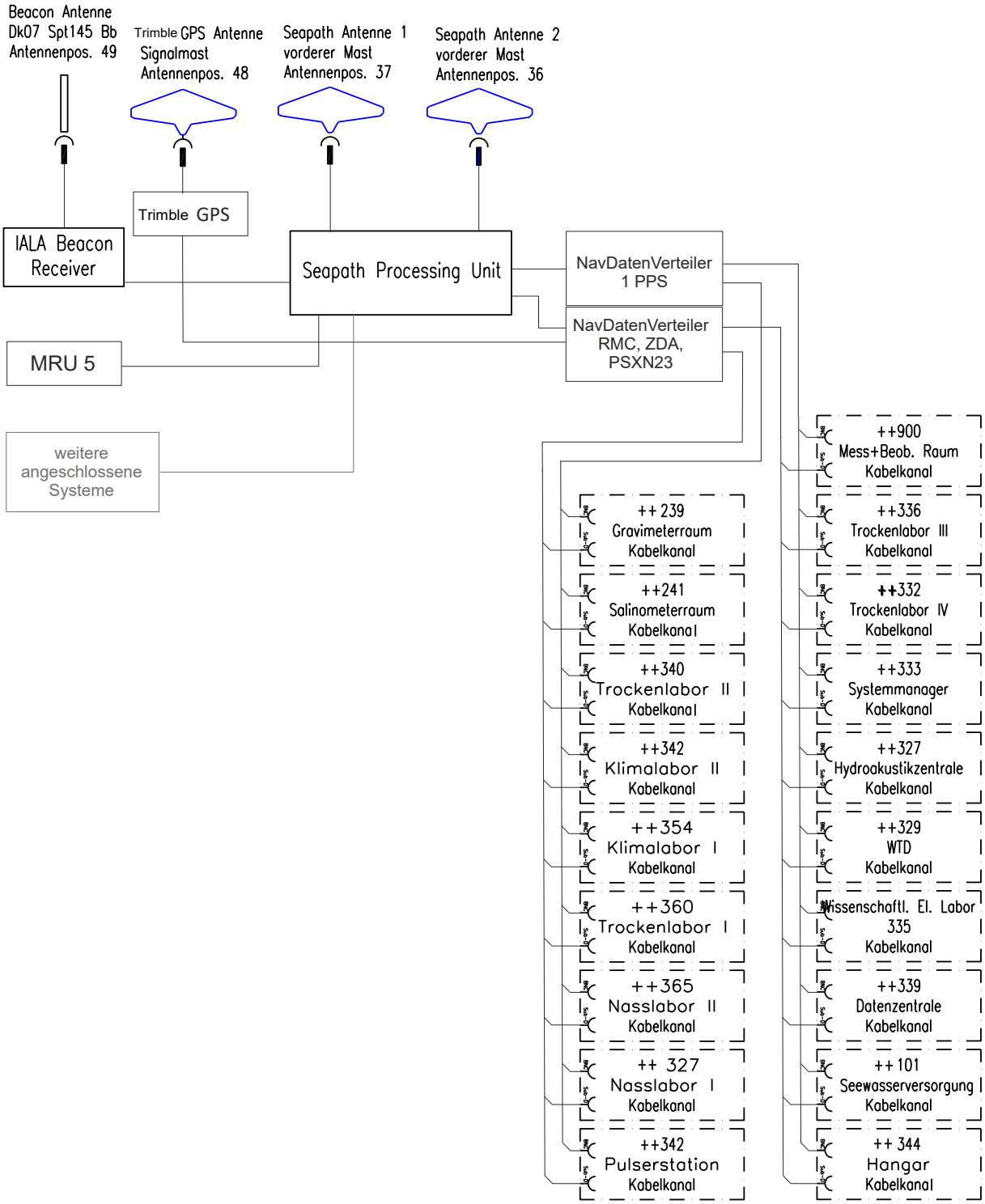
- Roll is positive with port side up with ±179.99_ valid range
- Pitch is positive with bow up with ±179.99_ valid range
- Heave is positive up with ±9.99 m valid range
- Heading is positive clockwise with 0 to 359.99_ valid range.

Non-valid data are assumed when a value is outside the valid range.
The first synchronisation byte always assumed to be zero. The sensor manufacturers have been requested to include sensor status in the format using the first synchronisation byte for this purpose.
It is thus assumed that

- 90h in the first byte indicates a valid measurements with full accuracy
- any value from 91h to 99h indicates valid data with reduced accuracy (decreasing accuracy with increasing number)
- any value from 9Ah to 9Fh indicates non-valid data but normal operation (for example configuration or calibration mode)
- and any value from A0h to AFh indicates a sensor error status

Interface	RS422 -- 9600,8,N,1
Connector	D-SUB 9F
	Tx+ pin 2
	Tx- pin 5
1-PPS	H/L-edge 5V at 50 Ohm
Connector	BNC socket, 50 Ohm

11.4.2. Schematic representation of the navigation data online distribution



11.5. Online presentation

The data displayed by the system are the representation of all detected by the system and the currently edited data. They are scientists and crew alike available to visualize individual requests for information.

The online display consists of a fixed configuration and several pre-configured display windows. Furthermore, an individual design of the display surface part of the online display.

Fixed display

Independently of the selected display format, the following values are displayed continuously in a fixed configuration display window:
Vessel name, call sign, time with reference date (UTC), Text Travel, Travel-key data, waypoint number. at TTG / time to go) and ETA as well as information about the print / log and data recording status.

Preconfigured display window

Individual display window
For customizing the display surface is a pool of various display screens as templates with alphanumeric and graphic displays are available, whose fields can be assigned to different channels

The free creation and editing of any number of display and print formats is done using the available digital measurement values including their graphical representation (bar chart, line chart, compass, direction / push-representation, track representation with coast lines, etc.) and free text blocks and frames. The digital measurement values are displayed with a measured value identifier, the actual measurement value and a unit. The respective display properties, such as font size, color identification / measurement / unit or background color can be selected freely.

Selection of some display modes:
- Up to three arbitrary measurement values in a line chart over a selectable time period from 1 minute to 24 hours, with the "past" values from the corresponding database are inserted automatically.

- Map display with / without coastlines worldwide in the following view:
- Fixed map
- Ship's position always in center
- True Motion presentation with map change at 80% by extended display area
- Automatic map zooming in meaningful different standards when traveling on a target point with representation from each bearing and distance
- Manual adjustment of the scale

- STATIONS display in the following view:
- Target in image center
- Ship in center
- Expected based
- Scale representation of the ship contour based on the Centre Of Gravity

- The configured display surfaces (. Masks templates including channel occupancy) can be stored.

- The mapping between mask position and channel / sensor at any time and at run-time dialog. The default assignments are stored in configuration files.
- Same masks can be used multiple times, with different channel assignments used.
- An individual mask selection and channel assignment must be saved under its own user account and reloaded. This user profile is then used as a standard or startup layout.
- The display tool has not only a gradual dimming day / night switching.
- There can be several display tools simultaneously and on different machines in operation. The individual windows can be displayed as icons and continue to receive the current values for display..
- The windows are resizable. There are limits to a minimum size, which is defined by the type and number of display objects and the font.
- The indicated values give the user any time the status (existence, validity, results of the plausibility check). This is done via color coding or graying of values.
- The operation of the display system is possible with both mouse and keyboard (function keys).
- All ads may be printed. In addition to a screen print individual windows can be selected and printed separately.

11.6. Data export

Online data interface

- The system provides configurable interfaces to the users to define their own NMEA - allows similar telegrams.
- The configured telegrams can be sent via TCP / IP and UDP.
- The transmission interval of these messages is configurable.
- The Telegram processes one or more times can be started on one and / or on different computers.
- Video images of scientific equipment (e.g. from ROV) and the vessel monitoring system can be displayed on all workstations

Offline data extraction

- Data extractions may be initiated by any client workstation.
- Access to the extraction tool via a Web browser.
- In the dialog of the destination files if necessary error responses (eg substitute values), the location and size limitations are the time domain, the channels, the time pattern and the desired data formats specified.
- The actual data extraction is asynchronous, batch oriented to the other user activities or advertisements. About the successful implementation of the selection order, the user will be informed by e-mail.
- As a result of the data extraction a description file with the settings and selections as well as a log file with any error messages are delivered next to the file with the actual values. All results are in ASCII format, so readable form. The values are displayed in tabular form. Each line all values of the selected channels are listed at the relevant time. The values of each line are separated by a definable separator (eg tab). This then allows easy processing of the data analysis tools (eg Excel).
- Export orders can be stored for each user and can be used at a later date from this user again.

11.7. Data backup

To ensure the entire system is a backup/recovery tool implemented.

11.8. Data archiving

- The system copies at regular configurable intervals and the stored sensor data of NMEA telegrams from the ring buffer in its own library devices.
- The archive units are swapped at the end of the journey section as a contiguous data archive on permanent storage medium (eg DVD, Blue-Ray disc, or external hard drive).

11.9. Scientific planning

For the planning and conduct of a research trip is an electronic tool for the station plans prepared.
- The program has an English interface.
- The program dynamically calculated taking into account the configurable ship speed, location and duration of the different planned Inserts the duration required for this purpose.
- The tool visualizes bathymetric maps in different projections and scales.
- The planned route of the expedition is visualized together with the bathymetric map.

11.10. Action Log

Is an electronic logbook available for the documentation of conducted scientific stations.
- The program has an English interface.
- The format of a station ID corresponds to a standardized format, as it is for example used by the DOD or AWI
- The storage of stations is supported by a database.
- Contextual information, such as Time of the station, ship's position, weather data, water depth and ship speed, winch data is received automatically via the DVS system.
- The list of to-use context data corresponding to the already used by AWI or DOD context data.
- Lack of context data can be added manually.
- Stored stations can be exported.
- The export format is used CSV-based and with end users, such as AWI or DOD tuned.
- The exported data is displayed in two lists (station protocol and operations of equipment and winches) as an Excel file

11.11. PC Workstations

Every laboratory has an MS Windows based PC workstation installed.
- DSHIP display
- MS Office package with Word, Excel and PowerPoint
- VLC Media Player
- Mozilla Firefox
- Internet access via C-band

12. Navigation systems

12.1. NACOS Platinium - Navigation and planning system

Manufacturer	SAM Electronics GmbH Products Automation, Navigation and Communication D-22763 Hamburg, Germany www.sam-electronics.de
Model	NACOS Platinium ED 3200 G501

The navigation system "NACOS Platinium ED 3200 G501" consists of three multi-function workstations (MULTI PILOT) with applications for RADAR, ECDIS, web guide and CONNING further two jobs for ECDIS and two CONNING indicators on which, if necessary, the ECDIS will be shown.

Another MULTI PILOT, but without web guide is placed in a separate room (emergency bridge) to allow for failure of the main bridge (eg by fire) the safe return to port function (SRTP).

Each workstation includes a monitor (TFT), an operating unit (rolling ball and keyboard), and a computer for display and is housed in a separate console. The workstations are connected via intelligent node (switch) through an Ethernet ring. By using a special network protocol ensures that, if a ring segment through cable break or node failure, the remaining jobs continue to have connection.

Three radar antennas with integrated transceivers are connected via ethernet to the ring and provide radar images and track data to the four MULTI PILOT. The radar antenna in the front mast is connected to the switch in the equipment room directly with the MULTI-PILOT on the temporary bridge. From there, an emergency operation can be performed on failure of the network ring.

Three sensor data computer DCU 1, DCU 2, and 3 take DPU, parallel navigation on data from two GPS receivers and the Gyro. Furthermore, Doppler log, TV-log, as well as a wind gauge are connected. The sensor data calculator distribute the data in the ring for display on all workstations. The sensor data computers are connected redundantly. If one fails or a sensor fails, it will change automatically to the other. One of these three sensor data computer is on the temporary bridge and is also directly connected to the MULTI PILOT there.

A train management computer (TRACK PILOT) is also connected to the ring and can be selectively controlled by the operator of one of the three MULTI-PILOT. The train management computer receives the data of the next five waypoints from the route planning and controls the rudder accordingly. The route can be created and maintained on each workstation. Typically, this task is, however, on one of the two ECDISPILOTEN provided as a planning machine, done.

A further sensor a AIS transponder is incorporated in the ring network. It provides objective data (position, MMSI, Name, ship type, etc.), which of the ships in the nearby area (typ. 10-20 NM) were sent out via VHF at all jobs. Conversely, the AIS transponder receives the system data of its own navigation system (position, velocity, etc.) for transmission to other ships in the vicinity.

In addition to the above-mentioned Components of the navigation system, which can be found in a similar configuration on other ships, additional features have been incorporated for the R/V SONNE:

1. Track data from an external planning system can be read in XML format.

2. The bearing data of an external radio direction finder are fed through one of the sensor data computer in the Ethernet ring and are available on each workstation.

3. A wave analyzer of the company WAMOS is connected through a firewall to the Ethernet ring and receives raw video from the radar to calculate wave height and direction.

4. Position and depth of unmanned submersibles are supplied as serial telegram on one of the sensor data computer in the Ethernet ring and are available on each workstation.

12.2. Navigation sensors

DGPS 1 (Satellite navigation)	DGPS Antenna. MGL-4, Saab R4 Vers.II, (Deck 10) DGPS NAV Sensor, Saab R4, Version II, (Cards table) (D)GPS NAV Display, Saab R5, (Cards table)	SAAB
DGPS 2 (Satellite navigation)	DGPS Antenna. MGL-5, Saab R6 Vers.II, (Signal mast) DGPS NAV Sensor, Saab R4, Version III, (Cards table) (D)GPS NAV Display, Saab R6, (Cards table)	SAAB
DGPS Hand held	Hand held GPS receiver GPSMap 78s (Bridge)	GARMIN
SAT-Log SAAB R4	DGPS Ant. MGL-4, Saab R4 Vers.II, (Deck 10) DGPS NAV Sensor, Saab R4, Ver. II, (Cards table)	SAAB
magnetic compass	REFLECTA 1 Magnetic compass with magnetic probe	ANSCHÜTZ
Gyro	Gyro Standard 22 (equipment room)	ANSCHÜTZ
Gyro	Gyro Standard 22 (Safety center FZZ Deck 03)	ANSCHÜTZ
Radar 1	14 ft. Antenna;S-Band Signal mast	SAM
Radar 2	8 ft. Antenna;X-Band Signal mast	SAM
Radar 3	5 ft. Antenna;X-Band front mast	SAM
AIS-Transponder	GPS-Antenna Deck 07 UKW-Antenna front mast	SAM
radio direction finder	UKW radio direction finder RT-500-M (Bridge) H-Antenna for UKW radio direction finder RT-500-M (front mast)	Rhotheta
NAVTEX	NAVTEX receiving set (Cards table) NAVTEX-printer 9528 (Cards table)	SAM Japan MARINA
Doppler-Log	SAM 4683 see " Hydroacoustic systems "	SAM
Navigation echo sounder	NES 4651 see " Hydroacoustic systems "	SAM

12.3. Dynamic positioning

Manufacturer	Kongsberg Maritime AS NO-3601 Kongsberg, Norway http://www.km.kongsberg.com
Model	K-Pos DP-11 ans cJoy
Modes	- DP - green DP (positionieren in einem Bereich - Autoheading - Autotrack - Joystick-Operation

12.4. Radio Direction Finder

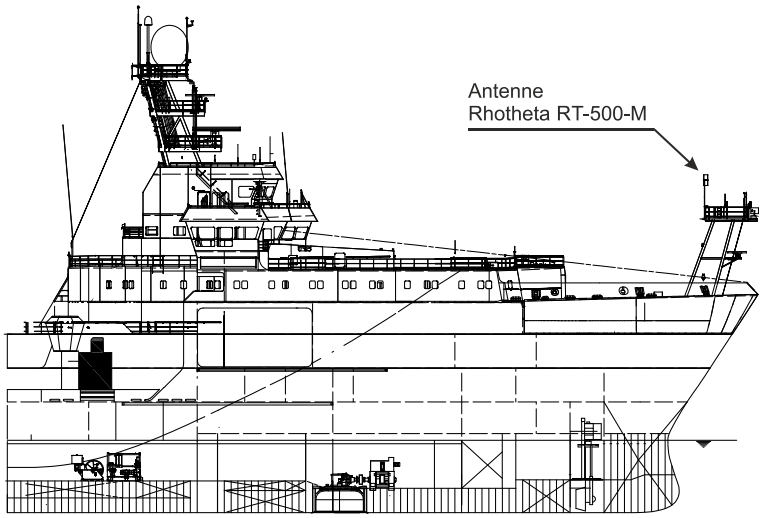
The RT-500-M is a high-performance direction finder. It can locate transmitters in a frequency range from 118 to 410 MHz. The direction determined is referenced to the antenna. One application is locating scientific equipment on the sea surface that is equipped with a corresponding transmitter.

Manufacturer	RHOTHETA Elektronik GmbH Dr.-Ingeborg-Haeckel-Str. 2 82418 Murnau Tel.: +49 88 41 4879 – 0 Fax: +49 88 41 4879 - 15 www.rhotheta.com

Features

- Device: RT-500-M with option F5 (Fast Channel Scan)
- Marine Direction Finder
- Frequency range:
  - 118 MHz – 124 MHz (VHF Air Band)
  - 154 MHz – 163 MHz (VHF Marine Band)
  - 240 MHz – 246 MHz (UHF Air Band)
  - 400 MHz – 406.092 MHz (COSPAS-SARSAT)
  - 406.100MHz – 410 MHz (UHF FM Band)
- Sensitivity
  - VHF Air Band: <=4 µV/m / 2.5 µV/m
  - VHF Marine Band: 3 µV/m / 2 µV/m
  - UHF Air Band: 6 µV/m / 4 µV/m
  - COSPAS-SARSAT: 6 µV/m / 4 µV/m
- Accuracy: <=5° RMS
- Display resolution: 1°
- Detectable modulated signals: A3E, F3E, A3X
- Minimum signal duration: <= 100 ms
- Polarisation: vertical

Antenna position



Control unit

The control unit is installed on the bridge (deck 8) in the main console, on the starboard side.

13. Other equipment and facilities

13.1. Ocean Floor Observation System (OFOS)

System integrator telemetry/electronic components	iSiTEC GmbH Bremerhaven
Conception/manufacture OFOS frame	„*Leitstelle Deutsche Forschungsschiffe*“ on the University of Hamburg
Depth of operation	down to 6000 meters
Connection to ship	over 18mm deep sea wire with combined coax and single mode fiber optic cable
Unit depth control	by lowering and heaving up the wire

UW unit

Dimensions OFOS frame	approx. 1650 mm (l) x 1330 mm (h) x 1250 mm (w)
Power supply	over the 18mm deep sea wire, using the coax cable transfer voltage: 600V AC transfer current: up to 1 A effective power: up to 400VA
Data transfer	over the 18mm deep sea wire using the single mode fiber optic cable Single-Mode-LWL
Video equipment of UW unit	1x SDI HD video camera (1080i, 720p) 1x network HD video camera (optional) 4x UW LED lamps 3x UW point laser
Photo equipment of UW unit	1x still camera (>30 MPixel) 2x flash 3x UW point laser, optional
Distance measurement to the ocean floor	1x altimeter
Sub position measurement	USBL system, SONARDYNE Ranger 2, fixed transponder, with power supply via UW unit

Deck unit

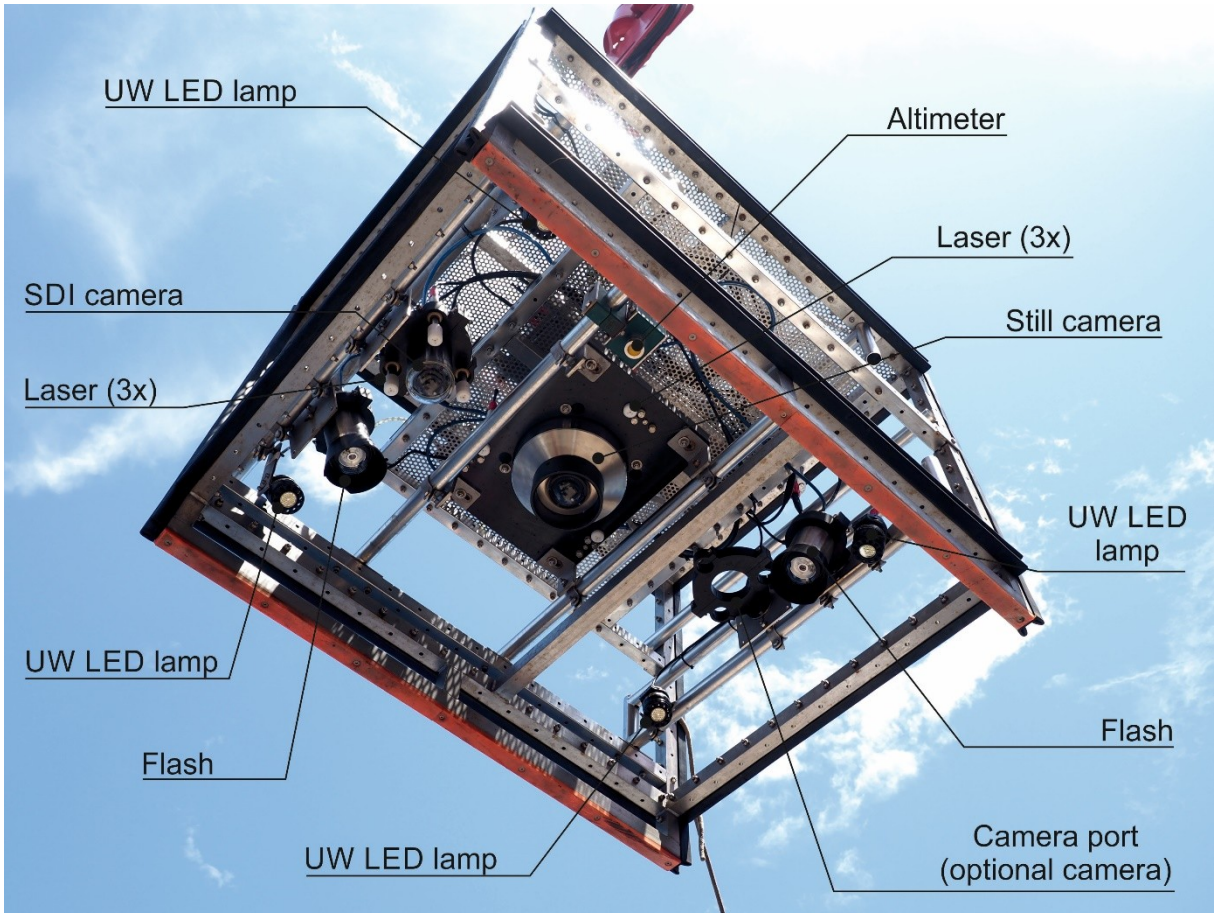
Installation location	Lab 333 „Wissenschaftliches Elektroniklabor“ Rack mounting
Savety precaution	Emergency stop switch, rack mounting Overcurrent protection system Isolation monitor (inner conductor//outer conductor to 3-layer armor)

Equipment of the Lab 333

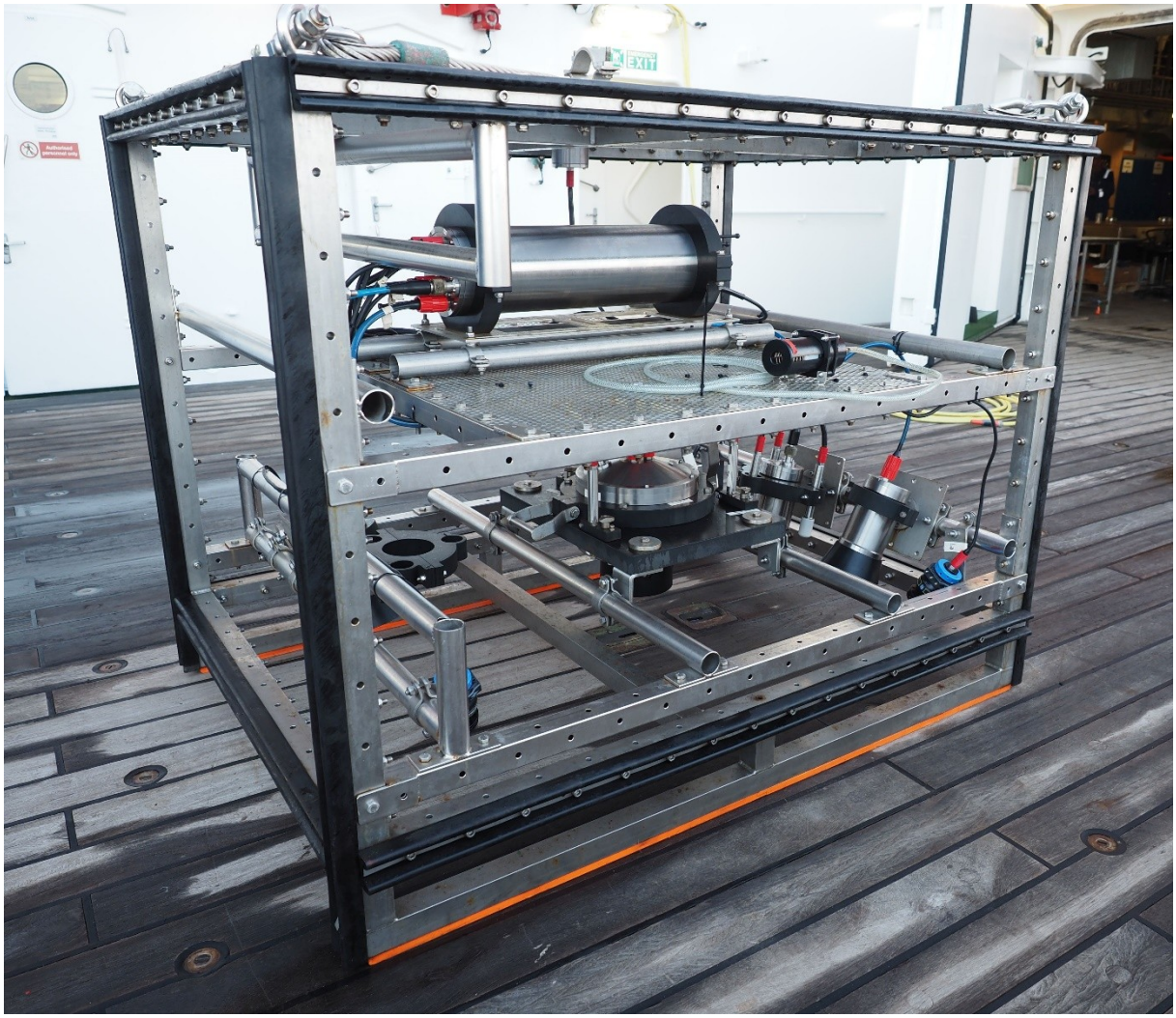
Winch Drivers workplace	1x connection to winch control 1x CCTV display (winch, deck)

	1x altimeter information
Operators workplace	2x operator stations • visualization, control, video and data recording • HD video liveview • HD video broadcast (optional network camera) • HD video recording (HDD) • HD video recording (HDD) with overlayed ships data • housekeeping data (voltages, temperature) • switching of UW LED lamps (ON/OFF) • diming of UW LED lamps • switching of point lasers • altimeter measurements
Photo workplace	1x operator station • live view of still camera • still camera control • manual still camera trigger • intervall control of still camera trigger
Rack	1x OFOS deck unit 2x recorder for video capture video distribution over ships TV network

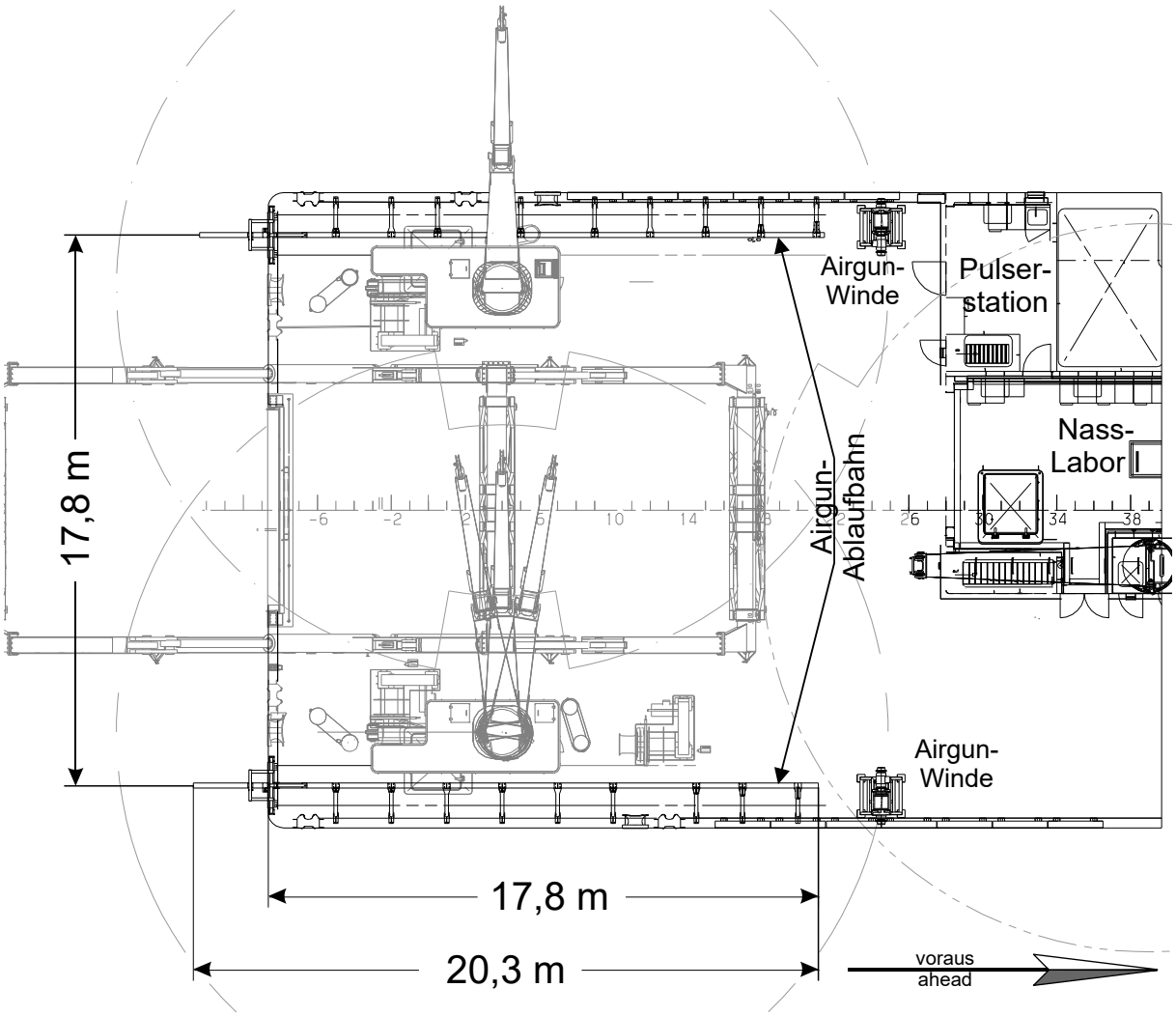
Bottom view of OFOS:



OFOS total view

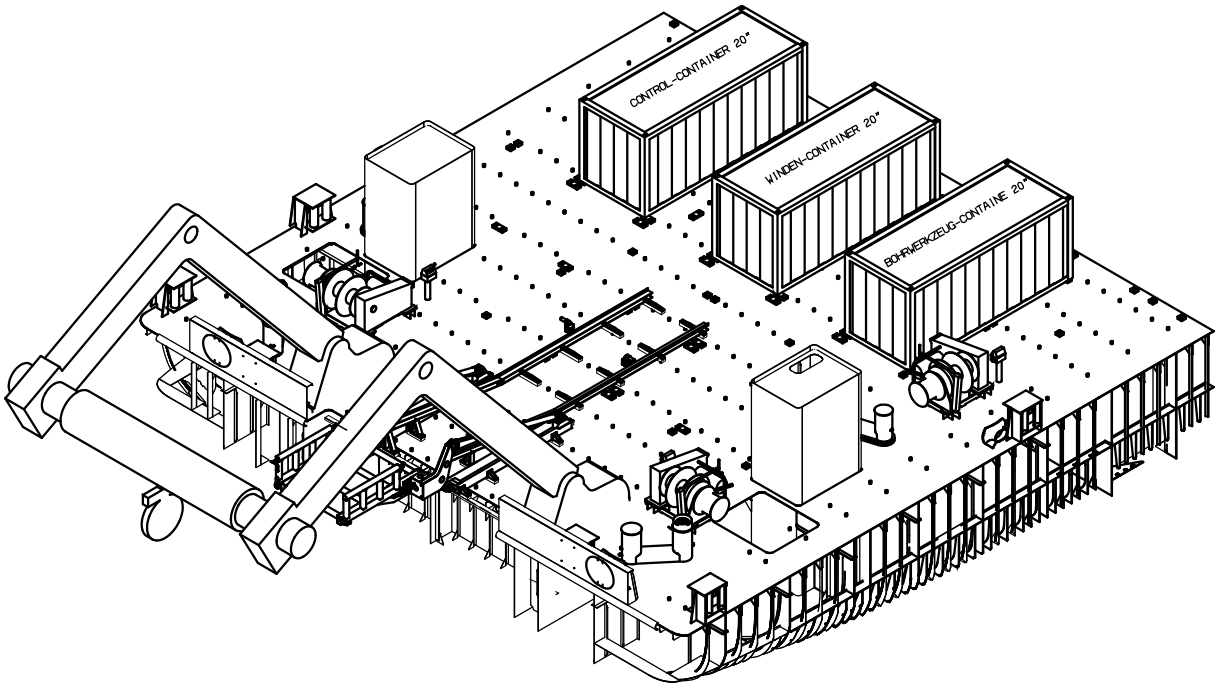


13.2. AirGun deployment rails

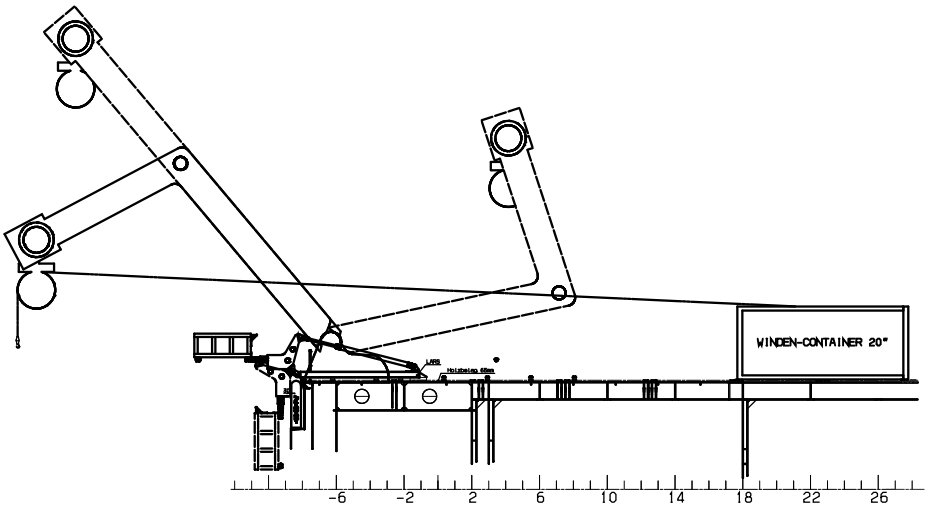


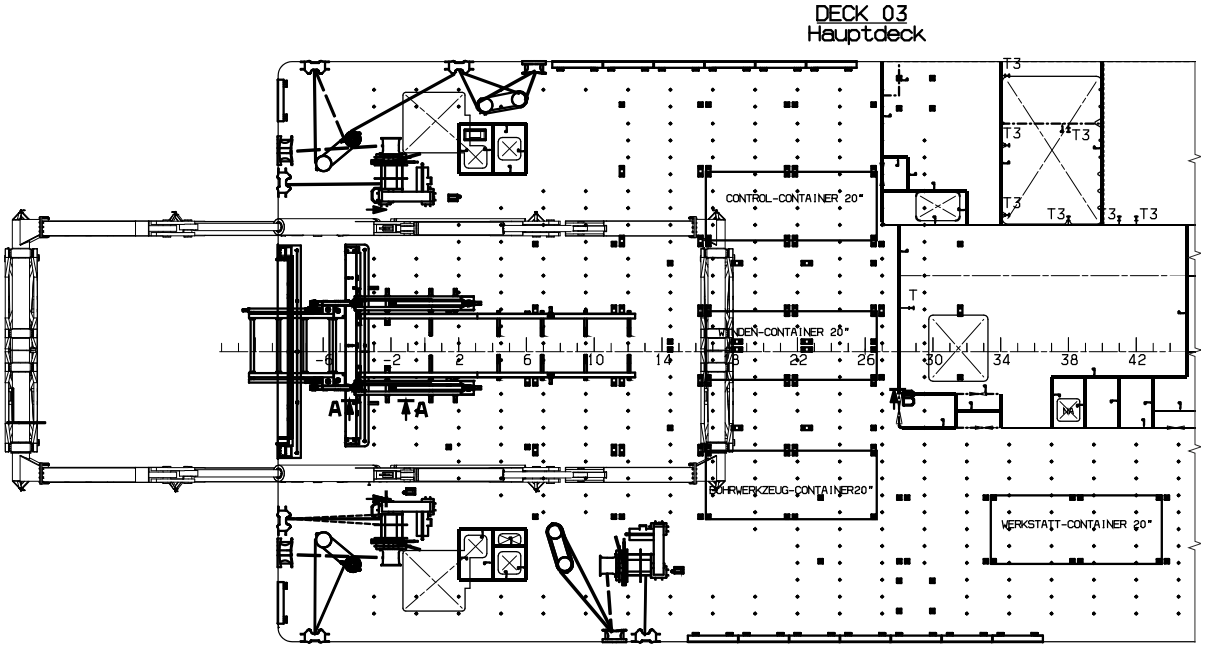
The AirGun winches are portable.
The cranes 3 (StB) and 4 (BB) are designed to outside suitable for towing.

13.3. Arrangement of MEBO 70 and 200



Arrangement MeBo 200 in the area of the A-Frame





Device list MeBo 70 und 200

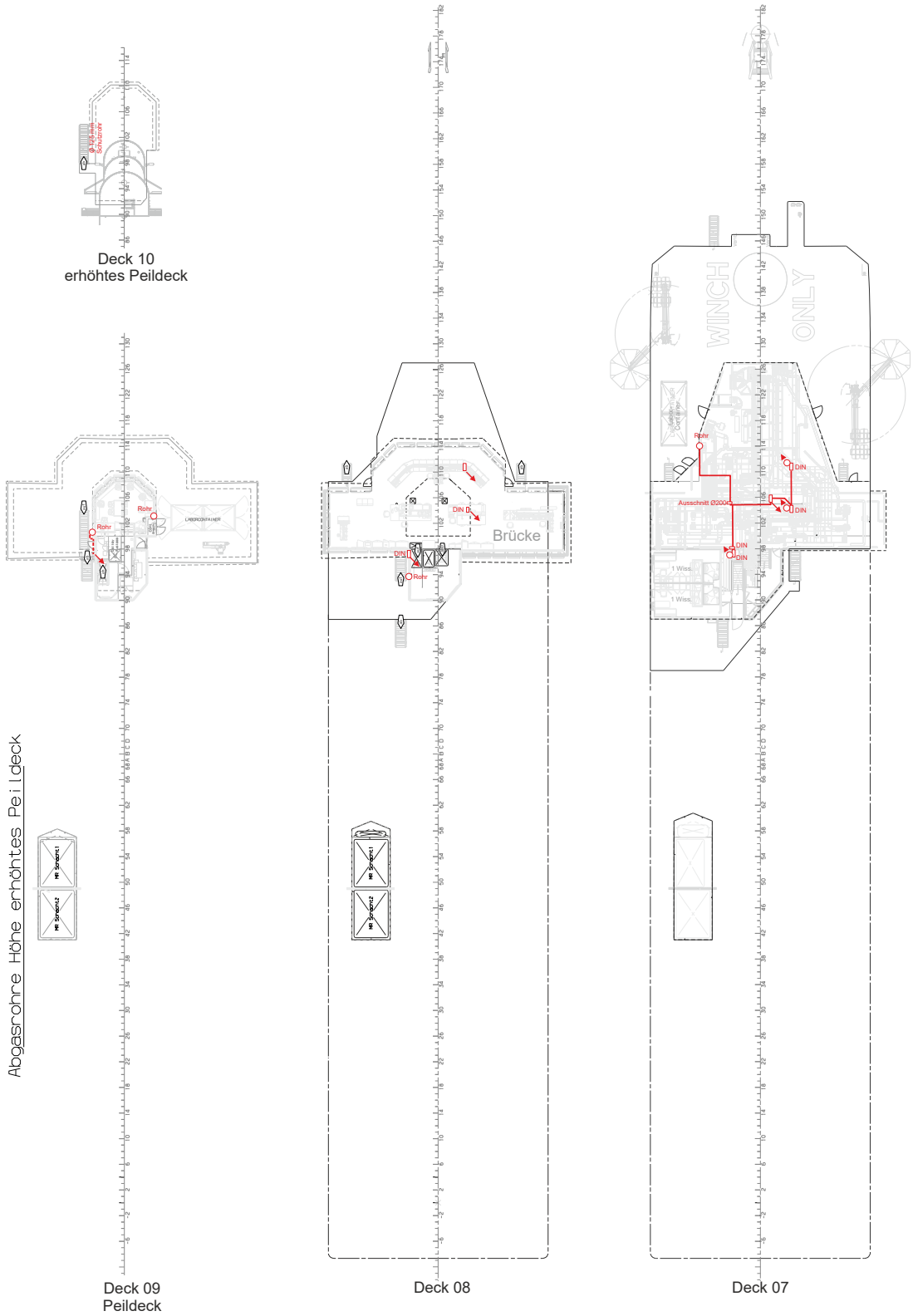
Nr.	Beschreibung	Größe	Gewicht	Stauplatz	Bemerkungen
1	MeBo 200 GEOU100038-7	20'	11 to	HD 360/370	
2	MeBo 200 Winde GEOU100041-1	20'	32 to	HD 330/340	
3	Aggregatecontainer	20'	12 to	HD 334/344	
4	Kontrollcontainer GEOU100039-2	20'	7 to	HD 315/317	
5	MeBo-Werkstattcont. GEOU100036-6	20'	9 to	HD 319/321	
6	Bohrcontainer GEOU100040-6	20'	12 to	HD 333/343	
7	LARS GEOU100040-6	20'	20 to	HD 360/370	Leercontainerauf 319/321 in zweiter Lage

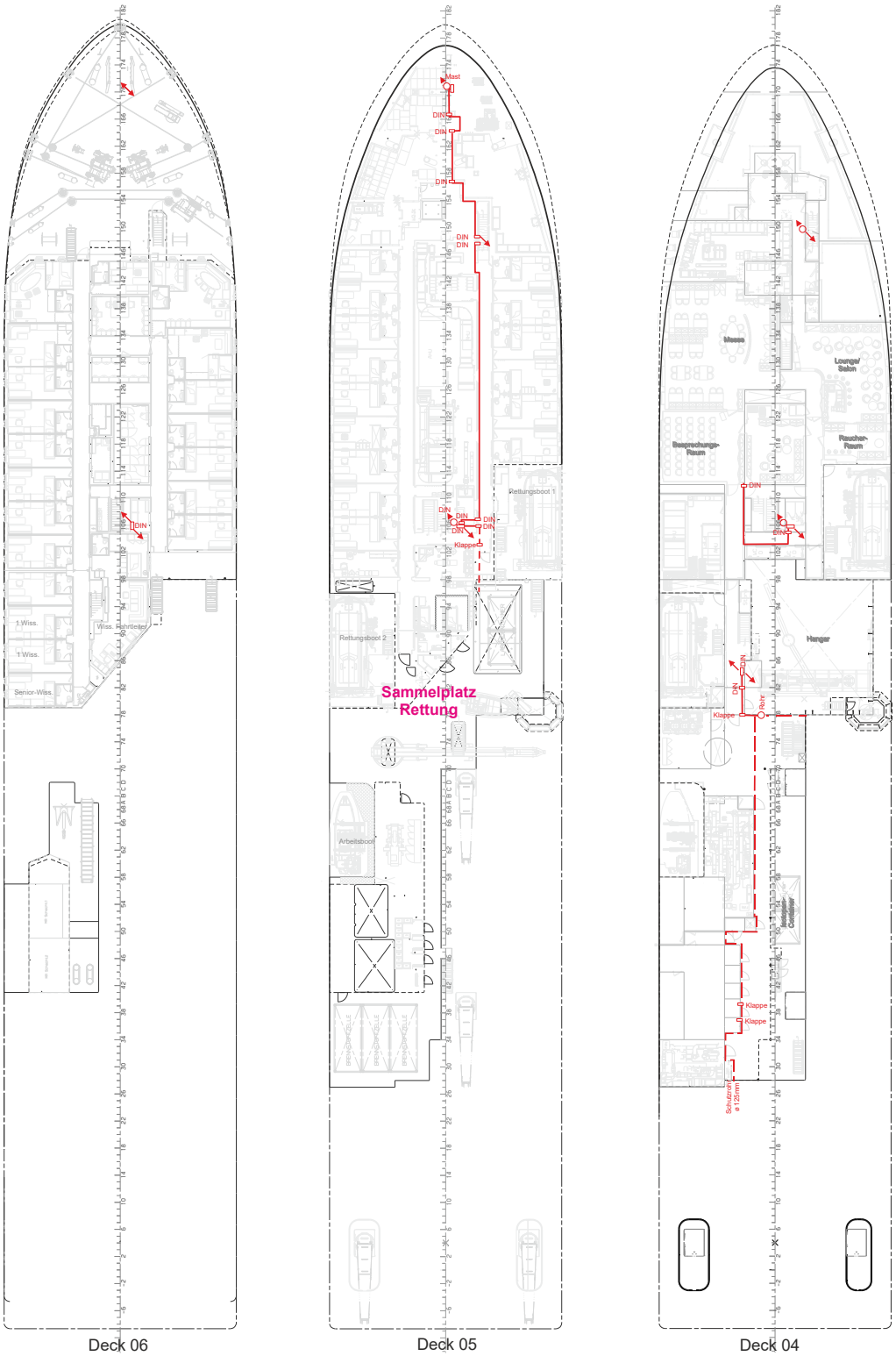
Hinweis: Im Unterschied zu MEBO 200 entfällt bei MEBO 70 der Aggregatecontainer (Nr. 3).

13.4. Flying cabling

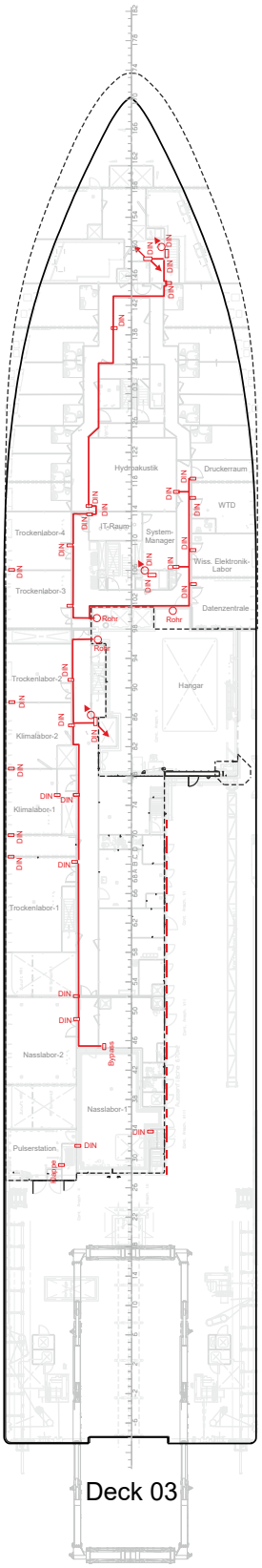
The "flying cabling" is the temporary laying of cables and hoses between the laboratories and into the outer region of the vessel.
In the corridors are open cable trays installed to hold the lines up. The wall openings shall be kept closed when not in use, otherwise the breakthrough is closed with the existing refractory pad (closed state). Overcoming the decks via separate trays.

	Flying cabling -- U-shaped cable tray
	Flying cabling -- hook
DIN	Port through the deck
DIN	Port through the wall
Rohr	Pipe with weather-tight closure
Bypass	Port through the wall
Klappe	Port through the wall
	Pipe upward with port
	Pipe up
	Pipe down

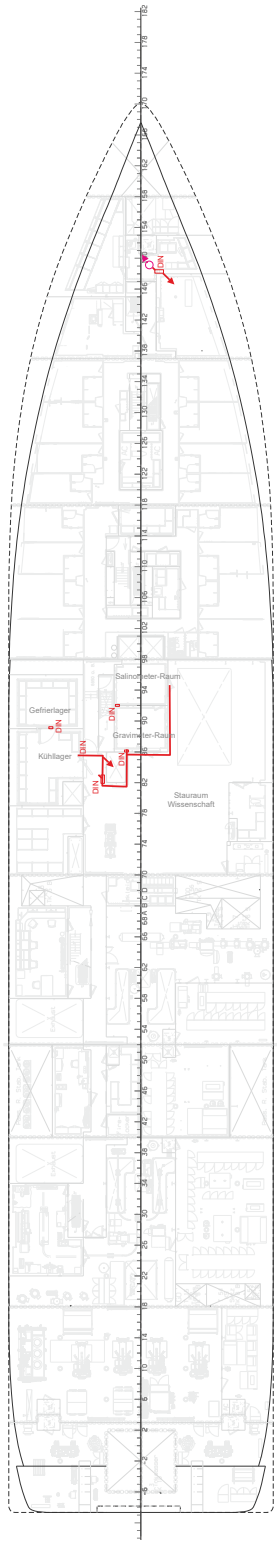

Deck 10
erhöhtes Peildeck
Abgasrohre Höhe erhöhtes Peildeck
Rohr
DIN
Brücke
WINCH ONLY
Ausschnitt Ø200
Deck 09
Peildeck
Deck 08
Deck 07



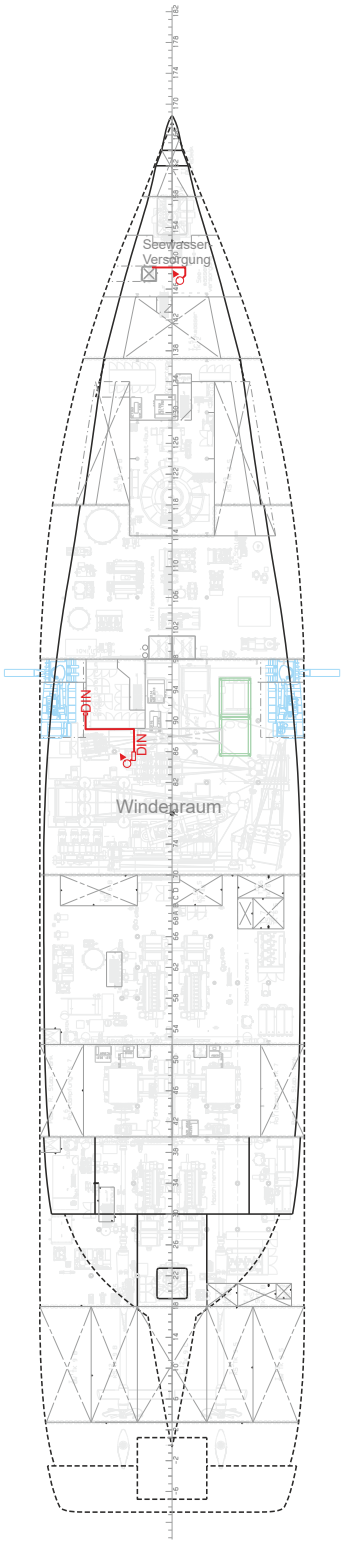
Deck 06 Deck 05 Deck 04



Deck 03



Deck 02

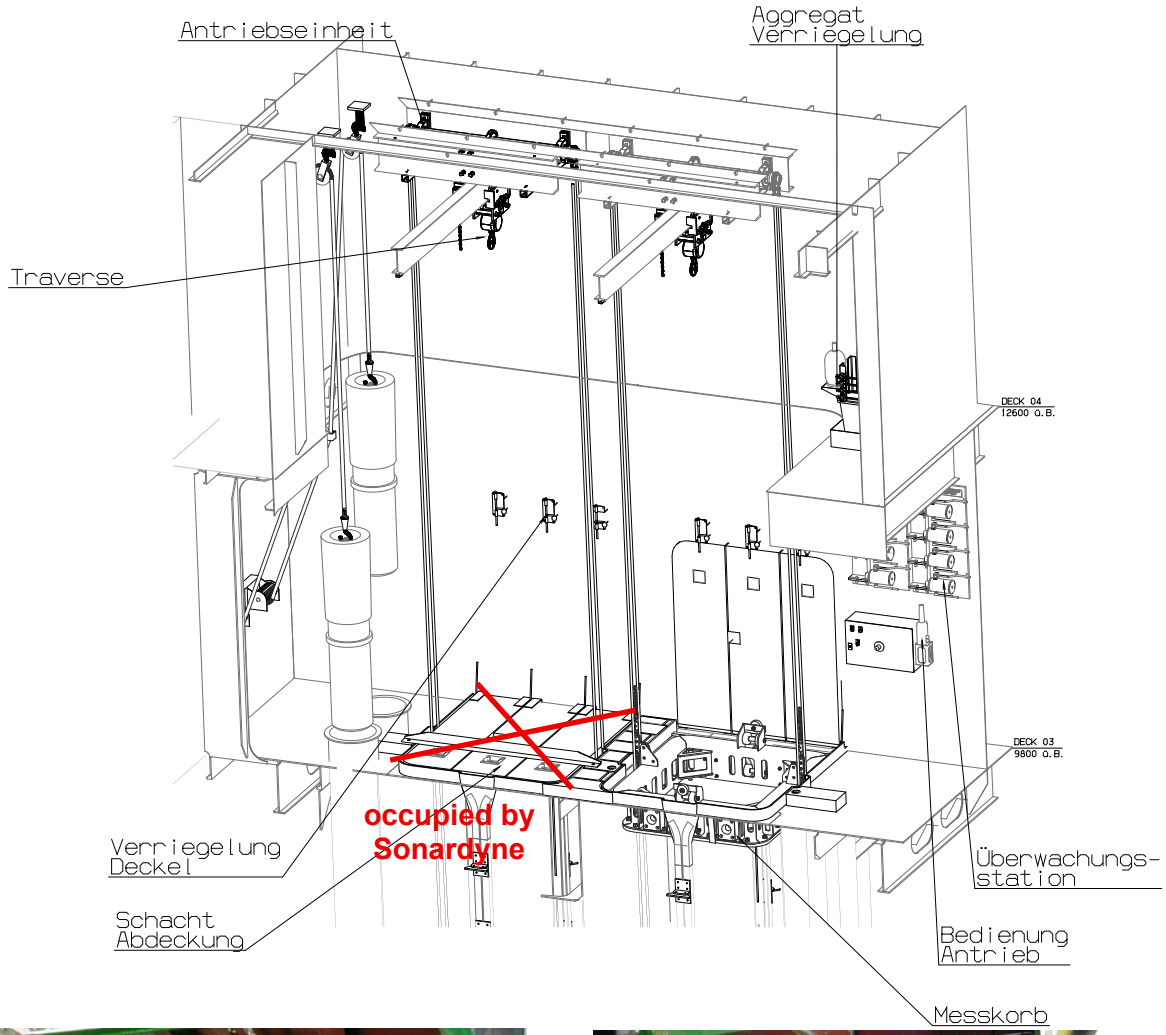


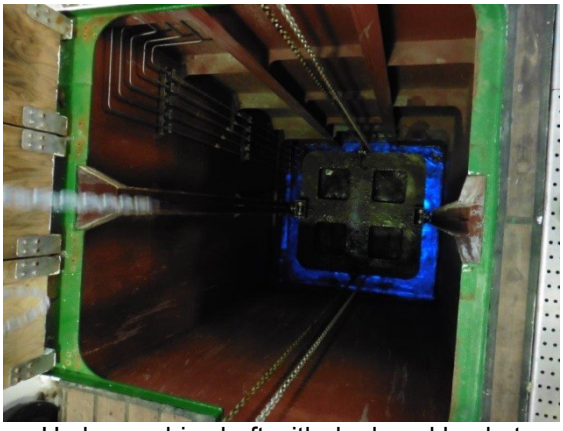
Deck 01

13.5. Hydrographic shaft

Following the installation of the Sonardyne USBL system in the port hydrographer shaft in 2024, only the starboard shaft remains available.

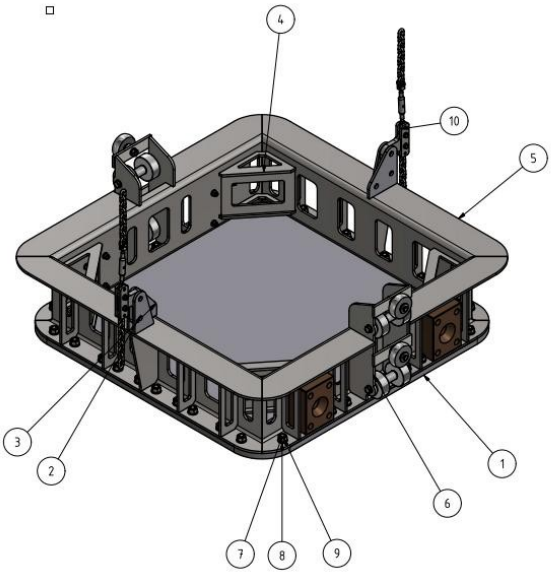
AUFBAU HYDROGRAPHENSCHACHT




Hydrographic shaft with deployed basket

Hydrographic shaft without basket

13.5.1. Measuring basket

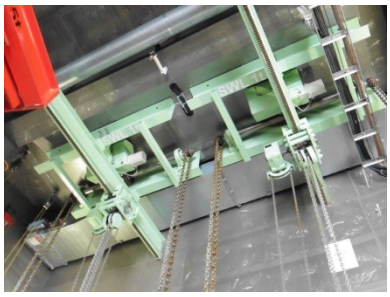


object	number	section
1	1	Base plate measuring basket
2	2	lashing 1
3	2	lashing 2
4	4	corner web
5	1	Base frame measuring basket
6	2	Role design Measuring basket
7	36	Hexagon bolt M20 x 60
8	36	U-disk
9	36	Hex nut
10	2	chain tensioner

The payload of the basket varies through the thickness of the base plate used.
The maximum mass of the base plate and payload (sensors, devices, etc.) is 625 kg

measuring basket 376.22 kg	base plate 25mm without stiffeners 324.68 kg	payload **300kg**
measuring basket 376.22 kg	base plate 15 mm 194.8kg	payload **429kg** plus any stiffeners, depending on the sensor
measuring basket 376.22 kg	base plate 10mm 129.87kg	payload **493kg** plus any stiffeners, depending on the sensor

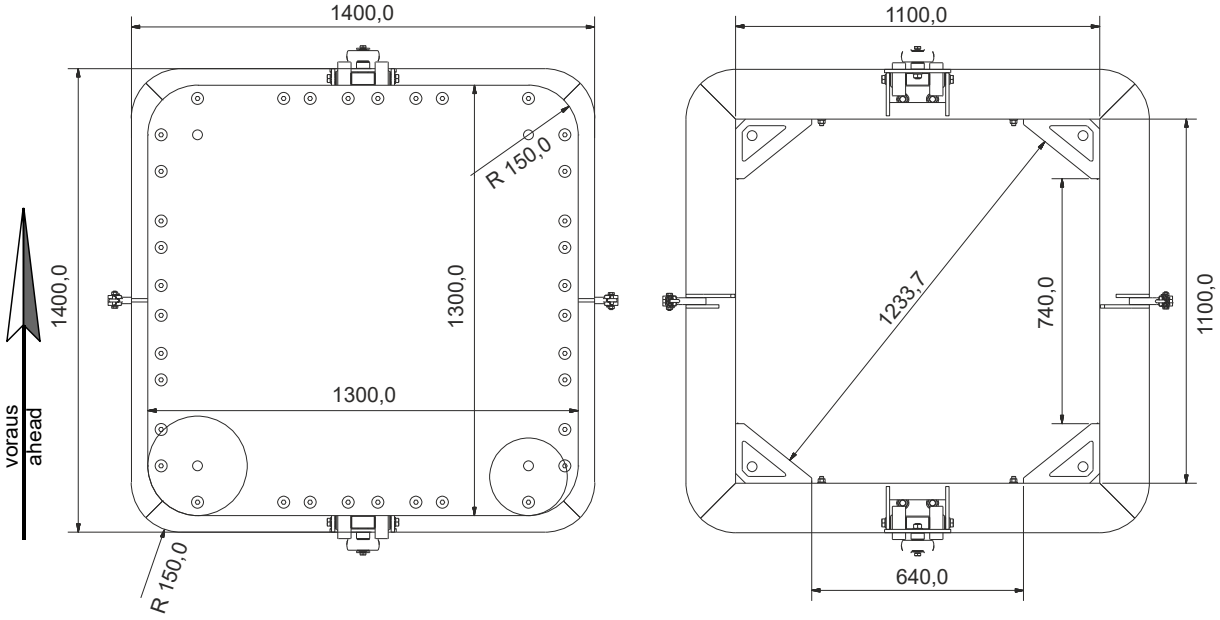
Basket


Winch above shafts

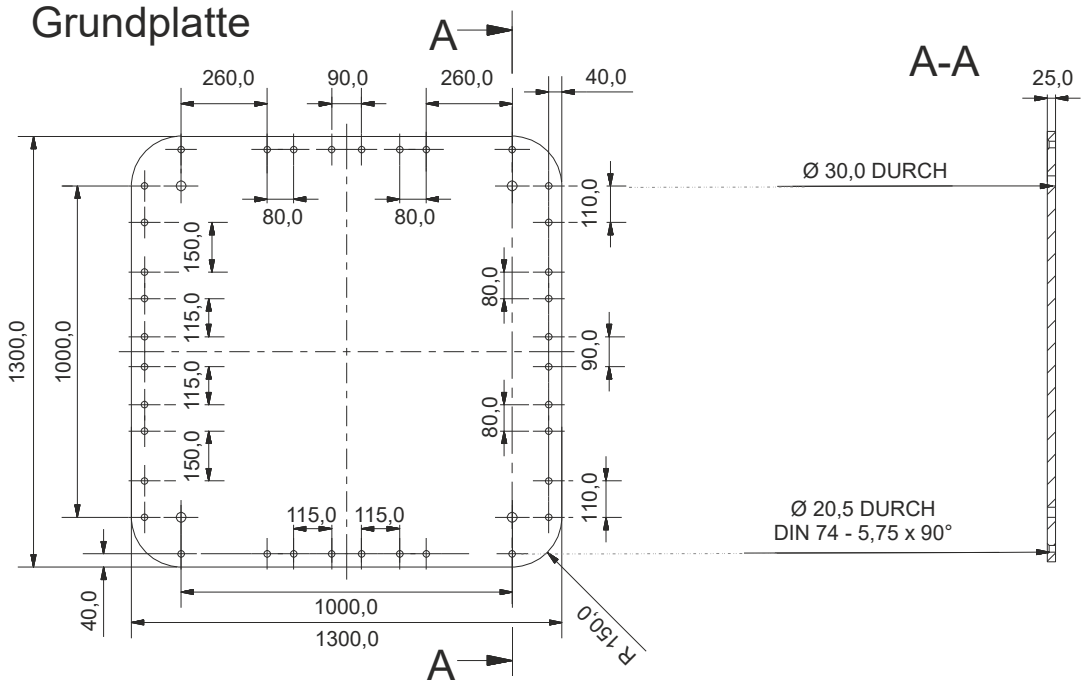
Shaft covers closed

Shaft cover open

Messkorb



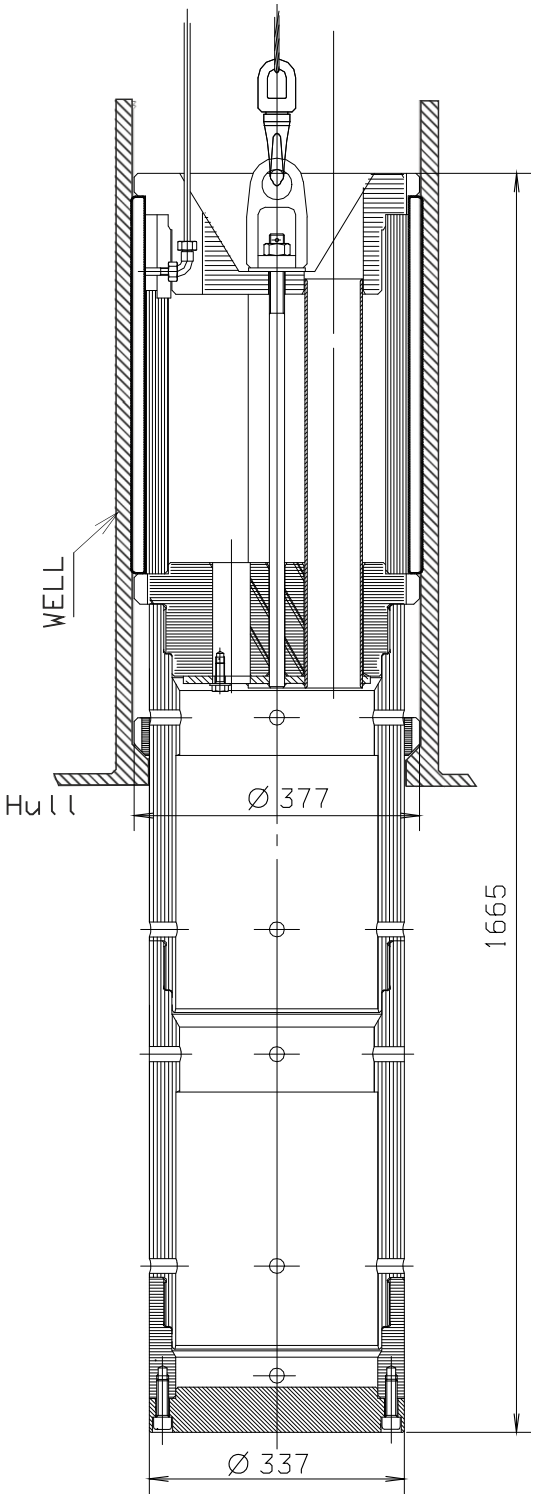
Grundplatte



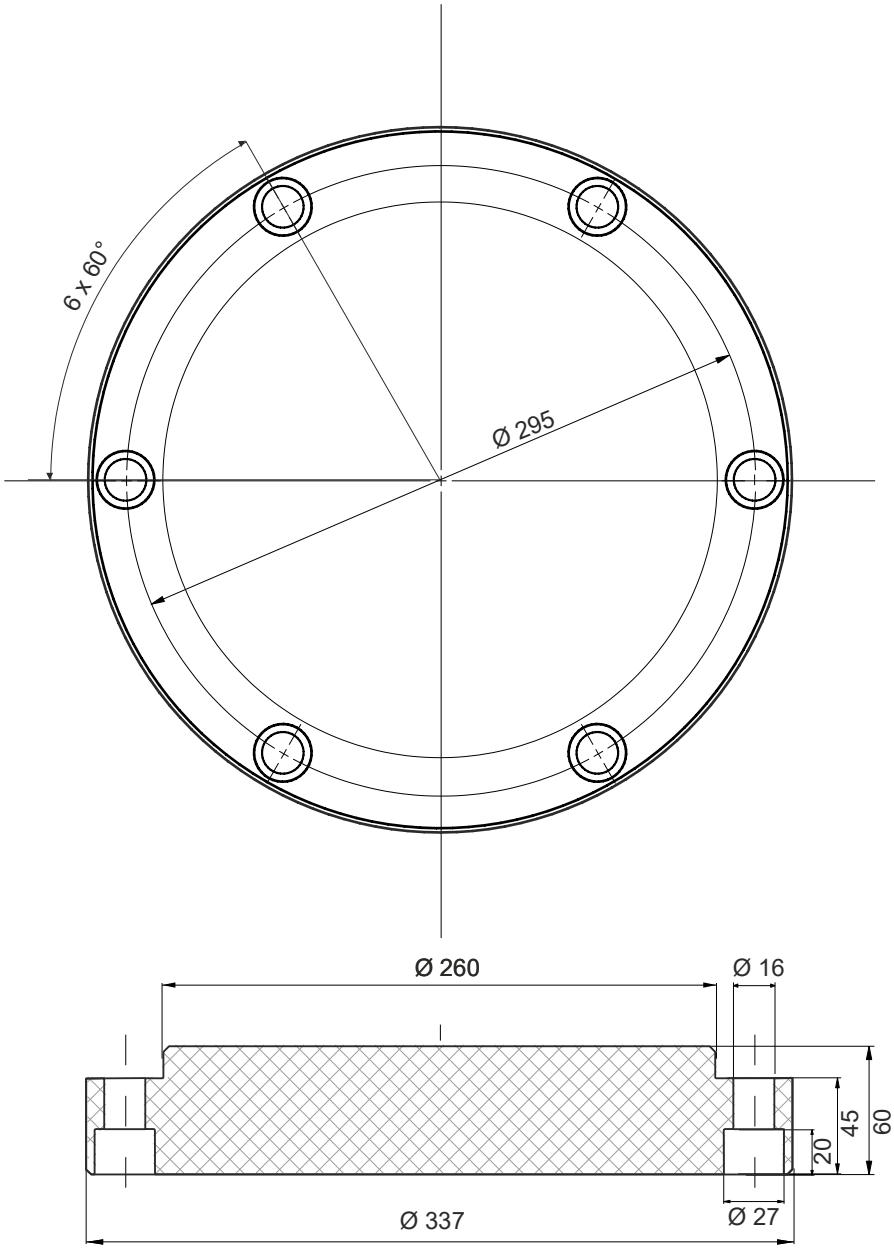
13.6. **Hydrographic pipe --** Equipment rack for small devices

Ship speed

12 kn	35 cm extended
7 kn	100 cm extended



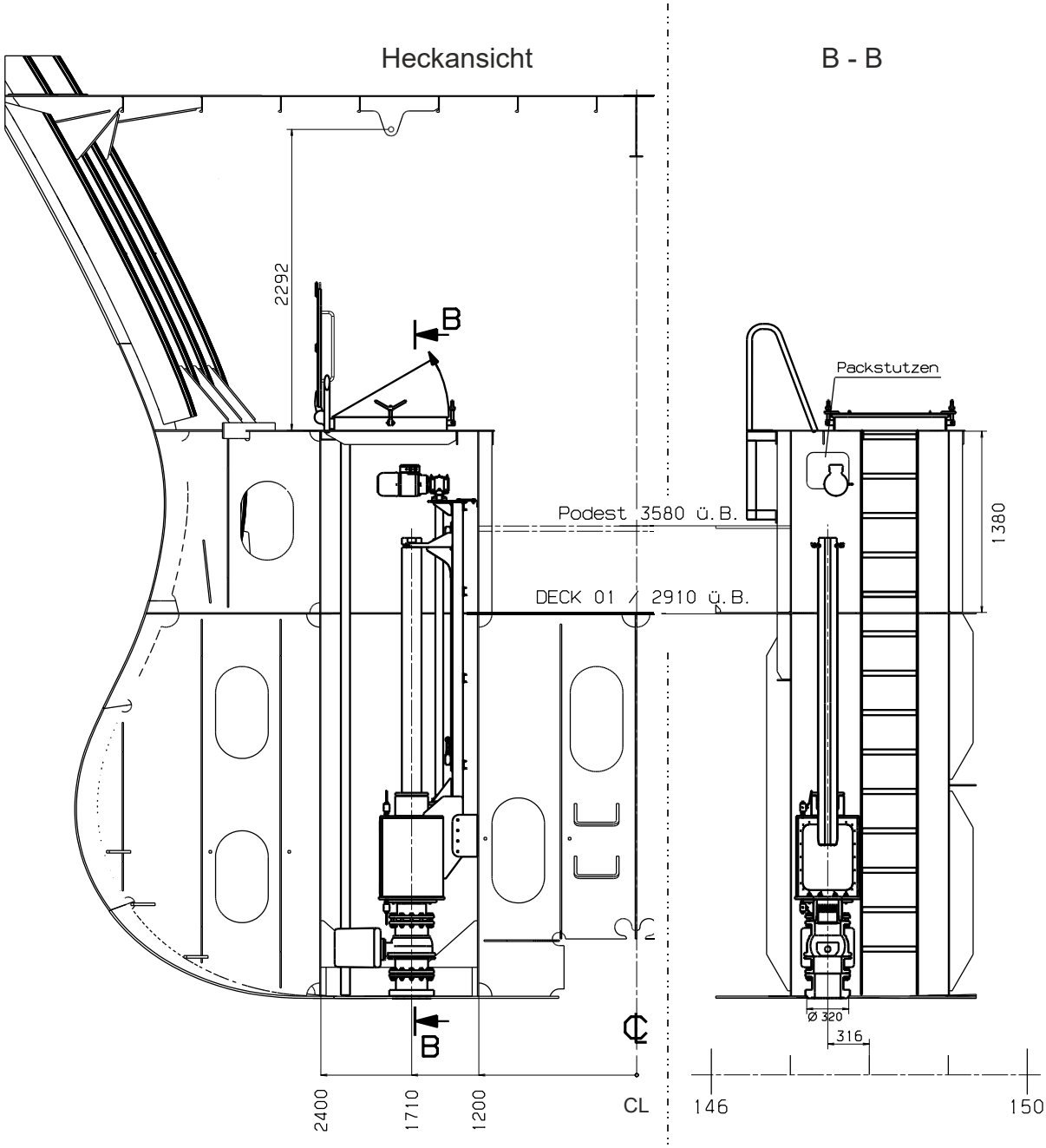
Hydrographic pipe -- Equipment rack for small devices



13.7. Extending apparatus

For insertion of probes and / or aspiration of seawater outside the boundary layer of the vessel a extending apparatus is installed

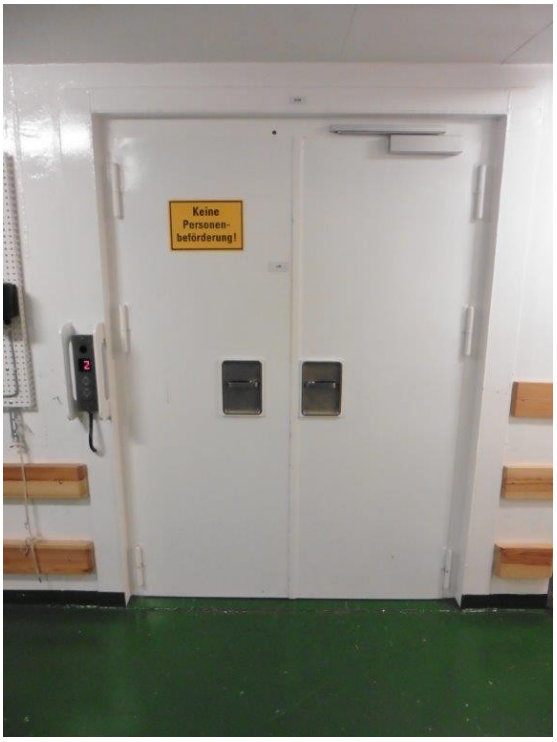
installation point	Deck 01 (Tankdeck) Room 101 " Sea water supply " Frame 147/148, port 1710 mm from center line
deploying deep	700 mm
Max. speed (extended)	12 kn



13.8. Freight elevator cargo space

The Freight elevator connects the load compartment (deck 02) with the main deck (deck 03)

Payload:	500kg		
Door width:	1300 mm	Door height:	2000 mm
Light cabin width:	1280 mm	Light cabin depth:	1250 mm



Goods lift (main deck level) closed

Goods lift (main deck level) open

13.9. CTD System

Manufacturer	Sea-Bird Electronic, Inc. Bellevue, WA 98005, USA
Model	SBE 911Plus with rosette water sampler 24 bottles of 10 liters
Board unit	SBE 11, installed in the data center
Sensors	2x Conductivity (SBE 4C) 2x Temperatur (SBE 3plus) 1x Druck (SBE 9plus) 2x Oxygen (SBE 43) 1x Altitude (Benthos PSA-916) 1x CHL/NTU (Wet Labs ECO) 1x PAR/Irradiance (Biospherical QCP2300) 1x Surface PAR (Biospherical QSR2200)
Responsibilities	The responsibility of the CTD system lies with the *"Controll station German Research Vessels"* at the University of Hamburg
Calibration	The sensors are routinely fed to the calibration

13.10. Underway-CTD (Ocienscience)

Manufacturer

The Oceanscience Group
4129 Avenida de la Plata
Oceanside, CA 92056

Phone (760) 754-2400
Fax (760) 754-2485

http://www.oceanscience.com
info@oceanscience.com

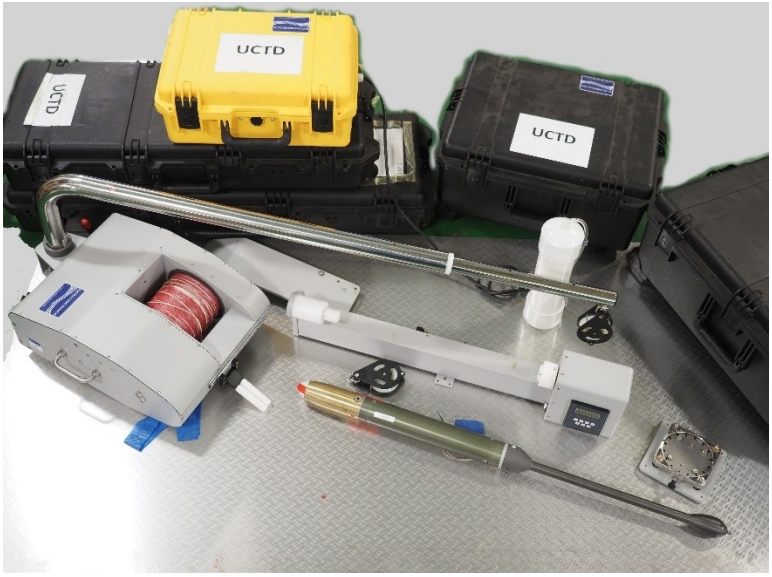
With the Oceanscience UnderwayCTD© (UCTD), CTD profiles can be recorded while underway down to a maximum depth of approx. 1,000m, whereby the possible profile depth decreases with increasing ship speed.

Profiling Capability

	Vessel Speed					
	0kts	2kts	4kts	6kts	8kts	10kts
FREECAST	1500m	1100m	900m	700m	650m	600m
TOW-YO (no line on tail)	1000m	700m	550m	450m	400m	350m

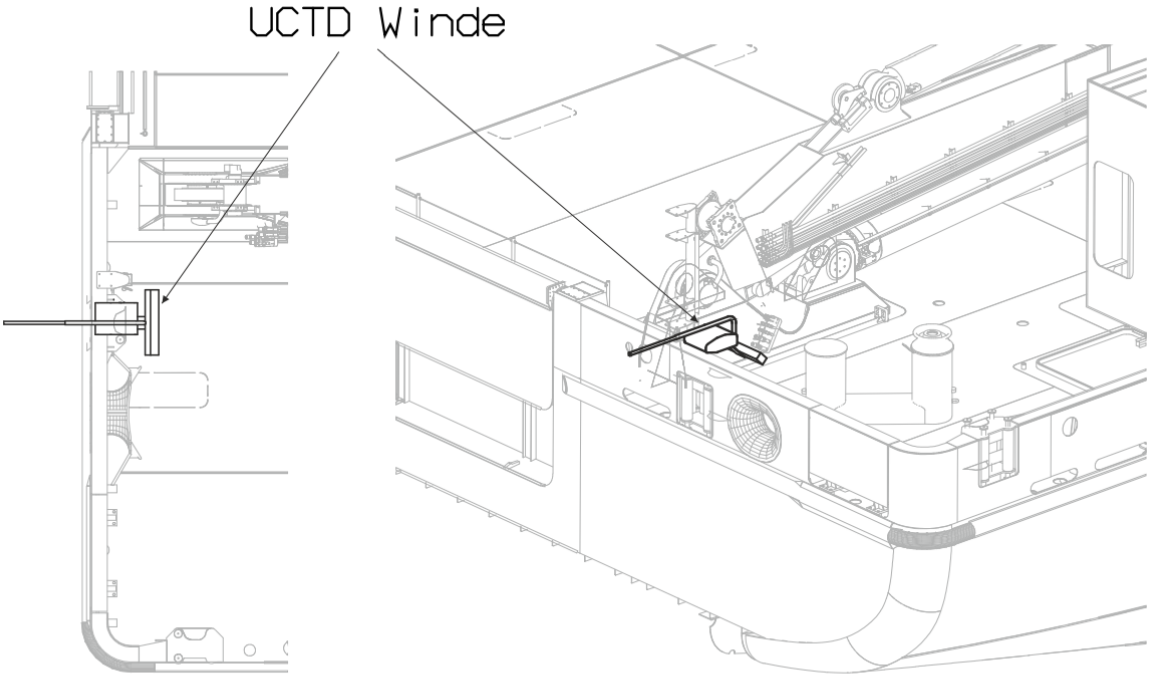
The system is stored on board as standard and must be installed at the stern for use. It consists of the following main components:

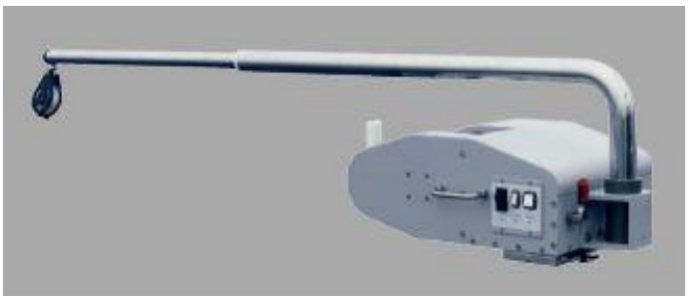
- Winch
- Probe Assembly
- Rewinder
- Davit
- Power Supply



The sensors are sent for calibration at regular intervals. A detailed user manual is available on board. This can be sent electronically if required.

Installation on vessels stern





Picture: http://www.oceanscience.com

13.11. Thermosalinograph

installation point	Deck 01 (tank deck) Room 101 " Sea water supply
Model	2x SBE 45 Thermosalinograph in 2x SMB (see chapter ***8.3.21 CleanSeaWaterlab***)
Manufacturer	Sea-Bird Electronic, Inc. Bellevue, WA 98005, USA http://www.seabird.com

Thermosalinograph

Conductivity and Temperature SeaBird SBE45

	Temperature (° C)	Conductivity (S / m)	Salinity (PSU)
Range	-5 to +35	0 to 7	-
Accuracy	± 0.002	± 0.0003	± 0.005
Stability	0,0002	0,0003	0,003
Resolution²	0.0001	0.00001	0.0002

Supply voltage	8 - 30 VDC
Weight	3.7 kg

² resolution
Typical RMS noise with fixed resistances on temperature and conductivity Inputs:

N Cycles*	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Sound Velocity (m/s)
1	0.000190	0.000014	0.00027	0.00066
2	0.000170	0.000010	0.00016	0.00057
4	0.000150	0.000005	0.00015	0.00055
8	0.000087	0.000005	0.00009	0.00033
16	0.000078	0.000004	0.00007	0.00025

* NCycles = number of measurements average per sample

13.12. Sound profile probe

Manufacturer
AML OCEANOGRAPHIC LTD
A300-2261 Keating Cross Rd
Victoria BC V8M 2A5
Canada
T: 250-656-0771
http://www.AMLoceanographic.com

Type
AML-3 LGR (titanium housing, max. depth up to 6000 m)
Modularly equipped with:

- X2change™ Sound Velocity
- CT•X2change™ Conductivity & Temperature
- P•X2change Pressure

Sensor-data

	Sound Velocity	Conductivity	Temperature	Pressure
Range:	1375 – 1625 m/s	0 to 90 mS/cm	-5°C to +45°C	0 - 6000 dBar
Precision (±)	0.006 m/s	0.003 mS/cm	0.003 °C	0.03 % FS
Accuracy (±)	0.025 m/s	±0.01 mS/cmT	±0.005 °C	0.05 % FS
Resolution	0.001 m/s	0.001 mS/cmT	0.001 °C	0.02 % FS
Response Time	20 ms	25 ms	100 ms	10 ms
Notes	Time of flight	Combined Conductivity & Temperature	Combined Conductivity & Temperature	Piezoresistive
Max Depth	6000 m	6000 m	6000 m	6000 m

AML-3 LGR (Logger Version)

Sensor port capacity	3 (TFS SONNE: SVP, C&T, P)
GPS	N/A
Wifi	N/A
Data communications	USB-C
Housing material	Titan
Depth rating	6000 m
Weight in Air	2.5 kg
Weight in water	1.9 kg
Cage	MTL-M0639-M
Diameter	76 mm
Length	398 mm
Internal storage	29 GB
Sample trigger	• Time (Sample rate) • Pressure increment • Sound Velocity increment Continious
Communication & post-processing software	Sailfish

13.13. Fluorometer

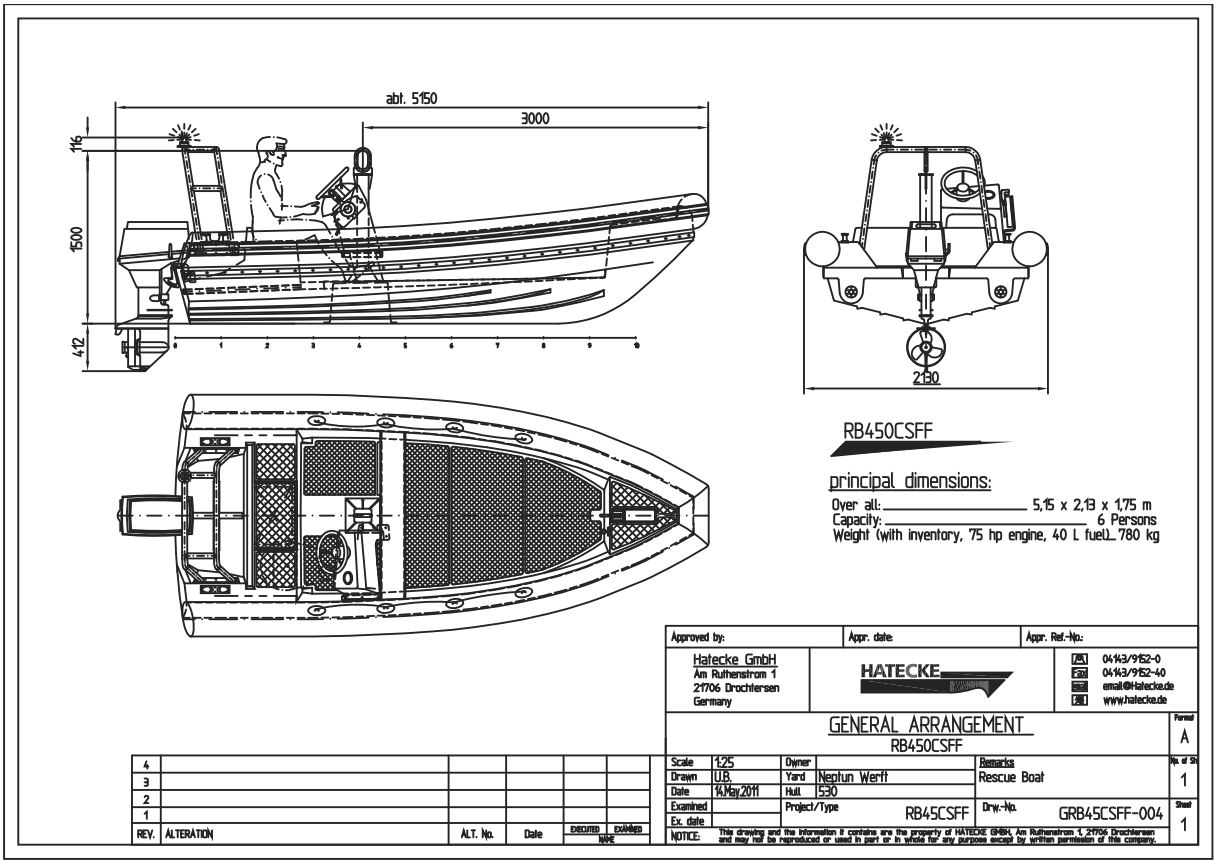
installation point	Deck 01 (tank deck) Room 101 " Sea water supply", Frame 145 -- 151
Model	FluoroProbe (Submersible Spectrofluorometer with Automatic Algae Class and Chlorophyll Analysis)
Manufacturer	biological • biophysical • engineering bbe moldaenke Wildrosenweg 3 24119 Kronshagen / Germany phone (+49) 431 38040-0 fax (+49) 431 38040-10 e-mail info@bbe-moldaenke.de http://www.bbe-moldaenke.de

FluoroProbe Specifications

Measurands	total chlorophyll [µg chl-a/l]
Chlorophyll	0 - 200 µg chl-a/l
Measurement procedure	spectral fluorometry
Resolution	0.05 µg chl-a/l
Transmission	0 - 100%
Water temperature	-2 - +40°C
Housing material	reinforced carbon fibre/V4A steel
Weight	4.5 kg
Dimensions (H x D)	450 x 140 mm
Voltage	12 V
Battery capacity	3900 mAh
Operating time	10 h - 30 days
Memory capacity	2 million datasets
Interface	RS485

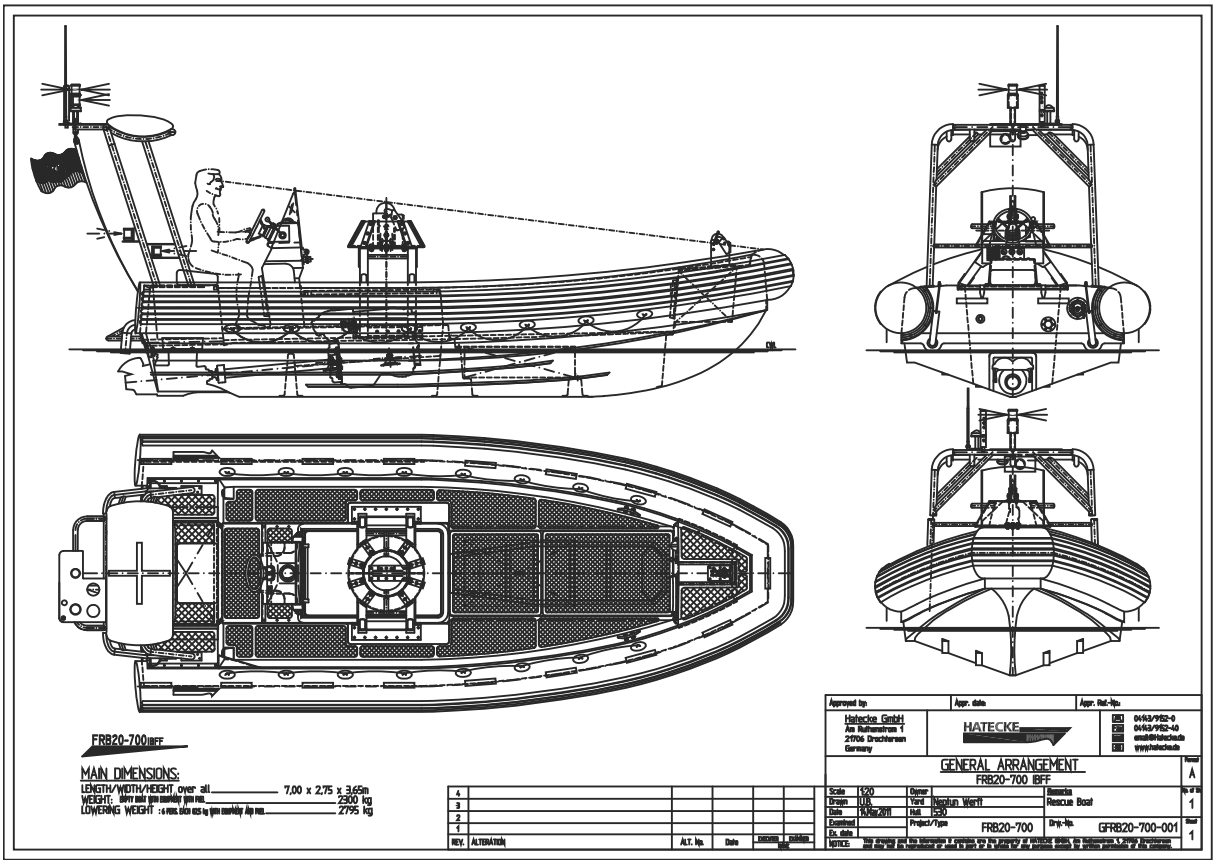
13.14. Working boat

Location	Deck 05 (2. Structure deck) Frame 80 StB
Manufacturer:	Hatecke GmbH Am Ruthenstrom 1 21706 Drochtersen http://www.hatecke.de
Model	RB450CSFF
Maße	5,15 x 2,13 x 1,75 m
Capacity	6 Persons
Weight	780 kg (with equipment, engine 56 kW, 40 l fuel)



13.15. Fast Rescue and working boat

Location	Deck 04 (1. Structure deck) Frame 64 port
Manufacturer:	Hatecke GmbH Am Ruthenstrom 1 21706 Drochtersen http://www.hatecke.de
Model	FRB20-700 IBFF
Maße	7,00 x 2,75 x 3,65 m
Capacity	6 Persons
Lowering weight	2795 kg (with equipment and 6 persons)



13.16. Nitrogen liquefaction plant

installation point	Deck 2 (tween deck) Storage space science
Model	StirLITE
daily output	60 l
tank capacity	200 l
Manufacturer	Stirling Cryogenics BV, Science Park Eindhoven 5003, 5692 EB Son, The Netherlands Tel.: +31 (0)40 2677 300, Fax: +31 (0)40 2677 301, info@stirlingcryogenics.com, http://www.stirlingcryogenics.com

13.17. Milli-Q-Device

13.17.1. Merck Millipore Integral 10

Installation point	Deck 3 - Drylab 1
Manufacturer	Merck Millipore
Typ	Integral 10
Production rate daily	240 Liter
Productquality	Clean Water Typ II acc. EP und USP and CLSI® - CLRW
Flowrate on EPod	0,05 – 2 Liter/min
Storage Tank	60 Liter

13.17.2. Merck Milli-Q IQ7005

Installation point	Deck 3 – Drylab 4
Manufacturer	Merck Millipore
Typ	Milli-Q IQ7005
Flowrate	5 Liter/Hour
Productquality	Cleanest Water Typ 1 out of Q-POD-extraction unit; Clean Water Typ 2
Storage Tank	25 Liter

13.18. Laborwasser (Destillat)

Available in following labs

Deck 3 (Main deck)
- Drylab 1
- Drylab 2
- Drylab 3
- Drylab 4
- Wetlab 2
- Climate Lab 1

Distillate tap

13.19. Deepest Freezers

13.19.1. Deepest Freezer 35 Liter

Installation point	Deck 3 (Main deck) - Drylab 4 - Wetlab 1
Manufacturer	National Lab GmbH
Typ	ProfiLine Pegasus PLPE 0486
Volume	35 Liter
Cooling capacity	max. -80°C General operating range: -40°C ~ -80°C
Internal dimen. (BxTxH mm)	330 x 355 x 300mm

13.19.2. Deepest Freezer 37 Liter

Installation point	Deck 3 (Maindeck) - Wet Lab 2
Manufacturer	Nordic Lab Benchtop freezer ULT U35
Volume	37 Liter
Cooling capacity	max. -86°C General operating range: -60°C ~ -86°C
Internal dimen. (BxTxH mm)	439 x 271 x 433mm

13.19.3. Deepest Freezer 549 Liter

Installation point	Deck 2 (Tweendeck) – Scientific cargohold
Manufacturer	Thermo Scientific TSX40086FA
Volume	549 Liter
Cooling capacity	max. -86°C General operating range: -40°C ~ -86°C
Internal dimen. (BxTxH mm)	2 drawer each 700 x 580 x 640mm

13.19.4. Tiefstkühlschrank 394 Liter

Installation Point	Deck 2 (Tweendeck) - Salinometer Lab -
Manufacturere	National Lab GmbH Thorbi® Primus TPU4586DCC
Volume	394 Liter
Cooling capacity	max.: -86°C General operating range: -40°C ~ -86°C
Internal dim. (BxDxH mm)	3 drawer each 467 x 597 x 242mm 1 drawer 467 x 597 x 244mm 1 drawer 467 x 597 x 245mm

13.20. Flake Ice machine

Installation point	Deck 3 (Main deck) - Wetlab 1
Manufacturer	Brema
Typ	GB 903 HC
Ice stock	30 Kg
Ice production	113 Kg / 24 hours

Flake Ice machine

13.21. Laboratory Dishwashers

Installation points	Deck 3 (Main deck) - Drylab 3 - Wetlab 2
Manufacturer	Miele Professional
Typ	G 7883 stainless steel
Design	below table, 60cm width
Programs	10 Standard cleaning- / desinfection programs

13.22. Digistorien Cabinets

Installation points	Deck 3 (Main deck) - Wetlab 1 - Wetlab 2 - Draylab 1 - Drylab 4
Manufacturer	Cryo Technik
Typ	VHA 1200
Work area	1200 x 600 mm
Hood	class I (chem) EN 12469

13.23. Heat Cabinets

Installation points	Deck 3 (Main deck) - Drylab 1 - Drylab 4 - Wetlab 1 - Wetlab 2
Manufacturer	Thermo Scientific
Typ	LUT 6050
Inner Dimen. (BxHxT mm)	435 x 500 x480
Volume	105 Liter
Set-temperature	250°C
Time heating up to 250°C	< 70 Minutes
Intended use	For drying and baking liquid coating materials. For example, paints whose solvents can form explosive mixtures with air.
NOT intended use	Dust must not be heated in this dryer, which can reach explosive concentrations when swirling. The dryer must not be used to heat liquids in closed containers or containers. No pyrotechnic substances or substances that are prone to exothermic reactions may be introduced into the device. Health-endangering materials and substances may due to leaks in the inner container especially in the Door area not be introduced.
Installatio point	Deck 3 (Main deck) - Scientific electronic lab
Manufacturer	Thermo Scientific
Typ	OGH 60
Inner Dimens. (BxHxT mm)	328 x 480 x389
Volume	61 Liter
Set Temperature	50°C bis 330°C
Time heating up to 150°C	< 25 Minutes
Intended Use	The Heratherm heating and drying cabinets are Laboratory equipment for thermal engineering Applications. The devices allow exact regulation of the temperature in the interior. Heat treatment of samples or goods with working temperatures from 50 ° C to 330 ° C, e.g. for drying, aging, analyzing, digesting, stoving, oxidizing, reducing and preheating. Heratherm heating and drying cabinets are for installation and operation in the following Intended for use: • heat treatment, • Drying of goodsBestimmungswidriger

NOT intended Use

The Heratherm heating and drying ovens should not be loaded with substances that overburden the ability of available laboratory equipment and personal protective equipment to provide adequate protection for users and third parties
No samples containing hazardous chemical substances may be processed which may be released into the ambient air due to leaks in the device or may be corrosive or otherwise damaging to parts of the Heratherm heating and drying cabinet.

To avoid the risk of explosion, the heating and drying oven must not be loaded with fabrics, substances or liquids as samples which:
• easily flammable or explosive,
• whose released vapors or dusts in combination with air form flammable or explosive mixtures,
• release the poisons,
Create a humid atmosphere,
• form dusts,
• cause exothermic reactions,
• intended for pyrotechnic purposes.

13.24. Refrigerators

Installation points	Deck 03 (Main deck) - Wetlab 1 - Wetlab 2 - Drylab 1 - Drylab 2 - Drylab 4 - Data
Manufacturer	Liebherr
Typ	FK 3640
Inner Dimens. (BxHxT cm)	47 x 145,2 x 44
Volume	333 Liter
Temperature range	+2°C bis +10°C

Installation points	Deck 3 (Main deck) - Drylab 3 - Hangar - Measuring and observation room
Manufacturer	Liebherr
Typ	FKU 1800
Inner Dimens. (BxHxT cm)	51,3 x 70,2 x 44,1
Volume	180 Liter
Temperature range	+2°C bis +10°C

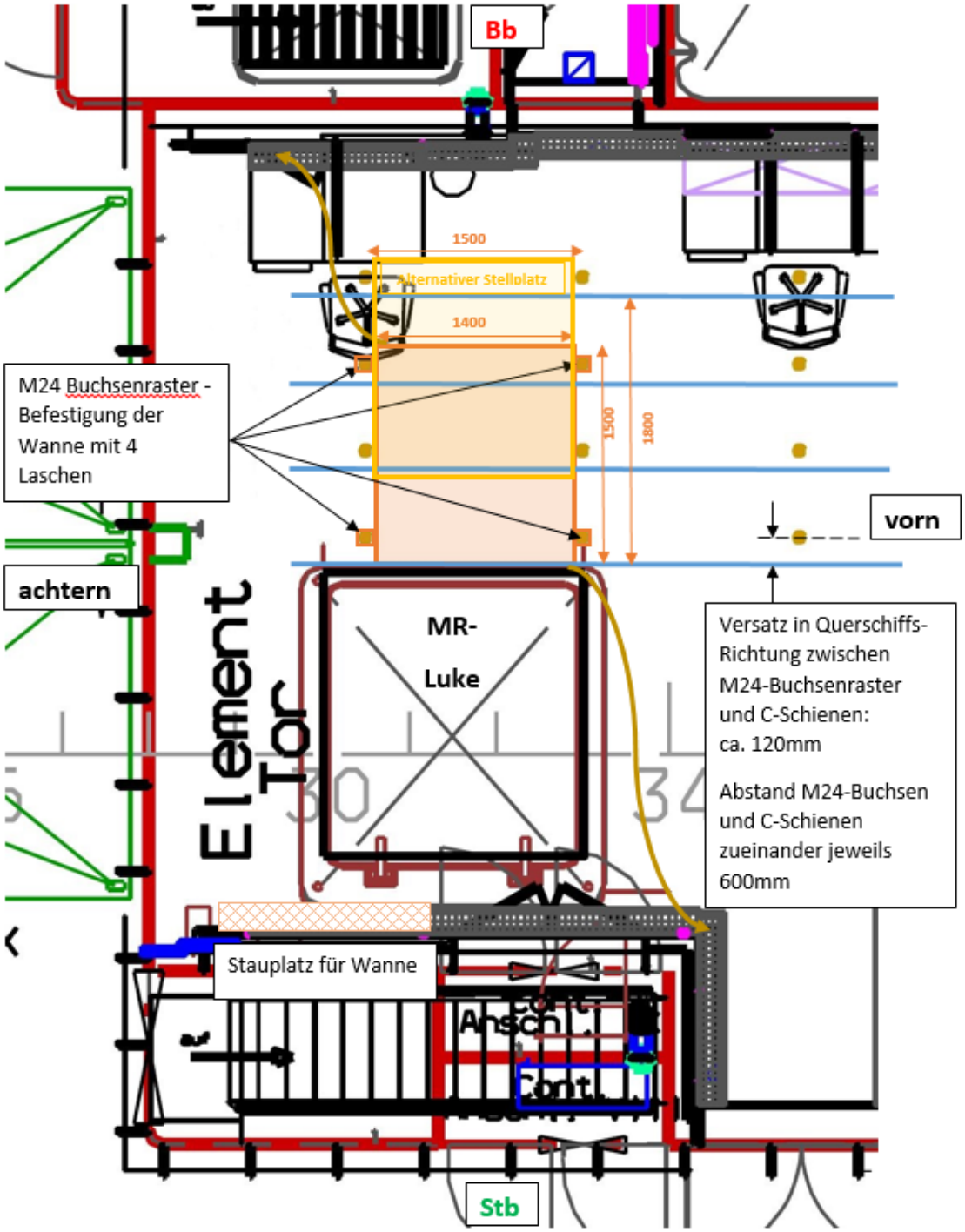
13.25. Deep Freezers

Installation points	Deck 3 (Main deck) - Wetlab 1 - Wetlab 2 - Drylab 1 - Drylab 2 - Drylab 3 - Drylab 4
Manufacturer	Liebherr
Typ	LGUex 1500
Inner Dimens. (BxHxT cm)	45,4 x 66,3 x 45
Volume	139 Liter
Temperature range	-9°C bis -26°C

13.26. Mobile Cabin for Rock Saw

Location	Deck 3 (Main Deck), Wet Laboratory 1
Manufacturer	KULA, Ottersberg (near Bremen), Germany
Dimensions	approx. 2000 x 1500 x 2000mm (L x B x H)

Location sketch



Befestigungslasche Boden (an M24-Buchsen)

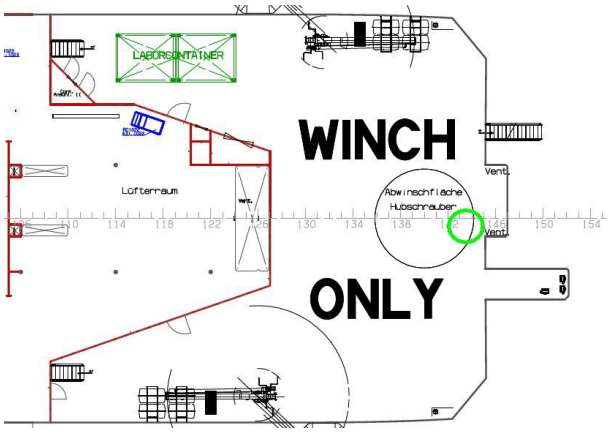
Ablaufschlauch 2"

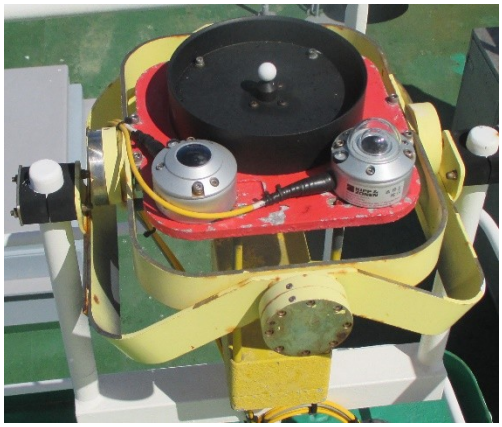
14. Meteorology

14.1. Global Radiation Sensors

Meteorological radiation measuring instruments for recording shortwave and longwave atmospheric radiation as well as photosynthetically active radiation (PAR).

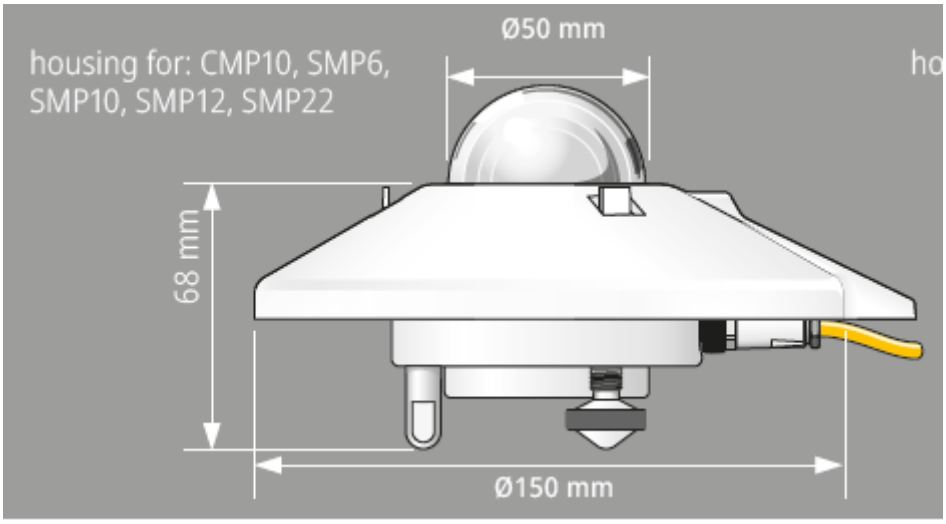
Location Deck 07 (4th Superstructure Deck), Frame 144, Starboard





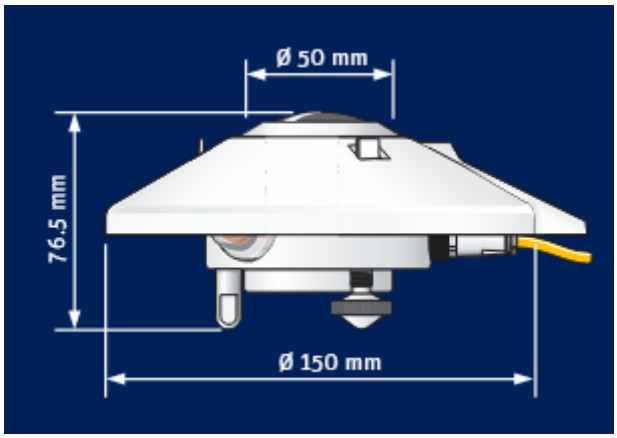
14.1.1. Pyranometer

Manufacturer	Kipp & Zonen (OTT HydroMet)
Type	SMP10-V
Classification	Spectrally Flat Class A
Measurement Range	400 bis 4000W/m²
Spectral Range (20% points)	270 bis 3000nm
Spectral Range (50% points)	285 bis 2800nm



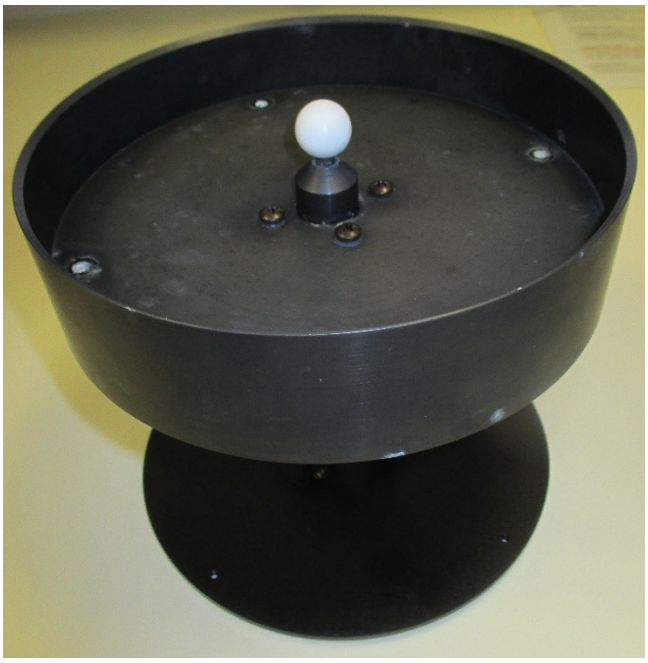
14.1.2. Pyrgeometer

Maufacturer	Kipp & Zonen (OTT HydroMet)
Tyep	SGR4-V
Measurement Range	0 bis 1000W/m²
Spectral Range (50% points)	4500 bis 42000nm



14.1.3. Quantum Scalar Irradiance PAR Sensor

Manufacturer	Biospherical Instruments Inc.
Type	QSR-2150
Measurement Range (PAR Dynamic Range)	$1{,}4 \times 10^{-5}$ bis 0,5 µE/(cm² * sec)
Spectral Range	400 bis 700nm



15. Communication

15.1. Alarms and emergency calls

Alarms and emergency calls

The alarm audibly via the public address system and means of Typhon.

7x short – 1x long (repeated) …	**General alarm** **Posing at the master station deck 05 (2 superstructure deck)**
short – long (repeated)	**Alarm to abandon the ship** **Posing at the assigned lifeboat**

Emergency calls ship internally

In an emergency, the bridge and the port is to inform the officer on duty.
Emergency calls via:
- Working channel intercom Science
- Working channel of the hand-held radios
- Telephone
- Wechselsprechanlage Intercom ship guide

Fire alarm

Cold room and sauna confining alarm

Alarm button in rooms with visual alarm display and acknowledgment before the rooms.
The alarm will be forwarded to the bridge.

Hospital- Alarm

Alarm button in the hospital with visual / audible alarm to quittierender the 2nd officer or Doc.
The alarm will be forwarded to the bridge.

15.2. External Communications

E-mail externally

see #General information

Telefon und Fax

see #General information

Internet

Internet via the C-band system is available throughout the ship via WLAN and Ethernet (RJ45).
The provider guarantees a transfer rate of 1.024 Mbps from ship to shore and 2.56 Mbps from shore to ship. An increase in bandwidth can be requested in advance of the voyage.
The maximum transfer rate is 2.56 Mbps for uploads and 7.68 Mbps for downlinks.
The bandwidth is shared by all users (scientists and crew).
In addition, scientists have access to a pro-rata monthly total data volume of 600 GB via Starlink via WLAN. The distribution of this data volume among the scientific participants is the responsibility of the chiefscientist.

15.3. Internal Communication

Telephone
All rooms are equipped with telephone.

Intercom Science

Principle of the system:
- No main intercom station
- All participants have equal rights
- Any number of participants can take part in a conversation group
- Each participant can join the group themselves
- All stations work with a microphone and talk button
- An announcement can be made to all stations from the bridge console, regardless of their switch position.
- One channel of the handheld radios can be integrated into communication via intercom

Intercom master and officers

For the scientists only use it for emergencies.

Public address system

The public address system is paging entire ship or sub-groups (corridors labs, etc.) designed.

15.4. TV-Monitoring

The camera system is used for visual monitoring of the winches and the working areas of the deck.
In the port mode, the TV system used to monitor the vessel as part of ISPS.

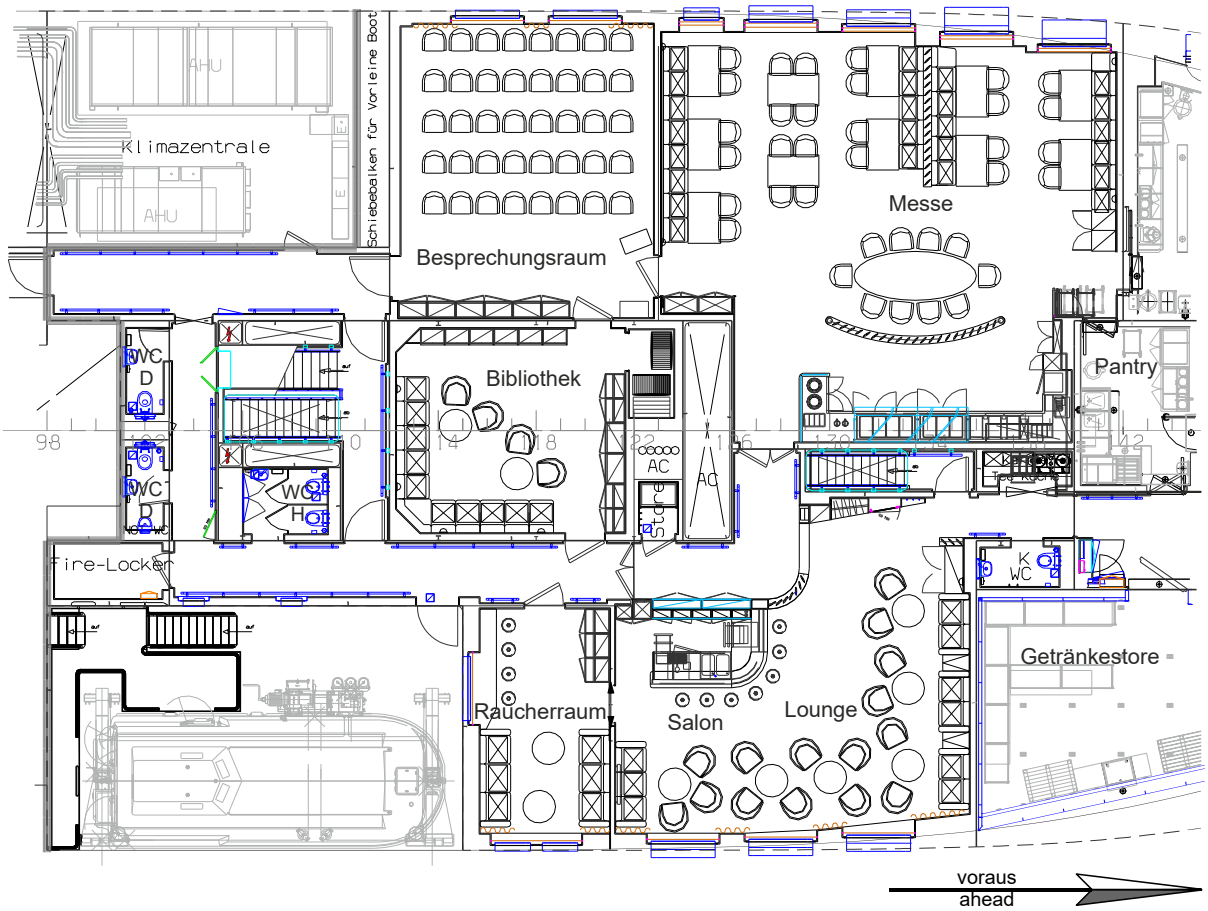
16. Life on board

16.1. Generally used rooms

16.1.1. Mess room, lounge, lounge, library, smoking room

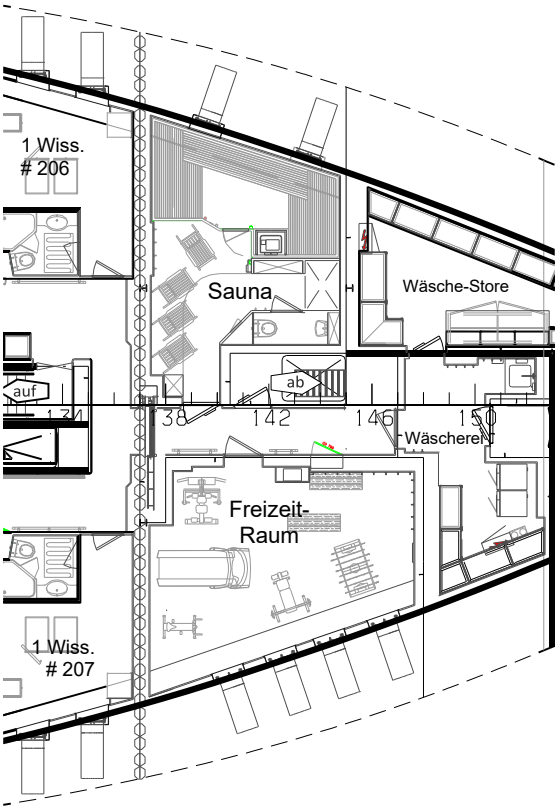
Location	1. Structure deck Frame 110 – 142

Mess room, lounge, library lounge, smoking room and meeting room are central rooms for meetings.
The Mess room is shared by crew and scientists.
The food expenditure is self-service.



16.1.2. Sauna and fitness room

Location	Deck 02 –tween deck Frame 137-145	
	Sauna	Fitness room
Room-No.		
Phone		
Room size	20 m²	23 m²



16.1.3. Laundry

For the scientific cruise participants is ever a laundry equipped with washing machines and dryers in the residential area of "Science" on deck 02 (steerage) and 03 deck (main deck) are available.

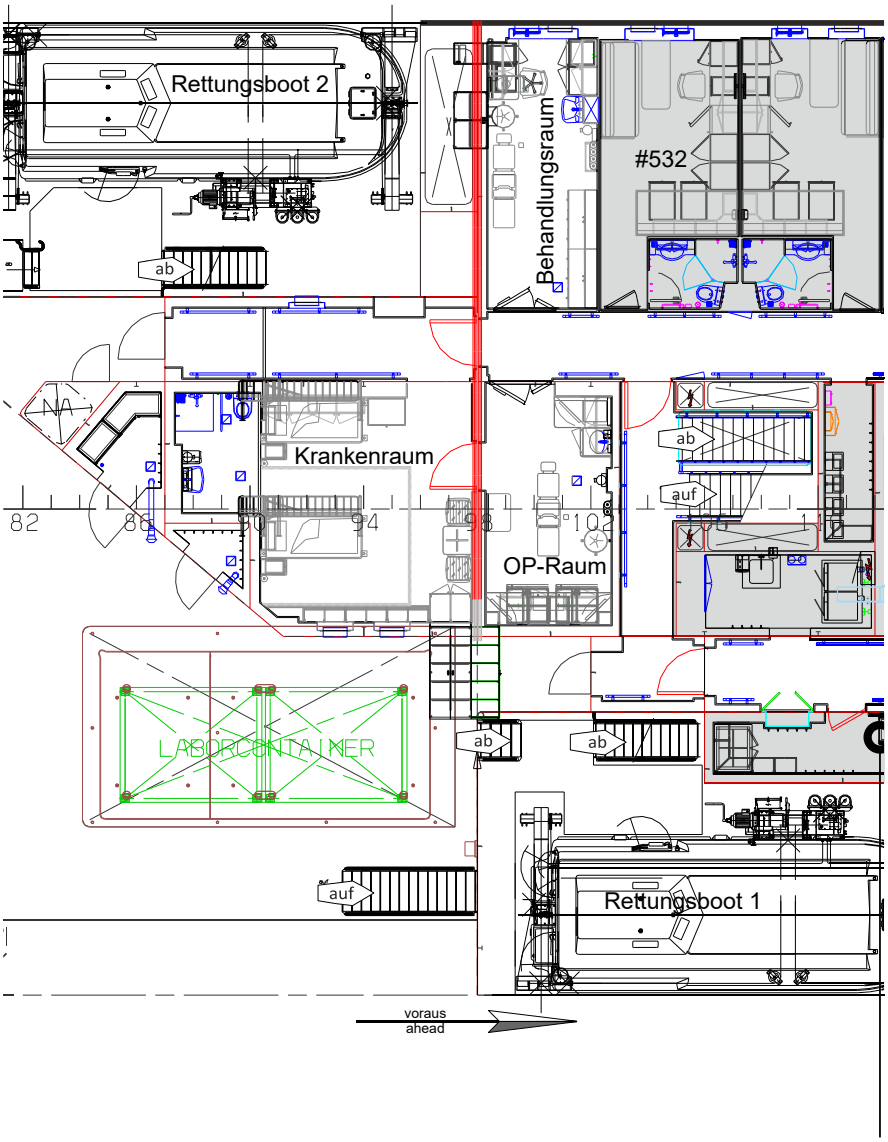
16.1.4. Luggage storage

For the scientific cruise participants is ever a luggage storage in residential facilities "science" on deck 02 (steerage) and 03 deck (main deck) are available.

16.2. Hospital und medizinische Einrichtung

Location 1. Structure deck BB
Frame 90 – 103

	Room-No.	Phone
Ambulance	536	112
OP-room	534	114
Sick room	538	115



16.3. Sale of goods on board

On board, drinks (soft drinks, beer, wine and spirits), tobacco, sweets and toiletries can be purchased in limited quantities and selections.
Payment is either in cash or by debit and credit card in the currency EURO.

16.4. Smoking on board

Smoking is allowed inside the ship only in the "smoking room"; on deck only in front of the hangar (in bad weather exceptionally also in the hangar near the door), provided that scientific measurements are not affected.

The illegal smoking within the ship leads to the triggering of a fire alarm, as all chambers and public areas are protected by ceiling smoke detectors.