Research Vessel
METEOR

On-board Handbook
for
Expedition Participants

2025_FS-Meteor_2-1-6_EN

Table of revisions:

Version	Subject of the change	Processor	Date
Origin	Meteor Handbook	Crew and inspection RF Reederei Forschungsschifffahrt	
V 1.0	New document	Dr. Rogenhagen / Crew and inspection Reederei F. Laeisz (Bremerhaven) GmbH	IV/2011
V 1.1	Various updates	Dr. Rogenhagen / Crew and inspection Reederei F. Laeisz (Bremerhaven) GmbH	XI/2012
V 2.0	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	IV/2013
V 2.1	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	V/2014
V 2.1.1	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	IX/2015
V 2.1.2	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	VII/2017
V 2.1.3	Various updates	Tassilo Flentje Briese Schiffahrts GmbH&Co. KG	IV/2020
V 2.1.4	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	I/2021
V 2.1.5	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	VI/2023
V 2.1.6	Various updates	Klaus Bergmann Briese Schiffahrts GmbH&Co. KG Research Shipping Department	VI/2025

Changes to the previous version marked in "yellow" in the manual.

Table of contents

Index

1. RESEARCH VESSEL METEOR

Information about the ship	
Ship's name:	Meteor
Call sign:	DBBH
IMO number:	8411279
Flag:	German flag (federal service flag)
Home port:	Hamburg
Owner:	Federal Republic of Germany, represented by the BMBF (Federal Ministry for Education and Research)
Logistics/supervision of ship's operation:	German research fleet coordination centre Institute for Oceanography of the University of Hamburg Prof. Dr. Eleanor Frajka-Williams Bundesstraße 53 20146 Hamburg Tel: (040) 42838-3640 Fax: (040) 42838-4644 E-Mail: leitstelle.ldf@uni-hamburg.de Homepage: https://www.ldf.uni-hamburg.de/en/meteor.html
Shipowner	Briese Schiffahrts GmbH & Co.KG Research Shipping Department Hafenstraße 12 D-26789 Leer, Germany Phone: +49 (0) 491 925 20 – 160 Fax: +49 (0) 491 925 20 – 169 research@briese.de www.briese.de

1.1 Technical Data

1.1.1 Ship

Ship's data	
Shipyard	Schlichting-Werft, Travemünde
Year of manufacture	1985/86
Build number	2030
Class	GL+100 A5 E2+MC AUT
Certified according to	DIN EN ISO 9002 + ISM-Code
Total length	97.50 m
Length between perpendiculars	90.00 m
Width	16.50 m
Depth	5.61 m
Height of main deck	7.70 m
Total height	46.40 m
Loop antenna folded down	45.00 m
Measurement according to London agreement	4.280 BRZ
Unladen weight of ship	3,825 t
Scientific load capacity plus 40 t for fixed load capacity, spare wires etc.	100 t 60 t
Speed	11.5 kn limited to **10kn** on advice LDF
Sphere of action (at 11.5 kn)	10,000 NM
Crew	34
Scientists / technicians	28
German Meteorological Service (DWD)	2

1.1.2 Machinery

2 electrical propulsion motors	1,150 kW each
1 fixed pitch propeller	5 blades, diameter 3.00 m

1.1.3 Energy generation

4 diesel engines	Each 1,000 kW at 750 rpm
4 alternating current generators	Each 1,350 kVA at 660 V
1 port diesel	342 kW at 1,500 rpm
1 alternating current generator	390 kVA at 380 V
1 emergency diesel	81.9 kW at 1,500 rpm
1 alternating current generator	93 kVA at 380 V

1.1.4 Aids to manoeuvring

Bow thruster, extendable	HRP 6011 PT with 1,100 kW, max. 1,200 rpm
Fin stabilisers	HDW 2 x 5.1 m²
Rudder	Spade rudder with hinged fin

2. CREW

Function	Number
Master	1
Leading nautical officer	1
1st Officer	1
2nd Officer	1
1st Engineer	1
2nd Engineer	2
Electrical engineer	1
Leader of the Scientific Technical Service (WTD)	1
WTD electronic engineer	1
WTD systems engineer	1
Doctor	1
Cook	1
Assistant cook	1
Fitter	1
Bosun	1
1st Steward	1
2nd Steward	2
Machine room mechanic	3
Deck mechanic	7
Launderer	1
Trainee	max. 3
Total	30 – 34

3. PLANS OF THE SHIP

Fig. 1 Research vessel METEOR

3.1 Deck arrangement

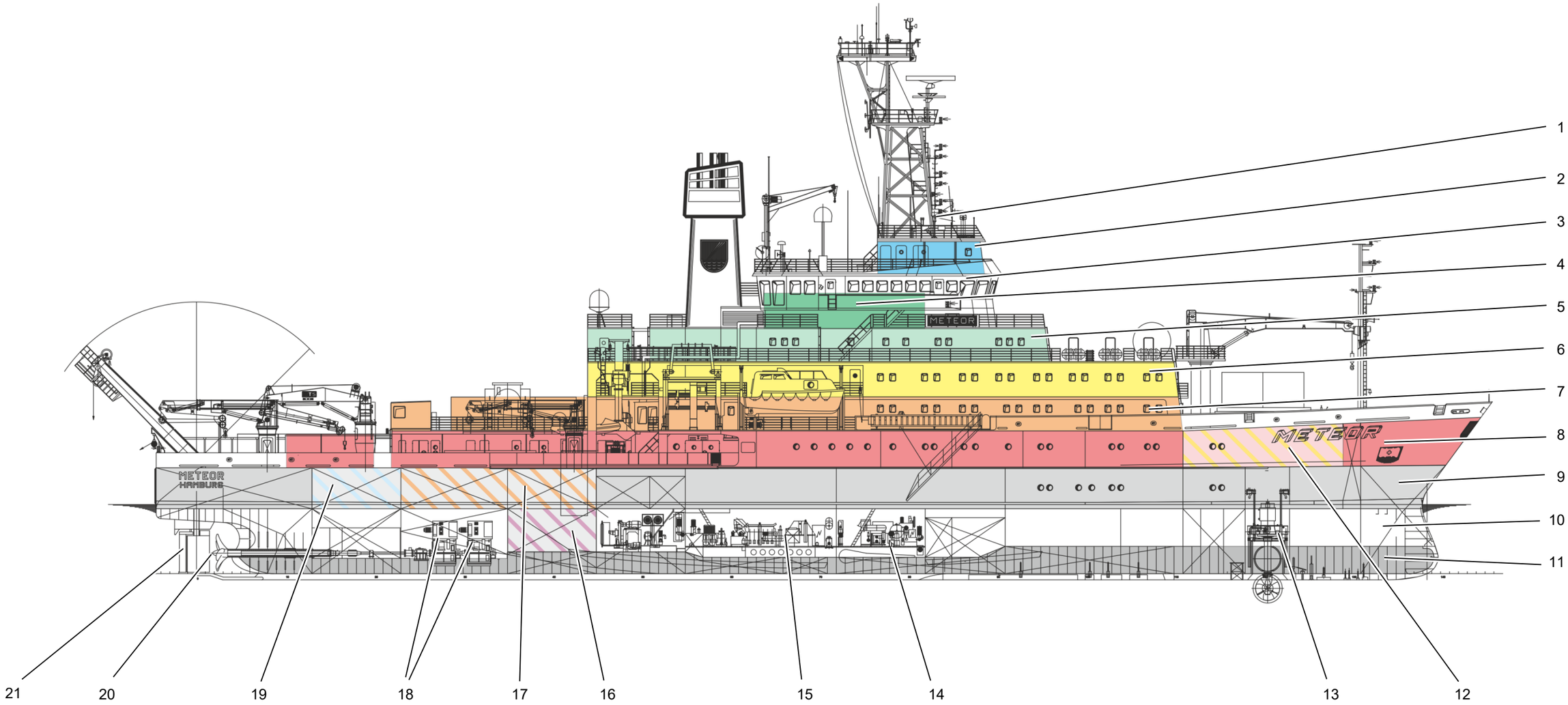


Fig. 2 RV METEOR, deck arrangement, scientific storage space, propulsion and aids to manoeuvring

Key:

1 6th superstructure deck
2 5th superstructure deck
3 4th superstructure deck, bridge
4 3rd superstructure deck (dark green doors)
5 2nd superstructure deck (green doors)
6 1st superstructure deck (yellow doors)
7 Forecastle deck (orange doors)
8 Main deck (red doors)
9 Tween deck (dark red doors)
10 Storage
11 Raised floor
12 Scientific storage area I
13 Bow thruster
14 Fin stabilisers
15 Energy generation
16 Scientific storage area IV
17 Scientific storage area II
18 Drive motors
19 Scientific storage area III
20 Propeller
21 Spade rudder (Becker rudder with fin)

3.2 Deck plans

3.2.1 6th and 5th superstructure deck

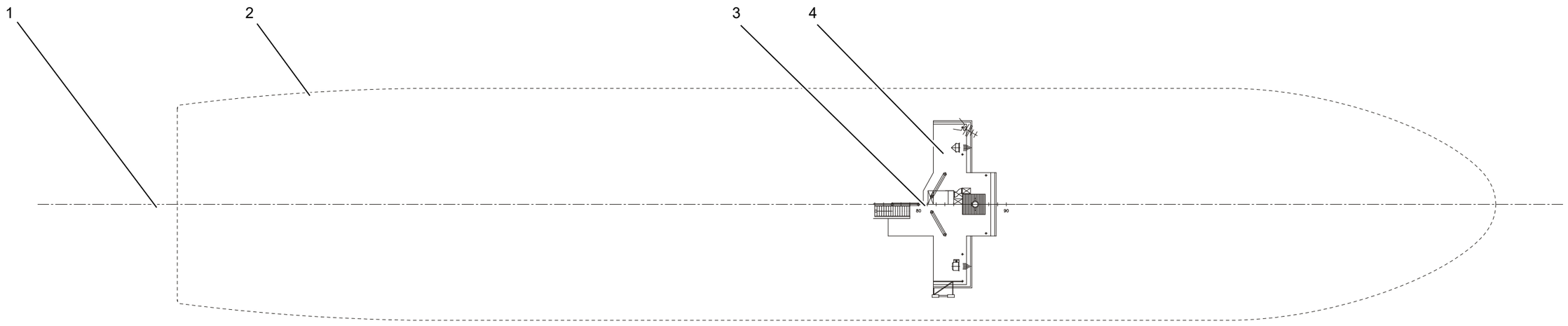


Fig. 3 RV METEOR, 6th and 5th superstructure deck

Key:

1 Centre line
2 Outer edge of main deck / bulwark
3 Antenna and signal mast
4 Work surface 6th superstructure deck
5 Air chemistry laboratory
6 Gas bottle area

3.2.2 4th and 3rd superstructure deck

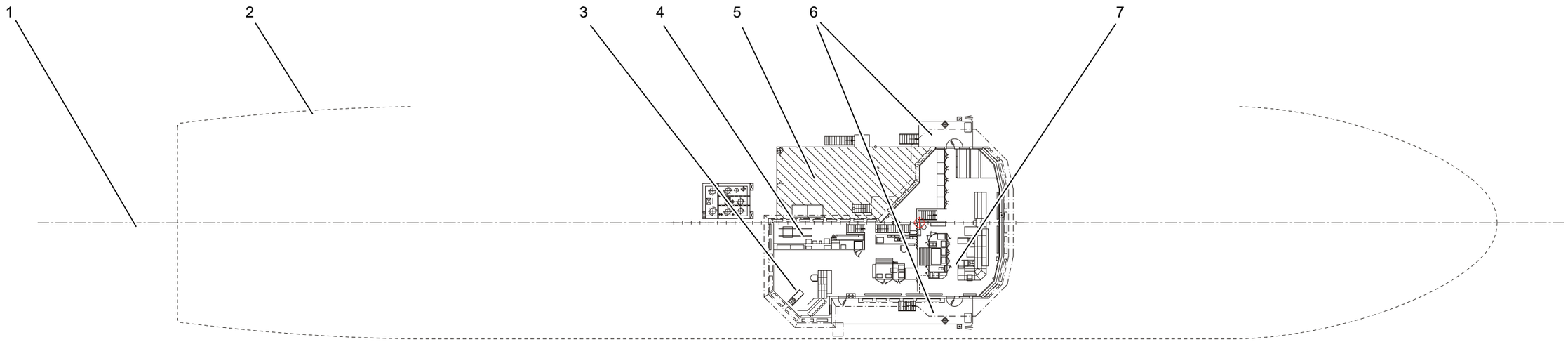


Fig. 4 RV METEOR, 4th and 3rd superstructure deck

Key:

1 Centre line
2 Outer edge of main deck / bulwark
3 Rear control console
4 Scientific workplace
5 Raised deck
6 Bridge wings
7 Main control console
8 Converter room
9 Side room
10 Telephone box
11 Radio room
12 Sounding centre

3.2.3 2nd superstructure deck

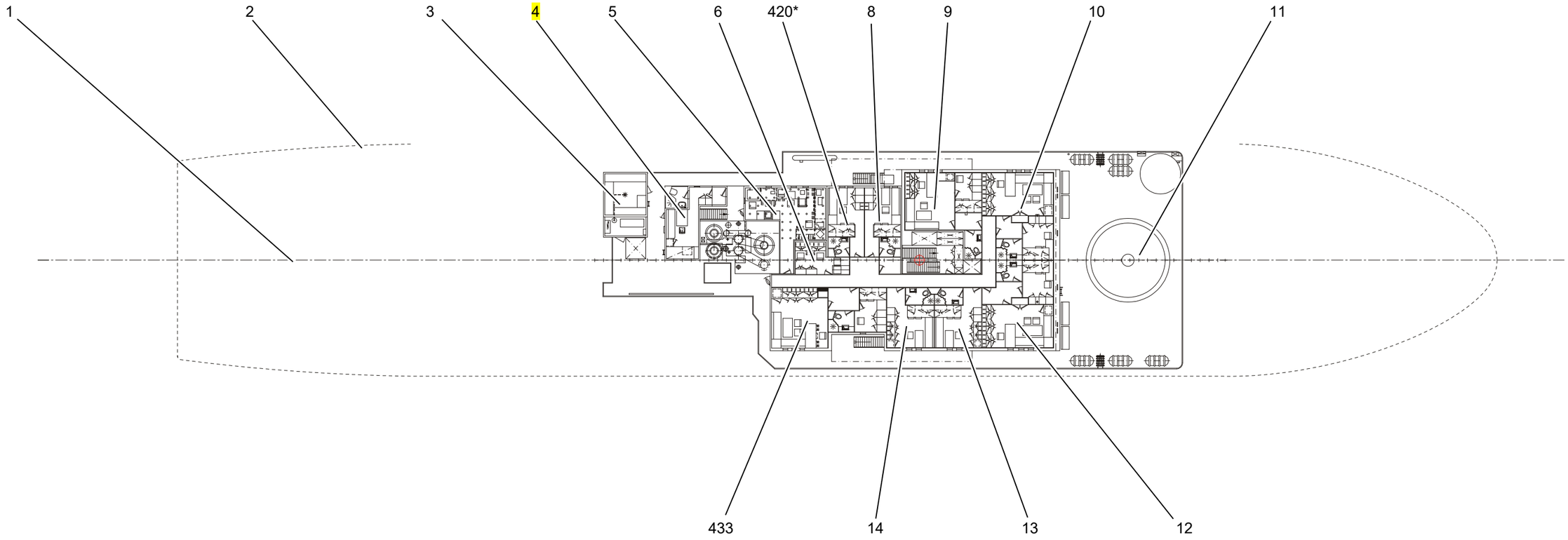


Fig. 5 RV METEOR, 2nd superstructure deck

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Paint store
4	Room: Bosun
5	On board weather station
6	Ship's office
420	Room: Weather technician
8	Room: Scientific Head of WTD
9	Room: 1st Officer
10	Room: Chief engineer
11	Helicopter abseil deck
12	Room: Master
13	Room: 2nd Officer
14	Room: 2nd Officer
433*	Room: Scientific expedition leader

*: Position number = room number scientific expedition participants

3.2.4 1st superstructure deck

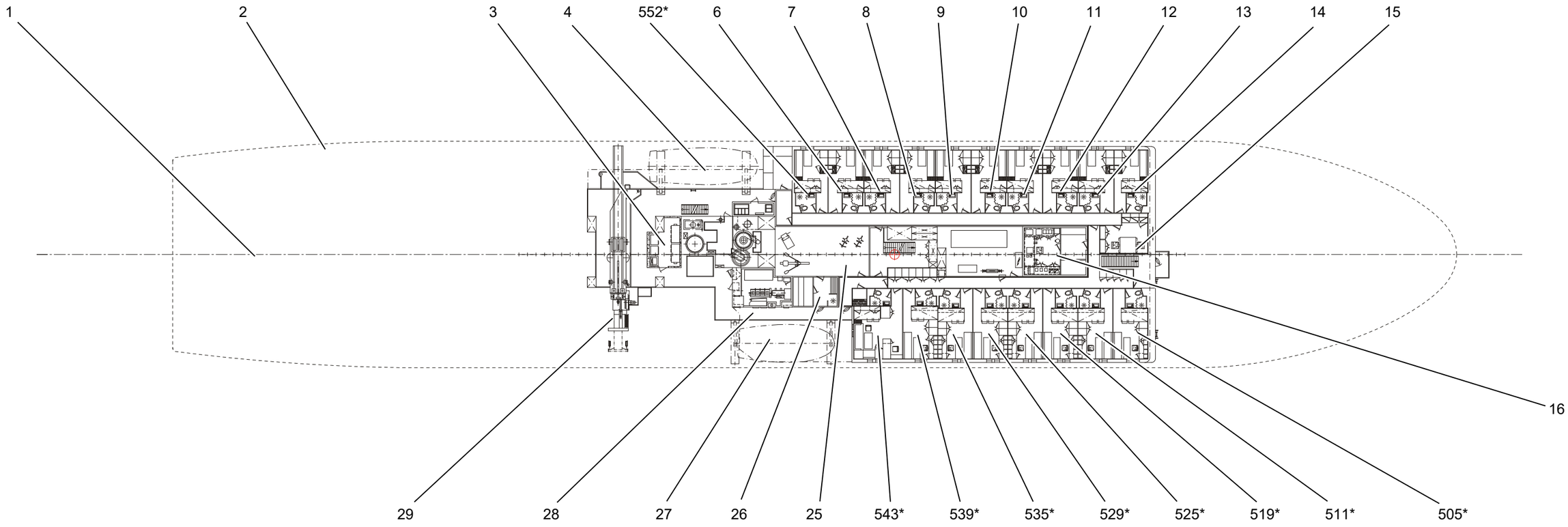


Fig. 6 RV METEOR, 1st superstructure deck

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Winch electronics room
4	Workboat / lifeboat METEORIT
552*	Room: Meteorologist
6	Room: 1st Cook
7	Room: 1st Steward
8	Room: Fitter
9	Room: 1st Bosun
10	Room: Electronic engineer
11	Room: System Manager
12	Room: Electrician
13	Room: 2nd Engineer
14	Room: 2nd Engineer
15	Office: Machine
16	Dark room
505*	Room: 1 scientist + 1 reserve
511*	Room: 1 scientist + 1 reserve
519*	Room: 1 scientist + 1 reserve
525*	Room: 1 scientist + 1 reserve
529*	Room: 1 scientist + 1 reserve
535*	Room: 1 scientist + 1 reserve
539*	Room: 1 scientist + 1 reserve
543*	Room: Senior scientist
25	Free time area
26	Sauna
27	Lifeboat
28	Emergency diesel room
29	Movebar

*: Position number = room number

3.2.5 Forecastle deck

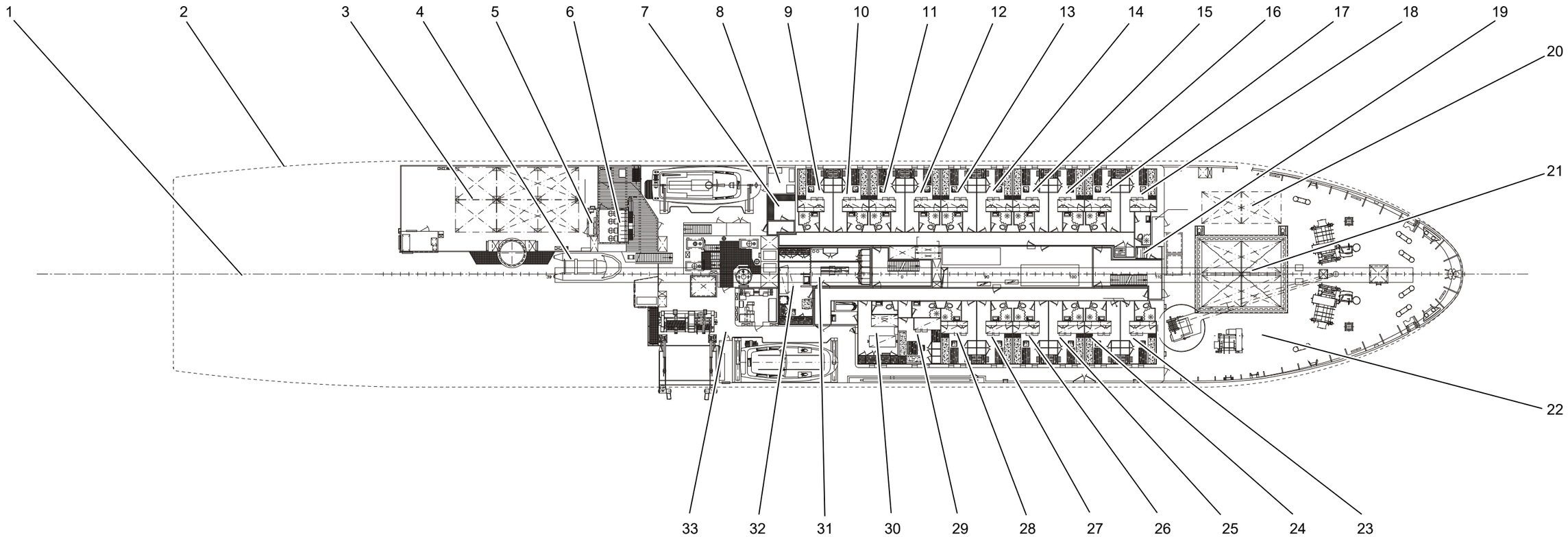


Fig. 7 RV METEOR, forecastle deck

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Container spaces
4	Working boat
5	Container terminals
6	Friction winch room
7	Electronics room
8	Crew laundry
9	Room for 2 people (crew)
10-17	Rooms for 1 person (deck crew)
18	Room for crew (machine)
19	Science laundry (self-service)
20	Container space 20'
21	2 Container spaces 20’
22	Forecastle deck
23	Room: Machine room mechanic
24	Room: Machine room mechanic
25	Room: Assistant cook
26	Room: 2nd Steward
27	Room: 2nd Steward
28	Room: Launderer
29	Room: Doctor
30	Hospital
31	OP
32	Treatment room
33	Access to lifeboat

3.2.6 Main deck

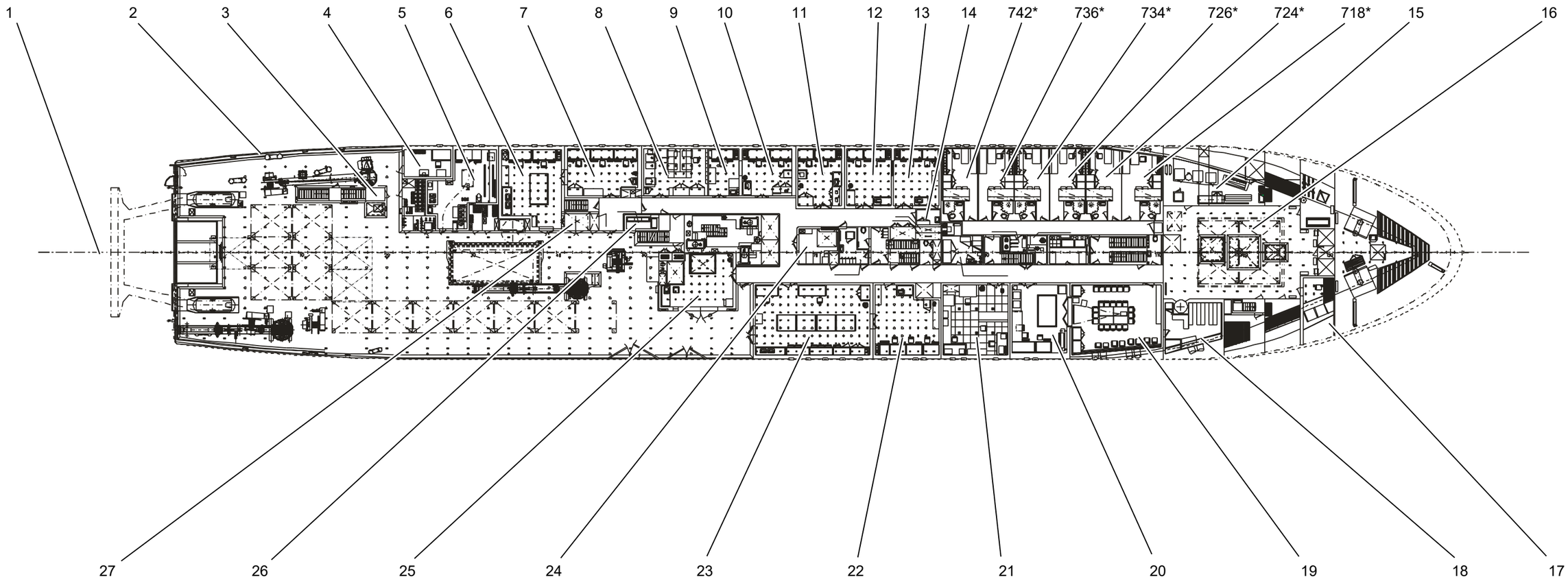


Fig. 8 RV METEOR, main deck with scientific working areas and living areas

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Container terminals
4	Pulser station (laboratory 11)
5	Deck workshop
6	Wet laboratory (laboratory 10)2
7	Measurement and registration room (laboratory 9)
8	Electronics workshop
9	Dry laboratory (laboratory 8)
10	Dry laboratory (laboratory 7)
11	Chemistry and biology laboratory (laboratory 6)
12	Clean laboratory (laboratory 5)
13	Clean laboratory (laboratory 4)
14	Double doors to clean laboratory
742*	Room: 1 scientist + 1 reserve
736*	Room: 1 scientist + 1 reserve
734*	Room: 1 scientist + 1 reserve
726*	Room: 1 scientist + 1 reserve
724*	Room: 1 scientist + 1 reserve
718*	Room: 1 scientist + 1 reserve
15	Laundry
16	Scientific storage area I
17	Paper store
18	Library
19	Conference room
20	Drawing room (laboratory 13)
21	Computer room
22	Universal laboratory (laboratory 15)
23	Geology laboratory (laboratory 16)
24	Gravimeter room (laboratory 12)
25	Filling room (laboratory 17)
26	Store for hazardous materials
27	Lift

*: Position number = room number

3.2.7 Tween deck

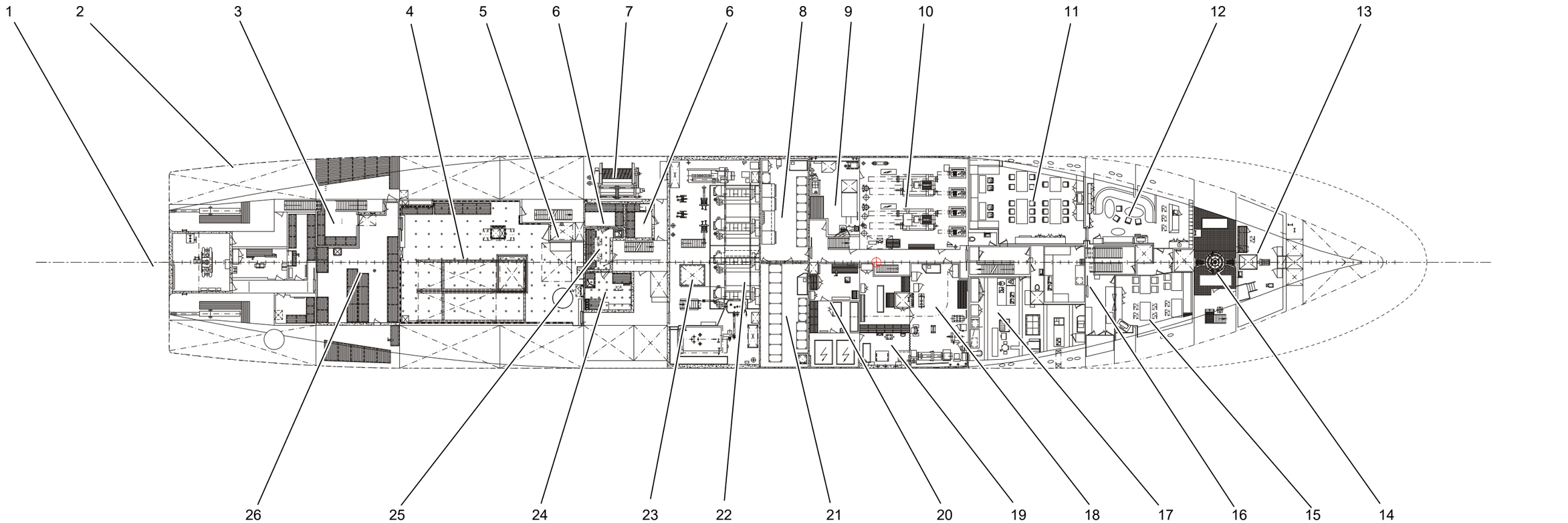


Fig. 9 RV METEOR, tween deck

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Chemicals room
4	Scientific storage area II
5	Lift
6	2 refrigeration rooms -2 to -25 °C
7	Storage winch W 12, 18.2 mm-single conductor cable
8	Machine control console
9	Waste incineration plant
10	Refrigeration room
11	Mess 1 for 28 people
12	Meeting room with bar
13	Measurement and sounding room
14	Bow thruster
15	Mess 2 for 16 people
16	Pantry
17	Galley
18	Machine workshop
19	Welding workshop
20	Electrical workshop
21	Control room
22	Machine room
23	Sounding shaft
24	Aquarium -2 to +25 °C
25	Laboratory and measuring room
26	Scientific storage area III

Tween deck

3.2.8 Storage

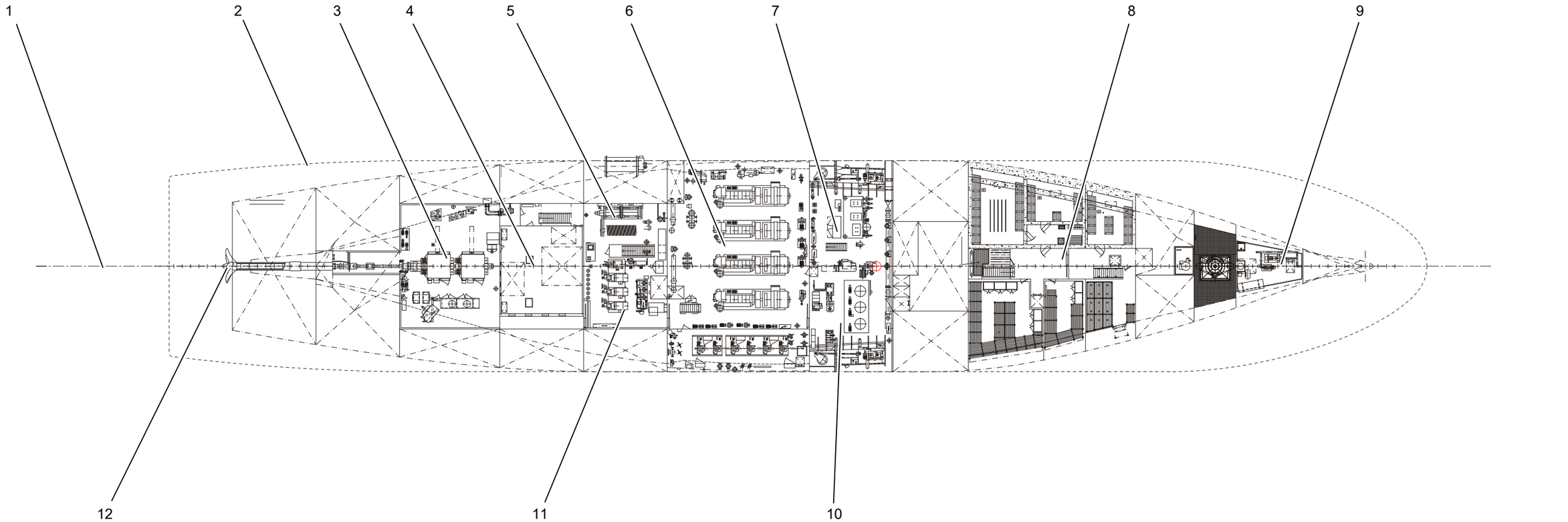


Fig. 10 RV METEOR, storage

Key:

1 Centre line
2 Outer edge of main deck / bulwark
3 Drive motor room
4 Scientific storage area IV
5 Storage winch W 11, 18 mm-deep sea wire
6 Diesel generator room
7 Auxiliary engine room
8 Storage / refrigeration areas ship
9 Ground measurement room
10 Auxiliary engine room
11 Hydraulic room
12 Propeller

Storage

3.2.9 Raised floor

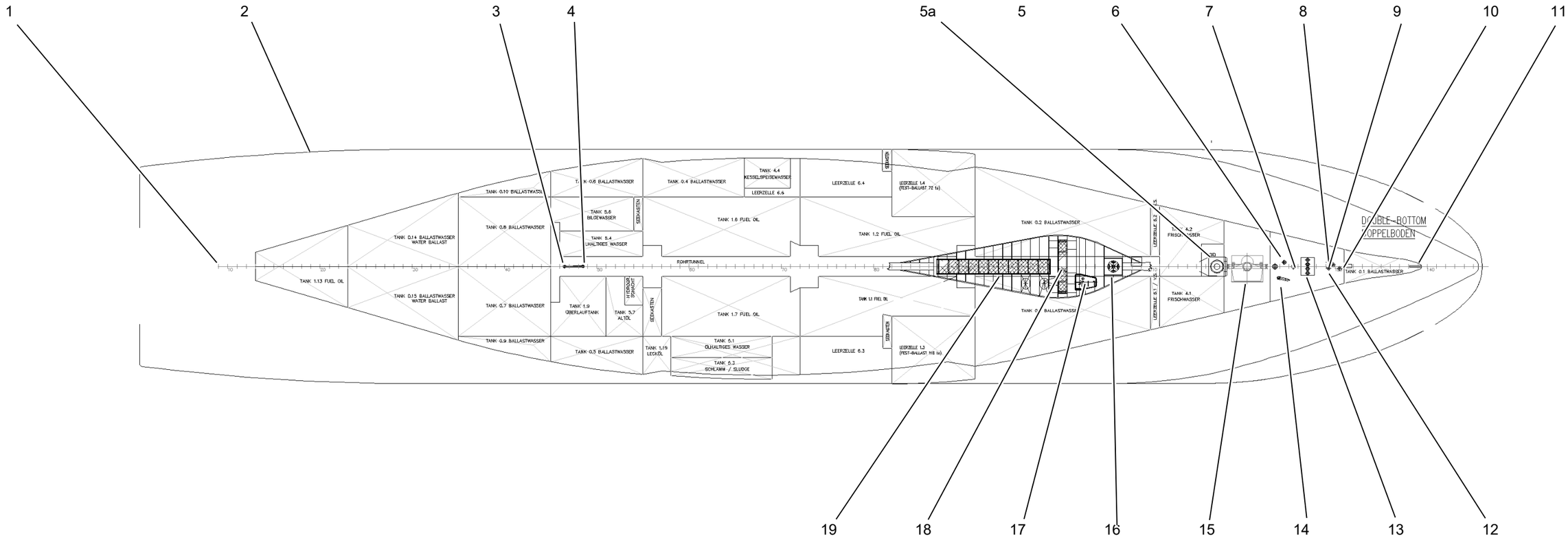


Fig. 11 RV METEOR, raised floor with sensors

Key:

1	Centre line
2	Outer edge of main deck / bulwark
3	Transponder converter
4	Pinger converter
5	Hydraulic lowering device
5a	38kHz-converter ADCP
6	Naviknot converter
7	75 kHz-converter ADCP
8	Dual frequency sound converter
9	Dual frequency sound converter
10	ATLAS Dolog converter
11	Pure sea water intake
12	Dual frequency sound converter
13	Transponder converter
14	Pure sea water intake
15	Bow thruster
16	Posidonia converter
17	EM 710 transmitting and receiving converter
18	EM 122 receiving converter
19	EM 122 transmitting converter

3.3 Plan of staircases

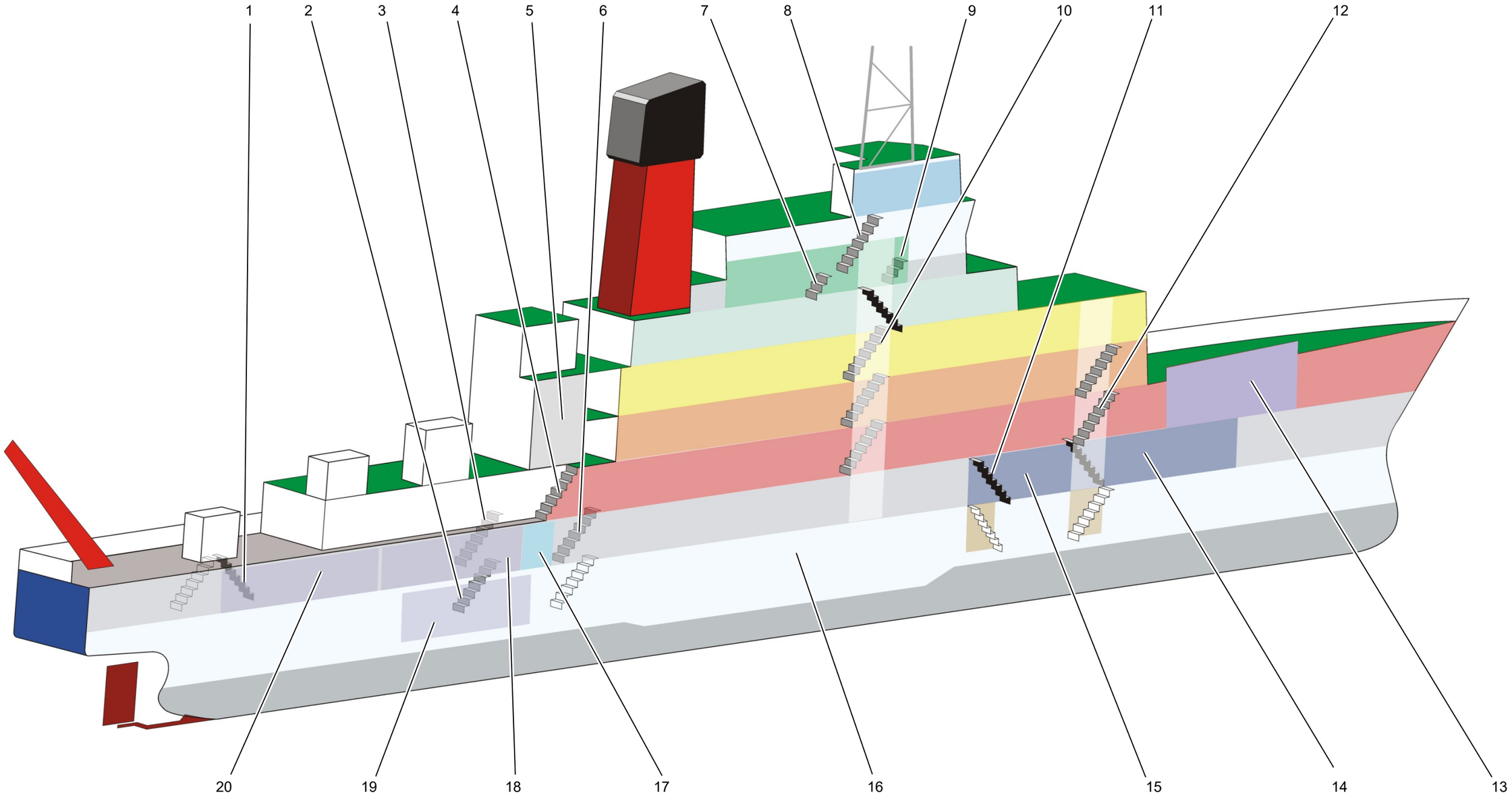


Fig. 12 RV METEOR, arrangement of connecting staircases inside the ship

Key:

1 Deck companionway forecastle rear: Staircase ↘ to scientific storage room 3
2 Tween deck under “3”: Staircase ↘ to scientific storage room 4
3 Main deck next to measurement and registration room: Staircase ↘ to scientific storage room 2
4 Main deck outside: Staircase ↗ midships to the forecastle deck under the movebar
5 Movebar area
6 Inner main deck opposite WTD-workshop: Staircase ↘ to the air-conditioned laboratory rooms
7 3rd superstructure deck: Staircase ↗ to the 4th superstructure deck (sounding centre to bridge aft)
8 4th superstructure deck: Staircase ↗ to the 5th superstructure deck (air chemistry)
9 3rd superstructure deck: Staircase ↗ to the 4th superstructure deck (radio centre to bridge front)
10 Central staircase: Main deck ↗ to 3rd superstructure deck, main deck ↘ to tween deck
11 Main deck: Staircase to ↘ mess (tween deck) and machine (storage)
12 Front staircase: Main deck ↗ 1st superstructure deck, main deck ↘ to the bar (tween deck)
13 Scientific storage area 1 (main deck)
14 Meeting room with bar / mess 2 (tween deck)
15 Mess 1 for scientists and officers (tween deck)
16 Machine rooms (storage and tween deck)
17 Air-conditioned laboratory rooms (tween deck)
18 Scientific storage area 2 (tween deck)
19 Scientific storage area 4 (storage)
20 Scientific storage area 3 (tween deck)

3.4 Lifting apparatus with working area

3.4.1 Cranes on the working deck

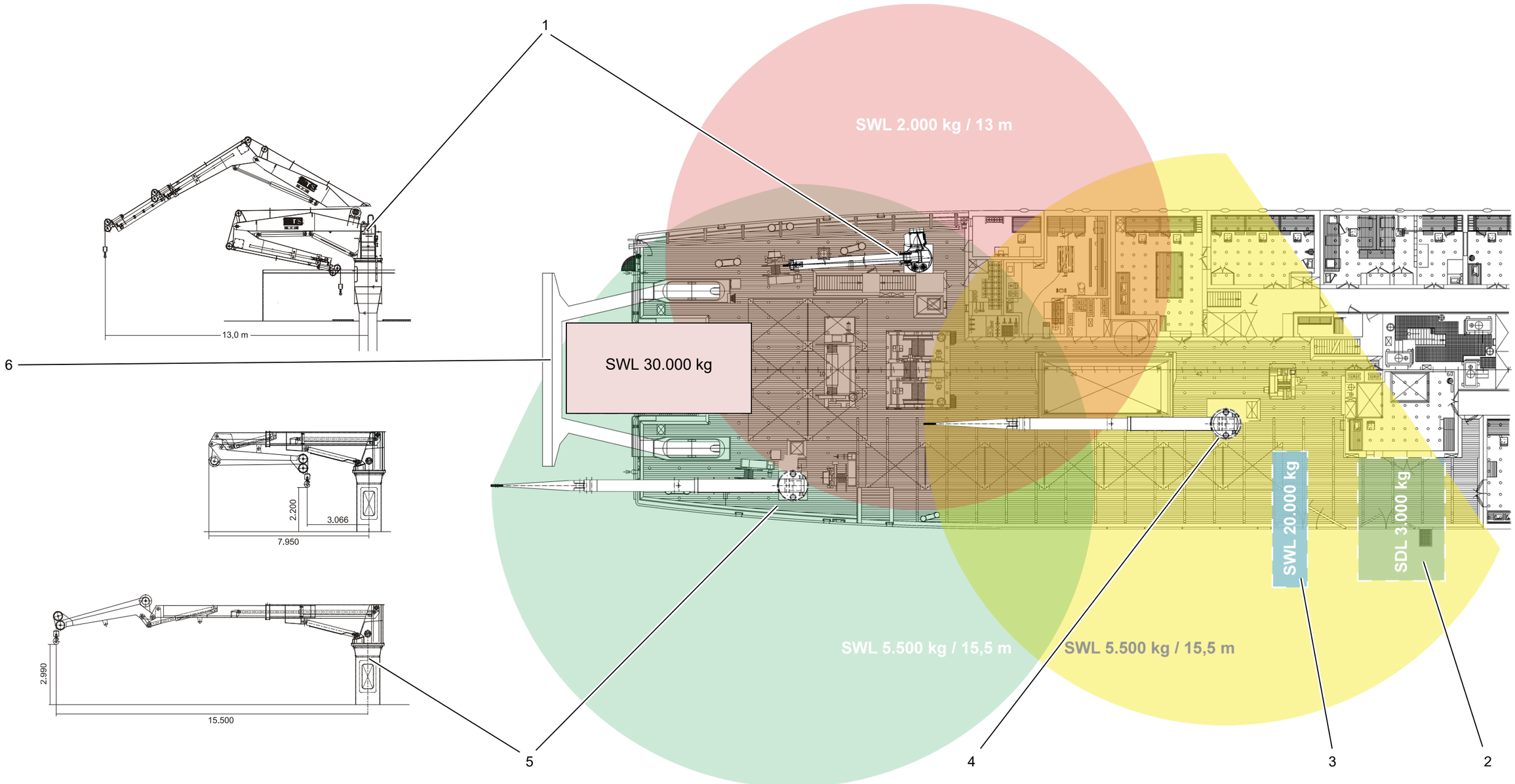
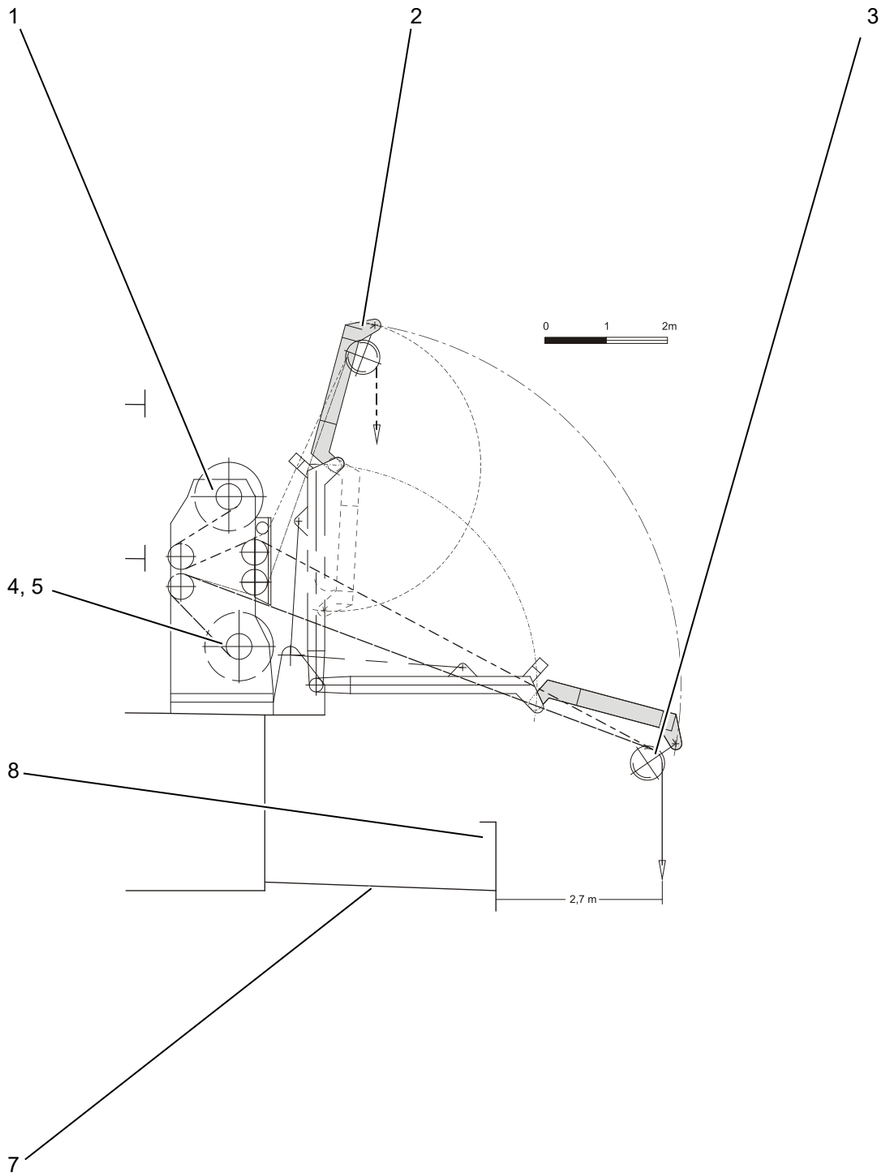


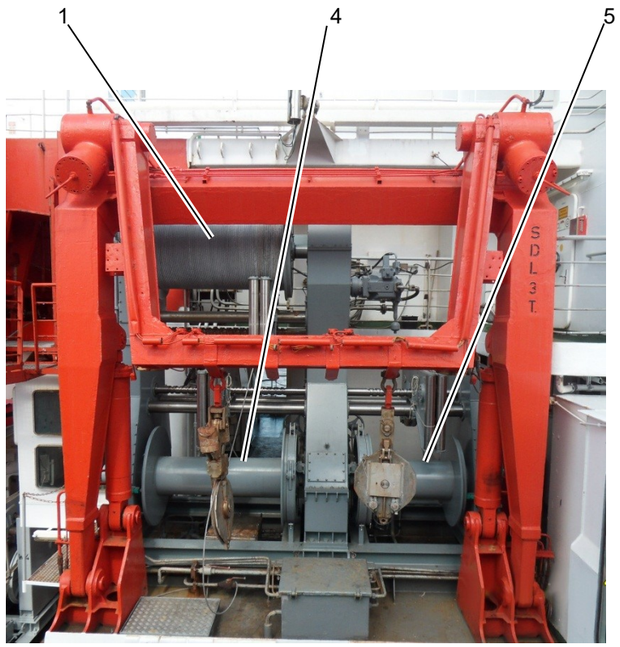
Fig. 13 RV METEOR, deck cranes and lifting apparatus with working area

Key:

1	Crane port rear (9):	SWL 2,000 kg at 13 m radius
2	Outrigger (3):	SDL 3,000 kg with 5,83 m radius
3	Movebar (4):	SWL 20,000 kg at 7.6 m radius
4	Crane deck centre (5):	SWL 5,500 kg at 15.5 m radius
5	Crane starboard rear (6):	SWL 5,500 kg at 15.5 m radius, identical in construction to pos. 4
6	Rear gallows (7):	SWL 30,000 kg up to 3 m behind transom

3.4.2 Outrigger





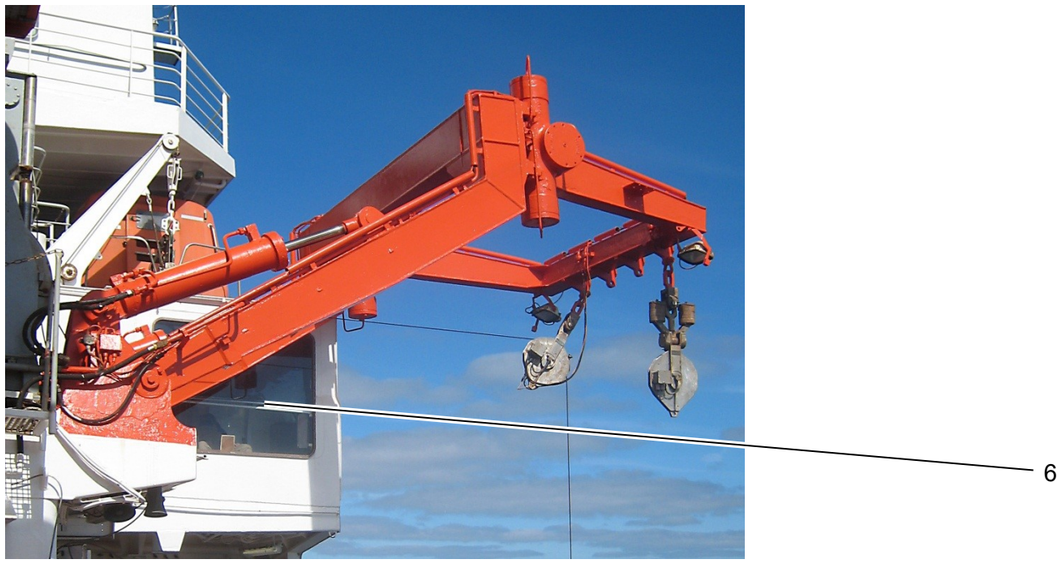


Fig. 14 RV METEOR, outrigger with winch arrangement and cable guide

Key:

1 Winch W 3 (installation height 1st superstructure deck)
2 Outrigger in upper end position
3 Outrigger in side end position
4 Winch W 2 (installation height forecastle)
5 Winch W 1 (dto.)
6 Winch console
7 Working deck (main deck)
8 Bulwark

3.4.3 Movebar

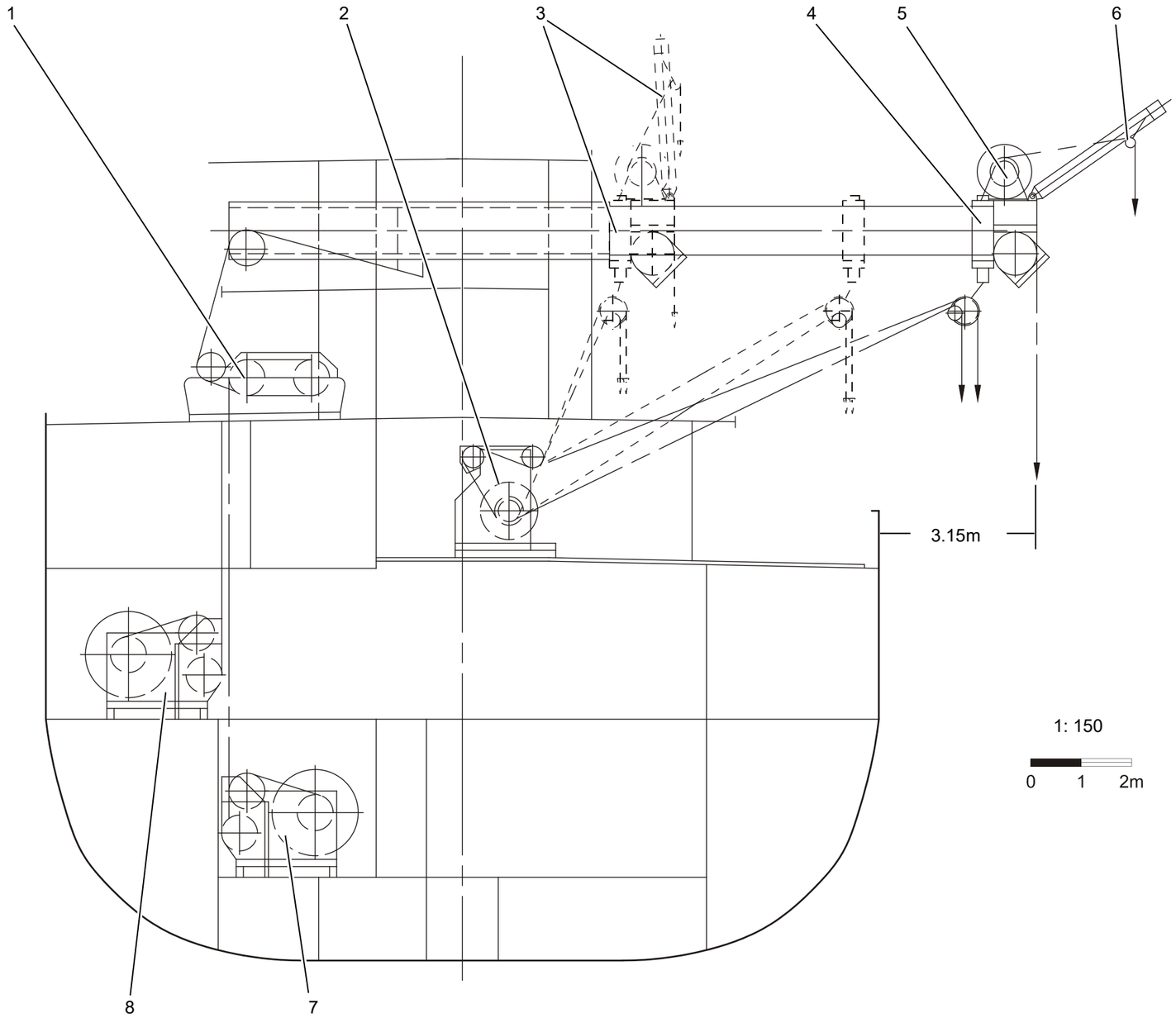
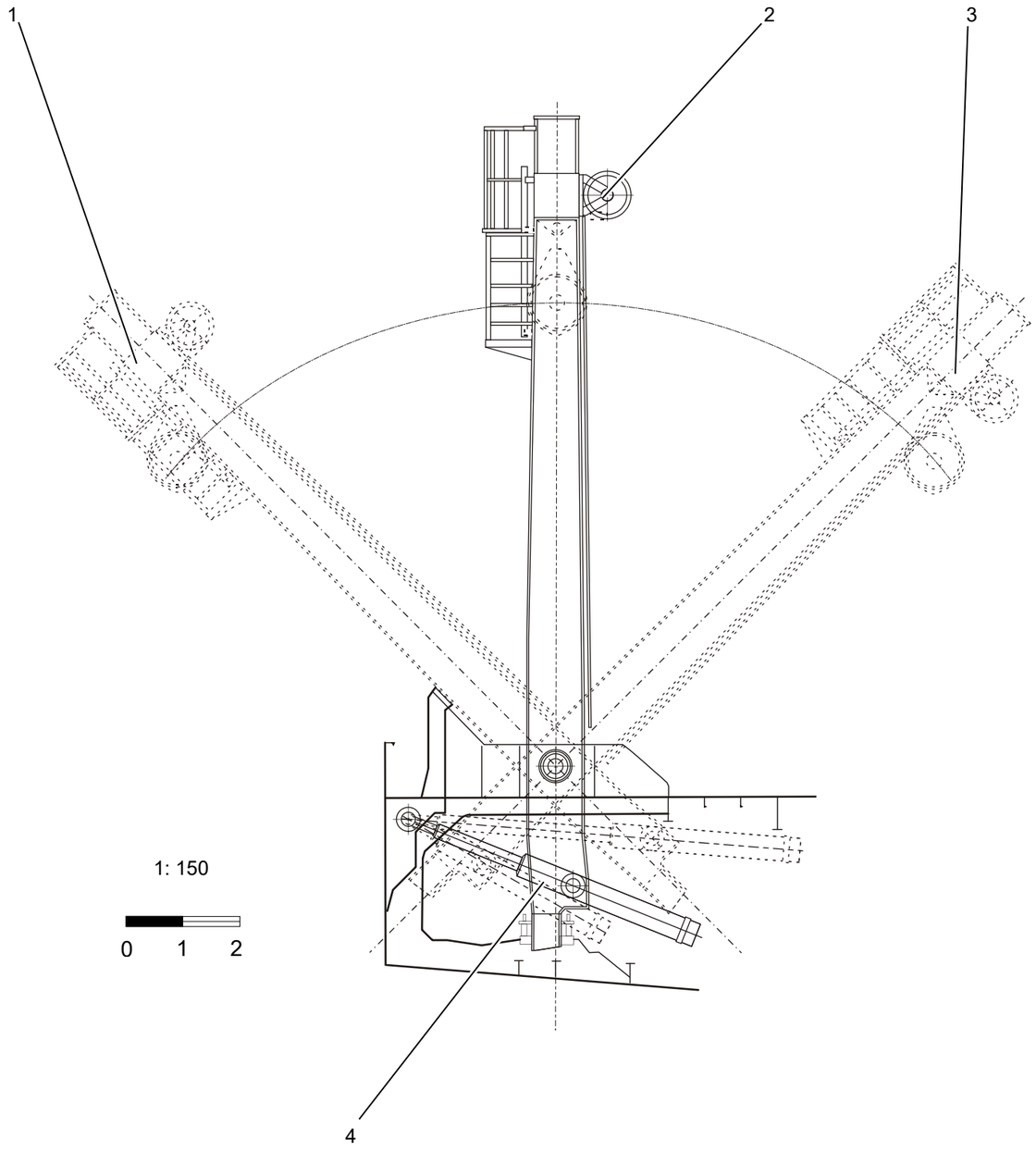


Fig. 15 RV METEOR, movebar

Key:

1 Friction winch W 10
2 Oceanographic wire winch W 4
3 Movebar and outriggers in stop position
4 Movebar in outer end position (Safe Design Load (SDL) 20 t)
5 Movebar positioning winch W 16 SDL 8 t
6 Movebar outrigger in outer working position SDL 7.5 t
7 Storage winch W 11
8 Storage winch W 12

3.4.4 Rear gallows



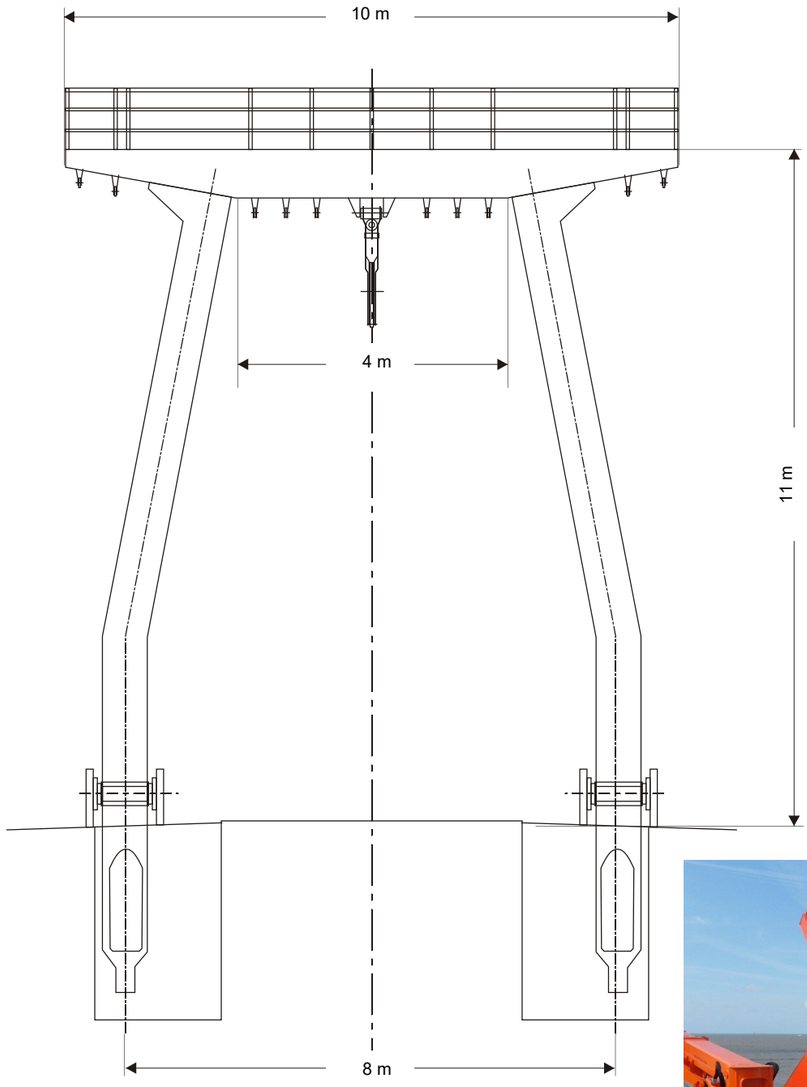


Fig. 16 RV METEOR, rear gallows

Key:

1 Rear gallows end position, swivelled out SDL 30 t
2 Winch W 14 SDL 10t
3 Rear gallows end position, swivelled in SDL 30 t
4 Hydraulic swing drive under working deck

Lifting apparatus

3.4.5 Crane on the foredeck

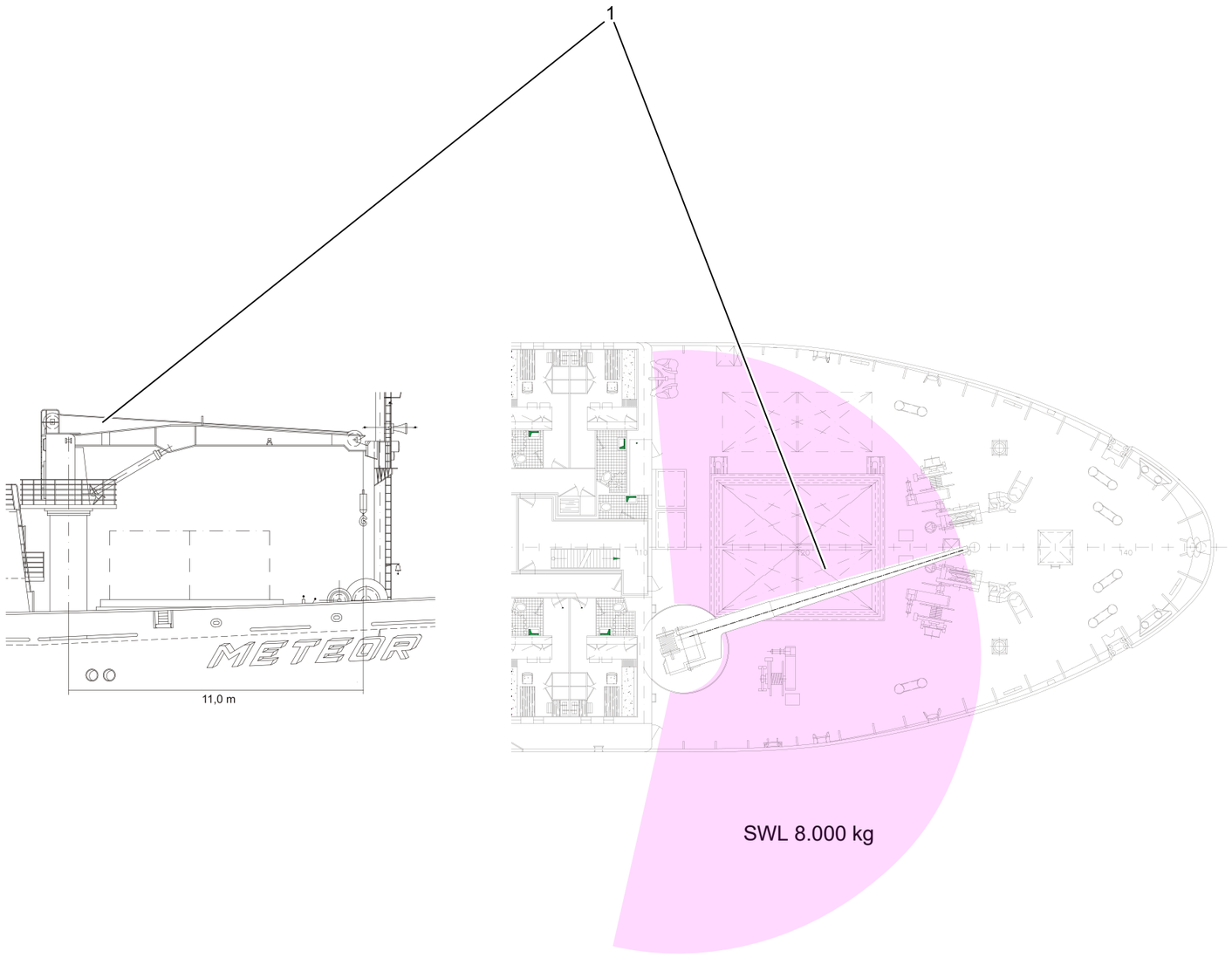


Fig. 17 RV METEOR, crane on the foredeck (provision crane)

Key:

1 Provision crane on the foreship: SWL 8,000 kg at 11 m radius

Lifting apparatus

3.4.6 Crane on 5th superstructure deck

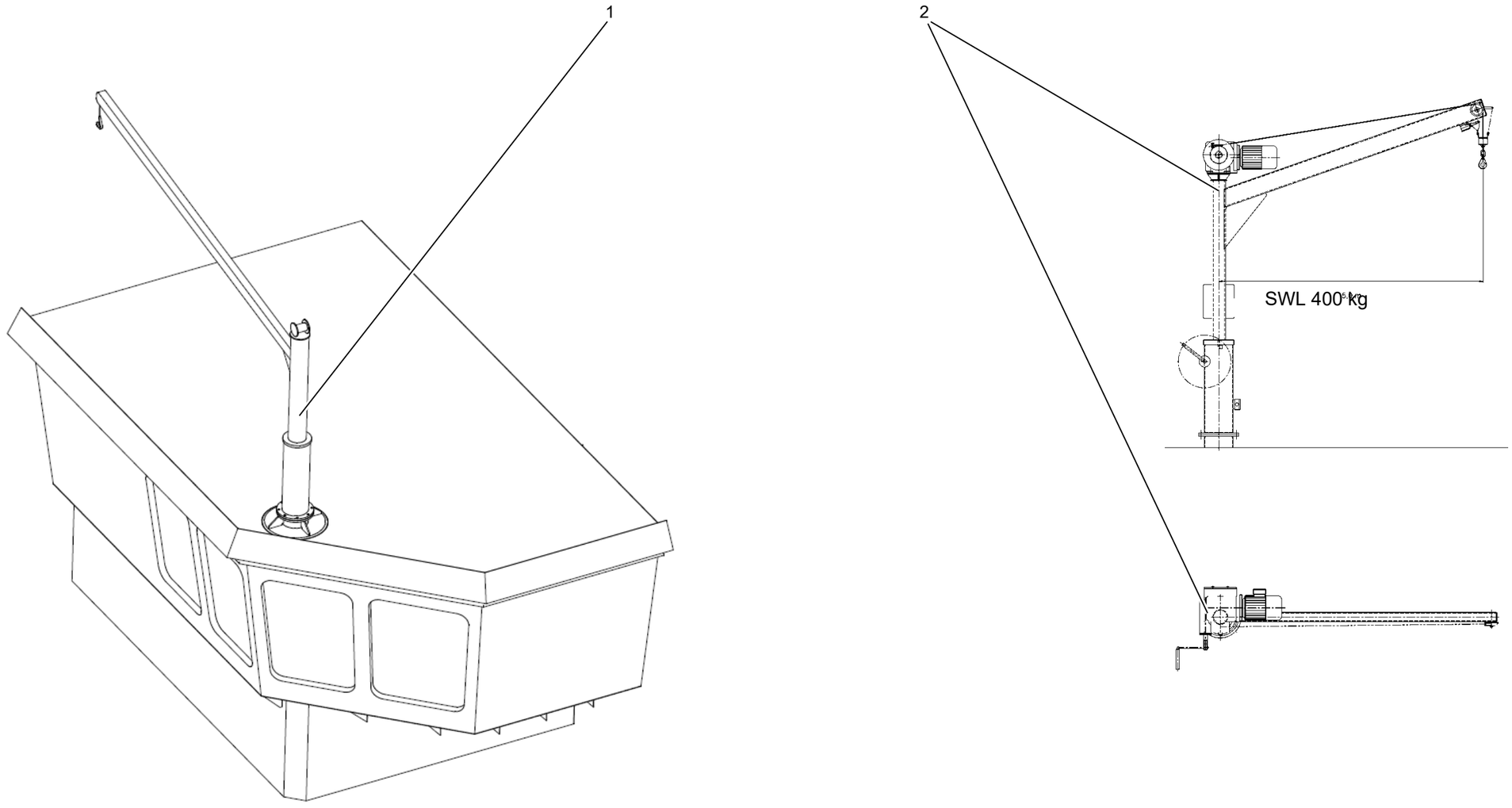


Fig. 18 RV METEOR, crane on 5th superstructure deck

Key:

1	Position of crane on 5th superstructure deck, near rib 64	
2	Crane on 5th superstructure deck	SWL 400 kg at 5 m radius

Lifting apparatus

3.5 Winch and rope data

Winch number / (position number)	W 1	W 2	W 3	W 4	W 10		W 11	W 12	W 14		W 16	W 17
Winch type	Single conductor and series winch			Oceanographic wire winch	Friction winch		Storage winch	Storage winch	Rear gallows winch, switchable		Movebar positioning winch	Transportable rewind winch
Heave speed [m/sec]	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2		0 – 2	0 – 2	0 – 0.3	0 – 0.6	0 – 0.33	3 – 30 m/min
Rope number	D 1	K 1	K 2	D 2								
Rope type	COSA aramide fibre	Single	Single	Stainless steel	Wire	Single	Drakoflex wire	Single conductor	Casar Powerplast wire rope		Casar Powerplast wire rope	
Diameter [mm]	8	11	11	6	18		18	18.2	22		18	max 18.2
Length [m]	2750	6300	6122	1900			10364	8018 space for 11000	45		45	
Make	Aramide fibre core with PA inlay + PE sheath	Coax, steel-reinforced	Coax, steel-reinforced	1x19 1570 N/m² sZ			Drakoflex 1700A zZ	Coax, steel-reinforced	Right-hand lay, Warrington Seale		36x6, right-hand lay, sZ, plastic core	
Corrosion protection		galvanised	galvanised	Stainless steel			thick	thick galvanised	galvanised		galvanised	
Twist free condition		non-rotating	non-rotating						non-rotating		non-rotating	
Tractive force of the winch [kN]	30	30	30	25	200		10/friction 200	10/friction 200	100	50	80	30
Breaking strength [kN]	36	80	80	29.7			207	175	471		300.1	
Breaking strength single wires [kN]		1.6	1.6				1.77	1.8	1.96		1.96	
Safe Working Load [kN], SF= 3.6 (GL for research) or 4 (manufacturer)	10	20	20	8.25			57.5	43.75	130.8	130.8	83.4	
Empty weight [kg/km]	60	470	470	179			1260	1120	2518		1676	
Weight in water [kg/km]	12	390	390	Approx. 160			956	850	2518		1776	
Total weight in water [kg]	72	2340	2340	Approx. 320			10519	6800	113.3		79.92	
Max. residual load in water against pull of winch [kg], with rope at max. stretch, but limiting SWL of ropes	2928	660	660	2180	8670	10155	9481	13200	9869	4886.7	7920.08	
Max. residual load in water [kg], against SWL with rope at max. stretch (mathematical)	928	-340 (if stretched out 6000 m, rope weight exceeds SWL)	-340 (if stretched out 6000 m, rope weight exceeds SWL)	505			-3731 (if stretched out 11000 m, rope weight exceeds SWL)	-2425 (if stretched out 8000 m, rope weight exceeds SWL)	12966.7	12966.7	8260.08	
Min. bending diameter [mm]		200	200	480			720	700	660		660	
Cable structure		19 x 0.287 mm	19 x 0.287 mm					19 X 0.455 mm				
Insulation material		PE	PE					PEw				
Insulation material strength		1.3 mm	1.3 mm					3.3mm				
Material outer cable shield		CU-braid	CU-braid					CU-braid				
Structure outer cable shield		24 x 3 x 0.2	24 x 3 x 0.2					24 x 6 x 0.2 mm				
Reinforcement		2x steel, galv.	2x steel, galv.					2x steel, galv.				
Capacity [nF/km]		110	110					95				
Resistance inside/outside [Ohm/km]		15 / 10	15 / 10					6 / 4				
Test voltage [kV]		8 (2 min)	8 (2 min)					10				
Wave resistance [Ohm]								50				
Attenuation 1 MHz [dB/km]								6				
Attenuation 10 MHz [dB/km]								20				

Status: 04.06.2025

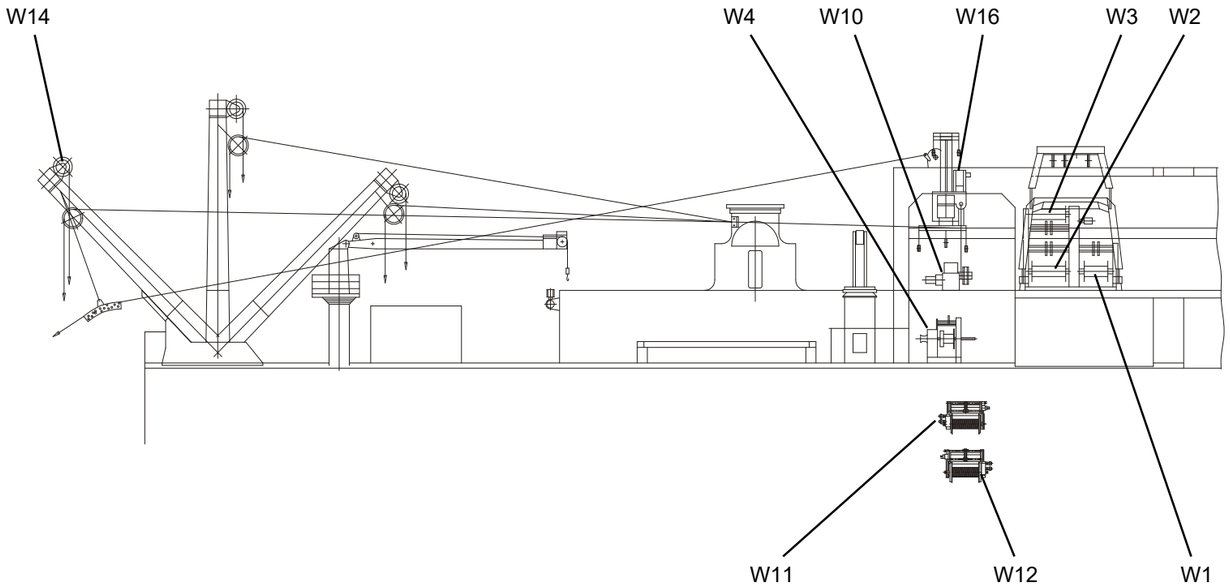


Fig. 19 RV METEOR, winch arrangement and cable guide (without mobile or container winches)

Winch and rope data

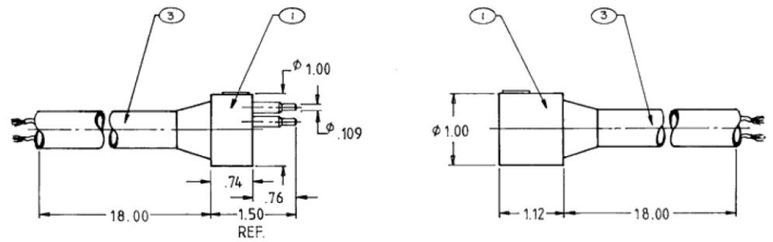
Connecting plug for the Koax single conductor cable

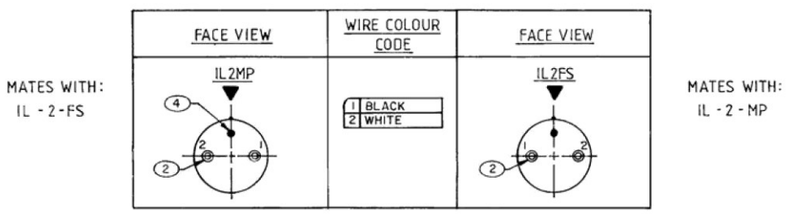
Watertight underwater sockets are fitted on the "wet end" on the coaxial single conductor cables.
The plugs can be used for the connection of measurement appliances, e.g. CTD probes.

Manufacturer	Sea Connections Systems Ltd.
Plug type	IL-2-FS (female)
Opposite piece on the appliance	IL-2-FS (male)

Plug layout

Core 1	Black	Shield (earth)
Core 2	White	Signal cable





1 RUBBER MOULD: NEOPRENE B/A X-5727
2 MALE/FEMALE CONTACTS: COPPER ALLOY AND GOLD PLATED PER MIL-G-45204
3 CABLE: 18 SO NEOPRENE CABLE 18/2,18/3,18/4
4 GUIDE PIN (MALE CONNECTOR): 304 STAINLESS STEEL PER QQ-S-763

3.6 Container spaces

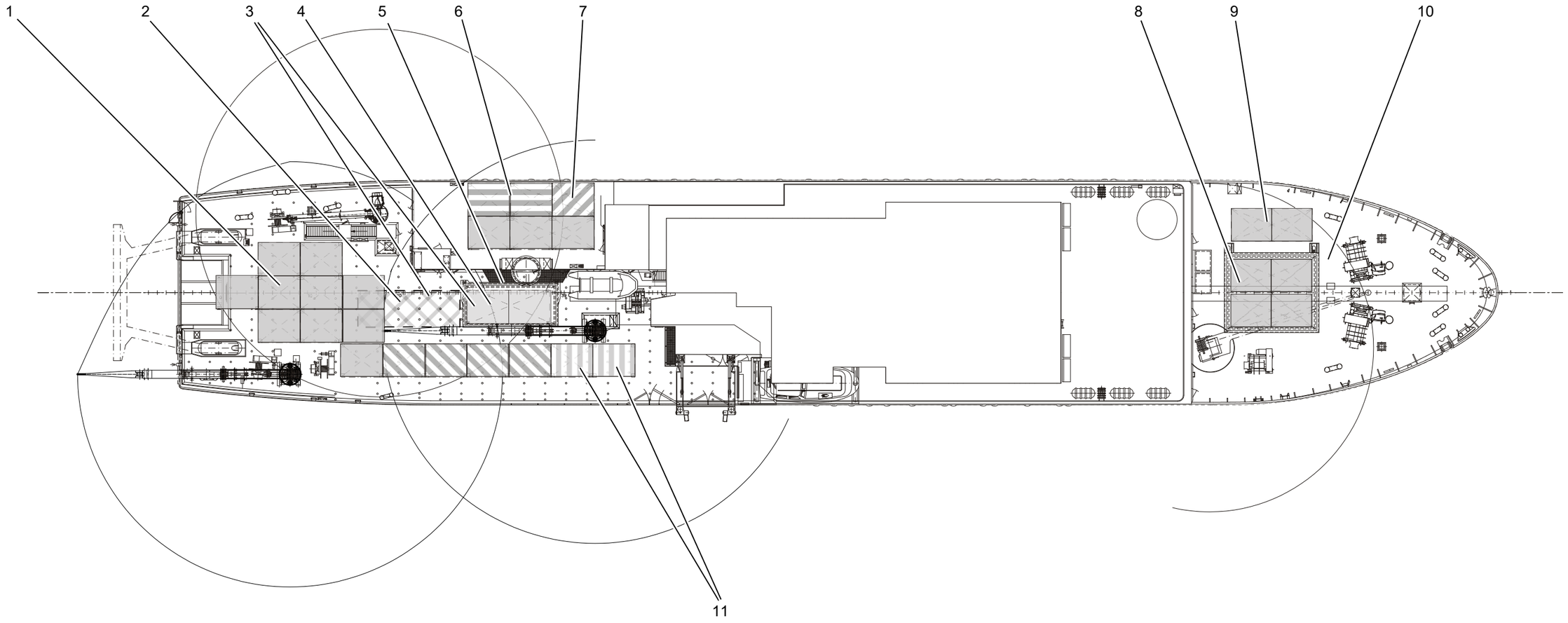


Fig. 20 RV METEOR, container spaces

Caution

The total weight of the scientific load capacity is 60 to.

Key:

1 Working deck with total of 16 spaces of 10 ft (or 6 of 20 ft + 4 of 10 ft)
2 Container feet for 30’ LMF compressor container
3 Spaces for FOC container cable winches 150/20, if in use (2 of 20 ft)
4 Hatch cover of hatch to scientific storage room 2 with 1 space of 20 ft / 8 t
5 Scientific storage room 2 with 6 spaces of 10 ft or
6 2 spaces on the rear forecastle are permanently reserved for the German Meteorological Service
7 1 space on the rear forecastle is occupied by a disposal container
8 Hatch cover on forecastle deck 4 x 10 ft spaces (or 2 x 20 ft)
9 Forecastle deck on port side with 2 x 10 ft spaces (or 1 x 20 ft)
10 Scientific storage area 1 with 4 x 10 ft spaces (or 2 x 20 ft)
11 Do not use these spaces if possible (safety assembly point and crane working area)

Caution

Containers which are brought / stowed on board must meet the US coastguard standard (proof with a test certificate)

Note

Containers which are to be stowed in the scientific storage area 1 (Fig. 20/10) must be loaded in such a way that the doors can be opened through the hatch before lowering.

If 2 containers are stored in the scientific storage area 1 (Fig. 20/10), then only the outer doors of the adjoining containers can be opened!

Note

Lashing in the form of twistlocks, chains, rods and clamping bolts is available on board for securing the containers on board.

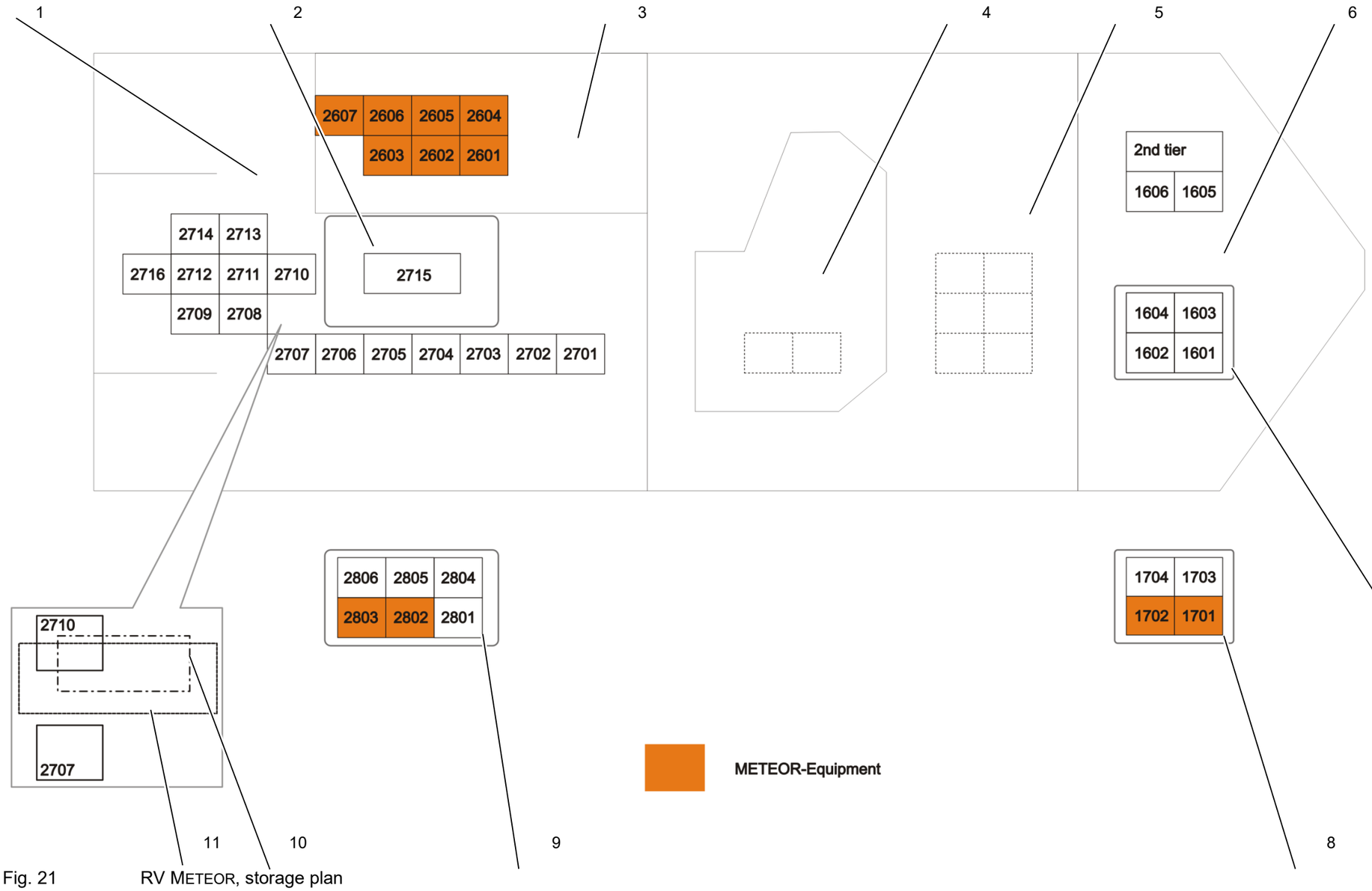
The weight load is limited to 10,000 kg per 10 ft. space.

Loading and unloading can usually be carried out with the onboard cranes, for working areas see chap. 3.4.1 and 3.4.6

Note

In the tropics a maximum of one refrigeration container can be placed in the hatch for scientific storage space 2 (Fig. 20/3).

3.6.1 Numbering of container spaces



Key:

1	Working deck
2	Hatch cover to scientific storage room 2
3	Forecastle deck, rear
4	Observation deck
5	Heli deck
6	Forecastle deck, front
7	Hatch cover to scientific storage room 1
8	Scientific storage room 1
9	Scientific storage room 2
10	Space for FOC winch 20’
11	Space for compressor 30’

Fig. 21 RV METEOR, storage plan

RV Meteor / DBBH

Master: _____ Port: _____

Voyage: _____

Issue: _____

	Cont. No. General Cargo	Weight [mt]	Stowage	Remarks
1	ASDE 02	5.5	2605 + 2606	DWD container
2	Helium gas bottle	2.4	2603 + 2607	DWD gas bottles
3	HBSU 100 704-1	2.2	2604	SOPEP container
4	BCHU 240 125-0	7.5	2601 + 2602	Lab container
5	RAVU 030 141-1	9.5	1701 + 1702	Provision container
6	MEBO frame	1.5	On top of 1701 + 1702	On top of canteen container
7	Mobile M winch	3.0	2802	Mobile METEOR winch
8	Spooling winch	6.0	2803	General Cargo without
9	Core stacking frame	2.9	On top of 2601 + 2602	On top of lab container
10	Parts of grav. Core frame	3.4	BD fwd	Pin + adapter
11				
12				
13				
14				
15				
16				
17				
18				

Additionally general equipment:

3.6.2 Deck socket grid

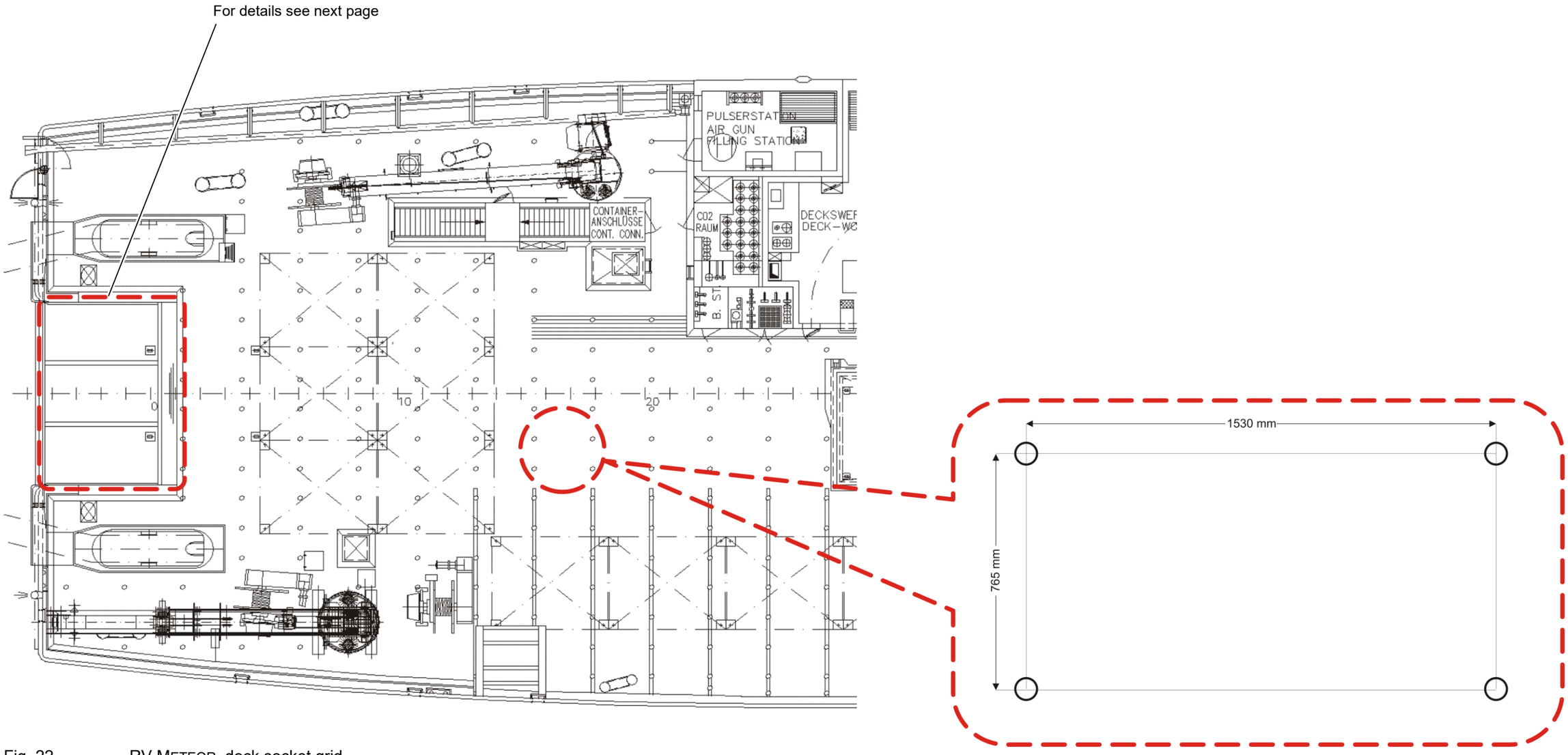
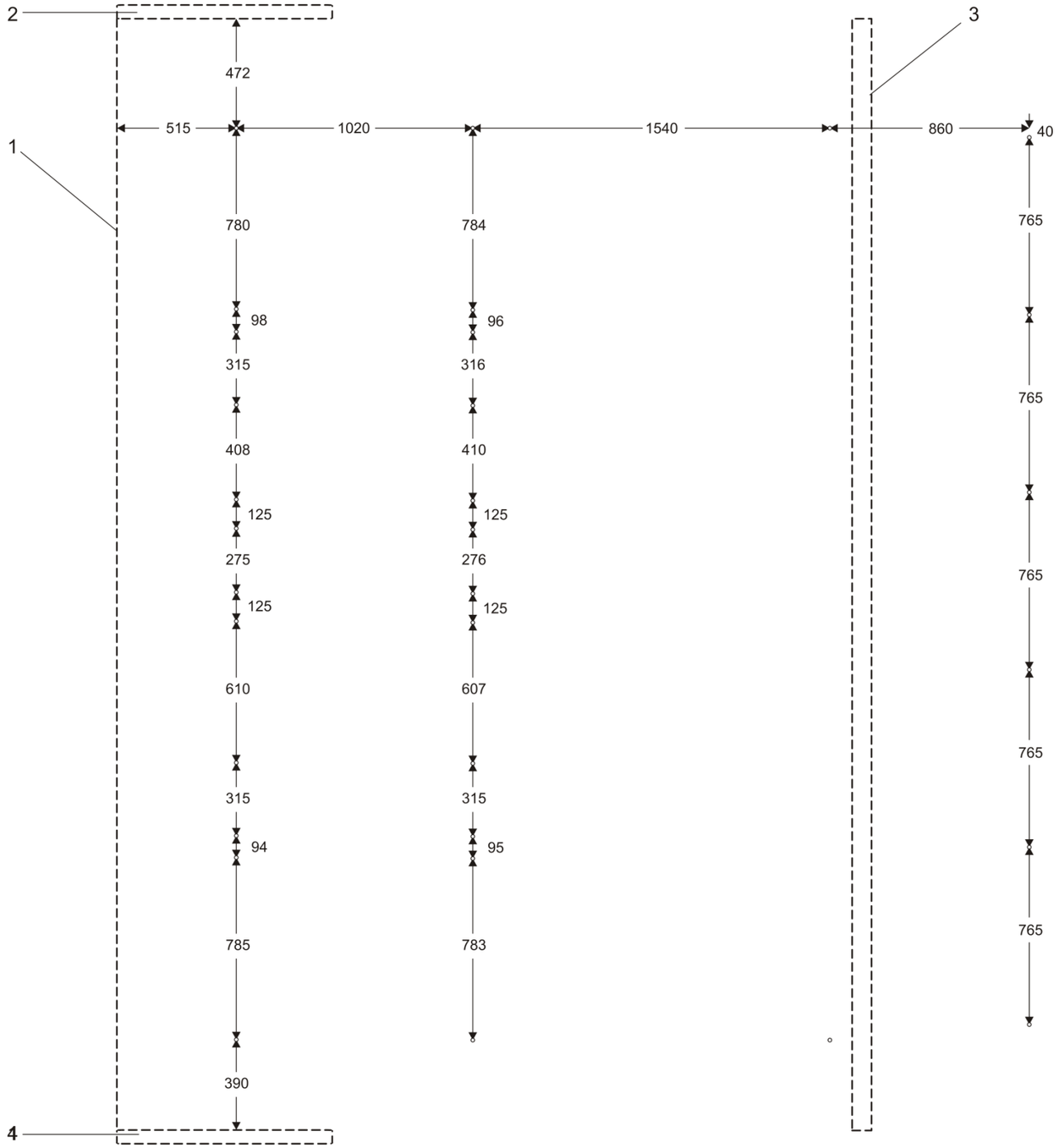


Fig. 22 RV METEOR, deck socket grid



Key

1 Rear edge of rear float
2 Bulwark, port
3 Front edge of built-over rear float
4 Bulwark, starboard

Fig. 23 RV METEOR, deck sockets of built-over rear float

3.7 Scientific storage area

3.7.1 Scientific storage areas I and IV

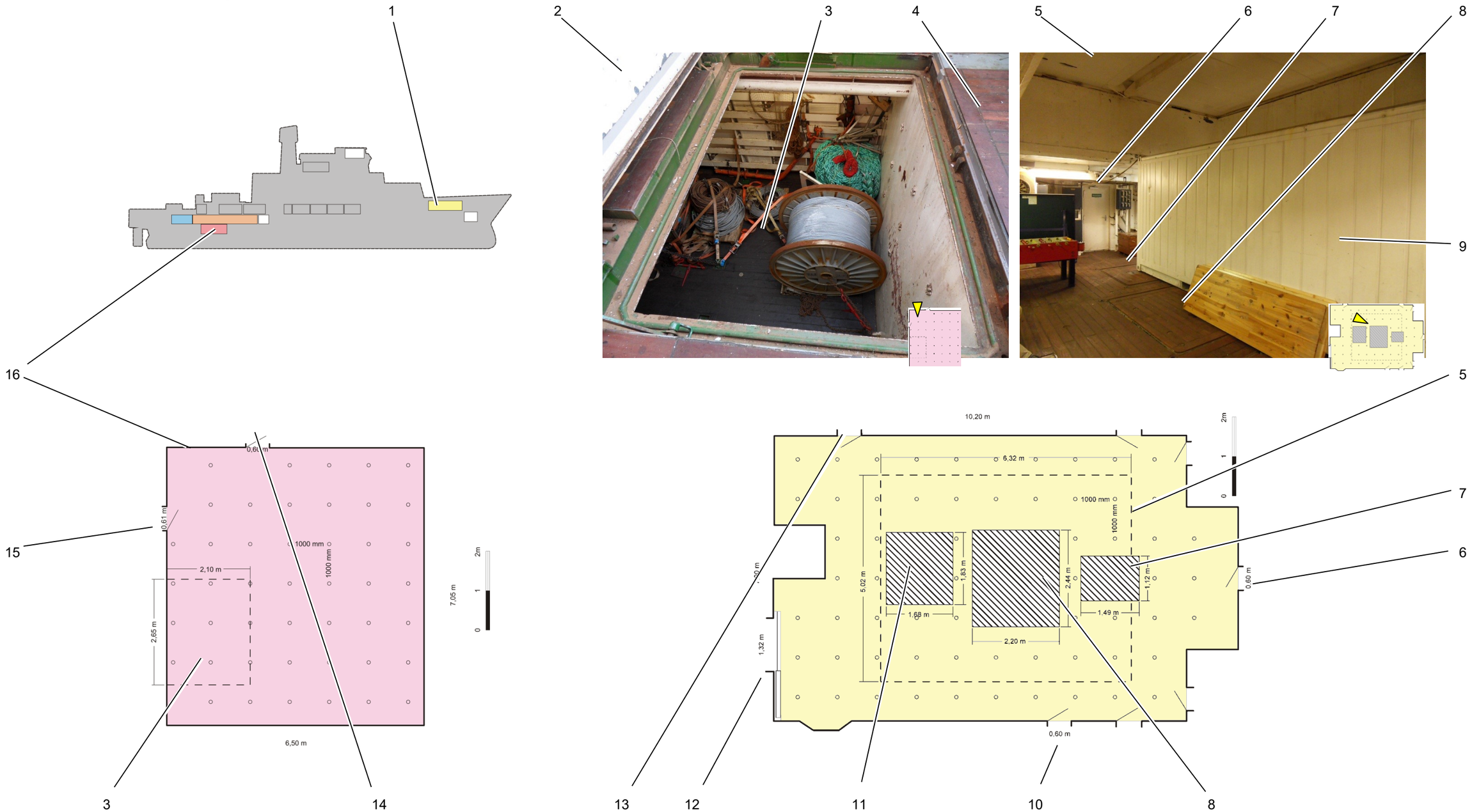


Fig. 24 RV METEOR, scientific storage areas I and IV

Key:

1 Scientific storage area I (WS I) on the main deck:
2 Opened hatch cover WS II to WS IV
3 Hatch opening WS II to WS IV
4 Deck surface in WS II
5 Deck opening and hatch coaming to forecastle above the scientific storage area I
6 Access to emergency exit foreship
7 Floor hatch in WS I
8 Floor hatch in WS I
9 Load 20' container in WS I
10 Access to staircase for sounding and measurement room
11 Floor hatch in WS I
12 Passage to main floor on main deck
13 WS I main deck: Access to on board laundry
14 Scientific storage room IV (WS IV) in storage: Access to the staircase for the aft ship
15 Access to the drive motor room
16 WS IV in storage

3.7.2 Scientific storage areas II and III

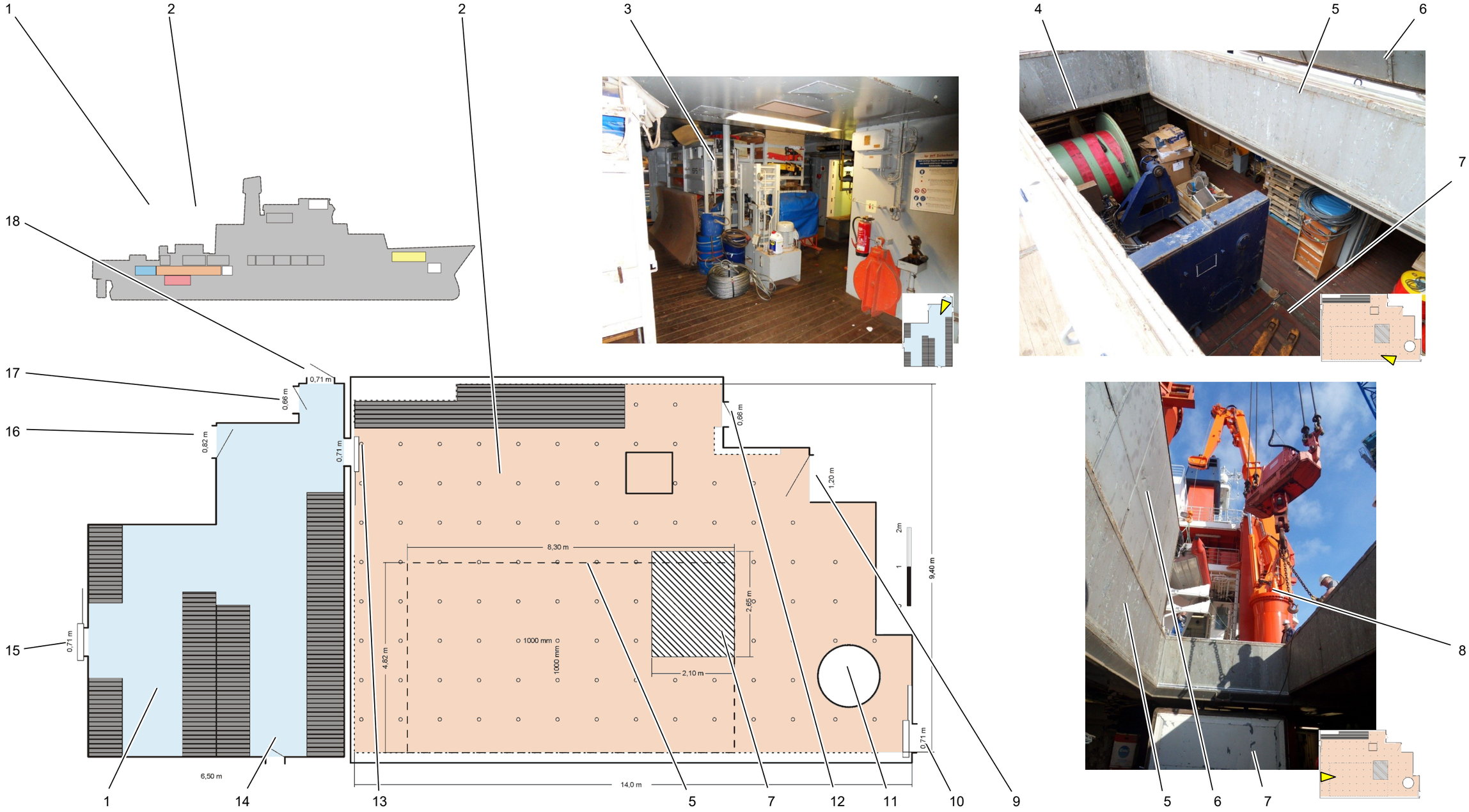


Fig. 25 RV METEOR, scientific storage areas II and III

Key:

1 Scientific storage area III (WS III) on the middle deck
2 Scientific storage area II (WS II) on the middle deck
3 View into the scientific storage area III
4 View into the scientific storage area II
5 Deck opening and hatch coaming to main deck above the scientific storage area II
6 Deck opening of the main deck to the WS II: Hatch cover opened
7 Deck opening with hatch cover from WS II to WS IV in storage
8 Main deck crane
9 Load lift to the deck and wet laboratory
10 Access to the landing (machine room, aquarium, aquarium staircase)
11 Crane column main deck crane (pos. 8)
12 Access to the staircase laboratory area rear
13 Watertight bulkhead with access from the scientific storage area II to III
14 Access to deck
15 Access to landing (rudder machine room, stores)
16 WS III middle deck: access to explosives room
17 Access to the staircase for the aft ship
18 Access to machine

Scientific storage areas

3.8 Antenna plans

3.8.1 Side and cross view

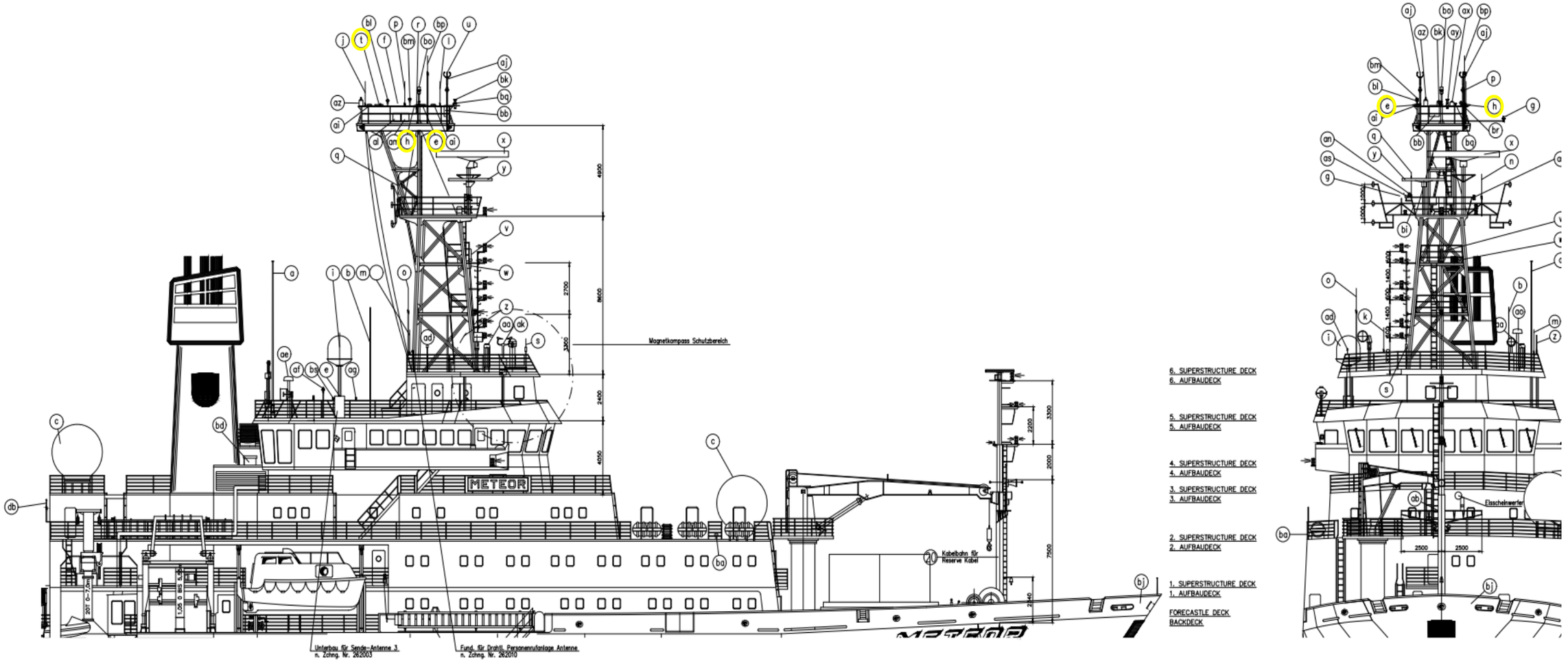


Fig. 26 RV METEOR, side and cross view

3.8.2 Top view

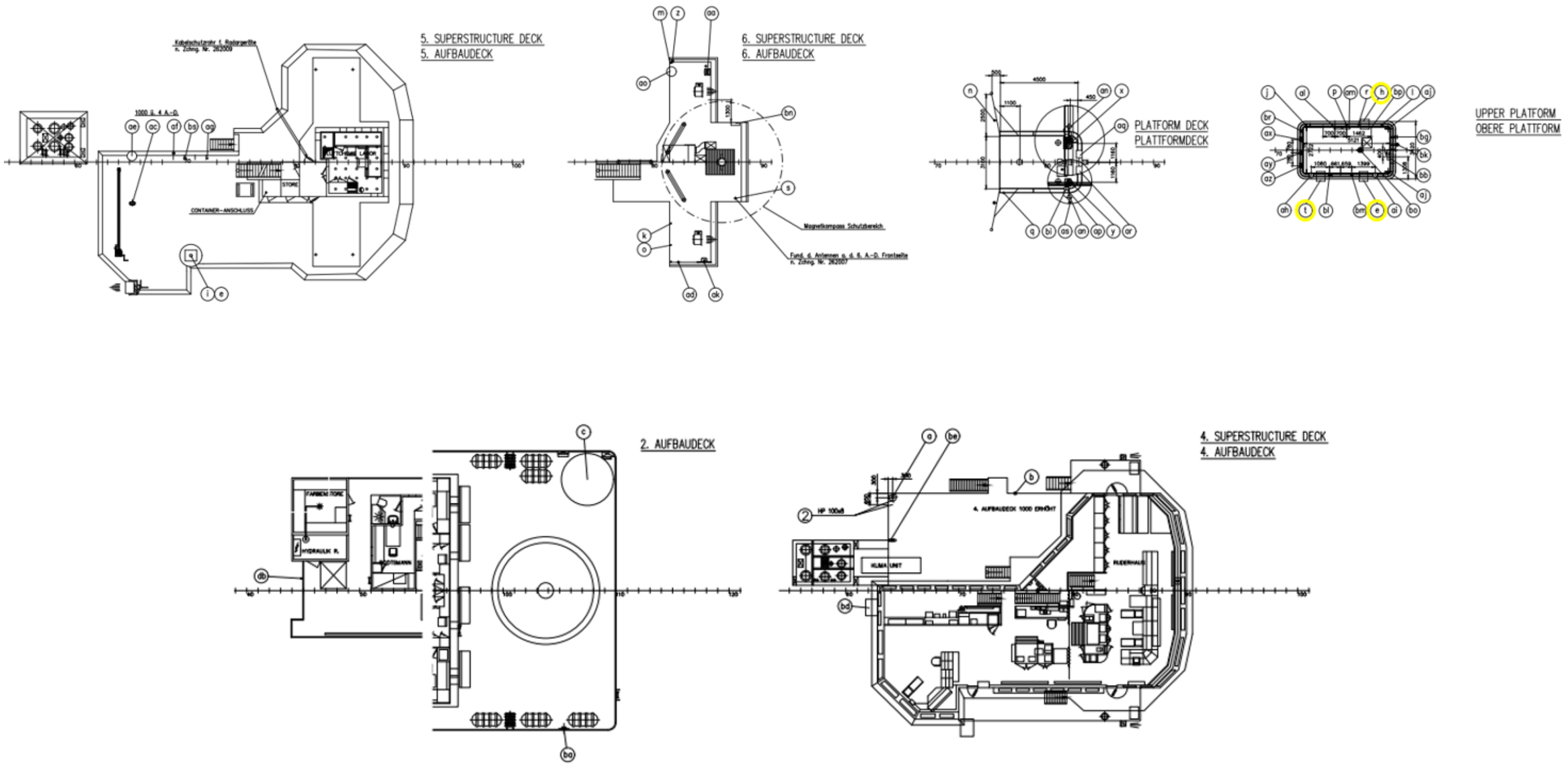


Fig. 27 RV METEOR, side and cross view

Key

Pos.	Benennung	Typ
br	Sonnenscheindauer	
bq	Niederschlagsmesser ja/nein	Thies Niederschlagswächter
bp	AIS VHF Antenne	Raytheon GX4
bo	Peilantenne	Rhoteta 500-M
bn	Dustmonitor	
bm	DGPS	SAAB R6 Premium
bl	DGPS	SAAB R6 Premium
bk	Niederschlagsmesser Menge	Eigenbrodt SRM 450
bj	Kabelkasten	K 7
bs	NAVTEX Antenne	Furuno NX-7H
bi	Kasten für Heizungs-Labyrinth	K 6
be	Seenotfunkboje	Kannad Auto 406
bd	Funkbatterie	
bb	Kabelkasten DWD	Signal und Power
ba	Kabelübergangskasten 3	
az	UV Sensor	Kipp&Zonen UV-S-EA-T
ay	Globalstrahlung	Kipp&Zonen Pyranom. CMP22
ax	Langwellen Strahlung	Kipp&Zonen Pyrgeom. CG4
aw	VHF Funk-Rep. Netzteil + Sender A	OMAN-TRA
av	VHF Funk-Repeater Antenne A	PCPI-70 RH/h
au	VHF Funk Repeater Antenne B	PCPI-70 RH/h
at	VHF Funk-Rep. Netzteil + Sender B	OMAN-TRA
as	Luftdrucksensor (Labyrinth)	Vaisala PTB220
ar	Signalsammelkasten	Mesta
aq	Kasten für Signalaufbereitung	K 5
ap	Kasten für Stromversorgung	K 4
ao	Iridium Certus (Speedcast)	Iridium
an	Beheizter Psychrometer m. Schutzhütte	3020.0000 u. 3022.0000
am	Kabelkasten WTD	Signal
al	Kabelkasten WTD	Power
ak	Sichtweitenmessgerät	Vaisala FS11
aj	Windgeschwindigkeit / Windrichtung	4431.2111 Thies Ultrasonic 2x
ai	Seapath 2	NovAtel GNSS-850
ah	Seapath 1	NovAtel GNSS-850
ag	Ex-GPS Meilen (Anzeige ist ausgebaut)	FURUNO FA-170

Pos.	Benennung	Typ
af	INMARSAT-C LRIT	Sailor 3027
ae	Iridium Certus	Iridium
ad	SSAS Iridium	Sailor
ac	VDR	
ab	Kabelübergangskasten 2	
aa	Wolkenuntergrenzesensor DWD	VAISALA CL51
z	UKW Antenne DWD (Obsolet)	
y	Radar-Antenne X-Band	GR 3004 BZ
x	Radar-Antenne S-Band	GR 3013 A001, A002 BZ
w	Radar-Antwortbake Anschlußkasten	Abgeschaltet (OBSOLET)
v	Radar-Antwortbake	Seawatch 300/28 (OBSOLET)
u	Windgeschindigkeit / Windrichtung	Thies Ultrasonic
t	Starlink Crew (Stb achtern)	Starlink
s	AIS VHF alt (Nicht mehr in Betrieb)	CX4
r	AIS GPS Antenne	SIMRAD
q	UKW6 Achterer-Fahrstand S/E-Antenne	Raytheon CX4 (Sailor RT2048)
p	UKW1 GMDSS S/E-Antenne	Raytheon CX4 (Sailor RT5022)
o	UKW4 Brücke Steuerbord S/E-Antenne	Raytheon CX4 (Sailor RT5022)
n	UKW3 Brücke Backbord S/E-Antenne	Raytheon CX4 (Sailor RT4800)
m	UKW2 GMDSS Konsole DSC-Antenne	Raytheon CX4
l	UKW2 GMDSS S/E-Antenne	Raytheon CX4 (Sailor RT5022)
k	UKW1 GMDSS Brücke Mitte DSC-Antenne	Raytheon CX4
j	UKW5 Kommunikationstisch S/E-Antenne	Raytheon CX4 (Sailor RT2048)
i	SAT-TV-Antenne	
h	Starlink Briese (Bb)	Starlink
g	INMARSAT-C	Sailor 3027
f		
e	Starlink Speedcast (Stb)	
db	UHF Tetra Pager Antenne achtern	
da		
c	Standleitung Intelsat	SeaTel 9797
b	GW/KW-DSC-Kontroller RX GMDSS	Raytheon AR55T
a	GW/KW Sende-Antenne GMDSS	Raytheon AT82D

3.9 Overview: Escape routes / assembly point / rescue resources

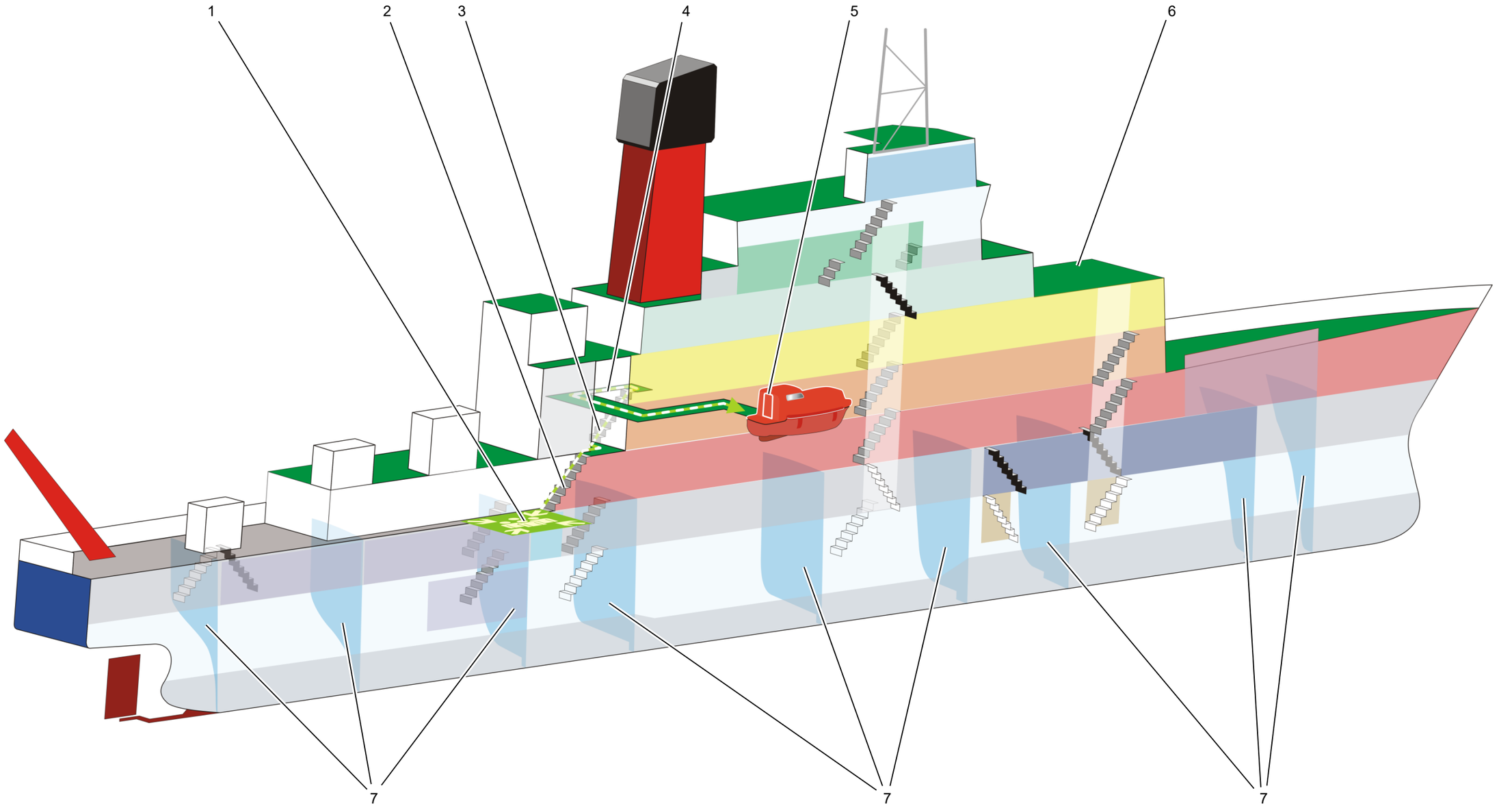


Fig. 28 RV METEOR, escape routes to assembly point and rescue boat

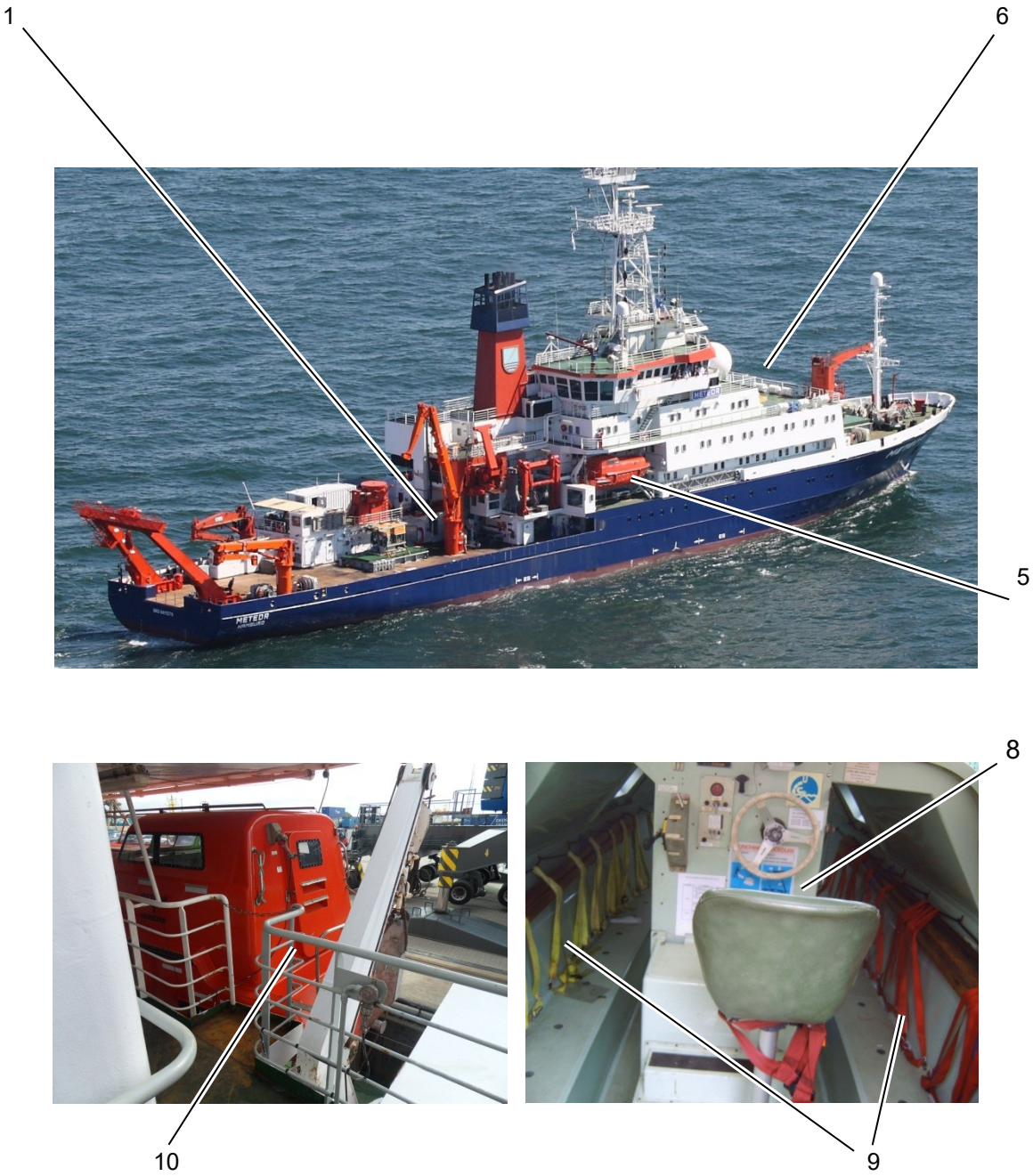


Fig. 29 Rescue resources

1	Assembly point main deck	6	Life rafts on the 2nd superstructure deck
2	Staircase, main deck ↗ to forecastle deck	7	Watertight bulkheads
3	Staircase forecastle deck ↗ to 1st superstructure deck	8	Boatsman's seat
4	Ambulatory 1st superstructure deck port	9	Seats with safety belts
5	Lifeboat starboard	10	Lifeboat entry from behind

Escape routes

4. LABORATORY AND WORKROOMS ON BOARD

4.1 General

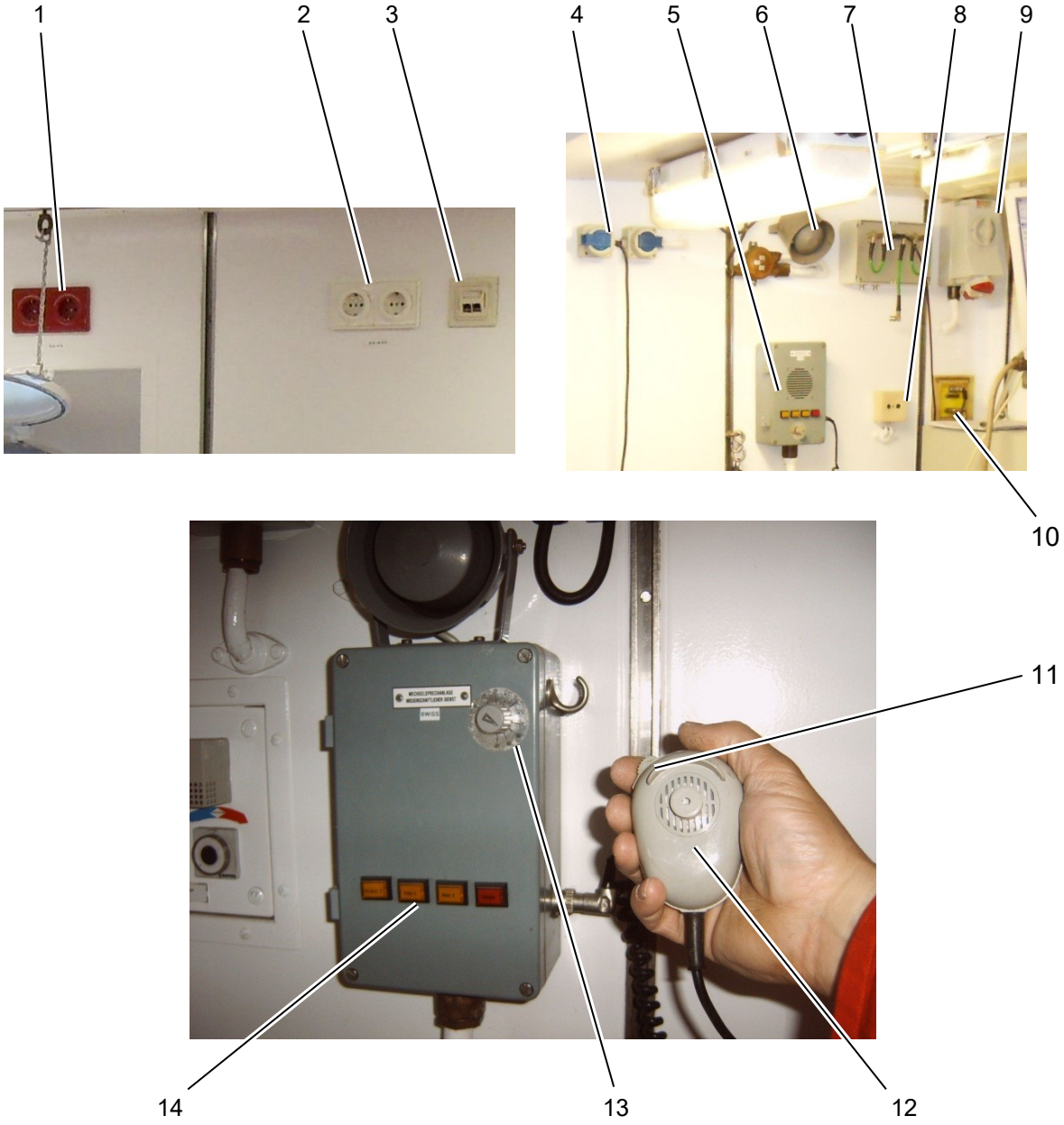


Fig. 30 Equipment details for the laboratory and workrooms

1 Double socket red, 220 V (RFI suppressed)
2 Double socket white, 220 V, not RFI suppressed
3 Network connections (LAN)
4 Double socket 220 V in wet rooms
5 Intercom science (pos. 11 -14)
6 Loudspeaker for announcements
7 Connection for control monitors
8 Antennae socket
9 Socket 380 V with switch
10 Connections to data distribution system
11 Speech button
12 Speech set
13 Volume regulator for the reception signal
14 Selection buttons for selection of network

The technical equipment of the laboratory and workrooms with connections and work resources can be found in the list of icons on the left side of the page.
The meaning of the icons is explained as a key in the left-hand book cover next to the icon list.

You can also print this key off separately. It is an appendix on the last page of this handbook.

You will find typical connections in the picture printed on the left hand side.

The connections and securing rails on the walls and the floor grid of the fastening thread are drawn in on the floor plans of the laboratory rooms. The scale of the representation is a uniform 1 : 50 so that you can take measurements for planning work.

The photos and floor plans shown come from the current recording from 2010. The wall plans give the condition at the time of commissioning in 1986. The information from the wall plans has been partly superseded by conversions. Contradictions between the plans and photos are therefore unavoidable to a certain extent.

The current photos and floor plans take precedence if there is any doubt!

4.1.1 Laboratory sockets:

There are two 220 V networks on board:

- The red double sockets belong to the RFI suppressed "laboratory network". They are reserved for consumers which react sensitively to network disruption (measurement and recording appliances, PC).
- The white double sockets and the ones marked AN are intended for non-sensitive consumers such as refrigerators or compartment driers.

Protection sockets must be used in wet rooms or during wet work for safety reasons. These are made available to the users of the ship.

4.1.2 Securing of heavy objects

A grid made of securing rails (C-rails) is present in the ceilings and walls in all laboratory rooms (except laboratory 3, 13, 18). The rail spacing is 600 mm. Mounting bars and M8 spring nuts are available for securing appliances to the C-bars in the rooms.

Threaded M8 bushes are located in the floor which are matched to the C-rail system. The grid width is also 600 mm.

C-rails and threaded bushes are included in the floor plans.

4.1.3 Securing of light objects to walls

Since most of the walls are made of sheet steel, magnets are the most suitable method for securing plans, papers or other information material. As the requirement for magnets cannot be covered on board, it is necessary to bring a sufficient number of magnets with you.

Adhesive tape is not permitted due to damage to the paint!

4.2 Air chemistry laboratory 1

5th superstructure deck

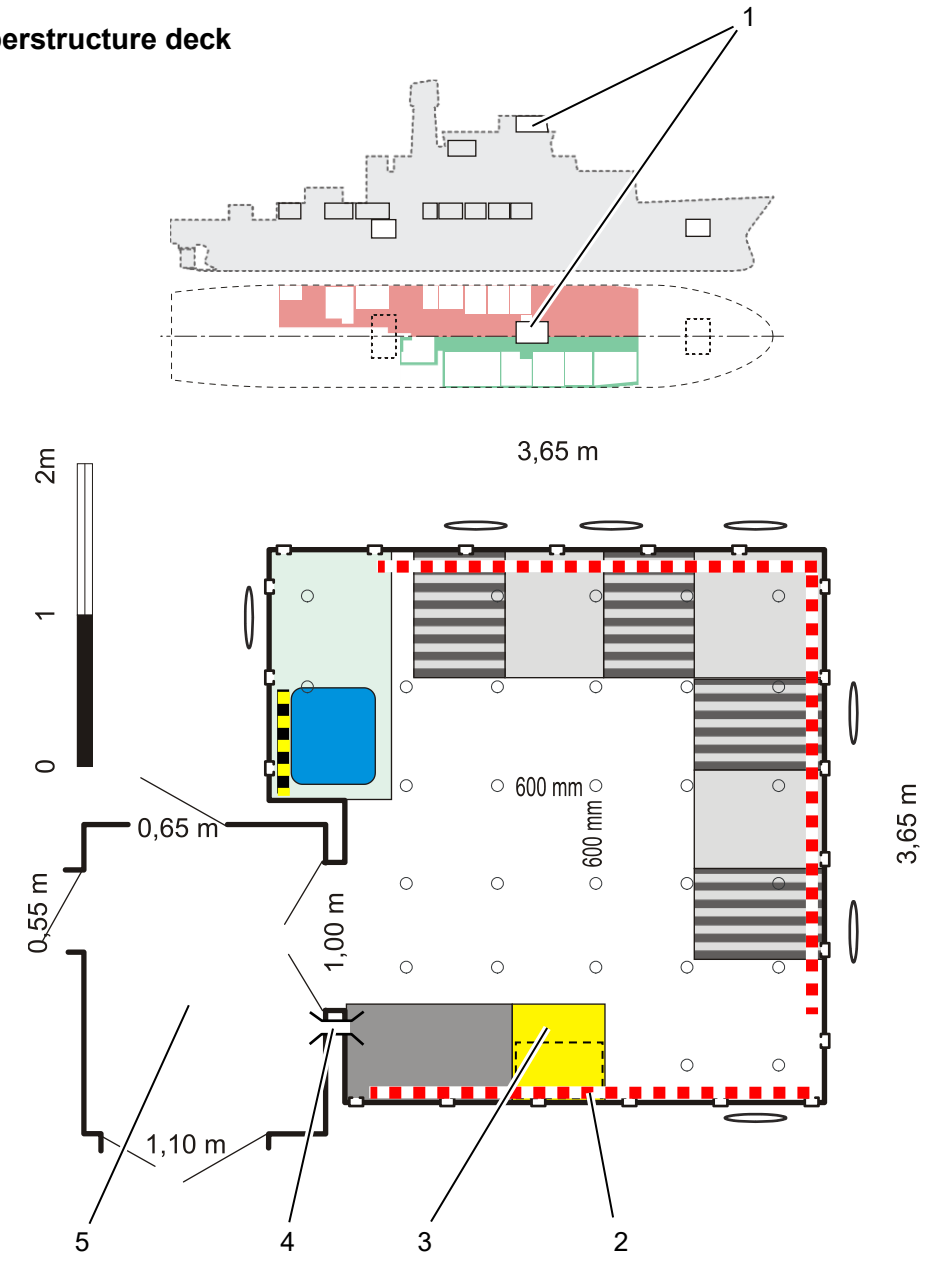


Fig. 31 Air chemistry laboratory 1

1 Air chemistry laboratory on the 5th superstructure deck
2 Place of installation ADU II position receiver (above "3")
3 Refrigerator (disposed)
4 Cable feed through
5 Anteroom, access from observation deck and from the staircase from the bridge

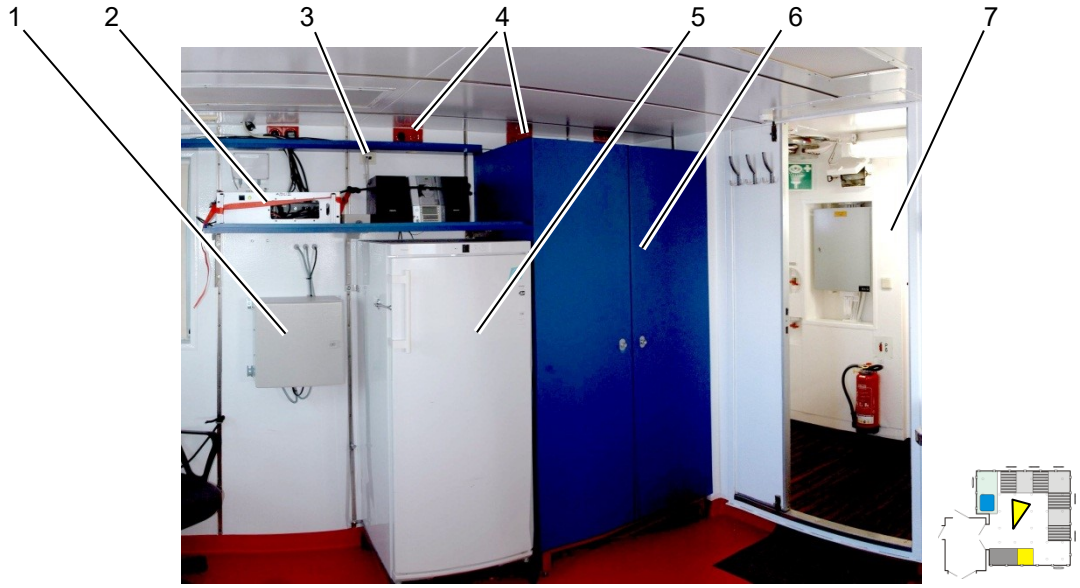


Fig. 32 Air chemistry laboratory 1

1		5	Refrigerator*
2		6	Storage location for Gonio radio direction finder
3	Antenna sockets	7	Access from anteroom, observation deck and bridge
4	Double sockets	8	

Refrigerator:
Standard refrigerator without freezer compartment, temperature setting 1 – 3 – 5 – 7 – 9 °C
Model Liebherr KP 3120 Comfort, usable capacity 297 litres, automatic defrosting
Disposed of due to defect and not replaced again because not needed.

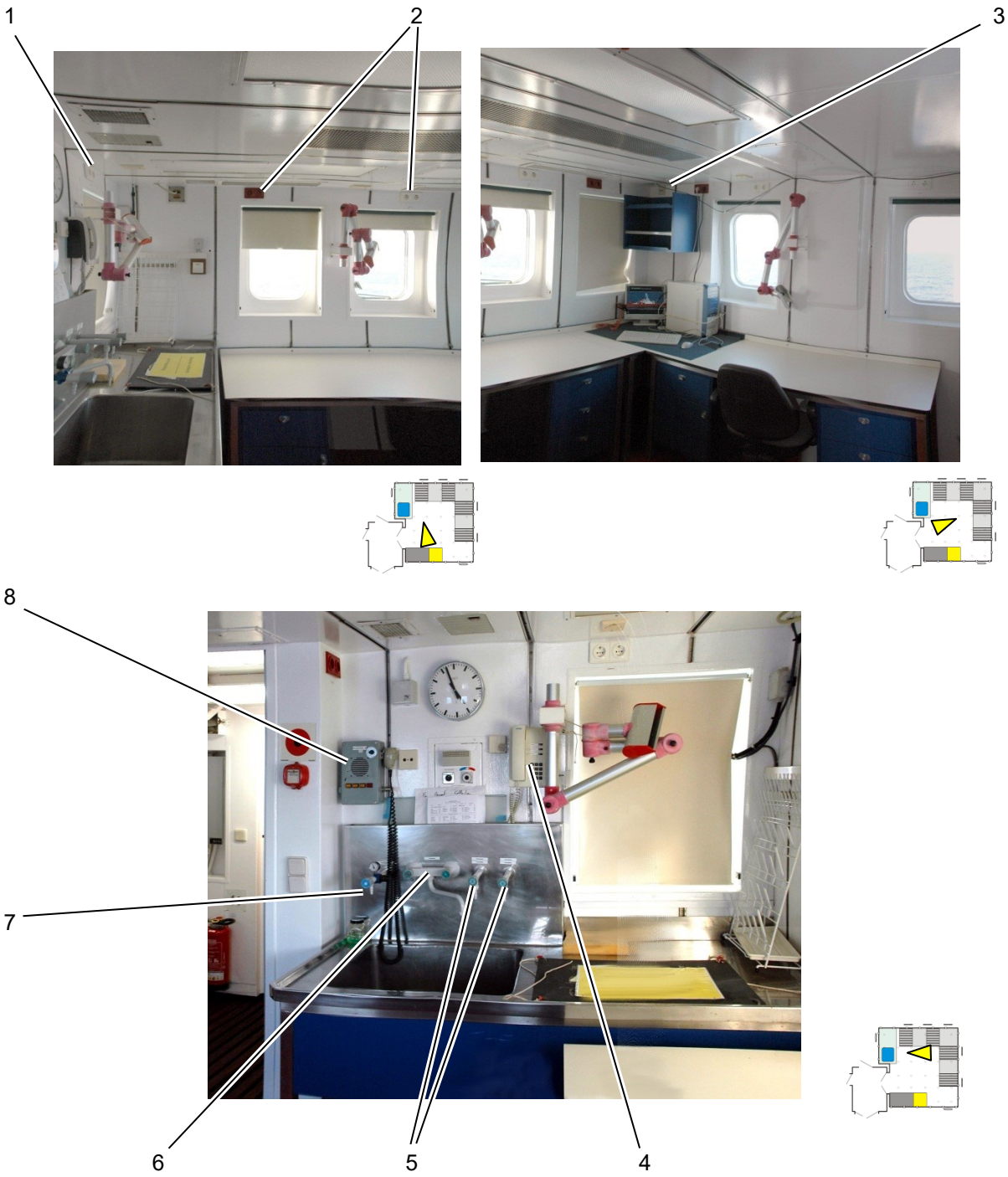


Fig. 33 Air chemistry laboratory 1

1 Data port hydrosweep+science
2 Double sockets
3 Network connections (LAN)
4 Telephone
5 Sea water (rotary pump)
6 Hot/cold water
7 Compressed air 0-6 bar, oil separated
8 Intercom science

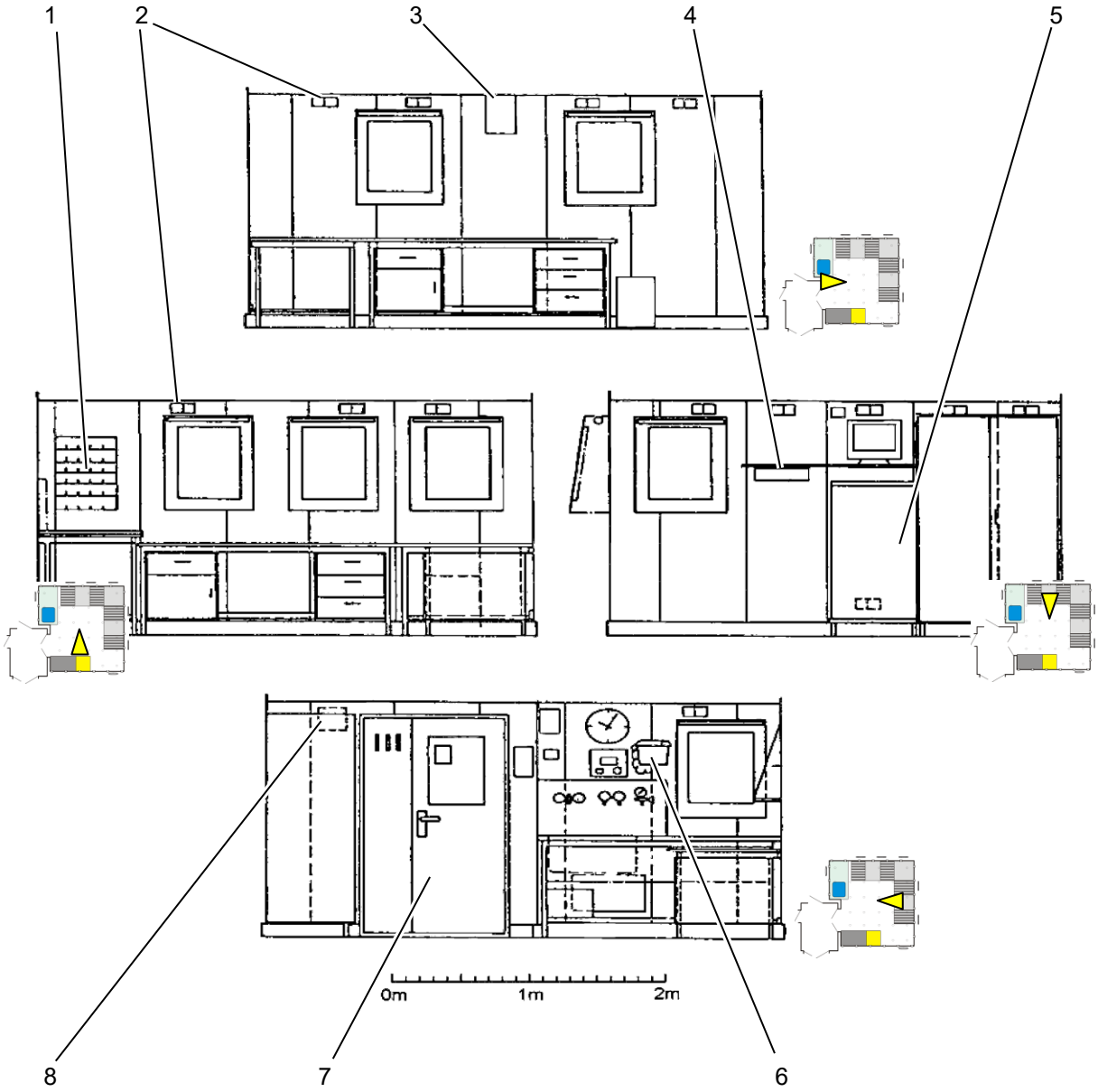


Fig. 34 Air chemistry laboratory 1 (detailed plan laboratory walls, status 1986)

1 Draining rack above sink
2 Double sockets
3 Mounting location of magnetic compass
4 Mounting location of operating appliance position sensor ADU II
5 Refrigerator
6 Telephone
7 Access from anteroom, observation deck and bridge
8 Cable feed through

4.3 Sounding centre 2

3rd superstructure deck

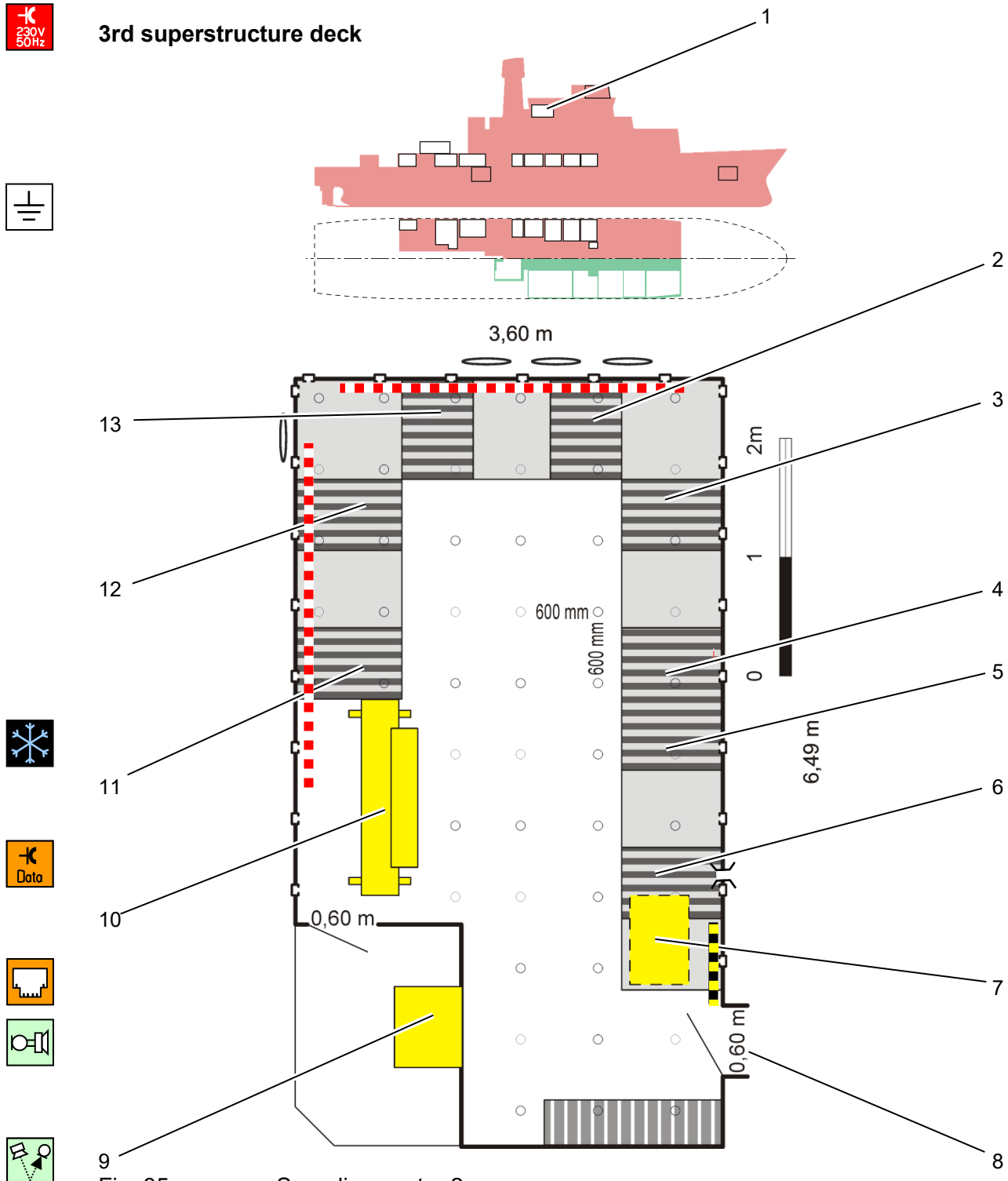


Fig. 35 Sounding centre 2

1 Sounding lab. on 3rd superstructure deck
2 Workplace PARASOUND Slave
3 Workplace DSHIP
4 Workplace EM122
5 Workplace EM710
6 Planning workplace and ECDIS display
7 Colour laser printer
8 Access from landing 3rd superstructure deck/bridge
9 Rack with EM122, EM710, PARASOUND master and slave computers
10 Plotter
11 Multibeam Postprocessing Neptune Softw.
12 Multibeam Postprocessing MBES Software
13 Workplace PARASOUND Master

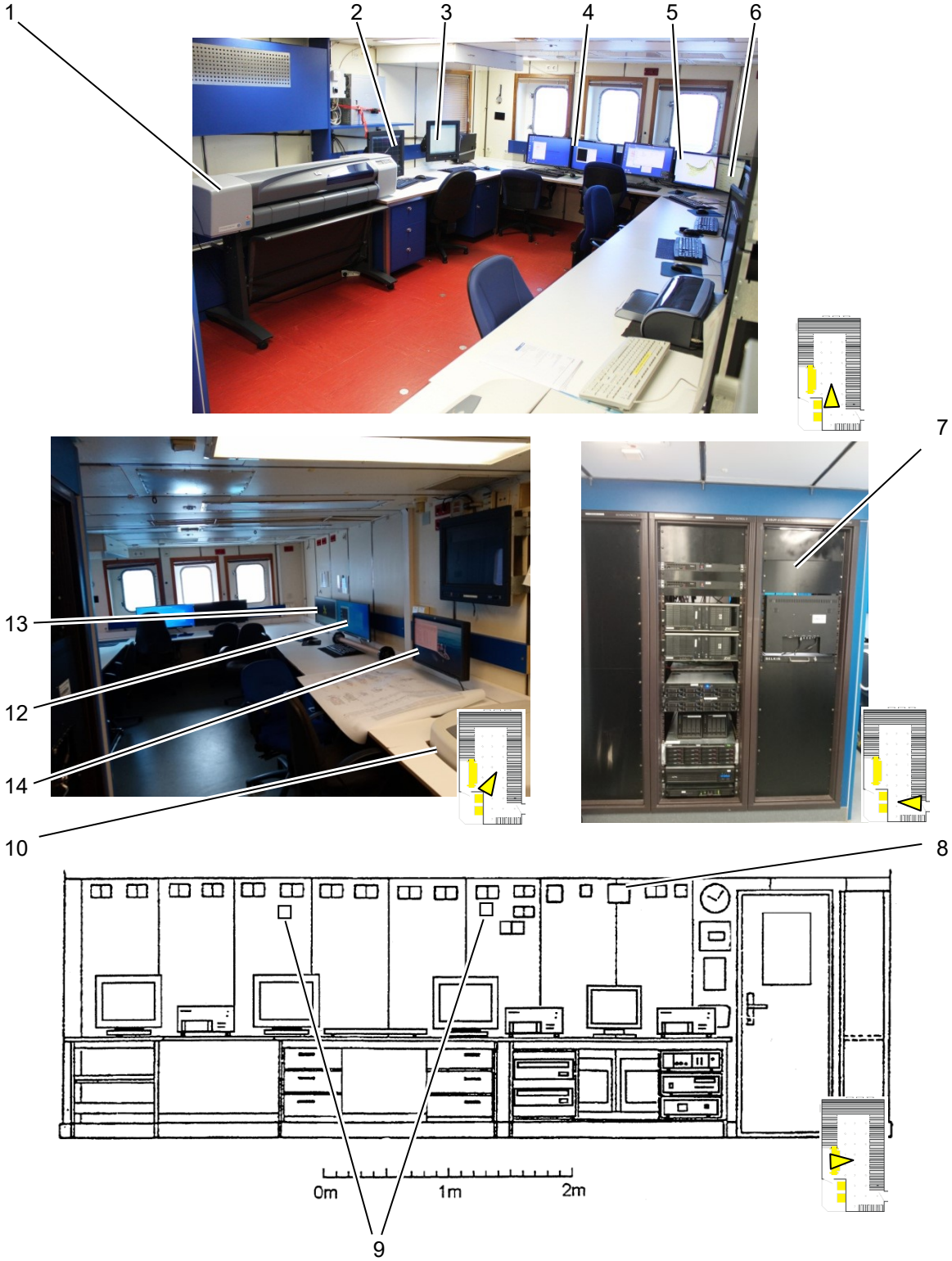


Fig. 36 Sounding laboratory 2 (detailed plan laboratory walls, status 1986)

1 Plotter
2 Workplace Postprocessing Neptune Softw.
3 Workplace Postprocessing MBES Software
4 Workplace PARASOUND Master
5 Workplace PARASOUND Slave
6 Workplace DSHIP
7 Rack with EM122, EM710, PARASOUND master and PARASOUND slave computers
8 Cable feed through
9 LAN connections
10 Colour laser printer
12 Workplace EM710
13 Workplace EM122
14 Workplace DSHIP

4.4 Darkroom 3

1st superstructure deck

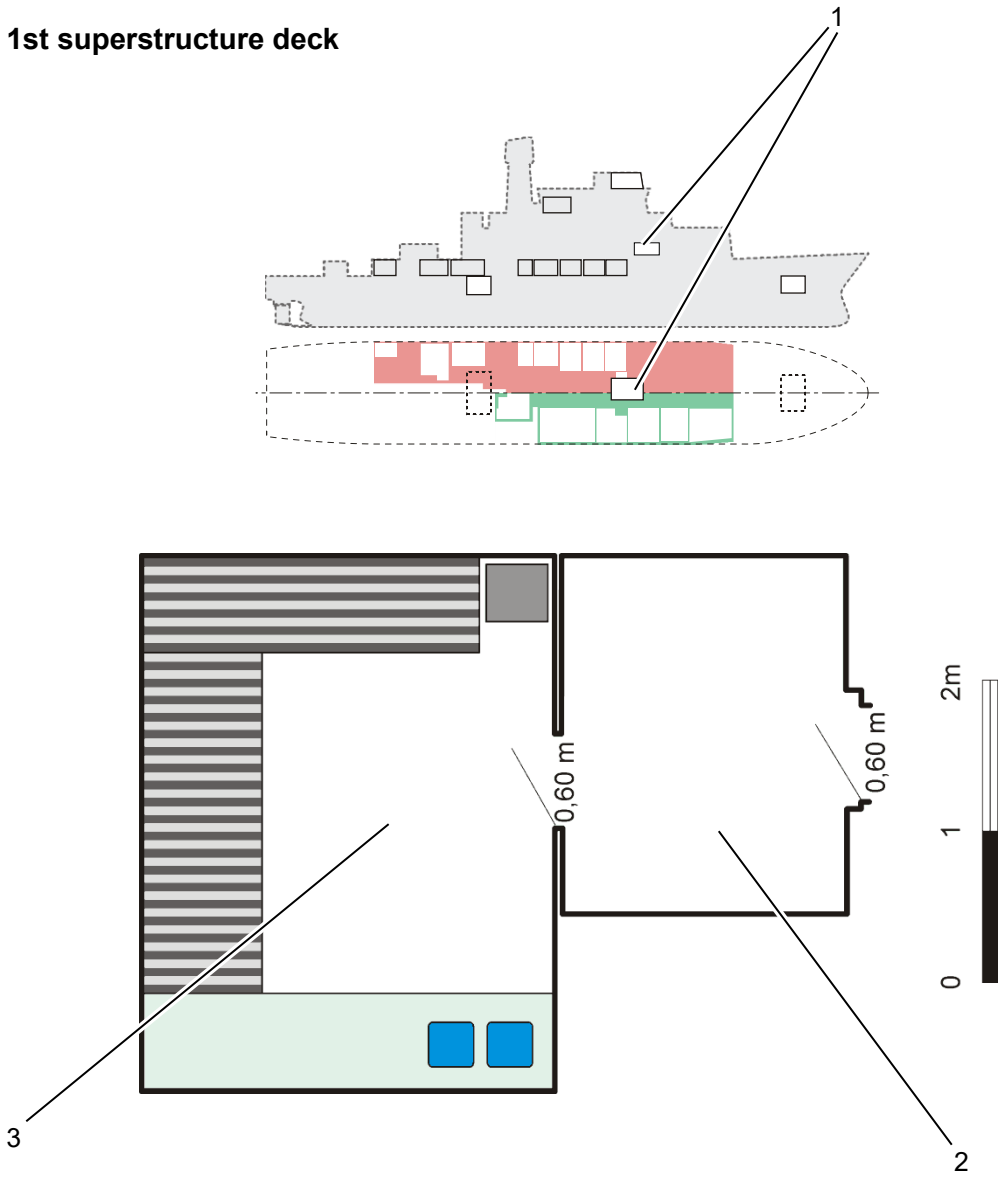


Fig. 37 Darkroom 3

1 Darkroom on 1st superstructure deck
2 Anteroom
3 Darkroom

Note

The former (chemical) photographic laboratory is no longer used for its original purpose in this age of digital photography.

Mainly used by the ship's doctor to analyse blood samples, but also available as a darkroom for scientific purposes.

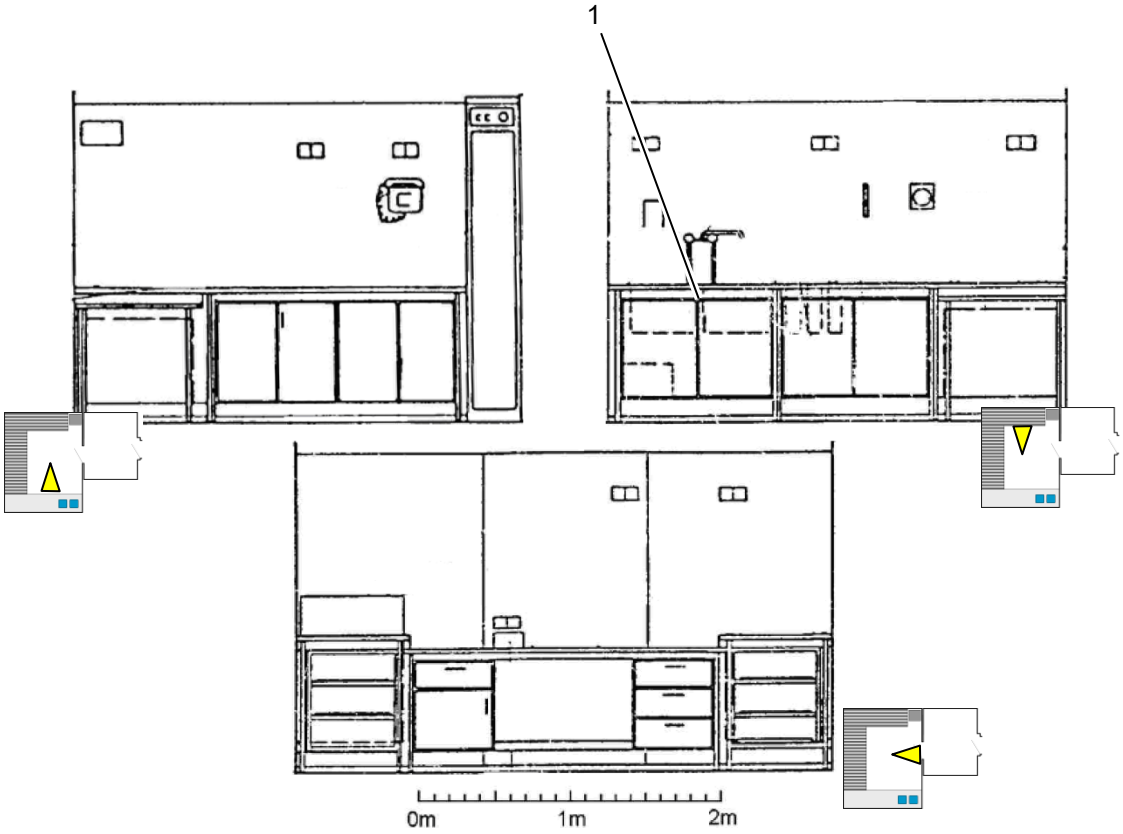


Fig. 38 Darkroom area of dark room 3 (detailed plan laboratory walls, status 1986)

1 Double sink

4.5 Clean laboratory 4 with double door

Main deck port

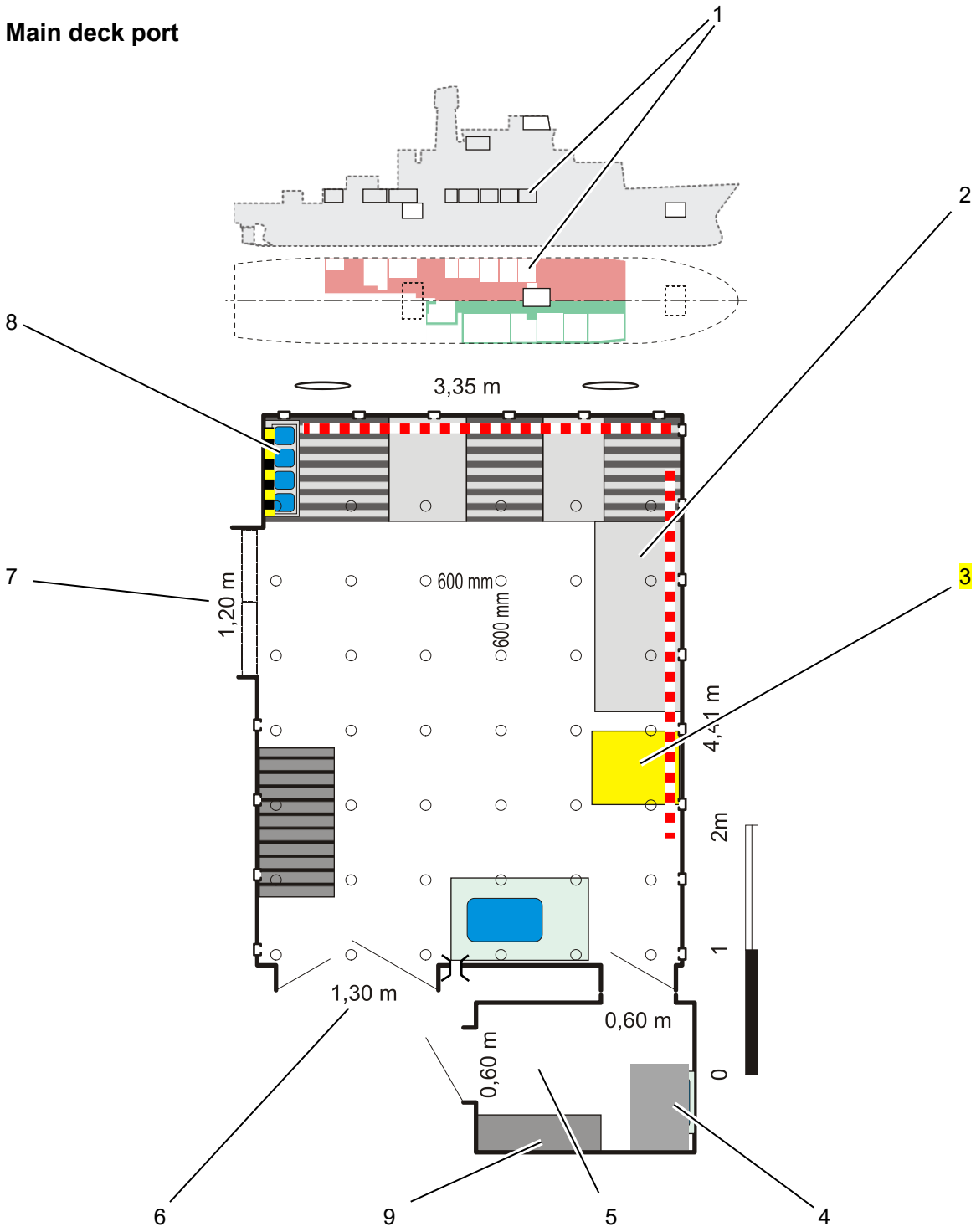


Fig. 39 Clean laboratory 4 with double door

1	Clean lab. 4 with double door on main deck	5	Double door
2	Additional folding table (flexible)	6	Access from landing main deck port
3	Cool box (flexible) actual lab 6	7	Access to clean laboratory 5, can be closed off with separate wall sections
4	Flake ice maker	8	4 sea water sinks direct to sea
		9	Ice cube maker

Fig. 40 Clean laboratory 4 with double door

1 Access to clean laboratory 5, can be closed off with separate wall sections
2 Ice cube and flake ice maker in the double door area
3 Cool box shifted to lab 6
4 Access to double door area

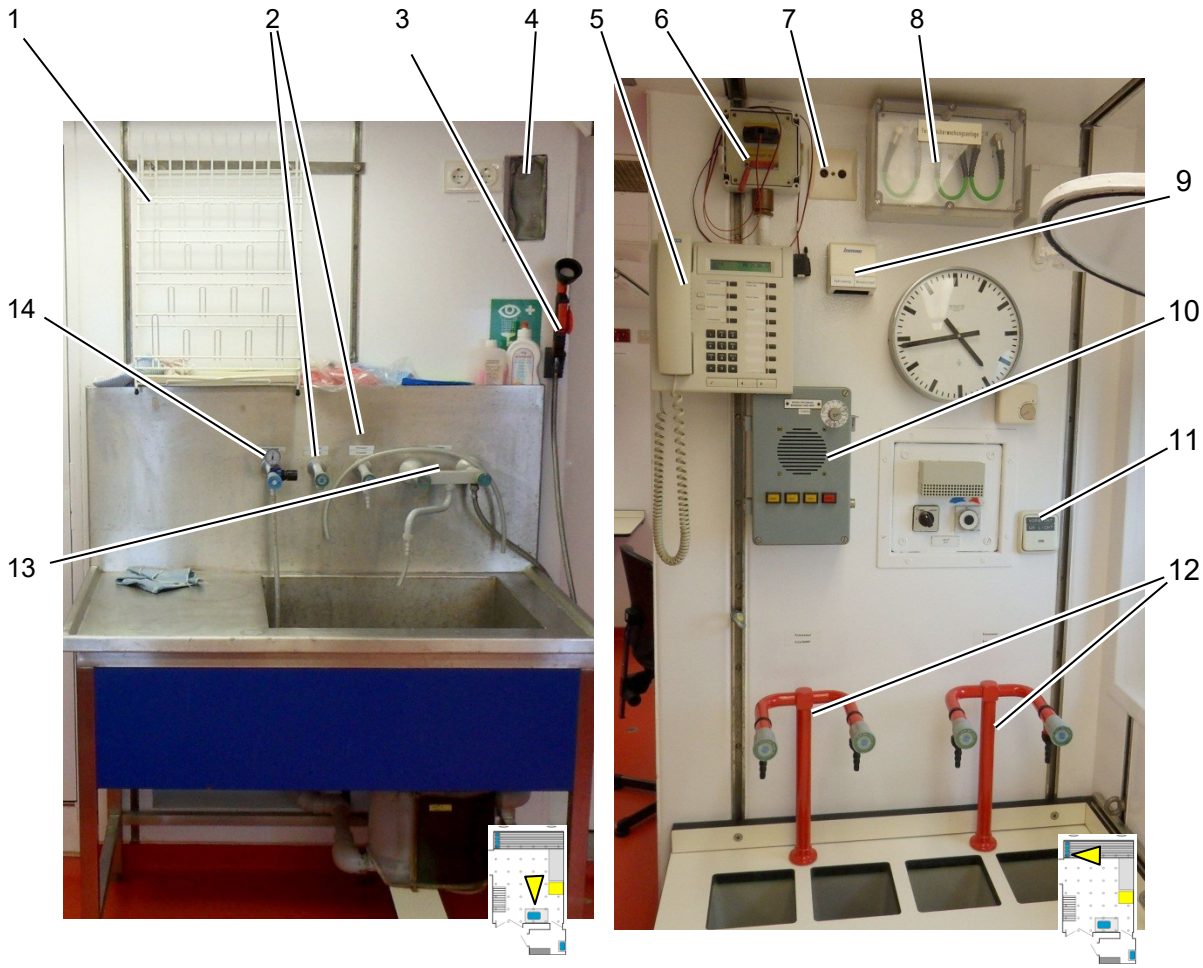


Fig. 41 Detailed plan of clean laboratory 4 with double door

1 Draining rack
2 Sea water taps
3 Hand shower
4 Cable feed through
5 Telephone
6 Connections to data distribution system
7 Antennae socket
8 Connections for control monitors
9 Data port hydrosweep+science
10 Intercom science
11 Switch for UV light
12 Sea water taps (rotary pump)
13 Hot/cold water
14 Compressed air 0-6 bar, oil separated

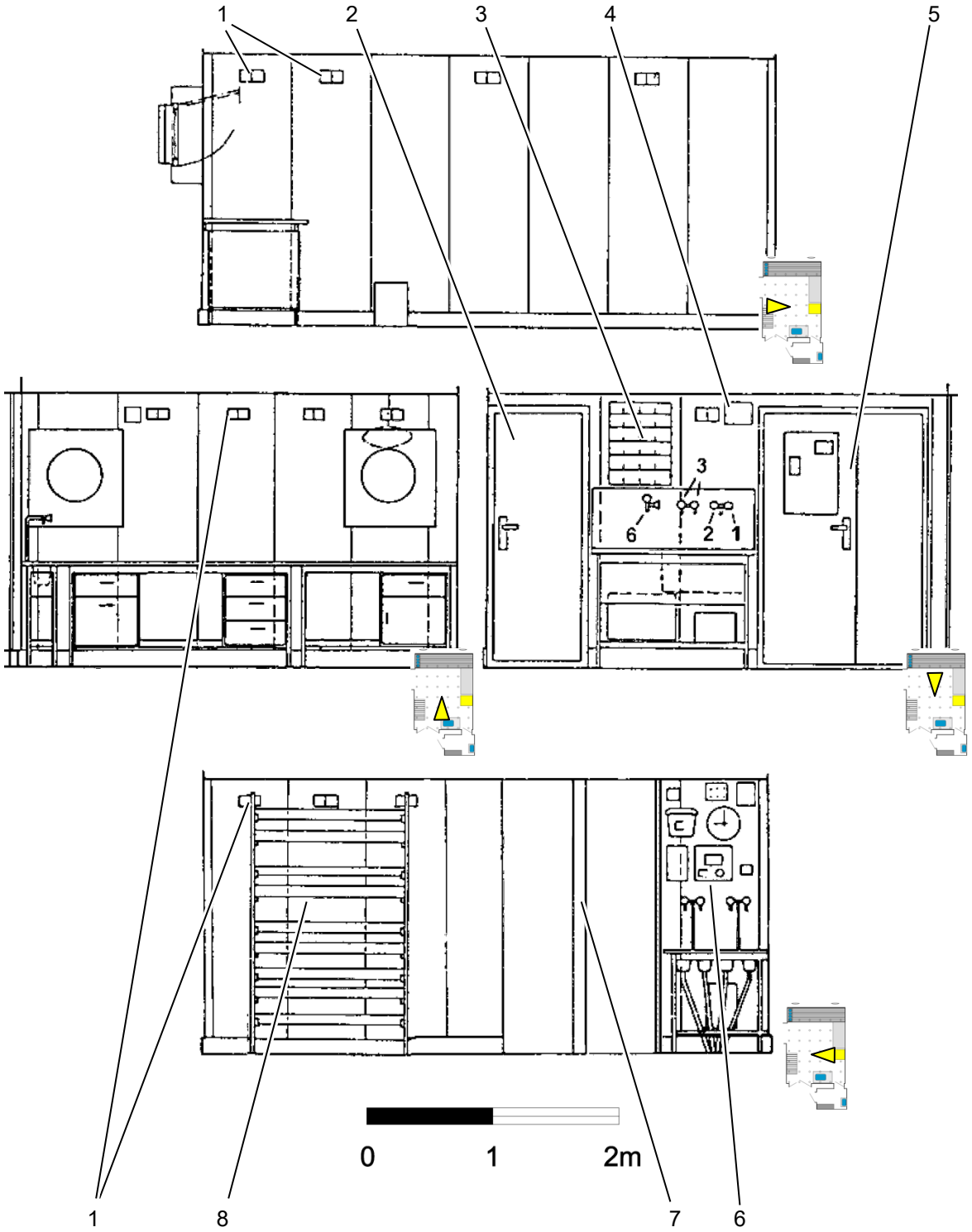


Fig. 42 Clean laboratory 4 (detailed plan laboratory walls, status 1986)

1 Double sockets
2 Access to double door area
3 Draining rack
4 Cable feed through
5 Access from main landing port
6 Communication connections
7 Access to clean laboratory 5, can be closed off with separate wall sections
8 Shelves

4.6 Clean laboratory 5

Main deck port

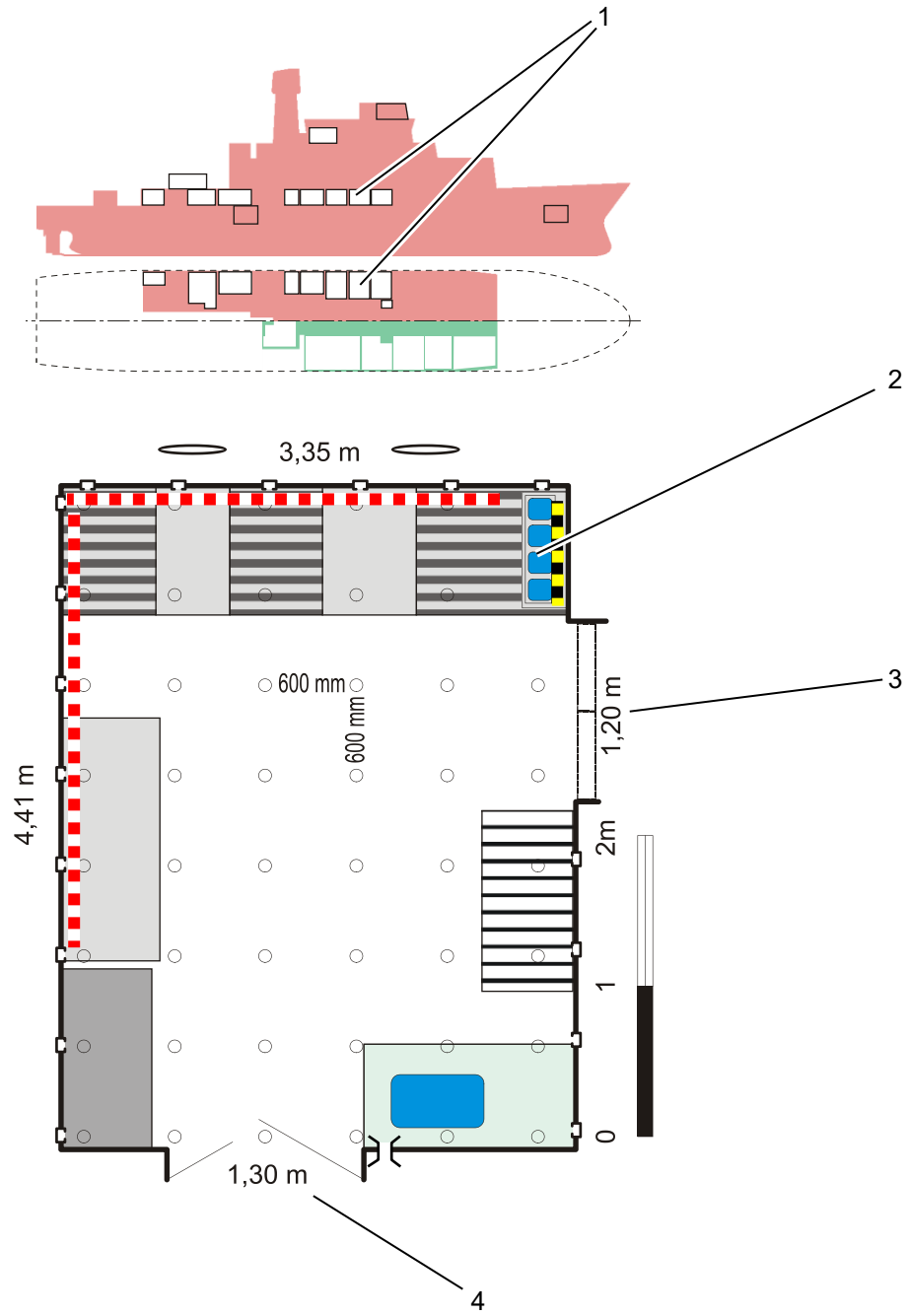


Fig. 43 Clean laboratory 5

1 Clean laboratory 5 on main deck

2 4 small sea water basins direct to sea

3 Access to clean laboratory 4, can be closed off with separate wall sections

4 Access from landing main deck port

Fig. 44 Clean laboratory 5

1 Access to clean laboratory 4, can be closed off with separate wall sections
2 Emergency shower
3 Operating fitting for emergency shower
4 Access to double door area clean laboratory 4
5 Access to bio-chemistry laboratory 6

Note

Emergency showers for decontamination in emergencies are located on the landing in front of laboratories 5 and 8.

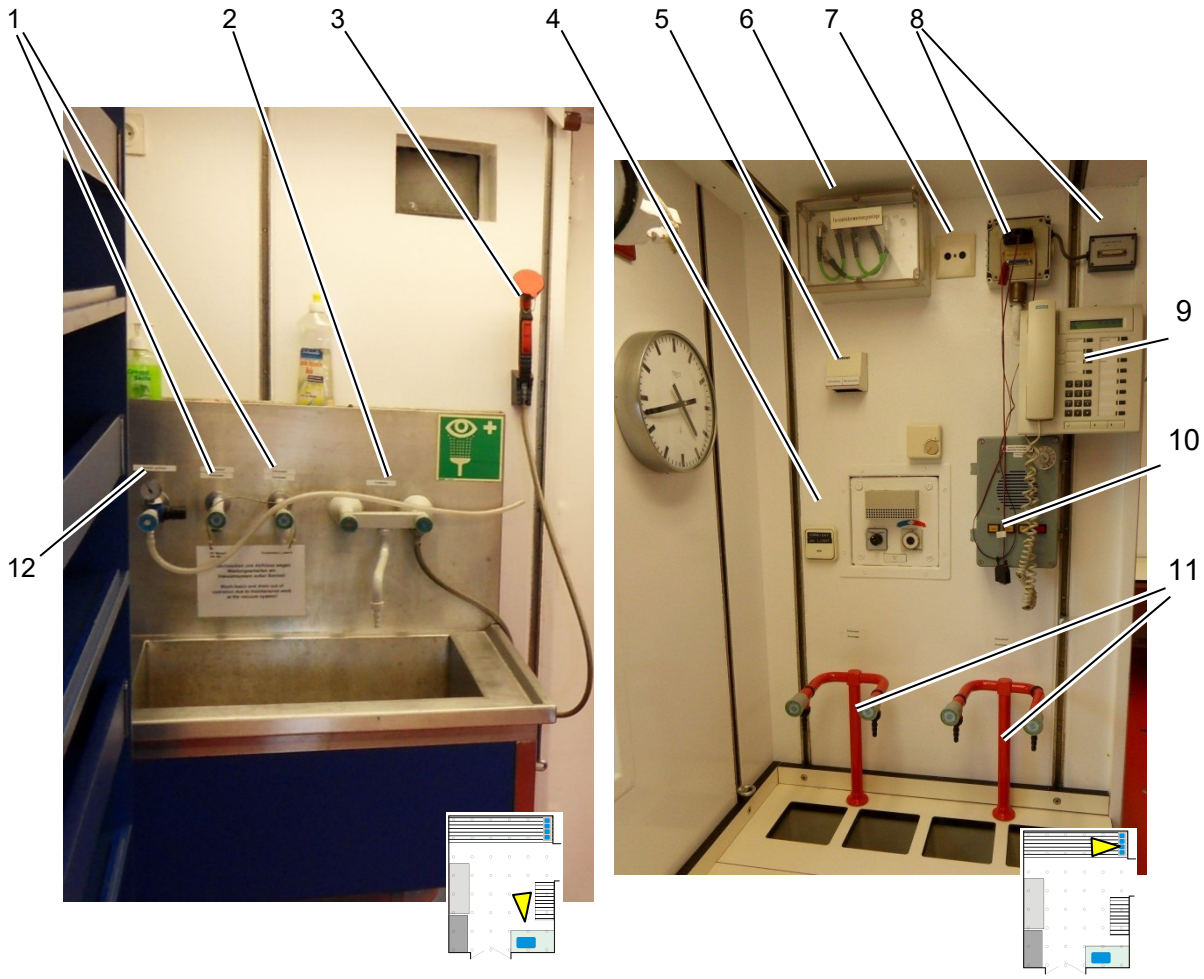


Fig. 45 Clean laboratory 5

1 Sea water taps (rotary pump)
2 Hot/cold water
3 Hand shower
4 Switch for UV light
5 Data port hydrosweep+science
6 Connections for control monitors
7 Antennae socket
8 Connections to data distribution system
9 Telephone
10 Intercom science
11 Sea water taps (rotary pump)
12 Compressed air 0-6 bar, oil separated

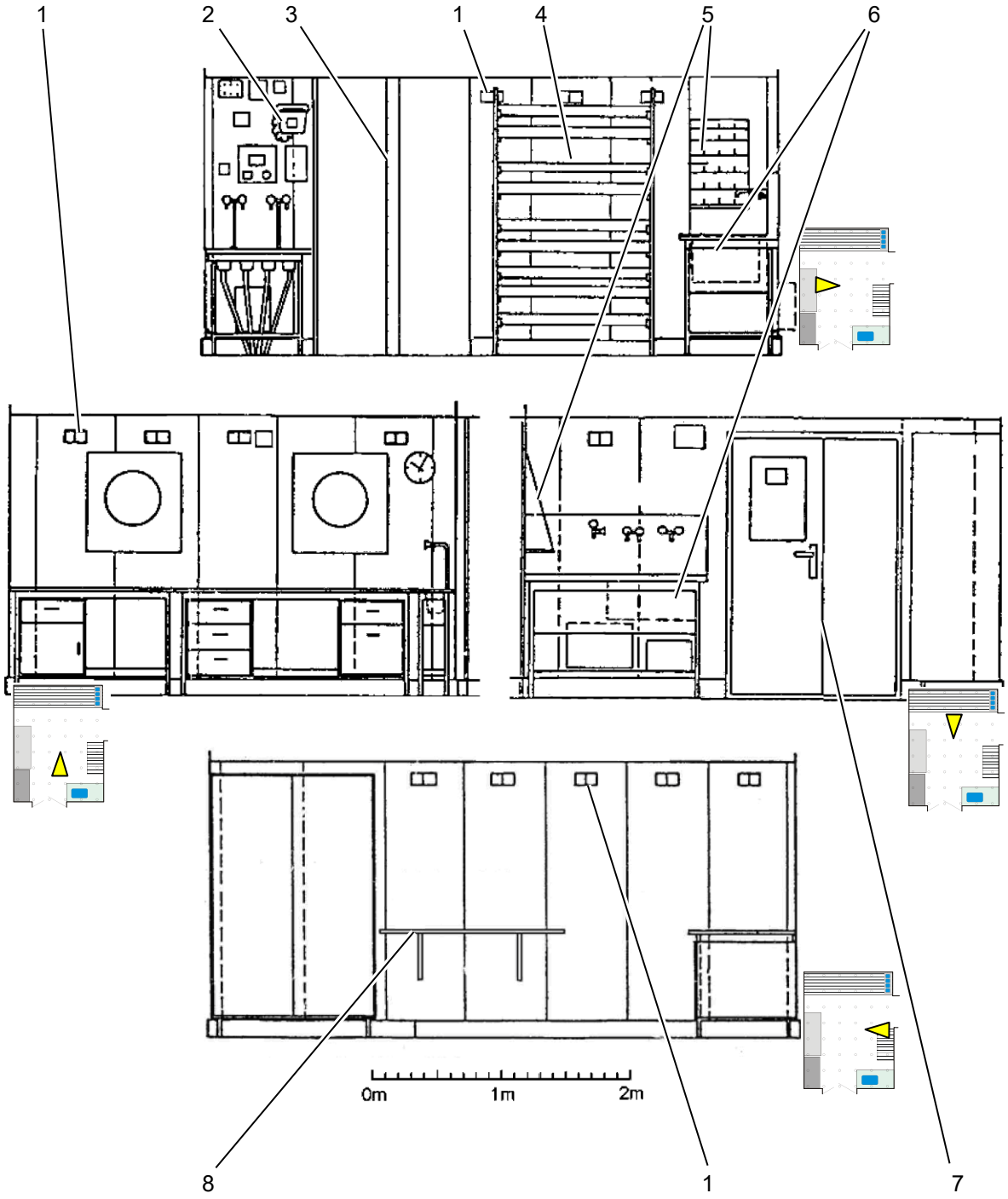


Fig. 46 Clean laboratory 5 (detailed plan laboratory walls, status 1986)

1 Double sockets
2 Communication connections
3 Access to clean laboratory 4, can be closed off with separate wall sections
4 Sample cabinet
5 Draining rack
6 Sink
7 Access from landing main deck port (with emergency shower)
8 Additional folding table

4.7 Bio-chemistry laboratory 6

Main deck port

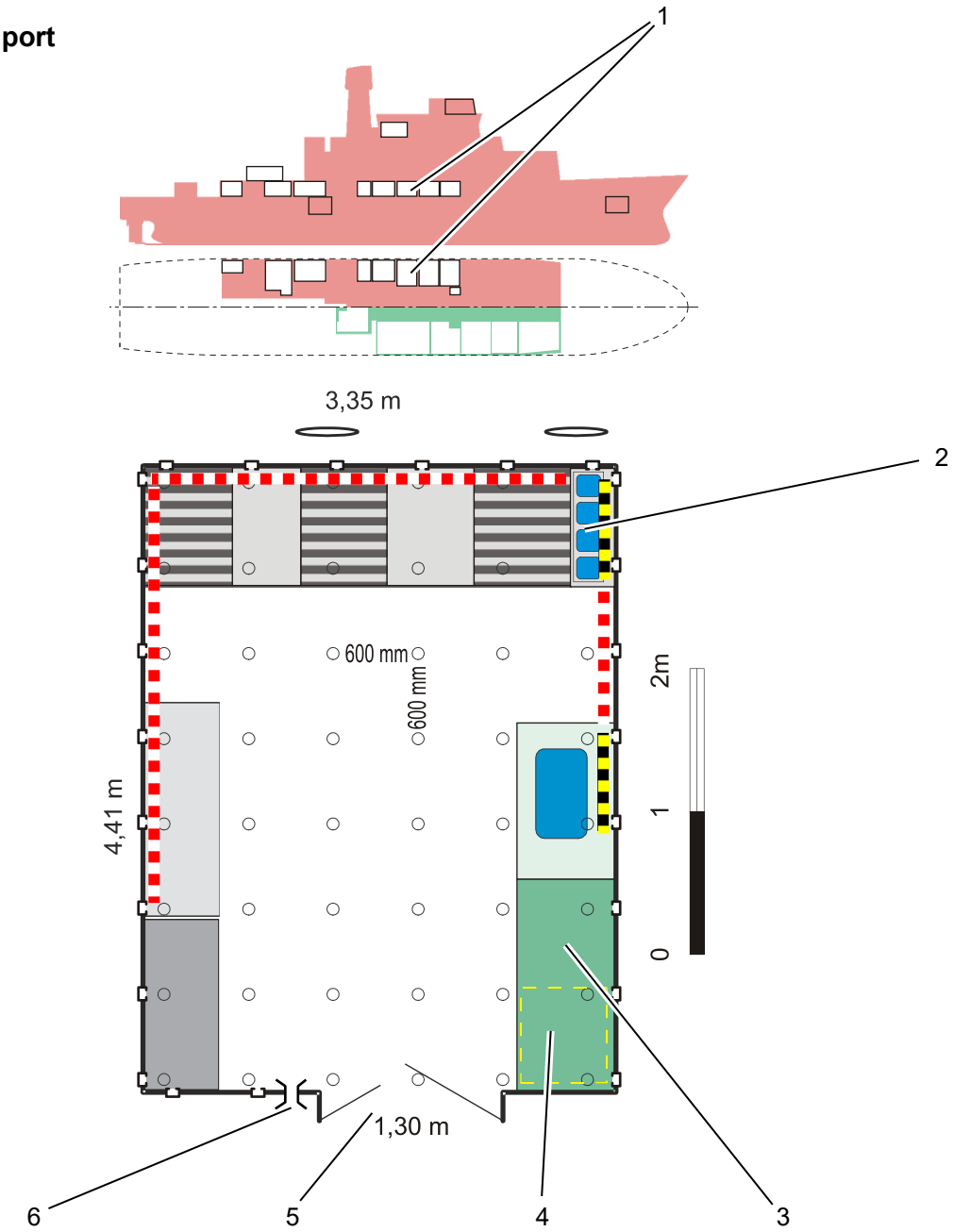


Fig. 47 Bio-chemistry laboratory 6

1	Bio-chemistry laboratory on main deck	4	Compartment drier
2	4 sea water sinks direct to sea	5	Access from landing main deck port
3	Fume cupboard	6	Cable feed through

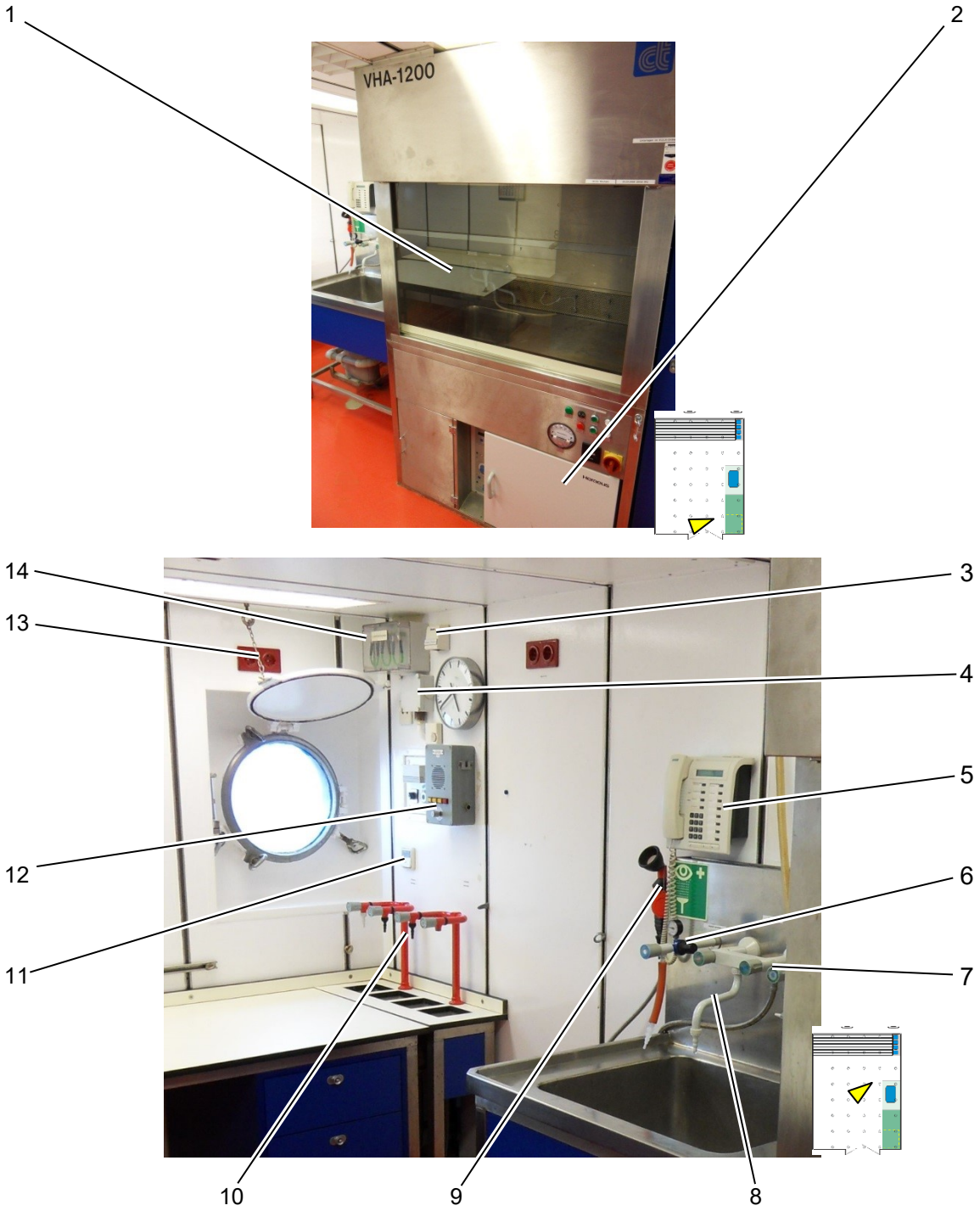


Fig. 48 Bio-chemistry laboratory 6

1 Fume cupboard
2 Compartment drier
3 Data port hydrosweep+science
4 Connections to data distribution system
5 Telephone
6 Compressed air 0-6 bar, oil separated
7 2 sea water taps (membrane pump)
8 Hot/cold water
9 Hand shower
10 4 sea water taps (membrane pump)
11 Switch for UV light
12 Intercom science
13 Double sockets
14 Connections for control monitors

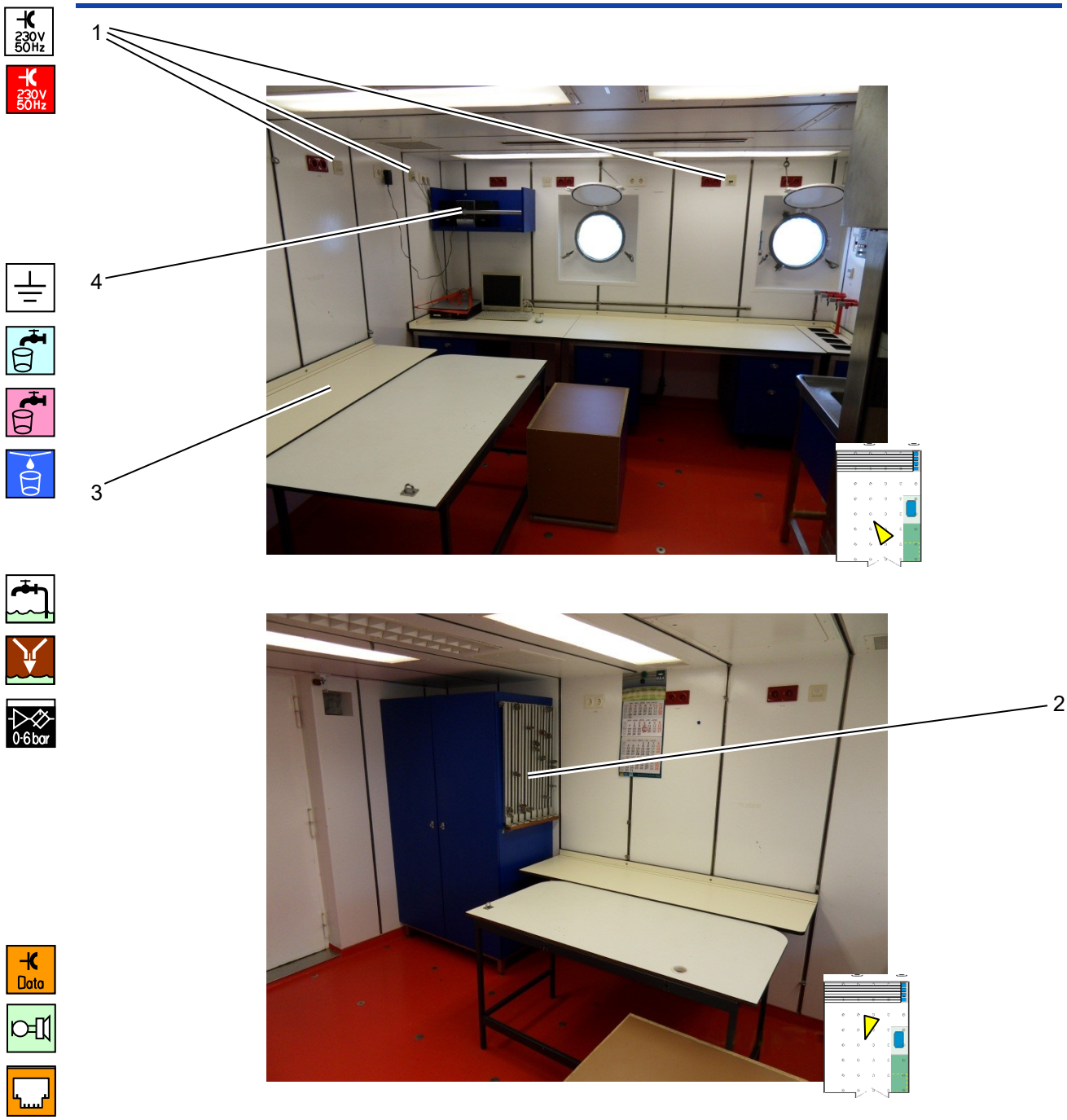


Fig. 49 Bio-chemistry laboratory 6

1 Network connections (LAN)
2 Securing rails for C-rail fitting
3 Additional folding table
4 Hanging shelf

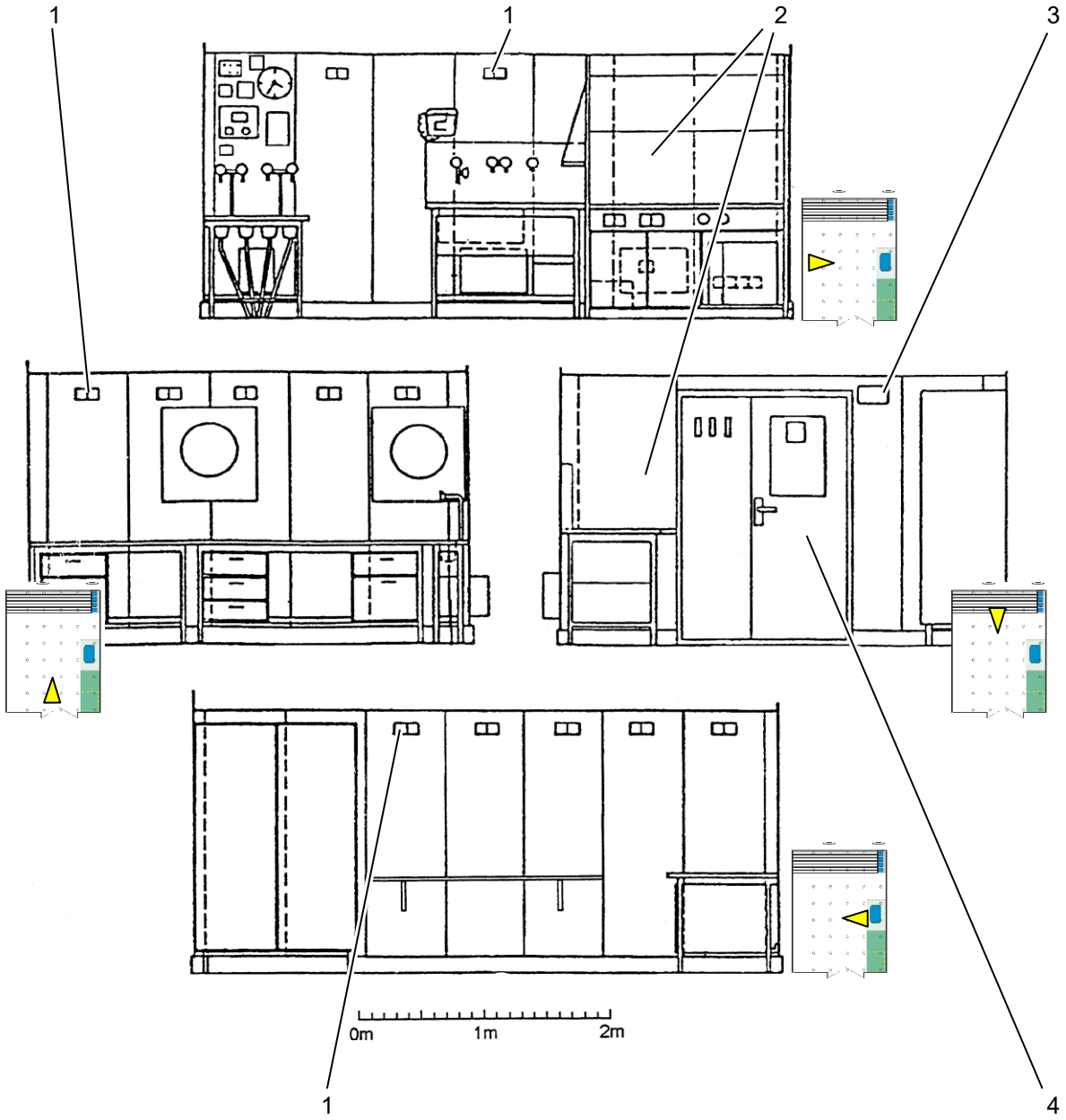


Fig. 50 Bio-chemistry laboratory 6 (detailed plan laboratory walls, status 1986)

1 Double sockets
2 Fume cupboard
3 Cable feed through
4 Access from landing main deck port

4.8 Dry laboratory 7

Main deck port

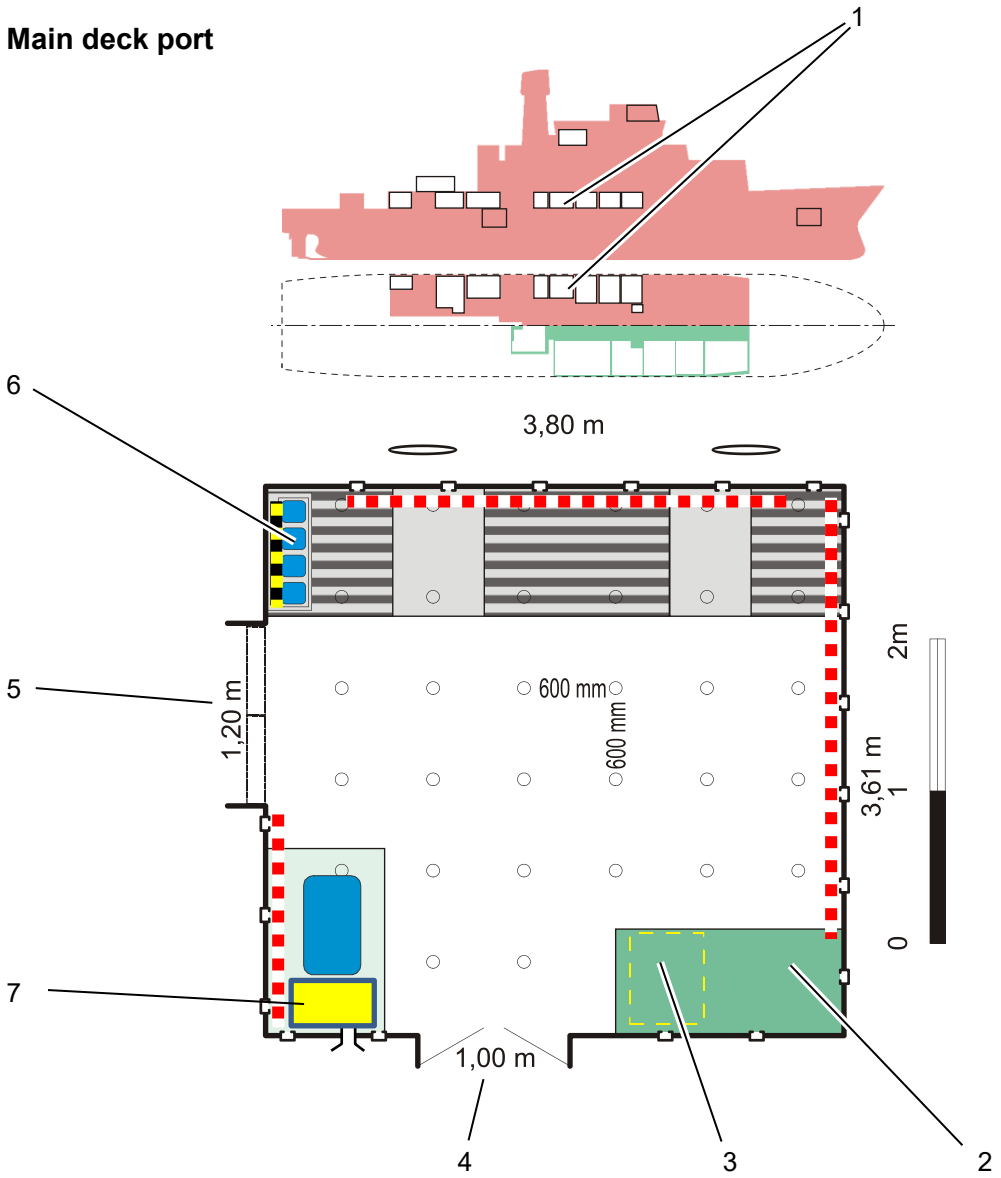


Fig. 51 Dry laboratory 7

1 Dry laboratory on main deck
2 Fume cupboard
3 Compartment drier
4 Access from landing main deck port
5 Access to dry laboratory 8, can be closed off with separate wall sections
6 4 sea water sinks direct to sea
7 Milli-Q “Integral 10”

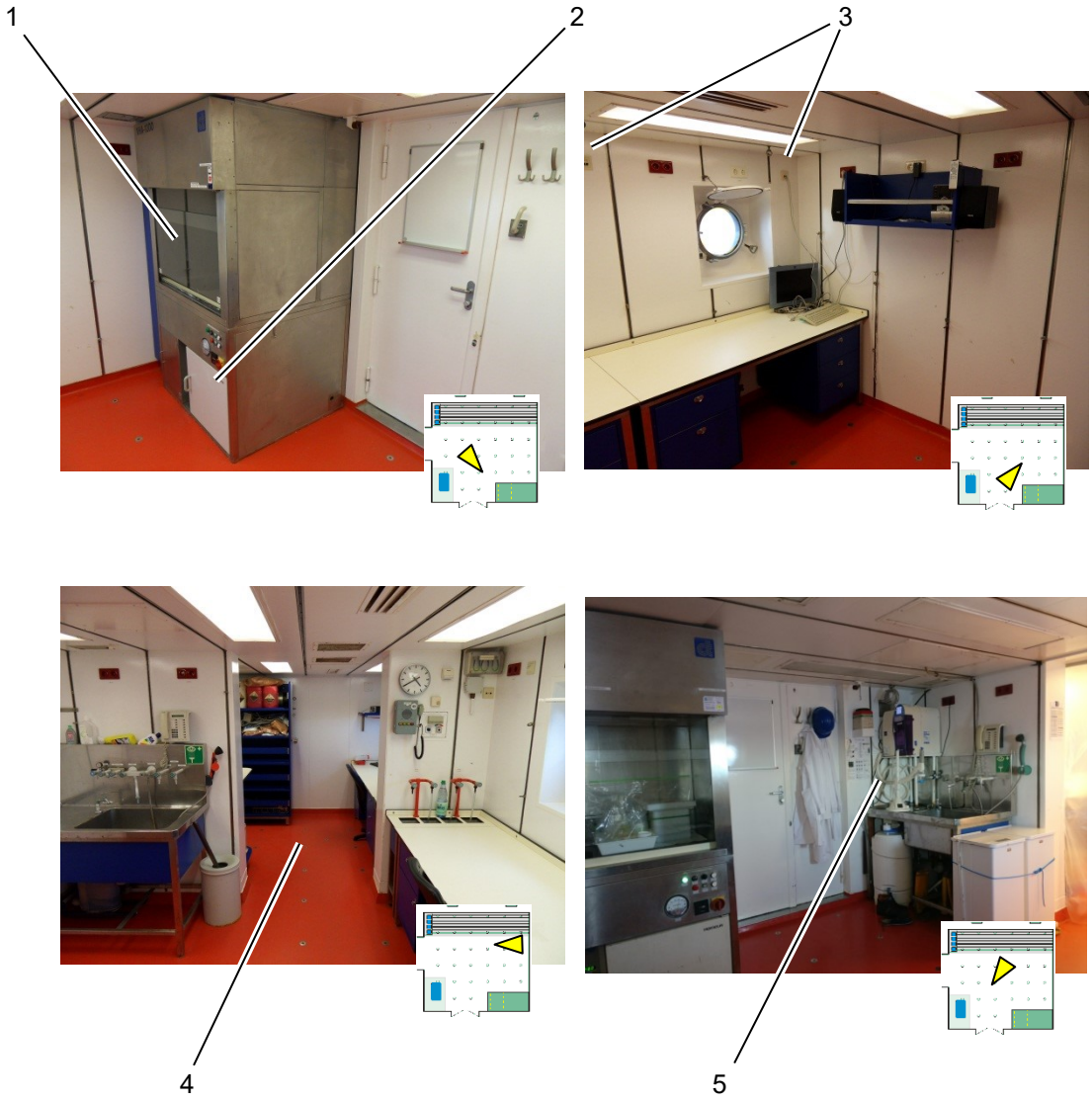


Fig. 52 Dry laboratory 7

1 Fume cupboard
2 Compartment drier
3 Network connections (LAN)
4 Access to dry laboratory 8
can be closed off with separate wall sections
5 Milli-Q “Integral 10”

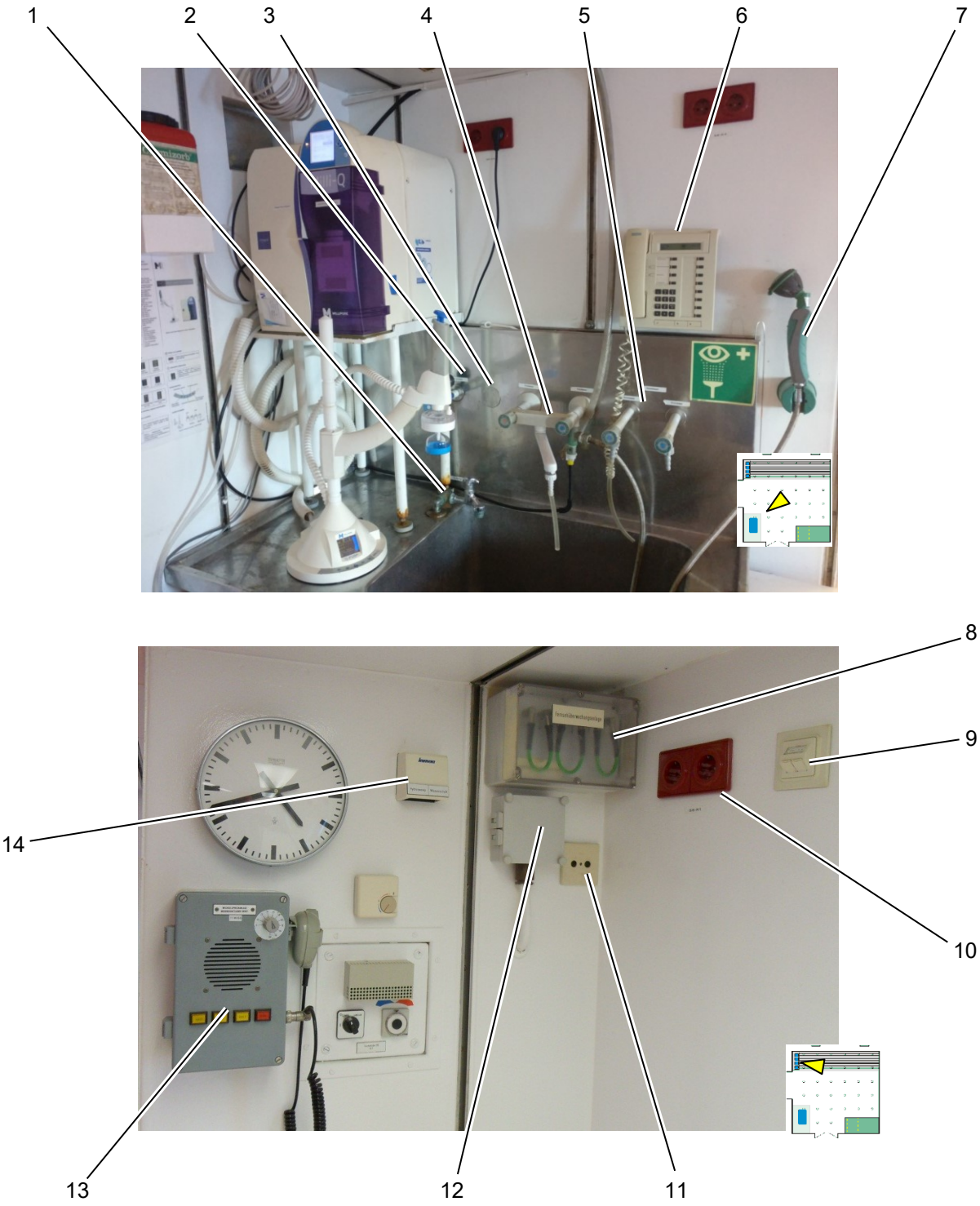


Fig. 53 Dry laboratory 7

1 Water from water purifier
2 Compressed air 0-6 bar, oil separated
3 2x distillate from vapouriser (deactivated)
4 Hot/cold water
5 2x pure sea water (rotary pump)
6 Telephone
7 Hand shower
8 Connections for control monitors
9 Network connections (LAN)
10 Double socket
11 Antennae socket
12 Connections to data distribution system
13 Intercom science
14 Data port hydrosweep+science

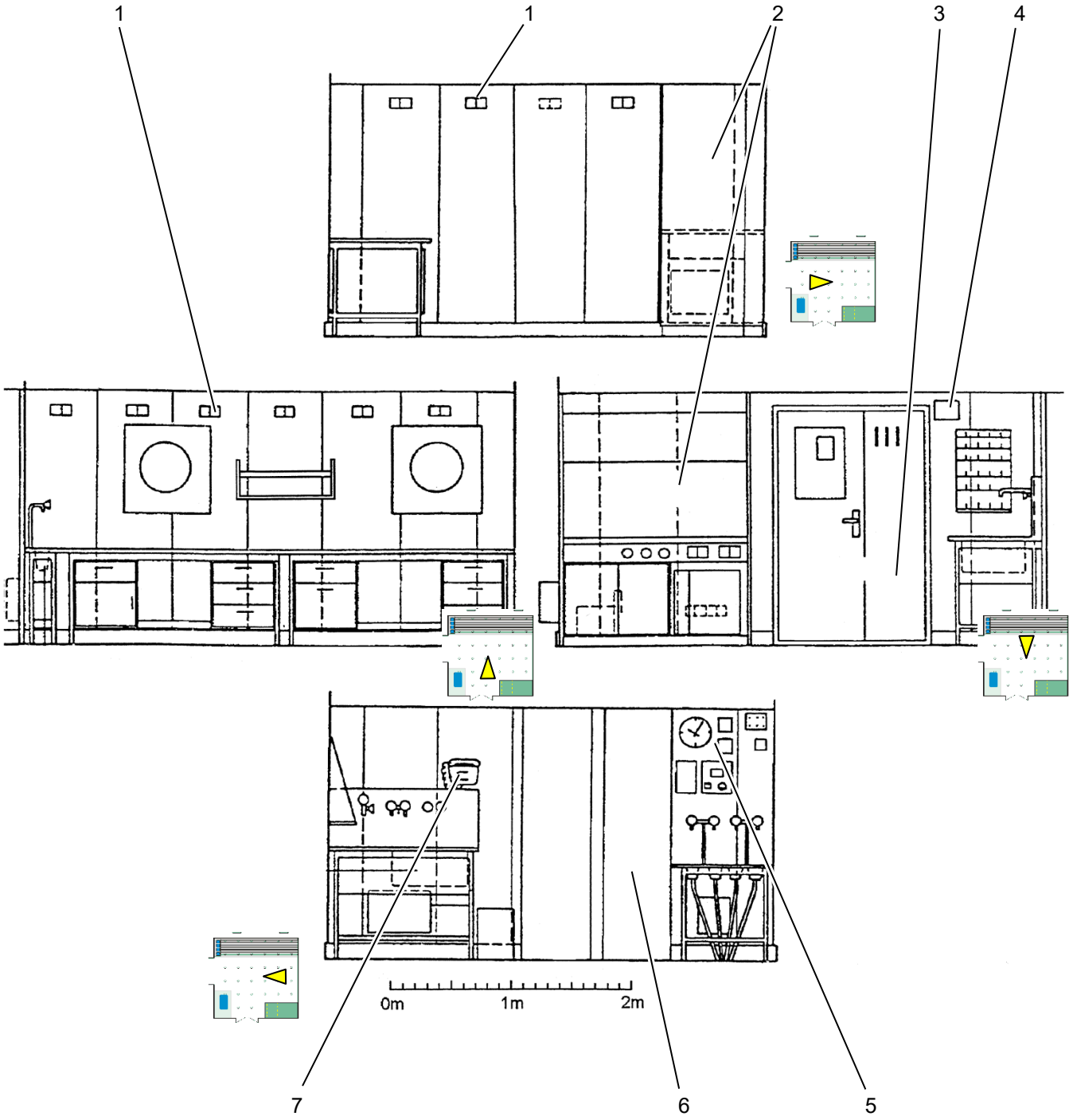


Fig. 54 Dry laboratory 7 (detailed plan laboratory walls, status 1986)

1 Double sockets
2 Fume cupboard
3 Access from landing main deck port
4 Cable feed through
5 Communication connections
6 Access to dry laboratory 8, can be closed off with separate wall sections
7 Telephone

4.9 Dry laboratory 8

Main deck port

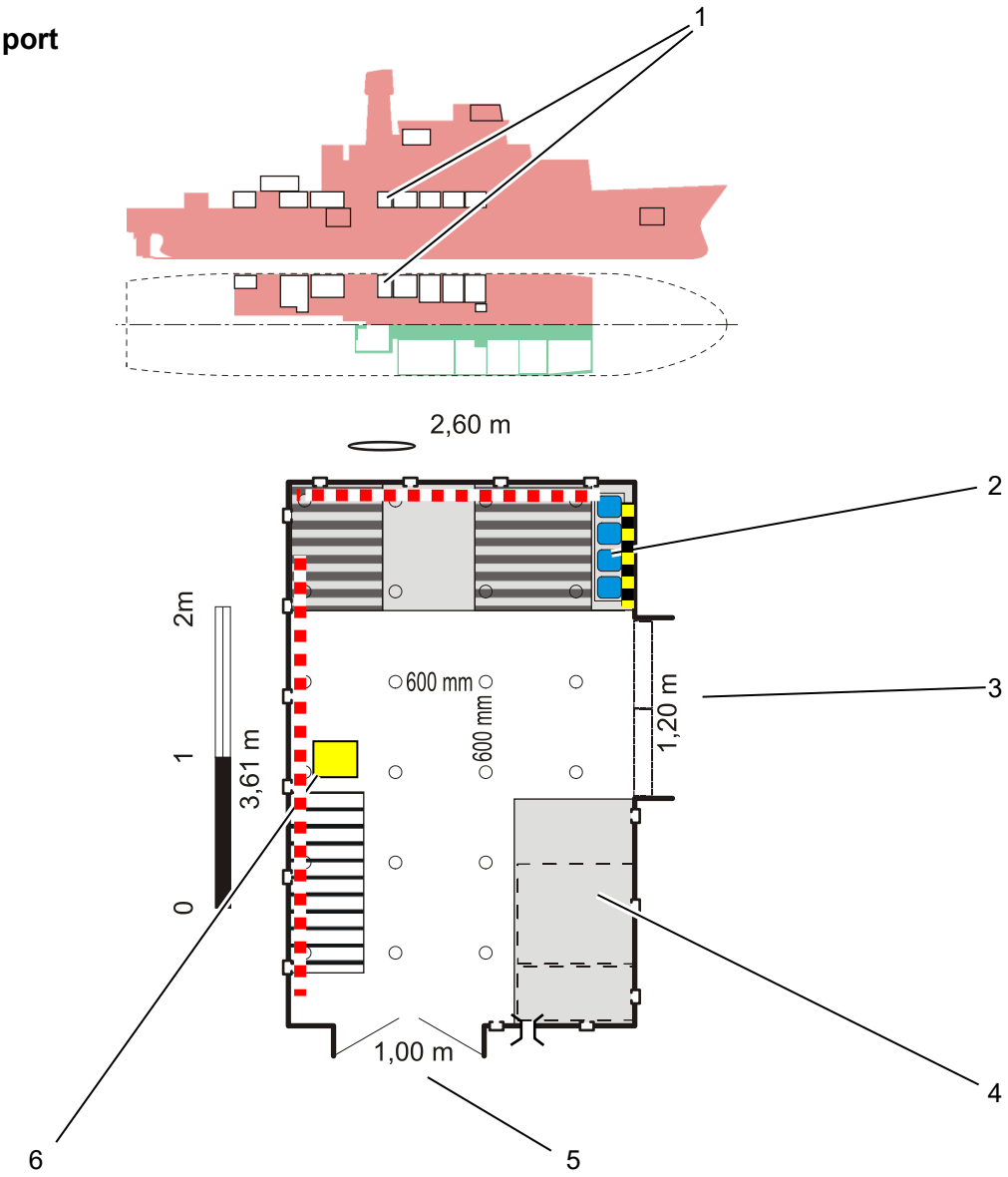


Fig. 55 Dry laboratory 8

1	Dry laboratory 8 on main deck	4	Laboratory cleaning machine
2	4 sea water sinks direct to sea	5	Access from landing main deck port
3	Access to dry laboratory 7, can be closed off with separate wall sections	6	Deep freezer space -80 °C

Fig. 56 Dry laboratory 8

1 Telephone
2 Laboratory dishwasher
3 Passage to dry laboratory 7, can be closed off with separate wall sections
4 Deep freezer space -80 °C

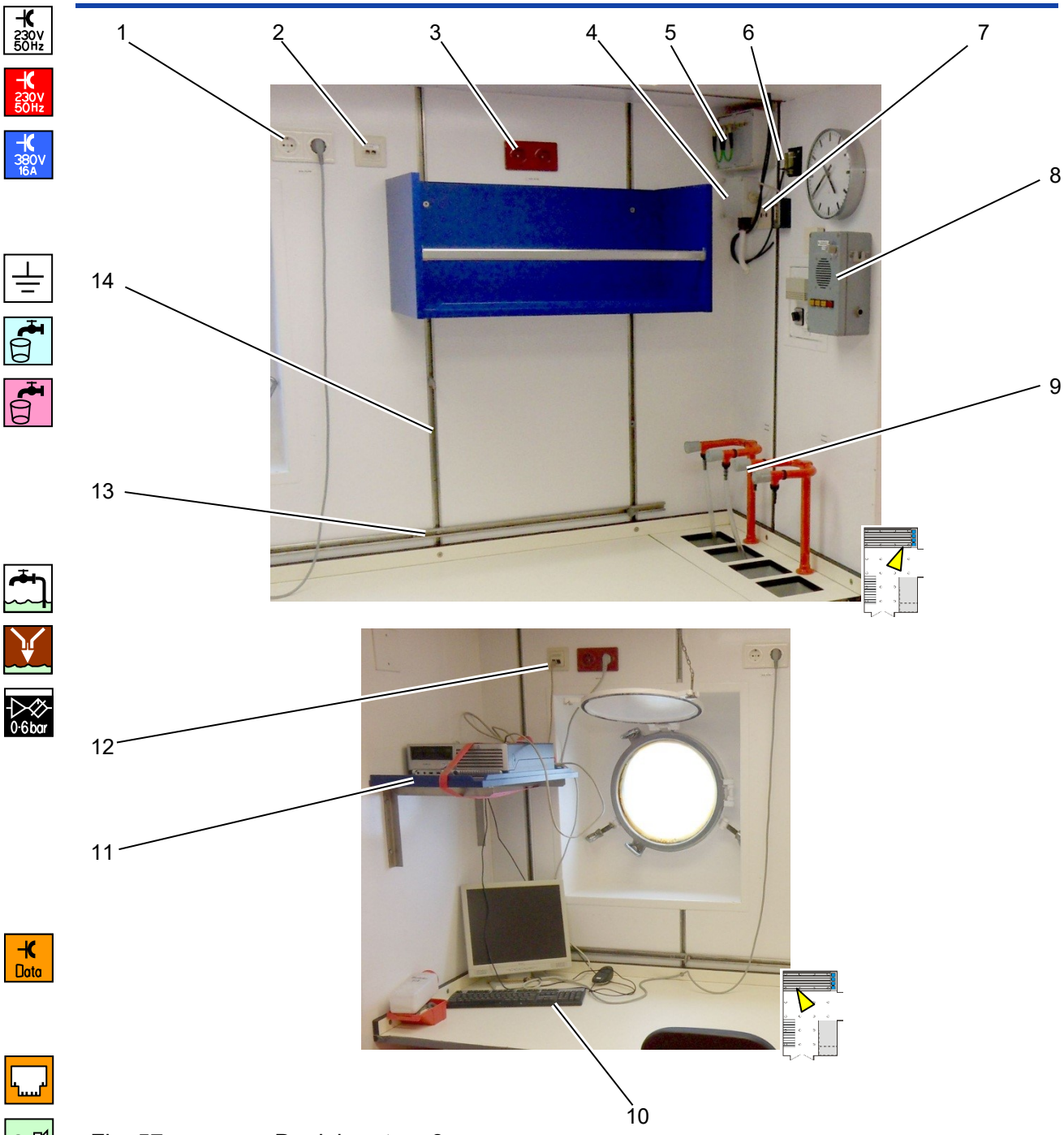


Fig. 57 Dry laboratory 8

1	Double socket	8	Intercom science
2	Network connections (LAN)	9	4 pure sea water taps (membrane pump)
3	Double socket	10	PC workplace (example)
4	Connections to data distribution system	11	Wall shelf with PC
5	Connections for control monitors	12	Network connections (LAN)
6	Connections to data distribution system	13	Horizontal C-rails
7	Antennae socket	14	Vertical C-rails

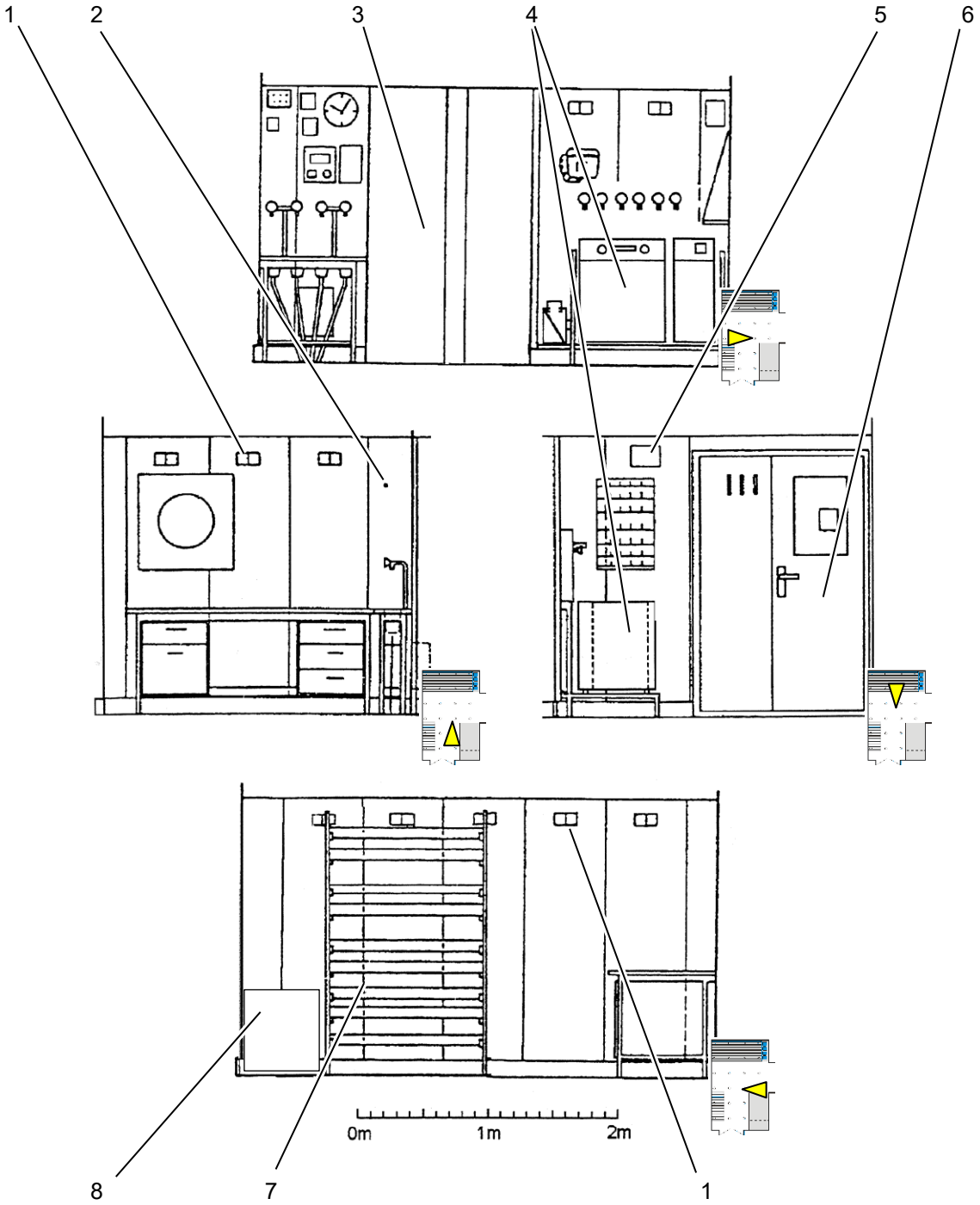


Fig. 58 Dry laboratory 8 (detailed plan laboratory walls, status 1986)

1	Double sockets	5	Cable feed through
2	Earthing bolts M10 (potential equalisation)	6	Access from landing main deck port
3	Access to dry laboratory 7, can be closed off with separate wall sections	7	Shelves
4	Laboratory cleaning machine	8	Deep freezer space-80 °C

4.10 Measurement and registration room 9

Main deck port

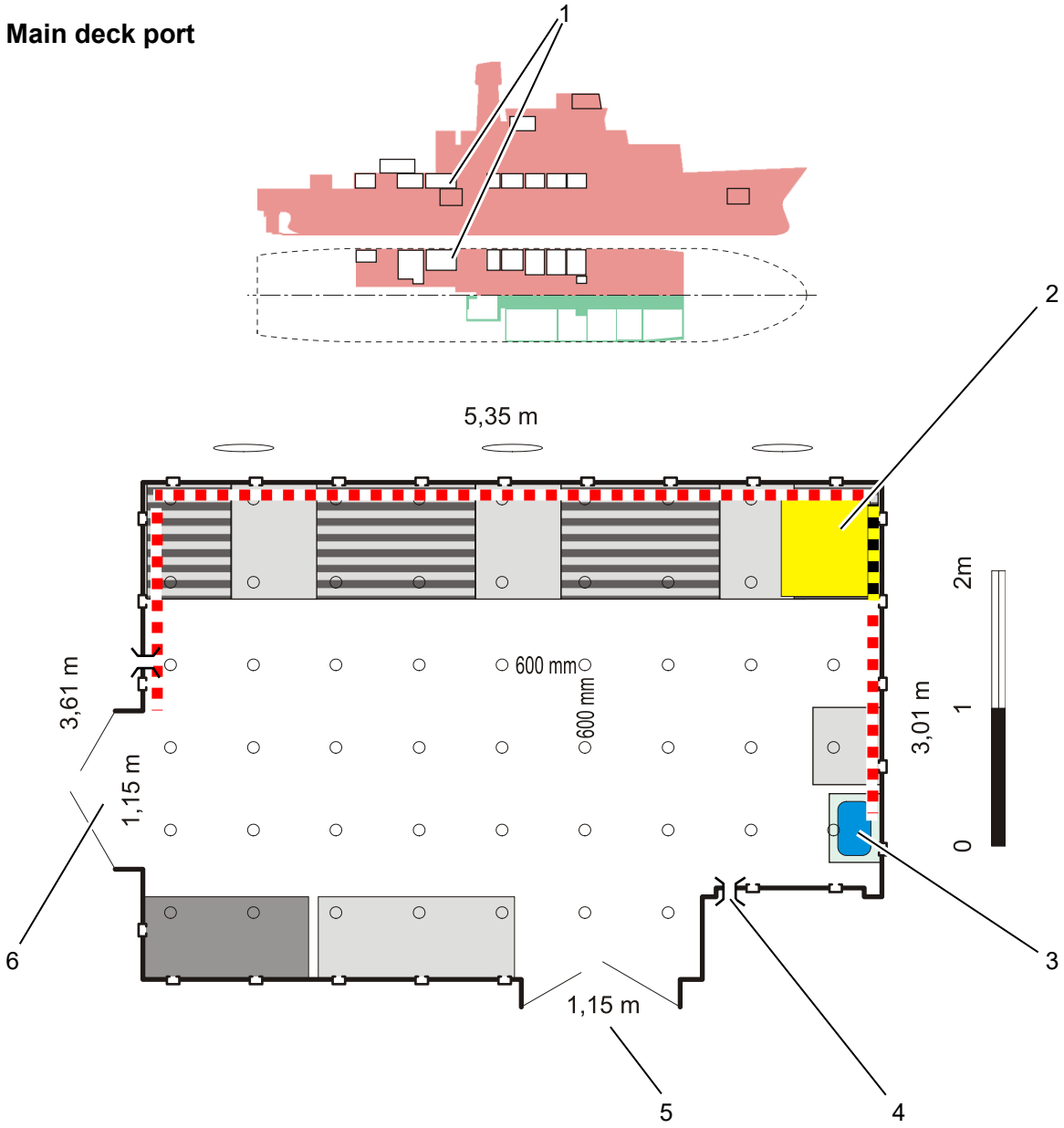


Fig. 59 Measurement and registration room 9

1	Measurement and registration room on main deck	4	Cable feed through
2	Posidonia 6000 operating unit	5	Access from staircase
3	Hand wash sink	6	Access to wet laboratory 10

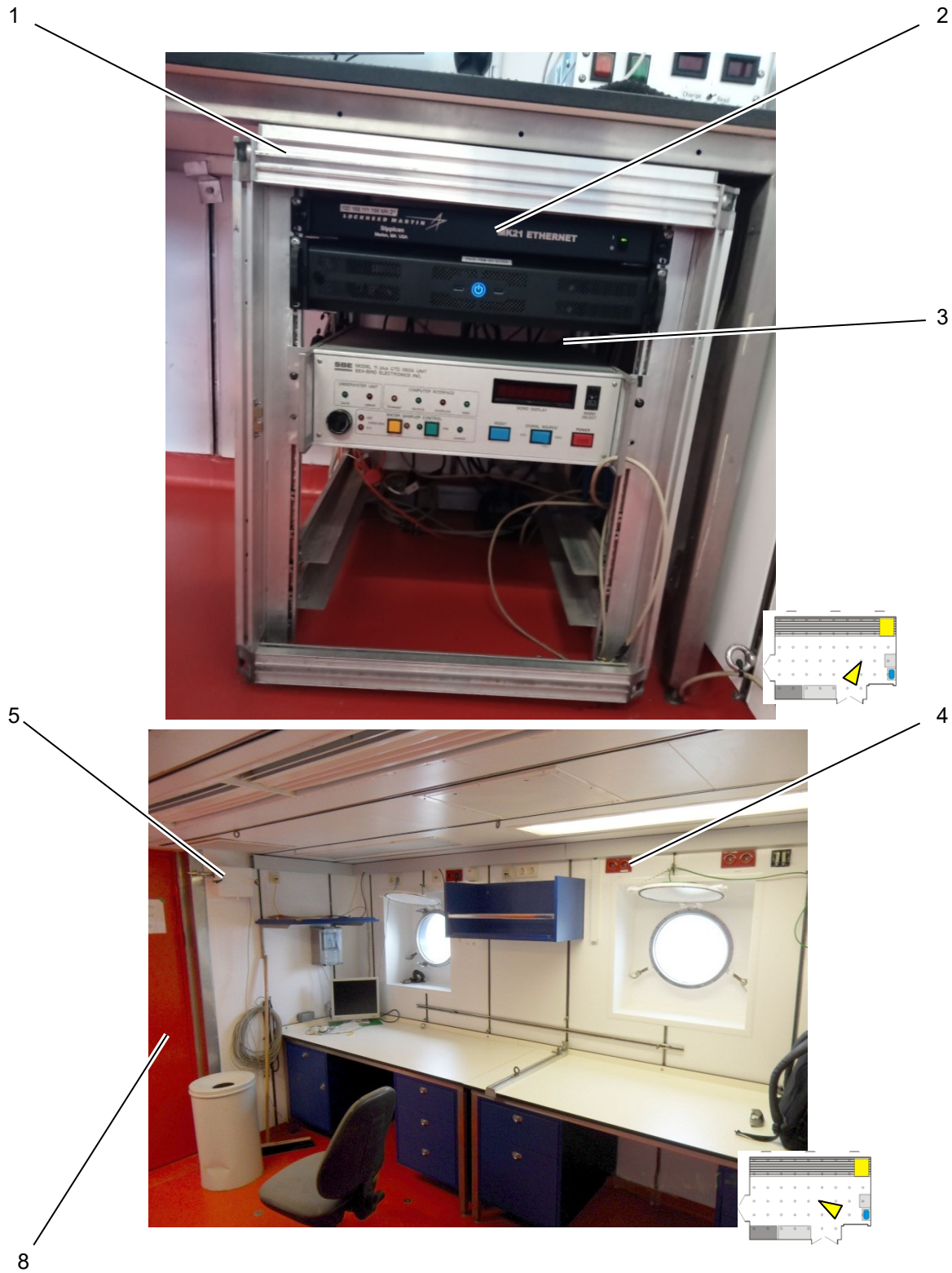


Fig. 60 Measurement and registration room 9

1 CTD monitor
2 DSHIP or Posidonia monitor
3 Posidonia monitor pull-out
4 Posidonia deck unit
5 CTD deck unit
6 Access to wet laboratory 10

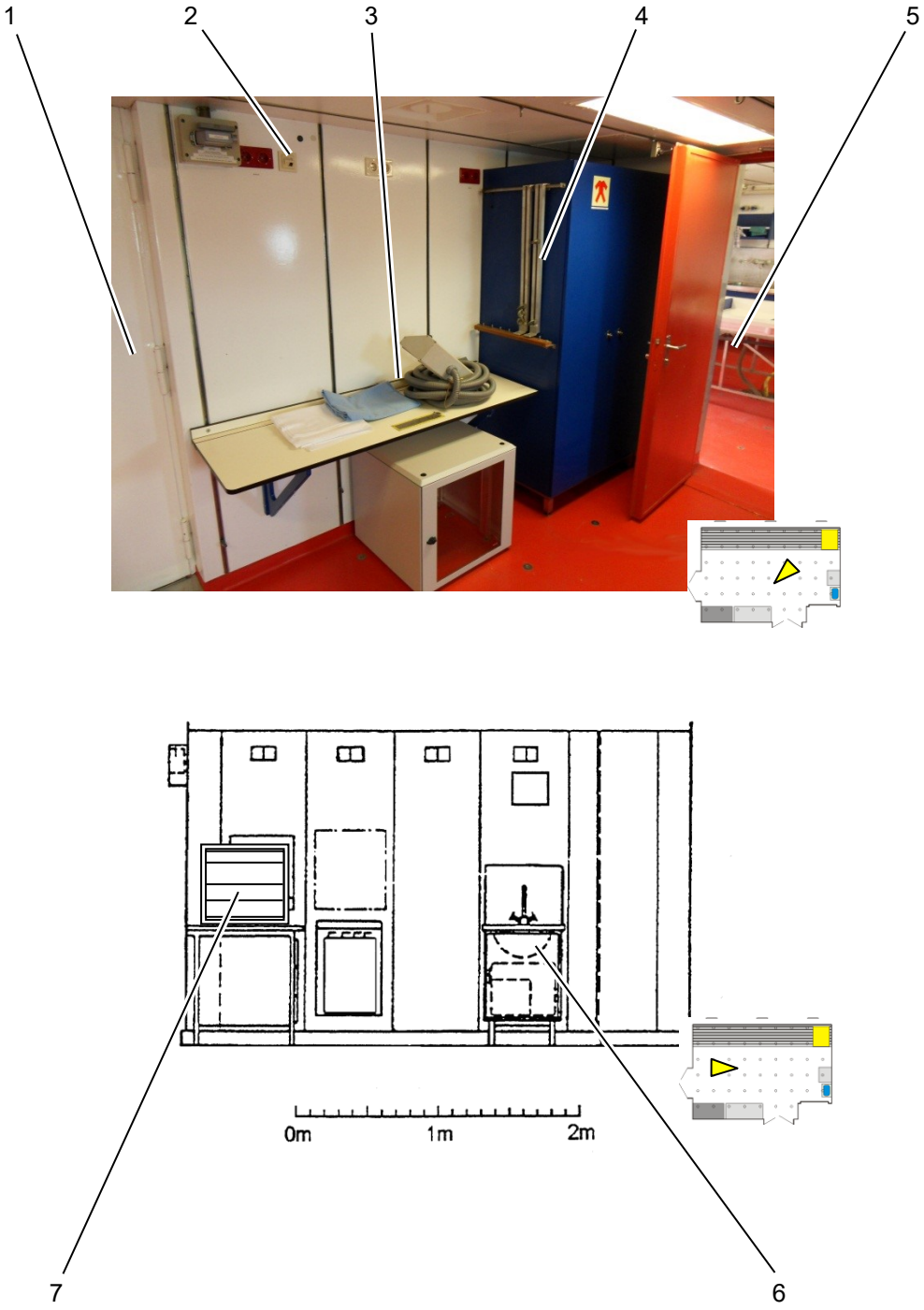


Fig. 61 Measurement and registration room 9

1 Access to staircase aft ship port
2 Network connections (LAN)
3 Additional folding table
4 Securing rails for C-rail fitting
5 Access to wet laboratory 10
6 Hand wash sink
7 Operating unit Posidonia 6000

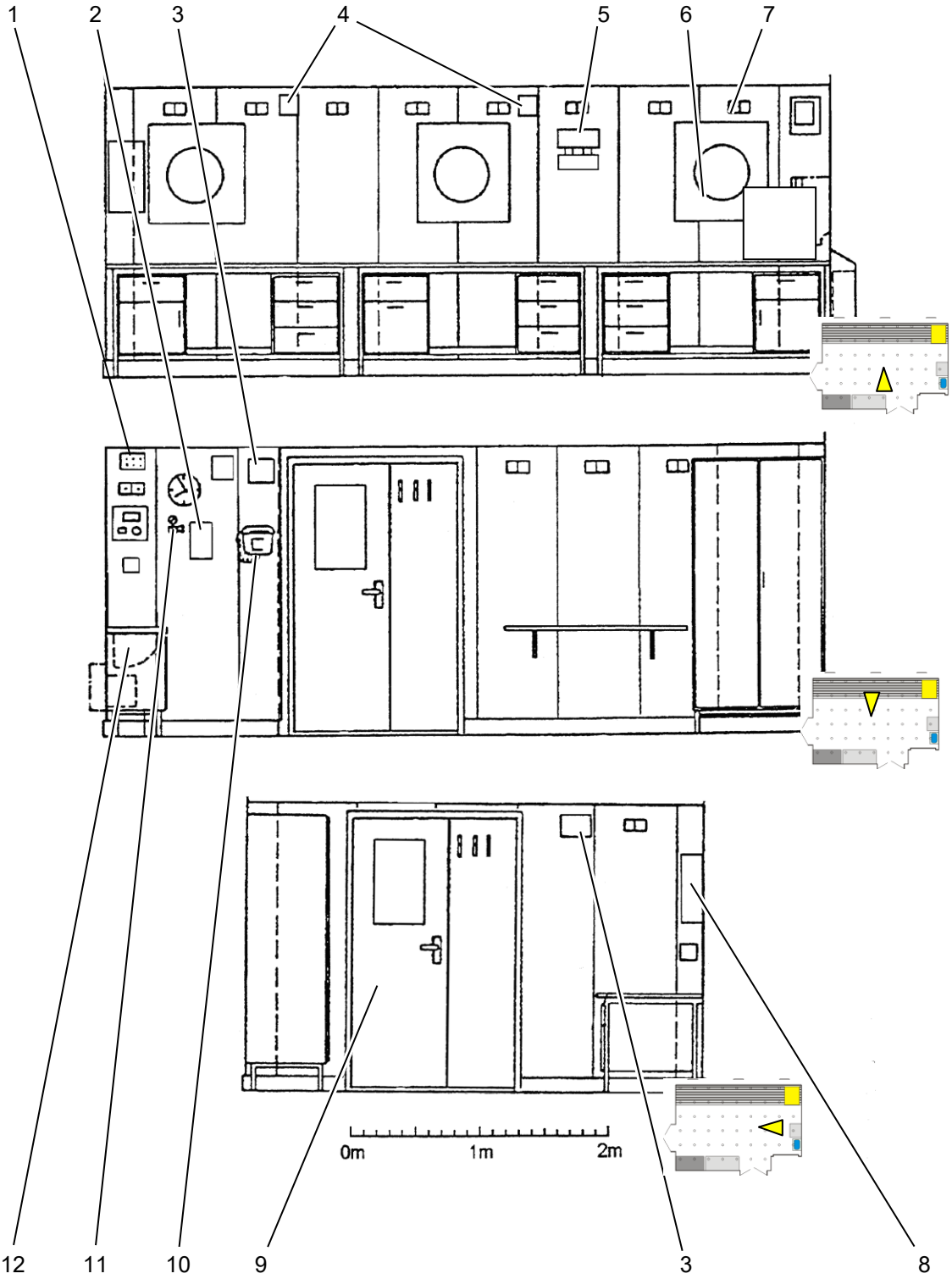


Fig. 62 Measurement and registration room 9 (detailed plan, status 1986)

1 Connection for control monitors
2 Intercom science
3 Cable feed throughs
4 Network connections (LAN)
5 Connection winches W 2,3,12
6 Operating unit Posidonia 6000
7 Connection measurement data distributor
8 Thermosalinograph (optional)
9 Access to staircase aft ship port
10 Telephone
11 Compressed air 0-6 bar, oil separated
12 Hand wash sink

4.11 Wet laboratory 10

Main deck port

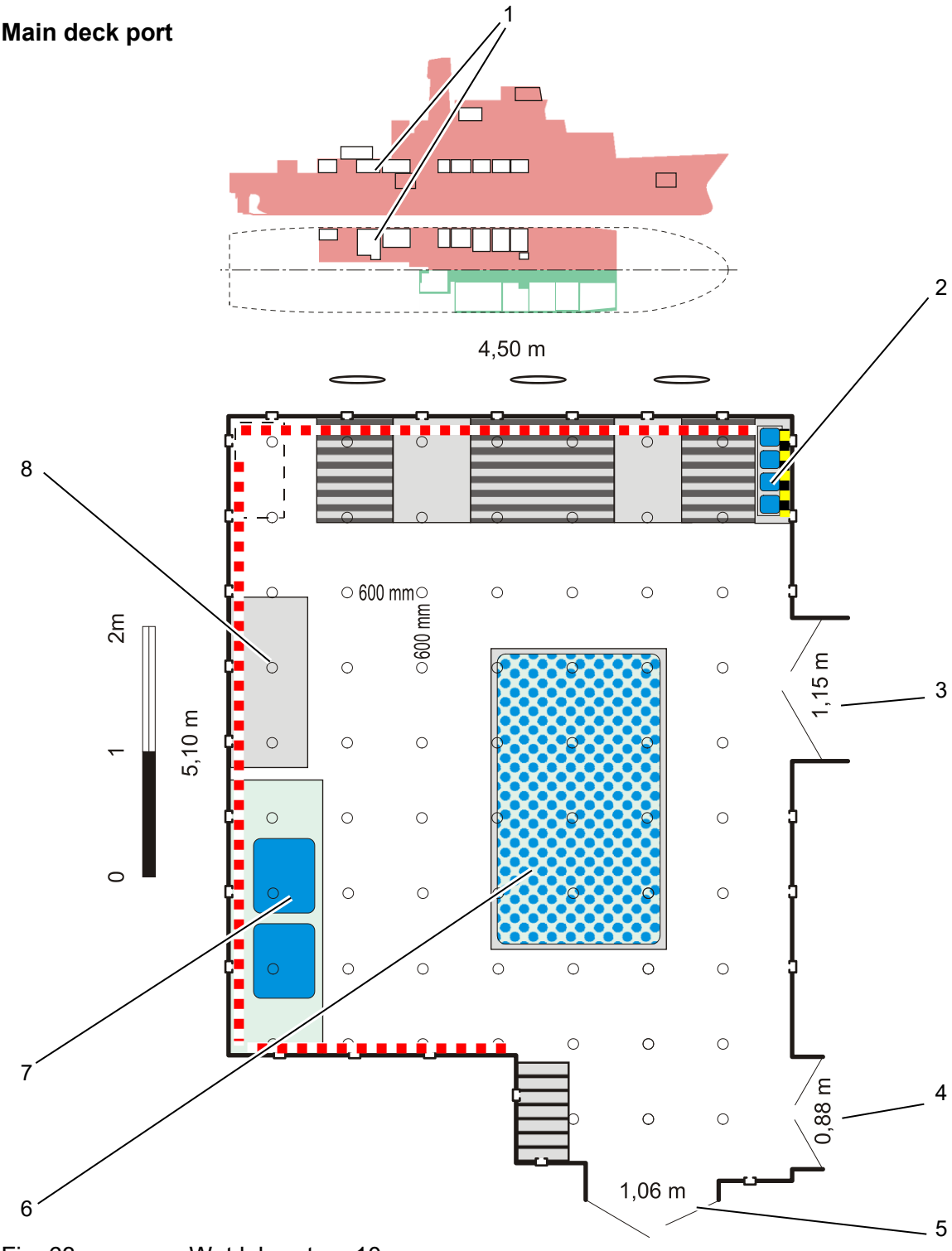


Fig. 63 Wet laboratory 10

1 Wet laboratory 10 on main deck
2 4 sea water sinks direct to sea
3 Access to measurement/registration room
4 Load lift to scientific stowage II
5 Direct access from working deck
6 Wet work table with run offs
7 Double wash basin
8 Additional folding table

Fig. 64 Wet laboratory 10

1 Wet work table
2 Water connections at the ceiling of the room

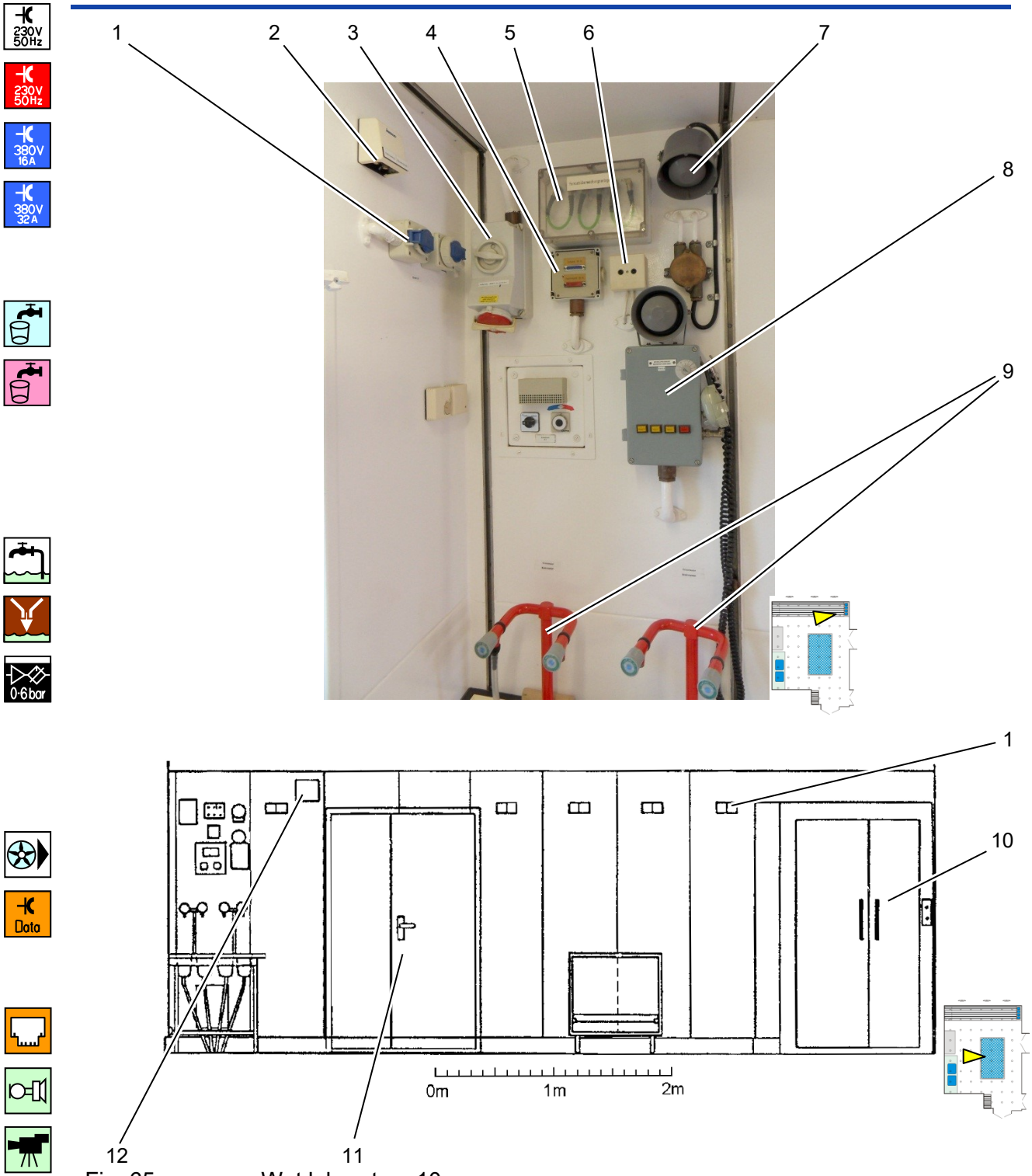


Fig. 65 Wet laboratory 10

1 Double sockets
2 Dataport hydrosweep/science
3 380 V connection with switch
4 Connections to data distribution system
5 Connections for control monitors
6 Antennae socket
7 Loudspeaker for announcements
8 Intercom science
9 Sea water taps (membrane pump)
10 Access to hoist to science 2
11 Access to the measurement and registration room 9
12 Cable feed through

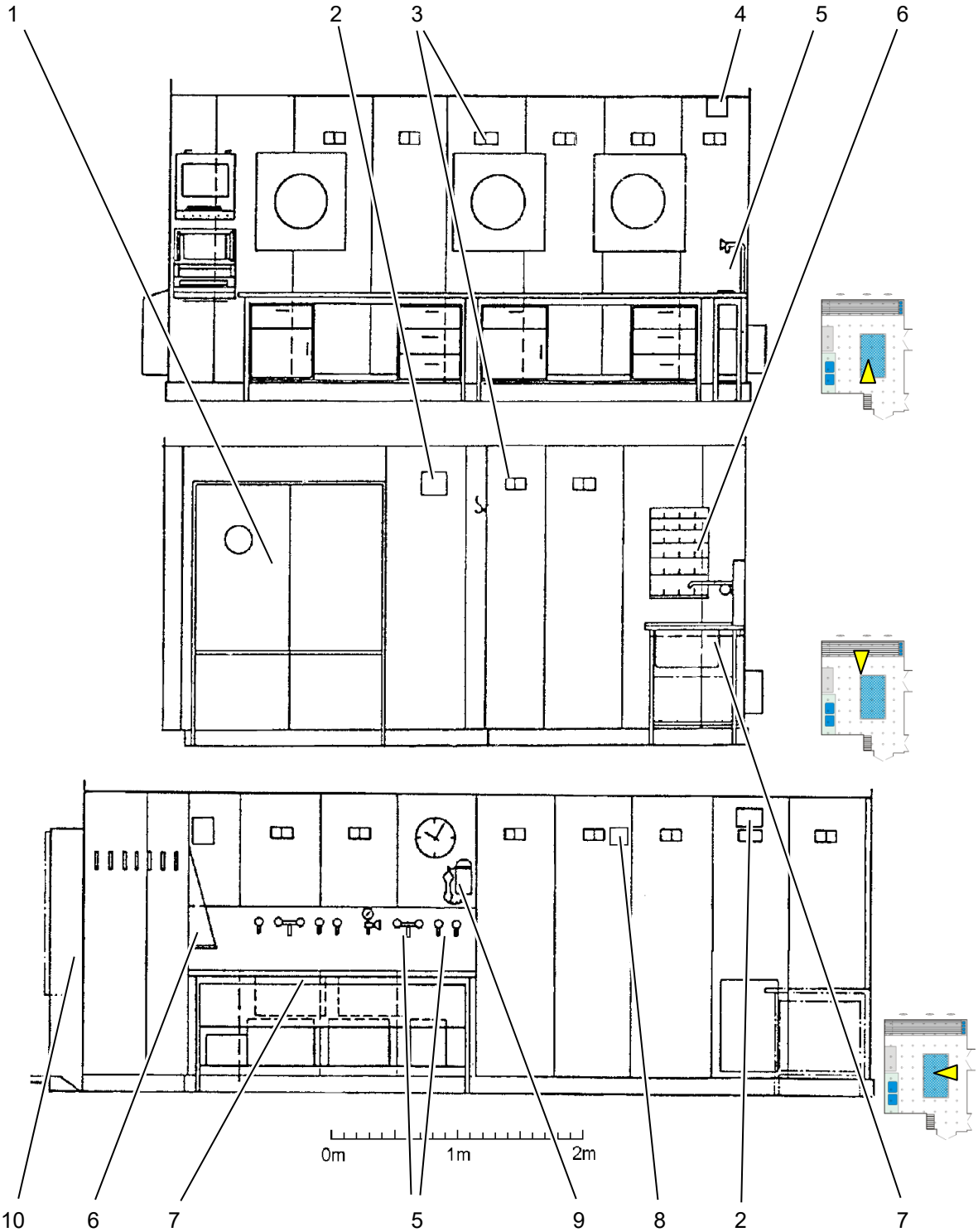


Fig. 66 Wet laboratory 10 (detailed plan laboratory walls, status 1986)

1	Access to the work deck for the aft ship	6	Draining rack
2	Cable feed throughs	7	Large double sink
3	Double sockets	8	Network connections (LAN)
4	Dataport hydrosweep/science	9	Telephone
5	Sea water taps (membrane pump)	10	Access to the work deck for the aft ship

4.12 Air gun room 11

Main deck

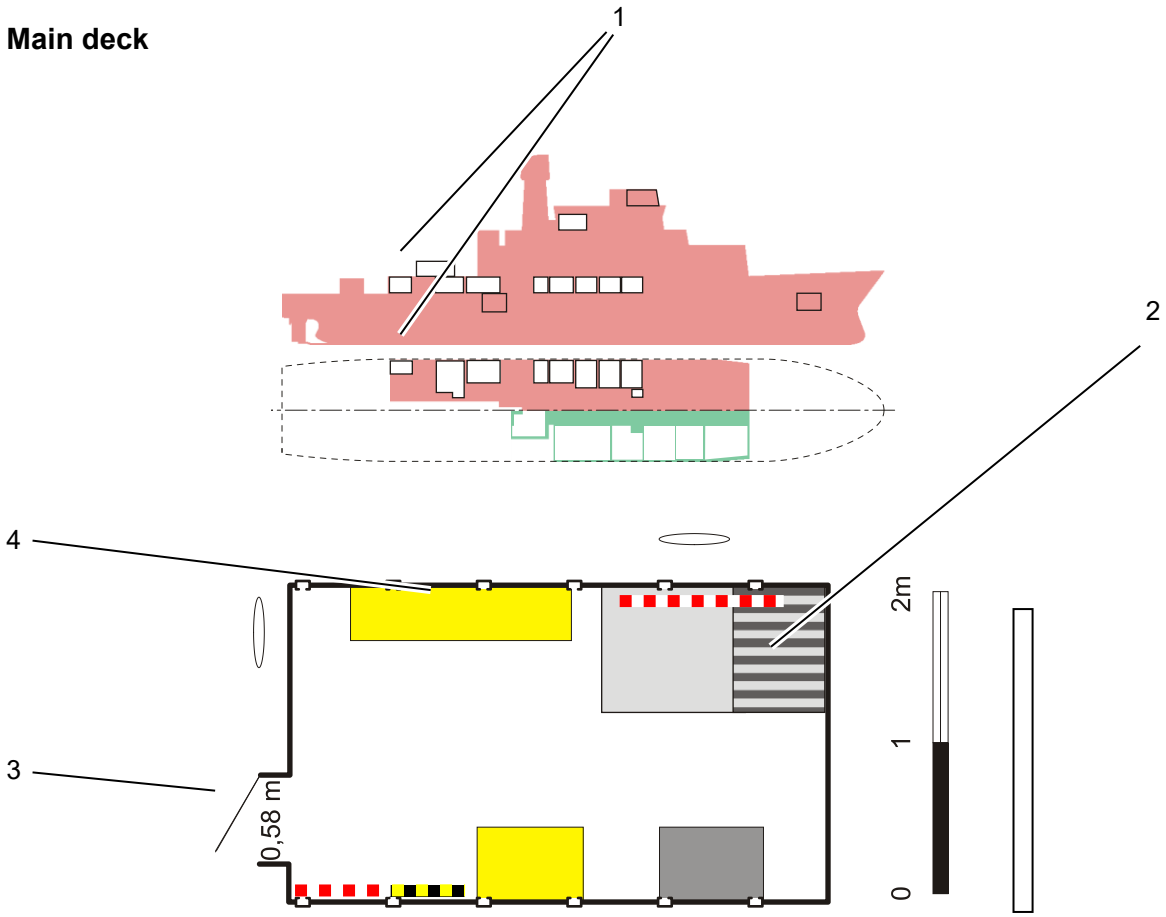


Fig. 67 Air gun room 11

1 Air gun room 11 on main deck
2 Workbench
3 Direct access from working deck
4 Air pulse fittings

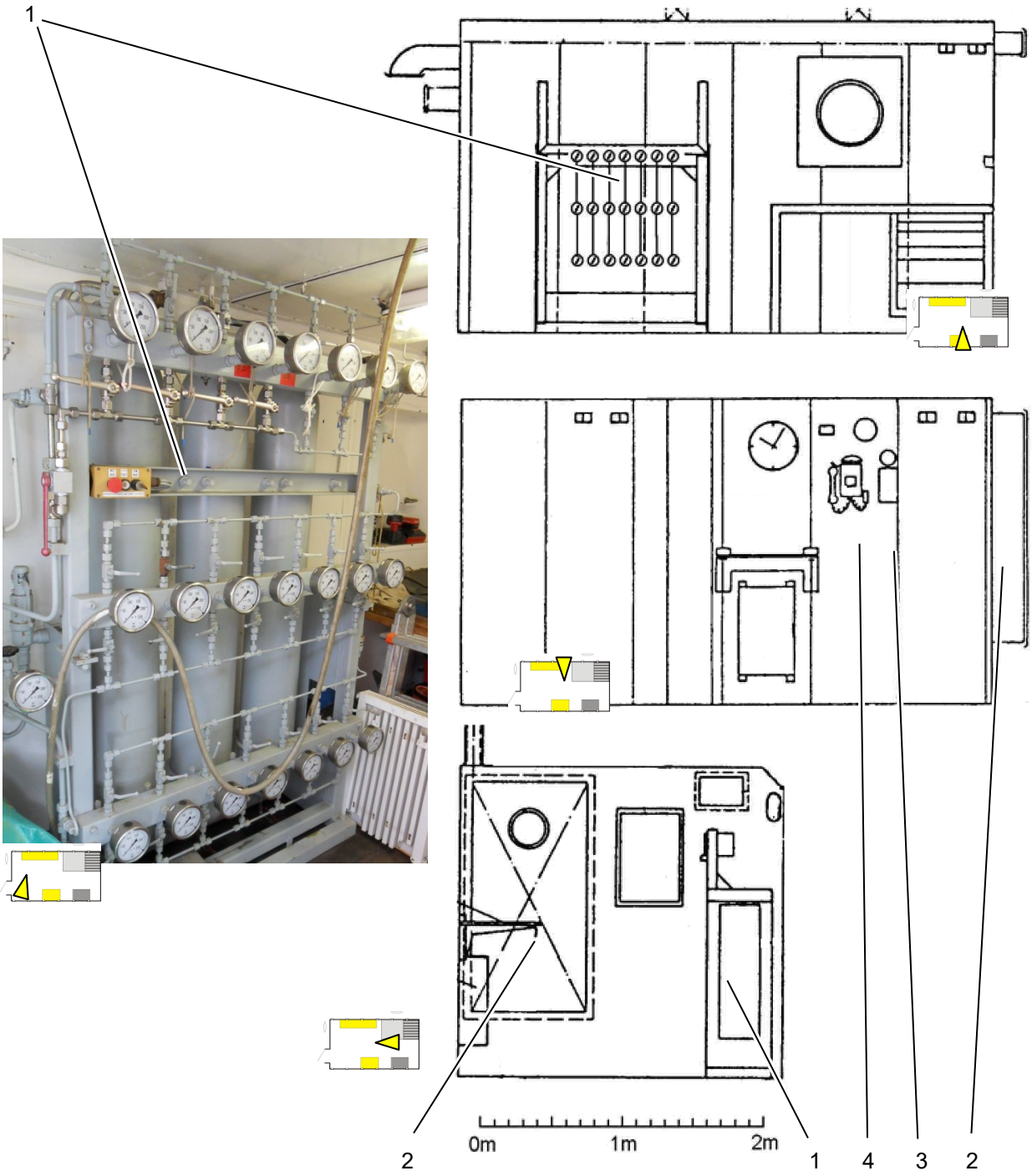


Fig. 68 Filling station for air guns

1 Filling station for air guns
2 Access to work deck
3 Intercom science
4 Telephone

Note

The connections for the air guns are Ermeto fittings, size S 8 and S 10.

4.13 Gravimeter room 12

Main deck

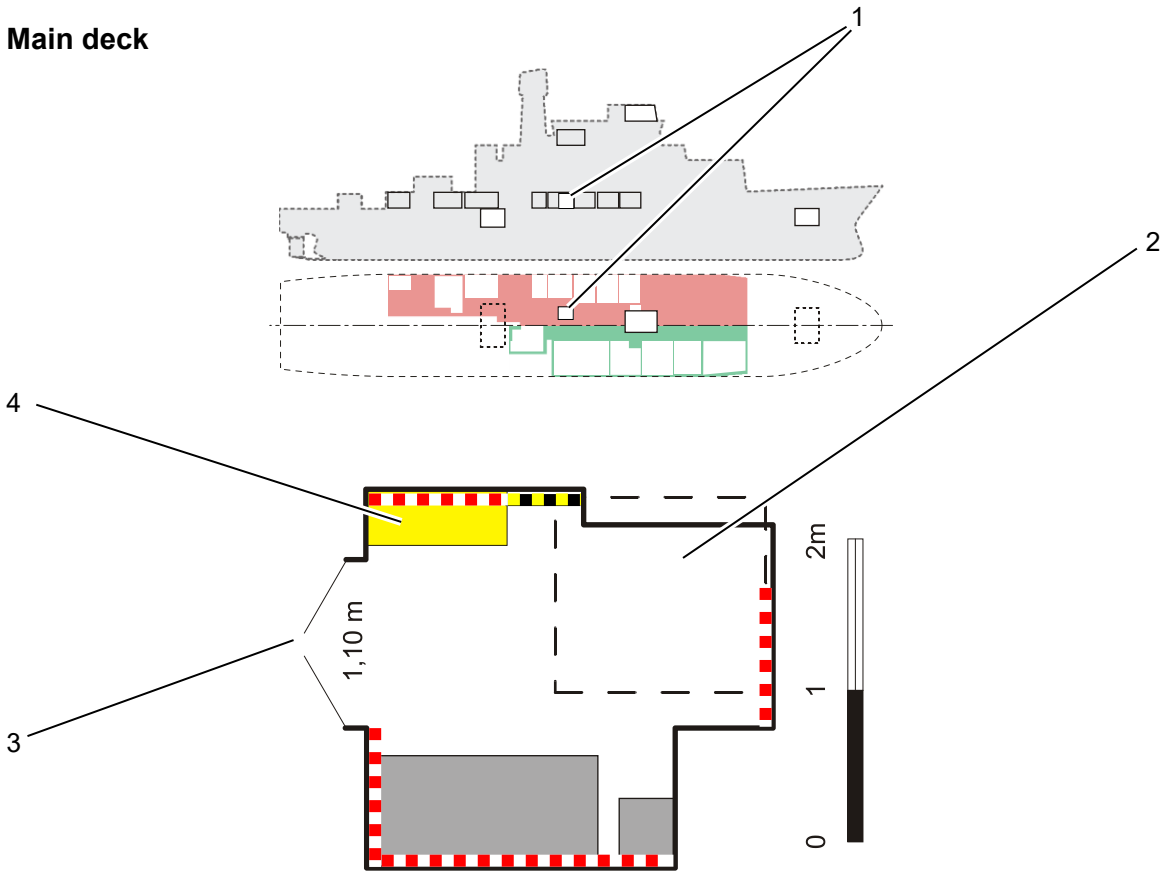


Fig. 69 Gravimeter room 12

1 Gravimeter room on main deck
2 Gravimeter base
3 Access to main landing
4 Air conditioning appliance (optional)

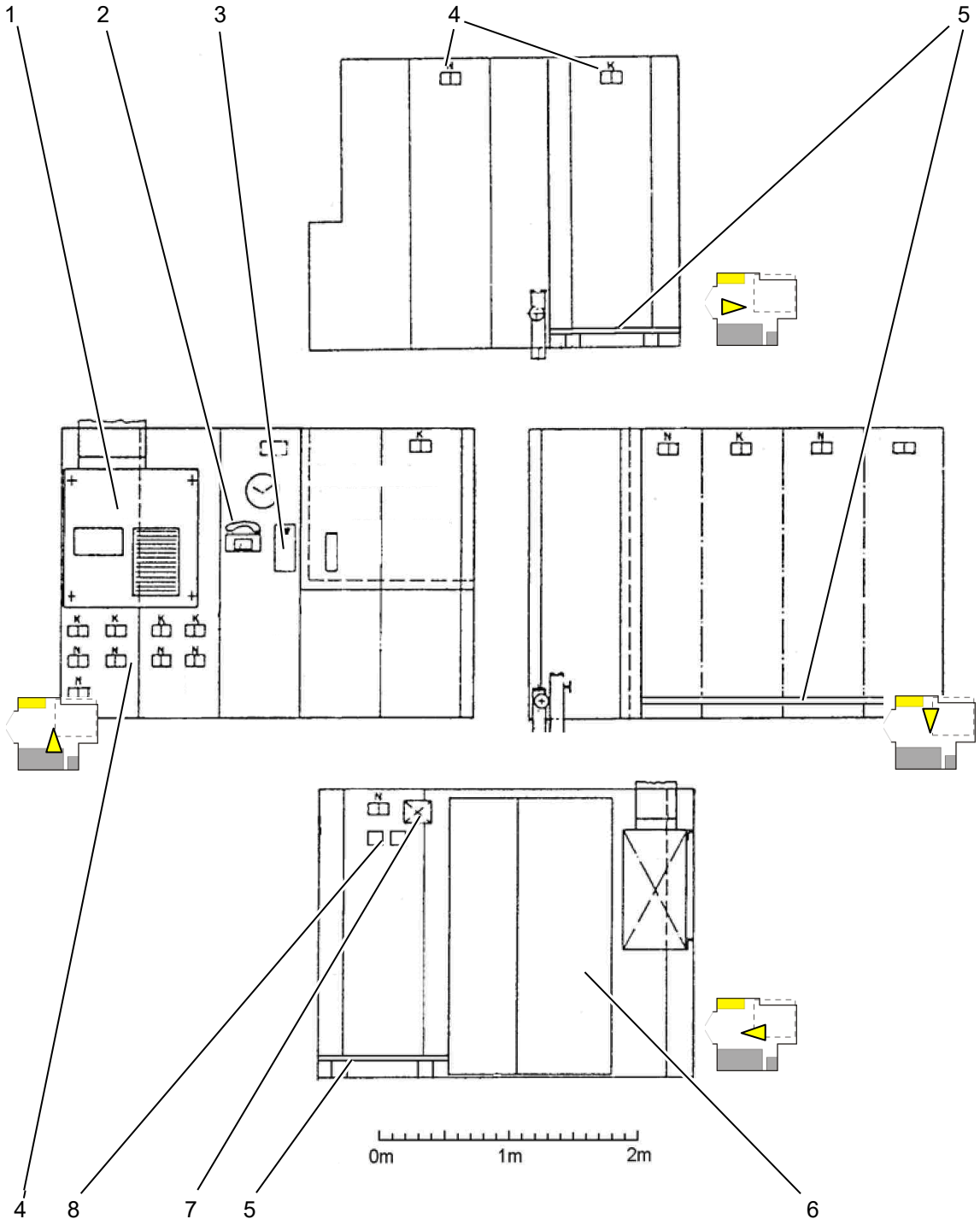


Fig. 70 Gravimeter room 12 (detailed plan of laboratory walls, version 1986)

1 Air conditioning appliance (optional)
2 Telephone
3 Intercom science
4 Double sockets
5 Wooden platform
6 Access to main landing
7 Cable feed through
8 Network connections (LAN)

4.14 Drawing room 13

Main deck starboard

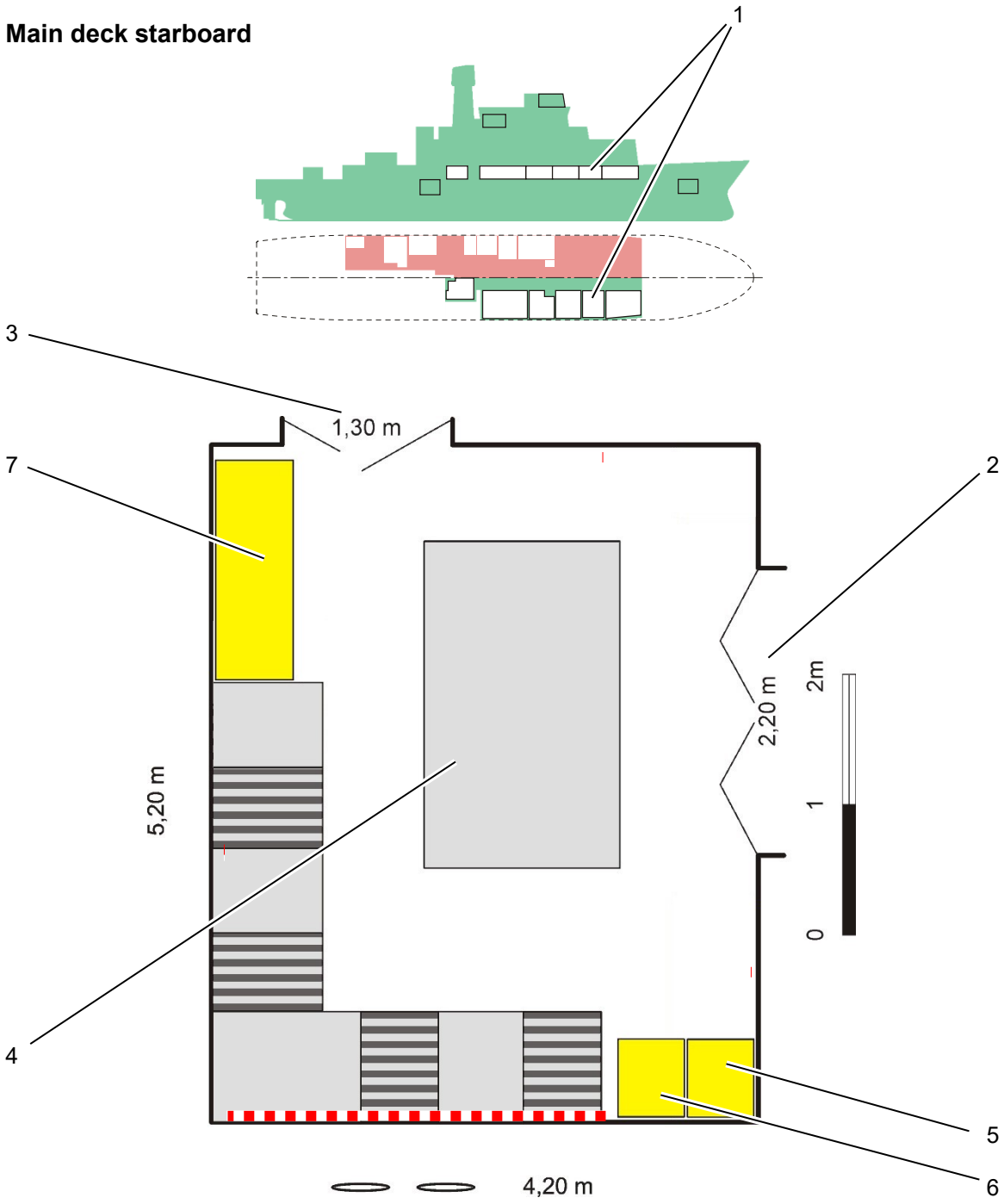


Fig. 71 Drawing room 13

1 Drawing room on main deck
2 Access to conference room main deck
3 Access from landing main deck starboard
4 Large drawing table
5 Network printer / scanner (ge)
6 Network printer / scanner (engl)
7 A0 plotter

Fig. 72 Drawing room 13

1 Network printer / scanner (ge)
2 Network printer / scanner (engl)
3 Large drawing table
4 A0-Plotter
5 Access from landing main deck starboard
6 Access to conference room main deck

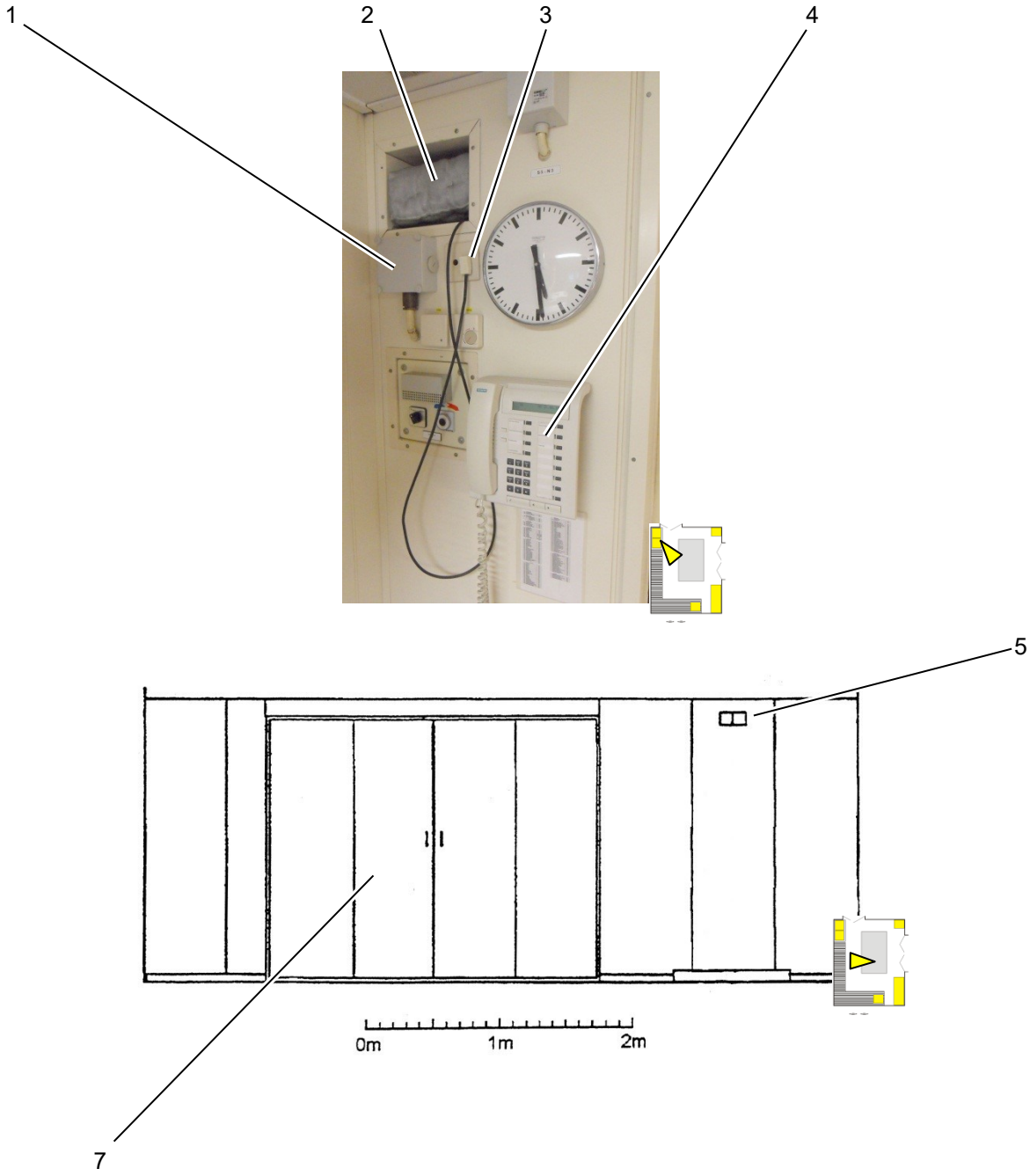


Fig. 73 Drawing room 13 (detailed plan of laboratory walls, version 1986)

1 Connection "monitor data"
2 Cable feed through
3 Antennae socket
4 Telephone
5 Double socket
6 Access to conference room

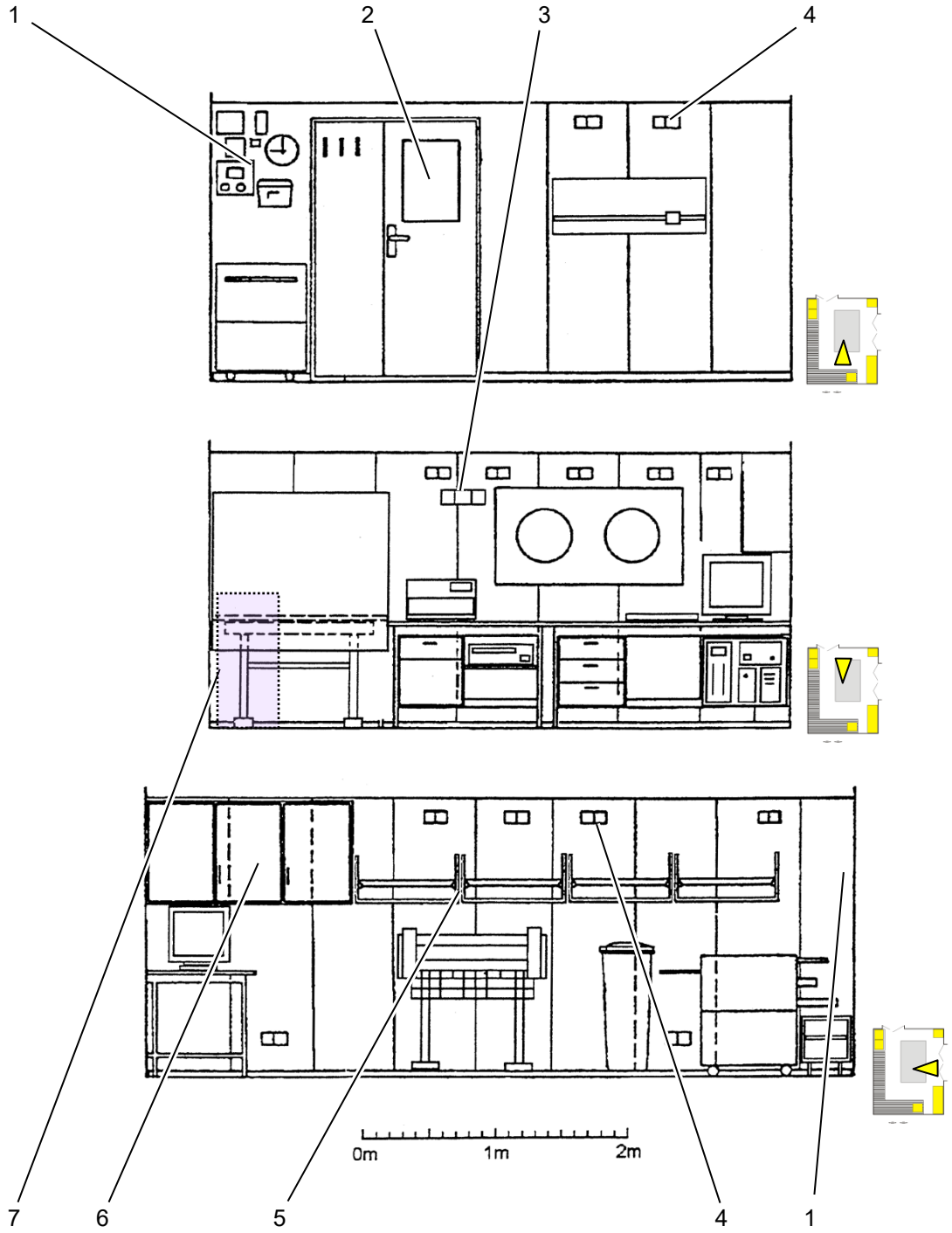


Fig. 74 Drawing room 13 (detailed plan of laboratory walls, version 1986)

1 Communication connections
2 Access to main landing starboard
3 Network connections (LAN)
4 Double sockets
5 Hanging shelf
6 Hanging lockers
7 A0 plotter (current position dotted)

4.15 Universal laboratory 15

Main deck starboard

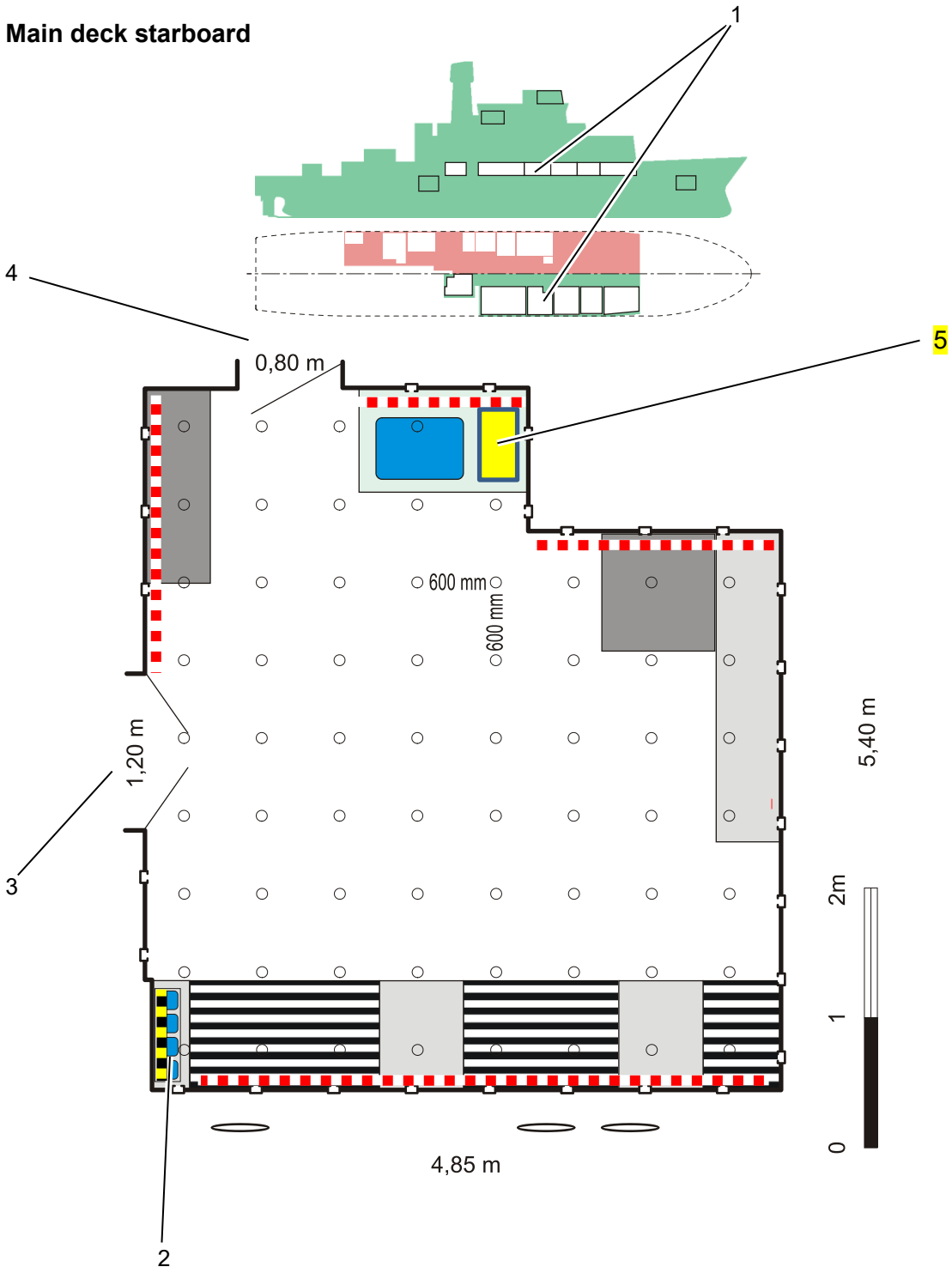


Fig. 75 Universal laboratory 15

1 Universal laboratory on main deck
2 4 small sea water basins direct to sea
3 Access to geo laboratory 16
4 Access from landing main deck starboard
5 Milli-Q “IQ 7005”

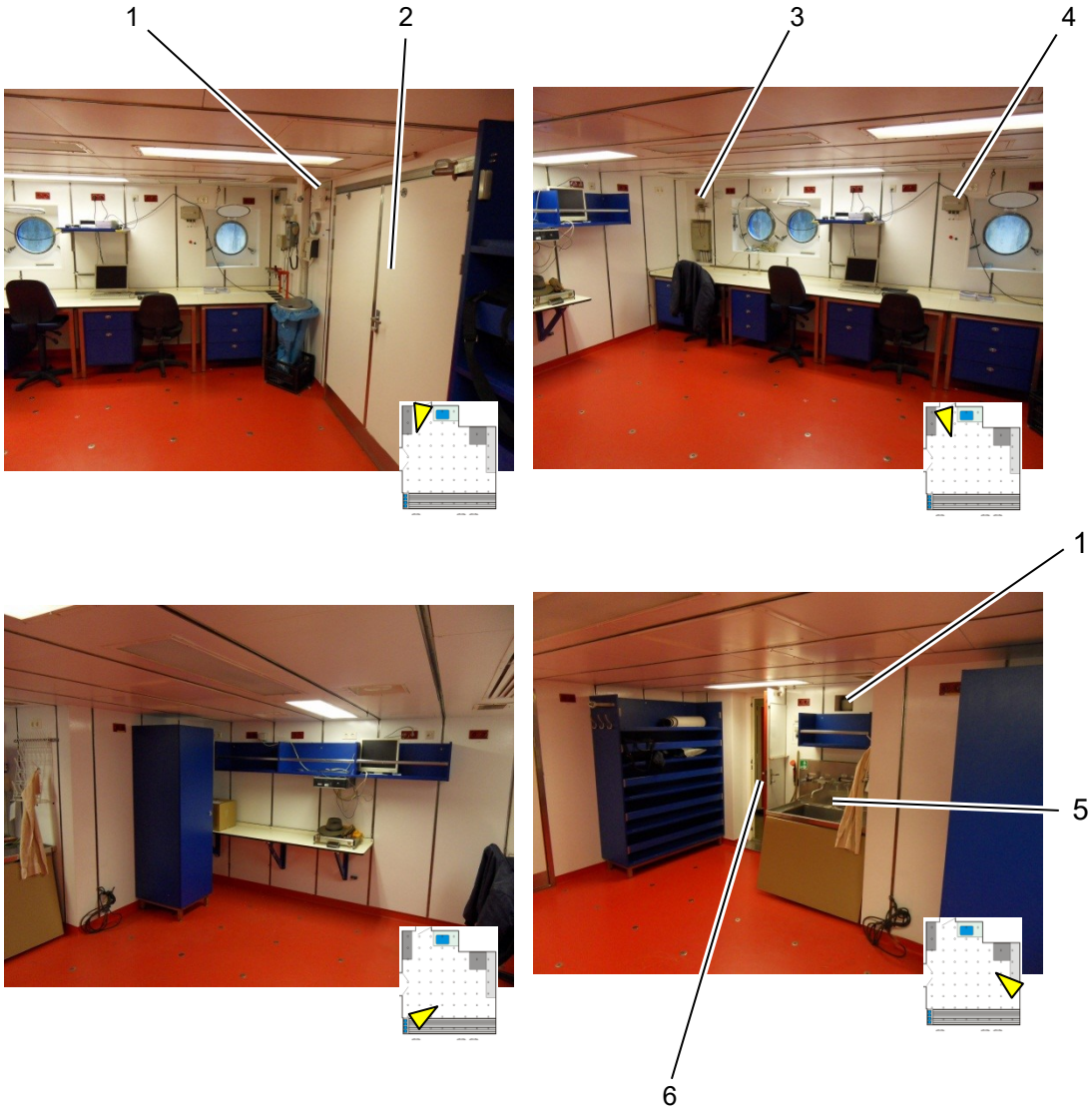


Fig. 76 Universal laboratory 15

1	Cable feed throughs	4	Junction box winches W 2,3,12
2	Access to geo laboratory 16	5	Large sink
3	Connections measurement data distributors	6	Access to landing main deck starboard

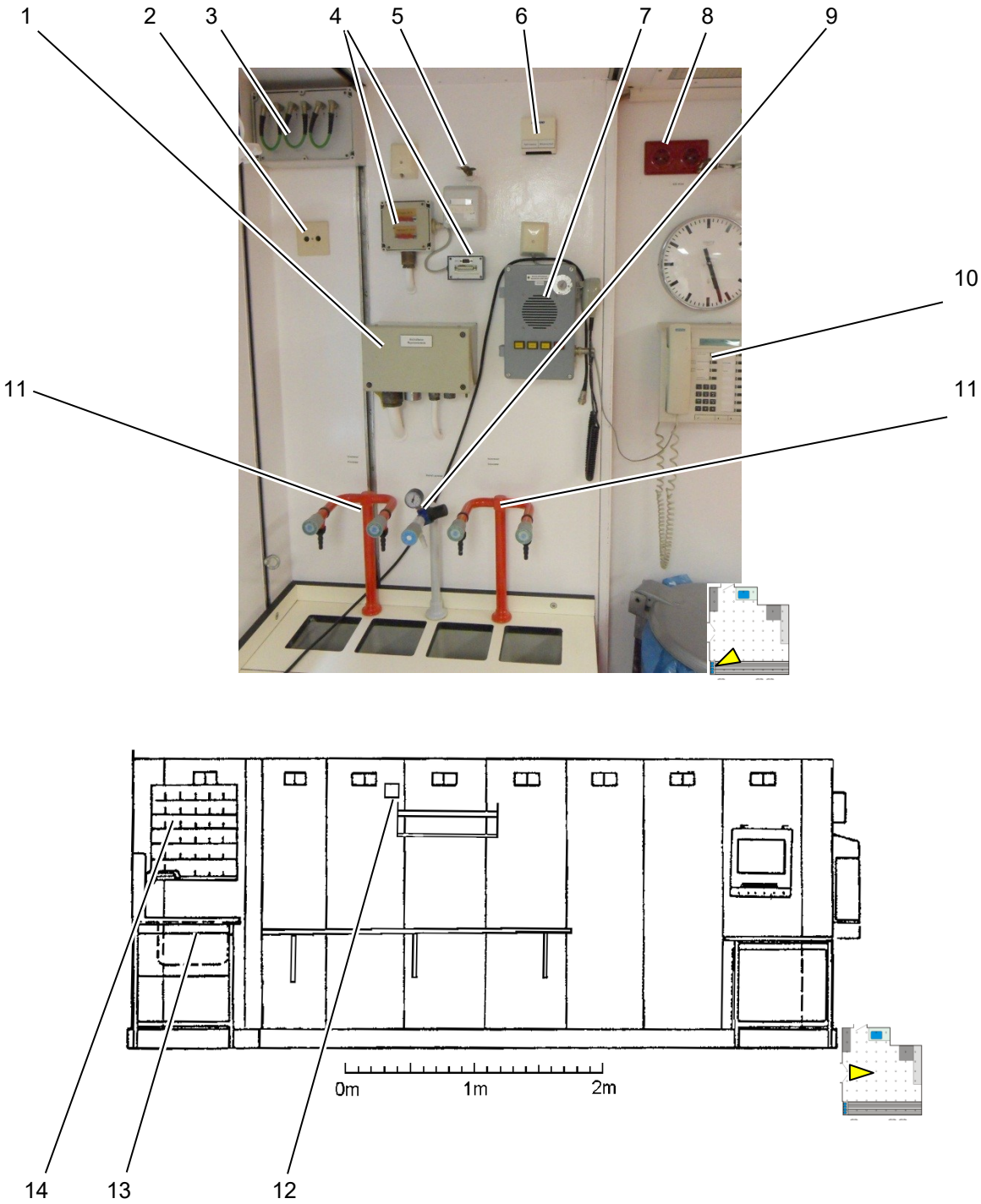


Fig. 77 Universal laboratory 15

1 Junction box magnetometer winch
2 Antennae socket
3 Connections for control monitors
4 Connections to data distribution system
5 Earthing bolts M10 (ship's earth)
6 Connections hydrosweep/science
7 Intercom science
8 Double socket
9 Compressed air 0-6 bar, oil separated
10 Telephone
11 Sea water taps (rotary pump)
12 Network connections (LAN)
13 Large sink
14 Draining rack

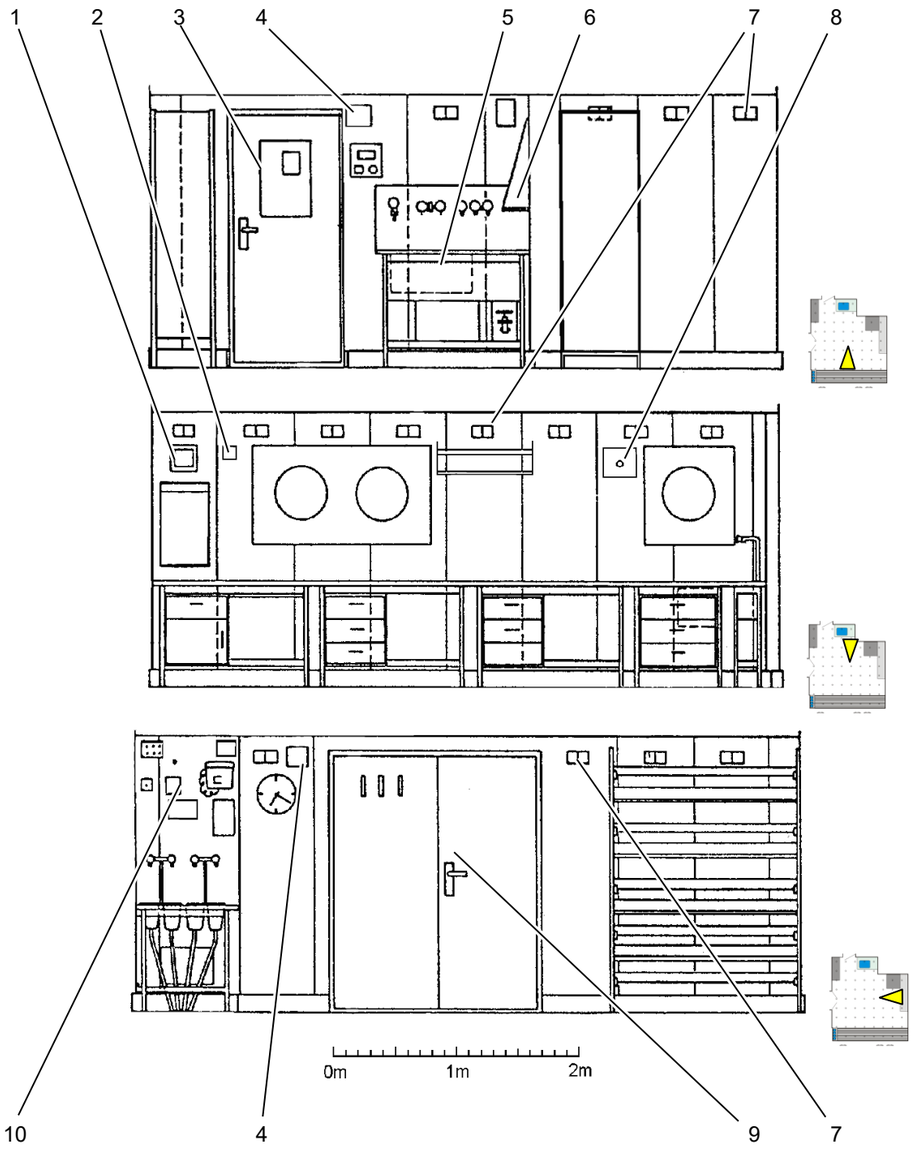


Fig. 78 Universal laboratory 15 (detailed plan of laboratory walls, version 1986)

1	Connections measurement data distributors	6	Draining rack
2	Network connections (LAN)	7	Double sockets
3	Access to main landing starboard	8	Junction box winches W2, W3, W12
4	Cable feed throughs	9	Access to geo laboratory 16
5	Large sink	10	Communication conections

4.16 Geo laboratory 16

Main deck starboard

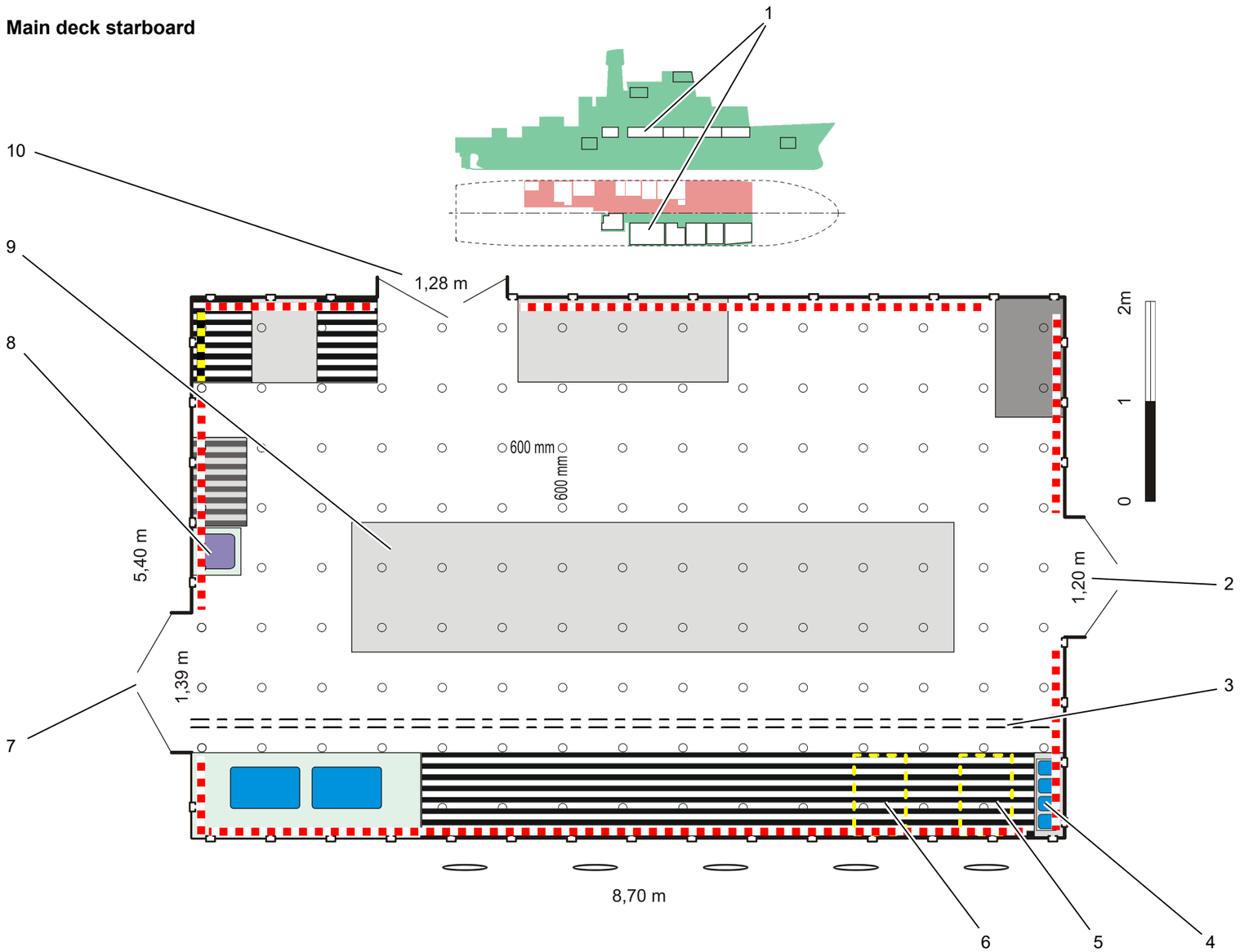


Fig. 79 Geo laboratory 16

Key:

1	Geo laboratory 16 on main deck	6	Compartment drier
2	Access to universal laboratory	7	Direct access from working deck
3	Crane track	8	Drinking water basin
4	4 small sea water basins direct to sea	9	Work table
5	Refrigerator	10	Access from landing main deck starboard

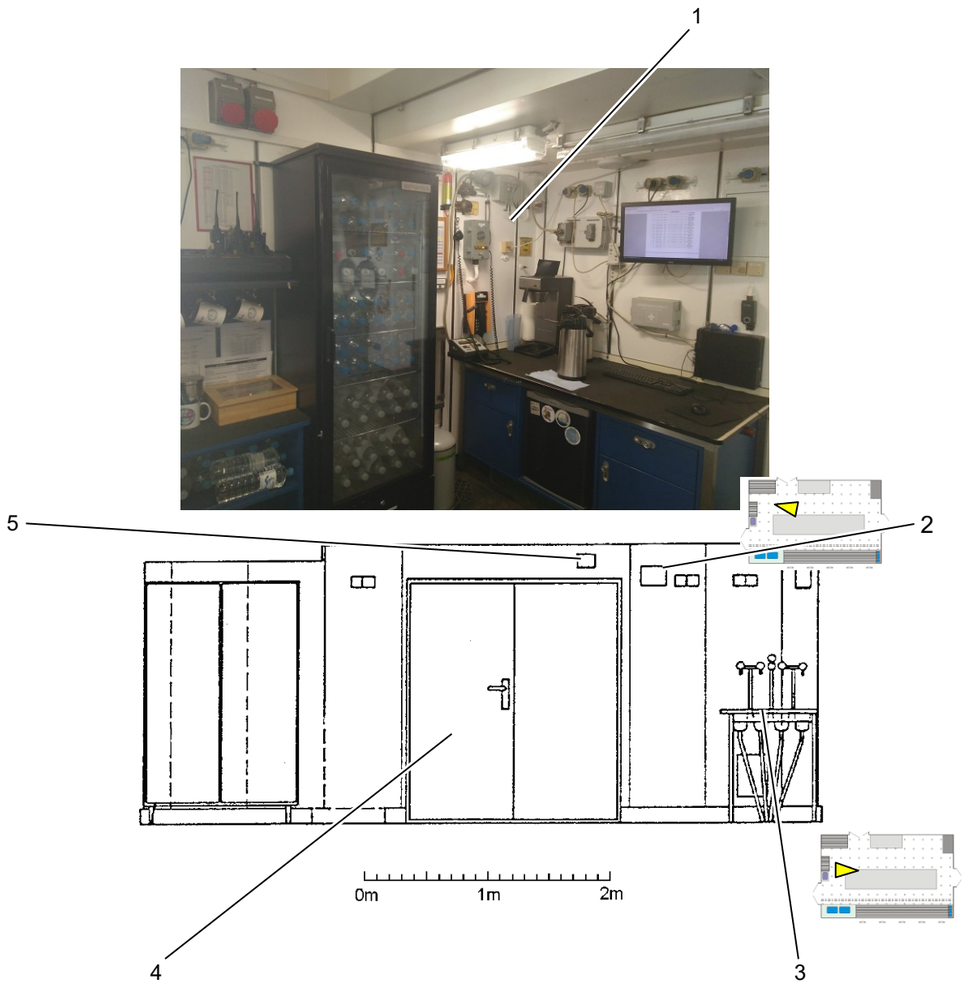


Fig. 80 Geo laboratory 16

1 Communication connections
2 Cable feed through
3 Sea water taps (rotary pump)
4 Passage to universal laboratory 15
5 Control box for crane track

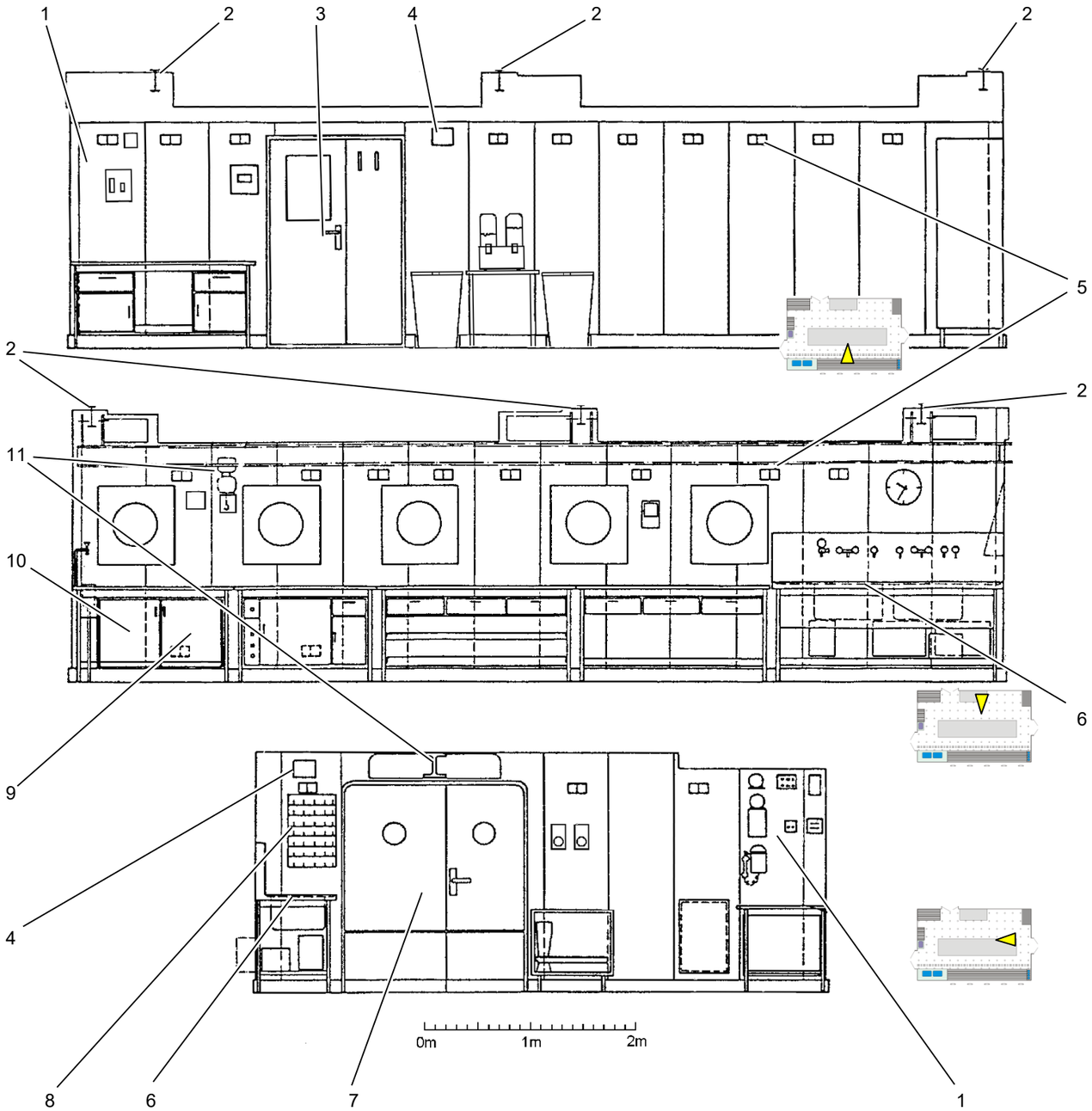


Fig. 81 Geo laboratory 16

1 Communication connections
2 Transverse rails for crane track
3 Access to landing main deck starboard
4 Cable feed through
5 Double sockets
6 Large double sink
7 Access to the work deck for the aft ship
8 Draining rack
9 Refrigerator
10 Compartment drier
11 Lengthways rails and crane block of the crane track

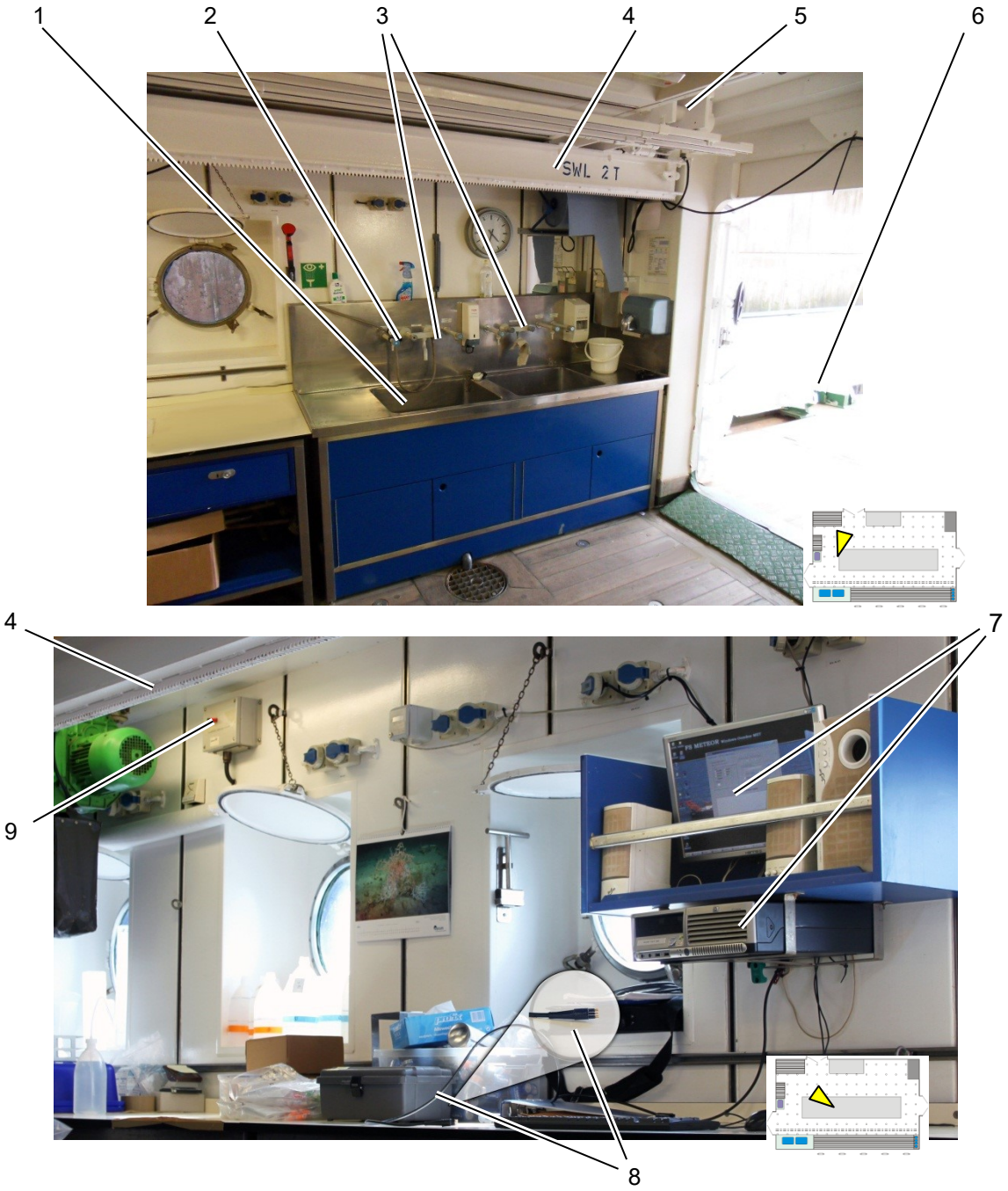
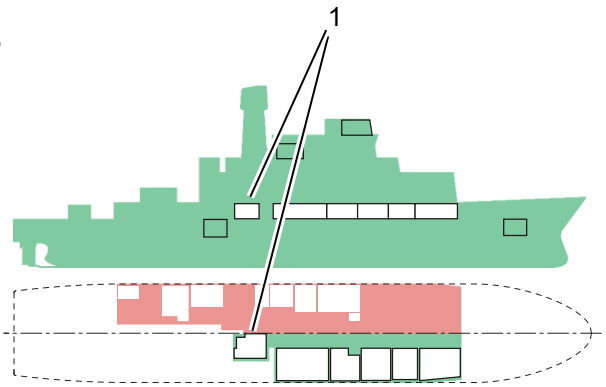


Fig. 82 Geo laboratory 16

1 Large double sink
2 Compressed air 0-6 bar, oil separated
3 Hot/cold water and pure sea water (rotary pump)
4 Longitudinal rail of the crane track SWL 2000 kg
5 Transverse rail of movable crane track (pos. 4)
6 Access to the work deck for the aft ship
7 PC with Seacat software for mobile sound probes
8 Connector for mobile sound probe
9 Connecting socket of on-board hydrophone at mobile triggering units

4.17 Filling room 17

Main deck midships



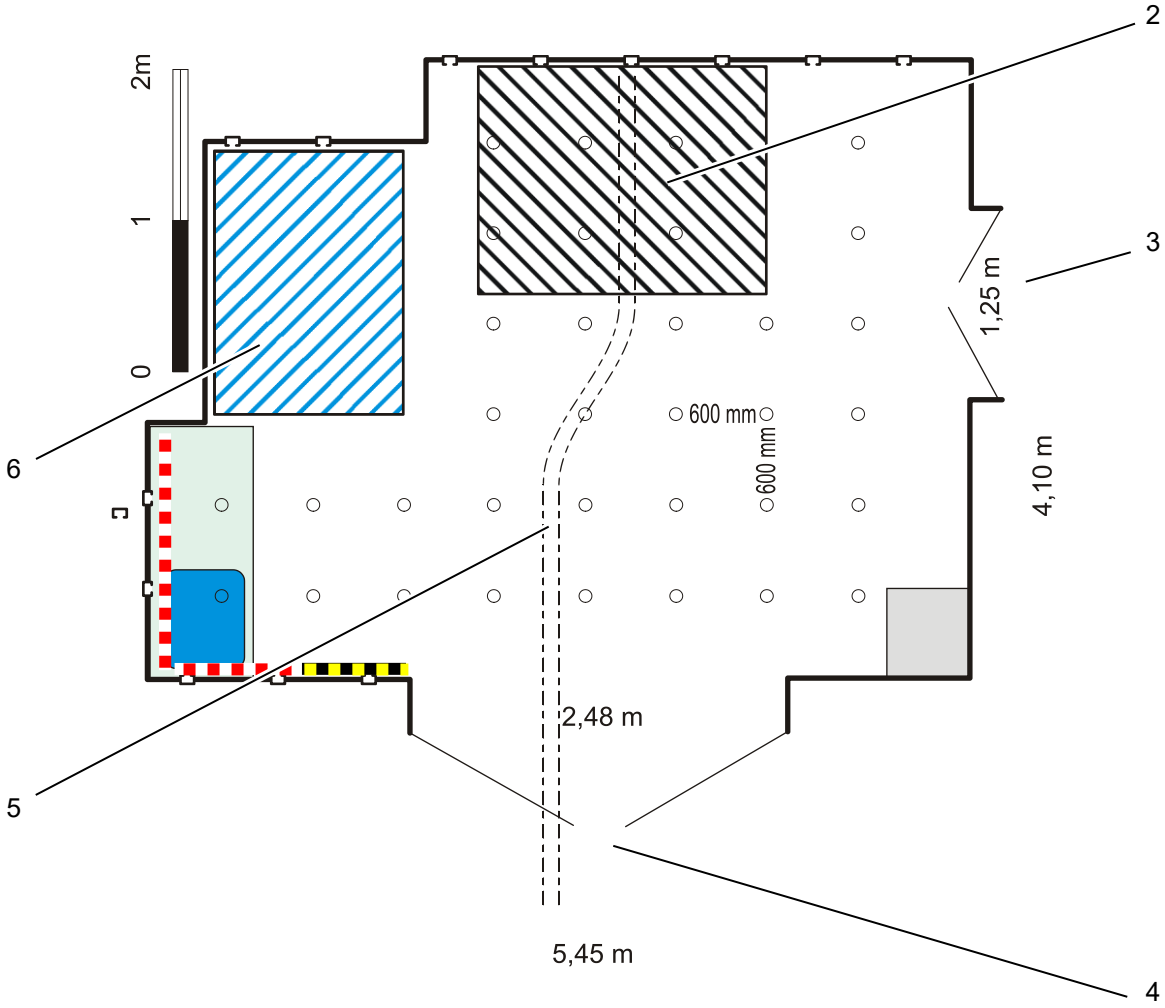
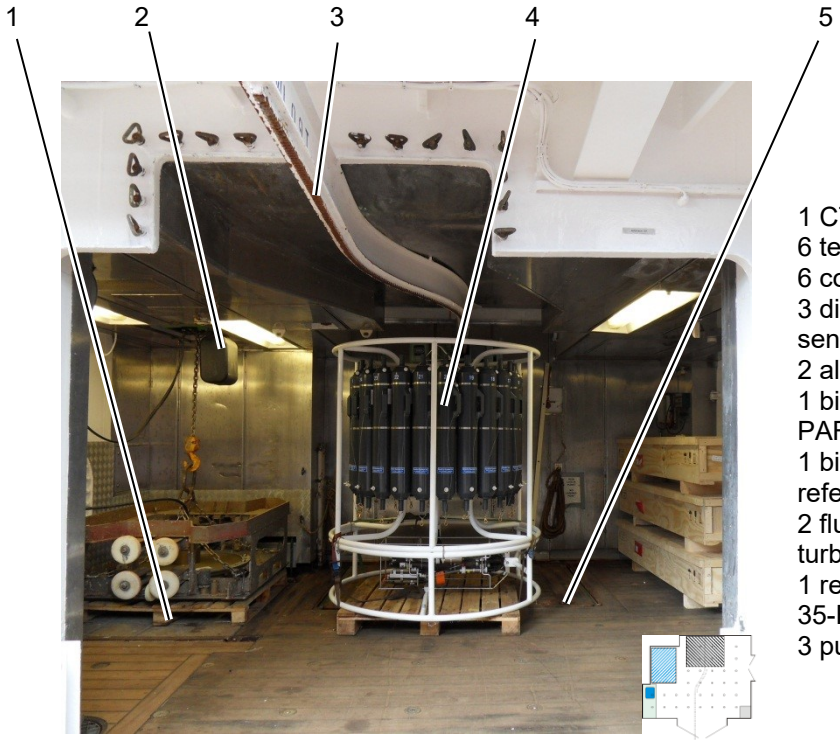


Fig. 83 Filling room 17

1	Filling room on main deck	4	Direct access from working deck
2	Hoist to machine room middle deck	5	Suspension crane track SWL 900 kg
3	Access from landing main deck starboard	6	Sounding shaft



1 CTD Plus SBE 9
6 temperature sensors SBE 3
6 conductivity sensors SBE 4
3 dissolved oxygen sensor sensors SBE 43
2 altimeters PSA 916
1 biospherical quantum scalar PAR sensor QSP 2350
1 biospherical surface reference sensor QSR 2200
2 fluorometer chlorophyll and turbidity FLNTU
1 reversing thermometer SBE 35-RT
3 pumps SBE 5T

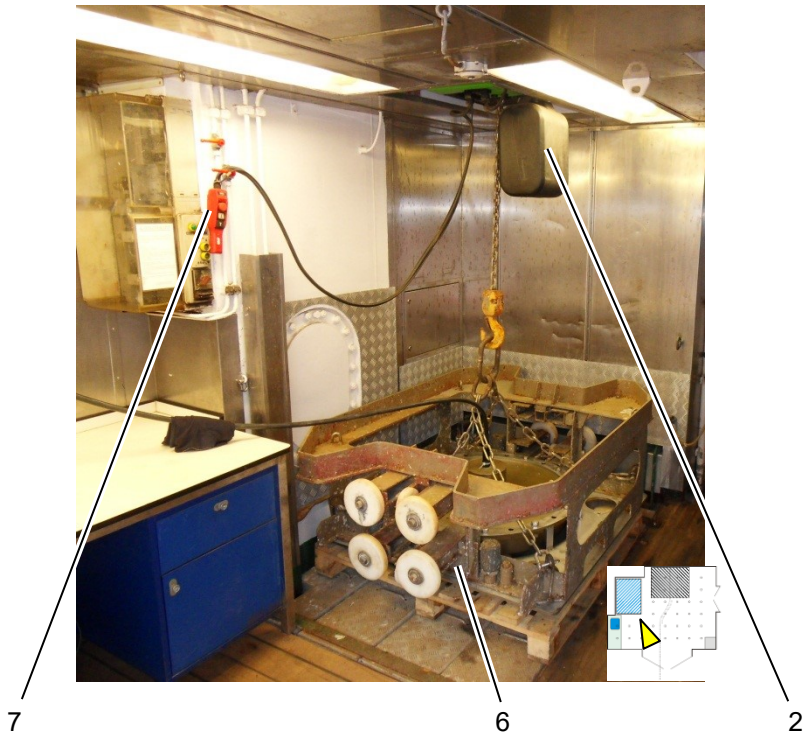
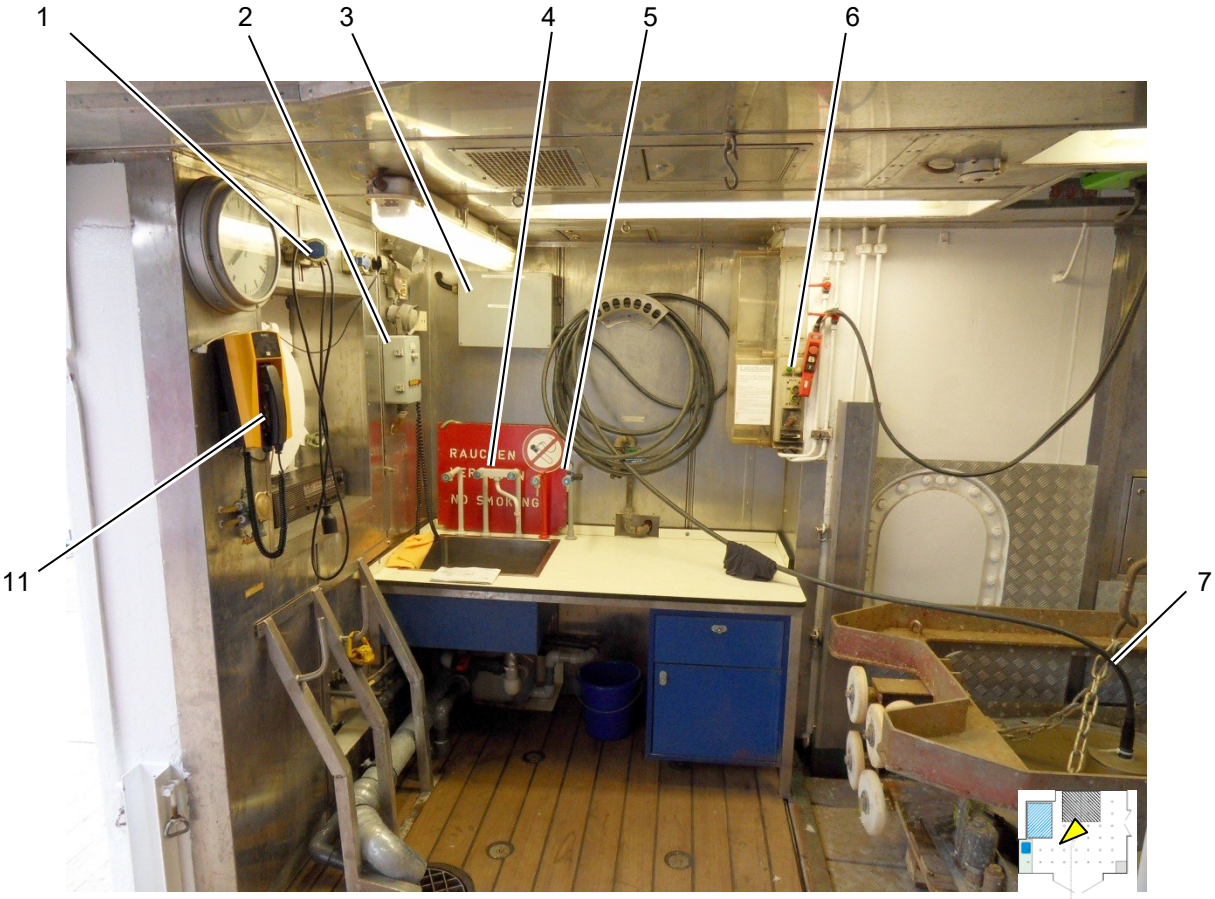


Fig. 84 Filling room 17

1 Sounding shaft
2 Lifting unit for sounding shaft
3 Suspension crane track SWL 900 kg
4 CTD water carousel (see 5.3.7)
5 Lift shaft to machine room
6 Sounding shaft basket
See drawing with dimensions
7 Operating appliance for sounding shaft



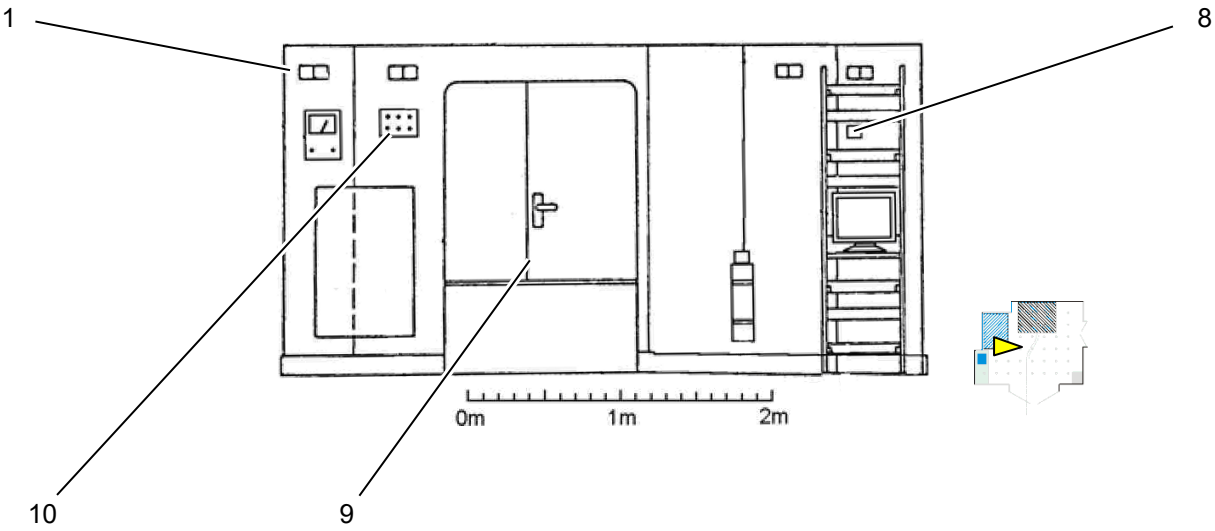


Fig. 85 Filling room 17 (detailed plan laboratory walls, status 1986)

1 Double sockets
2 Intercom science
3 Junction box ADCP
4 Hot/cold water and pure sea water (from rotary pump)
5 Compressed air 0-6 bar, oil separated
6 Operating appliance for sounding shaft
7 Cable feed ADCP
8 Network connections (LAN)
9 Access to landing main deck starboard
10 Cable clamps to the measurement and registration room 9
11 Telephone

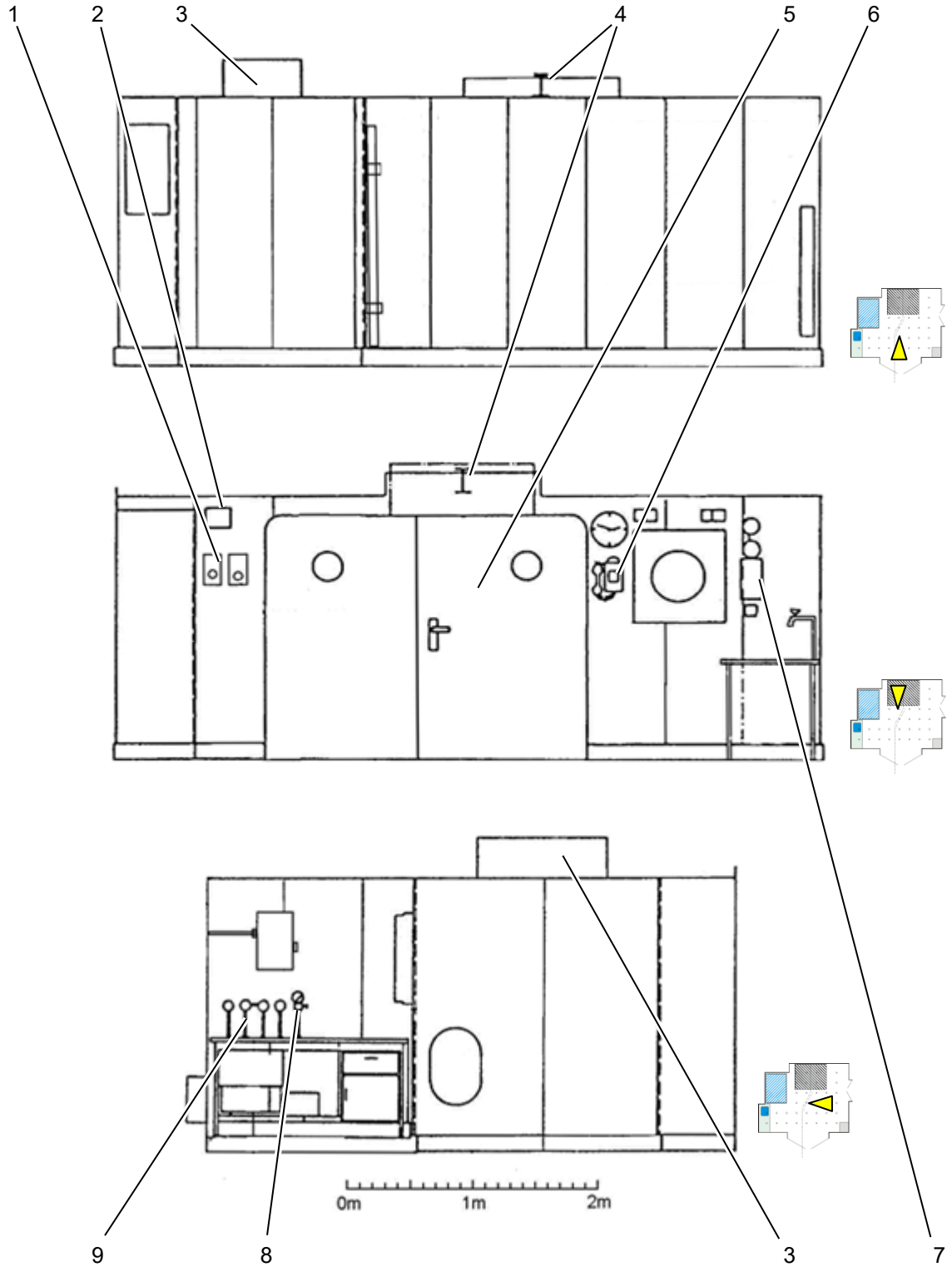


Fig. 86 Filling room 17 (detailed plan laboratory walls, status 1986)

1 High voltage sockets 380V 16/32 A
2 Cable feed through
3 Installation space lifting unit sounding shaft
4 Suspension crane track SWL 900 kg
5 Access to the work deck for the aft ship
6 Telephone
7 Intercom science
8 Compressed air 0-6 bar, oil separated
9 Sink with hot/cold water and pure sea water

4.18 Measurement and sounding room 18

Tween deck midships

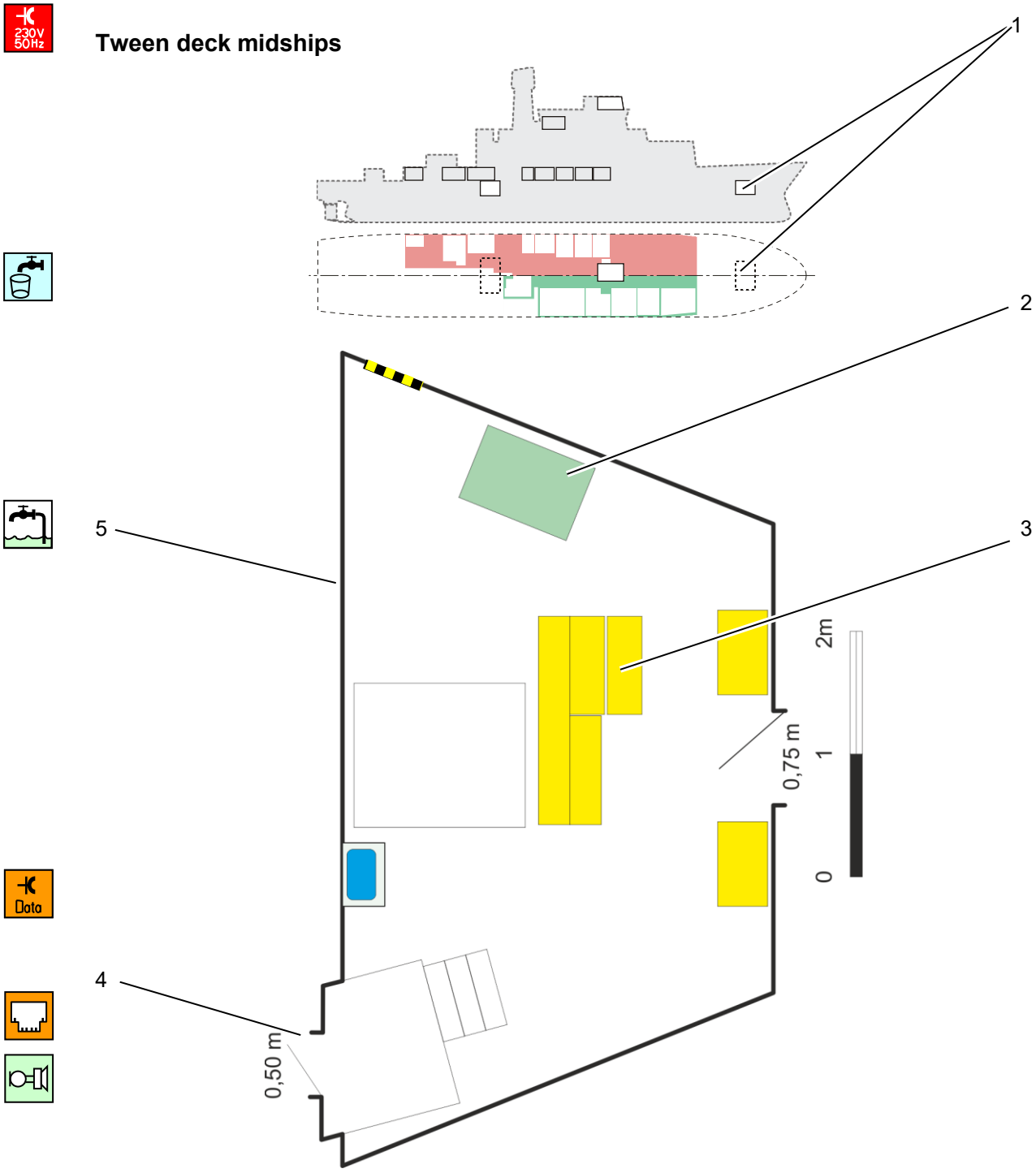
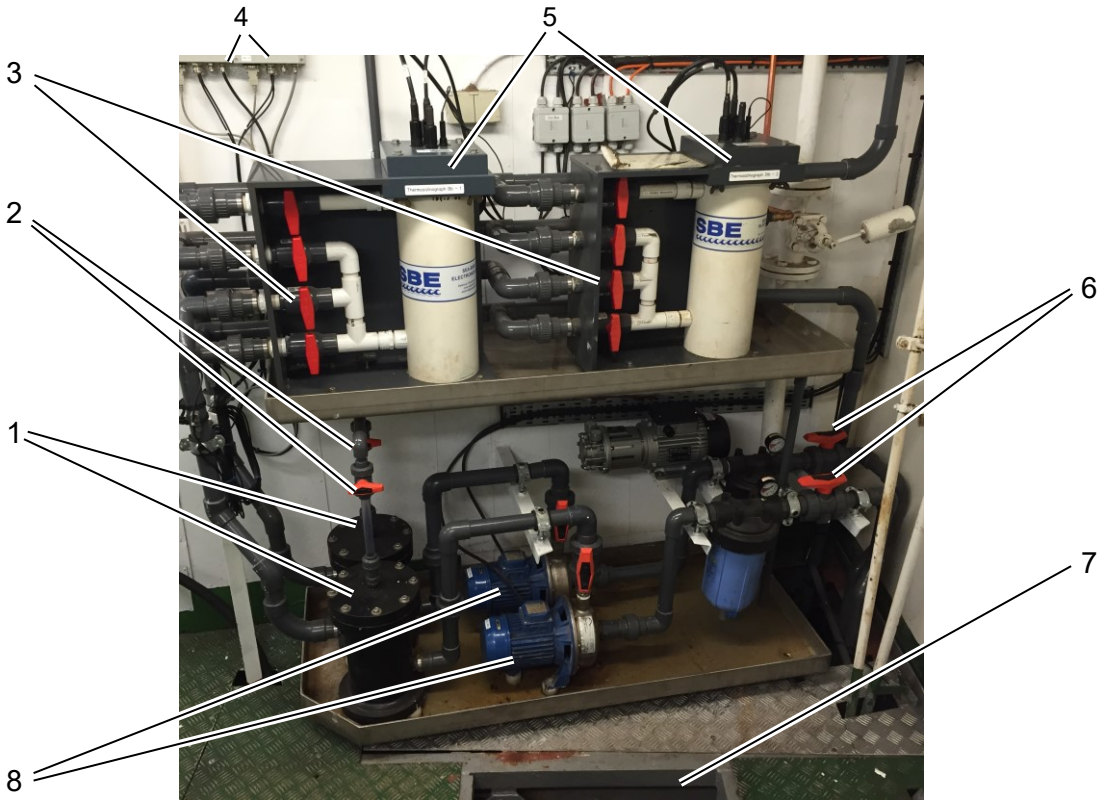


Fig. 87 Measurement and sounding room 18

1 Measurement / sounding room on tween deck
2 Seawater sampling from TSG
3 Parasound electronics
4 Access from the scientific stowage 1
5 Access to the bow thruster room



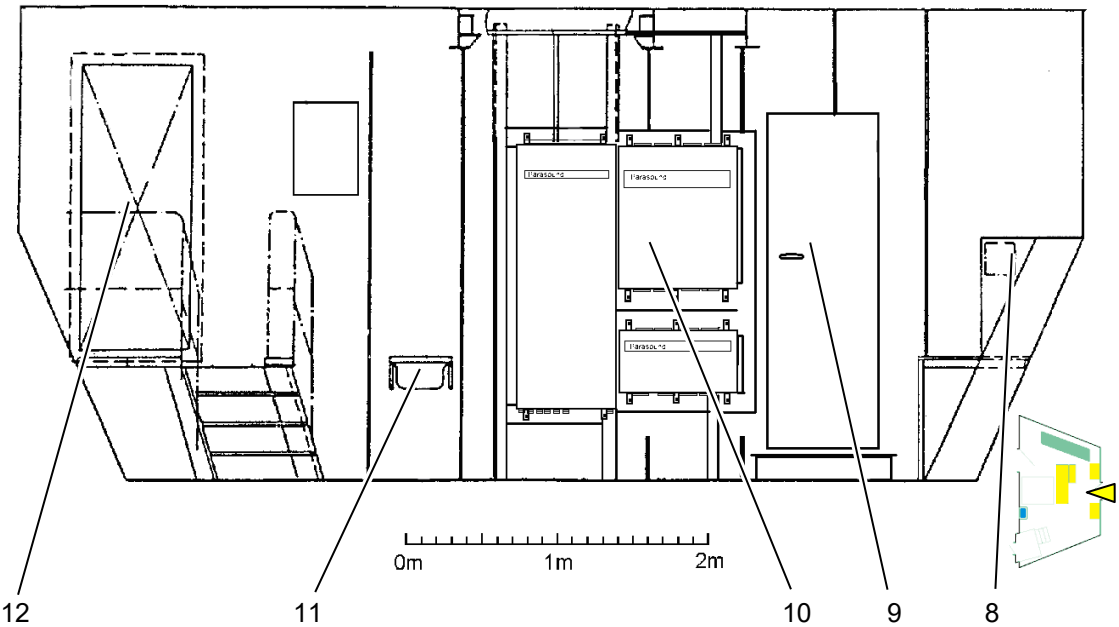


Fig. 88 Thermosalinograph in ground measurement room below measuring and sounding room 18

1 Debubbler
2 Venting valves
3 Sea water valves of thermosalinographs
4 Display of flow rate (DFM)
5 Thermosalinographs
6 Valves upstream of filters
7 sea water inlet valves in bilge

Measurement and sounding room drawing 18

8 Telephone, intercom, science
9 Access to the bow thruster room
10 Parasound electronics
11 Hand wash sink
12 Access from staircase and scientific stowage 1

4.19 Air conditioned laboratory unit 19

Tween deck midships

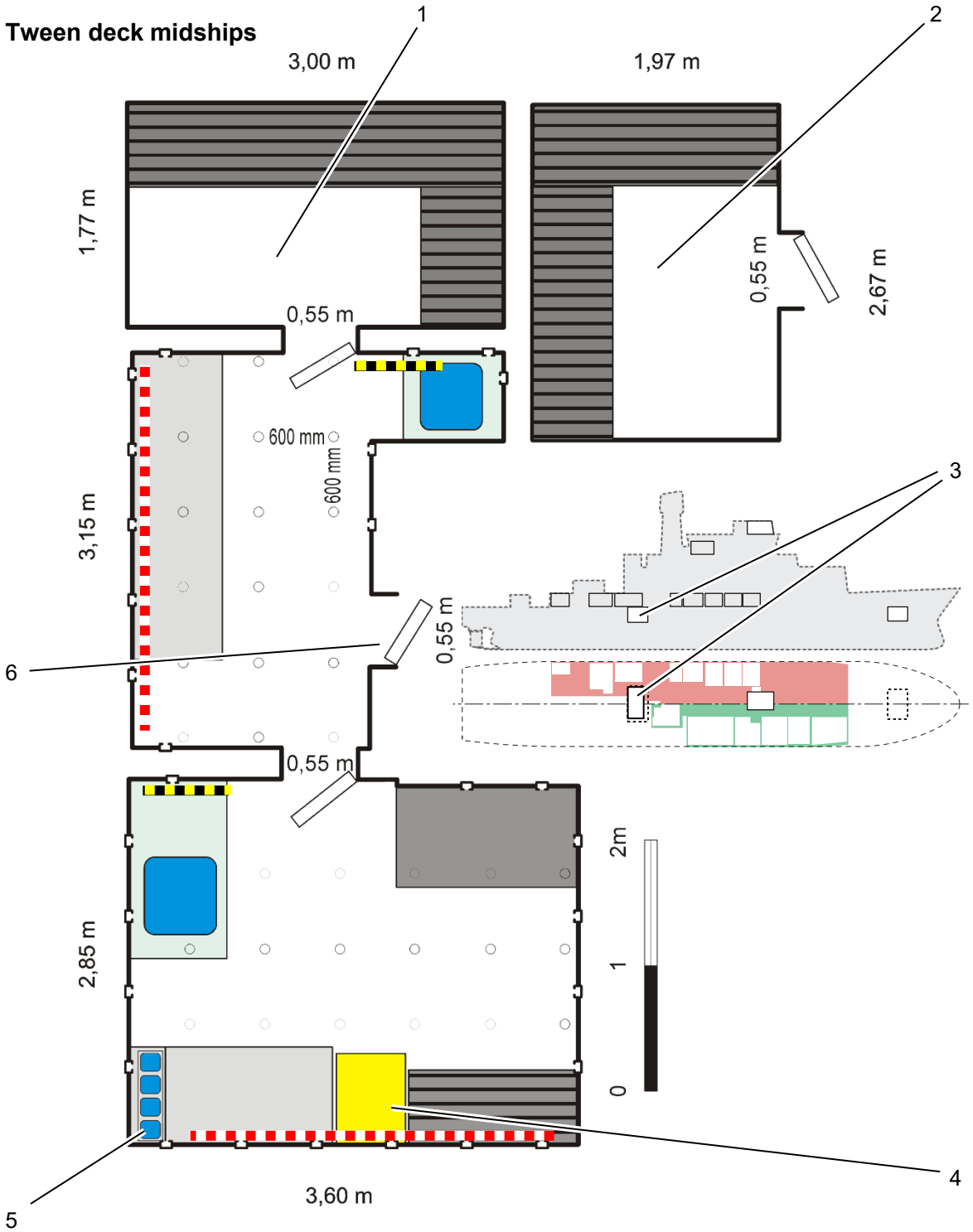


Fig. 89 Air conditioned laboratory unit 19

1 Refrigeration room (-2 to -25 °C)
2 Refrigeration room (-2 to -25 °C)
3 Air conditioned laboratories on tween deck
4 Deep freezer -80 °C
5 4 sea water sinks direct to sea
6 Access from staircase

Air conditioned laboratories and refrigeration room: Laboratory and measuring room

1 Laboratory and measuring room (+2 to 25 °C)
2 Access to the refrigeration room
3 Intercom science
4 Telephone
5 Sink with hot/cold water/pure sea water
6 Sea water (membrane pump)
7 Refrigeration room (-2 to -25 °C)

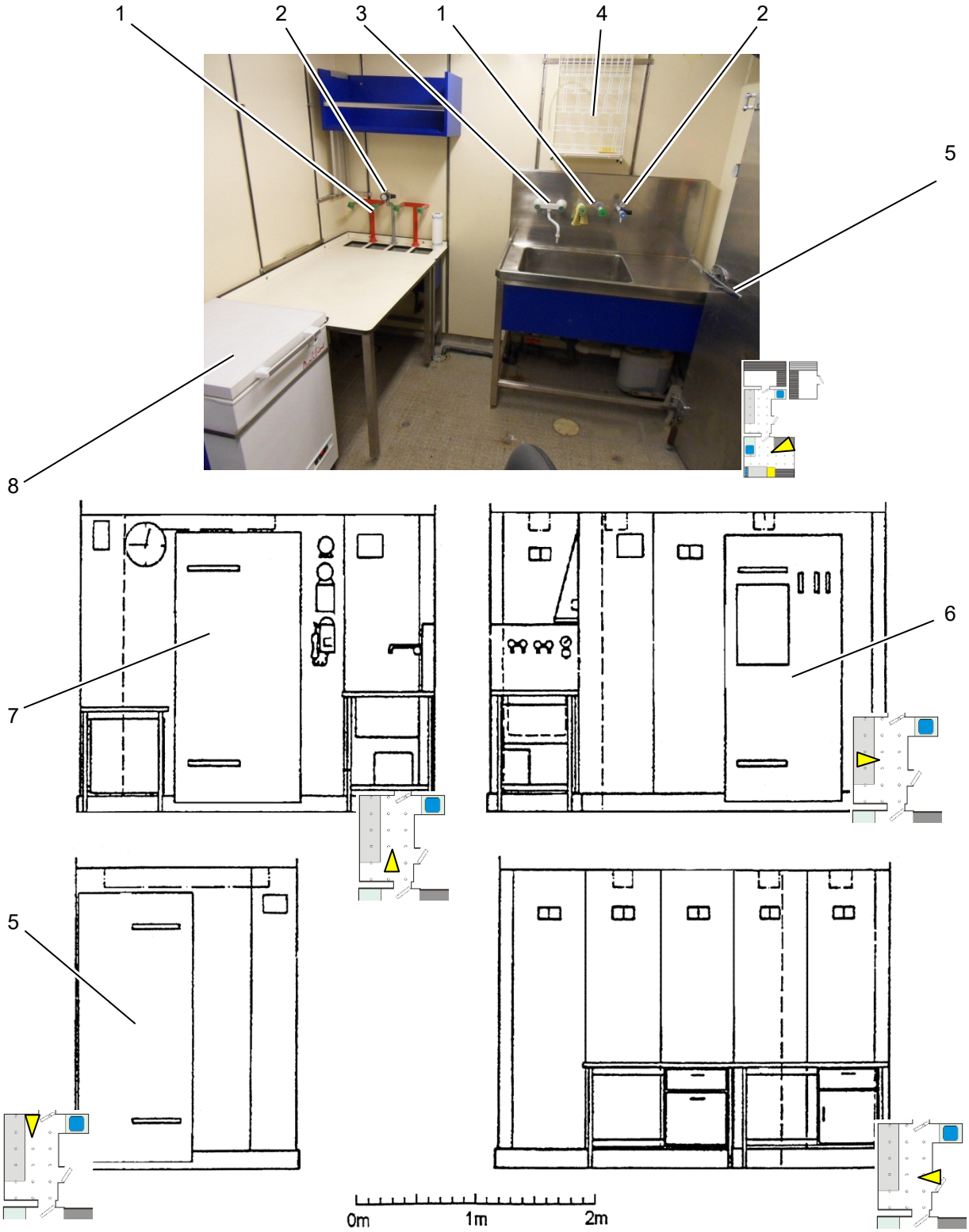


Fig. 91 Air conditioned laboratory unit: Aquarium cold room (photo), laboratory and measuring room (plan)

1	Pure sea water taps (membrane pump)	5	Access laboratory and measurement room/aquarium cold store
2	Compressed air 0-6 bar, oil separated	6	Access from staircase
3	Hot/cold water	7	Access to refrigeration room (-2 to -25 °C)
4	Draining rack	8	Deep freezer -80 °C

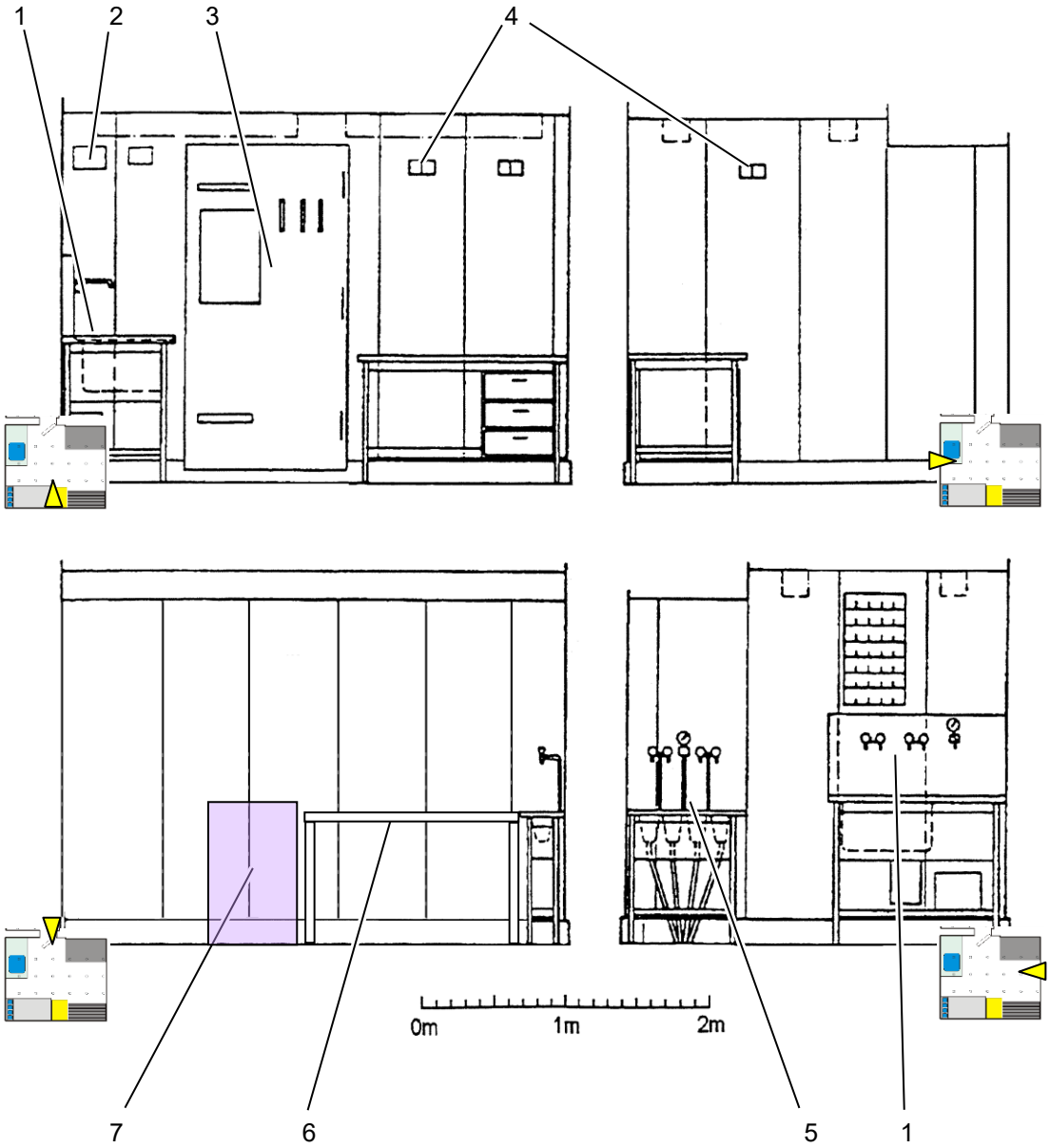


Fig. 92 Aquarium refrigeration room (detailed plan laboratory walls, status 1986)

1 Large sink
2 Cable feed through
3 Access from laboratory and measurement room
4 Double sockets
5 Pure sea water taps, compressed air, oil separated
6 Work table
7 Deep freezer -80 °C

4.20 Bridge

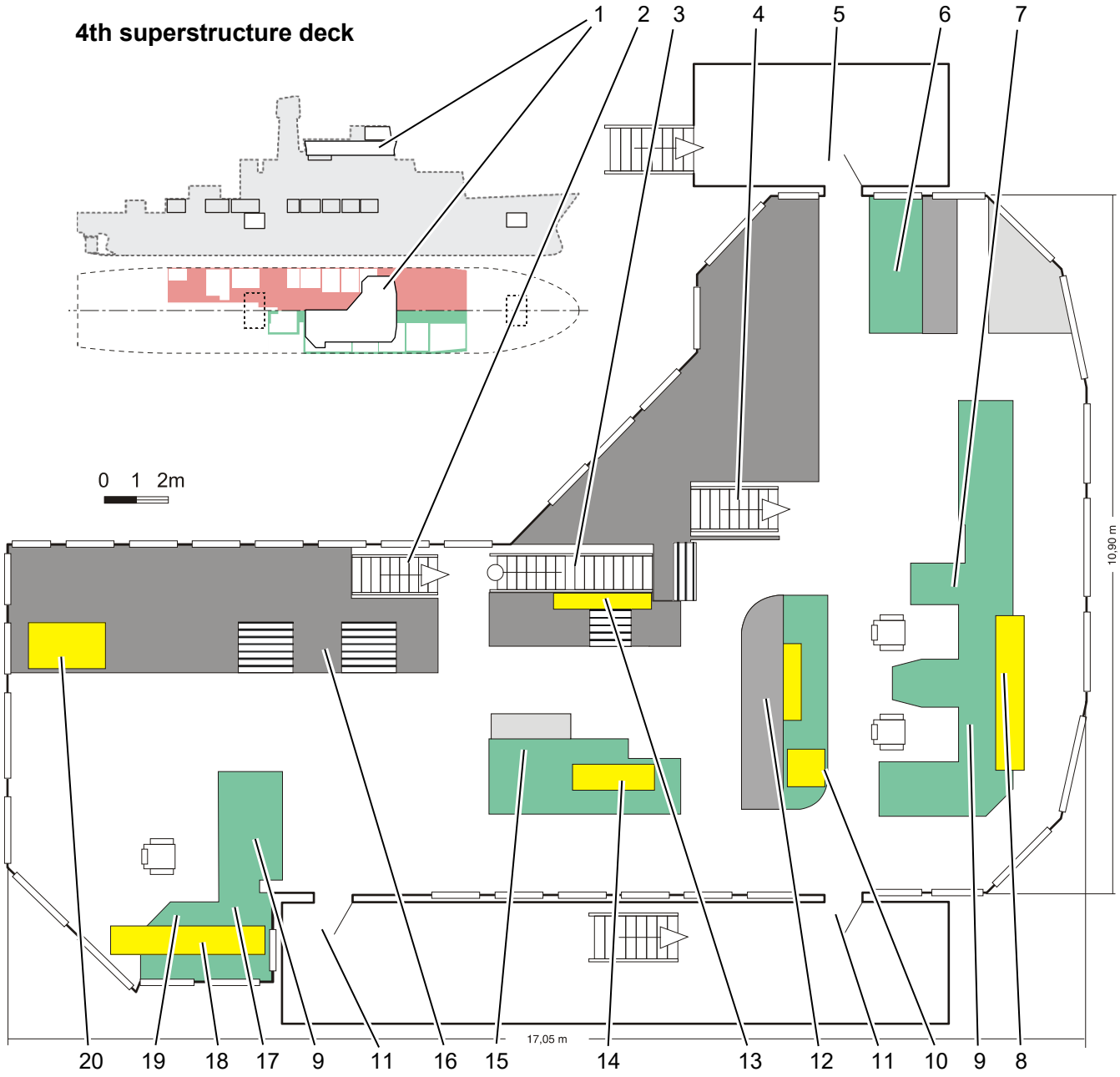


Fig. 93 Brigde

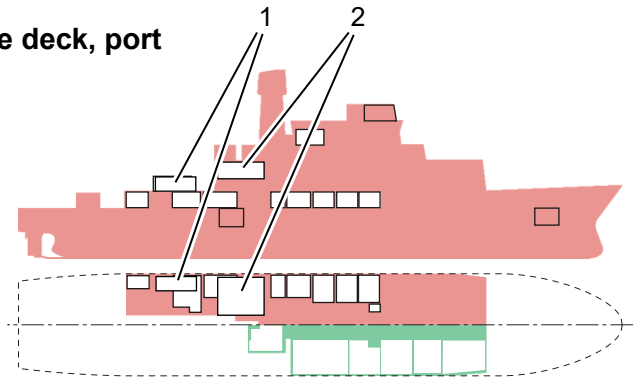
1 Bridge on 4th superstructure deck
2 Access from 3rd superstructure deck
3 Staircase to air chemistry laboratory, 5th superstructure deck
4 Access from central staircase
5 Access to port bridge wing
6 Safety desk
7 Main console control desk
8 Display devices above main console
9 RADAR / ECDIS displays
10 Navigation echo sounder
11 Access to starboard bridge wing
12 Map table
13 Radio direction finder, master clock
14 GPS devices
15 Planning table
16 Scientific workplaces
17 Console of rear control desk
18 Display instruments above rear console
19 Dynamic positioning equipment
20 Winch control station

Fig. 94 Bridge

1 Rear console (Fig. 93/17)
2 Main console (Fig. 93/7)
3 Map table (Fig. 93/12)
4 Scientific workplaces (Fig. 93/16)
5 Staircase to air chemistry laboratory, 5th superstructure deck
6 RADAR / ECDIS monitors (Fig. 93/9)
7 Dynamic positioning (Fig. 93/19)
8 Display instruments above console (Fig. 93/18)
9 Main console (Fig. 93/7)
10 Display instruments above console (Fig. 93/8)

4.21 German Meteorological Service (DWD)

2nd superstructure deck, port



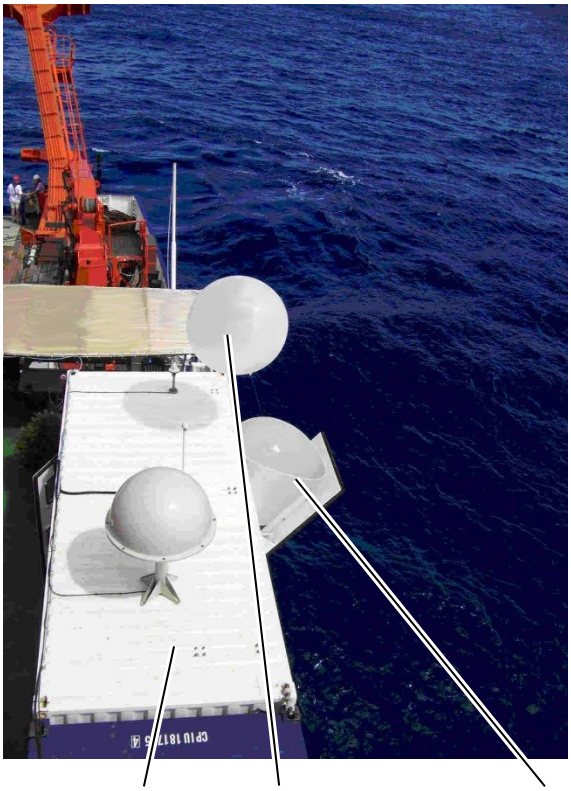


Fig. 95 (DWD) container with balloon ascent

1 DWD container on the rear forecastle deck
2 DWD on board weather service on the 2nd superstructure deck
3 Balloon container in DWD container
4 Balloon ascent

4.21.1 Tasks of the on board weather service

The on board weather service on the expedition vessel METEOR – a station of the German Meteorological Service (DWD) – is a fixed installation on board.

It is located on the 2nd superstructure deck on the forecastle side ("green deck").

On research expeditions it is permanently manned by a weather radio technician and if required also a qualified meteorologist of the DWD.
Both are competent in questions of maritime meteorology and the interpretation of meteorological data.

The tasks of the on board weather service essentially consist of the following items:

- As ship use and research activity are weather and sea dependent, the ship's officers and expedition leaders receive meteorological advice with the aim of safe and optimum carrying out of research tasks. Therefore, scientific appliances and equipment can be used without damage to the ship and its equipment.
  The basis of this advice is meteorological data material from the area where the ship is being used and the wider surroundings. These are weather observations from ships, buoys and land stations, map material prepared by national weather services, forecast maps of the German Weather Service received by E-Mail from DWD in Hamburg and from the European Centre for Medium-Term Weather Forecasting in Reading (ECMWF) and appropriate sea forecasts. Satellite images also play a big part in the assessment and interpretation of weather conditions and development.
- Generation of short and medium term (up to 10 days) weather forecasts or warnings for the relevant area of travel and use.
- Recording, testing and preparation of the ongoing meteorological data gained on board. They serve as basic material for scientific examinations on the part of the participating groups and for DWD and are incorporated directly into the advisory activity of the on board weather service.
- Some of these measurement data are already fed into the worldwide data exchange of the GTS (Global Telecommunication System) during the journey according to the international standard of the WMO (World Meteorological Organization)

4.21.2 Meteorological Advice

Weather forecasts and warnings for various time scales are created on the basis of meteorological data material from the area of use and the wider surrounding area. Short term weather forecasts (up to 36 hours) and warnings support the ship's officers and expedition leaders in the up to date planning and implementation of ship use and research activity.

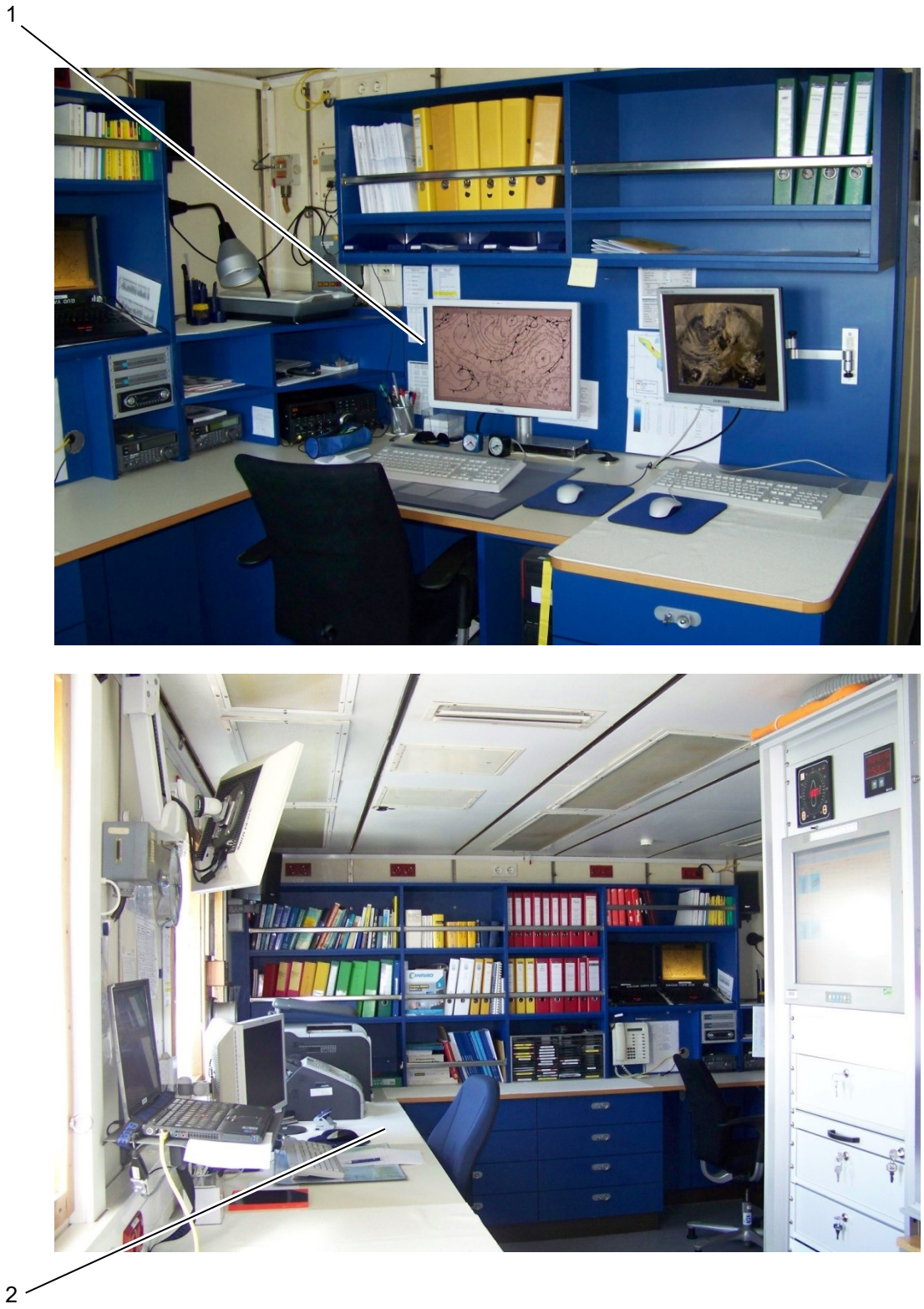


Fig. 96 DWD weather service

1 Weather technician workplace
2 Workplace meteorologist

Medium term prognoses (up to 10 days) of the DWD and other meteorological centres serve as a basis for the planning of subsequent engagements and thereby make a contribution to the optimum exploitation of ship times.

In this, satellite images received on board are assessed and interpreted and added to map material prepared by national weather services (analyses, prognoses). This map material is increasingly received by satellite supported channels of communication (E-Mail) as only as small number of short wave transmitters (e.g. DWD transmitter Pinneberg) air such products. First of all the model chains of the German Meteorological Service (GME model) and the EZMW and the subsequent products based on them like swell prognoses etc. are used.

4.21.3 Data recording

The ongoing meteorological data must be recorded, tested and prepared. They are not just incorporated in the advisory work. They also serve as basic material for scientific examinations on the part of the participating groups of scientists and also later examinations by the German Meteorological Service. Some of these measurement data are fed into the worldwide data exchange of the GTS during the journey in accordance with the international standard within the framework of the GOS (Global Observing System) of the WMO.

4.21.4 Trajectory data

The on board weather service on RV METEOR can if required make trajectory data available for scientific investigations daily via the German Meteorological Service in Offenbach by e-mail. This request for trajectory data must be made to the on board weather service prior to the start of the section of the expedition.

With the help of trajectory data the path of air particles at various heights (ground up to a pressure surface of 50 hPa) can be traced back to the ship position within a time period of up to 108 hours before their arrival. Therefore they can be used by air chemical working groups as reference values for investigations into the origin and further removal of air impurities for example.

Current trajectory data are made available in the on board weather service as complete map plots or raw data files.

For further detailed information (measurement instruments, data recording) on the RV METEOR on board weather service in the form of a PDF file (approx 2.5 MB) see www.dwd.de.

4.22 Conference room

Main deck starboard

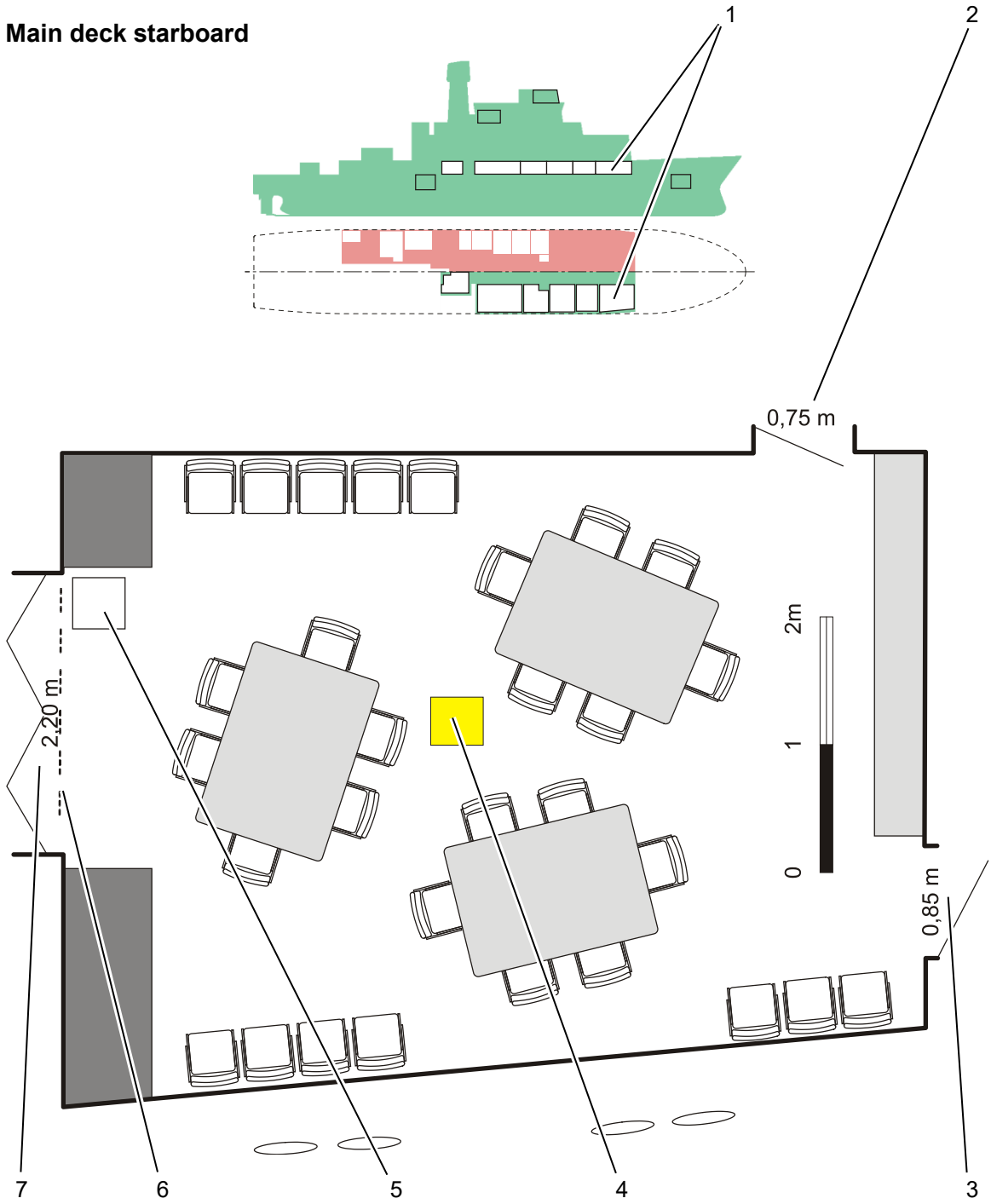


Fig. 97 Conference room

1 Conference room on the main deck
2 Access from landing main deck starboard
3 Access to library (key from ship's doctor)
4 Projector below ceiling
5 Lectern (easily movable)
6 Projection screen
7 Access to drawing room

Fig. 98 Conference room

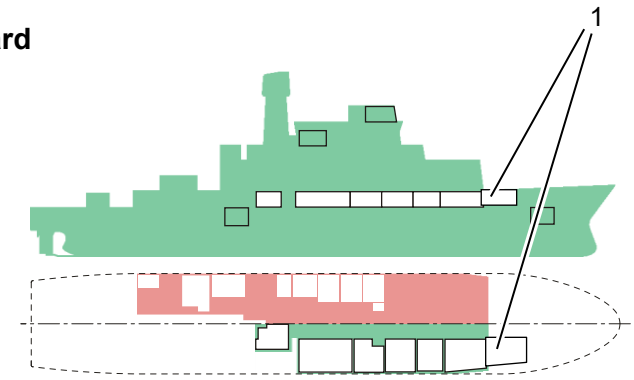
1	Beamer	3	Projection screen
2	Various playing appliances	4	Lectern

Note

The arrangement of the tables shown can be changed if required.

4.23 Library

Main deck starboard



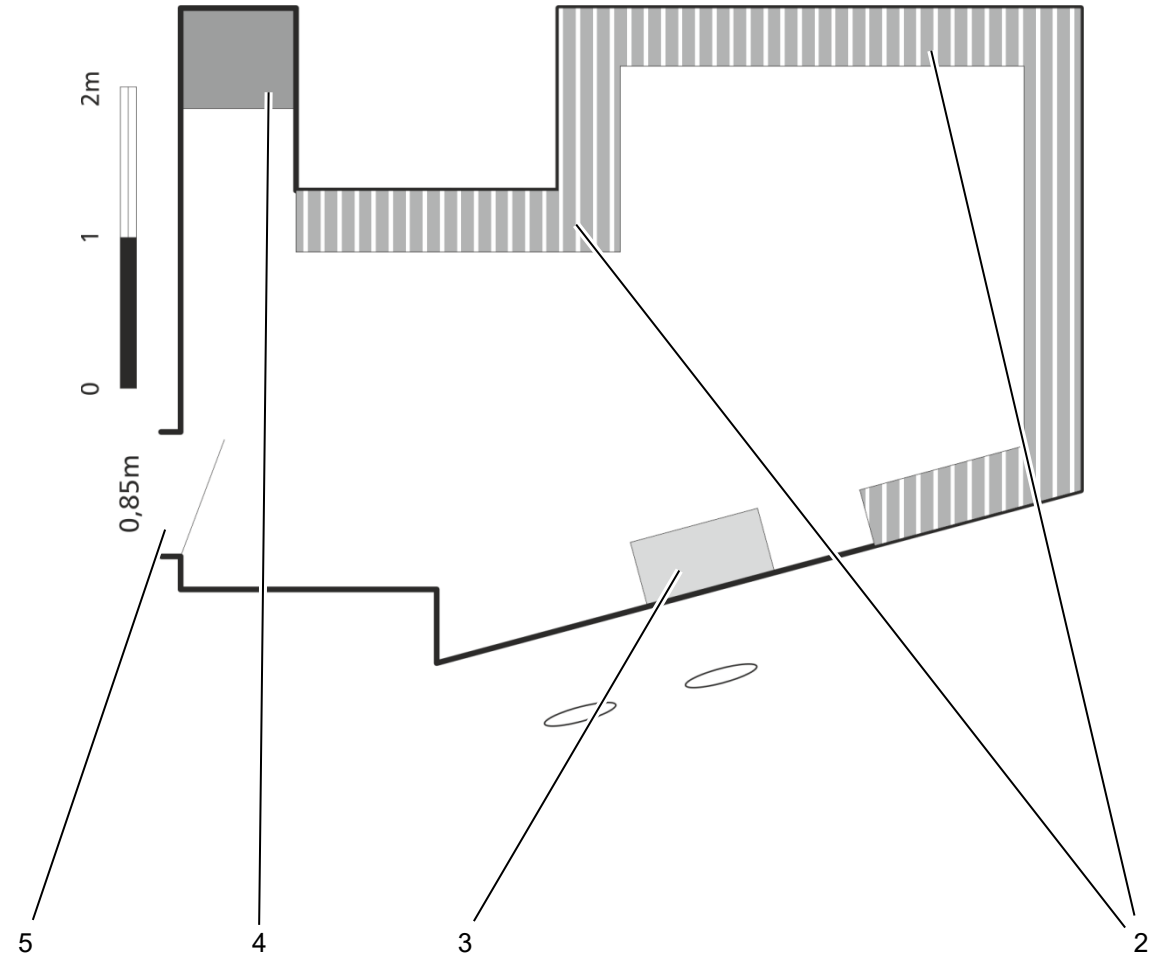


Fig. 99 Library

1 Library on main deck starboard
2 Shelves
3 Table
4 Cabinet
5 Access from conference room

Fig. 100 Library

Note

The key to the on board library is held by the doctor.

5. APPLIANCES AND EQUIPMENT

5.1 Hydro acoustic equipment and measurement appliances

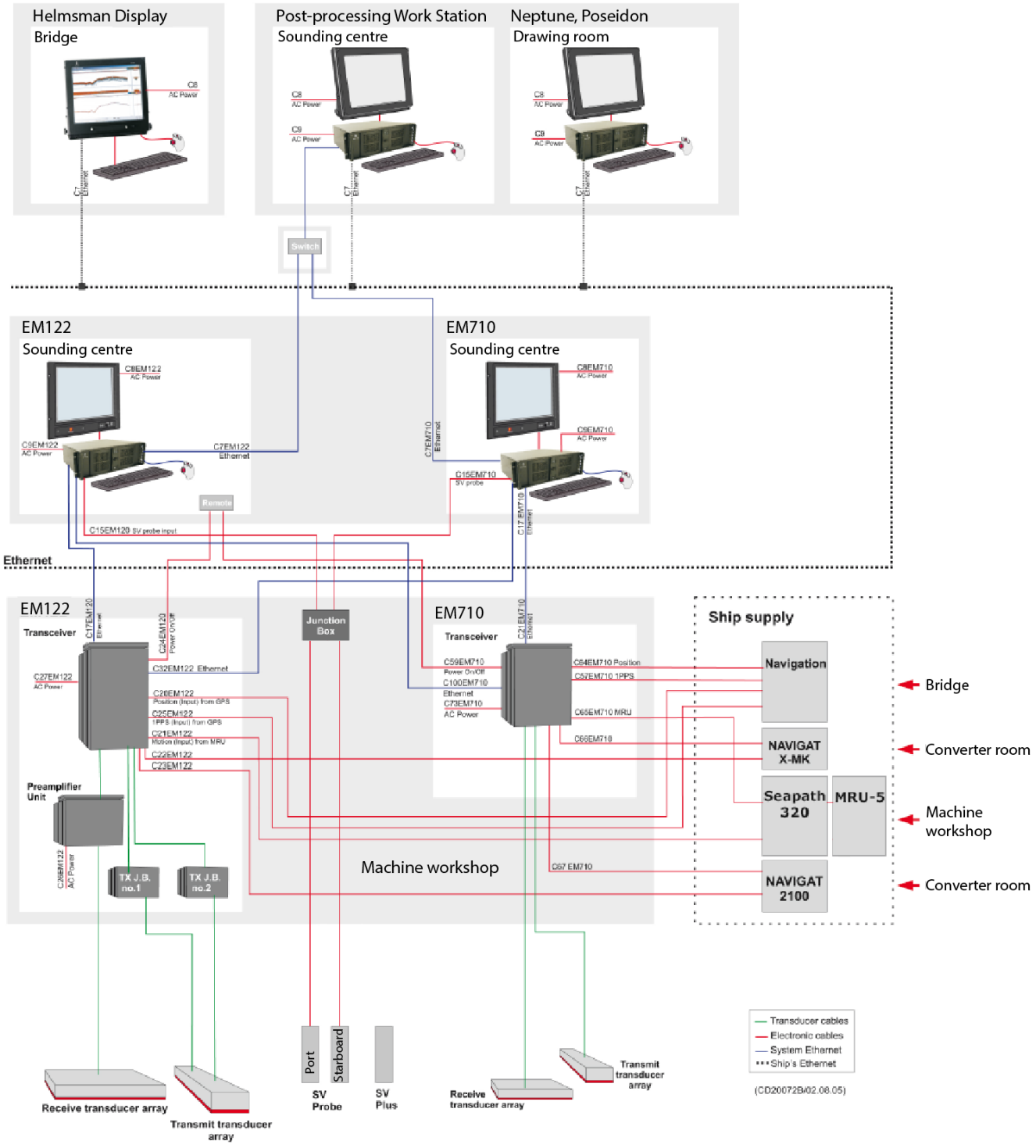


Fig. 101 Echo sounder KONGSBERG EM 710 and EM 122

5.1.1 Echo sounder for bathymetric measurement

Kongsberg EM 710 1° x 1°

The appliance enables extensive hydrographic measurement in flat sea areas up to a depth of 2,000 m and the recording of the morphological structures. These can be represented on maps as isolines or grids.

Manufacturer	Kongsberg Maritime A/S, Norway
Frequency	70 – 100 kHz
Properties	Echo sounder with 432 beams
Radiation angle	up to 140° transverse to ship's axis
Range	up to 2,000 m
Measurement width	Depth/substrate dependent, max. 5.5 times water depth
Hardware	• 2 operator-PC • 2 post-processing-PC
Location	one in the sounding centre and one in the drawing room
Display	The data is shown online on the operator PC and the helmsman display PC (bridge). Real-time colour display with 2D or 3D ground map and isoline plot.
Data issue	Printouts of display in Postscript and then on A3 laser printer or A0 colour plotter. The data is stored in binary for further processing with the Neptune software, output in ASCII format.
Operating software	Seafloor Information System SIS v3.7
Post processing-software	Neptune
Data storage	Raw data on DVD, hard drive, DAT tape
Corrections	Roll, pitch, heave
Calibration	• via waterborne sound speed (input / fixed probe) • via waterborne sound profile (mobile probe) • with help of data of a CTD
Transducer / sensor installation location	Between rib 102 and 105

Note

Supervisors and trained scientific personnel must be provided for the operation, water-borne sound profiles and the post processing of the data.

Soundlevel

System	SL	NF1	PL@NF1	NF2	PL@NF2
EM 710/712 1°	228	0.3 m	215	61 m	192

Pressure Level

System	PL @1m	PL @10m	PL @100m	PL @1000m	R @180dB
EM 710/712 1°	210	200	185	138	150 m

5.1.2 Echo sounder for bathymetric deep sea measurement

Fig. 102 Echo sounders KONGSBERG EM 710 and EM 122

1 Receiving transducer EM 710
2 Transmission transducer EM 710
3 Receiving transducer EM 122
4 Transmission transducer EM 122

Kongsberg EM 122 1° x 2°

The appliance enables extensive hydrographic measurement in sea areas up to a depth of 11,000 m and the recording of the morphological structures. These can be represented on maps as isolines or grids.

Frequency	12 kHz
Properties	Echo sounder with 400 beams
Radiation angle	up to 140° transverse to ship's axis
Range	up to 11,000 m
Measurement width	> 5.5-times water depth
Hardware	• 2 operator-PC • 2 post-processing-PC
Location	one in the sounding centre and one in the drawing room
Display	The data is shown online on the operator PC and the helmsman display PC (bridge). Real-time colour display with 2D or 3D ground map and isoline plot.
Data issue	Printouts of display in Postscript and then on A3 laser printer or A0 colour plotter. The data are saved in a binary way for further processing with Software Neptune, issue in ASCII format is possible.
Operating software	Seafloor Information System SIS v3.7
Post processing-software	Neptune (issue in ASCII-Code possible)
Data storage	Raw data on DVD, hard drive or DAT tape
Corrections	Roll, pitch, heave
Calibration	• via waterborne sound speed (input / fixed probe) • via waterborne sound profile (of mobile probe)
Installation position transducer	between rib no. 87 and 101

Note

Quantity of data depending on depth 1 – 4 GB/month
Processing time 5 – 6 hours per day of measurement
Data archiving in DOD, BSH Hamburg

Note

Supervisors and trained scientific personnel must be provided for the operation, water-borne sound profiles and the post processing of the data.

Soundlevel

System	SL	NF1	PL@NF1	NF2	PL@NF2
EM 120/122/124 1°	242	3.5 m	210	438 m	189

Pressure Level

System	PL @1m	PL @10m	PL @100m	PL @1000m	R @180dB
EM 120/122/124 1°	210	206	195	181	1108 m

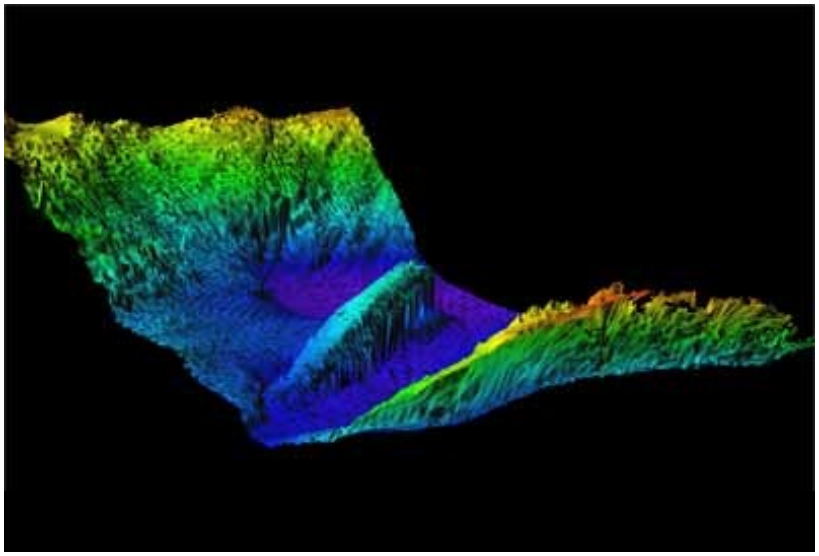


Fig. 103 Screen presentation on echo sounder KONGSBERG EM 710

“Neptune” Postprocessing Software

Description	Neptune is a software for recording, visualisation and post processing of the echo sound data. Neptune therefore represents a comprehensive postprocessing package for hydrographic measurements.
Hardware	2 post processing-PCs with DVD, USB connection and external hard drive
Work places	1 for each post processing PC • in the computer room • in the drawing room (laboratory 13)
Data editing	The following data can be corrected retrospectively: • Position • Course • Depth (with depth distorted values) • Profile definition • Waterborne sound speed Data reduction is possible.
Presentation	Map extract and scale can be freely selected Isoline, map grid and transverse profiles on plotter possible
Data issue	Laser printer A3 and colour plotter A0
Data import and export	via • DVD • USB • Mobile hard drive • Operator PC network • External computers via TCP/IP, FTP (Twisted Pair)

5.1.3 Deep sea sediment echo sounder

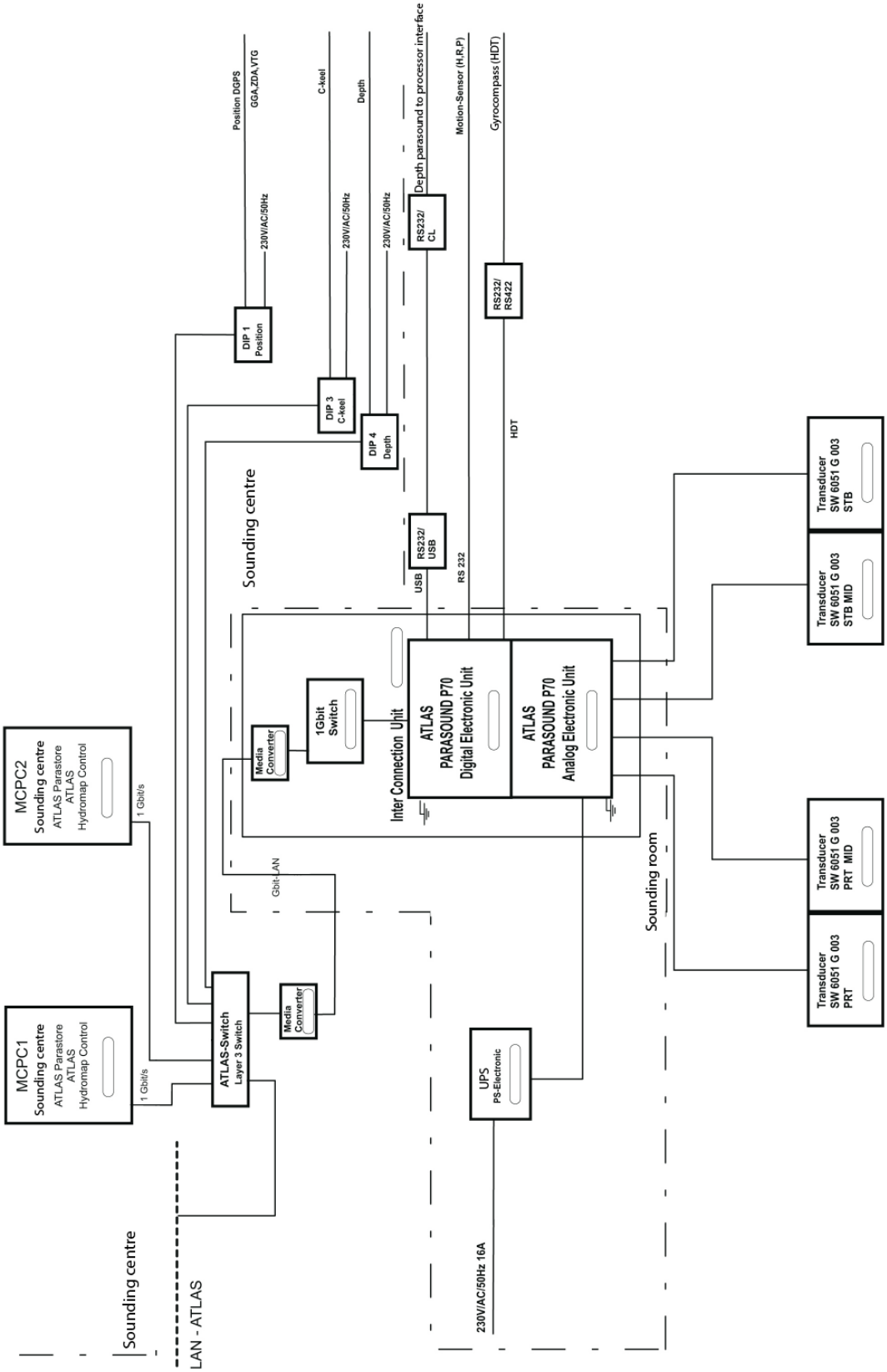


Fig. 104 Appliance chart "Parasound P70"

Parasound DS-3 / P70

Parasound is a sediment echo sounder with which the internal structures of the sedimentary sea bed covering are measured along the ship's course.

Manufacturer	ATLAS HYDROGRAPHIC GmbH, Bremen	
Frequencies:	Frequency	Radiation angle
Primary High Frequency PHF 1	18 – 33 kHz	4.0° x 4.5° (18 kHz)
		2.2° x 2.5° (33 kHz)
Primary High Frequency PHF 2	18.5 – 39 kHz	
Primary Low Frequency PLF	3 – 12 kHz	24.0° x 28.0° (3 kHz)
		6.0° x 7.0° (12 kHz)
Secondary High Frequency SHF	36.5 – 40 kHz	2.0° x 2.3°
Secondary Low Frequency SLF	0.5 – 6.0 kHz	4.5° x 5.0°
Range	10 m – 10,000 m	
Sediment penetration	Up to over 200 m, depending on water depth and sediment	
Resolution	Up to 15 cm	

Note

With a ground inclination > 4° no more penetration!

Hardware	1 Operator-PC with DVD drive
Location operating appliance	Sounding centre
Display	Echogram presentation on operator PC (online and offline)
Issue	Print outs by colour printer
Compensation	Roll (>+/- 20°), pitch (> +/-10°), heave (> +/- 5 m)
Transducer / sensor installation location	Between rib 126 and 127, midships

Note

Supervisors and trained scientific personnel must be provided for the operation and the post processing of the data.

Note

You can find further information in the ATLAS Parasound P70 handbook which can be dowloaded from the website of the control centre.

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

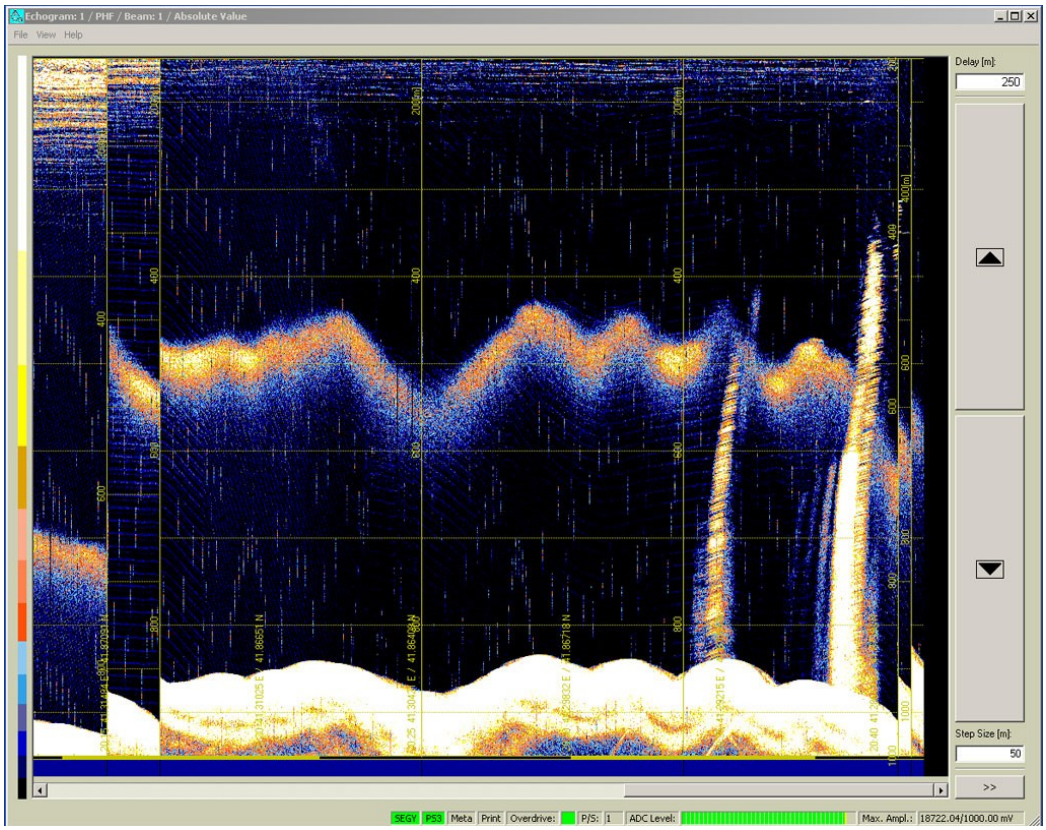


Fig. 105 Screen presentation sediment echo "Parasound"

Parastore-3 postprocessing system

Description	Parastore-3 is a software for the recording, visualisation and post processing of the Parasound data. It is possible to present and print out echograms, spectograms and single traces in several instances. Several numerical or graphical processing algorithms can be applied in order to improve the graphic quality of the data.
Workplace	Operator-PC in the sounding centre
Data	The raw data are deposited by Parasound 3 in asd format (“atlas sound data” format). The raw data contain the data of the complete water column. In order to extract the relevant part of the sediment echo, the data can be extracted online or offline through a depth window. The data reduction occurs through automatic or manual carrying along of a data window and by sampling the traces. The offline processing is not possible during measurement operation. The export of the data occurs into the standard seismic data format SEG-Y. As an option storage can occur in PS3 format (Parasound data format of the University of Bremen).

Note

Supervisors and trained scientific personnel must be provided for operation of the software.

Note

The software is issued free of charge but in a controlled fashion by ATLAS HYDROGRAPHIC GmbH, Bremen to users in German institutions.

5.1.4 Navigation echo sounder / echograph

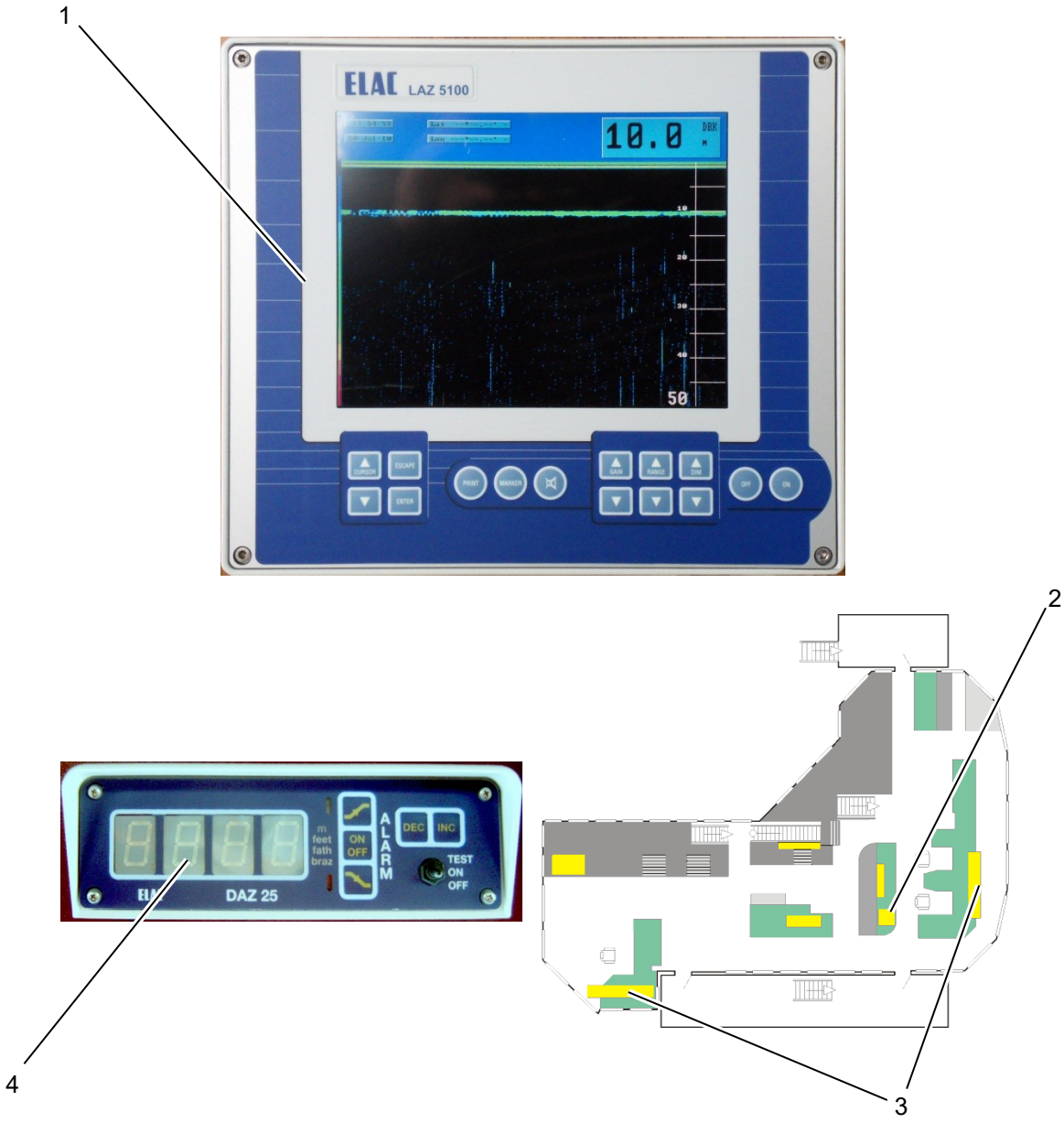


Fig. 106 ELAC LAZ 5100 and repeater display DAZ 25

1 Navigation echo sounder ELAC LAZ 5100
2 Navigation echo sounder installation location
3 Installation location repeater display
4 Repeater display: DAZ 25

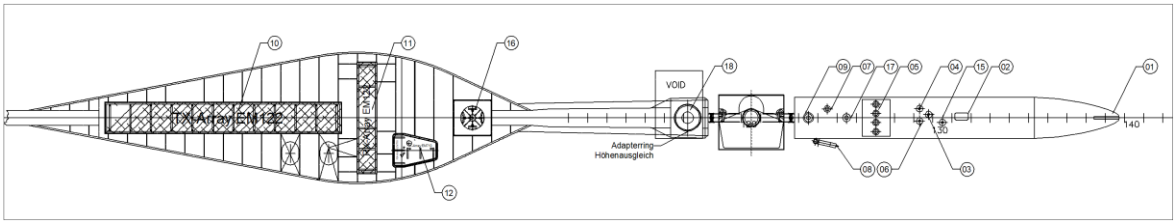
ELAC LAZ 5100

Measurement of the water depth below the keel for navigation and for support of the scientific echo sounding equipment

Manufacturer	L3 ELAC Nautik GmbH, Kiel
Frequency	100 kHz
Range	600 m
Hardware	• Display appliance (recorder) on map table • Digital display (ceiling console on the control console)
Installation locations	Bridge front, starboard
Transducer / sensor installation location	Between rib 130 and 131, midships

5.1.5 Acoustic Doppler current profiler

Arrangement Hydroacoustic



① REINSEEWASSERANSAUGUNG	CLEAR–SEAWATER–INLET
② ATLAS DOLOGSCHWINGER	TRANSDUCER ATLAS DOLOG
③ ZWEIFREQUENZLOTSCHWINGER	TRANSDUCER FOR DUAL FREQUENCY ECHO SOUNDER
④ ZWEIFREQUENZLOTSCHWINGER	TRANSDUCER FOR DUAL FREQUENCY ECHO SOUNDER
⑤ PARASOUNDSCHWINGER	TRANSDUCER PARASOUND
⑥ ZWEIFREQUENZLOTSCHWINGER	TRANSDUCER FOR DUAL FREQUENCY ECHO SOUNDER
⑦ SAM–DOLOG	SAM–DOLOG
⑧ REINSEEWASSERANSAUGUNG	CLEAR–SEAWATER–INLET
⑨ HYDRL. AUSFAHREINRICHTUNG	HYDR. LIFTING DEVICE
⑩ EM 120 SENDEWANDLER	EM 120 SENDING TRANSDUCER
⑪ EM 120 EMPFANGSWANDLER	EM 120 RECEIVING TRANSDUCER
⑫ EM 710 WANDLER	EM 710 TRANSDUCER
⑬ PINGERWANDLER	PINGER RECEIVER
⑭ TRANSPONDERSCHWINGER	TRANSPONDER TRANSDUCER
⑮ ATLAS ECHOGRAPHSCHWINGER	TRANSDUCER ATLAS ECHOGRAPH
⑯ POSIDONIA–WANDLER	POSIDONIA–TRANSDUCER
⑰ 75 kHz ADCP	ACOUSTIC DOPPLER CURRENT PROFILER 75 kHz
⑱ 38 kHz ADCP	ACOUSTIC DOPPLER CURRENT PROFILER 38 kHz

Fig. 107 ADCP

17 75 kHz transducer of the ADCP at frame 125
18 38 kHz transducer of the ADCP at frame 117

ADCP

The appliance is for measurement of the current direction and speed in the water column.

Description	The ADCP measures the relative current direction and current speed in the water column under the travelling ship with the help of the Doppler effect. Subsequently a conversion into absolute values occurs with the data of the external GPS position sensor and the compass heading being incorporated. There are two systems on board: Ocean Surveyor 38 kHz (OS38) and Ocean Surveyor 75 kHz (OS75). The 75 kHz appliance is installed at a fixed angle of 45°, the 38 kHz appliance is used in the hydrographic shaft at an installation angle of 0°.
Manufacturer	Teledyne RD Instruments

Working frequencies

Frequency	Range	Installation position of the transducer
38 kHz	up to 1,000 m	Sounding shaft
75 kHz	up to 400 m	At rib 125

Note

The use of the other devices in the sounding shaft is restricted while the 38 kHz converter is being used.
Both transducers can be operated at the same time.

Location operating appliance	ADCP-PC in the computer room
Data storage	on PC
Software	VmDas (Teledyne RD Instruments)

5.1.6 Position sensor

Fig. 108 Position sensor MRU 5 in the machine workshop

Position sensor MRU 5

The motion sensor measures roll, pitch, heading and the heave of the ship.

Description	The data is given to the multibeam echo sounders EM710 and EM122, the sediment echo sounder Parasound P70 and to DSHIP with 100 Hz in Simrad3000 format via Seapath.
Manufacturer	Kongsberg Maritime

5.1.7 Seapath

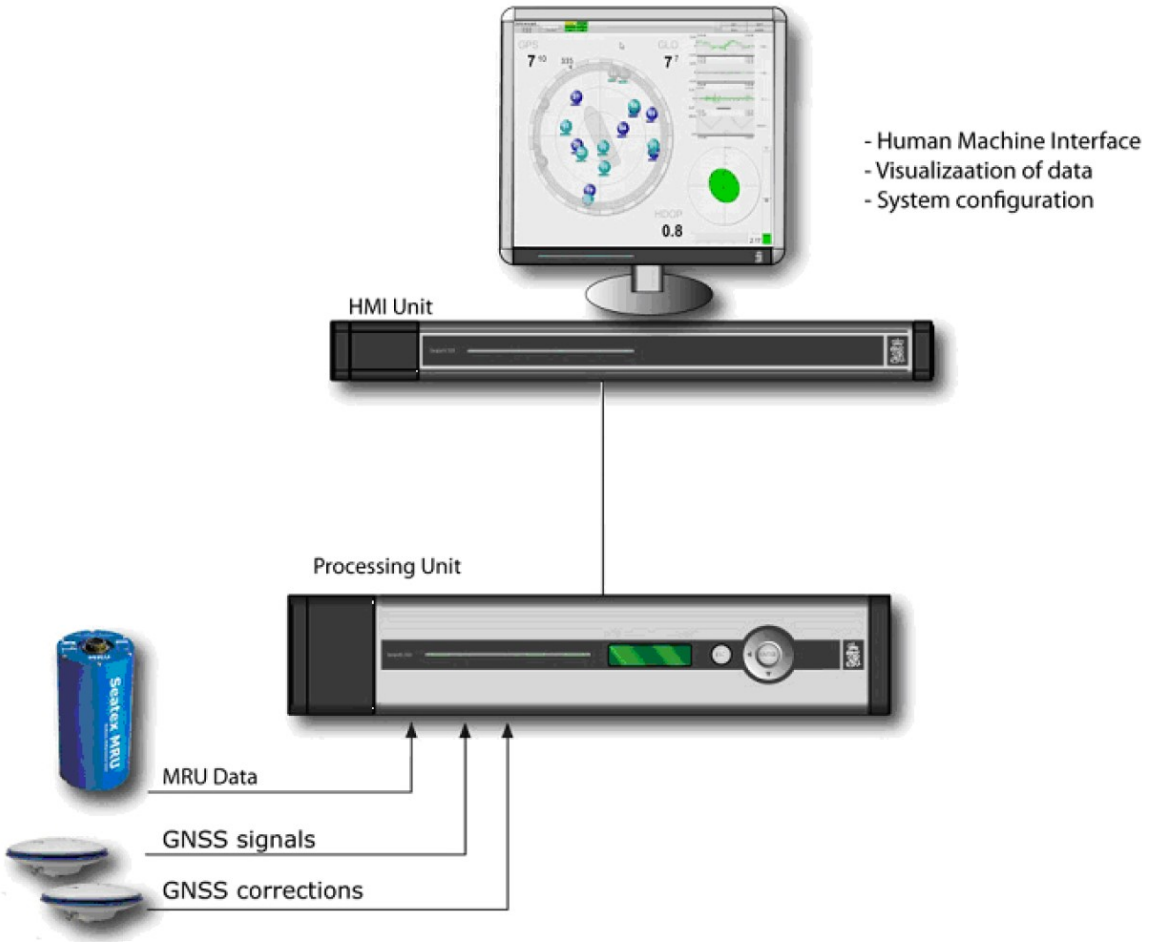


Fig. 109 Seapath system

Seapath 300

Description	Seapath 300 is a positioning, position and heading sensor and combines the movement sensor data of the MRU with GPS satellite signals. The heart of the system consists of the MRU 5 (motion to reference unit) and two GPS. Seapath was specially developed for hydrographic applications in which it is important to have the exact heading, position, heave, roll and pitch data with chronological synchronism. The combination of the movement data of the ship and an exact GPS position makes it possible to calculate correction data that is even more accurate, which is sent to the EM710 and EM122 multibeam echo sounders and the Parasound sediment echo sounder. The sounders can therefore compensate for the movements of the ship in the best possible way. Precise bathymetric maps can be produced in this way.
Manufacturer	Kongsberg

5.1.8 2-axis Doppler log

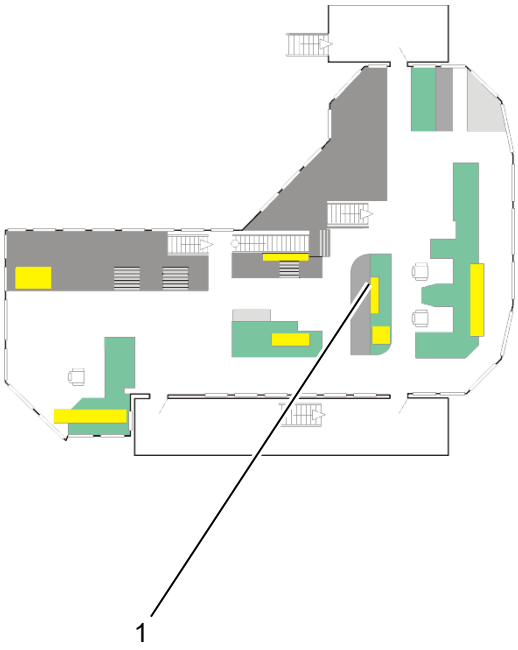


Fig. 110 SAM 4683 Doppler log (2-axis)

1 SAM 4683 installation location

SAM 4683 Doppler log (2-axis)

Description	The appliance works under water with the Doppler effect and on the basis of the satellite locating. The Doppler-Log supplies the speed over ground in a lengthways and lateral direction and speed through water.
Manufacturer	SAM Electronics / Skipper
Location operating appliance	Bridge, front and various repeater displays
Installation position transducer	Spant 124 ship's floor
Values issued	The following are displayed via the device itself, the repeater displays and DSHIP: • Speed in lengthways direction • Speed in lateral direction • Speed through water • Rate of turn • Heading • Lateral speeds on bow and stern

5.2 Other navigation and measurement appliances

5.2.1 Underwater positioning system

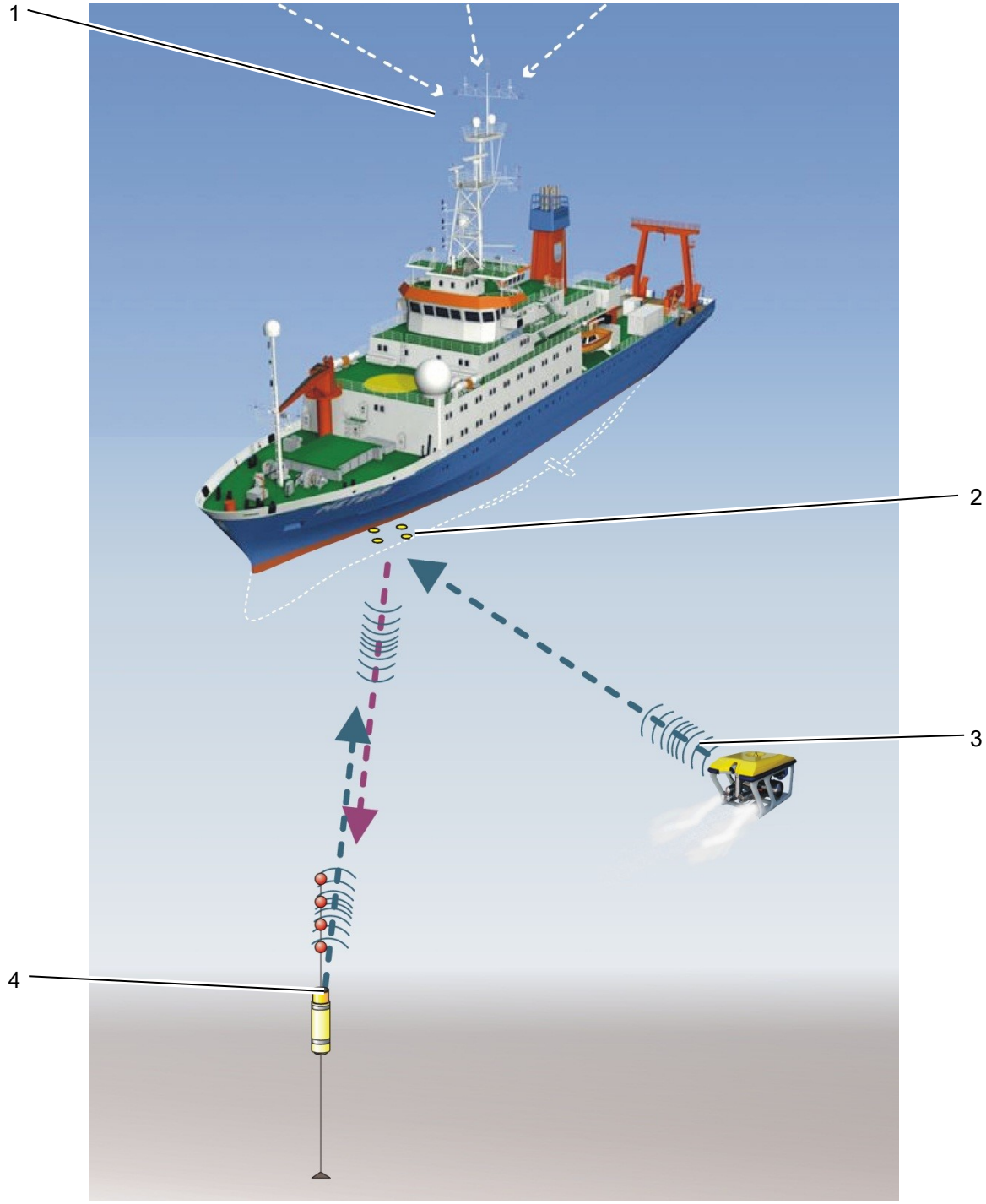


Fig. 111 Way of operation of the Posidonia appliance

1 GPS receiver determines ship position
2 4 underwater sound transducers on the floor receive/transmit position signals
3 ROV sends position signals
4 Transponder or responder in device transmits / receives position signals

Posidonia 6000

The appliance helps determine the position of one or several underwater vehicles or objects e.g. anchorings up to a max water depth of 6,000 metres.

Description	With the Posidonia 6000 the position of an underwater vehicle is determined with the time differences of acoustic position signals between 4 transmitters or receivers below the ship and a transponder or responder on the underwater vehicle being evaluated and placed in relation to DGPS signals.
Manufacturer	iXSea SAS
Location operating appliance	Posidonia-PC in the measurement and registry room
Display	• As an image on the Posidonia PC, • on the bridge as a position on the electronic map (ECDIS)
Data storage	on PC
Installation position of the sensors	Floor, rib 106, midships

Transponders

Two mini transponders and a releaser are present for the Posidonia system:

Technical Data

Type	Number	Type
Transponders	3	**Ixsea Oceano MT861S-R**
Frequency range		Low Frequency Band 8 kHz -16 kHz
Engagement depth		6000 m
Weight air/water		8 kg / 6 kg
Dimensions		L = 450 mm, Ø 70 mm
Releaser	1	**Ixsea Oceano RT861B2S**
Frequency range		Low Frequency Band 8 kHz -16 kHz
Engagement depth		6000 m
Weight air/water		25 kg / 16 kg
Dimensions		L = 780 mm, Ø 130 mm

On board Meteor there is the option of releasing ixBlue/exail releasers via POSIDONIA or the existing release box/case including hydrophone.

5.2.2 Differential GPS (DGPS)

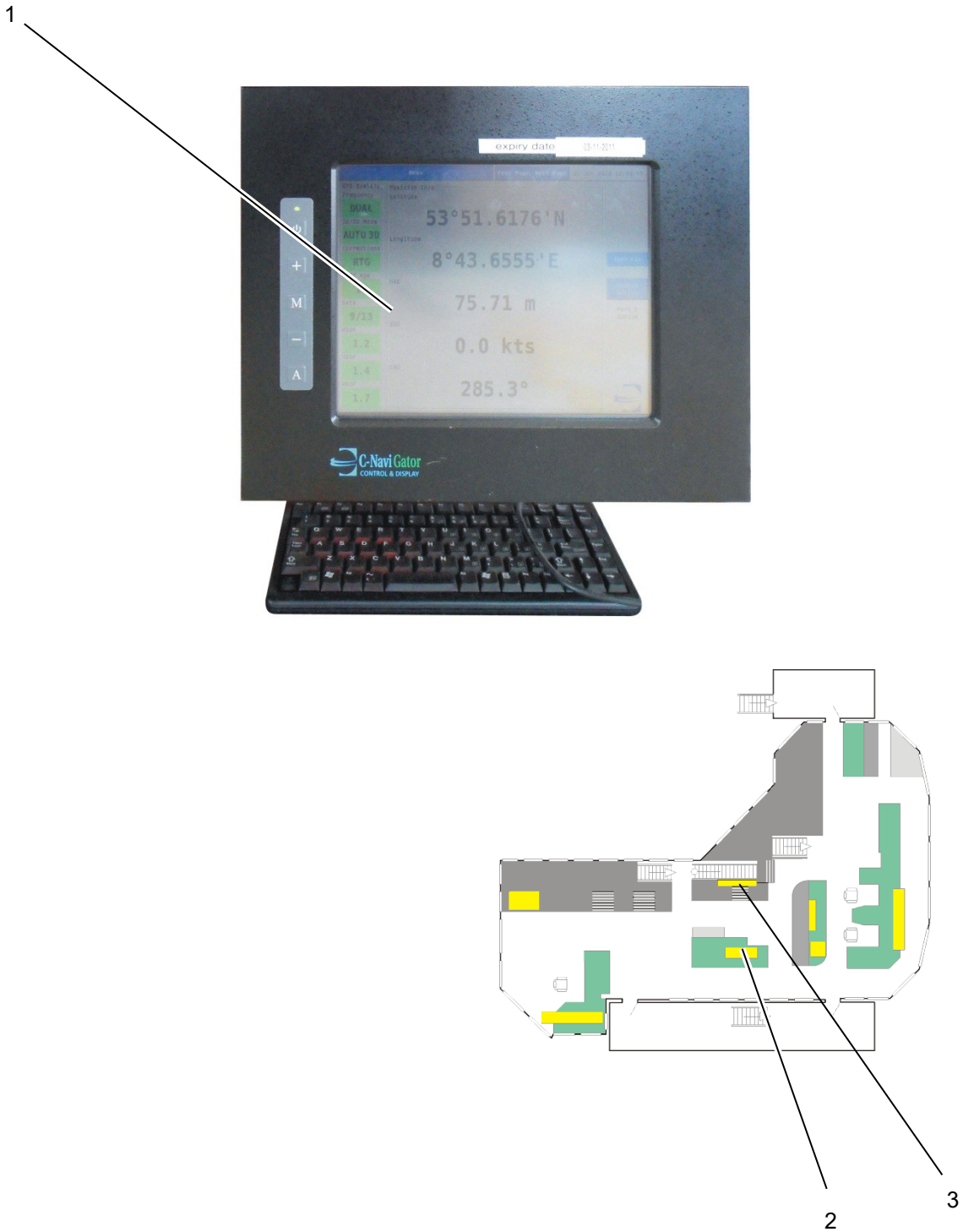


Fig. 112 C-Navigator, RhoTheta 500 radio direction finder

1 C-Navigator at planning table
2 C-Navigator installation location
3 Rhotheta 500

GPS C-Nav

The appliance supplies the position and time data for the multibeam echo sounders and the sediment echo sounder.
The correction data are leased for the full year.

Two C-Nav 3050 DGPS receivers are present on board.

Manufacturer	C&C Technologies
Installation point operating appliance	Bridge (planning table)

5.2.3 Global Positioning System (GPS)

The following appliances are also present on board as additional GPS systems:

- Shipmate GN30-2 (manufacturer Simrad)
- Simrad HS50 (GPS-compass)

5.2.4 VHF radio direction finder

1

Fig. 113 RhoTheta 500 radio direction finder, Gonio radio direction finder

1 RhoTheta 500 radio direction finder

Rho Theta 500

The device is used for targeting and locating scientific devices that are equipped with VHF transmitters.

Antenna Position	Mast top platform
Build in position controler	On Bridge in front console
Frequencies	Aeronautical band frequencies: 118.8 … 121.5 … 124.0 MHz in 5 kHz steps Marine band: 156 – 162.1 MHz in 5 kHz steps ARGOS Frequencies: 401.650MHz ± 2kHz SARSAT Frequencies: 406.025MHz ± 2kHz ()
On-board transmitter	Type *Novatech*
Max. water depth	7.300 m
Frequencies	154.585MHz and 160.785MHz

5.2.5 Gyrocompass

Navigat X MK1

The compasses Navigat X and Navigat 2001/FOG work in parallel.
The FOG is connected as main sensor, the Navigat X serves as a reserve system.

The speed error is corrected automatically.

Manufacturer	C. Plath, Hamburg
Installation location	Converter room next to the bridge
Retrospective turning gyrocompass	> 100° / sec
Roll and pitch freedom	+/- 40°
Oscillation error	< 0.1° secans* of the width
Static errors	< 0.1° secans* of the width
Dynamic error	< 0.4° secans* of the width
	*: secans = 1/cosinus

5.2.6 Fibre optic course and position reference system FOG

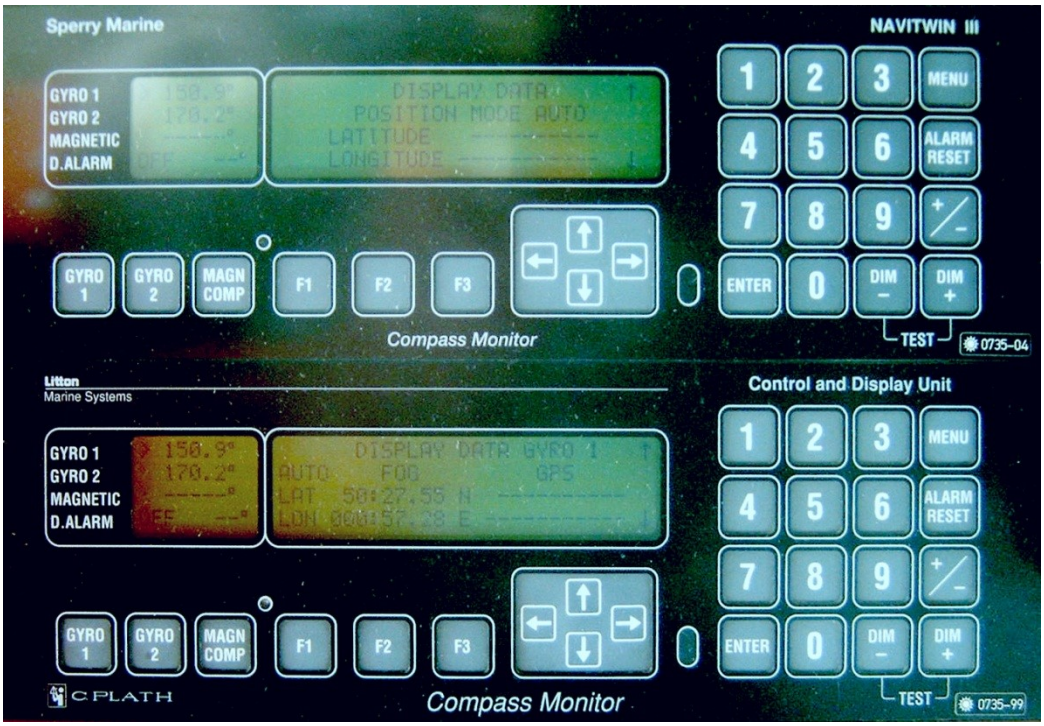


Fig. 114 Navigat 2100, compass displays

Navigat 2100

The Navigat 2100 is a fully electronic, digital, fibre optic gyrocompass system in an adaptive strapdown technology.

Description	An arrangement of three fibre optic gyroscopes and two electronic levels is able to determine geographical north. In this the turning speeds of the three fibreoptic gyroscopes and the signals of the electronic levels are used to calculate the earth's direction of rotation by using an adaptive Kalman filter. The northern direction is derived from this. In addition to the angle information for heading, roll and pitch, the turning rates are also available as initial values. The roll and pitch values serve for compensation of the hydroacoustic plant equipped with appropriate entries e.g. Parasound, ADCP. The data and the status are recorded, stored and distributed via the DSHIP.
Manufacturer	C. Plath, Hamburg
Installation location	Converter room next to the bridge

Measurement ranges

Course / z-axis	0° – 360°
Roll x-axis	+/- 45°
Pitch y-axis	+/- 45°
Rotation speeds (X, Y, Z)	+/- 50°/sec

Accuracy

Course	< 0.7°sec / width
Roll/pitch angle	< 1.0°
Rotation speed (ROT)	< 0.4°/min
X-/Y-rotation speeds	< 0.4°/min

Area of use

Geographical width	+/- 75°
Speed:	+/- 75 kn

5.3 Scientific work equipment

5.3.1 Hydrophone extension unit

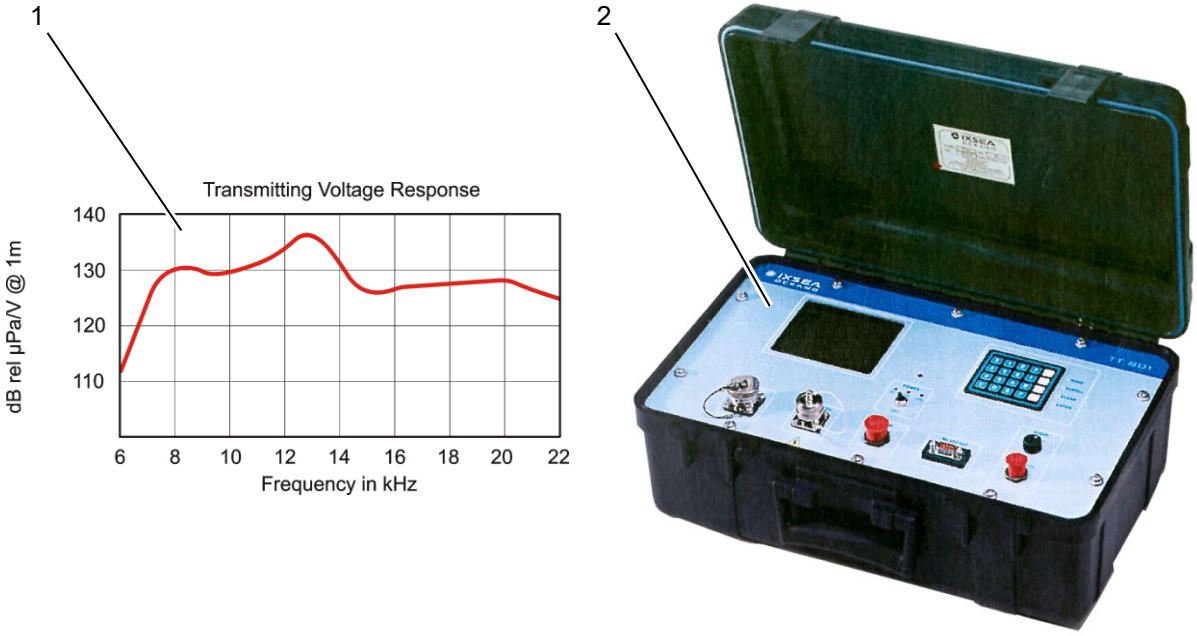


Fig. 115 Transmit / receive characteristic transducer ITC–3013, triggering unit IXSEA TT-801

1 Transmit / receive characteristic transducer ITC–3013
2 Triggering unit IXSEA TT-801

The hydrophone extension unit is a universal extending unit for securing hydro-acoustic converters. At present the ship's own transducer is fitted.

However a user specific transducer can also be used.
The exchange can take place with the ship afloat without docking.

Note

When using new transducers, the available space in the extension shaft must be taken into account.

Manufacturer	Hoppe
Installation point operating appliance	Bridge, operation by bridge personnel
Hydrophone extension unit installation location	Foreship, ground measurement room between rib 123 and 124
Extension depth	600 mm below lower edge box keel
Hydrophone extension unit clearance width	125 mm, sufficient for e.g. OCEANO acoustic modules AM 121)
On board transducer	International Transducer Corporation, Type ITC 3013
On-board triggering unit	IXSEA, Type TT-801

On board Meteor there is the option of releasing ixBlue/exail releasers via POSIDONIA or the existing release box/case including hydrophone.

5.3.2 Deep freezers

Fig. 116 Deep freezer

National Lab GmbH, ProfiLine Taurus , type: PLTA 0986

The two freezers are used for storing samples at very low temperatures.

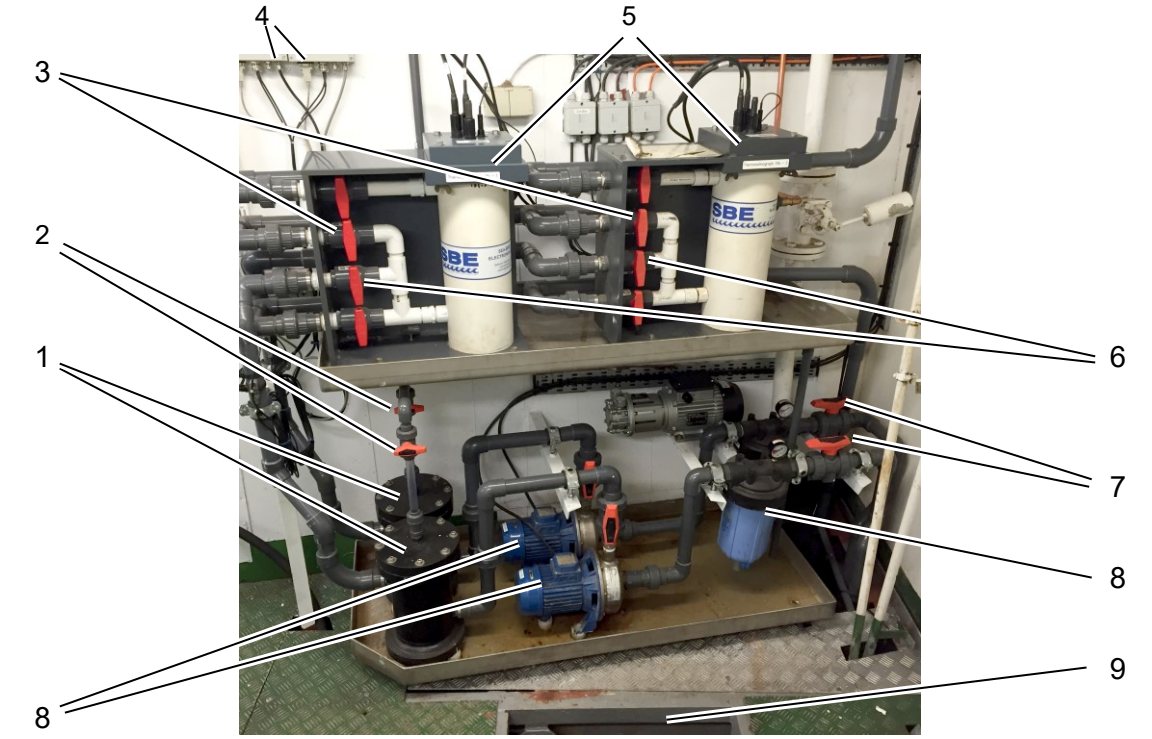
Temperature	-40 to -80 °C
Dimensions (inner)	L 385 mm, W 385 mm, H 470 mm
Contents	each approx. 70 litres
Installation locations	Clean laboratory 8 and aquarium refrigeration room

Note

Requirement should be stated in good time (>24 h in advance).

If samples remain on board for longer, it is requested that subsequent user groups are informed about fill level, duration of stay and ideal temperature.

5.3.3 Thermosalinograph



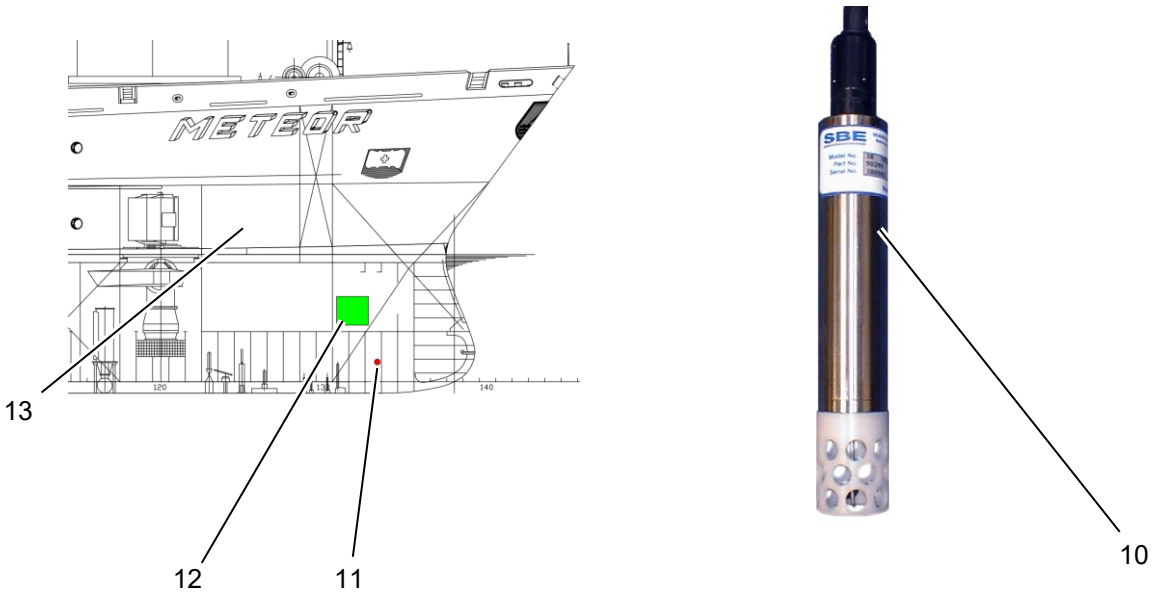


Fig. 117 Thermosalinograph, temperature sensor SBE 38

1 Debubbler
2 Venting valves for debubbler
3 Sea water valves to the TSG
4 Flow meter display
5 Thermosalinographs (TSG)
6 Fresh water flushing valves to the TSG
7 Valves upstream of sea water filters
8 Sea water filter
9 Inlet connection installation location in bilge
10 Temperature sensor SBE 38
11 Thermosalinograph in bow measurement room
12 Water inlet connections Spt 134 port and starboard
13 Measurement and sounding room 18 with sampling

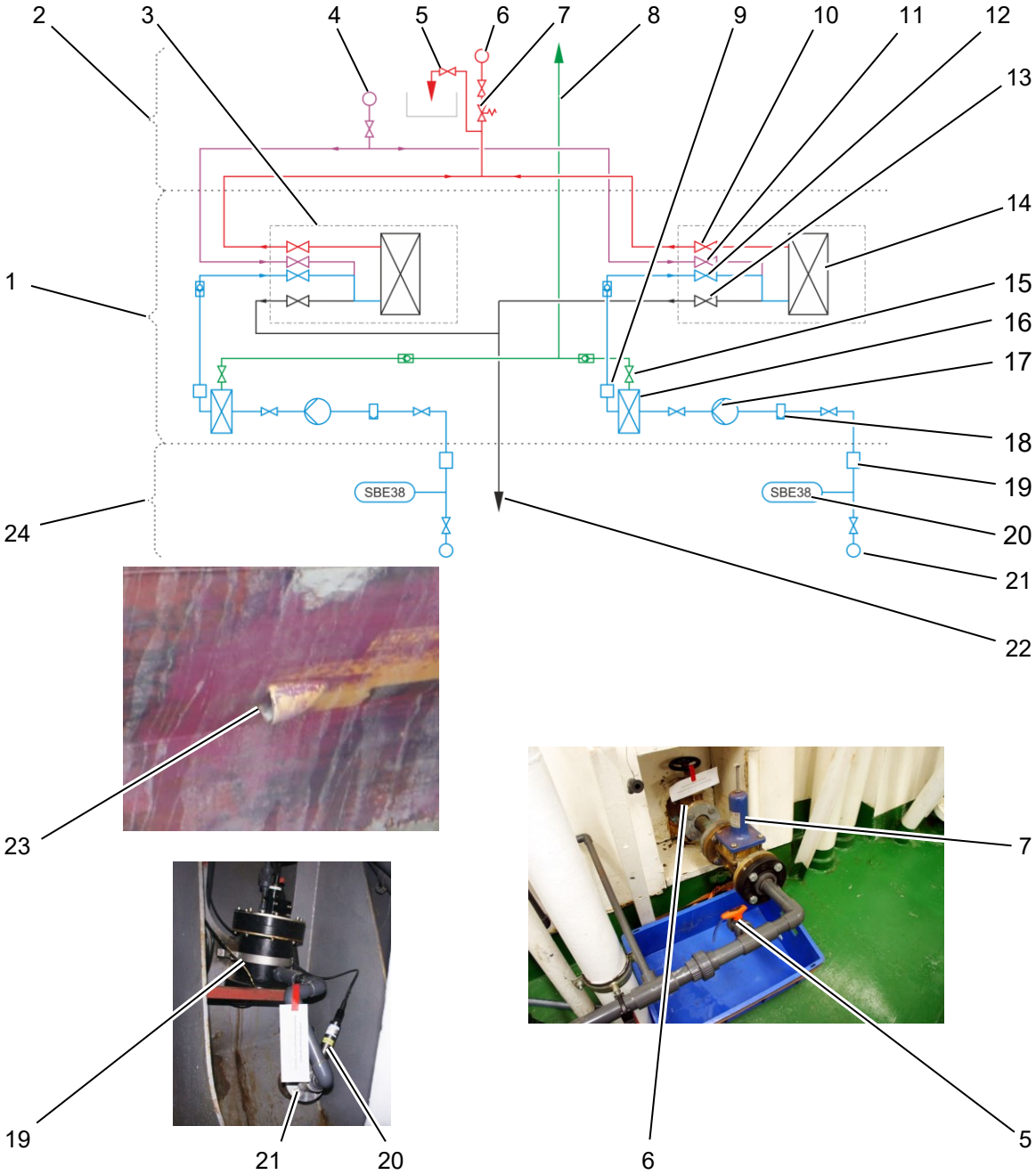


Fig. 118 Thermosalinograph, temperature sensor SBE 38

1	Floor measuring room (not accessible)	13	TSG drainage valves
2	Bow and sounding room (accessible)	14	Thermosalinograph
3	Thermosalinograph enclosure	15	Venting valves for debubbler
4	Fresh water access	16	Debubbler
5	Tap with hose for sampling	17	Sea water pump
6	TSG outlet	18	Sea water filter
7	Pressure retention valve	19	SVP (Sound Velocity Profiler)
8	Debubbler venting outlet	20	SBE38 temperature sensor
9	Flow meter sensor	21	Inlet connection installation location in bilge
10	TSG outlet valves	22	TSG drainage outlet
11	Fresh water flushing valves to the TSG	23	Water inlet connections in foreship Spt 134
12	Sea water valves to the TSG	24	Bilge

SBE21 Seacat

The thermosalinograph is used to measure the temperature, conductivity and salt content of the sea water The water inlet connections are in the bulbous bow, several metres below the water line. An external temperature sensor is attached to the TSG.

Manufacturer	Sea-Bird Electronics, inc.

Accuracy

Temperature	0.01 °C / 6 months
Conductivity	0.001 S/m/month

Resolution

Temperature	0.01 °C
Conductivity	0.0001 S/m
Measurement rate	6 sec
Installation location	Measurement and registration room, laboratory 18
Calibration	The sensors are regularly sent to the manufacturer for calibration.

Digital Oceanographic Thermometer SBE38

The Digital Oceanographic Thermometer SBE 38 is installed as an external temperature sensor upstream of the thermosalinographs, in order to obtain an exact water temperature.
The sensors are embedded into the supply lines directly at the entry point on the outer shell of the ship at the level of the intake connections for the thermosalinographs.

Manufacturer	Sea-Bird Electronics, inc.

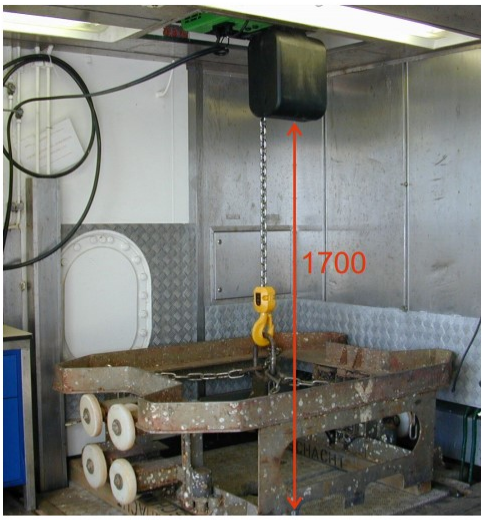
Accuracy

Working area	-5 … +35 °C
Starting accuracy	1 ± 0.001 °C (1 mK)
Stability	0.001 °C (1 mK) in 6 months (certified)

Resolution

Temperature	0.00025 °C (0.5 mK)
Calibration	-1 … + 32 °C
Measurement error caused by self-warming	below 200 µK
Installation location	Embedded in the supply lines at the outer skin of the ship at the entry point

5.3.4 Sounding shaft

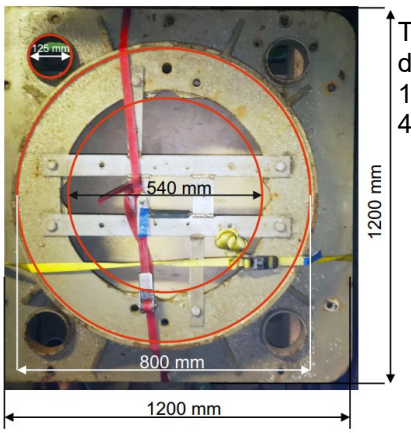


Load capacity of the chain hoist: 900 kg

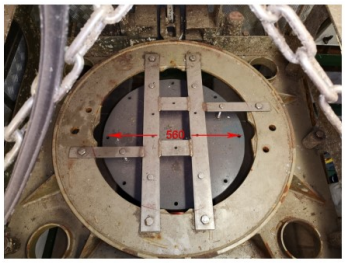
The sounding shaft plates are attached to the sounding shaft basket from below.

The clear height in the filling room is limited by the chain box and the chains on the sounding basket limit the clear height, too.

Meteor sounding shaft adapter plate



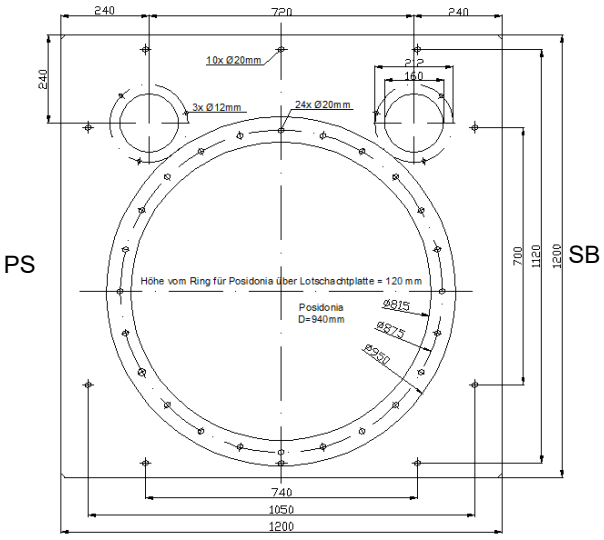
The inner diameter is 125mm for all 4 small holes.



Alternative gray adapter plate for Simrad EK 80

Meteor sounding shaft plate 1

Bow

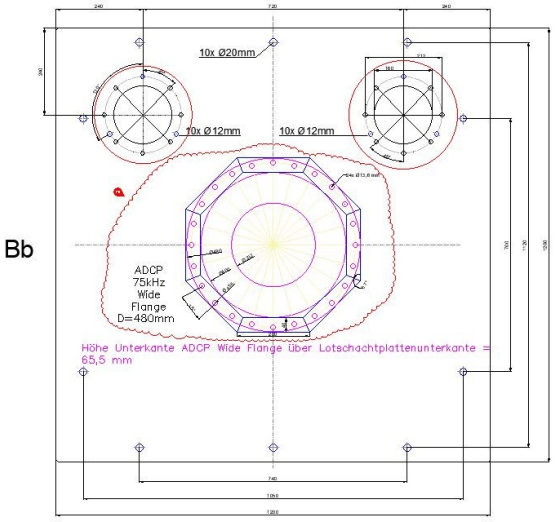


PS SB

Stern

Lotschachtplatte 3 FS"Meteor"

Vorn



Bb Stb

Achtern

Meteor sounding shaft plate 4 – since M201 – arrow = bow

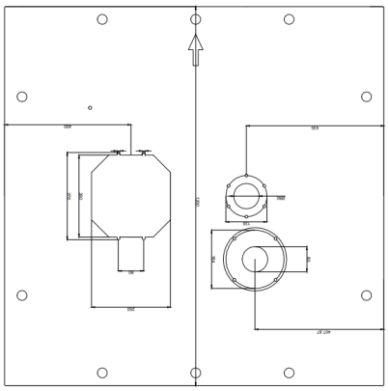


Fig. 119 Sounding shaft, basket and adapter plates

The sounding shaft basket in the sounding shaft makes it possible to suspend sensors, samplers and other scientific appliances.

For this purpose one adapter plate acts as carrier of the appliances. There are two adapter plates on board.

Description	The adapter plate used as appliance carrier is moved in the sounding by means of an electrically operated winch and locked hydraulically in the lower end position.

Note

The additional use of other devices in the sounding shaft is restricted while the 38 kHz ADCP converter is being used.

Installation location	Filling room, laboratory 17, accessible from the working deck
Thickness of the plate	15 mm
Studs	Ø 20, L 120 mm
Height of sounding shaft basket	440 mm
Hook height of the lifting equipment	1,920 mm above floor of the filling room
Deck clearance	2,150 mm
Height of floor above ship's floor	approx. 6,400 mm

5.3.5 Water-borne sound detectors

Applied Microsystems SV Plus V2

Two mobile water-borne sound detectors are available on board for measuring the velocities of water-borne sound.

Manufacturer	AML Applied Microsystems

Depth

2000 m	AML Applied Microsystems SV Plus V2 SN 3498
5000 m	AML Applied Microsystems SV Plus V2 SN 3757

5.3.6 Core stacking frame

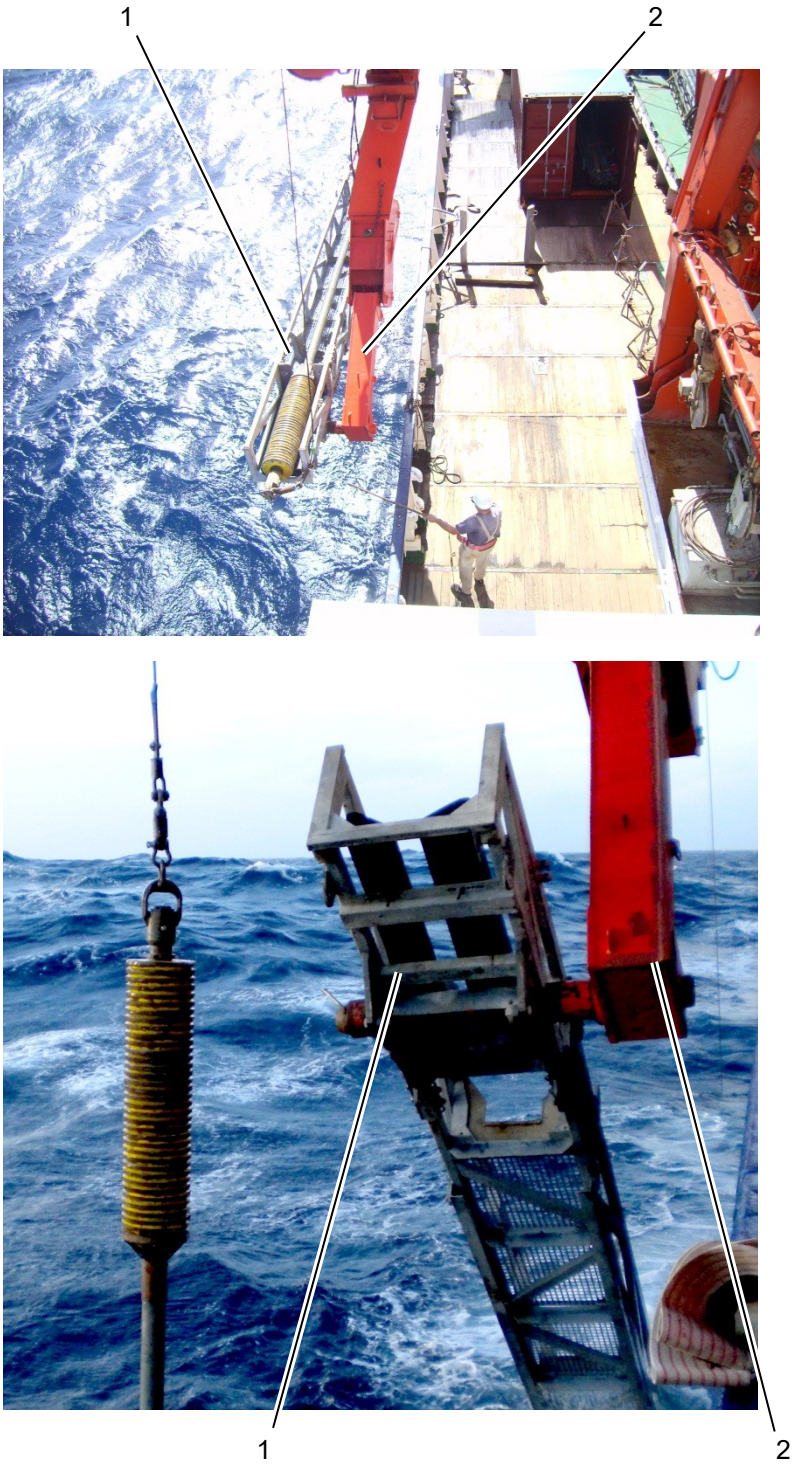


Fig. 120 Core stacking frame

1 Core stacking frame
2 Pivot with adapter on movebar

The appliance assists in safely bringing various core unloading appliances with possible core lengths of up to 24 metres on or off the ship.

Manufacturer	Elbe Hydraulik, Osterrönfeld
Description of structure	Square pipe construction from hot dip galvanised steel
Load bearing capacity of the frame	Max. 6,000 kg

Note

The load capacity of the system is restricted to a maximum of 5,000 kg by the holding force of the positioning winch.

Components

Weights set-holder	Number	1
	Length	1,820 mm
	Width	900 mm
	Height	750 mm
	Mass	450 kg
Core box / core pipe sensor frame	Number	3
	Length	each 5,700 mm
	Width	each 800 mm
	Height	each 750 mm
	Mass	each 550 kg
End frame with swing arm and wheels	Number	1
	Length	1,200 mm
	Width	1,074 mm
	Height	770 mm
	Mass	250 kg

Note

The core stacking frame is only on board if requested and if it is not used it will be removed!

If required, the maximum required length must be specified during the coordination meeting and entered in the device list in the minutes.

5.3.7 CTD probe and water carousel

Fig. 121 CTD probe and water carousel

Conductivity and temperature profiles in the water column are measured with a CTD probe ("Conductivity, Temperature, Depth") (salt content calculated from this).

A CTD probe with water carousel is available on board as a back up for the CTDs people have brought with them.

The equipment consists of a water carousel with CTD, the on board appliance (Deck Unit) SBE-11 Plus (V2) and a PC with data recording.

SEASOFT from Sea-Bird Electronics is used as software.

Manufacturer	Sea-Bird Electronics, inc.
Type designation	SBE911Plus
Total weight of the frame	Max. 200 kg
Number of water carousels	24 bottles ocean test equipment OTE 110B
Content / bottle	10 litres

Sensors present

Number	Equipment
1	CTD Plus SBE 9
6	Temperature sensors SBE 3
6	Conductivity sensors SBE 4
3	Dissolved oxygen sensor SBE-43
2	Altimeter PSA 916
1	Biospherical quantum scalar PAR sensor QSP 2350
1	Biospherical surface reference sensor QSR 2200
2	Fluorometer chlorophyll and turbidity FLNTU
1	Reversing thermometer SBE-35 RT
3	Pumps SBE 5T

Note

The sensors must be calibrated regularly by the manufacturer and are not available on board during this time.

5.3.8 Radiation protection container

Fig. 122 Radiation protection container

Warning!

Danger of scatter contamination of the ship!

Do not under any circumstances bring contaminated sediments outside the container unintentionally!

Following completion of the work with radioactive substances and cleaning of the container, wipe tests must be carried out in line with the valid Ship Board Procedure (SBP).

A record of these wipe tests is kept.

One copy of this record (forms on board) goes to the next person in charge of safety (to be filed in the log book for the radiation protection container), to the chief and to Mr Rabsch (Institute for Marine Science, Kiel).

The next person responsible for safety must retest the wipe test values passed on to him by his predecessor when taking over the container as any possible contamination will otherwise be blamed on him.

Radiation protection container

The laboratory container is used for handling radioactive materials and sources in accordance with the certificate of approval of the container.

Safety level of the container:

Permitted activities related to the handling of open sources according to the handling permit HH-RA-46-21 from December 10th, 2021 Laboratory container RV Meteor.

Maximum total activity of unsealed radioactive substances:

H-3 = 15,0 GBq

C-14 = 1,0 GBq

P-32 = 1,5 MBq

P-33 = 1,0 GBq

S-35 = 1,0 GBq

Ca-45 = 1,0 GBq

Mn-54 = 15,0 MBq

Fe-55 = 150 MBq

Fig. 123 View of inside of radiation protection container

Owner	German Federal Republic, represented by the BMBF (Federal Ministry for Training and Research)
Contact for approval processes	Applications to work with radioactive materials must be submitted following consultation with the University of Hamburg, the shipping company and the Leitstelle Deutsche Forschungsschiffe (German Research Fleet Coordination Centre). http://www.mpi-bremen.de/Strahlenschutzcontainer_FS_Meteor.html
Power supply	380 / 220 V AC
Connections	Hot/cold water Pure sea water Working pressure 5 bar
Dimensions	In line with 20' standard container
Mass	approx. 7,500 kg
Set up location	Space 1 and 2, forecastle deck rear

Note

For operation the container must be on deck!

Storage	If the container is not on board, the sensitive items of equipment (scintillation counter, monitor etc) must be stored in a wooden box in scientific storage room 3.

Note

The organization of the radiation protection container on board F.S. Meteor has been subject to new regulations since 2010.

In order to allow the expeditions to run seamlessly, the registrations for the radioactive work must arrive punctually with the authorities. Working with radioactive isotopes is strictly prohibited without the relevant approval.

Dose rate measurement device	Berthold LB124

5.3.9 MeBo launching device

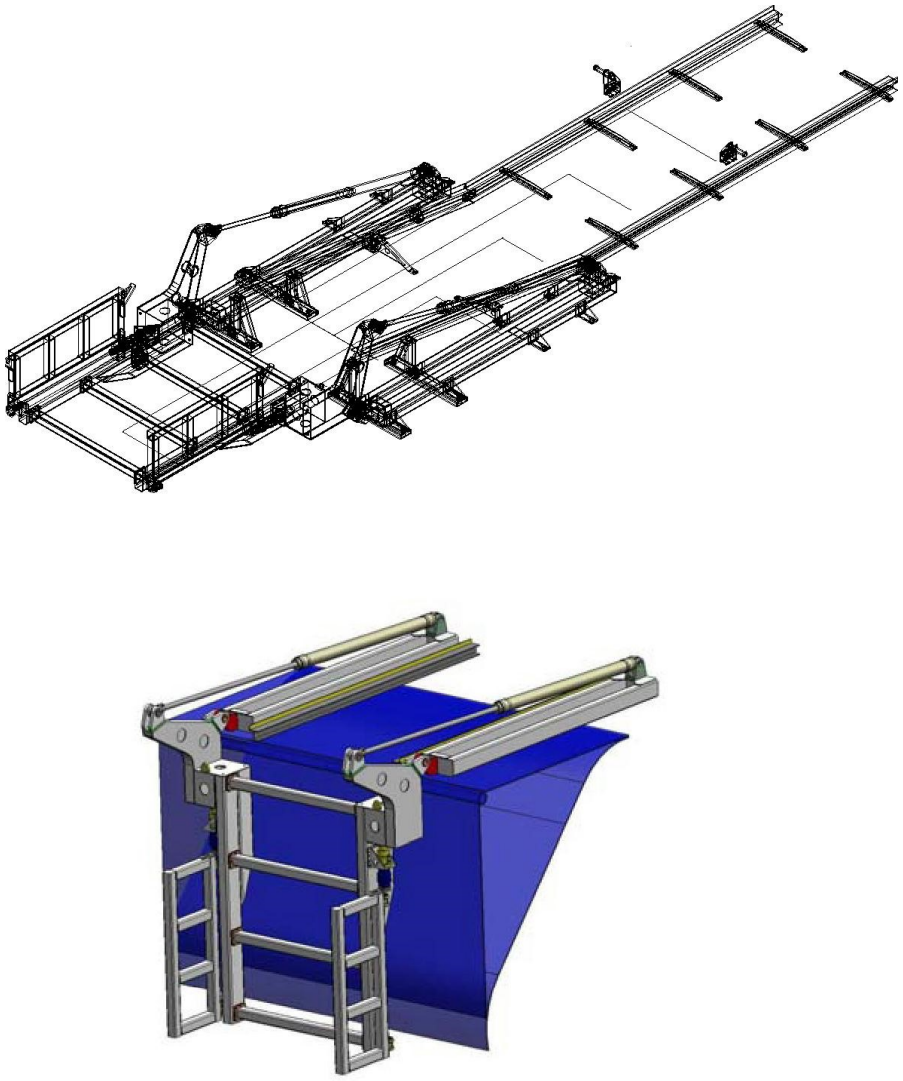


Fig. 124 MeBo launching arrangement

The appliance acts as a launching device for the sea bed measurement appliance "MeBo" belonging to the University of Bremen.

Manufacturer	MWB AG, Bremerhaven
Total mass	5,600 kg

Dimensions on deck

Length	approx. 10 m
Width	approx. 4 m
Height	approx. 1.5 m

Dimensions of swivel device

Length	approx. 3 m
Width	approx. 2.6 m
Height	approx. 1.0 m
Set up location	Working deck, at the rear on the rear gate

Note

The launching frame is stored at MeBo in Bremen and if required sent to the ship dismantled in a 20' open top container (height 2.75 m).

The use of the MeBo must be agreed with the headquarters and the University of Bremen in good time.

The shipping company must be informed regarding transport.

5.3.10 Nitrogen Generator

Fig. 125 Nitrogen Generator

LN 20 AC

The appliance is able to generate up to 20 litres of nitrogen per day.

Manufacturer	Cryoandmore
Width	approx. 1.200 mm
Hight	approx. 1.800 mm
Depth	approx. 600 mm
Mass	300 kg
Tank (Dewar)	100 ltr
Installation location	WS1, starboard

Note

The appliance needs approx. 5 days to start up.

If nitrogen is needed at the start of the journey, the requirement must be registered in good time.

5.3.11 Pure water system Milli-Q Integral 10 and IQ7005

Fig. 126 Milli-Q ultra-pure water system

Milli-Q Integral 10 and IQ 7005

The Milli-Q integral system produces pure and ultra pure water from fresh water for all laboratory applications.

A Progard pretreatment pack performs the first preparation step and protects the system from coarse contaminants and hardening constituents.

Subsequent treatment is carried out in a high-performance reverse osmosis module.
Reverse osmosis (RO) technology is a water treatment process based on the use of membranes, which removes a high percentage of all types of contamination from tap water.

In the third treatment step, an Elix module removes the remaining ions. The ion exchange resins contained in the module are continuously regenerated by an electric current. As a result, they perform to a consistently high standard and must neither be chemically regenerated nor replaced.

The water flows through a 254 nm UV reactor to reduce the level of germs and is sent for interim storage in a pure water reservoir. The pure water reservoir is equipped with an automatic disinfection system.

The next step in the preparation of ultra pure water involves using an application-specific Quantum polishing pack to remove ions and organic contaminants at trace level.

In addition to the ultra pure treatment media used to remove ions and organic matter, the Milli-Q Integral System is equipped with UV photo-oxidation technology, which reduces the organic substances to a minimum thereby maximising the useful life of the Quantum polishing pack.

Finally, the Milli-Pak filter unit at the Q-Pod extraction station ensures the microbiological and particulate purity of the ultra pure water.

Production capacity	10 / 5 litres / hour
Reservoir capacity	60 / 25 litres
Point of withdrawal	Dry laboratory 7 / Universal Laboratory 15

5.3.12 Container cable winch

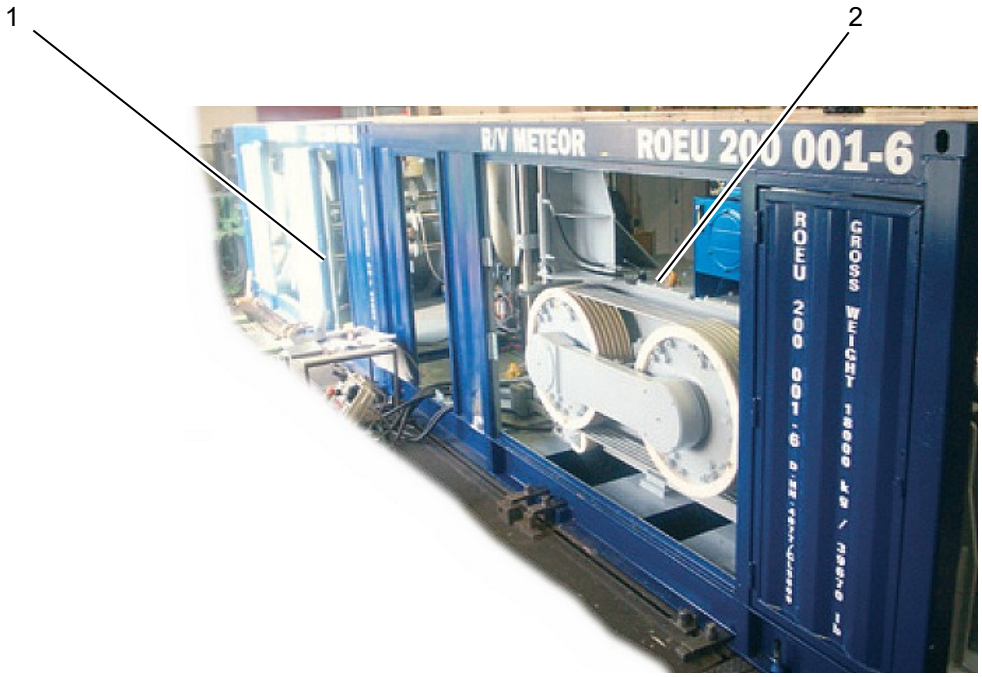


Fig. 127 Container cable winches in standard set up (series operation)

1 Container with storage winch
2 Container with friction winch

HATLAPA 150 / 20

The container cable winch is intended for mobile use with FOC cables with an external diameter of 18.2 or 25 mm.

It is for example used with drilling appliances such as "ROCKDRILL" (BGS) or “MeBo” (Marum).

The system consists of two containers:

Container "F" with friction winch

Container "S" with storage winch

Manufacturer	HATLAPA "Uetersener Maschinenfabrik GmbH&Co.KG"
Construction	20’ standard container with CSC certificate and GL certificate
Dimensions (L x W x H)	6,058 x 2,438 x 2,591 m
Set up location	Working deck (main deck)

Ring wheel

Manufacturer	Ramert, Kiel
Electrical connections	3 x 3.6 kV, 25 A 3 x 1 kV, 6 A 2 x 230 V for heating 2 x for safety switches
FOC connection	1 Monomode 9 / 125 µm

Max. cable lengths

Cable diameter	Max length	Number of layers
18.2 mm	7,600 m	21
25 mm	3,800 m	15

Mass

Container	"F" (friction winch)	"S" (storage winch)
Weight without cable	13.5 t	11.5 t
Weight with cable		20 t

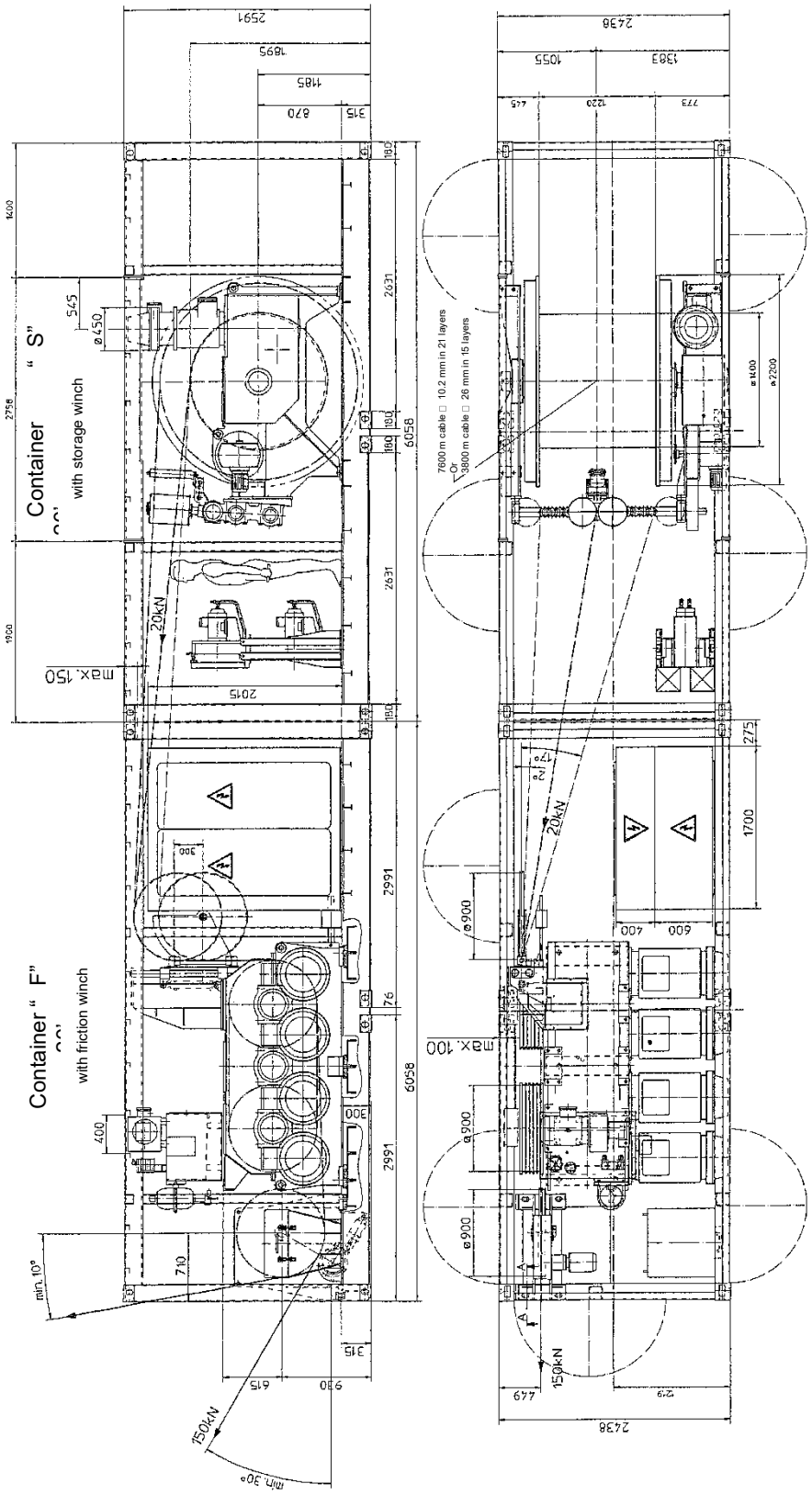


Fig. 128 Container winches F and S

Note

The container cable winches are not constantly on board. Their use must be agreed with the headquarters in good time (min. 6 month in advance).

The shipping company must be informed regarding mobilization and transport.

Note

The container cable winches are designed for both cable diameters.

The cables must spooled, if necessary, by manufacturer HATLAPA (today MacGregor).

The containers can also be stacked one above the other.

The rollers needed for operation with this set up are not available at present.

5.4 Working boats

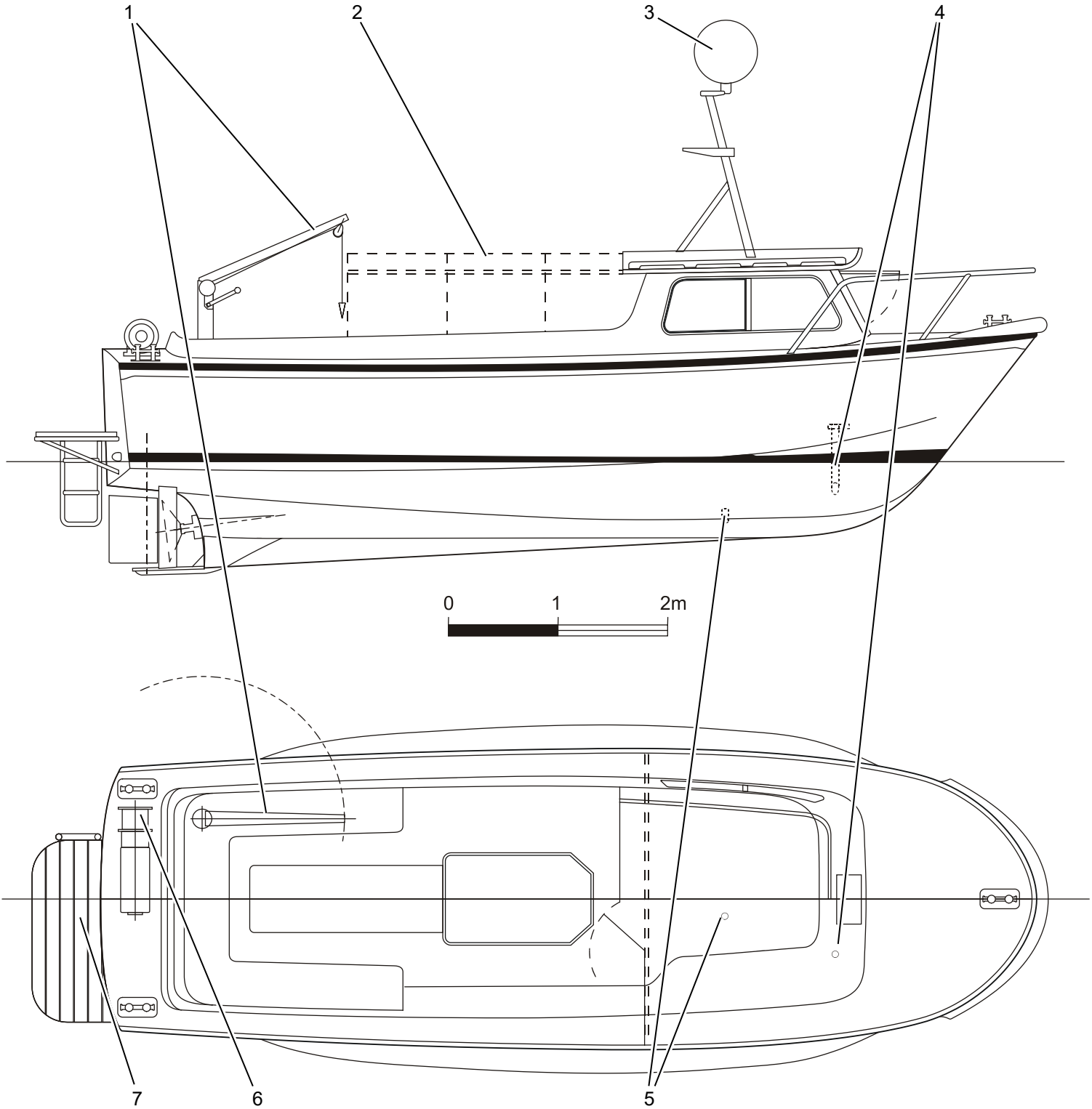


Fig. 129 Working boat METEORIT

1 Work crane, manually operated, SWL 250 kg
2 Weather protection covering (removable)
3 Radar reflector
4 Rudder pipe, ø 50 mm (sounding shaft)
5 Log
6 Work winch, 150 wire ø 8 mm
7 Rear platform for divers etc.

5.4.1 Motor rescue and working boat METEORIT

The motor boat METEORIT is available for outboard work and limited transport of personnel.

It has a covered and heated control station and a large open deck area with a bench which can be covered by weather protection.

A manually operated crane with 250 kg lifting capacity, an electric winch with 150 m wire and a platform at the rear make launching and diving work from the boat possible. Measurement appliances can be brought out by a rudder pipe.

The working boat on METEOR is stored midships on the forecastle deck on the port side.

Nautical equipment:

- Magnetic compass, echo sounder, log, mobile GPS receiver
- VHF voice radio, radar reflector, position and work lighting

Energy supply:

- 24 V power supply, 4 CEE standard sockets
- 24 V – 32 A connection for a 230 V transformer

Scientific:

- Worktop with socket grid (M8, 600 x 600 mm in the floor)
- Work crane (pivoted davit), hand operated, SWL 250 kg
- Electric winch at the rear, 150 m wire ø 8 mm
- Rudder pipe (e.g. as sounding shaft) ø 50 mm, front at starboard side

Boat data	
Shipyard	Hatecke-Werft, Drochtersen, Germany
Year of manufacture	1985/86
Total length	8.51 m
Width	2.75 m
Depth	1.10 m
Side height	1.75 m
Displacement	5.5 t
Driving power	72 kW
Speed	8.5 kn
Sphere of action (at 8.5 kn)	200 NM
Water tank capacity	125 L
Number of people permitted	41

5.4.2 Working boat

Fig. 130 Working boat (inflatable boat)

A rigid inflatable boat with outboard motor is available for assistance outside.

It has a solid floor and a central, fixed control station.

The inflatable boat on METEOR is stored above the working deck by laboratory 10 (wet laboratory) in a bedding and it is lowered with the deck crane.

6. COMMUNICATION

6.1 Marine radio

Call sign of RV METEOR: DBBH

6.2 Telephone/fax/data

6.2.1 Dedicated line (C band / KU band)

C-band is used as standard on board

The C band equipment works via a so-called global beam and provides a secure connection up to an elevation angle of 5°.

The satellite capacity is hired exclusively and is thus used exclusively for connection to and from the Meteor. Data can be permanently transferred via the connection. For this purpose all internet services such as www, e-mail etc are available.

The antenna of the C band equipment (radome with 3.65 m diameter, approx. 800 kg weight) is installed on the port side of the 2nd superstructure deck. Because of this installation location, there is a limited viewing angle of 90° azimuth to the satellite at an elevation of less than 45°. In addition there is a limited viewing angle of 25° azimuth at an elevation of 45° to 60°.

In order to prevent possible connection interruptions because of C-band antenna shut-offs, an additional KU band antenna was installed on the roof of the paint store behind the funnel. A connection interruption can still occur if the ship operates outside the KU band coverage area (e.g. in the Indian or Pacific Ocean). In addition, a Starlink-antenna was installed by the provider in 2023 to compensate for temporary failures of the C-band system due to frequency overlaps of the new 5G mobile network near the coast.

In addition the dedicated line provides the integration into the ship's telephone system. The ship has telephone numbers which are on the German landline network and it can be reached by them.

6.2.2 Starlink

All passengers have the opportunity to make phone calls, exchange emails, use search engines, surf the internet, increasingly use social media, download music and films, etc. via the internet.

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

6.2.3 Iridium OpenPort

The Iridium OpenPort system provides worldwide availability and it is therefore used in those areas where the C band satellite is not available and in the event of a Starlink failure. For this system costs are incurred based on use. No flat rate is offered at present, e.g. a flat rate for monthly data transfer. Data transfer via this system is more cost effective than via the Fleet77 devices which are present.

The system provides Iridium telephone devices as well as data transfer. At periods when the ship is not being used, there is just a low basic charge as the ship has C band coverage for a long period.

The antenna of the Iridium OpenPort device has a diameter of 57 cm and it is 23 cm high. The weight is 12 kg.

6.2.4 RV Meteor telephone numbers

Bridge telephone (dedicated line)	+49 – 421 – 9850 4370
Bridge telephone number (Iridium OpenPort)	+8816 77 701 858
Radio room fax (dedicated line)	+49 – 421 – 98504379
Expedition leader (dedicated line)	+49 – 421 – 98504372
Expedition leader (Iridium OpenPort)	+8816 77 701 859

6.2.5 Telephone (private use)

On board there is a telephone box on the 3rd superstructure deck for use with prepaid cards. Connections are possible via either the dedicated line (only German landline network) or via Iridium Open Port (worldwide).

Note

Only ship to land connections are possible from the telephone box.

Tariffs as of September 2015:

Dedicated line per card approx. 300 min (= 15 EURO).

Iridium Open Port per card approx. 30 min (= 27.50 EURO).

6.2.6 On board telephone

An internal telephone system with around 200 telephone points is installed on board.

The numbers have three figures:

Number range	Participation group
100 – 199	Bridge, nautical rooms, navigators, deck personnel, doctor and treatment rooms
200 – 299	Machine control room, machine rooms, machine personnel
300 – 399	Scientific technical service
400 – 499	Messes, stewards, cooks
500 – 599	Laboratory rooms
600 – 699	Expedition leader and scientists' rooms
700 – 799	Radio room, radio side room
800 -	German Meteorological Service (DWD)

6.3 Scientific intercom system

The scientific intercom system serves to create up to three speech circuits on board which are independent of one another, one of which can always be selected.

On board there are 42 telephone points at user relevant locations.

On deck these are also equipped with pressure chamber loudspeakers. By selecting a speech circuit, it is possible to make a connection to one or more telephone points of the same circuit. Channel 3 is normally used for communication between the laboratories, the bridge and the winch consoles.

Selection of the speech circuit occurs by pressing a button on the operating appliance. The activation of the connection occurs by pressing the speech button on the handset.

6.4 E-mail

An electronic mail system is present on the ship (DAVIS-mail, Software & Systems AG).

Each participant in the voyage is given a personal e-mail address, which can be used both officially and privately. The addresses are allocated on board by the systems manager (Sysman). For this purpose he receives a list of the scientists who will be joining the ship prior to departure.

Participation in the e-mail system includes agreement by the user to electronic storing of his e-mail in on board or on land systems for any verification obligations.

6.4.1 Personal e-mail address

"1st letter of first name.surname@meteor.briese-research.de"e.g. for Hein Mück "h.mueck@meteor.briese-research.de"

Personal addresses are limited to 500 kBytes per e-mail (incoming and outgoing).

For incoming e-mails (to *.*@meteor.briese-research.de) above the size limits, notification will take place via the mail system. The e-mail can then be released by the system manager on the instruction of the system manager.

6.4.2 Permanent e-mail addresses

The following official addresses are available for sending/receiving large e-mails, which will be issued by the voyage leader:

- chiefscientist@meteor.briese-research.de (limited to 2 MBytes)
- logistics@meteor.briese-research.de (limited to 2 MBytes)
- senior@meteor.briese-research.de (limited to 2 MBytes)
- technics@meteor.briese-research.de (limited to 2 MBytes)

The size limit can be increased accordingly by the Sysman (system administrator) for the transmission time if required.

If required and with the consent of the expedition leader, additional work addresses with a higher size limit of up to 2 MB can be set up temporarily.

6.4.3 Accessibility of the ship

The ship can be reached by e-mail at address master@meteor.briese-research.de. The e-mails must be limited to a maximum of 2 MBytes!

6.5 Internet

6.5.1 PC with internet access

If in the event of a Starlink failure resp. used data volume only the dedicated line is available, the following computers are made available in subordinate order for free internet use with reference to telephone and e-mail:

- Expedition leader
- Master
- German Meteorological Service
- Sysman
- 1 public PC available for scientific use in the drawing room
- 1 public PC available for crew in ship's office 2nd superstructure deck

In principle the activation of the internet access is restricted to these PCs.

The sysman can if required clear further computers/laptops temporarily for internet use following assent of the expedition leader and master.

6.5.2 Internet use, bandwidth

As the bandwidth via C-band is limited when Starlink fails or the data volume is used, simultaneous internet use has an adverse effect on the general internet speed. The current bandwidth of 128 kbit/s will in no way allow "jerk free" surfing and downloading as it would on land.

If there is only Iridium OpenPort available, internet use will remain limited to the PC of the expedition manager for reasons of cost. If required, an additional internet connection can be made temporarily available by the system manager.

Note

The laws and stipulations regarding internet use (e.g. surfing on pages with illegal content or content which endangers young people) do of course also apply on board.

6.6 Network (LAN)

6.6.1 Description

There is a computer network on board which ensures that connections can be made to the different computer systems on board.

Technical Data:	
Protocol	TCP/IP
Physical connections	Twisted Pair (RJ45), two connections each in a double socket
Cable type	Category 6
Active components	1 Switch 10/100/1000 Mbit/s with 8x48 connections
Operating systems	Windows, MacOS X, Linux
Server	File server with mass storage which can be accessed by all computers in the network.
Services	• On board e-mail (internal webmailer and POP3/IMAP access) • DSHIP data distribution system • Intranet, printing, plotting, DHCP, DNS
Accessories	Laser printer, colour printer, colour plotter, colour scanner, DVD/CD burner
Incorporation of computers	Additional computers can be incorporated via the TCP/IP. These computers can use all services in the network.

6.6.2 Rooms with network connections (LAN)

Deck	**Room**
Main deck	Clean laboratory 4
	Clean laboratory 5
	Bio-chemistry laboratory 6
	Dry laboratory 7
	Dry laboratory 8
	Scientific technical service
	Measurement and registration room 9
	Wet laboratory 10
	Air gun room 11
	Gravimeter room 12

Deck	Room
Main deck	Drawing room 13
	Computer room 14
	Universal laboratory 15
	Geo laboratory 16
	Filling room 17
	Conference room
	All rooms for scientists
	Scientific stowage 1
Forecastle deck	Treatment room
	All rooms for crew
1st superstructure deck	Machine office
	All rooms for scientists and crew
2nd superstructure deck	On board weather station
	Ship's office
	All rooms for scientists and crew
3rd superstructure deck	Sounding centre 2
	Radio room
4th superstructure deck	Bridge
5th superstructure deck	Air chemistry laboratory 1
Tween deck	Machine control room (MKR)
Containers, further rooms	Connection by loose laid network cables possible.

Note

Several connections are already taken up by recording computers and DSHIP display PCs with fixed installations.

6.7 PC work stations

6.7.1 Scientific PC work stations

Three PC work stations for scientific users are installed in the drawing room (main deck). The computers are connected to the other laboratory rooms via the network, meaning that data transfer with other computers is possible without problems.

The DSHIP display PCs installed in the laboratory rooms can also be used for normal PC applications.

Network connection standard: Ethernet connection 10/100/1000 Mbit/sec, TCP/IP

6.7.2 Software

The PC workstations and DSHIP display PCs have the Windows 7™ or Windows10™ operating system as standard.

Most of the PCs also have Microsoft Office™ (Word, Excel etc.), scanner software and DVD/CD burner software.

User specific software which has been brought on board can be installed by the system manager if required and should be deleted again at the end of the expedition.

6.8 DSHIP display PC

DSHIP is based on the DAVIS™ measurement data management system and it represents a flexible system for the recording, processing, visualisation, distribution and archiving of marine measurement data.

6.8.1 Recording of data

DSHIP is suitable for the recording of data of various instruments via standard interfaces like

- NMEA 0183 / 2000,
- IEEE 488,
- networks.

6.8.2 Distribution of data

DSHIP generates standard and user specific configured data telegrams and makes these available via various interfaces:

- to configurable NMEA clients,
- via serial interfaces,
- via network interfaces.

6.8.3 Visualisation of data

The visualisation of data occurs

- through pre-configured standard displays,
- through freely configurable displays,
    - scale values
    - graphs
    - plots
- in day/night mode,
- in maps.

6.8.4 Storage of data

Measurement data can be archived in various ways:

- automatically online,
- in configurable compression,
- in compressed storage on board,
- for later use on land.

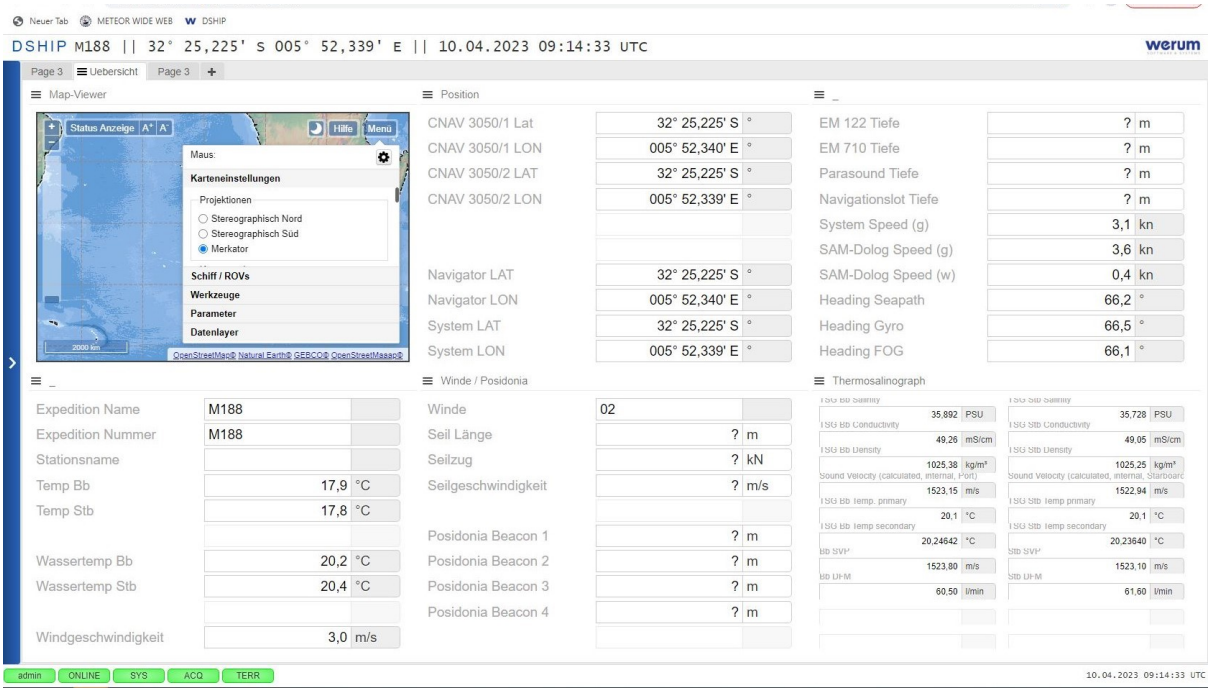


Fig. 131 Example of DSHIP display presentation

6.8.5 Export of data

The data export occurs web based in various formats:

- as ASCII,
- CSV or
- Other.

Selection of export data according to

- Date,
- Time,
- Sensor.

The data are available as an e-mail message or for offline processing.

6.8.6 Further features

DSHIP works independently, is capable of multitasking and provides

- Comfortable autonomy for automatic use, this allows
    - Fitting of new sensors
    - Configuration of available sensors
    - Installation of back up and archiving modalities
- Continuous monitoring,
- Possibility of configuration before start of expedition,
- Avoidance of inconsistent entries,
- Scientific station book with
    - Event and alarm treatment with classification of the events
    - Position according to time and other data
    - Listing of the use of appliances and events.

6.9 Camera monitoring system

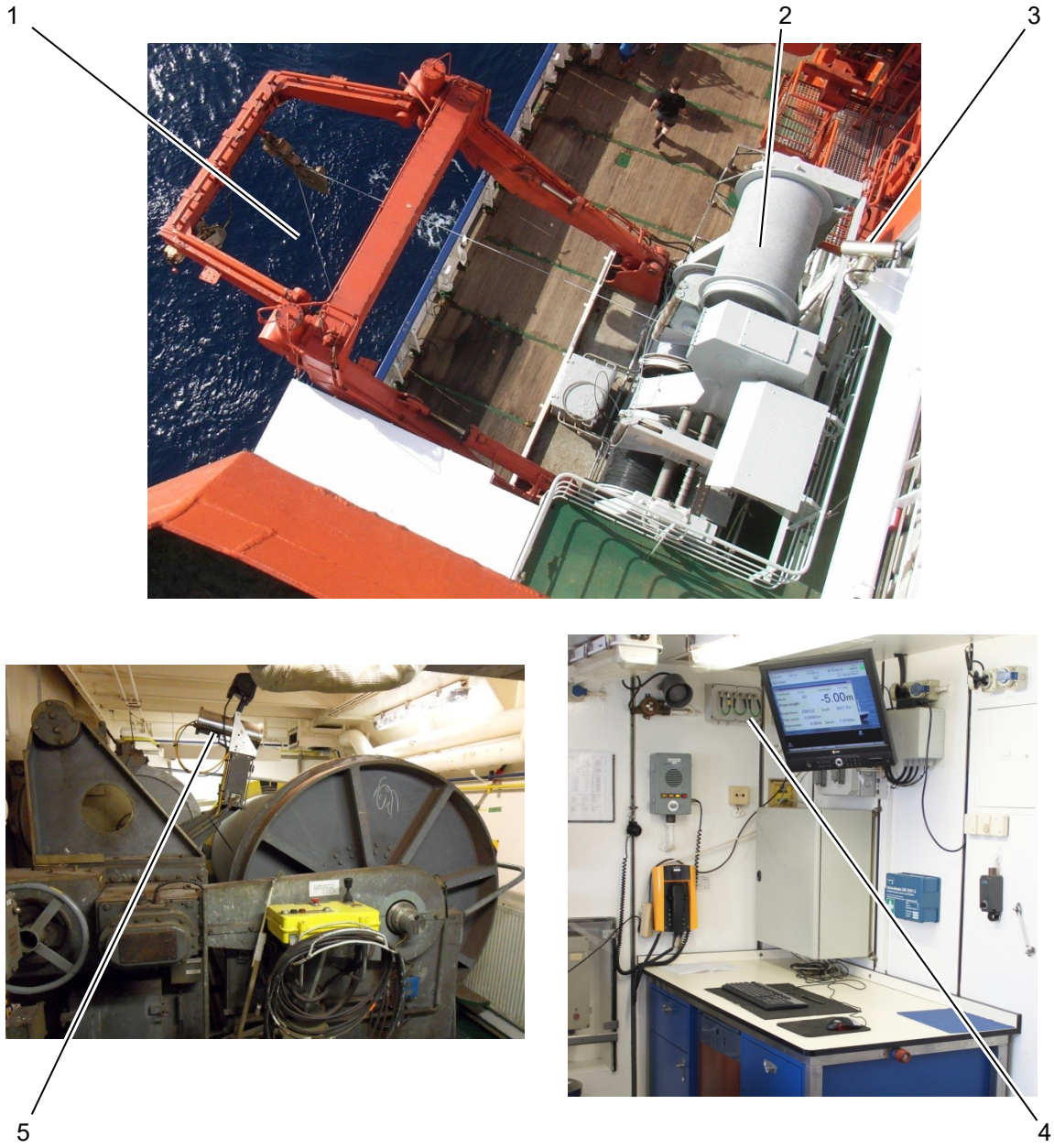


Fig. 132 Monitoring cameras 2 and 8, junction box in geo laboratory 16

1 Outrigger
2 Winch W3
3 Camera 2
4 Junction box in geo laboratory 16
5 Camera 8 at winch W12

6.9.1 Description

The camera monitoring system provides visual monitoring of the winches and the working deck.

The setting of the cameras and the operation occur through the ship's personnel (scientific technical service WTD) and the ship's personnel on the bridge.

In some of the laboratories connecting sockets for video monitors are available, onto which the images of cameras 1, 2 and 3 can be switched.

The connection is undertaken by WTD.

6.9.2 Cameras on RV Meteor

Camera	Installation	Monitoring area
1	horizontal/vertical can be pivoted with zoom	Rear gallows with linked deck area
2	horizontal/vertical can be pivoted with zoom	Rope outlet winches W1, W2, W3 with associated deck area
3	horizontal/vertical can be pivoted with zoom	Area under the movebar, winch W4 with associated deck area
4	fixed	Storage winch W3 (11mm cable)
5	fixed	Storage winch W2 (11mm cable)
6	fixed	Friction winch W10
7	fixed	Storage winch W11
8	fixed	Storage winch W12

7. LIFE ON BOARD

Fig. 133 Mess and bar

1 Buffet in the mess
2 Dining room
3 Bar
4 Counter in the bar

Life on board the expedition vessel for the scientists is determined by various factors:

- Accommodation in (double) cabins
- Comprehensive, varied on board catering
- Uniformity of daily routine (except for current experimentation phases), no customary passing of the week
- Possibility of convivial and sporting activities during free time on board
- Limited individual opportunities for withdrawal
- Limited communication channels to mainland
- Limited sharing in up to date media, politics and culture. E-newspaper “Die Welt” is available on the Meteor Intranet
- Best possible incorporation into on board life

7.1 Cabins

The accommodation of the scientists is usually in comfortable twin cabins with bunk beds on the mostly well attended expeditions.

Each room has a comfortably sized wet room (WC, shower and sink).

A table, couch and network connection are also available.
Cupboard space is appropriate but not lavish.

Cabin	Deck	Number	Cabin number
Twin cabins	1st superstructure deck	7	505, 511, 519, 525, 529, 535, 539
Twin cabins	Main deck	6	718, 724, 726, 734, 736, 742
Single cabins	1st superstructure deck	2	543 (Senior scientist) 552 (Meteorologist)
Single cabins	2nd superstructure deck	2	433 (Voyage leader) 420 (Weather radio engineer)

Fig. 134 Free time opportunities

1 Sports equipment in fitness room
2 Sports equipment in scientific stowage 1
3 Seat on rear forecastle deck

7.2 Food

The catering for the expedition participants is done in the on board kitchen in the mess in the middle deck port front.

7.3 Sale of canteen goods

The steward is responsible for the sale of canteen goods.

Please speak to the steward regarding sales times.

A card reader for cashless payments is present on board, which takes EC cards and the most popular credit cards.

7.4 On board laundry

A laundry is present on board in which any washing can be processed on request.

The on board laundry is located on the main deck port side next to the front scientific stowage 1.

A washing machine and drier are available for scientists who are travelling in the front of the forecastle deck.
The washing powder is available on board.

7.5 General rules of conduct

Note

No waste or other objects may be thrown from the ship!

7.5.1 Safety

At the start of each expedition the safety officer conducts a comprehensive safety lecture.

Safety instructions are placed on the inside of all doors of rooms. These must be read carefully by each participant in the expedition.

Please memorise the following two types of alarm:		
General alarm	● ● ● ● ● ● ● ▬	7 short tones and 1 long tone in succession
Leaving the ship	● ▬ ● ▬ ...	1 short and 1 long tone in succession (repeated continuously)

7.5.2 Health

The following documents must be brought along regardless of the area of the expedition:

- Blood group notification or emergency ID
- Allergy notification (if present and necessary)
- Vaccination certificate
  Vaccination certificates are required by the port health authorities of many countries.
- Medication taken regularly in sufficient quantity.
  The stocks of the on-board pharmacy only cover emergency and standard medication.

7.5.3 Battery supply

Watch, camera and other important batteries are of course at the end of their life cycle during a research expedition. Even if various types of battery are available on board, there cannot be any guarantee that the right type is available. For this reason it is absolutely necessary that replacement batteries are brought for appliances which the expedition participant brings on board!

7.5.4 Glasses

Glasses are sensitive. They can only be repaired on board in exceptional cases. You must bring a replacement pair with you. Remember your sunglasses as well!

7.5.5 Table tennis

There is a table tennis table on board which can be set up in the scientific stowage areas 1 and 2 in good weather and when there is sufficient space available.

If you like to use your own bat, you will need to bring it with you!

7.5.6 Room doors

Room doors should remain open at sea if nobody is in the room. The stewards can then carry out cleaning without anyone having to be present or disturbed.

7.6 Waste disposal

7.6.1 Waste separation

Separate containers in the living and laboratory area are put in place for glass and metal waste and also for waste which can be incinerated.

The waste containers in the living rooms may only be used for waste which can be incinerated.

7.6.2 Packaging

When packing scientific equipment, you are asked to use materials which can easily be reduced to small pieces and burnt with low pollution.

7.6.3 Used batteries

Used batteries and old rechargeable batteries are collected on board and disposed of in accordance with the national regulations.

7.6.4 Residual waste

Combustible waste is disposed of by means of a shredder and a waste incinerator.

Rubbish which cannot be or may not be shredded and incinerated is collected and disposed of properly on shore.

7.6.5 Chemicals

Fig. 135 Chemical store

During the voyage, chemicals will be kept in the chemical store, which is on the working deck next to the stairs to the forecastle deck.

The store has an area of 2.44 m x 0.97 m and a height of 2.33 m.

It is equipped with two racks, each of which has five shelves (height per compartment 41 cm, depth 45 cm):

- Shelf 1 [W x H]: 1.75 m x 1.80 m,
- Shelf 2 [W x H]: 0.81 m x 1.80 m.

At the end of the trip, all chemicals must be removed from the ship and the chemical store handed over to the 1st officer broom-clean.

The disposal of solid and liquid chemicals must occur in a technically correct manner, with return transport where necessary.

With larger quantities the following must be taken into account:

- Collect chemicals separately in plastic containers while taking the IMDG regulations into account
- Mark containers clearly with contents while taking the IMDG regulations into account
- Return transport is performed by the user together with the scientific equipment

The following documents are required:

- Safety data sheet for each substance (reference via the manufacturer)
- Certification concerning hazardous goods (responsible declaration)
- Container packing certificate

Labelling with IMDG label:

- Container marking: 4 large labels
- Container marking: 2 small labels

List of illustrations: