

Seebeck® Mooring Equipment



TSU GmbH

Stahl-, Maschinen- und Anlagenbau

Seebeck® Mooring Equipment

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The Aim:

- To moore big ships of any type
- To handle mooring lines with a minimum of labour
- To enable quick and easy release of mooring lines in an emergency situation and under any load condition

More than 9,500 quick release mooring hooks are already delivered.

It has always been our aim to offer a design service for complete mooring systems.

Fundamental Advantages and Special Reasons to Use Seebeck® Mooring Equipment

- Low profile and compact design
- Manual release force at Safe Working Load (SWL) less than 150 N
- Hooks return automatically into working position when released under load
- In no-load condition the hooks are hanging free suspended
- Hooks can move independently into the horizontal and vertical plane
- Each hook can be released individually
- Hooks are to be released from a safe position
- Each hook is provided with an integrated locking device to prevent accidental release
- Each hook is load tested before delivery
- Only regular greasing is required
- Easy disassembly by removing the horizontal bolt
- Synthetic hook bumper to prevent sparking
- Hooks are capable to release the mooring rope under full load or with just the weight

Since 2000 the TSU GmbH continues the longstanding production of the Seebeck® Mooring Equipment. The Seebeck® Mooring Systems have proven their outstanding performance for decades in harbours all over the world. More than 10,000 mooring units have been produced since 1958.

TSU GmbH is a proof tested welding company according to the German Industrial Standard DIN 18800-7, Klasse E and DIN 15018 (Großer Eignungsnachweis) and is certified according to DIN EN ISO 9001:2008. Further examples of our quality seals are the Germanischer Lloyd Certificate about Approval For Welding and the GOST-R Certificate of Conformity.

You may find further information on our company and the complete catalogue of Seebeck® Mooring Equipment as PDF-format on our homepage

www.tsu-gmbh.de

Should you require any further information please do not hesitate to contact us.

Standard Design Loads

Seebeck® Quick Release Mooring Hooks

Safe Working Loads (SWL):

500 kN, 600 kN, 750 kN, 1,000 kN, 1,250 kN,
1,500 kN, 2,000 kN, 2,500kN

Increased capacities upon request

Release load = SWL

Test load 1.25 x SWL

Manual release force less than 150 N at SWL

Seebeck® Mooring Pulleys:

SWL: 750 kN, 1,000 kN, 2,000 kN

Seebeck® Electrical Mooring Capstans:

SWL: 10 kN, 15 kN, 20 kN, 25 kN, 30 kN

Hauling speed: 15, 20, 25 and 30 m/min

Standard Hook Assemblies

Delivery is complete with mounting base and all necessary anchoring components.

Templates for exact positioning of the anchor bolts are available.

Different design for:

- Concrete embedment
- Welded onto steel deck
- Bolted onto steel deck

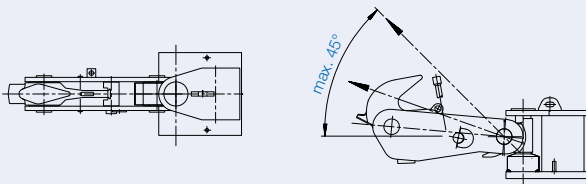
Various different arrangements are available upon special request.

Optional:

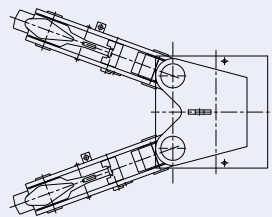
- Safety Locking Device
- Safety Latches
- Insulation
- Sliding Plates

Standard Arrangements

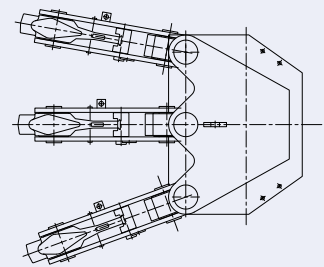
Single



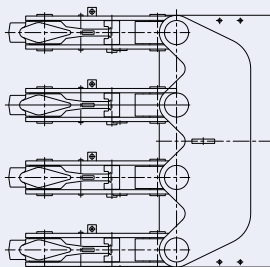
Double



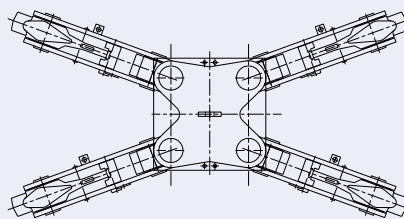
Triple



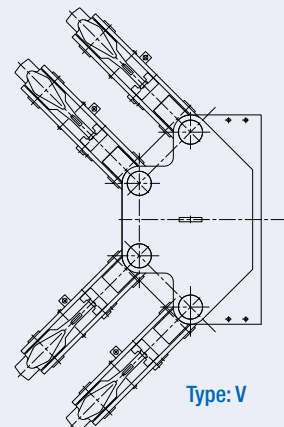
Quadruple



Type: Standard



Type: Back to Back



Type: V

Based on the shown assemblies various different arrangements are available. Please specify your special requirements and we shall provide a suitable solution.

Typical Hook Assembly with Integrated Vertical Capstan

Type: 125-00-2-AFM

Consisting of:

Hook Assembly Type: 125-00-2A (2x SWL 1.250 kN)

Capstan Type: AS

Dimensions depending on:

X1

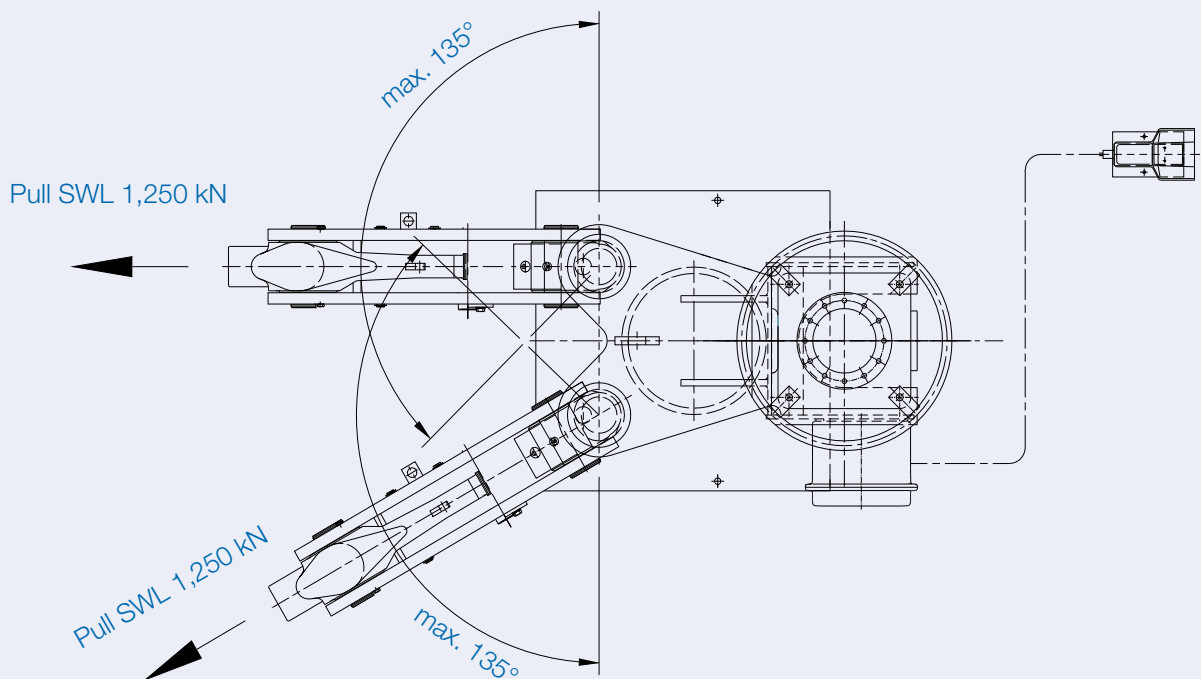
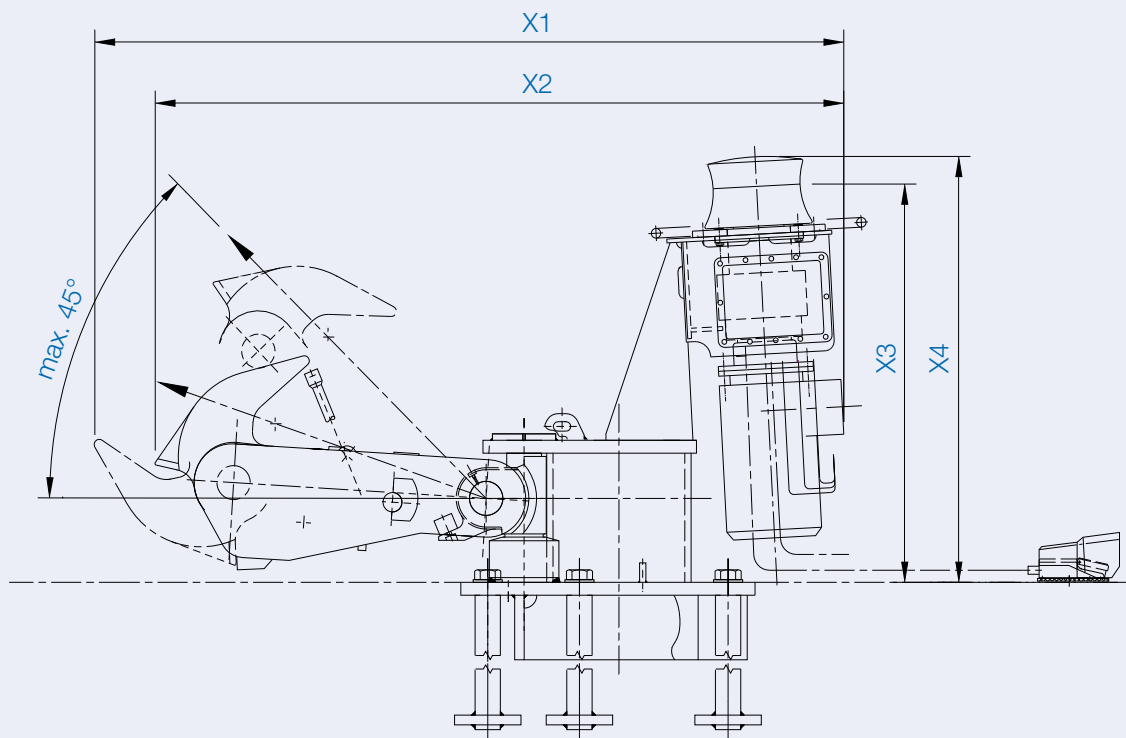
X2/X3

X4

Hook Type

Capstan Type

Mounting

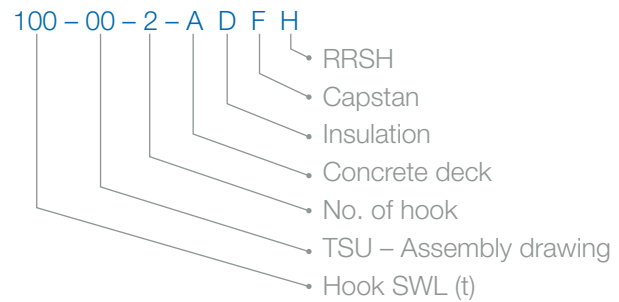


Type Identification for Hook Assemblies

- A: Concrete embedment
- B: Welded onto steel deck
- C: Bolted to steel deck
- D: With insulation
- E: Electrically remote controlled – RRS E
- F: Flanged electrical capstan (type: AS)
- G: Roller fairlead
- H: Hydraulically remote controlled – RRS H
- K: Safety latches
- M: Manually released
- N: Safety release device (for installation on mooring buoys)

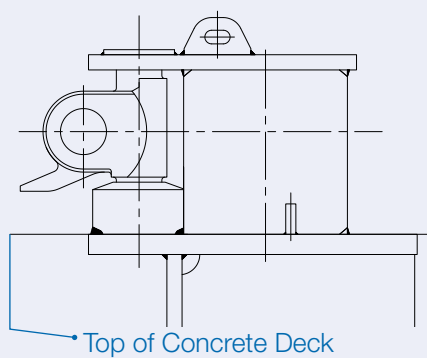
Example:

Double hook assembly, Concrete deck, Hooks SWL 1,000 kN, Hydraulic RRS H, Capstan, Insulation

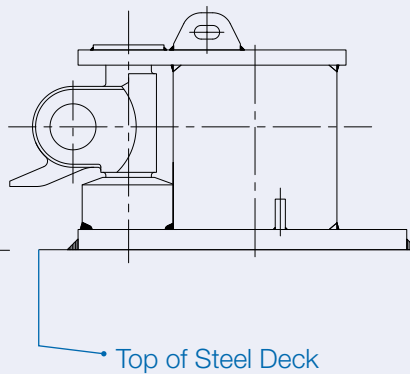


Mounting Bases

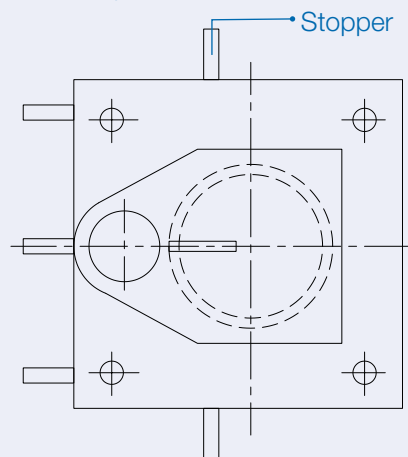
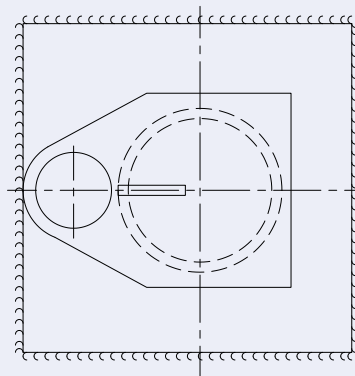
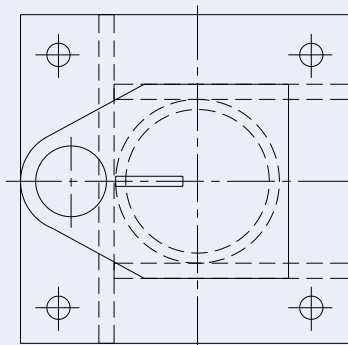
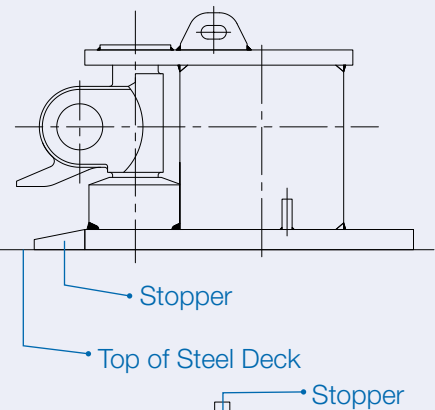
Type A: Concrete deck



Type B: Welded onto steel deck



Type C: Bolted onto steel deck



TYPE A: Welded stiffeners underneath to transmit the horizontal shear forces into the concrete structure.

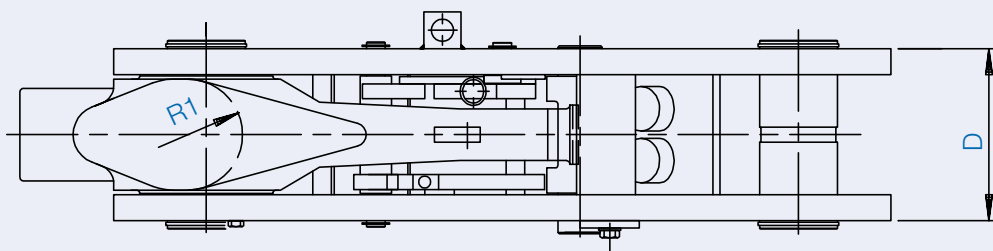
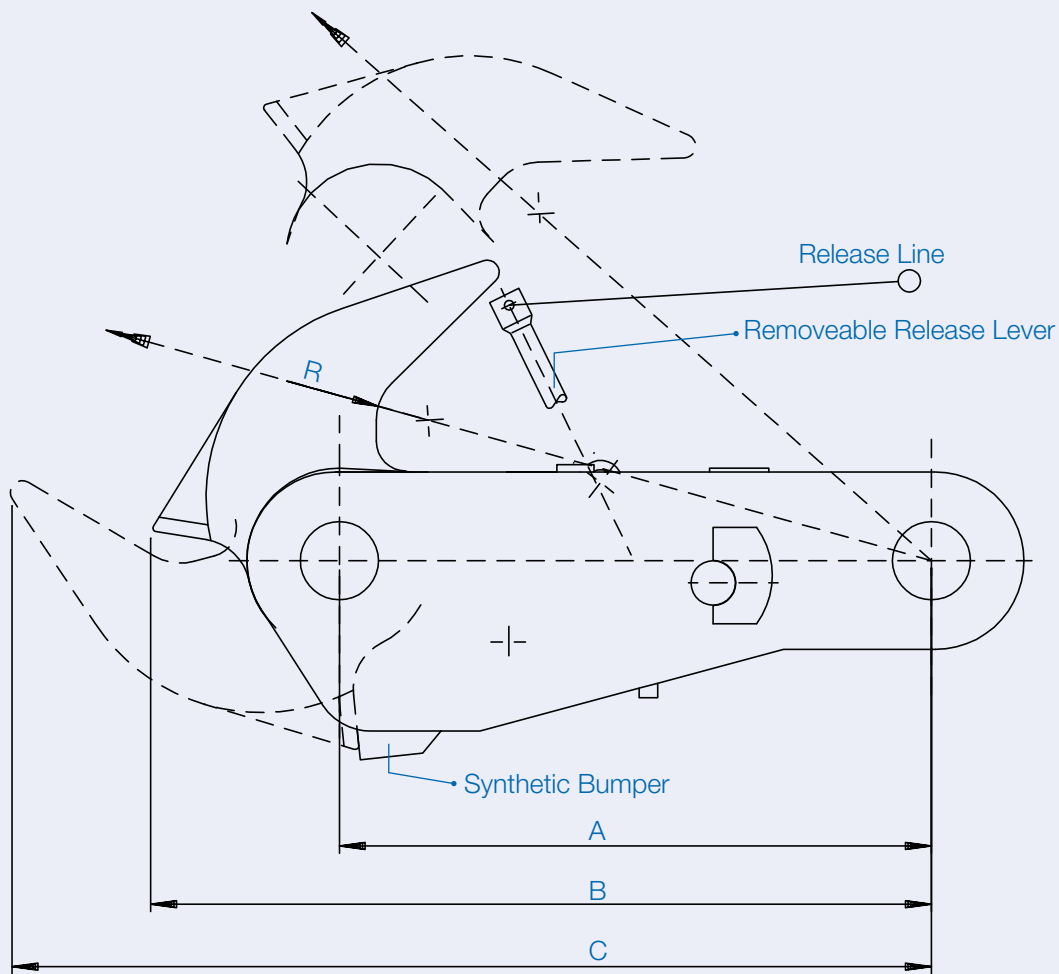
TYPE B: Welded onto steel deck, deck structure must be stiffened underneath.

TYPE C: Welded steel stopper (frame in case of insulation) around the base plate to transmit horizontal shear forces. Anchor bolts must be welded into the existing steel structure with all necessary stiffeners.

Insulation

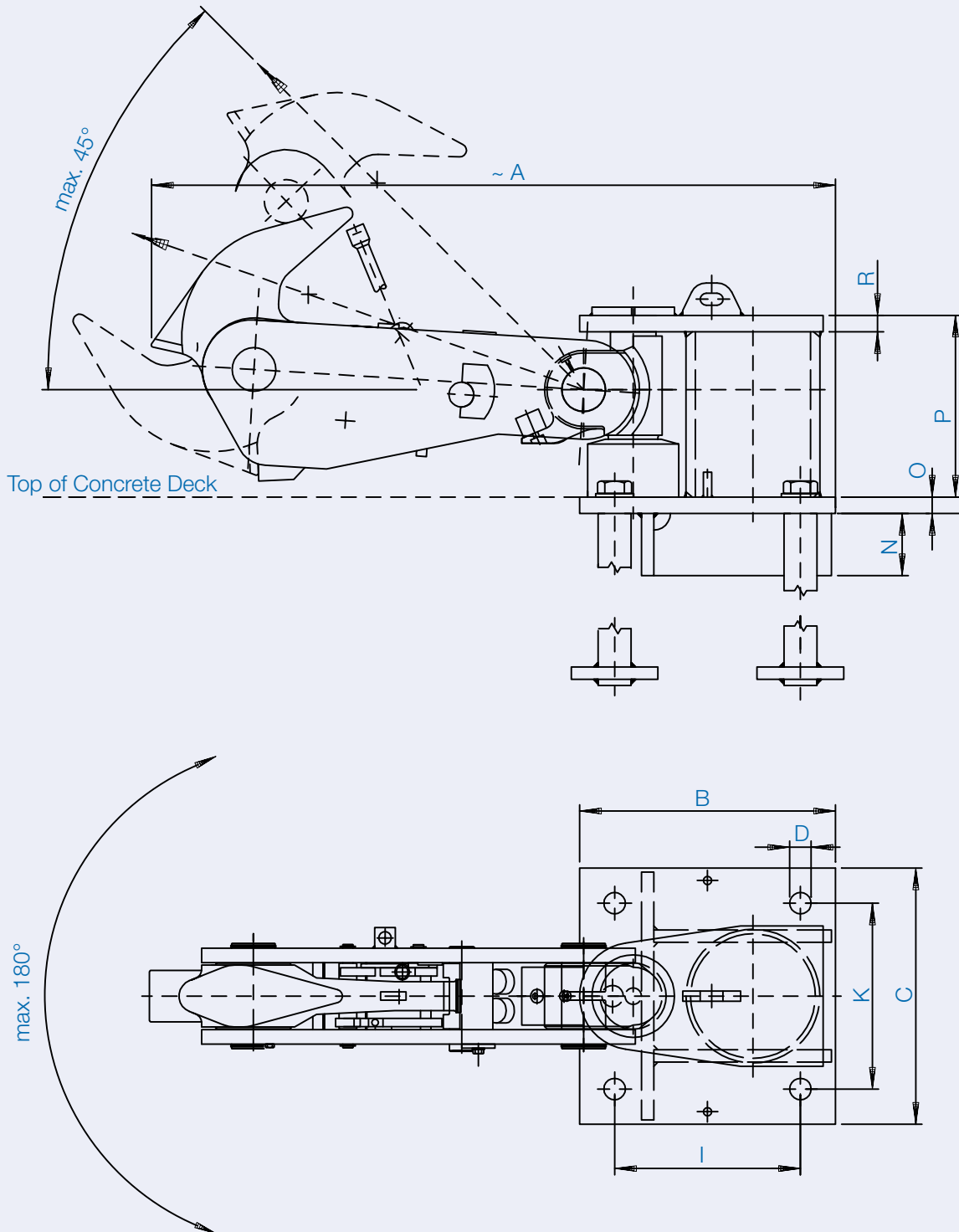
If the jetty is cathodically protected with an impressed current system, the hook assemblies can be supplied with an insulating set to prevent electrical contact between hook assembly and jetty structure and between capstan and capstan foundation.

Hook Types



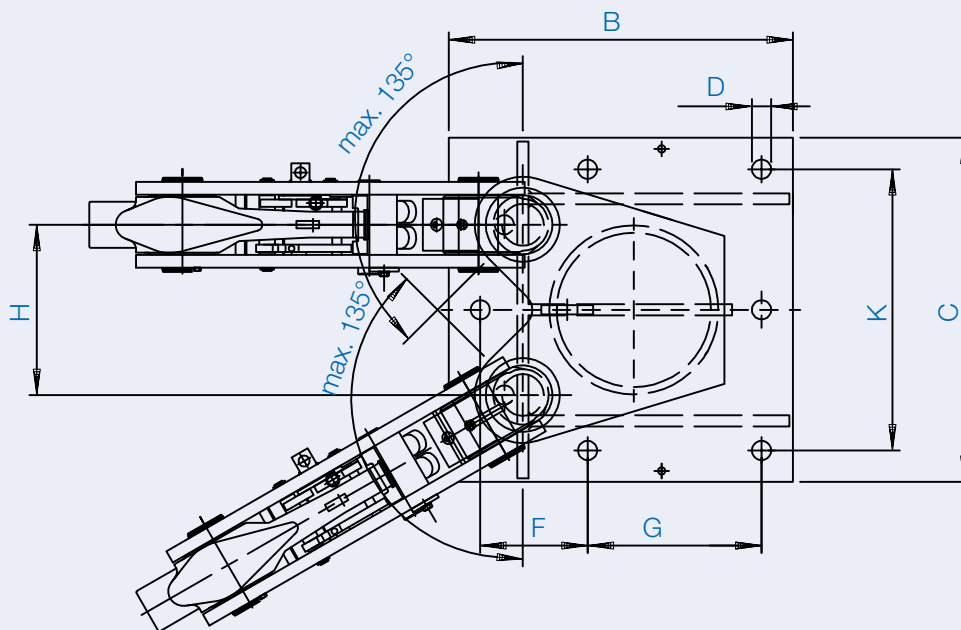
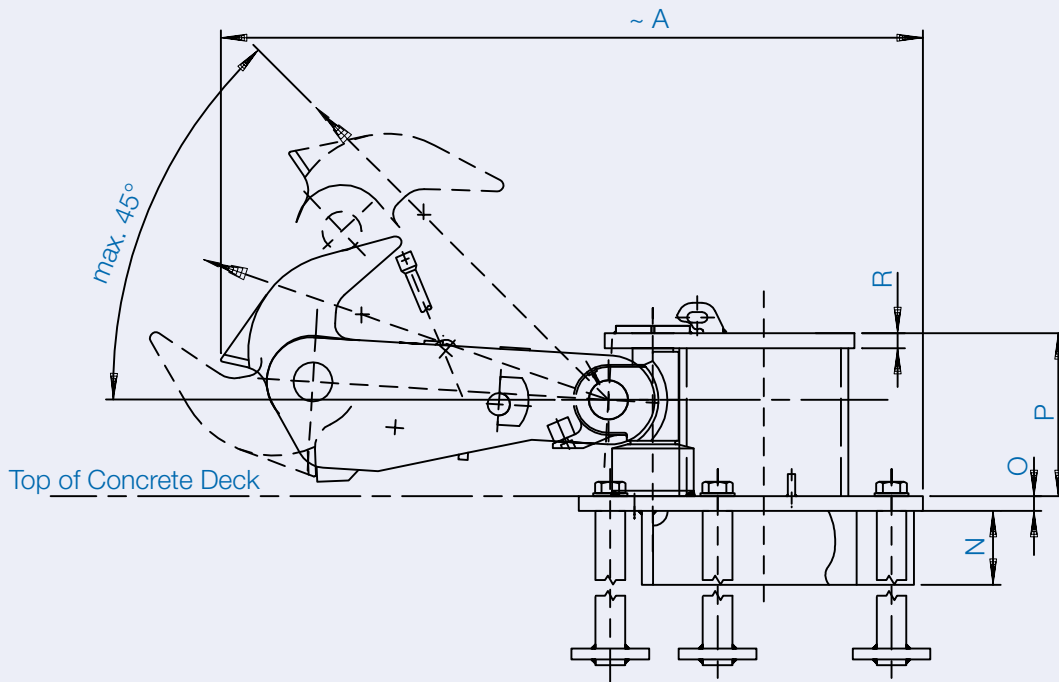
SWL kN:	Hook Type:	Main Dimensions:
500	050-01-00-M	A Distance Between the Main Bolts
600	060-01-00-M	B Length of the Locked Hook
750	075-01-00-M	C Length of the Released Hook
1,000	100-01-00-M	D Minimum Width of Hook
1,250	125-01-00-M	R Radius of Curvature of Hook Member
1,500	150-01-00-M	R1 Radius of Hook Member
2,000	200-01-00-M	
2,500	250-01-00-M	

Single Hook Assemblies



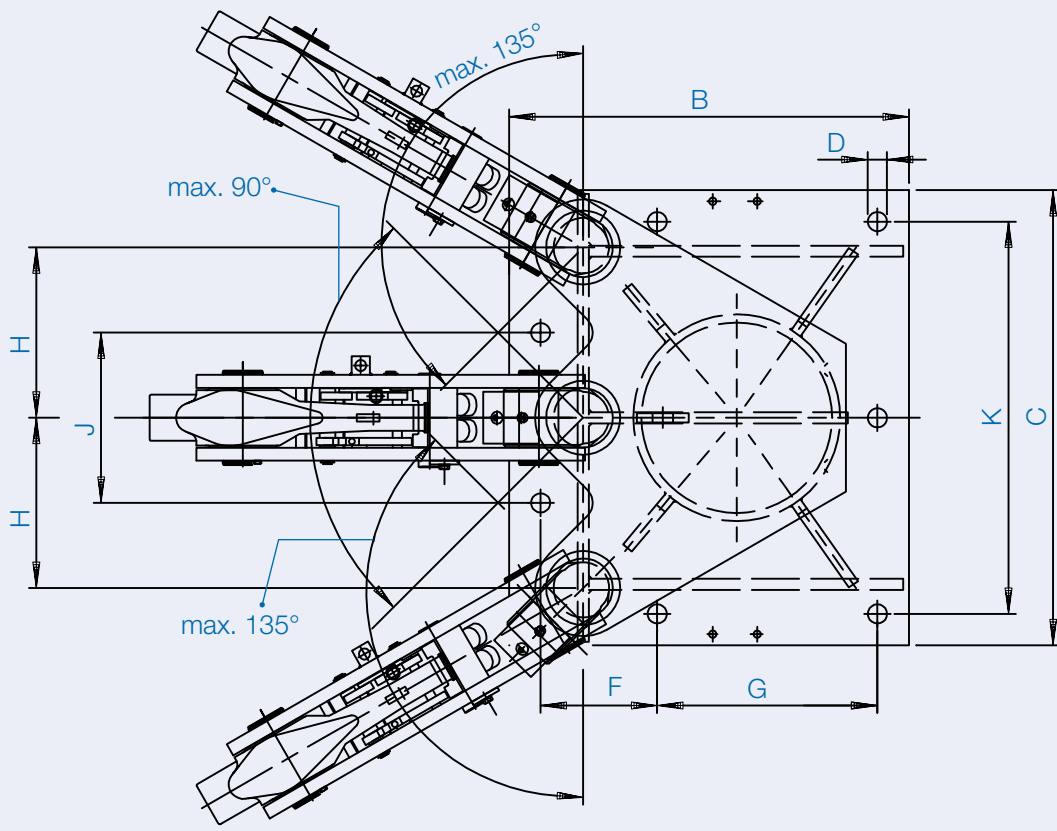
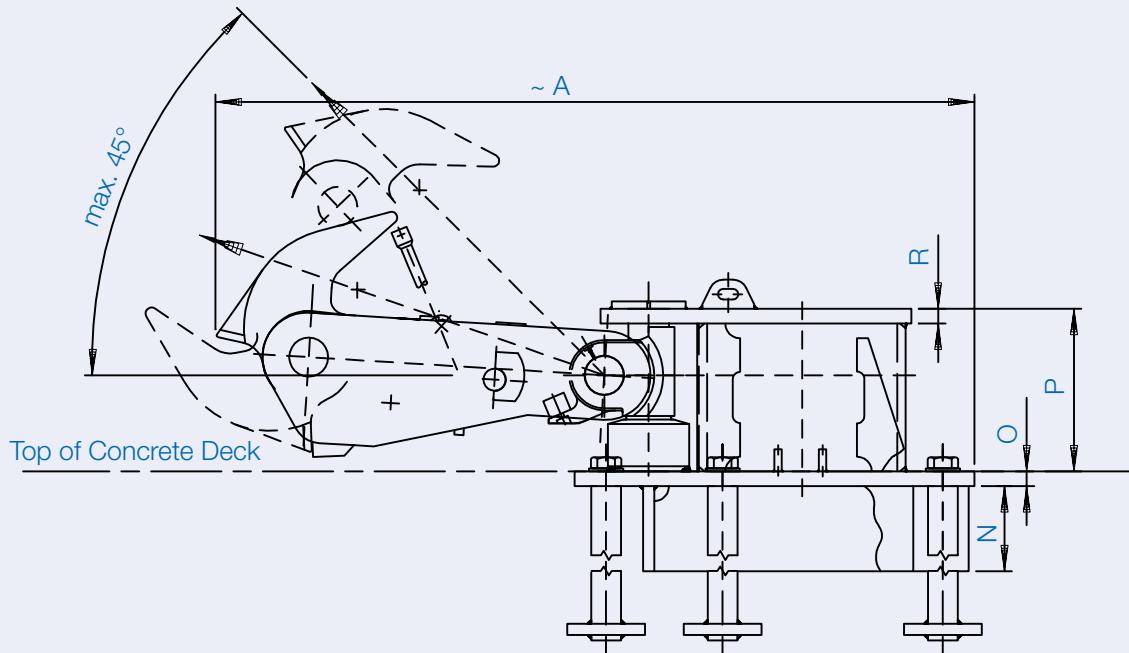
Cap. kN:	Assembly Type:	Main Dimensions:	
500	050-00-1-A	A Length of the Locked Hook Assembly	P Height of Mounting Base
600	060-00-1-A	B Length of Mounting Base	R Cover Plate Thickness
750	075-00-1-A	C Width of Mounting Base	
1,000	100-00-1-A	D Bore Diameter	
1,250	125-00-1-A	I Hole Separation	
1,500	150-00-1-A	K Hole Separation	
2,000	200-00-1-A	N Depth of Thrust Plate	
2,500	250-00-1-A	O Base Plate Thickness	

Double Hook Assemblies



Cap. kN:	Assembly Type:	Main Dimensions:	
1,000	050-00-2-A	A	Length of the Locked Hook Assembly
1,200	060-00-2-A	B	Length of Mounting Base
1,500	075-00-2-A	C	Width of Mounting Base
2,000	100-00-2-A	D	Bore Diameter
2,500	125-00-2-A	F	Hole Separation
3,000	150-00-2-A	G	Hole Separation
4,000	200-00-2-A	H	Distance Between the Hooks
5,000	250-00-2-A	K	Hole Separation
		N	Depth of Thrust Plate
		O	Base Plate Thickness
		P	Height of Mounting Base
		R	Cover Plate Thickness

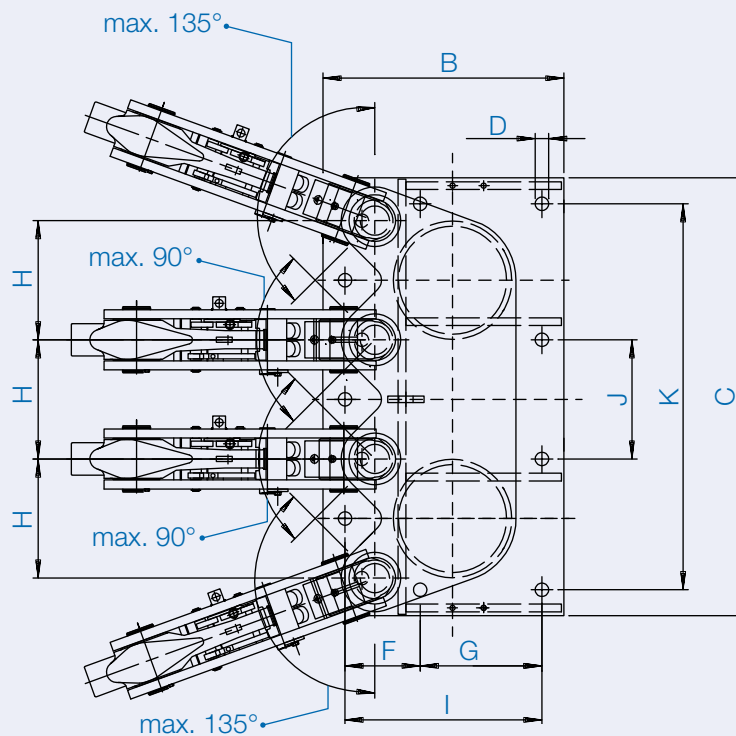
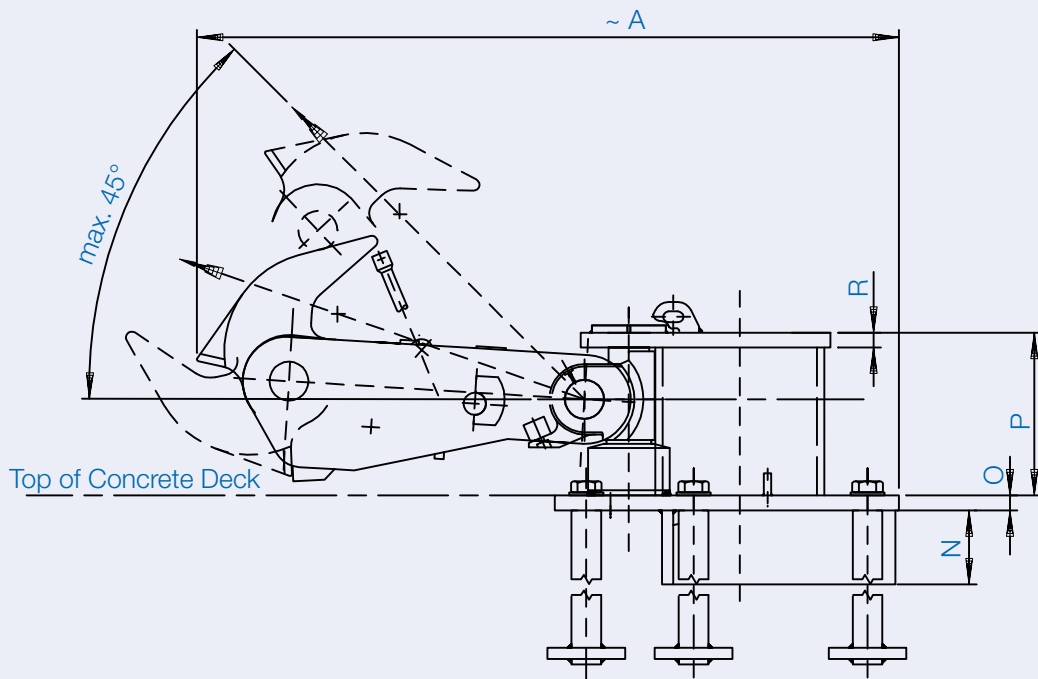
Triple Hook Assemblies



Cap. kN	Assembly Type	Main Dimensions:	
1,500	050-00-3-A	A	Length of the Locked Hook Assembly
1,800	060-00-3-A	B	Length of Mounting Base
2,250	075-00-3-A	C	Width of Mounting Base
3,000	100-00-3-A	D	Bore Diameter
3,750	125-00-3-A	F	Hole Separation
4,500	150-00-3-A	G	Hole Separation
6,000	200-00-3-A	H	Distance Between the Hooks
7,500	250-00-3-A	J	Hole Separation
		K	Hole Separation
		N	Depth of Thrust Plate
		O	Base Plate Thickness
		P	Height of Mounting Base
		R	Cover Plate Thickness

Quadruple Hook Assemblies

Type: Standard



Cap. kN: Assembly Type:

2,000	050-00-4-A
2,400	060-00-4-A
3,000	075-00-4-A
4,000	100-00-4-A
5,000	125-00-4-A
6,000	150-00-4-A
8,000	200-00-4-A
10,000	250-00-4-A

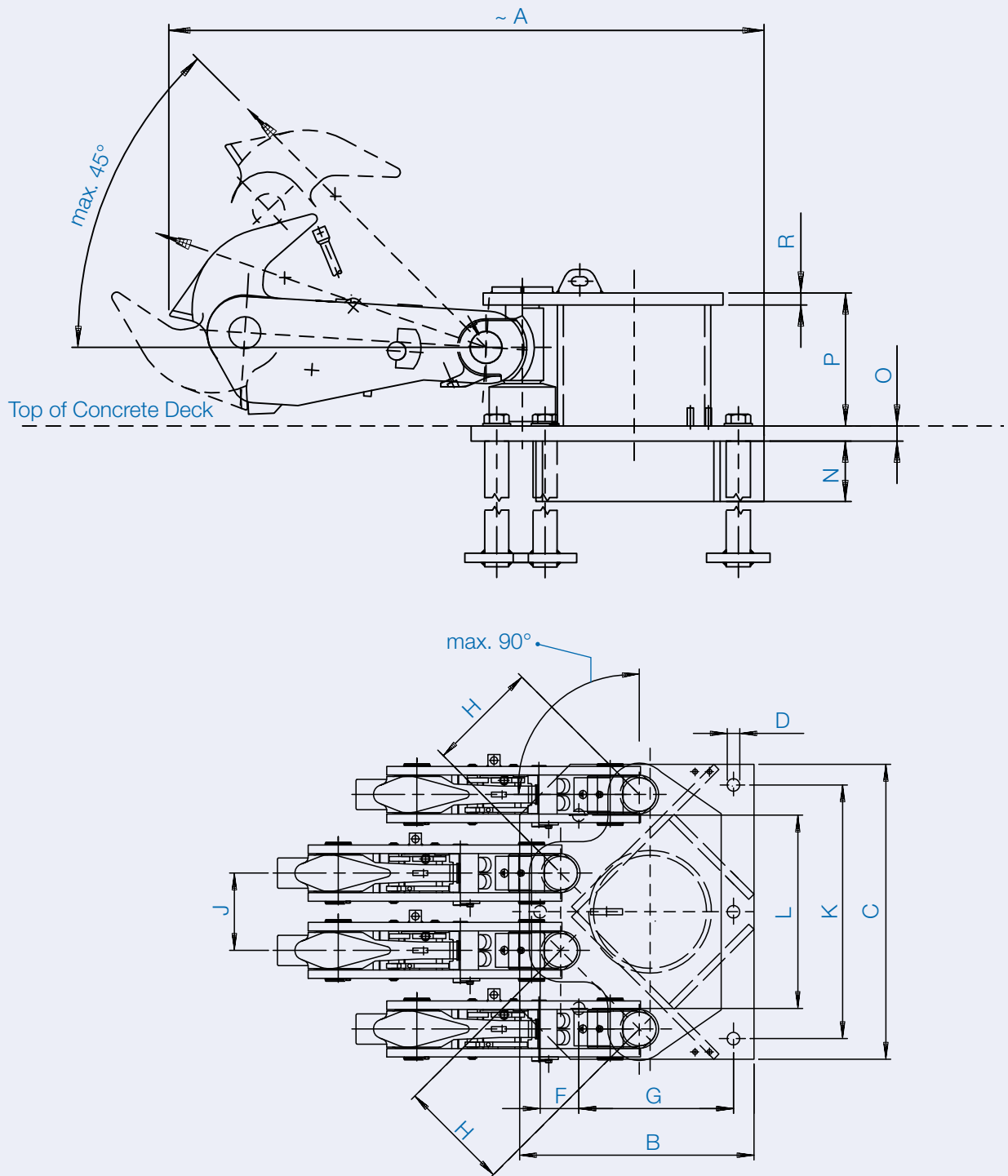
Main Dimensions:

A	Length of the Locked Hook Assembly
B	Length of Mounting Base
C	Width of Mounting Base
D	Bore Diameter
F	Hole Separation
G	Hole Separation
H	Distance Between the Hooks
I	Hole Separation

J	Hole Separation
K	Hole Separation
N	Depth of Thrust Plate
O	Base Plate Thickness
P	Height of Mounting Base
R	Cover Plate Thickness

Quadruple Hook Assemblies

Type: V



Cap. kN: Assembly Type:

2,000	050-00-4-VA
2,400	060-00-4-VA
3,000	075-00-4-VA
4,000	100-00-4-VA
5,000	125-00-4-VA
6,000	150-00-4-VA
8,000	200-00-4-VA
10,000	250-00-4-VA

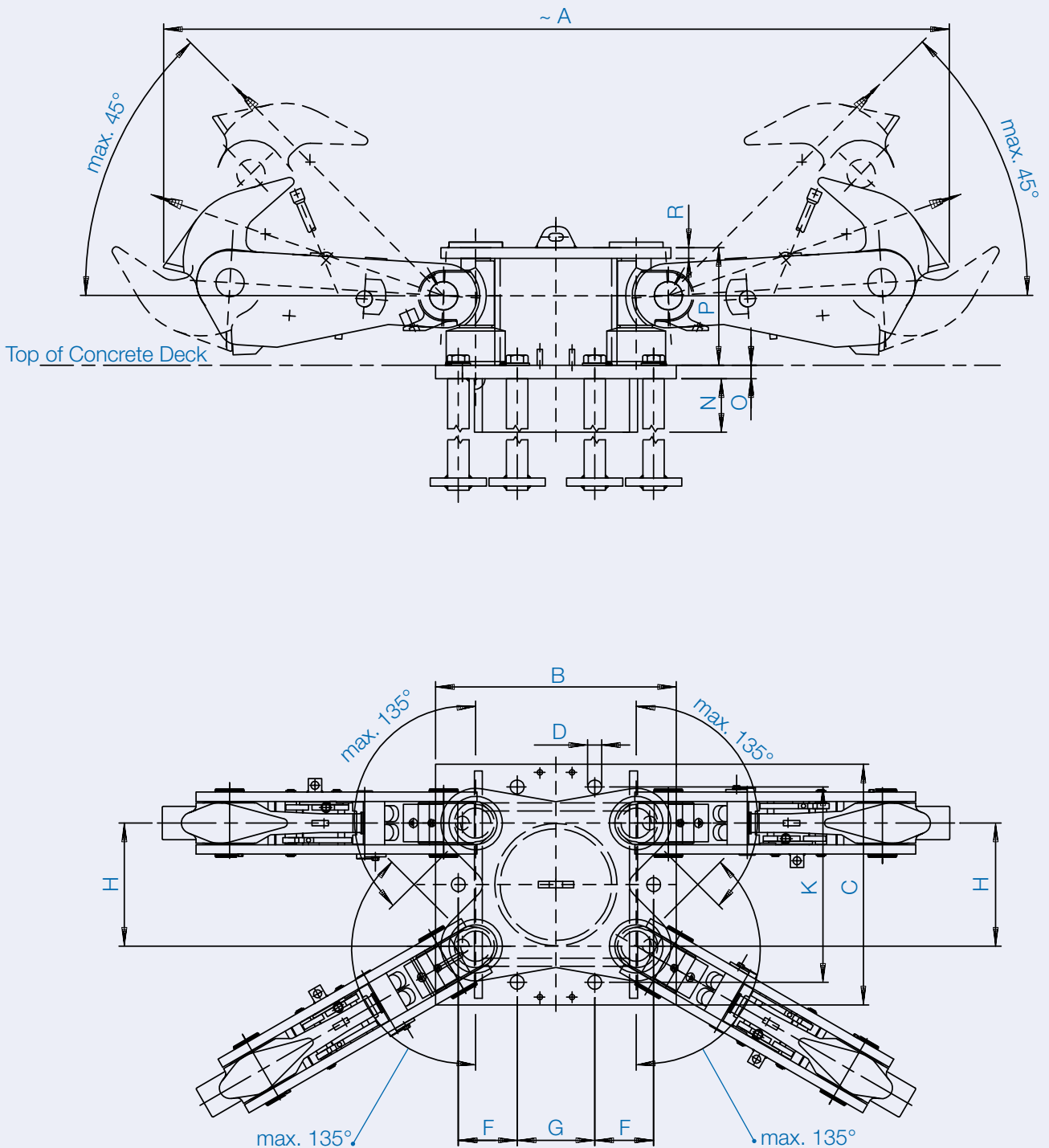
Main Dimensions:

A	Length of the Locked Hook Assembly
B	Length of Mounting Base
C	Width of Mounting Base
D	Bore Diameter
F	Hole Separation
G	Hole Separation
H	Distance Between the Hooks
J	Distance Between the Hooks

K	Hole Separation
L	Hole Separation
N	Depth of Thrust Plate
O	Base Plate Thickness
P	Height of Mounting Base
R	Cover Plate Thickness

Quadruple Hook Assemblies

Type: Back to Back



Cap. kN: Assembly Type:

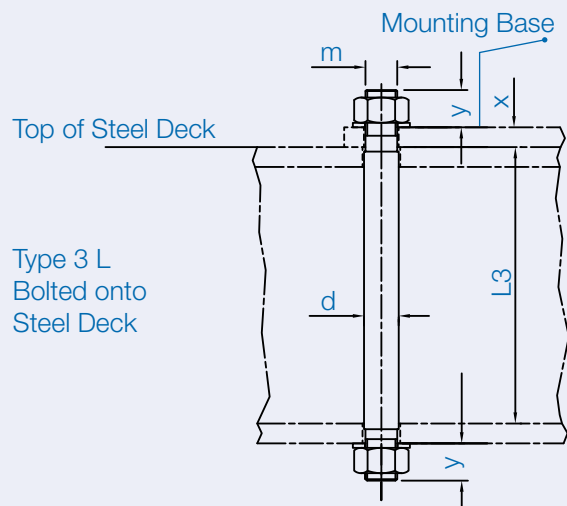
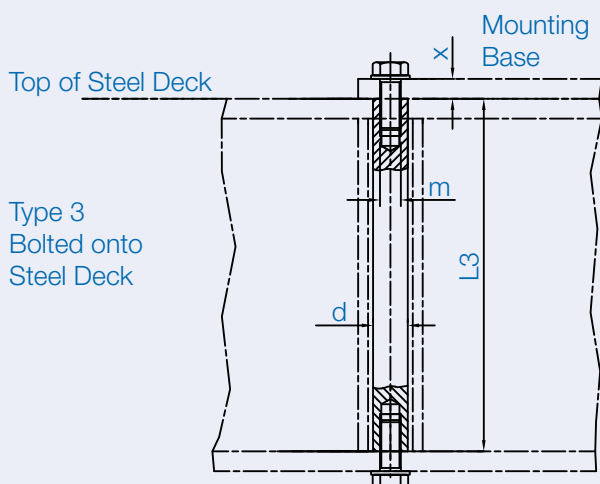
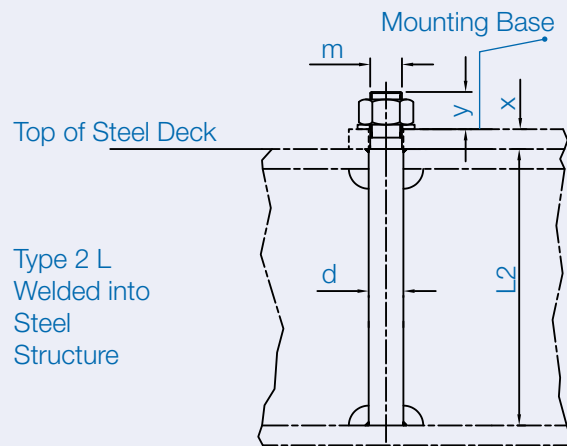
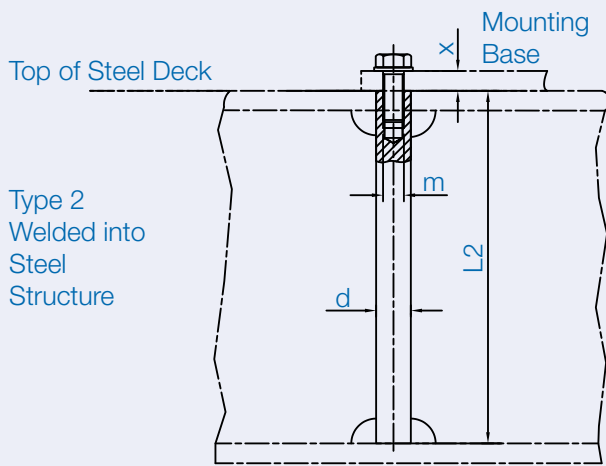
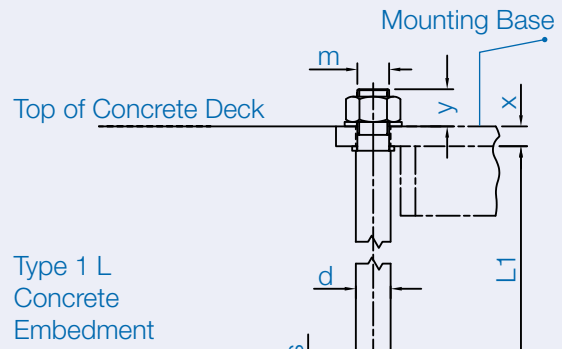
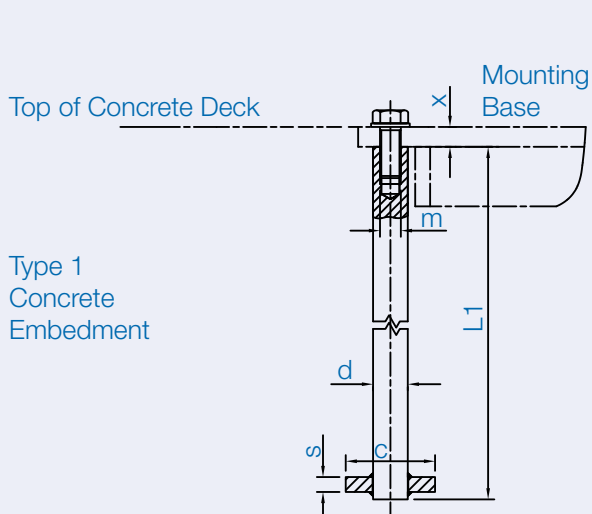
2 X 1,000	050-00-2-2A
2 X 1,200	060-00-2-2A
2 X 1,500	075-00-2-2A
2 X 2,000	100-00-2-2A
2 X 2,500	125-00-2-2A
2 X 3,000	150-00-2-2A
2 X 4,000	200-00-2-2A
2 X 5,000	250-00-2-2A

Main Dimensions:

A	Length of the Locked Hook Assembly
B	Length of Mounting Base
C	Width of Mounting Base
D	Bore Diameter
F	Hole Separation
G	Hole Separation
H	Distance Between the Hooks
K	Hole Separation

N	Depth of Thrust Plate
O	Base Plate Thickness
P	Height of Mounting Base
R	Cover Plate Thickness

Anchor Bolts



Main Dimensions:

- c Anchor Plate Diameter
- d Anchor Bolt Diameter
- m Thread Diameter
- x Base Plate Thickness
- y Protruding Length of Anchor Bolt
- L1 Length of Anchor Bolt
- L2 Length of Anchor Bolt
- L3 Length of Anchor Bolt

Bolt Material: S355J2 DIN EN 10025-2

Electrical Mooring Capstans

In order to save time and to ensure maximum safety the very heavy mooring ropes of berthing ships are lifted up to the mooring hooks or mooring positions by using Seebeck® Electrical Mooring Capstans.

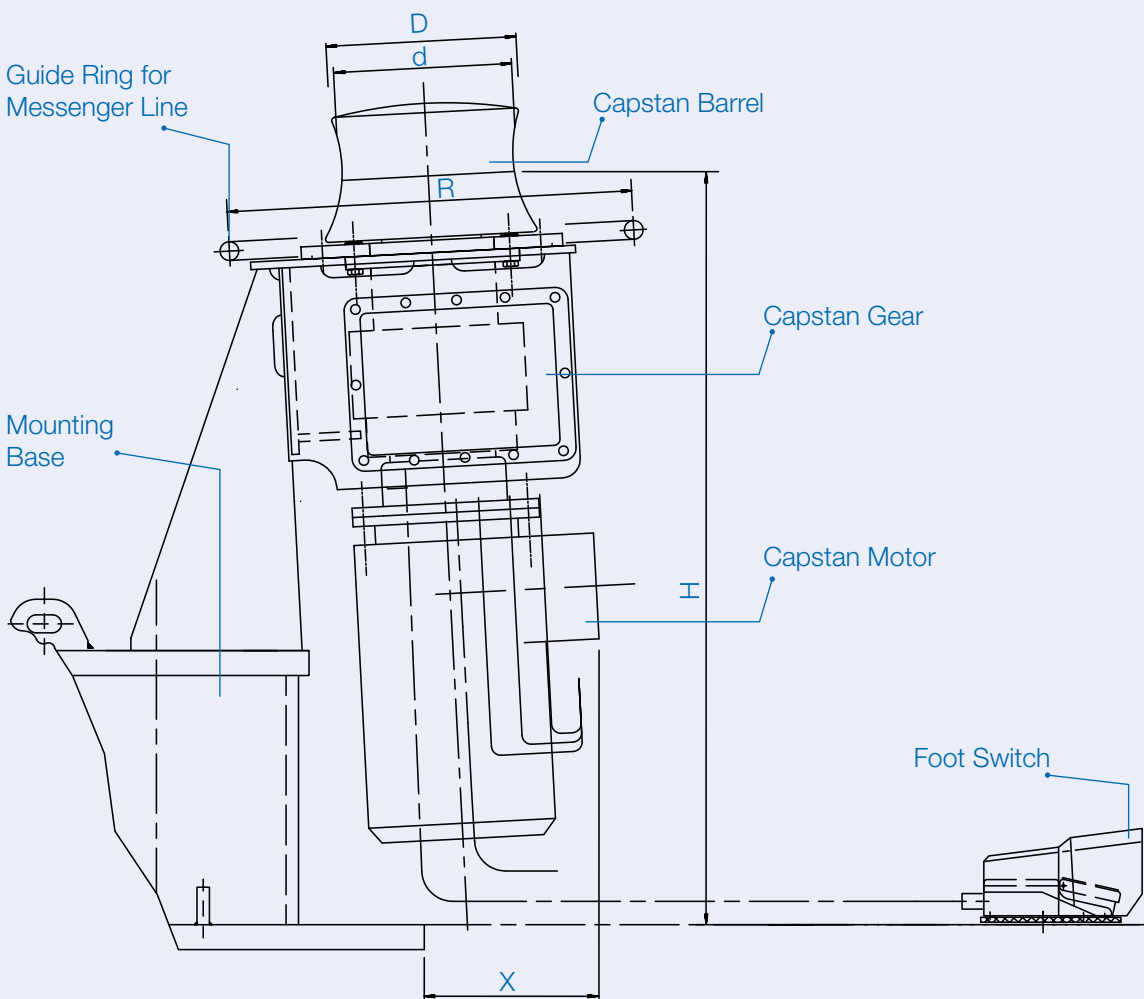
Integral units (AS) or freestanding units (FS)

In combination with Seebeck® Quick Release Hook Assemblies we recommend the use of integral capstan units (type AS) which are attached by

means of a welded support to the top face of the hook assembly mounting base.

Wherever there are existing jetties without Seebeck® hook assemblies and such jetties are only equipped with conventional bollards then freestanding capstan units (type FS) can be installed at any time by simply drilling the necessary holes into the deck structure and fixing the capstan with special dowels and screws.

Integrated Vertical Capstan (AS)



Capstan Type:

AS 1/20/4
 AS 1/25/5.5
 AS 1/30/5.5
 AS 1.5/20/5.5
 AS 1.5/25/7.5
 AS 2/20/7.5
 AS 3/30/11

Sample for Capstan Type:

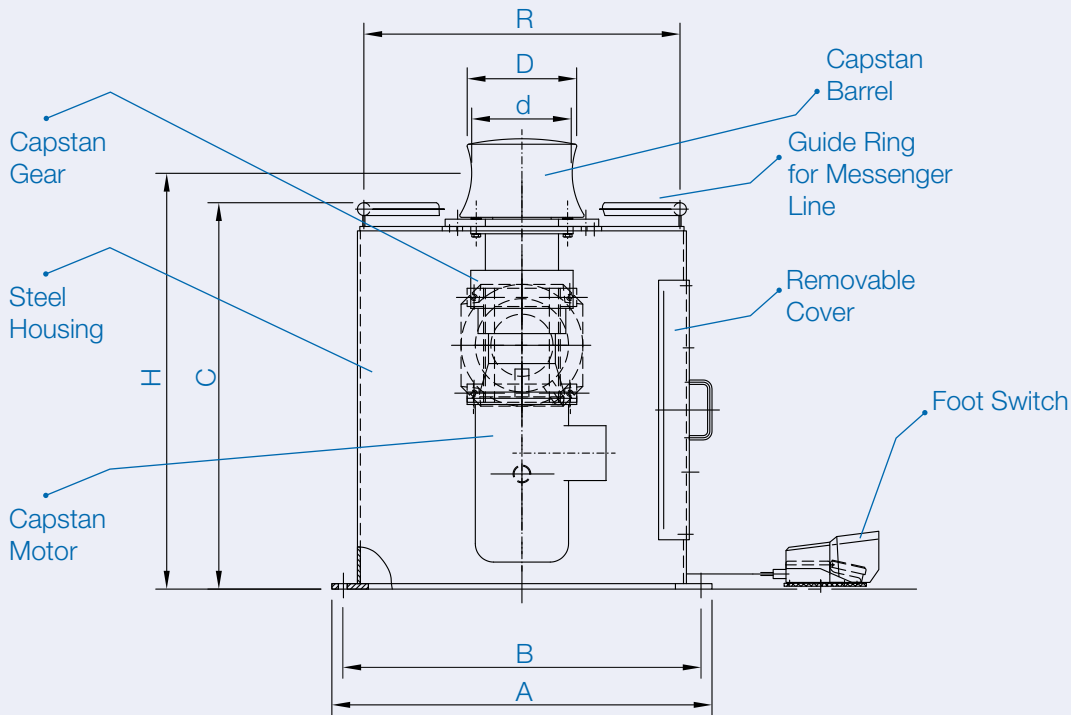
AS Integrated Type
 1 Nominal Pull 1 t (10 kN)
 30 Hauling Speed 30 m/min
 5.5 Motor Power Rate 5.5 kW

Main Dimensions:

d Inner Diameter of Capstan Barrel
 D External Diameter of Capstan Barrel
 H Height of Rope Guide
 R Guide Ring Diameter
 X Overhang to Base Plate

OTHER CAPACITIES UPON REQUEST.

Freestanding Vertical Capstan (FS)



Capstan Type:

FS 1/20/4
 FS 1/25/5.5
 FS 1/30/5.5
 FS 1.5/20/5.5
 FS 1.5/25/7.5
 FS 2/20/7.5
 FS 3/30/11

Sample for Capstan Type:

FS Freestanding Type
 1 Nominal Pull 1 t (10 kN)
 30 Hauling Speed 30 m/min
 5.5 Motor Power Rate 5.5 kW

Main Dimensions:

A Base Plate Diameter
 B Pitch Circle Diameter
 C Height of Guide Ring
 d Inner Diameter of Capstan Barrel
 D External Diameter of Capstan Barrel
 H Height of Rope Guide
 R Guide Ring Diameter

OTHER CAPACITIES UPON REQUEST.

Capacity

Nominal pull: 10 - 15 - 20 - 25 - 30 kN
 Hauling-speed: 15 - 20 - 25 - 30 m/min.
 Starting pull: acc. to motor torque characteristic curve approximately twice the nominal pull.
 OTHER CAPACITIES UPON REQUEST.

Capstan gears:

Planetary cell type, maintenance-free for lifetime

Electrical motors

Standards: DIN, EN, ISO

- 220 to 660 V, 3 phases
- 50/60 HZ
- IP 56
- Single speed or double speed
- One rotating direction or reversible
- Overload relay or thermistor protection
- Space heater
- Explosion proof

For operators safety, we recommend to use a capstan with integrated backstop or integrated brake motor.

Both devices are able to hold an attached load safely when the motor is stopped.

1. Backstop (Non-Return Blocking Device)

- One rotating direction standard: capstan barrel clockwise rotation
- Anti-clockwise rotation blocked by backstop
- More safety and better handling for the operator

2. Brake Motor

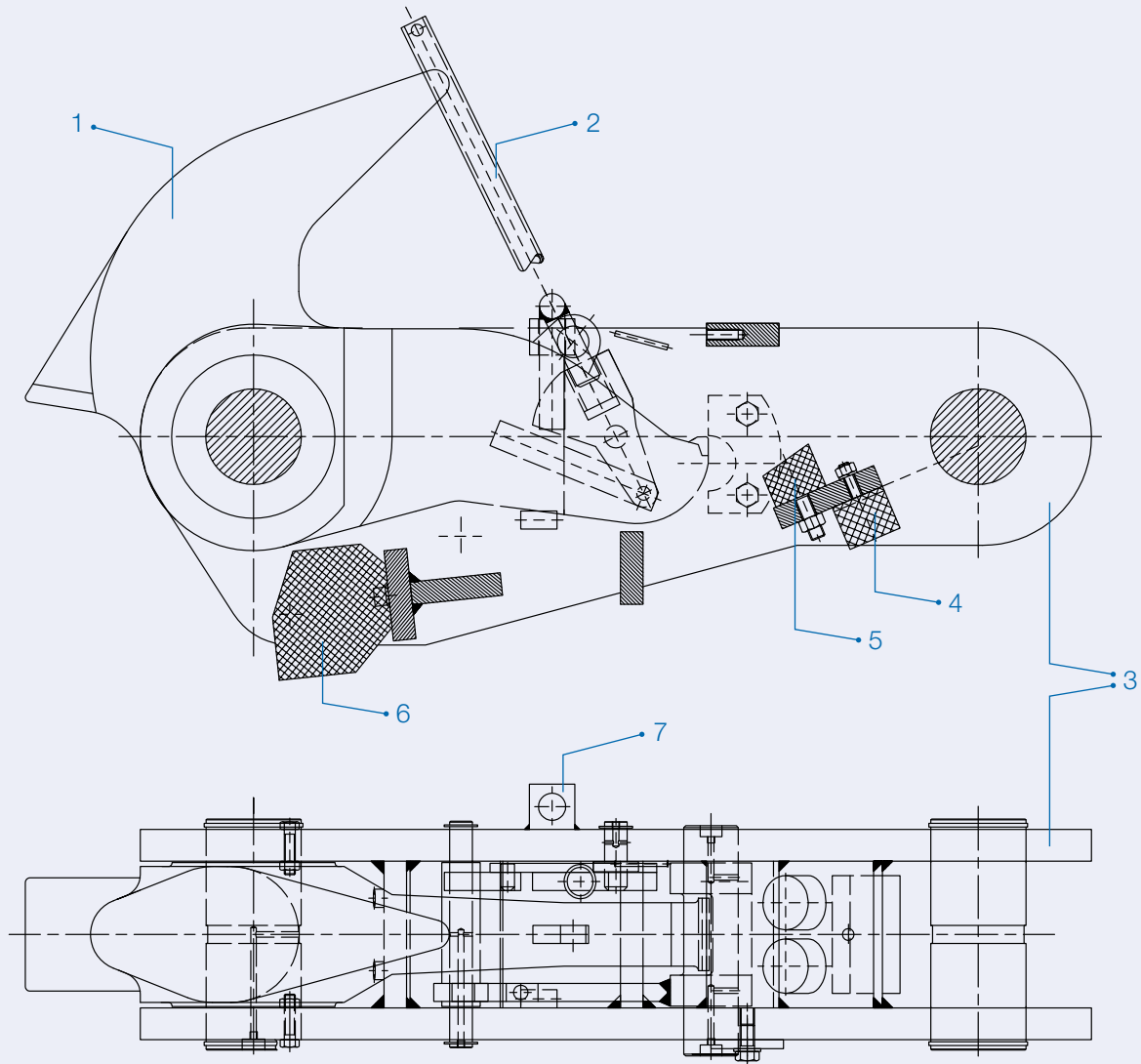
- Two rotating directions
- Double foot switch, one for each direction or one reversing switch, 1 - 0 - 1
- Both directions blocked; when the motor is stopped
- Motor thermistor protected

Manual Quick Release Mooring Hook (M)

Hooks are freely suspended under no load condition.

When the vertical pull direction drops below 15°, the support bumper will be depressed and the forward synthetic hook bumper will rest on the deck.

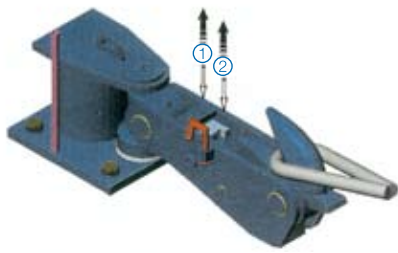
This way the insulation from hook to deck is maintained.



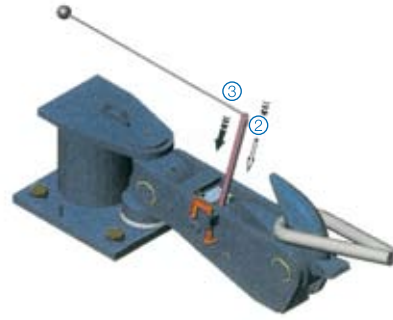
Main Parts:

- 1 Hook Member
- 2 Release Lever
- 3 Side Plate
- 4 Support Bumper
- 5 Bridge Bumper
- 6 Hook Bumper
- 7 Looking Device

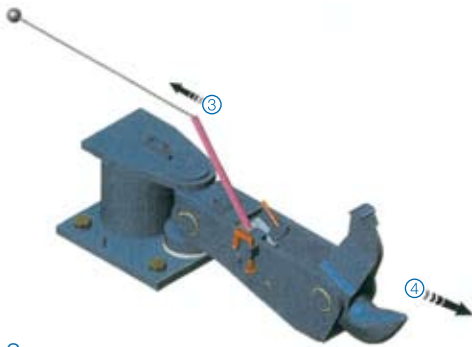
Operating Instructions for Manual Release



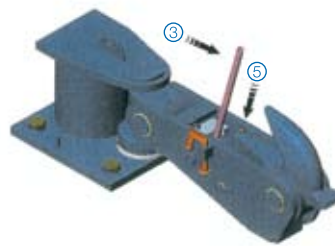
1
Lift locking device ① from locating hole ② and turn clear.



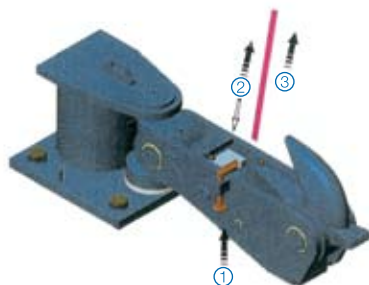
2
Insert release lever ③ into locating hole ② as shown.



3
Pull release lever rope ③ and hook will trip casting off hawser ④.



4
After hook has returned to horizontal (working) position, press down indicator ⑤ flush with side plate and push lever forward ③.



5
Remove release lever ③. Replace locking device ① into locating hole ②. The hook is now ready for use.

Remote Release System (RRS)

In addition to manual release, each Seebeck® Mooring Hook can be equipped with a remote release device.

There are two systems available:

- Electrical Remote Release System (RRS E)
- Hydraulic Remote Release System (RRS H)

The RRS enables the operator to release the hooks in any of the following ways:

From the central control panel:

- Each hook individually
- All hooks simultaneously in case of emergency

Locally:

- Each hook individually by means of assembly integrated push buttons
- In case of power failure, each hook can be released manually

Options:

- Hook status lamps on the control panel
- Push buttons for release in groups
- Explosion proof execution of the complete system
- Additional disconnection of the loading arms when the hooks are emergency released

Electrical Remote Release System (RRS E)

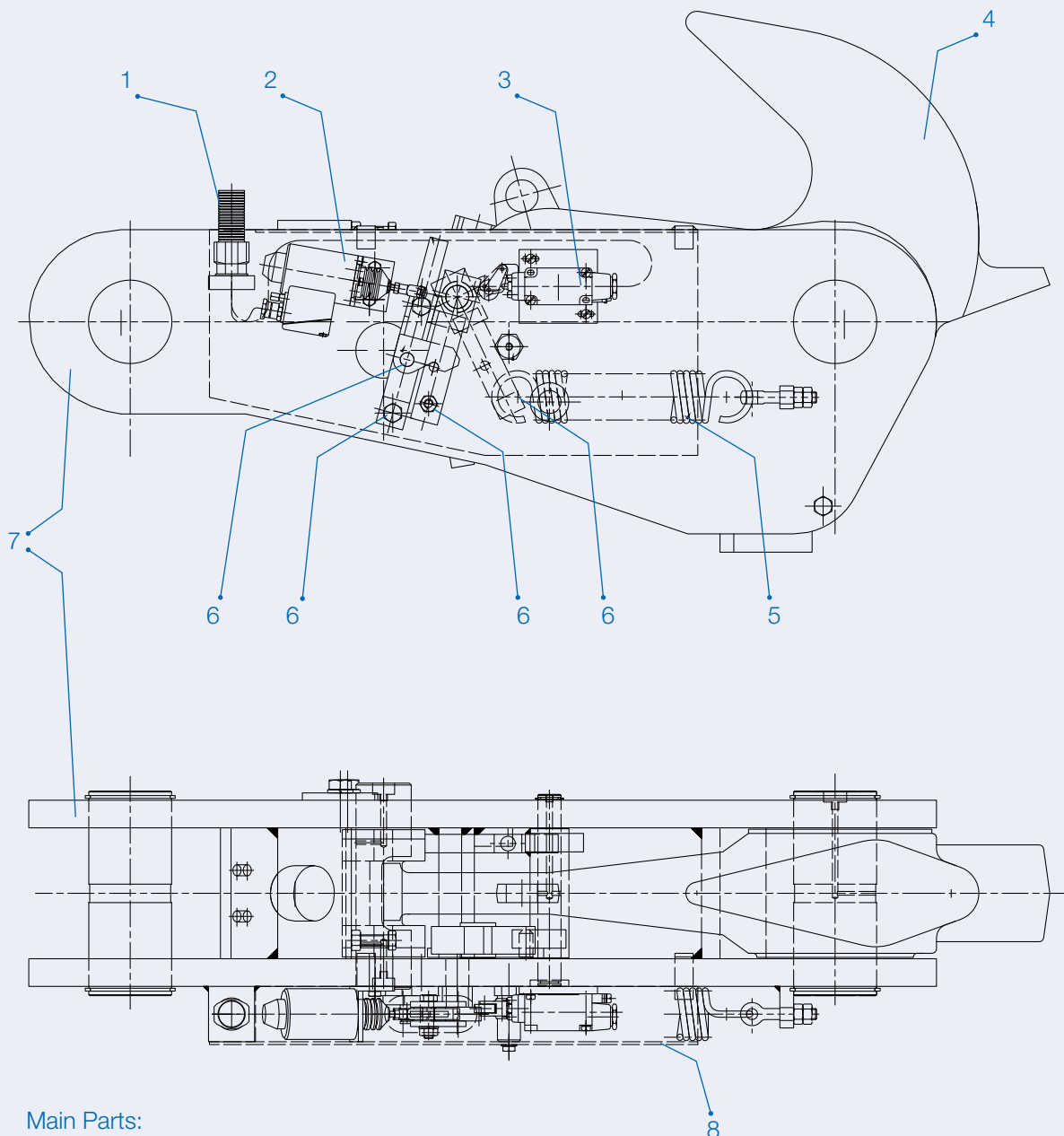
Consisting of:

- Remote release device, attached to the side of each hook
- One central control panel for RRS
- Local release push buttons
- Control cables between control and each hook assembly

Advantages:

- Easy to install – only power and control cables must be laid
- The release device is protected by a removable cover plate
- By using an UPS (Uninterruptible Power Supply) the hooks can be remote released also in case of power failure

Electrical Remote Release Unit



Main Parts:

- | | |
|---------------------------------|--------------------|
| 1 Cable Protection (Flexible) | 5 Release Spring |
| 2 Release Solenoid EExs | 6 Mechanical Parts |
| 3 Hook Status Indicating Switch | 7 Side Plate |
| 4 Hook Member | 8 Cover Plate |

Hydraulic Remote Release System (RRS H)

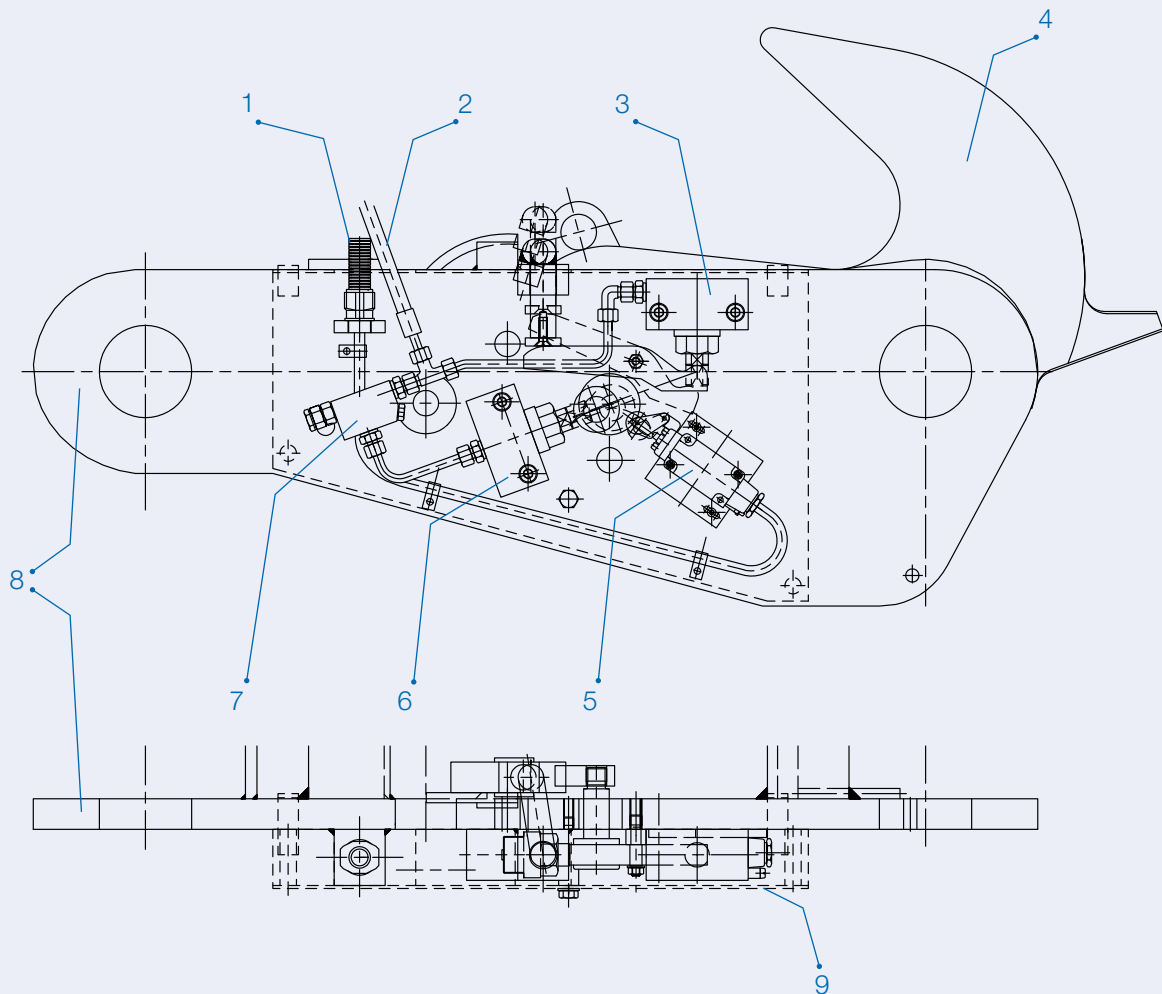
Consisting of:

- Remote release device, attached to side plate of each hook
- Hydraulic power packs, each serving 2–5 hooks, including local release push buttons
- One central control panel for RRS H
- Hydraulic high pressure hoses between hydraulic power pack (HPP) and each individual hook
- Control and power cables

Advantages:

- Short hydraulic connections
- The release device is protected by a removable cover plate
- By using an UPS (Uninterruptible Power Supply) the hooks can be remote released also in case of power failure

Hydraulic Remote Release Unit



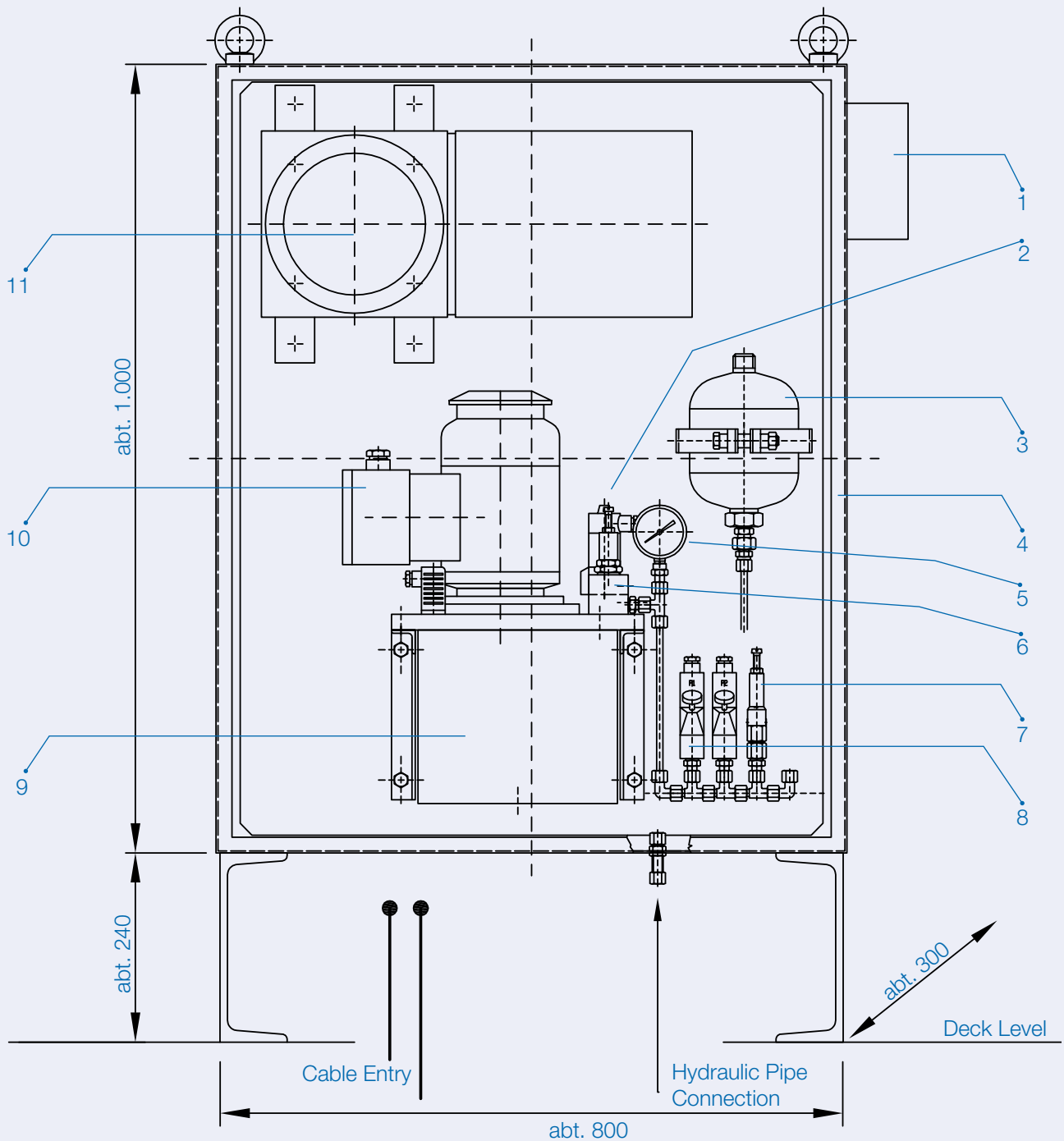
Main Parts:

- 1 Protection Hose for Cable
- 2 Hydraulic High Pressure Hose
- 3 Hydraulic Piston to Unlock Release Mechanism
- 4 Hook Member
- 5 Limit Switch (Hook status indicating switch)
- 6 Hydraulic Release Piston
- 7 Pressure Relief Valve
- 8 Side Plate
- 9 Cover Plate

Hydraulic Power Pack (HPP)

Explosion Proof Type: HPP 3

- 1 Local Release Push Button
- 2 Pressure Accumulator
- 3 Solenoid Valve Block
- 4 Stainless Steel housing
- 5 Pressure Gauge
- 6 Pressure Adjusted Valve
- 7 Safety Valve
- 8 Pressure Switches
- 9 Hydraulic Aggregate
- 10 Electrical Pump Motor
- 11 Motor Starter and Terminal Box



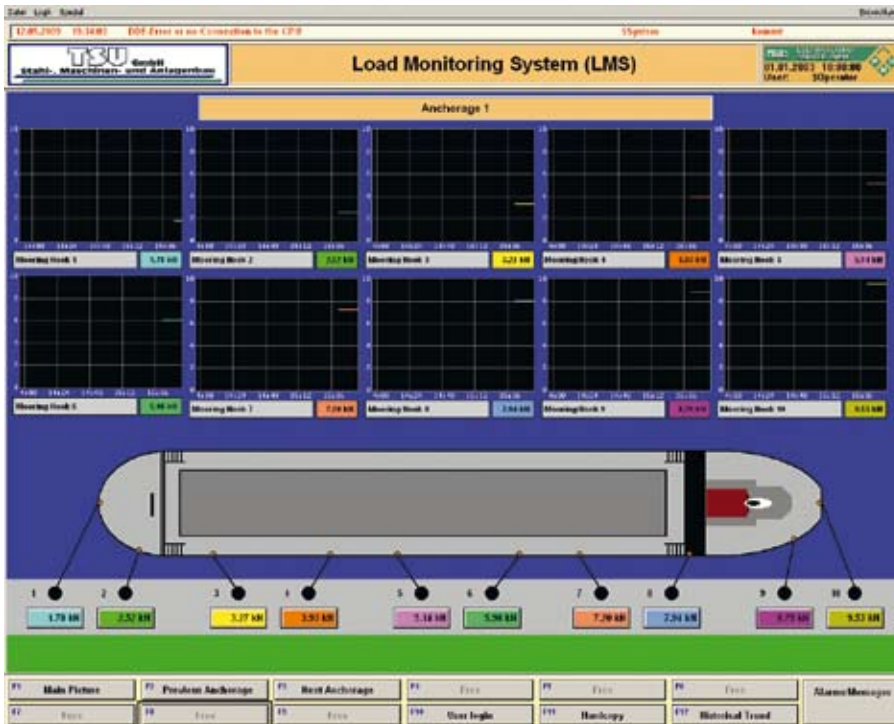
Load Monitoring System (LMS)

In order to safeguard the vessel and the jetty against breakouts of large vessels, the integration of a Load Monitoring System becomes more and more general practice.

All this provides the personnel with data to slacken overloaded or to tighten underloaded mooring lines, to obtain an overall equal mooring load pattern, which is the base for a safe mooring of big vessels and which prevents accidents, caused by broken mooring lines.

The LMS meets the following requirements:

- Measuring the load in each mooring line
- Measuring the total load on each dolphin
- Display and recording of the measured values in real time
- Underload and overload alarm when the preset loads are exceeded



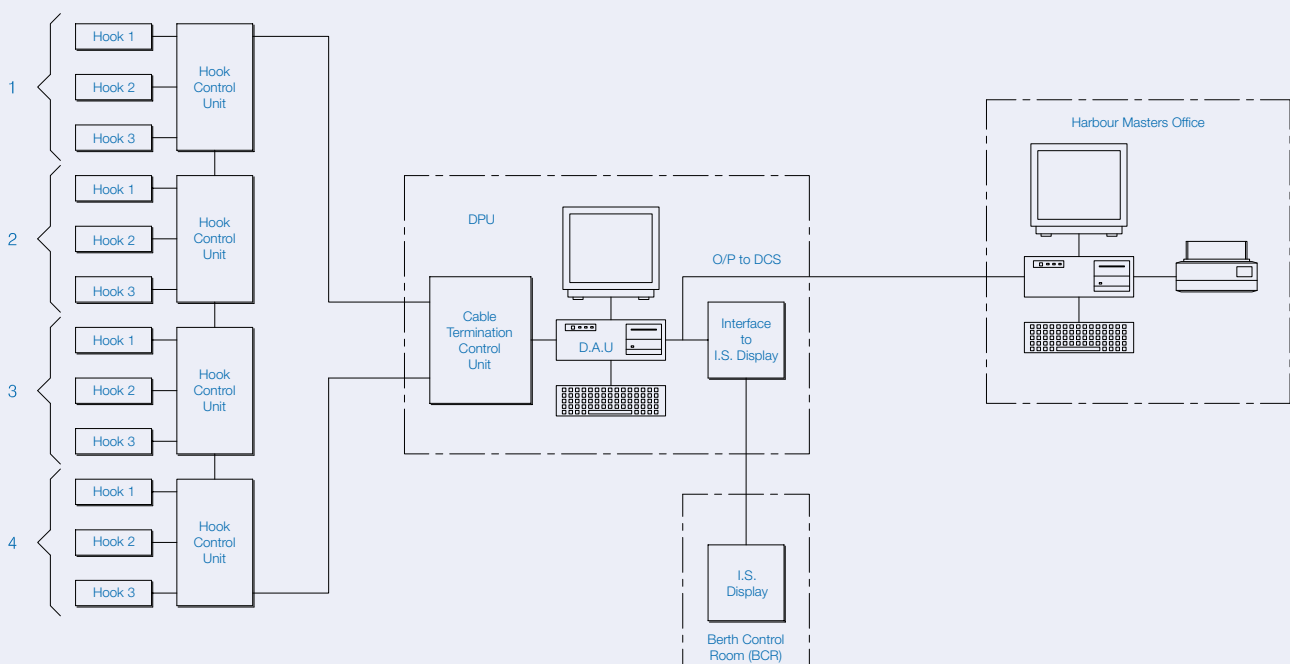
Anchorage Main Picture

Use the program button e.g. Mooring Hook 1 to show Anchorage 1 – Mooring Hook 1. Parameter: Current Value, Pre-Alarm, Delay Time Pre-Alarm, Main-Alarm, Delay Main-Alarm, Alarm Suppression, Recording Measured Values (Data Export).

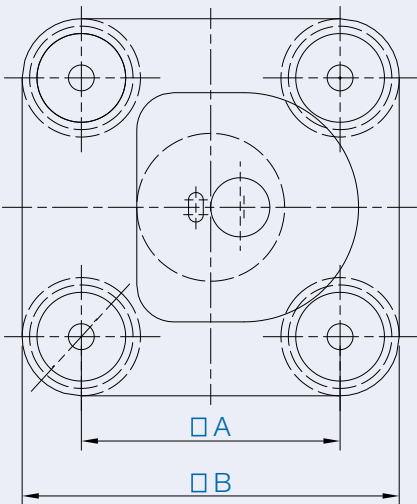
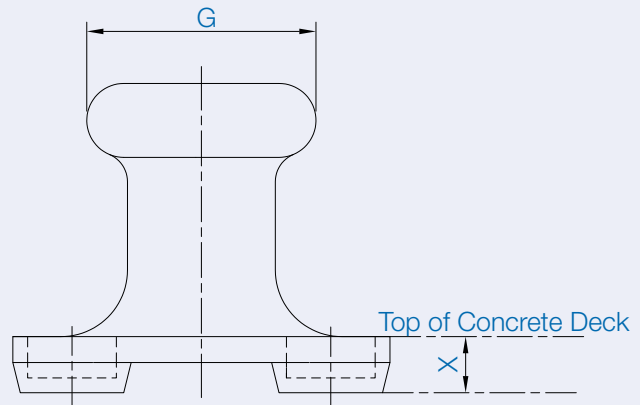
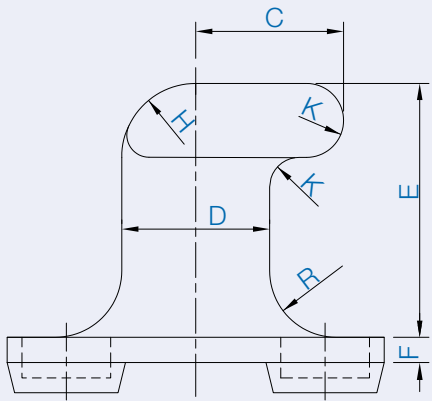
Use the soft keys to show:

- Previous Anchorage
- Next Anchorage
- Main Picture
- User Login
- Hardcopy
- Historical Trend
- Alarms/Messages

Typical Berth Arrangement

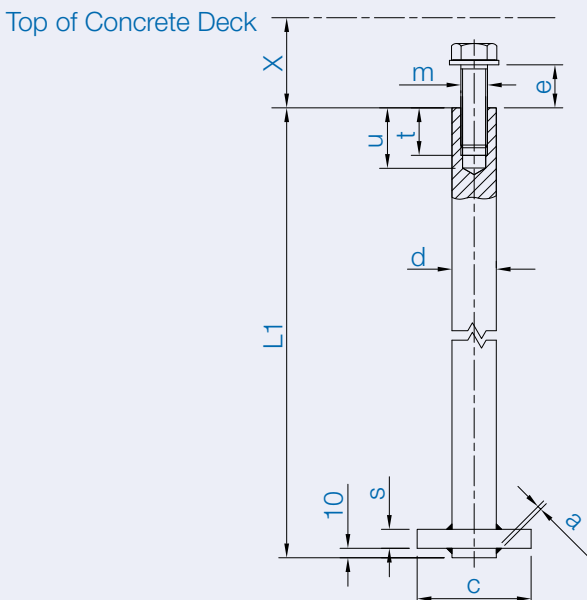


Bollards



Bollard Type:	Cap. t:	Main Dimensions:
15.112.1	15	A Hole Separation
30.112.1	30	B Length of Bollard
50.112.1	50	C Depth of Lug
75.112.1	75	D Pin Diameter
125.112.1	125	E Height of Bollard
		F Base Thickness
		G Width of Lug
		H Radius
		K Radius
		R Radius
		X Foundation Thickness

Anchor Bolts for Bollards



Bollard Type	15.112.1 30.112.1	50.112.1	75.112.1	125.112.1
Bolts	M30x80	M36x100	M42x110	M48x130
a	5	6	7	7
c	160	180	210	240
d	60	70	80	90
L1	70	800	900	1000
m	M30	M36	M42	M48
s	25	30	30	40
t	55	65	75	85
u	65	75	85	95
x	70	90	100	120
Weight	22 kg	33 kg	48 kg	70 kg

Annex: Technical Information

A

Material specification

All used materials are acc. to DIN/EN standard with material test certificate acc. to EN 10204 3.1

B

Welding

Acc. to DIN/EN

Company qualification acc. to DIN 18800 – 7 / 15018 „General approval for structural steel” certified by SLV Hannover

Weld seam test (NDT)

Visual

- Ultrasonic
- Magnetic particle
- Dye penetrant
- Carried out by the responsible welding engineer of the Q.A. Department

C

Standard coating

Shotblasting acc. to SA 2,5

Epoxy-Zinc 100 microns

Colour: dark grey/black

Special coating upon request

D

Manufacturing

Manufacturing acc. to DIN/EN standards

Electrical components acc. to ISO/VDE/EN

E

Load test for Seebeck® QRMH's

To guarantee function and quality, each QRMH is load tested in a certified workshop.

Tests are carried out on a calibrated test bench, approved by all independent classification authorities such as GL, LRS, DNV, RINA, BV, ABS if required.

Hook test procedure:

- Load test SWL
- Load test at test load (1,25xSWL)
- Release test at SWL
- Release test at slake rope
- Visual check of components
- Stamping of each hook on the top distance plate

Stamp sample:

Our works ref. No.	703211
Hook No.	9650
SWL	100 kN
TL	1250 kN
Date of Test	03 TSU 09

GL, LRS ...no. if applicable

- Recording of the manual effort to release the hook at SWL. Guaranteed maximum release force: less than 150 N

Test certificate

Standard: works test certificate (Q.A.Dep.)

Declaration of conformity (CE)

Optional: LRS, GL or other upon request

TECHNICAL MODIFICATIONS RESERVED!

Contact

TSU GmbH

Stahl-, Maschinen und Anlagenbau

Plant:

Bückingstraße 66
27568 Bremerhaven

Administration:

Herwigstraße 12 – 14
27572 Bremerhaven

Phone: +49 471 – 94793 – 0

Fax: +49 471 – 94793 – 255

E-Mail: info@tsu-gmbh.de

www.tsu-gmbh.de