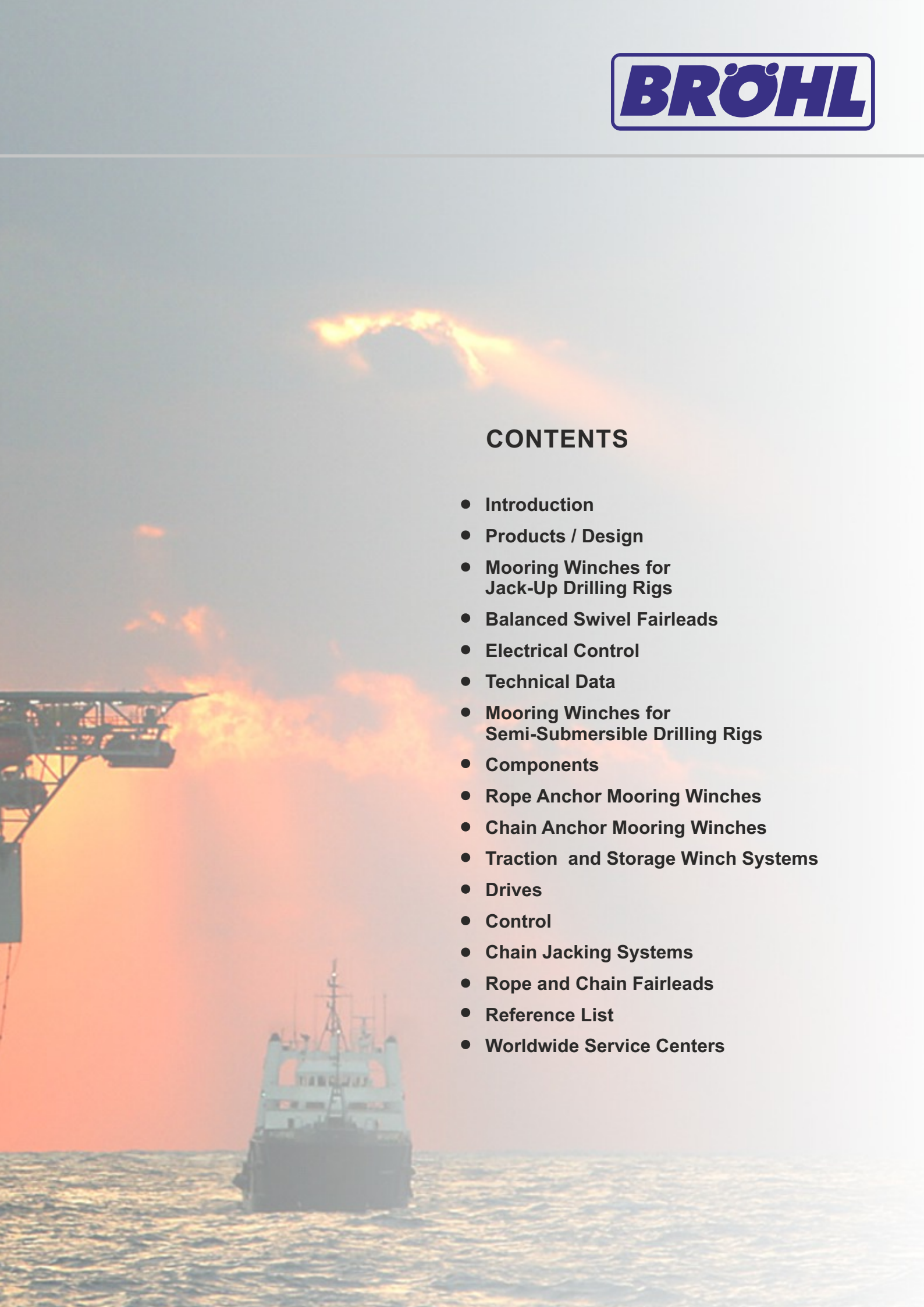
BRÖHL

THE MARINE SUPPLIER SINCE 1885

Mooring / Anchoring Systems

for Mobile Offshore Rigs



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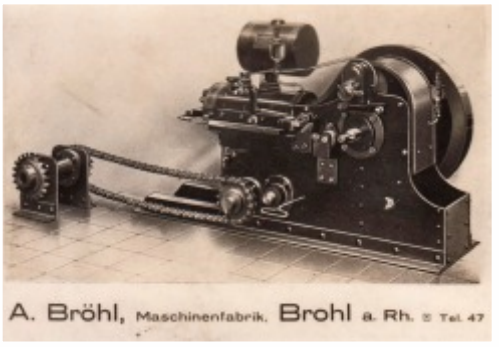
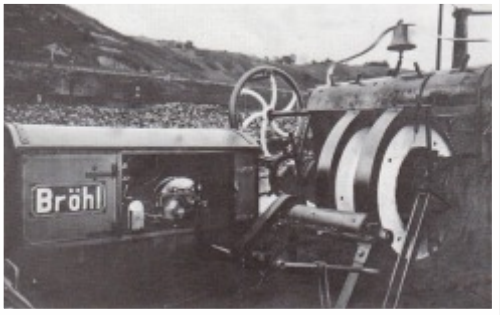
Introduction

BRÖHL GmbH is one of the oldest marine equipment suppliers in the world. Established in Germany in 1885, BRÖHL specializes in the manufacturing of heavy-duty winches and special machinery for manifold marine applications, as well as in installations for lifting and transferring vessels in shipyards and naval bases worldwide.

BRÖHL provides vast experience with all kind of offshore mooring installations either with rope or chain application.

After decades of refining their expertise Bröhl now defines the world-class standard for designing and building winches.





Lloyd's Register LRQA

Certificate of Approval

This is to certify that the Management System of:

BROEHL GmbH

Koblenzer Str. 42, 56656 Brohl-Lützing, Germany

has been approved by LRQA to the following standards:

ISO 9001:2015

P.G. Cornelissen

Issued By: Lloyd's Register Deutschland GmbH for and on behalf of: Lloyd's Register Quality Assurance Ltd

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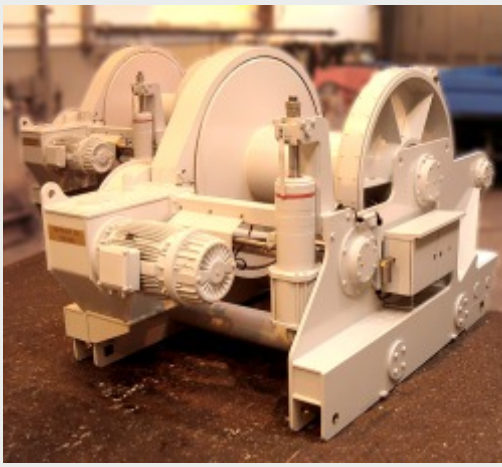
The product's high quality combined with it's flexible organization and efficient manufacturing processes allow BRÖHL to fulfill individual customer wishes. This in turn has put the company in a solid position in the global market. BRÖHL enjoys a high number of loyal employees. Many of whom have been with the company for the second and third generation sharing in the company's success while preparing it for further prosperity.

Service Centers on all continents ensure support and assistance for the customers on short notice.

Products

Two main types of mooring winches and solutions for the offshore industry are offered:

- Both standardized and customized mooring winches and fairleads for jack-up drilling rigs
- Tailor-made wire rope or chain anchor mooring winches and fairleads for semi-submersible drilling rigs



Other types of winches include those for AHTS- and FPSO vessels, chain systems for production platforms and equipment for pipe laying vessels etc.

All winches are designed and built according to five core requirements:

- SAFETY
- RELIABILITY
- EASY HANDLING
- LOW MAINTENANCE
- ENVIRONMENT FRIENDLY

In addition, the BRÖHL winch also comes with the following features:

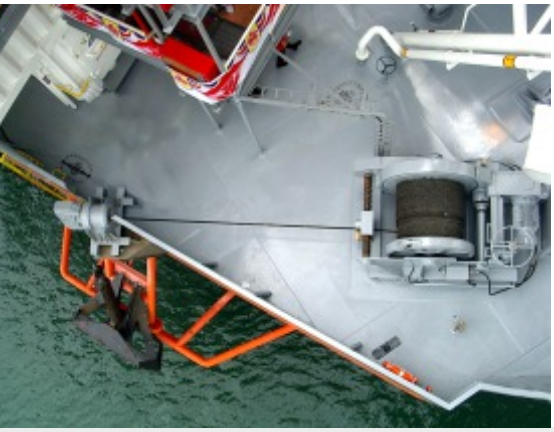
- Designed in compliance with the offshore rules of international classification societies, such as the American Bureau of Shipping (ABS), Det Norske Veritas (DNV) and Lloyd's Register of Shipping (LR), and conforming to ISO 3730 standards (if required)
- Suitable for operation in all kinds of environmental conditions (-10°C to 45°C) relative humidity as high as 95%
- Extremely smooth operations with noise levels to be kept down to as low as 70 dB.

Design

The winches are designed as a compact and robust steel welded construction. Material selection is carefully made according to DIN 17100 General Structural Steel and DIN 17200 Alloyed Steel:

Gear Housing	:	Steel S355J2G3 or S235JRG2
Foundation	:	Steel S355J2G3
Rope Drum	:	Steel S355J2G3
Main Shaft / Axle	:	Quality Steel C45N (approx. AISI 1042)
Pinion Shafts	:	Quality Steel 42CrMo4V or C45N (approx. AISI 4140 or AISI 1042 respectively)
Gear Wheel	:	Quality Steel C45N (approx. AISI 1042)

- The design of the gear wheel is according to the NIEMANN method or other methods as specified by client, such as ISO 6336 or AGMA.
- The gear wheel is made of high alloyed steel, which allows for greater robustness with overload.
- The gear wheels are connected to the shaft by means of fitting keys.
- All shafts are supported by roller bearings.
- The enclosed reduction gear is splash lubricated, and the main gear wheel is grease lubricated. The main gear wheel can be either open or enclosed as required by client's specification.
- The driving motors, attached at the gear housing, are connected to the reduction gear by means of elastic couplings.



Mooring Winches for Jack-Up Drilling Rigs

Features:

Winch Frame: designed as a bearing housing that supports the drum, with a reduction gearbox integrated into the frame, and supported by a cross beam to ensure a rigid construction

Reduction Gear: completely enclosed design, with highly alloyed spur wheels and pinion shafts running on roller bearings and hard chromium plated replaceable bushes

Rope Drum: designed with LEBUS grooves, machined grooves or flat surface, as applicable.

Main Gear Wheel: grease lubricated and protected by means of a sheet metal cap

Pinion: manually declutchable by means of a dog clutch for free wheeling

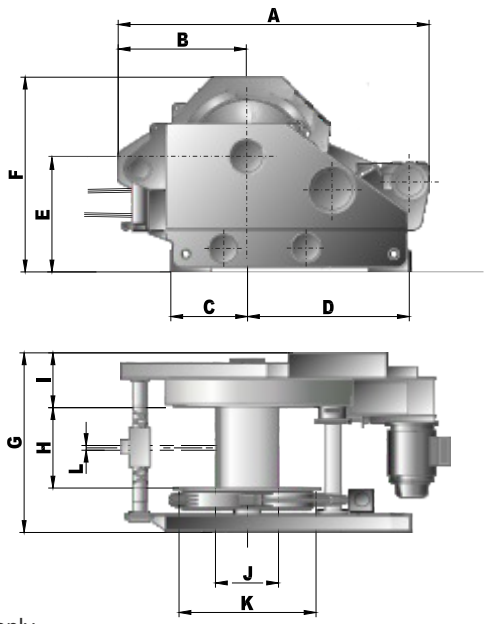
Band Brake: manually operated, with spindle made of stainless steel and high-friction brake lining

Spooling Device: with mechanical direct drive and two vertical guiding rollers; maximum fleet angle of 3.6° to each side

Elastic Motor Coupling: arranged between driving motor and gear wheel; anti-slip design

Options:

- load measuring device, to be integrated into the winch frame, with 2 stainless steel (AISI 316) load cells suitable for the rope breaking force
- remote controlled hydraulically operated band brake
- remote controlled pneumatically operated band brake
- line-length indication ; line-speed indication
- main gear wheel enclosed, in one common housing with reduction gear.



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dimensions in mm

	A	B	C	D	E	F	G	H	I	J	K	L
OMW-250	*3430*	*1425*	*900*	*1725*	*1270*	*2290*	*2320*	*1080*	*600*	*580*	*1500*	*38*
OMW-300	*3550*	*1425*	*900*	*1730*	*1270*	*2290*	*2125*	*880*	*600*	*580*	*1500*	*38*
OMW-400	*3890*	*1480*	*1000*	*1820*	*1320*	*2370*	*2740*	*860*	*1030*	*720*	*1800*	*42*
OMW-500	*4300*	*1790*	*1000*	*2040*	*1590*	*2930*	*2870*	*960*	*1030*	*720*	*2000*	*45*
OMW-800	*5030*	*2090*	*1230*	*1800*	*2060*	*3370*	*2900*	*1420*	*650*	*985*	*2300*	*57*

Balanced Swivel Fairleads for Jack-Up Drilling Rigs

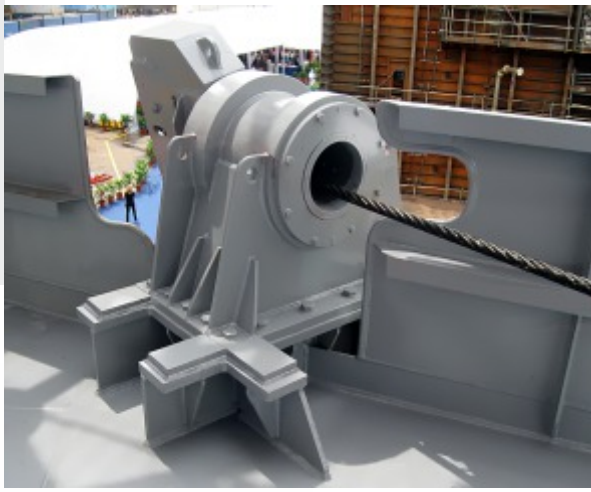
Features:

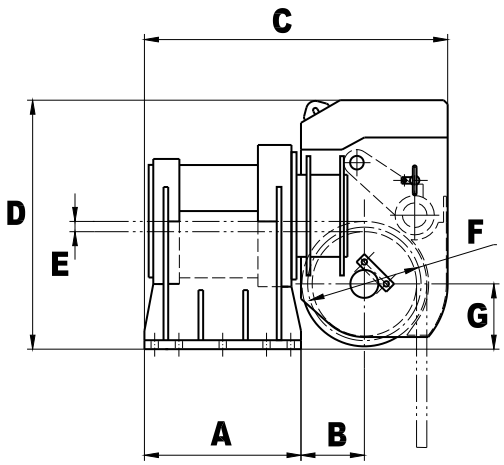
Bearing Pedestal: in robust steel welded construction, designed for rope breaking strength, to be bolted or welded on deck

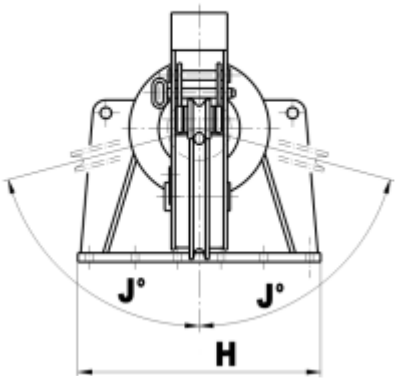
Swivel Head: with rotary transmission, running on anti-friction bearings

Rope Guiding Sheave: made of high strength forged steel, with machined rope grooves, running in anti-friction bearings

Upper Guiding Roller: hinged and suitable for rope insertion, secured by means of a locking bolt







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	A	B	C	D	E	F	G	H	J
F14	*620*	*215*	*1100*	*960*	*38*	*418*	*256*	*1000*	*75°*
F15	*680*	*245*	*1240*	*1080*	*42*	*482*	*280*	*1100*	*75°*
F16	*740*	*285*	*1385*	*1205*	*45*	*548*	*305*	*1200*	*75°*
F17	*840*	*340*	*1630*	*1320*	*54*	*614*	*340*	*1300*	*75°*
F18	*890*	*390*	*1800*	*1440*	*57*	*708*	*300*	*1400*	*75°*

Electrical Control

Switch Cabinet - for installation below deck

Protection type IP 54, with all necessary instruments for control of all mooring winches, control transformer 480V or 400V / 230V, standstill heating 230V and ammeter

Options:
- winch-mounted IP56 stainless steel switch cabinet (compact design)
- triple pole-changing
- VFD - variable frequency drive

Single Local Control Stand

For control of each mooring winch, protection type IP 56, with seawater resistant housing, complete with the following instruments:

- joystick for winch speed control for hoisting / lowering (at high and low speeds) with back spring pressure for zero positioning
- emergency stop button
- signal lamps
- heating 230V / 20W

Options:
- load indication
- line-length indication
- line-speed indication
- single control stand as portable / pendant type with standpipe and plug-connection

Central Control Panel

Drop-in type to be installed in the bridge panel, complete with the following instruments:

- selector switch for all winches
- signal lamps for all winches
- joystick for hoisting / lowering (at high and low speeds)
- emergency stop button

Options:
- load indication
- line-length indication
- line-speed indication
- central control stand as portable / pendant type

Technical Data

Technical data mechanical part:

		OMW-250	OMW-300	OMW-400	OMW-500	OMW-800
Nom. rope pull 1st layer	[kn]	*250*	*300*	*400*	*500*	*800*
Rope speed 1st layer	[m/min]	*5,8 / 11,6*	*5,8 / 11,6*	*5,8 / 11,6*	*5,8 / 11,6*	*4 / 8*
Nom. rope pull 10th layer	[kN]	*119*	*142*	*190*	*242*	*275*
Rope speed 10th layer	[m/min]	*12,2 / 24,4*	*12,2 / 24,4*	*12,2 / 24,4*	*12,2 / 24,4*	*12,2 / 24,4*
Brake holding force 1st layer	[kN]	*600*	*600*	*1000*	*1200*	*2050*
Drum ID	[mm]	*580*	*580*	*720*	*720*	*930*
Wire size	[mm]	*38*	*38*	*42*	*45*	*57*
Drum capacity	[m]	*760*	*760*	*760*	*700*	*1050*
Number of layers		*10*	*10*	*10*	*10*	*10*
Total dry weight	[ton]	*9,5*	*10*	*14*	*16*	*28*

Technical data electrical part:

		OMW-250	OMW-300	OMW-400	OMW-500	OMW-800
Power supply	[V / Hz]	*480 / 60*	*480 / 60*	*480 / 60*	*480 / 60*	*480 / 60*
Power output	[kW]	*27/27*	*32/32*	*46/46*	*58/58*	*64/64*
Protection	[IP]	*56*	*56*	*56*	*56*	*56*
Isolation class (rest. class B)	[kN]	*F*	*F*	*F*	*F*	*F*
Motor type		*3 - phase*	*3 - phase*	*3 - phase*	*3 - phase*	*3 - phase*
Motor surface cooled		*yes*	*yes*	*yes*	*yes*	*yes*
Tropical moisture proof isolation		*100% RH*	*100% RH*	*100% RH*	*100% RH*	*100% RH*
Operation mode	[min]	*S2 - 30 / 30*	*S2 - 30 / 30*	*S2 - 30 / 30*	*S2 - 30 / 30*	*S2 - 30 / 30*
Numbers of poles		*8 - 4*	*8 - 4*	*8 - 4*	*8 - 4*	*8 - 4*
Number of rotation	[rpm]	*875 / 1750*	*875 / 1750*	*875 / 1750*	*875 / 1750*	*875 / 1750*
Spooling protection		*yes*	*yes*	*yes*	*yes*	*yes*
Stand still heating	[220/110V]	*yes*	*yes*	*yes*	*yes*	*yes*
Electro - magnetic brake (fail - safe type)		*yes*	*yes*	*yes*	*yes*	*yes*

The data provided is for illustration purposes only.

Mooring Winches
for Semi-Submersible Drilling Rigs

General

The Mooring Winches for semi-submersible rigs in principle consist of a base frame, electric motor, reduction gearbox and a drum or windlass (for wire rope and chain respectively). The basic unit can be extended to include another one, two or three drums or windlasses to create an 8-, 12- or 16-point mooring system.
Existing mooring systems are equipped with shaft couplings for the possibility of a future extension.

Design Criteria

- The winches are designed as a compact and robust steel welded construction.
- All structural parts and components are designed according to the maximum breaking strength of the chain.
- The gear wheel is typically designed according to the NIEMANN method, however other methods are sometimes used if specified by the client, such as ISO 6336 or AGMA.
- All shafts are supported by roller bearings.

Explosion-Proof Design

Ex-proof design for all components necessary to execute emergency release is available as an option.

Regulations

ABS Rules for Building and Classing Mobile Offshore Drilling Units
DNV Rules for Classification of Offshore Drilling and Support Units
DNV Offshore Standard - Position Mooring
Norwegian Maritime Directorate (NMD), Anchoring / Positioning Systems on Mobil Offshore Units

Environmental Design Criteria

The standard Mooring Winches are designed for operation under the following conditions:

Minimum operating temperature:	-10°C
Maximum operating temperature:	45°C
Maximum seawater temperature:	35°C
Relative humidity:	95%

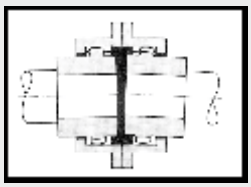
Components

The main components of the Mooring Winches are:

Reduction Gear:
fully enclosed gearbox with spur wheel gears, supported by roller bearings, running in an oil bath, splash lubricated

Pinion:
grease lubricated, driving the main gear wheel.

Transmission Shaft:
with curve-tooth coupling for an easy alignment of the drum or windlass part



Water-Cooled Dynamic Brake:
for drag mode operation during deployment of anchors, spring applied and pneumatically activated, with friction linings of water resistant copper alloy, capable of absorbing a high brake torque at continous operation

Gear Brake:
fail-safe design, pneumatically or hydraulically operated

Gear Shifting:
remote controlled, for operation of winches in low and high gear, with neutral position

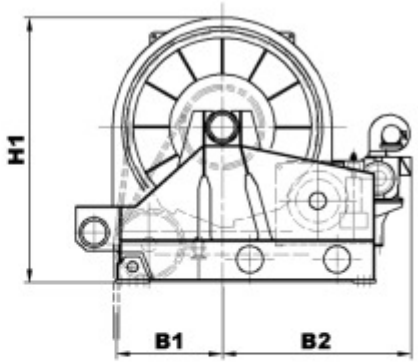
Spline Clutch:
remote controlled, for engaging and disengaging of the selected drum or windlass with the winch system

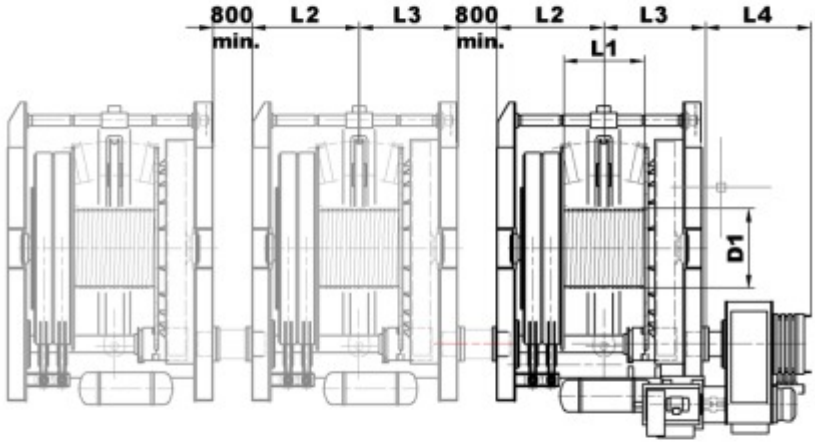
Sling Band Brake:
fail-safe design, pneumatically or hydraulically operated, with non-asbestos woven lining

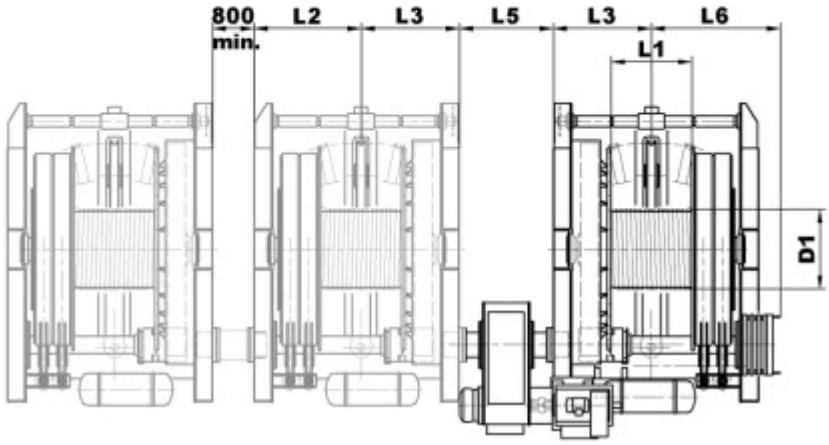
Option: Two Band Brakes
each band brake with 50% of maximum breaking strength of wire rope or chain in compliance with requirements of ABS MODU P or NMD

Air / Oil Tank:
pressurized air or oil for releasing the band brakes in case of emergency

Rope Anchor Mooring Winches







	RopeSize	D1	B1	B2	H1	L1	L2	L3	L4	L5	L6
RAMW-25	*2,5"*	*1088*	*1500*	*3170*	*4120*	*1431*	*1870*	*1820*	*1920*	*1590*	*2290*
RAMW-30	*3"*	*1292*	*1710*	*3210*	*4450*	*1439*	*1880*	*1850*	*1920*	*1590*	*2300*
RAMW-35	*3,5"*	*1513*	*2015*	*3580*	*5030*	*1472*	*1900*	*1920*	*2000*	*1640*	*2320*
RAMW-40	*4"*	*1734*	*2215*	*3790*	*5350*	*1687*	*2000*	*2040*	*2040*	*1680*	*2420*

The data provided is for illustration purposes only.

dimensions in mm

The drum of the Rope Anchor Mooring Winch is equipped with:

Main Gear Wheel:
grease lubricated and protected by means of a sheet metal cap

Rope Drum:
in steel welded construction, with reinforced flanges to withstand the lateral forces of high layer spooling, supported by roller bearings

Option: brake rim with stainless steel surface

LEBUS Grooves:
bolted down split-sleeve type Lebus grooves to ensure a proper spooling of the rope even in high layers

Spooling Device:
a spooling arm with rope sheave operated by a chain driven diamond screw shaft with a manually or automatically operated re-adjustment device

Ratchet Wheel:
with manually activated pawl for fixing the rope drum for maintenance purpose

Technical Data

	RAMW-25	RAMW-30	RAMW-35	RAMW-40
Nom. pull 1. step	*700kN x 0-30m/min*	*970kN x 0-30m/min*	*1370kN x 0-30m/min*	*1770kN x 0-30m/min*
Nom. pull 2. step	*1050kN x 0-20m/min*	*1450kN x 0-20m/min*	*2050kN x 0-20m/min*	*2650kN x 0-20m/min*
Stalling pull	*770kN / 1160kN*	*1070kN / 1600kN*	*1500kN / 2260kN*	*1950kN / 2920kN*
Rope length	*4900 ft*	*4900 ft*	*4900 ft*	*4900 ft*
Layer	*13*	*13*	*12*	*10*
Power output	*415 kW*	*570 kW*	*810 kW*	*1050 kW*
Brake holding force	*3320 kN*	*4680 kN*	*6570 kN*	*8440 kN*
Pay-out speed (dyn. brake)	*100m/min at 670kN*	*100m/min at 1000kN*	*100m/min at 1000kN*	*100m/min at 1000kN*

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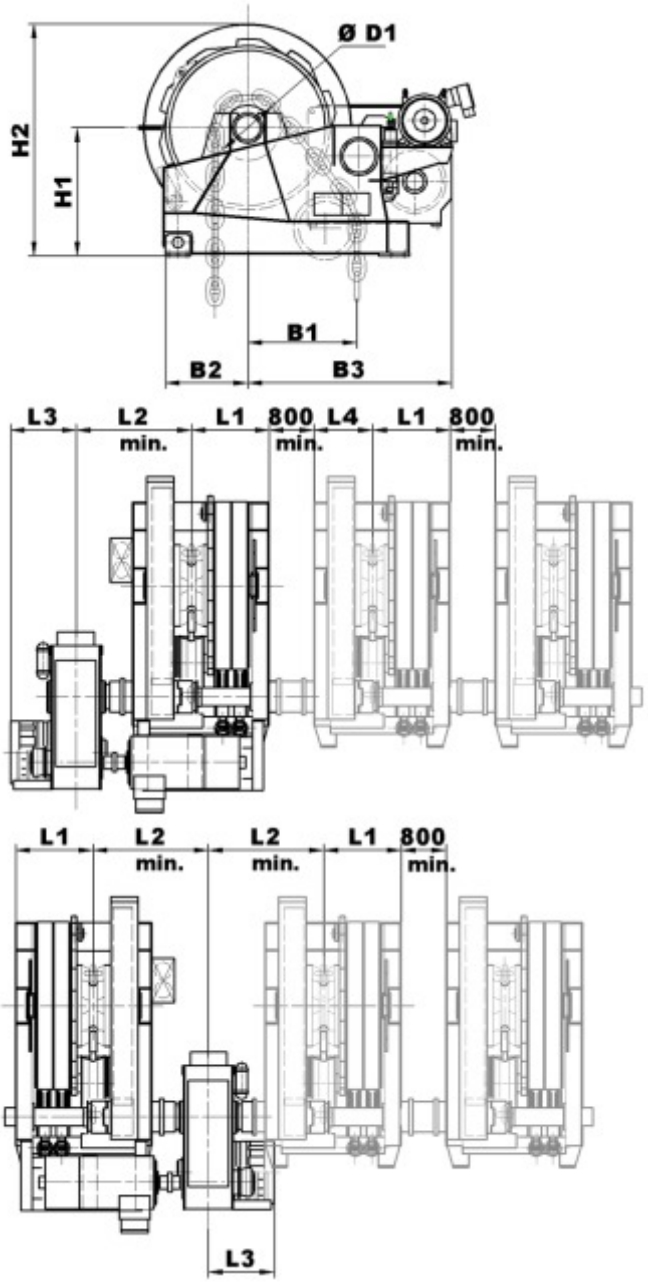
Chain Anchor Mooring Winches



	ChainSize	D1	L1	L2	L3	L4	B1	B2	B3	H1	H2
CAMW-30	3"	991	1230	1900	1150	950	1800	1380	3280	2240	3850
CAMW-35	3,5”	1170	1390	2065	1250	1055	1950	1475	3655	2300	4160
CAMW-40	4"	1326	1550	2230	1300	1100	2100	1620	3990	2380	4300

The data provided is for illustration purposes only.

dimensions in mm

The windlass of the Chain Anchor Mooring Winch is equipped with:

Main Gear Wheel:
grease lubricated and protected by means of a sheet metal cap

Cable Lifter:
with 5 snugs, suitable to accommodate the kenter shackle, in high grade cast material, supported by roller bearings

Option: brake rim with stainless steel surface

Chain Stripper:
to prevent the chain from getting stuck in the cable lifter

Sheave:
to ensure a proper guiding of the chain down to the chain locker

Ratchet Wheel:
with manually activated pawl for fixing the cable lifter for maintenance purpose

Technical Data

	CAMW-30	CAMW-35	CAMW-40
Nominal pull 1.step	980kN x 0-18m/min	1350kN x 0-18m/min	1680 x 0-18m/minkN
Nominal pull 2. step	1955kN x 0-9m/min	2700kN x 0-9m/min	3365kN x 0-9m/min
Stalling pull	2150 kN	2970 kN	3700 kN
Brake holding force	6010 kN	8190 kN	10240 kN
Power output	350 kW	480 kW	600 kW
Pay-out speed (dyn. brake)	100m/min at 1000kN	100m/min at 1000kN	100m/min at 1000kN

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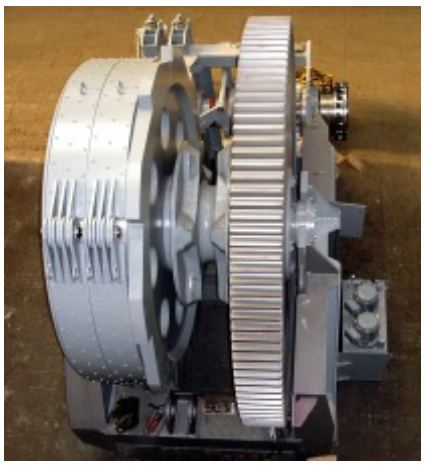
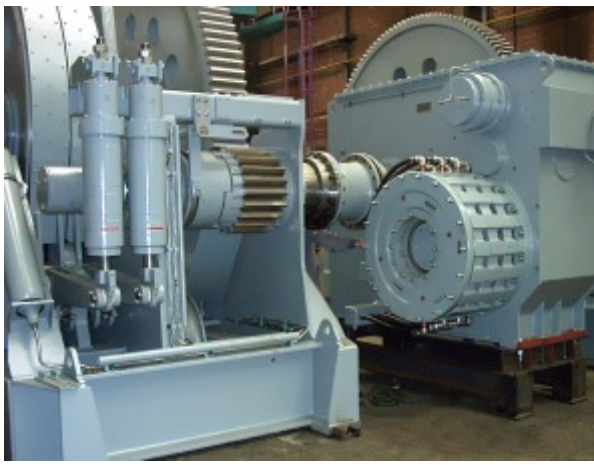
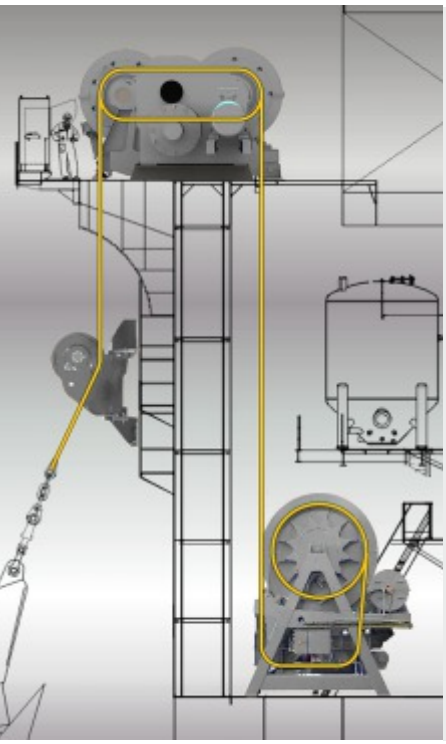





Traction and Storage Winch Systems

In Traction and Storage Winch Systems a Double Drum Traction Winch on deck operates together with a corresponding Storage Winch generally placed at the bottom of the column.

The rope will be wrapped around the grooved drum pair of the Traction Winch in a single layer.

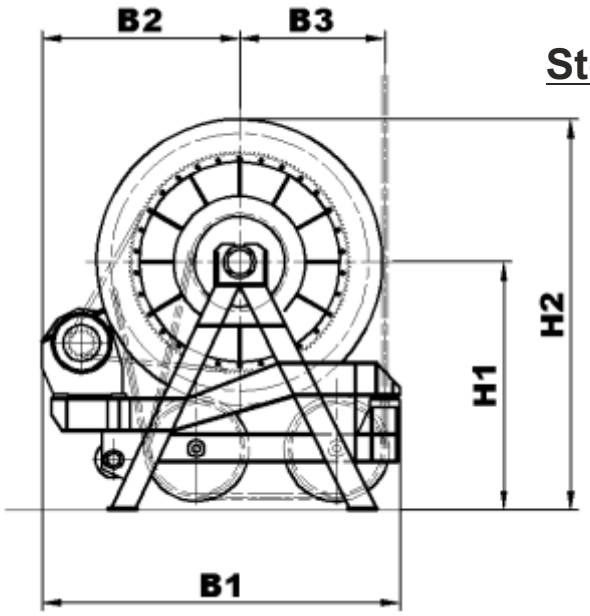
The rope is not firmly clamped on the drum but is held by friction only.

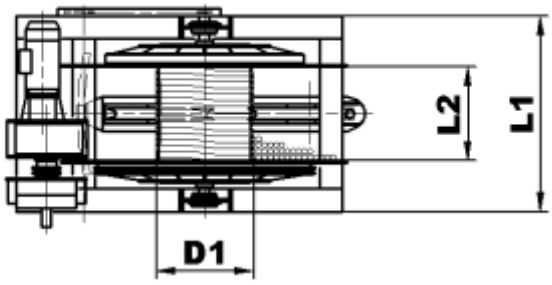
The complete rope length will be reeled on the drum of the Storage Winch.

There is a constant pulling force over the complete rope length without any losses, unlike conventional wire rope winches with multi-layer drums.

The pulling force of the Storage Winch will be controlled by signals given by load cells in the Traction Winch, thus ensuring a sufficient pre-tension at any time.

Storage Winch

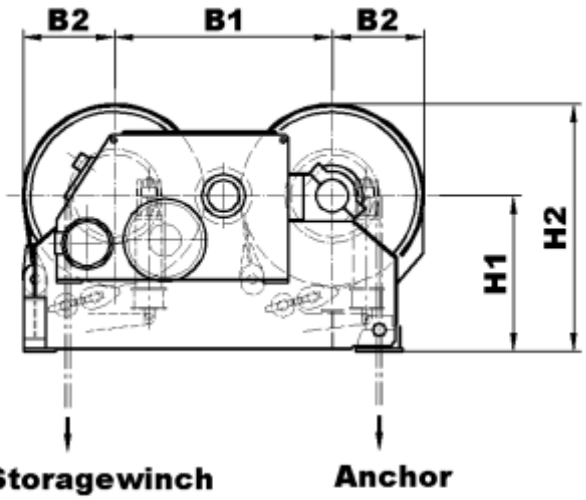


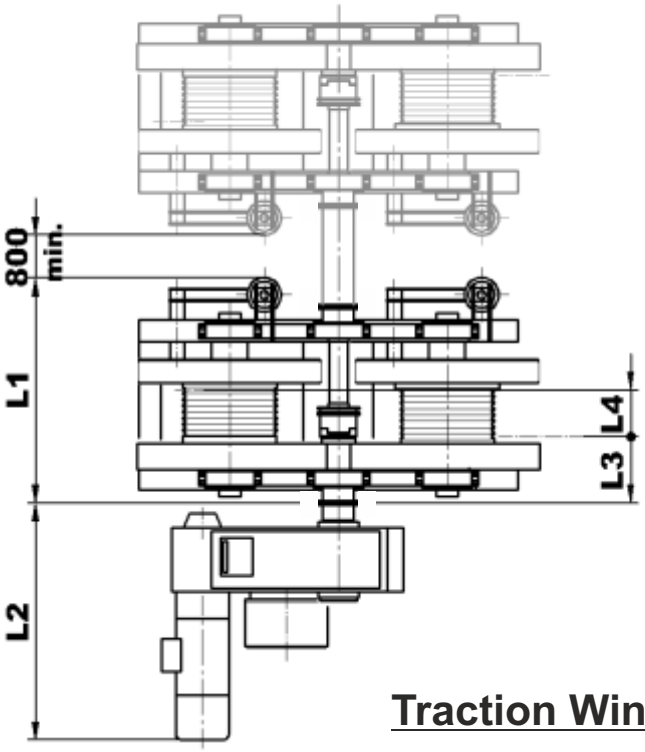


	RopeSize	RopeLength	Layer	D1	B1	B2	B3	L1	L2	H1	H2
SW-30	3"	4900 ft	15	1296	4760	2630	1930	2600	1240	3300	5200
SW-35	3,5"	4900 ft	15	1530	5460	2990	2260	2660	1250	3590	5800
SW-40	4"	4900 ft	14	1734	5820	3090	2460	2780	1340	3950	6350

The data provided is for illustration purposes only.

dimensions in mm





Traction Winch

dimensions in mm

	RopeSize	D1	B1	B2	L1	L2	L3	L4	H1	H2
TW-30	3"	1300	3000	1270	3110	3280	920	640	2150	3420
TW-35	3,5"	1530	3550	1500	3250	3310	1080	750	2450	3950
TW-40	4"	1734	4050	1750	3430	3360	1250	850	2820	4570

Technical Data

	TW-30	**TW-35**	**TW-40**
Nom. pull 1. step	970kNx30m/min	1370kNx30m/min	1770kNx30m/min
Nom. pull 2. step	1450kNx20m/min	2050kNx20m/min	2650kNx20m/min
Stalling pull	1070kN / 1600kN	1500kN / 2260kN	1950kN / 2920kN
Brake holding force	4680kN	6570kN	8440kN
Pay-out speed (dyn. brake)	100m/min at 1000kN	100m/min at 1000kN	100m/min at 1000kN

The data provided is for illustration purposes only.

Drives

The winches are driven either by a squirrel-cage AC motor or by a shunt-wound DC motor in 4-quadrant operation:

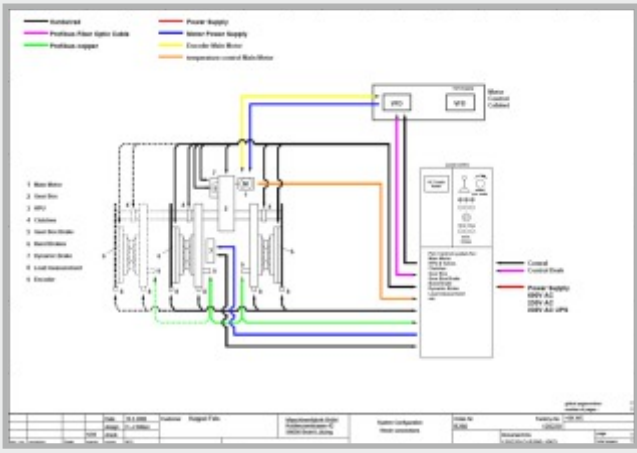
AC Motor
Three-phase squirrel cage motor, construction type IM B3, IP 56, S2-60 min., insulation class F, with temperature sensors, axially preloaded roller bearings and anti-condensation heating

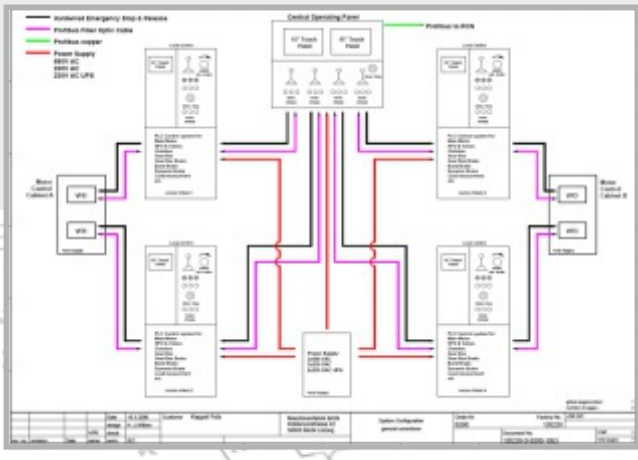
DC Motor
e.g. GE 752 high torque DC drilling motor, with pressurized connection box, space heater, pressure sensor and blower assembly

The motors will be controlled by a variable frequency drive (VFD) or a silicon controlled rectifier (SCR).

VFD and SCR can be part of the winch control system or supplied by any suitable external system.

Both VFD and SCR systems allow the winch to be operated at different speeds during operation.





High Pressure Hydraulic Drive

Alternatively - in the range of up to 600 kW performance - a high pressure hydraulic drive system is available, with each winch drive consisting of:

2 x motors, axial piston type, system pressure 250 bar
1 x closed circuit Hydraulic Power and Control Unit (HPU) with variable displacement pumps of axial piston type

Control

The control is a PLC based system with a high degree of automation. Operations such as shifting to different gears as well as operating the different clutches and band brakes are automatically carried out by the control system.

Clear text displays will be supplied for the local control panels as well as for the central control panel. Indicating lights will inform the operator of the status and availability of the system. The automatic control system ensures that the possibility of wrong or unsafe operations is reduced to a minimum.

Features of automatic control system:

- Monitoring of motor current and motor temperature, air pressure resp. oil pressure and oil level in HPU as well as temperature of cooling water of dynamic brakes
- Measuring of tension by load cells based on RSG technology
- Measuring of speed and length of wire rope or chain by digital encoders
- Local control panel with 10" touch screen con-taining all of the following for the operation of the winch system:
  - Main switch ON/OFF
  - Tension indicator
  - Length indicator
  - Speed indicator
  - Winch speed control joystick
  - Winch dynamic brake control regulator
  - Emergency brake release button
  - Emergency stop button
  - Status and alarm lamp
- Central control panel with 15" touch screens with joysticks, push buttons and indicating lights for the operation of the selected winch system:
  - Selector switch for drum or windlass on selected winch system
  - Selector switch for gearstep (1 or 2) or drag mode (3)
  - Emergency brake release button for all winches
  - Emergency stop button for all winches
  - Status and alarm lamps

Option:

local operator's cabin with heating, air condition, wipers, safety rail and access board at the outer perimeter

Chain Jacking Systems

Chain Jacking Systems are an alternative to wire rope or chain anchor ainches whenever very high pulling forces are required or when there are space restrictions on the deck.

Chains with very big diameters can be paid-in and paid-out by lifting and lowering of hydraulic jacks in a step-by-step operation.

Features of the Chain Jacking System:

Skid Frame: in steel welded construction

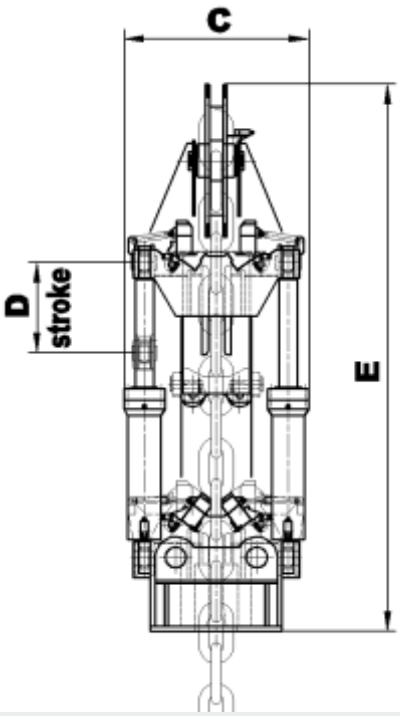
Stationary Chain Stopper: double flap-type, hydraulically operated with integrated load cell

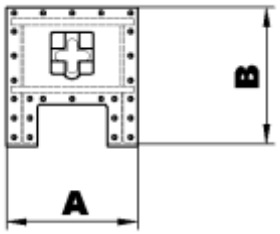
Travelling Chain Stopper: double flap-type, hydraulically operated

Lifting Jacks: with ceramic coated piston rods and pivoting bearings made of stainless steel

Guiding Sheave (Turn-Down Sheave): with 5 snugs and measuring device for chain length

Hydraulic Power and Control Unit (HPU): with oil tank, 2 variable displacement pumps of axial piston type, 2 AC motors and 2 servo pumps, valve block, switchgear cabinet, monitoring and alarm equipment





	ChainSize	A	B	C	D	E
CJ-30	3”	1000	1200	1400	780	4750
CJ-40	4"	1280	1350	1800	1025	5550
CJ-50	5"	1625	1715	2290	1300	7050

dimensions in mm

	CJ-30	**CJ-40**	**CJ-50**
Nom. pull	1700 kN	2500 kN	3350 kN
Speed in/out	22 m/h	22 m/h	22 m/h
Max. pull	2000 kN	3000 kN	4000 kN
Static force	6010 kN	8965 kN	14980 kN
Cylinder bore	220 mm	260 mm	300 mm
Hydr. pressure	300 bar	300 bar	300 bar

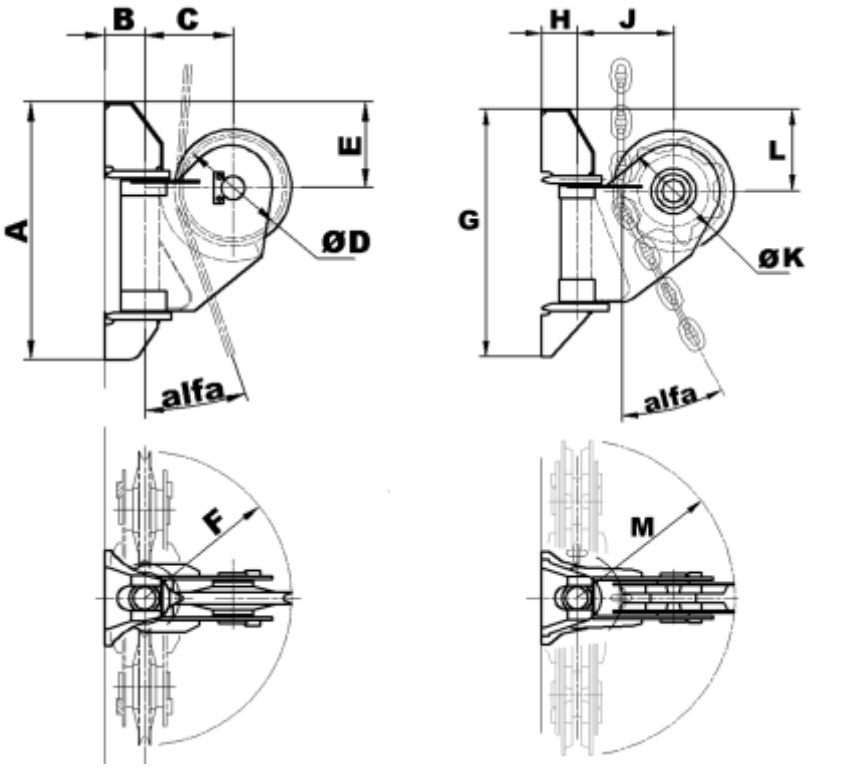
The data provided is for illustration purposes only.

Rope and Chain Fairleads

The Rope and Chain Fairleads are column-mounted steel welded constructions made of S355J2+N material.
Each fairlead consists of upper and lower brackets, side plates, axles and sheaves (for wire rope) or cable lifter (for chain).

Features of the Rope and Chain Fairleads:

- Designed for maximum breaking strength of wire rope resp. chain
- For operation above and under water
- Swivelling 90° either side of centre
- Sheave up to 90° arc of contact of the wire rope
- Cable lifter with 7 snugs (for chain)
- Self-lubricated bushings
- Axles with stainless steel surface made of AISI / SAE 316 material
- Option: axles supported by spherical roller bearings
- Option: wire or chain running through trunnion (compact design)



The data provided is for illustration purposes only. dimensions in mm

Chain	Rope	Size	A	B	C	D	E	F	G	H	J	K	L	M	ALFA
	RF-25	2,5"	2430	380	840	1024	810	1390							15°-90°
CF-30 /	**RF-30**	3"	2920	460	1010	1216	980	1670	3290	470	1280	1370	1090	2085	15°-90°
CF-35 /	**RF-35**	3,5"	3410	530	1170	1424	1140	1945	3880	550	1515	1620	1285	2460	15°-90°
CF-40 /	**RF-40**	4"	3890	620	1340	1632	1300	2225	4390	620	1710	1830	1450	2780	15°-90°
CF-50		5"							5400	750	2130	2290	1810	3470	15°-90°

Reference List

Jack-Up Drilling Rigs

HULL No.	OWNER	VESSEL NAME
KF B260	NDC	Al-Hail
KF B263	DDI	Deep Driller 2
KF B267	DDI	Deep Driller 3
KF B271	DDI	Deep Driller 5
KF B284	DDI	Deep Driller 6
KF B289	DDI	Deep Driller 8
KF B269	Awilco	WilCraft
KF B285	Awilco	WilBoss
KF B293	Awilco	WilStrike
KF B273	Maersk	Maersk Resilient
KF B274	Maersk	Maersk Resolute
KF B275	Maersk	Maersk Resolve
KF B276	Maersk	Maersk Reache
KF B277	Seadrill	West Atlas
KF B291	Seadrill	West Arial
KF B311	Seadrill	West Callisto
KF B312	Seadrill	West Juno
KF B283	GDI	Al-Zubarah
KF B290	Jindal	Discovery I
KF B292	Jindal	Virtue I
KF B294	Great Eastern	Greatdrill Chetna
KF B297	Great Eastern	Greatdrill Chitra
KF B300	Rowan	Rowan Viking
KF B301	Rowan	Rowan Stavanger
KF B306	Rowan	Rowan Norway
KF B317	Workfox	Seafox 5
KF B319	Chernomorneftegaz	Nezalezhnist
KF B320	Asia Offshore	AOD I
KF B321	Asia Offshore	AOD II
KF B324	UMW	UMW Naga 4
KF B325	Arab Drilling	Arab Drill 50
KF B326	Transocean	Siam Driller
KF B327	Transocean	Andaman
KF B328	Oro Negro	Primus
KF B329	Ensco	Ensco 120
KF B330	Ensco	Ensco 121
KF B331	Maersk	Intrepid
KF B332	Maersk	Interceptor
KF B333	JDC	Hakuryu 11
KF B334	Vision Drilling	Dynamic Vision
KF B335	Transocean	Ao Thai
KF B336	Oro Negro	Laurus
KF B337	CP Latinas	La Santa Maria
KF B338	CP Latinas	La Covadonga
KF B339	Arab Drilling	Arab Drill 60
KF B340	UMW	UMW Naga 5
KF B341	GDI	
KF B342	GDI	Dukhan
KF B345	Asia Offshore	AOD III
KF B346	Ensco	Ensco 122
KF B347	Maersk	
KF B351	Clear Water	
KF B352	Clear Water	
KF B353	Star Drilling	
KF B354	Grupo R	Cantarell 1
KF B355	Grupo R	Cantarell 2
KF B356	Grupo R	Cantarell 3
KF B357	Grupo R	Cantarell 4
KF B359	Ensco	Ensco 110
KF B360	Grupo R	Paraiso I
KF B361	Grupo R	Paraiso II
KF B363	PetroVietnam	
KF B376	UMW	
M- 1123		
KF B364	Transocean	
KF B365	Transocean	
KF B366	Transocean	
KF B367	Transocean	
KF B368	Transocean	
KF B369	Ensco	Ensco 123
KF B371	Fecon	
KF B372	Fecon	
KF B373	Fecon	
KF B374	Kencana	SKD Raiqa

Semi-Submersible Drilling Rigs

KF B280	Maersk	Maersk Developer
KF B281	Maersk	Maersk Discoverer
KF B295	Maersk	Maersk Deliverer
KF B286	Ensco	Ensco 8500
KF B287	Ensco	Ensco 8501
KF B298	Ensco	Ensco 8502
KF B303	Ensco	Ensco 8503
KF B308	Ensco	Ensco 8504
KF B310	Ensco	Ensco 8505
KF B315	Ensco	Ensco 8506
KF B288	Transocean	DD III
KF B296	Queiroz Galvao	Gold Star
KF B309	Queiroz Galvao	Alpha Star
KF B316	PetroVietnam	PV Drilling V

Semi-Submersible Accommodation Vessels

KF B261	Prosafe	Consafe Concordia
KF B302	Floatel	Floatel Superior
KF B307	Floatel	Floatel Reliance
KF B343	Floatel	Floatel Victory
KF B348	Floatel	Floatel Endurance
KF B362	Floatel	Floatel Triumph

Floating Drilling, Production, Storage and Offloading Vessels

KS 379	Prosafe	Azurite

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