



SECURING YOUR VISIONS

DECK MACHINERY



SEC is the supplier of a wide variety of winches and winch-related products. For several decades, SEC has specialized in supplying conventional electric and hydraulic winches as well as the turnkey electric hydraulic winch has a number of advantages for ship owners, shipyards and engineers.

SEC has been designing, building and maintaining winches since 1890. In the early stage of the design process, SEC can advise both shipyard and ship owner about the optimal installation of the winches. During this stage, an optimum can be found within the limits of classification society rules, rules of different sailing areas and technical requirements.

This optimum can be reflected in a mooring arrangement plan. Since limitation of space on board is a key issue for the ship owner, SEC is constantly looking for ways to save space. This may result in an alternative position for the electromotor.



For instance, it may be placed on top of the gearbox of the electric hydraulic winch. This construction solves many rope problems. Each turnkey compact winch is a stand-alone system, where separate hydraulic and electric components are used.

This may seem expensive at first glance, but when compared to the costs involved with installing additional required items on a separate power pack, the electric hydraulic winch is the better option. For example, the amount of oil in the SEC electric hydraulic winch is a fraction of the amount of oil required for hydraulic winches with a separate power pack. It also eliminates cleaning and maintenance of hydraulic piping inside the vessel, because all hydraulic hoses are mounted inside the enclosed gearbox.



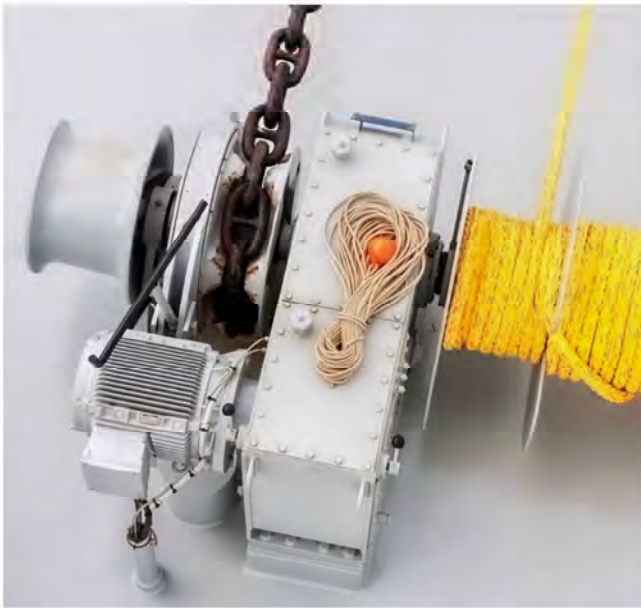
WINCHES DRIVES GENERAL

Thanks to the fact that SEC's main sub-suppliers have a worldwide network, SEC is able to call upon a group of specialists to assist you when needed.

Shipyards may prefer the simple installation of an electric winch above other types, whereas ship owners are more interested in the operational advantages of hydraulic winches. SEC has combined these two preferences into a single winch design- Turnkey Electric Hydraulic Winch.

Logistically, this configuration is the best solution for the shipyard. Each winch has its own hydraulic and electric unit. This might not seem interesting, but from the logistical point of view, it offers the shipyard a major advantage. If necessary, the complete winch can be built in the block section. This means the time needed to install a complete anchoring and mooring system can be reduced to a minimum.

In general, SEC winches are delivered with a closed foundation, ready to be welded to the deck. On request, a part of the chain pipe can even be preinstalled, so no additional disassembly and assembly of the winch has to be done by the shipyard. If a shipyard has to install a hydraulic winch to a separate power pack, it has to supply and install the complete piping from the power pack to winch and back.



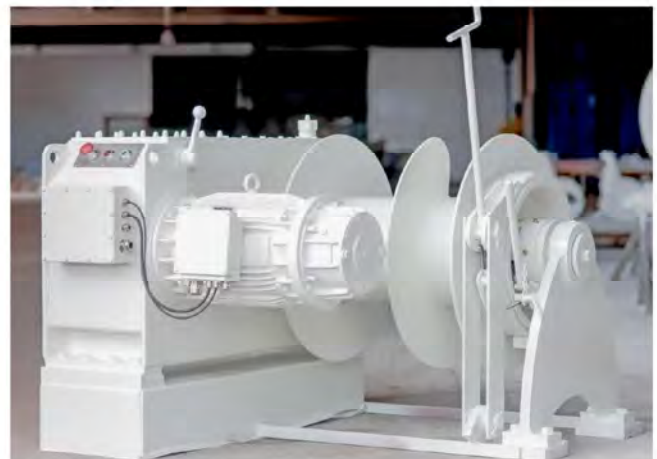
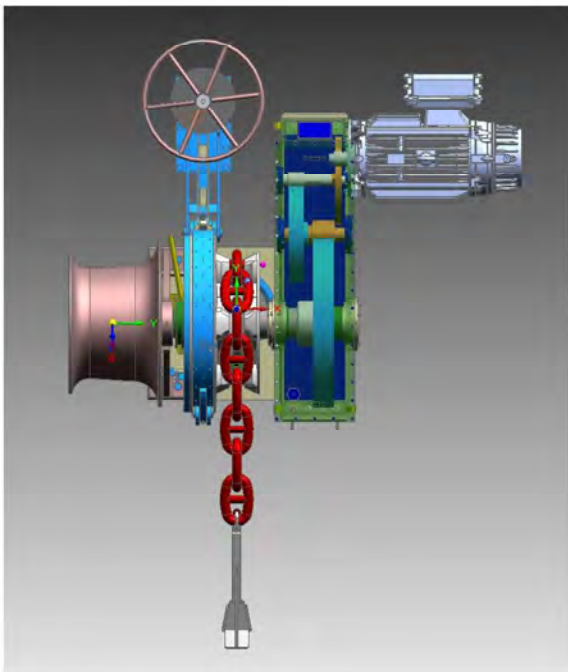
WINCHES DRIVES GENERAL

The time-consuming and expensive job can be avoided if you choose the turnkey electric-hydraulic winch. The complete hydraulic installation is incorporated in the gearbox.

This means the shipyard can install the winch in just a few hours. The installation features of the SEC winches are interesting for shipyards, but of even greater importance is SEC's backup during the installation process. SEC tests the winches before installation and guarantees the winches work properly when they are installed in accordance with SEC instructions.

The SEC winches have a special advantage above conventional winches. Whereas many winches are delivered with an open foundation, the SEC winch is normally supplied with a closed foundation, making engineering of a counter foundation unnecessary. The SEC winch is not a standard winch. It is custom-built and constructed of standard components. The winch can be constructed for all situations on board.

The SEC engineering department is a reliable partner in the design and engineering process of a vessel's deck machinery. The employees are available to answer the most difficult practical questions concerning space, weight or strength limitations of the anchoring and mooring equipment.



WINCHES DRIVES

HYDRAULIC WINCHES

STEPLESS SPEED CONTROL ● COMPACT CONSTRUCTION

ONLY ONE HYDRAULIC DRIVE REQUIRED ● OPERATION EITHER MECHANICAL OR ELECTRICAL

SUPPLY OF OIL TO BE REALIZED BY A COMBINED EXISTING POWER ● PACK ALREADY ON BOARD



SEC hydraulic winches have a compact size due to an innovative concept with high quality materials. Operation of the winch can be either mechanical directly from the power pack, or electrical by means of a potentiometer/angle sensor placed in a seawater resistant control stand or inside the winch.

The supply of oil (flow and pressure) to the hydraulic motor can be realized by a combined existing power pack on board. When power pack is not available to operate the winches, a dedicated small power pack can be delivered for emergency use.



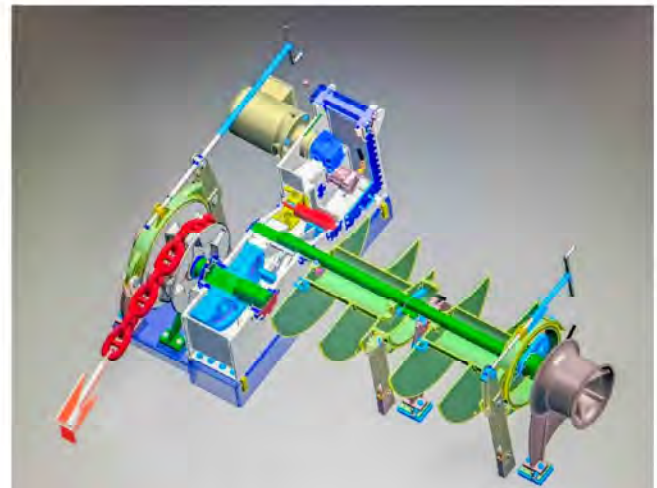
WINCHES DRIVES

ELECTRIC HYDRAULIC WINCHES

COMBINE ADVANTAGES OF BOTH ELECTRIC AND HYDRAULIC WINCH
TIME SAVING INSTALLATION PROCEDURE
STEPLESS CONTROL OF SPEED AND PULL
SELF TENSIONING ● LOW MAINTENANCE
CLOSED GEARBOX ● MEDIUM PRESSURE
HIGH QUALITY COMPONENTS
NO EXTERNAL HYDRAULIC PIPING NECESSARY

Thirty-five years ago, SEC developed the electric hydraulic winch which combines the advantages of the electric and the hydraulic winches into one compact design.

The main shaft is driven by a variable hydromotor, which enables stepless control of speed. The incorporated pump is powered by an electromotor mounted in the winch. Therefore, hydraulic piping from the engine room to the winch is no longer necessary.



WINCHES DRIVES

ELECTRIC HYDRAULIC WINCHES

All hydraulic components are incorporated in the totally closed gearbox. This gives the advantage that environmental influence will have no effect on the

operational system. The position of the electromotor can vary from the side to top or bottom of the gearbox. Installation under deck is also possible.



WINCHES DRIVES

ELECTRIC FREQUENCY CONTROLLED WINCHES

- LOW NOISE ● NO HYDRAULIC OIL
- ENVIRONMENTAL GREEN TECHNOLOGY
- LESS MAINTENANCE ● NO HYDRAULIC SPECIALIST NEEDED
- ELIMINATES HYDRAULIC OIL AND PIPING

The optional feature for electric winches is the frequency drive. The benefits for frequency drive are plentiful. The generator needed for frequency drive can be smaller because of the low starting current. As energy is only needed during operating, it is also more environmental friendly. The self tension system comes without a loadcell or pulse encoder. Installation can be done swiftly because of less cables used. The precise stepless control is made for smooth operation.

The system has an easy monitoring by color graphic display and monitors chain length, chain and rope tension and winch drum speed (options). The winch is protected against peak torque and overloading and reduces wear on ropes and the winch. Also the frequency drive has the possibility for remote shore support. The conclusion can be that frequency control makes for better performance and lower cost of ownership.



WINCHES DRIVES

ELECTRIC WINCHES

LOW NOISE ● NO HYDRAULIC OIL

ENVIRONMENTAL GREEN TECHNOLOGY ● LESS MAINTENANCE

NO HYDRAULIC SPECIALIST NEEDED

ELIMINATES HYDRAULIC OIL AND PIPING

The electric winches of SEC can be delivered with either one, two or three speed electromotors, also as option stepless control and dynamic control can be achieved with a voltage frequency converter.

For anchor winches the three-speed motor is most commonly used. The winches are supplied with a control stand, which has to be installed near the winches. The motor is directly connected to the gearing.

After welding on deck and electrical connection, the winch is ready for use. The electromotor is fully equipped for use in a seawater environment.



The standard features which come with this TENV (Totally Enclosed Non-Ventilated) electromotor are:

Anti condensation heater

Special coating

IP 56

A temperature rise class F

Electric disk brake

Marine standard execution

Particular care is taken to adequately handle the double torque which anchor winches will require at full load (2 minutes). A Protective Thermal Circuit (PTC) connection (thermal control over the windings) is also standard for these types of winches. For mooring winches, the DMS-self tensioning feature can be supplied as option.



WINCH TYPES

ANCHOR MOORING WINCHES

BOTH ANCHORING AND MOORING COMBINED IN ONE WINCH

COST EFFICIENT SOLUTION WEIGHT REDUCTION ● COMPARED TO SEPARATE WINCHES

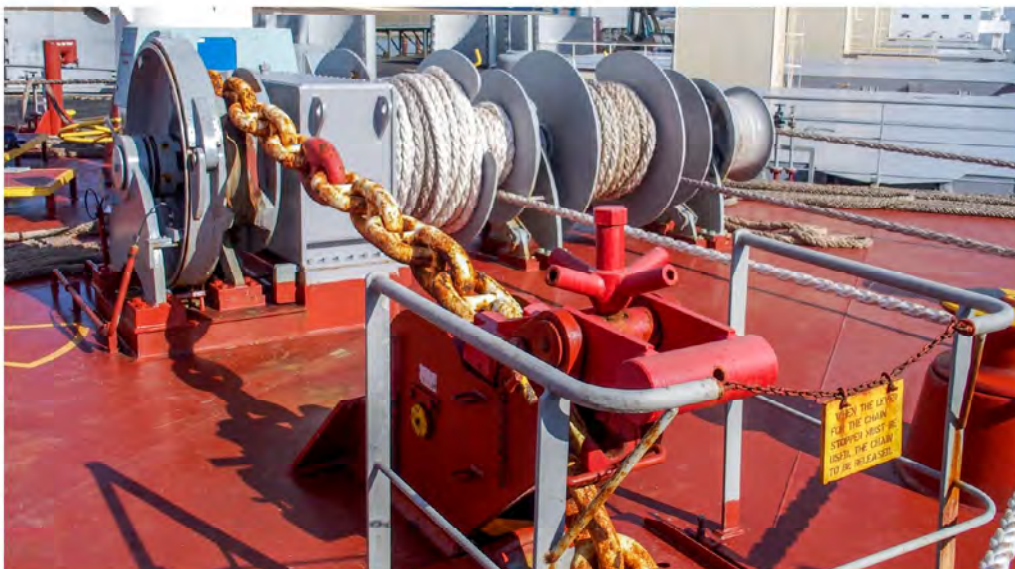
LIMITATION OF REQUIRED SPACE ON BOARD

TURNKEY ELECTRIC-HYDRAULIC DESIGN ● LOW MAINTENANCE

SPLIT DRUM FOR STORAGE AND OPERATING PART FOR SYNTHETIC ROPES

The anchor mooring winch is designed and adapted to the customer's wishes and, of course, based on the different classification rules. Therefore, standard drums are seldom used by SEC. When polypropylene or equivalent rope material is applied, the drum will be split in a storage and operating part as standard. The combined anchor mooring winch has a positive effect on the weight of the complete anchoring and mooring configuration. The combined winch requires one gearbox and one drive only. On small foreships it may be possible to combine both anchoring and mooring of the portside and starboard winches into a single winch unit. This may be achieved with the

restriction that the hawser pipes have a certain distance from each other. Besides that, the chains have to enter the chain locker and hawser pipe at a certain angle. Since the closed foundation is normally included, installation of the SEC anchor mooring winch is a simple task for the shipyard. The anchor mooring winch can be equipped with a self tensioning device only for mooring operations.



WINCH TYPES

MOORING WINCHES

- HIGH QUALITY COMPONENTS ● SEAWATER RESISTANT BEARINGS
- SPLIT DRUMS POSSIBLE ● SELF TENSIONING



The mooring winch produced by SEC has a nominal pull from 20kN to 400kN. The design principles of a mooring winch are based on the nominal pulling force of the winch. This force depends on the minimum breakload of the applied rope or wire. The rope diameter, length and material of the mooring line determine the diameter and length of the drum. To help increase the lifetime of mooring lines, the SEC mooring winches have a large drum diameter than prescribed by Class societies. The mooring winches are delivered with a split drum when polypropylene is applied. On mooring winches with steel wire the drum will not be split.

Both self tensioning and remote control can be easily added to this winch.



WINCH TYPES

CAPSTANS

HYDRAULIC COMPONENTS INCLUDED

NO EXTERNAL PIPING NECESSARY ● STEPLESS SPEED

TWO DIRECTIONS ● DIN 84154 DIMENSION POSSIBLE

The SEC electric or hydraulic capstans are characterized by their compact shape. The warping head is built on top of a round pedestal. Either the electric or hydraulic system is built in this pedestal, so the components will be under deck. Within a certain range the operating height of the capstan can be adjusted to meet practical requirements. The electric capstan can be delivered with a one, two or three-speed electromotor. The advantage of the hydraulic capstan is the possibility for stepless control

of the warping head. SEC can deliver capstans according to DIN 84154. The electric or hydraulic capstans can also be supplied in the anchor capstan version.

SEC is also able to supply capstans that have gears and electric motors that are fully incorporated in the warping head of the capstan. This way of building results in very compact shaped capstans that can be installed completely on deck.



ADDITIONAL EQUIPMENT

WINCHES RATCHET CHAIN STOPPERS RKR

EASY TO INSTALL ● ROLLER TYPE ● BIG RANGE

The RKR chain stopper is the top model in the chain stopper range. This is not just because it is a roller type, but because it is a so-called 'semi-automatic' ratched fall-over type.

This fall-over type has the advantage of securing the chain in the chain stopper whenever unforeseen slipping of the chain occurs. During heaving anchor operation, ratchet of chain stopper keeps closed. The ratchet will secure chain, to avoid damage of e-motor and gear wheels due to huge reaction of chain in rough sea.

A roller chain stopper is a good solution, in particular for larger chain sizes. Pulling the spindle on the stopper enables tight securing of the anchor in the anchor pocket or against the vessel's hull. All turning parts are made of high quality materials. The roller is fitted with sea water-resistant bronze bearings. Parts of the spindle are made from stainless steel.

According to classification rules, the chain stoppers need a holding force of 80% of the minimum breakload of the chain. On request, SEC can also supply chain stoppers.

It is possible to mount the chain stopper at an angle in order to adjust the flow of the chain towards the hawserpipe.



Chain Diameter	Length (mm)	Breadth (mm)	Height (mm)	Weight (kg)
12.5-14	360	190	380	66
16-17.5	445	245	460	76
19-20.5	525	280	540	105
22-24	610	320	650	121
26-28	715	380	710	210
30-32	850	398	750	264
34-36	940	485	965	330
38-40	1,020	544	995	400
42-44	1,110	600	1,090	594
46-48	1,230	660	1,170	760
50-52	1,290	710	1,225	780
54-56	1,380	760	1,320	1,045
58-60	1,530	776	1,354	1,210
62-64	1,710	793	1,390	1,520
66-68	1,760	880	1,535	1,880
70-73	1,830	940	1,580	2,610
76-78	1,920	990	1,620	3,345
81-84	2,010	1,040	1,660	4,180
84-87	2,100	1,090	1,720	5,225
90-92	2,220	1,150	1,820	5,960
95-97	2,340	1,215	1,920	6,200
100-102	2,460	1,280	2,015	6,900
1,005-107	2,580	1,340	2,115	8,000
111-114	2,750	1,430	2,250	8,900
117-120	2,900	1,500	2,375	9,800
122-124	3,000	1,555	2,450	10,700
127-130	3,150	1,630	2,570	12,000
132-137	3,300	1,715	2,700	14,200

WINCH OPTIONS

SELF-TENSIONING SYSTEMS

EASY TO OPERATE ● HYDRAULIC OR ELECTRICAL OPTIONS

CUSTOM-MADE SOLUTIONS

The self tensioning systems are only used for mooring winches. When tides are differing or when quick loading/unloading is demanded (Container/Ro-Ro) Self tensioning demands special requirements for the system since it has to be on stand-by 24 hours a day. In general two self tensioning systems can be supplied:

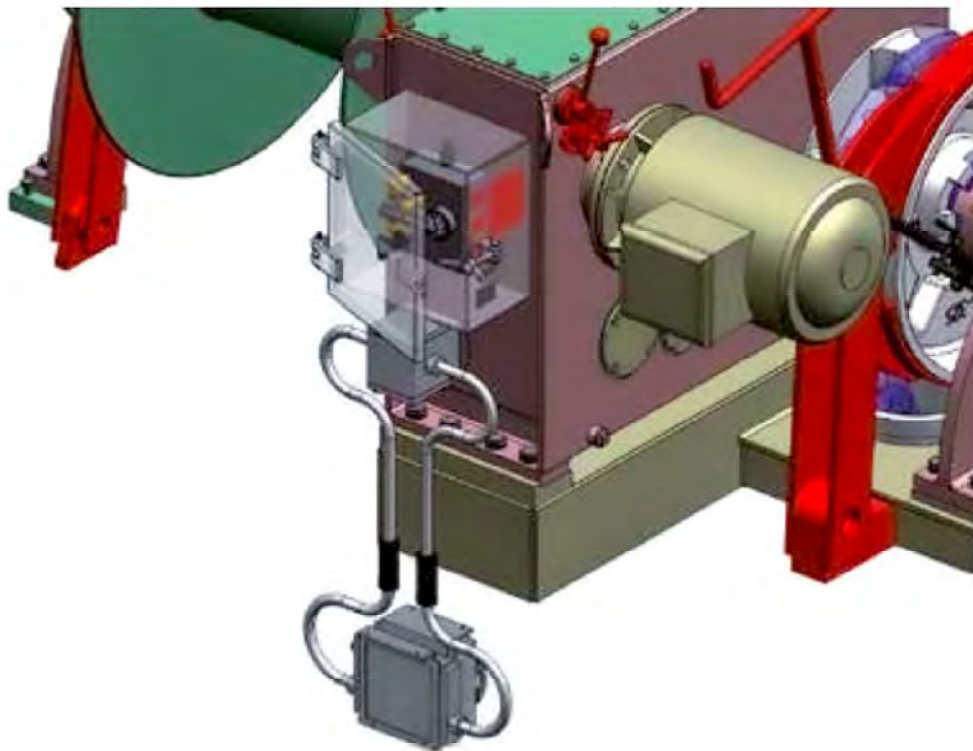
The hydraulically controlled self tensioning
The electrically controlled self tensioning

The first one is used at hydraulic and electric-hydraulic systems. The hydraulically operated self tensioning system is adjustable by changing the pressure.

For an electric-hydraulic winch, only an oil cooler has to be installed below deck. One of the advantages of

this system is the low noise level, due to the fact that the hydraulic components are inside the gearbox. The second one, the electrically controlled DMS unit, is used for electric winches. With a DMS system the stress in one of the gear steps in the gearcase is measured with a sensitive bolt, this gives a signal which is converted by an amplifier. The amplifier gives an electric pulse signal to the control system of the winches, which dynamically regulates the tension force of the winch.

For the frequency control mooring winch, the self tension system no need DMS unit. And the PLC system measures the motor torque from Frequency driven.



WINCH OPTIONS

WIRELESS REMOTE CONTROL

Wireless Remote control of the winches is specially developed to ease the control and monitor for the operators. The configuration of a Wireless Remote control station on portside and starboard are regarded as a standard, but more comprehensive systems are also possible. The controls at hydraulic

winches can be arranged with hydraulic valves, electric master switches or potentiometers an infinitely variable control. The master switches are delivered as standard in a watertight box, ready for mounting on deck.

Advantages:

Protection class: IP 56

Multi-control fingertip switch

Stepless control

Compact size



WINCH OPTIONS

HYDRAULIC POWER PACKS

COMPACT TURNKEY STRUCTURE ● ALL COMPONENTS IN ONE BLOCK
SUITABLE FOR OTHER HYDRAULIC SYSTEMS

Hydraulic winches require power packs that can be installed below deck. SEC is able to deliver a wide range of power packs, all specially designed to operate the accompanying winches. Each power pack is produced to the winches specifications. For example, a power pack can be designed to operate all winches simultaneously or individually. The dimensions of the power pack will be determined according to the requested specification of the shipyard and/or shipowner and based on the speed and pull requirements.



On special request, SEC is able to deliver power packs suitable for the operation of winches and other on board systems. Every SEC power pack is compact and easy to install. The complete power pack is built into a framework on which all features can be mounted, for example, oil coolers, electric operating valves, load sensing system, self tensioning blocks, electric motors and hydraulic pumps.



WINCH OPTIONS

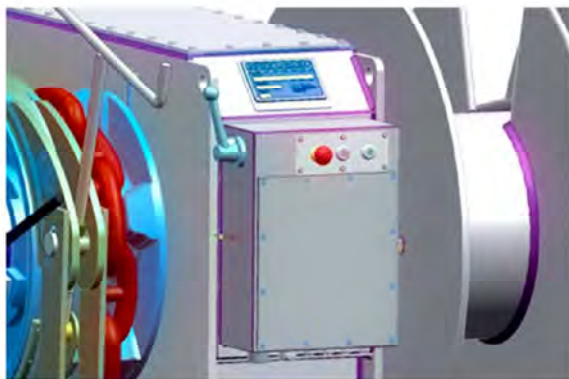
EXPLOSION PROOF CONTROL STAND

Explosion class: according to customer's requirement

Protection class: IP 56

Material of control stand: Stainless steel

Single control stand and Double control stand can be supplied according to customers' requirements.



WINCH OPTIONS

SERVICES

24 HOURS A DAY STAND-BY ● WORLDWIDE DELIVERY OF SPARE PARTS
DIRECT ACTION PREVENTS LOSS OF TIME



If SEC winches are regularly maintained according to the instruction book, SEC can guarantee many years of productive operation. However, after several years of use, certain parts of the winch may require service. According to Murphy's Law, however, replacement or repair of these parts will always be required in the most difficult circumstances.

SEC has designed a service procedure to assist you when you need help. The main goal of our service team is to have the vessel on its route with minimal time loss.

The SEC service is driven by two aspects:
Prevention of time loss
Worldwide delivery of parts

Failure of an essential part of the winch may result in losses due to a delay in a port or even missing the next charter.

To prevent excessive delays in the delivery of parts, the SEC winch has been constructed of components from reliable suppliers with service points in major ports across the world. This will normally reduce the repair time to just a few hours.

Other parts of the winch—apart from electric and hydraulic components—can either be delivered from stock from spares shop or fabricated in our machine shop on short notice. However, you'll be happy to know that these parts seldom break down.

WINCH OPTIONS

EQUIPMENT TABLE

EQUIPMENT			ANCHOR CHAIN			BOW ANCHORS		MOORING ROPES		
Number		Letter	K2 mm	K3 mm	Length m	CONY MASS Kg	HHP MASS Kg	PCS	Length m	MBL kN
> 50	70	a	12.5	---	220	180	135	2	80	35
> 70	90	b	14	---	220	240	180	2	100	40
> 90	110	c	16	---	247.5	300	225	2	110	40
> 110	130	d	17.5	---	247.5	360	270	2	110	45
> 130	150	e	17.5	---	275	420	315	2	120	50
> 150	175	f	19	---	275	480	360	2	120	55
> 175	205	g	20.5	---	302.5	570	430	2	120	60
> 205	240	h	22	20.5	302.5	660	495	2	120	65
> 240	280	i	24	22	330	780	585	3	120	70
> 280	320	j	26	24	357.5	900	675	3	140	80
> 320	360	k	28	24	357.5	1,020	765	3	140	85
> 360	400	l	30	26	385	1,140	855	3	140	95
> 400	450	m	32	28	385	1,290	970	3	140	100
> 450	500	n	34	30	412.5	1,440	1,080	3	140	110
> 500	550	o	34	30	412.5	1,590	1,195	4	160	120
> 550	600	p	36	32	440	1,740	1,305	4	160	130
> 600	660	q	38	34	440	1,920	1,440	4	160	145
> 660	720	r	40	36	440	2,100	1,575	4	160	160
> 720	780	s	42	36	467.5	2,280	1,710	4	170	170
> 780	840	t	44	38	467.5	2,460	1,845	4	170	185
> 840	910	u	46	40	467.5	2,640	1,980	4	170	200
> 910	980	v	48	42	495	2,850	2,140	4	170	215
> 980	1,060	w	50	44	495	3,060	2,295	4	180	230
> 1,060	1,140	x	50	46	495	3,300	2,475	4	180	250
> 1,140	1,220	y	52	46	522.5	3,540	2,655	4	180	270
> 1,220	1,300	z	54	48	522.5	3,780	2,835	4	180	285
> 1,300	1,390	A+	56	50	522.5	4,050	3,040	4	180	305
> 1,390	1,480	B+	58	50	550	4,320	3,240	4	180	325
> 1,480	1,570	C+	60	52	550	4,590	3,445	5	190	325
> 1,570	1,670	D+	62	54	550	4,890	3,670	5	190	325
> 1,670	1,790	E+	64	56	577.5	5,250	3,940	---	190	350
> 1,790	1,930	F+	66	58	577.5	5,610	4,210	---	190	375
> 1,930	2,080	G+	68	60	577.5	6,000	4,500	---	190	400
> 2,080	2,230	H+	70	62	605	6,450	4,840	---	200	425
> 2,230	2,380	I+	73	64	605	6,900	5,175	---	200	450
> 2,380	2,530	J+	76	66	605	7,350	5,515	---	200	480
> 2,530	2,700	K+	78	68	632.5	7,800	5,850	---	200	480
> 2,700	2,870	L+	81	70	632.5	8,300	6,225	---	200	490
> 2,870	3,040	M+	84	73	632.5	8,700	6,525	---	200	500
> 3,040	3,210	N+	84	76	660	9,300	6,975	---	200	520
> 3,210	3,400	O+	87	78	660	9,900	7,425	---	200	555
> 3,400	3,600	P+	90	78	660	10,500	7,875	---	200	590
> 3,600	3,800	Q+	92	81	687.5	11,100	8,325	---	200	620
> 3,800	4,000	R+	95	84	687.5	11,700	8,775	---	200	650
> 4,000	4,200	S+	97	87	687.5	12,300	9,225	---	200	650
> 4,200	4,400	T+	100	87	715	12,900	9,675	---	200	660
> 4,400	4,600	U+	102	90	715	13,500	10,125	---	200	670
> 4,600	4,800	V+	105	92	715	14,100	10,575	---	200	680
> 4,800	5,000	W+	107	95	742.5	14,700	11,025	---	200	685
> 5,000	5,200	X+	111	97	742.5	15,400	11,550	---	200	685
> 5,200	5,500	Y+	111	97	742.5	16,100	12,075	---	200	695
> 5,500	5,800	Z+	114	100	742.5	16,900	12,675	---	200	705
> 5,800	6,100	A*	117	102	742.5	17,800	13,350	---	200	705
> 6,100	6,500	B*	120	107	742.5	18,800	14,100	---	200	715
> 6,500	6,900	C*	124	111	770	20,000	15,000	---	200	725
> 6,900	7,400	D*	127	114	770	21,500	16,125	---	200	725
> 7,400	7,900	E*	132	117	770	23,000	17,250	---	200	725
> 7,900	8,400	F*	137	122	770	24,500	18,375	---	200	735
> 8,400	8,900	G*	142	127	770	26,000	19,500	---	200	735
> 8,900	9,400	H*	147	132	770	27,500	20,625	---	200	735
> 9,400	10,000	I*	152	132	770	29,000	21,750	---	200	735
> 10,000	10,700	J*	157	137	770	31,000	23,250	---	200	735
> 10,700	11,500	K*	157	142	770	33,000	24,750	---	200	735
> 11,500	12,400	L*	162	147	770	35,000	26,625	---	200	735
> 12,400	13,400	M*	---	152	770	38,500	28,875	---	200	735
> 13,400	14,600	N*	---	157	770	42,000	31,500	---	200	735
> 14,600	16,000	O*	---	162	770	46,000	34,500	---	200	735



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