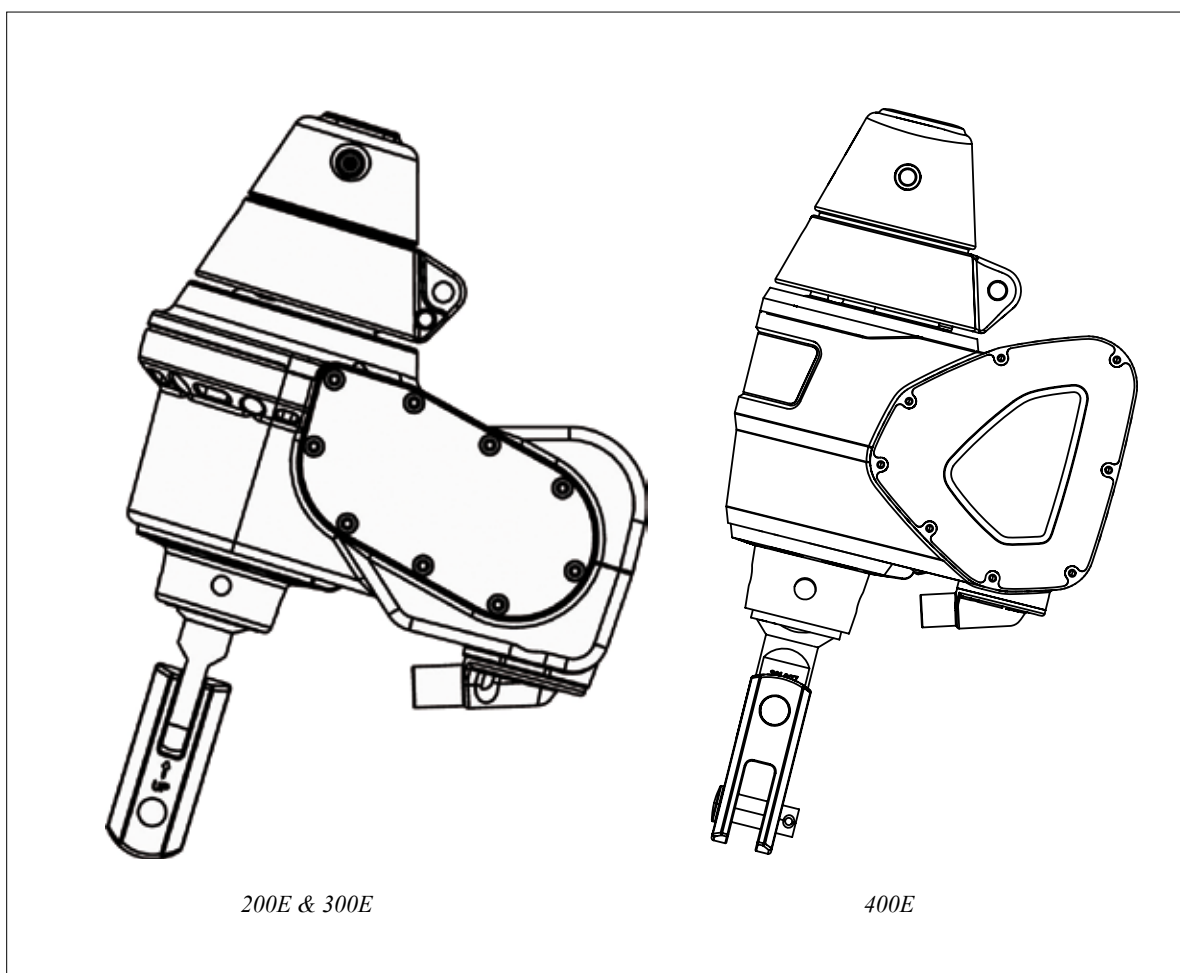


Manual

Furlex Electric *200E, 300E & 400E*



1 Introduction

1.1 Instructions

In order for you to gain the most benefit and enjoyment from your Furlex Electric system, we recommend that you study these instructions thoroughly. The instructions also contain advice about equipment that is not included in the Furlex Electric basic kit, i.e. cables, fuses, etc. We therefore recommend that these instructions be read before purchasing additional material and the installation work is started.

The instructions are divided into three main sections:


- **ELECTRICAL INSTALLATION IN THE BOAT**
- **RETROFITTING A MOTOR UNIT ON AN EXISTING FURLEX**
- **OPERATIONAL INSTRUCTIONS**

For installation of the furling system only (Forestay, extrusion and bearing assembly) on boats and rigs, follow specific parts from instruction 595-104-E for manual Furlex 200S & 300S, 595-231-E for manual Furlex 200TD & 300TD, 595-116-E for manual Furlex 400S, 595-240-E for manual Furlex 400TD. It is very important that the instructions are read and implemented.

EF in the margin indicates that the information is specific for retrofitting on an EXISTING FURLEX

NF in the margin indicates that the information is specific for installation of a completely NEW FURLEX-E including forestay, extrusion and bearing assembly.

TD in the margin indicates that the information is specific for retrofitting on a FURLEX-TD i.e. Seldén's Furlex for below-deck installation.

□ All safety-related information is indicated by the following symbol: 

The instruction includes and refers to three different Furlex-sizes, 200E, 300E and 400E respectively. This designation can be found on the motor unit.

All dimensions specified in the instructions are in millimetres (mm) unless otherwise indicated.



The information in this instruction must be followed without exception to avoid breakdowns and the risk of personal injury.

The 2-year guarantee on the Furlex Electric system is only valid if the system is assembled and operated in accordance with these instructions.



Read all the instructions before installing.

Seldén Mast AB's guarantee for Furlex Electric-parts is 2 years. The guarantee applies to faults caused by Seldén Mast AB, arising through faulty construction, material or work.

The guarantee applies only if the Furlex system has been installed, operated and maintained in accordance with this instruction and has not been exposed to greater loads than those given in the brochure and instruction material.

If the system is repaired by anyone other than Seldén Mast AB or one of our authorised dealers, the guarantee ceases to be valid.

Seldén Mast AB reserves the right to alter the content and design without prior warning and maintains the right to future design changes.

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1.2 Product information

Seldén has manufactured the Furlex furling foresail system since 1983. Furlex quickly became the market leader, a position it still occupies today due to further development of the self-furling foresail concept. Our current production includes, in addition to the basic model **Furlex S** (controlled from the cockpit via a line), **Furlex H** (hydraulic controls) and **Furlex TD** for below-deck installation, (Through Deck).

The latest addition to the Furlex-collection is **Furlex E** (Furlex Electric) and **Furlex TDE** (Through Deck Electric). In addition to the success we have had in creating a powerful, reliable product for new boats, we are now proud to offer owners of the older Furlex S-system, (from 1997), an easy upgrading to electrical operation. This also means that a customer who buys a boat sometime in the future that is equipped with a manual Furlex (Furlex S) can later easily upgrade it to electrical operation.

When we developed Furlex Electric we had the following criteria in focus:

Powerful It should be able to furl a sail in really hard wind conditions.

Simple construction Easy to install and perform service on

Compatible with Furlex S Should fit on existing manual systems. (from 1997)

Reliable A minimum number of components in both the mechanical and electrical design.

Cost-effective A well thought out, high quality product at an acceptable price.

It has always been our intention to retain responsibility for our products through all stages of supply. Furlex Electric is therefore only sold through local, authorised dealers who can satisfy all of our customers requirements. These can assist with advice, installation help and service.

Furlex Electric is supplied as a basic kit for most boats. There are a number of accessories for adaptation of the equipment, such as remote control, fuses, etc.

Furlex is developed and manufactured by Seldén Mast AB, the world's leading manufacturer of masts and rigging systems. Our range of products consists of self-furling systems for a large number of boats, from dinghies to 80 foot displacement boats.

We wish you fine sailing with your Furlex Electric.



Follow the instructions carefully during installation

1. Snap shackle
2. Adapter
3. Tack ring
4. Terminal eye or Furlex rigging screw
- 2-4. Lower bearing assembly
5. Flange
6. Ball-bearings installed in bearing cage
7. Toggle, stiff
8. Shims
9. Extension link, stiff (option)
10. Motor unit
11. Flange ring
12. Motor unit cable collar
13. Protective sleeve for cable
14. Deck collar
15. Emergency furling equipment
16. Connection box
17. Control box
18. Battery isolator (not supplied)
19. Main fuse with holder (option)
20. Control current switch (option)
21. Button lighting switch (option)
22. Control buttons (option)
23. Remote control (option)
24. Adapter tube with adapter
25. Tack ring
26. Deck collar
27. Lower bearing assembly
28. Fork termination

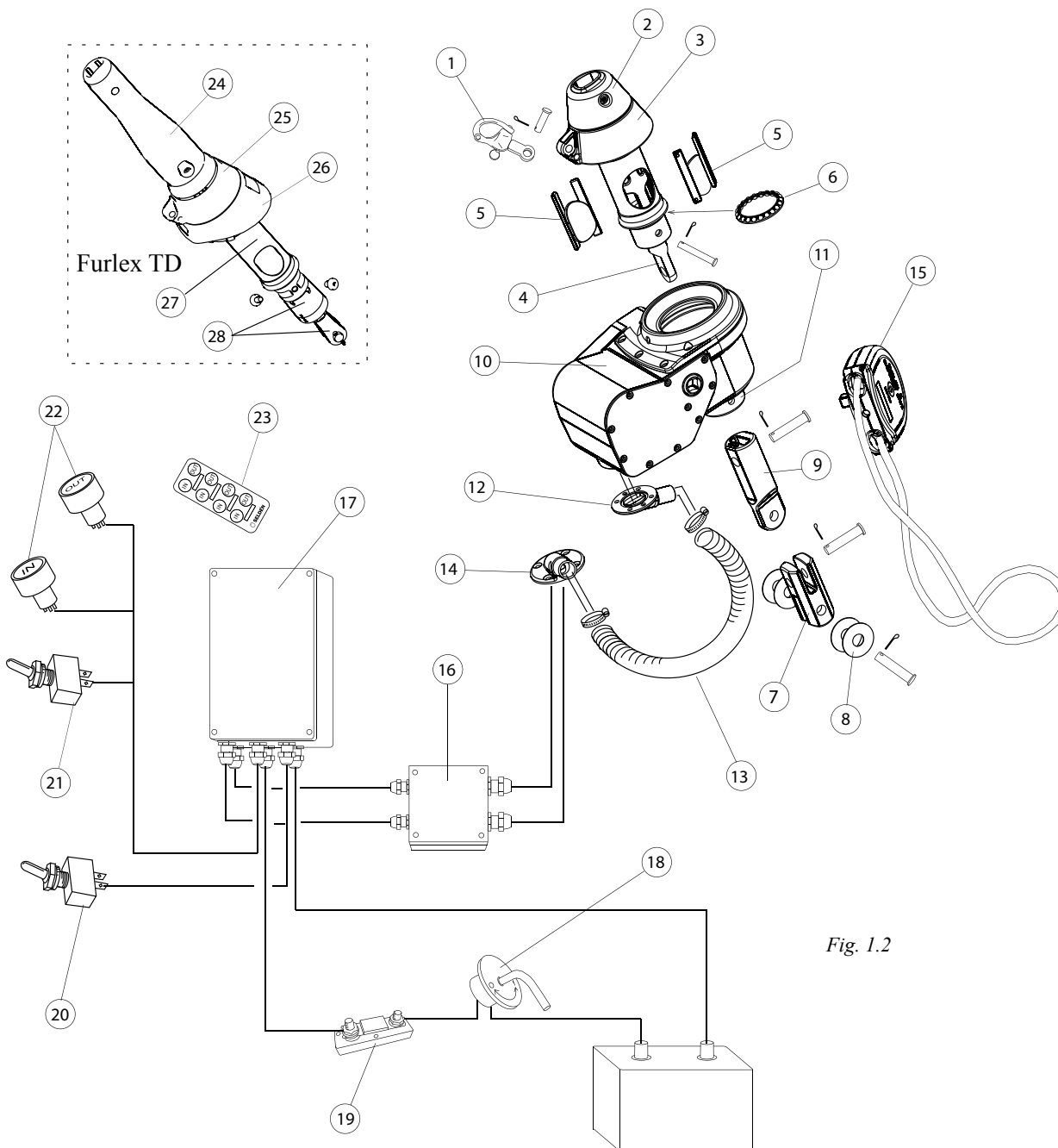
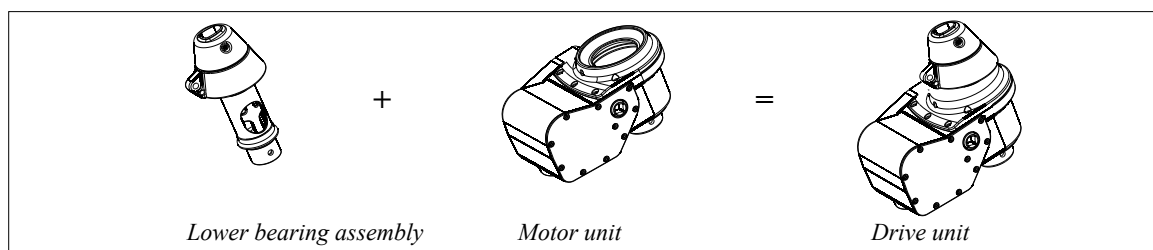


Fig. 1.2



1.3 Product description

The Furlex Electric drive unit consists of the motor unit together with the lower bearing assembly. The electric motor is supplied with power and controlled via the control box. The main parts of the system are shown in fig 1.2.

Motor unit

The motor unit contains an electric motor that drives a reduction gear via a belt. The reduction gear in turn drives the lower bearing assembly, and thereby the sail extrusion, via one or two flanges.

Technical data for the motor unit:

Furlex Series	Drive ratio (reduction and belt drive)	Electric motor Qty
200E	53.4:1	1
300E	60.8:1	1
400E	63.1	2

IP-class motor unit IP57. (Does not include water entry via the open end of the cable protection sleeve).

The rotational speed of the sail extrusion at different loads can be read from diagram 1.3.a-1.3.e.

Electric motor

The electric motor is a DC brush motor with permanent neodym-magnets. The direction of rotation is changed by switching polarity with a relay in the control box.

The electric motor is located within the starboard cover lid. The stainless steel cover lid is sealed with gasket silicon. The electric motor is protected from overheating by a protective current limitation function in the control box, the function disconnects the power to show that the motor is overloaded. This function is described more completely under "Control box" later on in chap. 1.3.

Technical data for the electric motors:

Furlex Series	Voltage (V)	Nominal power (W)	Speed (unloaded) (rpm)
200E	12	220	2330
300E	12/24	450	2150
400E	12/24	900	2150

Current consumption at different loads can be seen in diagram 1.3.a-1.3.e.

Belt drive

The belt drive is within the port cover lid. It comprises toothed aluminium pulleys and a belt made from composite material. The stainless steel cover lid is sealed with gasket silicon.

Data for belt drive:

Furlex Series	Drive ratio (belt drive)
200E	1.78:1
300E	1.52:1
400E	1.5:1

Reduction gear

The reduction gear comprises a worm and a pinion. The end of the worm can be seen on the starboard side, it has a 1/2" socket to allow emergency furling. The worm is supported in the housing on two angular-contact bearings.

The pinion is made from bronze and is supported in the motor housing with roller bearings.

On delivery, the reduction gear is packed with ball bearing grease.

The worm and pinion are sealed with grease seals.

The reduction gear is self-locking. This means that the sail is prevented from unfurling, however hard the sheet load is.

Refer to chap. 8 for service of the motor unit/reduction gear.

Data for reduction gear:

Furlex Series	Drive ratio (reduction gear)
200E	30:1
300E	40:1
400E	42:1

Torque, current consumption and rotational speed

The torque on the drive unit output shaft (extrusion), current consumption and rotational speed of the extrusion can be seen for Furlex 200E, 300E and 400E in diagram 1.3.a-1.3.e. The loads of 60, 90 and respective 135 Nm correspond to furling in very hard weather or when the sheet is insufficiently slack. In “normal” conditions, the drive unit works at 20 to 30% of its maximum capacity.



For cable dimensions, refer to table 4.9.c.

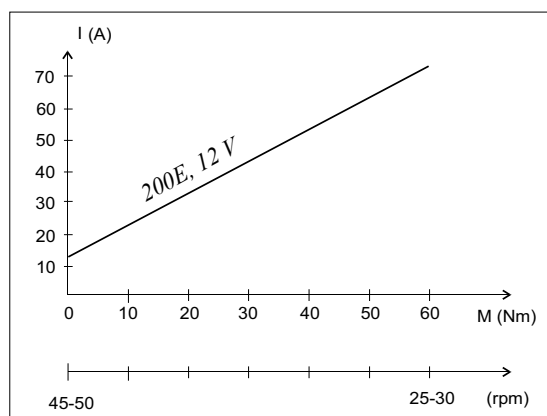


Diagram 1.3.a

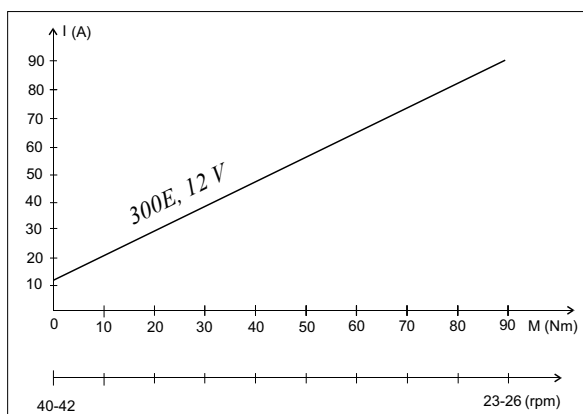


Diagram 1.3.b

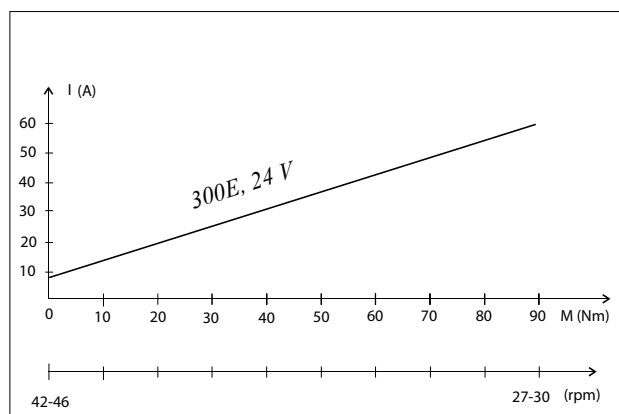


Diagram 1.3.c

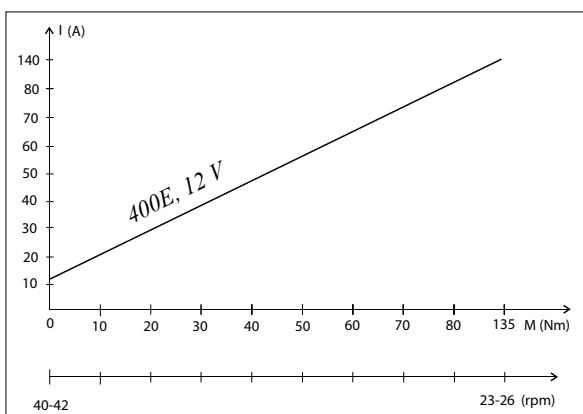


Diagram 1.3.d

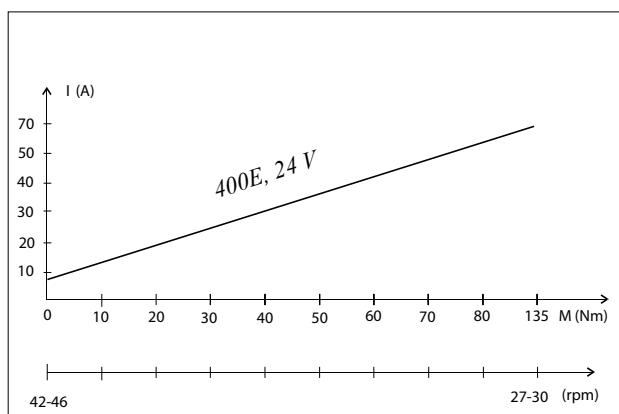


Diagram 1.3.e

Control box

The Furlex Electric is connected to and is controlled from the control box. The box is available in 12 V or 24 V versions. Class IP65. The box is intended for installation under deck, not in the anchor box or equivalent.

It contains the following functions:

Connection points for the power cables

Connection plinths for the control cables

Polarity alternating relay

Current limiting function

Fuse for control current. Type: Glass tube fuse (Ø 5x20) 3.15 A

Connection plinth for remote control (Remote control can be purchased as an option)

The current to the motor is limited electronically by the control box. The two potentiometers (R) and (B) on the electronics board are set to the correct value for the motor in question at delivery and are sealed with yellow tape. The blue pot. (B) controls the current value. The red pot. (R) determines how long this current is permitted before the current is cut.

At 110 A 12 V (75 A 24 V) the current will be cut within 1 sec, independent of the values set on the two potentiometers. Such high currents can occur if one does not slacken the sheet when furling.

When the IN or OUT button is released, the current protection is reset automatically after a few seconds. One can now continue furling/unfurling, but has received a warning that the load is too high.



The current limitation value (potentiometers) are set at delivery and shall not be adjusted.

The current limitation also functions as a fuse if a short-circuit should occur between the control box and the motor.

Connection box

The connection box is the dividing point between the drive unit and the boat, it is intended for installation in the anchor box. When removing the drive unit from the boat, disconnect the motor cables from the connection box plinth.

Class IP65.

Wireless remote control (option)

Furlex Electric can be equipped with wireless remote control as an accessory. In addition to the remote hand unit, an extra circuit board with control electronics is required (receiver board). This easily mounted in the control box. The hand unit (transmitter) is equipped with a button panel for a total of four on/off functions (8 buttons).

Controlling a Furlex Electric occupies one of these functions (2 buttons). There are therefore an additional three on/off functions remaining for other equipment onboard. E.g. electric or hydraulic furling mast, hydraulic boom hauler, anchor winch, etc. For each of these additional functions, an additional circuit board will be required.

The hand unit is powered by one battery, type 4LR44.

Class IP65. (impervious to flushing and rain but not submersible).

For order no., see chap. 2.4.

INSTALLATION

2 Check list

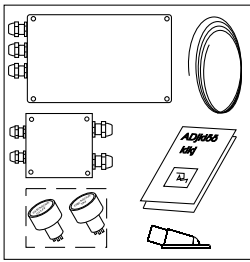
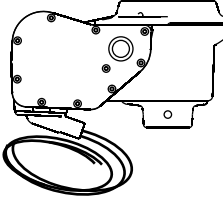
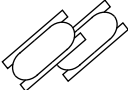

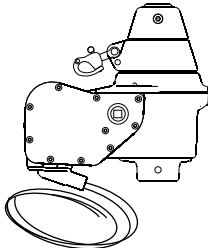
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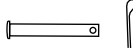
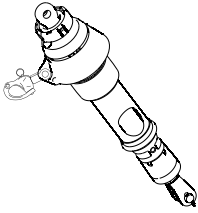

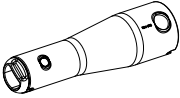

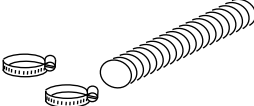
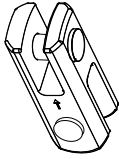
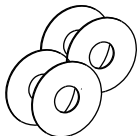
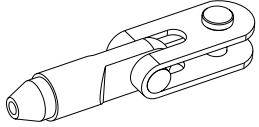
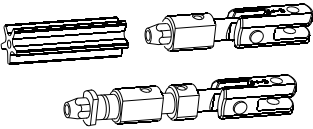
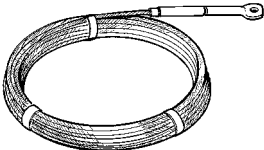
Furlex E complete system with extrusion kit

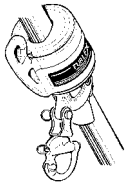
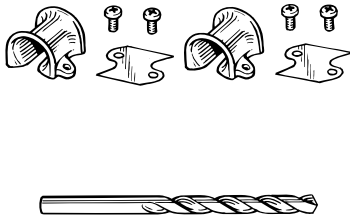
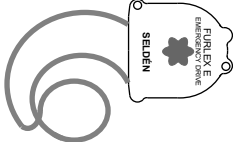

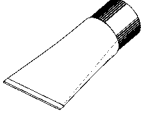
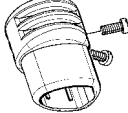

Furlex E for retro-fitting on existing Furlex S

Furlex TDE complete system with extrusion kit

Furlex TDE for retro-fitting on existing Furlex TD

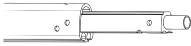
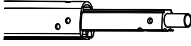



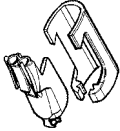

		NF	EF	TD	EF	NF	EF	TD	EF	
		Furlex E 200E & 300E Complete system	Retrofit E 200E & 300E For retrofiting	Furlex 200TDE & 300TDE Complete system	Furlex 200TDE & 300TDE Retrofit For retrofiting	Furlex 400E Complete system	Retrofit 400E For retrofiting	Furlex 400TDE Complete system	Furlex 400TDE Retrofit For retrofiting	<input checked="" type="checkbox"/>
Control pack (See 2.3, Separate check list) May be included in the large box or may have been sent separately in advance, depending on the order)		1	1	1	1	1	1	1	1	<input type="checkbox"/>
Motor unit		-	1	1	1	-	1	1	1	<input type="checkbox"/>
Carriers Part. no. 200E 539-630 Part. no. 300E 539-648 Part. no. 400E 539-782		-	2	2	2	-	2	2	2	<input type="checkbox"/>
Ball bearings in cage Part. no. 200E 319-845-01 Part. no. 300E 319-846-01 Locking ring Part. no. 200E 301-510 Part. no. 300E 301-508		-	1+1	-	1+1	-	-	-	-	<input type="checkbox"/>
Drive unit (Lower bearing assembly with snap shackle and motor unit)		1	-	-	-	1	-	-	-	<input type="checkbox"/>

Rigging bolt with split pin		1+1	1+1	-	-	1+1	1+1	-	-	<input type="checkbox"/>
Lower bearing assembly with snap shackle		-	-	1	-	-	-	1	-	<input type="checkbox"/>
Deck collar with screw and template		-	-	1	-	-	-	1	-	<input type="checkbox"/>
Adapter tube with adapter and extrusion screws		-	-	1	-	-	-	1	-	<input type="checkbox"/>
2 bolts		-	-	2	2	-	-	2	2	<input type="checkbox"/>
Protective cable sleeve Part. no. 200E 319-836 + 312-211 Part. no. 300E/400E 319-837 + 312-210 with 2 hose clamps		1+2	1+2	1+1	1+1	1+2	1+2	1+1	1+1	<input type="checkbox"/>
Stiff toggle		-	1	-	-	-	1	-	-	<input type="checkbox"/>
Washers		4	4	4	4	4	4	4	4	<input type="checkbox"/>
Wire terminal with toggle		-	-	1	-	-	-	1	-	<input type="checkbox"/>
Wire terminal with spacer or rigging screw function. (depending on order)		1	-	-	-	1	-	-	-	<input type="checkbox"/>
Forestay wire with top bearing		1	-	1	-	1	-	1	-	<input type="checkbox"/>

Halyard swivel with snap shackle		1	-	1	-	1	-	1	-	<input type="checkbox"/>
200S: 2 halyard leads 508-159 with insulator washers incl. 4 screws Drill bit Ø 5.3 mm 300S/400S: 2 Halyard leads 508-128 with insulator washers incl. 6 screws Drill bit Ø 5.3 mm		1 pack- age	-	1 pack- age	-	1 pack- age	-	1 pack- age	-	<input type="checkbox"/>
Control hand unit for emergency furling		1	1	1	1	1	1	1	1	<input type="checkbox"/>
Locking fluid		1	1	1	1	1	1	1	1	<input type="checkbox"/>
Grease		1	1	1	1	1	1	1	1	<input type="checkbox"/>
Top guard incl. 2 screws		1+2	-	1+2	-	1+2	-	1+2	-	<input type="checkbox"/>
Instructions Spare parts list Guarantee certificate		1 ¹⁾	1 ¹⁾	1 ¹⁾	1 ¹⁾	1 ¹⁾	1 ¹⁾	1 ¹⁾	1 ¹⁾	<input type="checkbox"/>


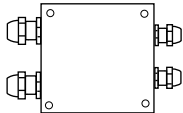


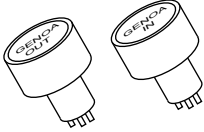

¹⁾ Instructions for installation and operation for Furlex E are packed in the control package.

2.2 Foil pack


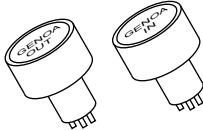
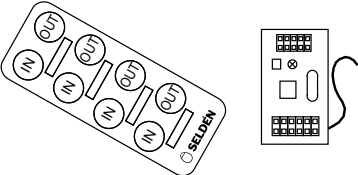
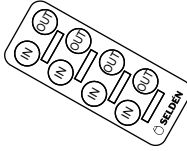
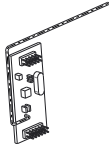
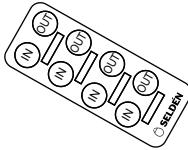
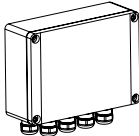
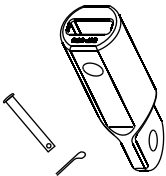
		NF	EF	TD	EF	
		Furlex E Complete system	Retrofit E For retrofiting	Furlex TDE Complete system	Furlex TDE Retrofit For retrofiting	<input checked="" type="checkbox"/>
200S-400S One 1000 mm extrusion with long joining sleeve		•	-	•	-	<input type="checkbox"/>
200TD: One 800 mm extrusion with long joining sleeve 300TD: One 770 mm extrusion with long joining sleeve 400TD One 660 mm extrusion with long joining sleeve		-	-	•	-	<input type="checkbox"/>
200S/300S One 2000 mm extrusion with spacer tube		•	-	•	-	<input type="checkbox"/>
400S/400TD One 1700 mm extrusion with spacer tube		-	-	•	-	
2400 mm extrusions with spacer tube + joining sleeve (Number dependant on length ordered)		•	-	•	-	<input type="checkbox"/>
Sail feeder (Sail feeder + sailfeeder connector)		•	-	•	-	<input type="checkbox"/>
1 short coupling plate for each 2400 mm of extrusion 1 long coupling plate (Foresail feeder) 1 locking pin Ø 3 x 25 for 1000 mm extrusion		•	-	•	-	<input type="checkbox"/>

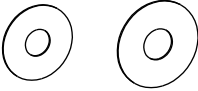
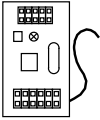
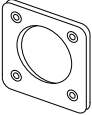
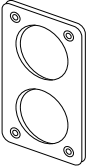

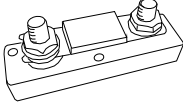
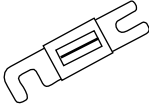
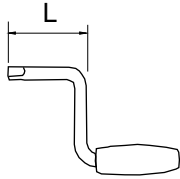
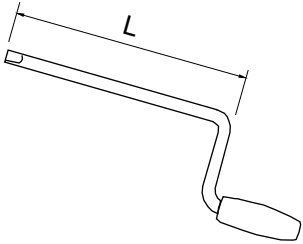
2.3 Check list for control package

The control package is included in Furlax Electric basic kit **EF** or is supplied in advance **NF**

		NF	EF	TD	EF	
		Furlax E Complete system	Retrofit E For retrofiting	Furlax TDE Complete system	Furlax TDE Retrofit For retrofiting	<input checked="" type="checkbox"/>
Control box 12V or 24V Check the voltage (V) (See dataplate on side of box)		1	1	1	1	<input type="checkbox"/>
Connecting box		1	1	1	1	<input type="checkbox"/>
15 m signal cable 7x0.75 mm ² , colour coded		1	1	1	1	<input type="checkbox"/>
Including deck collar 4 self-tapping screws		1	1	-	-	<input type="checkbox"/>
Control button GENOA IN Control button GENOA UT Incl 8 cable lugs (Only if ordered)		(1+1)	(1+1)	(1+1)	(1+1)	<input type="checkbox"/>
Instruction		1	1	1	1	<input type="checkbox"/>

2.4 Accessories Number = dependant on the order

		NF	EF	TD	EF	
		Furlex E Complete system	Retrofit E For retrofiting	Furlex TDE Complete system	Furlex TDE Retrofit For retrofiting	<input checked="" type="checkbox"/>
15m signal cable 7x0.75 mm ² , colour coded (Part no. 531-033-15)						<input type="checkbox"/>
Control button GENOA OUT (Part no. 540-459-01) Control button GENOA IN (Part no. 540-460-01)						<input type="checkbox"/>
Complete remote control for Furlex E MK1, incl. hand unit with battery and "plug-in" receiver board. (Part no. 532-510-01) Compatible with Furlex E controlbox w. software up to FW1.7.0						<input type="checkbox"/>
Extra hand unit for remote control, incl. battery, MK1 (Part no. 532-460-01) Compatible with Furlex E controlbox w. software up to FW1.7.0						<input type="checkbox"/>
Receiving-card "plug-in" type for Furlex E (Part no. 532-465-01) Compatible with MK1, MK2						<input type="checkbox"/>
Extra hand unit for remote control, incl. battery, MK2 (Part no. 532-460-11) Compatible with Furlex E controlbox w. soft- ware FW2.0.0, and 4-function receiver.						<input type="checkbox"/>
Receiving box for remote control (4 functions). (Part no. 532-466-10) Receiver box 4 functions compatible with MK2 transmitter Spare fuse: type glass tube, 4 A (T4L250V)						<input type="checkbox"/>
Eye/fork extension link, Ø 6, Ø 7 mm, L=90 mm (Part no. 517-070-01) Ø 8, Ø 10 mm, L=130 mm (Part no. 517-071-01) Ø 12 mm, L=190 mm (Part no. 517-072-01) Ø 14 mm, L=190 mm (Part no. 517-073-01)						<input type="checkbox"/>

<p>Shims Ø 6, Ø 7, Ø 8 mm wire (Part no. 164-516)</p> <p>Ø 10 mm wire (Part no. 164-519)</p> <p>Ø 12 mm wire (Part no. 164-523)</p> <p>Ø 14 mm wire (Part no. 164-524)</p>						<input type="checkbox"/>
<p>Receiver card (Part no. 532-465-01)</p>						
<p>Stainless panel for Seldéns control buttons, single (Part no. 540-461-01)</p>						<input type="checkbox"/>
<p>Stainless panel for Seldéns control buttons, double (Part no. 540-462-01)</p>						<input type="checkbox"/>
<p>Switch, toggle type with long neck, rubberised, for installation in max 7 mm thick panel (Part no. 532-514)</p>						<input type="checkbox"/>
<p>Fuse holder (Part no. 532-512) Fuse not included, order separately</p>						<input type="checkbox"/>
<p>Blade fuse 160 A (Part no. 532-513) Fits holder 432-512 Intended for 200E 12V, 300E 12/24V For minimum cable cross-section 16 mm² (Always have a spare fuse onboard)</p>						<input type="checkbox"/>
<p>Short crank for emergency furling, L=100 mm (Part no. 533-922)</p>				-	-	<input type="checkbox"/>
<p>Long crank for emergency furling, L=325 mm (Part no. 533-923)</p>				-	-	<input type="checkbox"/>

3 Assembly preparations

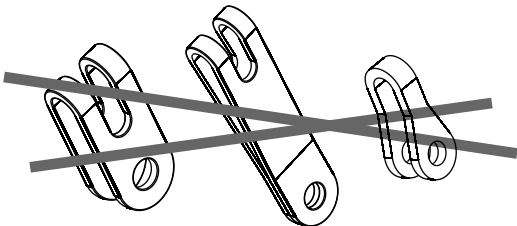
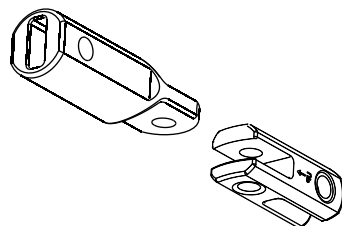
3.1 Forestay attachment – Main rule

The main rule is that the forestay and all its connections shall be flexibly jointed in all directions. In most cases, a toggle shall be fitted between the Furlex stay and the forestay attachment.

3.2. Connection to the deck

EF Existing Furlex-systems are equipped with a fork toggle as standard. This must be replaced by the stronger toggle included in the kit.

If an extension link is used, this should also be replaced by a stronger type. See table 3.2.4.

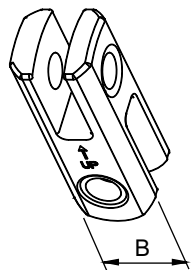
	
<p>These toggles and extension shall not be used since they do not fulfil the torsional requirements.</p>	<p>These toggles and extensions are designed for Furlex E and fulfil the torsional requirements.</p>

Check that the boat’s forestay attachment is strong enough to take up the torsional forces from the Furlex-E. Since there is no furling line to take up the torsional forces when, e.g. sailing with a reefed foresail, all of the torsional forces will be taken up by the drive unit and be transferred via the toggle and any extension link to the boat’s forestay attachment. See table 3.2.1 for minimum torsional strength.

Furlex Series	Maximum torque on the forestay attachment (Max Service Load) (Nm)											
	6 mm wire		7 mm wire		8 mm wire		10 mm wire		12 mm wire		14 mm wire	
	Rigg-type		Rigg-type		Rigg-type		Rigg-type		Rigg-type		Rigg-type	
	Mast-head	Partial	Mast-head	Partial	Mast-head	Partial	Mast-head	Partial	Mast-head	Partial	Mast-head	Partial
200E	95	108	144	168	219	226	-	-	-	-	-	-
300E	-	-	-	-	242	281	430	440	-	-	-	-
400E	-	-	-	-	-	-	-	-	758	801	1141	998

The torque is transferred to the forestay attachment via the width of the toggle (B). If the forestay attachment is too light weight, it can be locally deformed, Even if the attachment to the boat itself can handle the maximum stated torque.

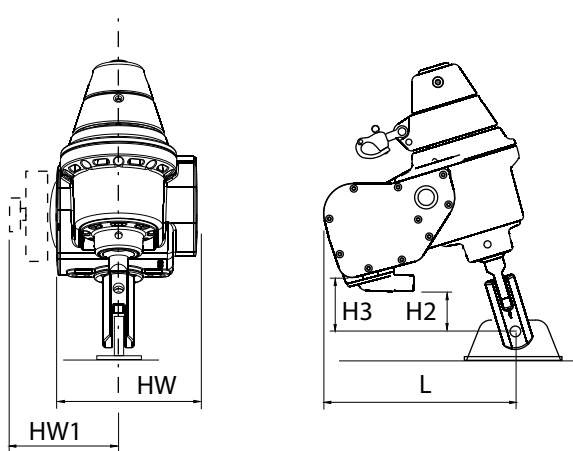
Furlex Serie	Toggle width B as illustrated (mm)					
	6 mm wire	7 mm wire	8 mm wire	10 mm wire	12 mm wire	14 mm wire
200E	32	35	35	-	-	-
300E	-	-	35	40	-	-
400E	-	-	-	-	47	47



The strength can be theoretically calculated or found via practical tests.

If the chainplate is not sufficiently strong, there are four threaded holes on the underside of the motor unit to which a torque absorber can be fitted. This must be individually adapted for the boat in question and is therefore not supplied by Seldén.

3.2.1 Dimensions of drive unit, deck fitting

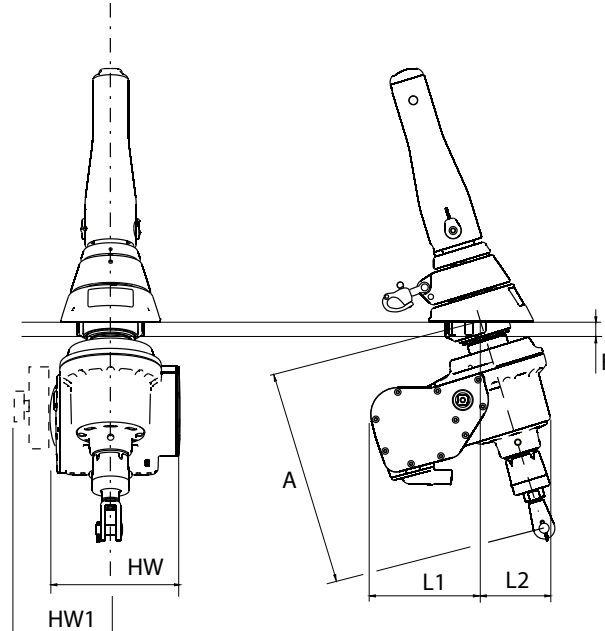


Furlex Series	L (mm)	H2 (mm)	H3 (mm)	HW (mm)	HW1 (mm)
200E	225	45	60	160	145
300E	260	65	80	210	160
400E	314	135	159	218	203

* The dotted lines show emergency furling fitted. The figure shows Furlex 200E.

Table 3.2.1

3.2.2 Dimensions of drive unit, TDE



Furlex Series	A (mm)	F (mm)	L1 (mm)	L2 (mm)	HW (mm)	HW1 (mm)
200TDE	290-450	20	145	95	160	145
300TDE	330-490	20	170	105	210	160
400TDE	433-633	30	190	131	218	203

* The dotted lines show emergency furling fitted. The figure shows Furlex 200TDE.

Table 3.2.2.a

The black collar ① (fig. 3.2.2.b) on the 300TD-model motor unit is chamfered ② to achieve an F-measurement of 20 mm, see table 3.2.2.a.

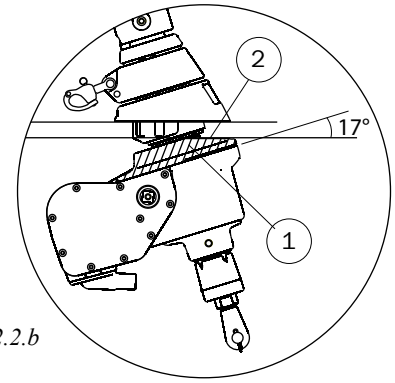


Fig. 3.2.2.b

3.2.3 Toggles and extensions

If the boat is fitted with a bow anchor, it may be necessary to raise the drive unit to allow clearance for the anchor. High-strength extension links are available as accessories, see table 3.2.4. The links have the same length (H) as the corresponding links on Furlex S.

If the lower drive unit is raised by using extension links or similar. Then the Furlex-**toggle**, or corresponding with the same function, **shall be mounted between the extension link and the boat's forestay attachment.**

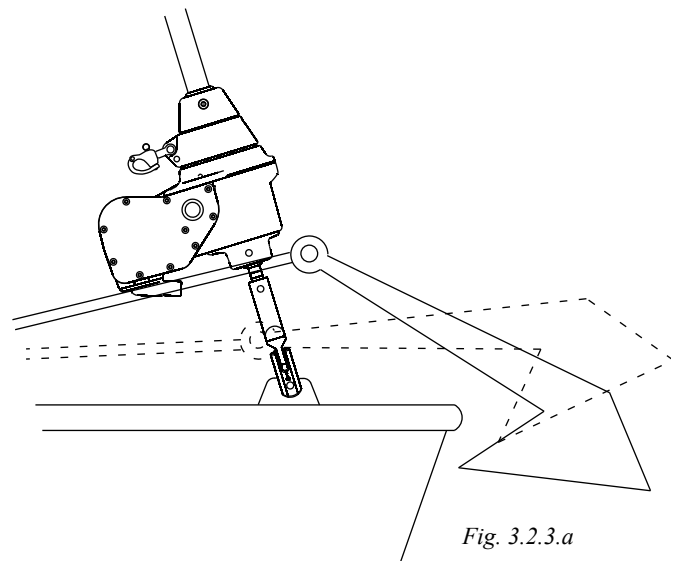


Fig. 3.2.3.a

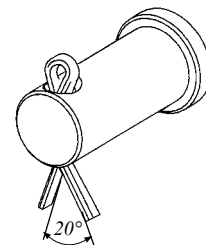


An extended toggle does not give the required flexibility. It must always be connected to the boat's forestay attachment via a toggle.



Make sure that the toggles' split pins are secure after installation, see fig. 3.2.3.b.

Fig. 3.2.3.b



Ensure that the torsional strength of the boat's forestay attachment is sufficient and that the correct toggle is used.

3.2.4 Dimensions and data for toggles (Toggles can be supplied by a Furlex dealer)

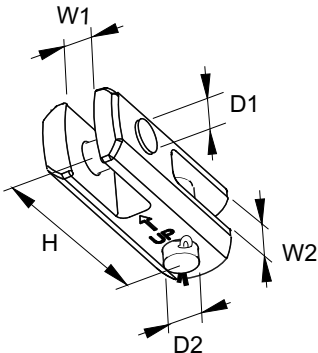
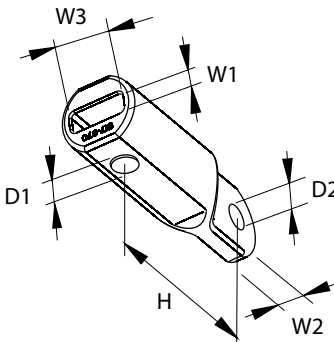
Toggel type		Forestay Dimension					
		Ø 6	Ø 7	Ø 8	Ø 10	Ø 12	Ø 14
	Art. no.	539-658-01	539-659-01	539-660-01	539-667-01	539-783-01	539-784-01
	Length (H)	45	45	55	55	65	80
	Ø Rigging bolt (D1)	12	12	14	16	19	22
	Fork width (W1)	10.2	10.2	13.6	13.6	20	21
	Ø Rigg bolt (D2)	10	12	14	16	19	22
	Fork width (W2)	12	14	14	16	21	23
	Art. no.	517-070-01	517-070-01	517-071-01	517-071-01	517-072-01	517-073-01
	Length (H)	90	90	130	130	190	190
	Ø Rigging bolt (D1)	12	12	16	16	19	22
	Fork width (W1)	10.2	10.2	13.7	13.7	20	21
	Eye (D2)	12.5	12.5	16.5	16.5	19.5	22.5
	Thickness (W2)	10	10	13.5	13.5	19.2	20.2
	Internal width (W3)	27	27	33	33	38	44.3

Table 3.2.4

3.3 Anchor box drainage

Make sure that the draining hole for the anchor box is sufficiently large to prevent water being dammed up in the box if the boat dives in high seas. This is especially important for Furlex TD Electric, since the motor unit is fitted further down in the anchor box. If the anchor box fills up with water, this could damage the motor unit.

On some boats, the anchor box cover has a hole for the chain shaped like a “letterbox”. This hole can allow large amounts of water to enter if the boat dives in high seas.

Tip; Fasten a piece of foam to the cover. Make a hole for the chain. This reduces the water flow considerably.



Make sure that the anchor box is well drained and does not risk being filled with water.

4 Electrical installation in the boat

4.1 Cables and components

Fig. 4.1 is an overview drawing of a typical electrical installation for a Furlex Electric. All components and cables (C1-C6) are shown and referred to in the text in this and following chapters.

The cable sizes are described in chap.4.9.

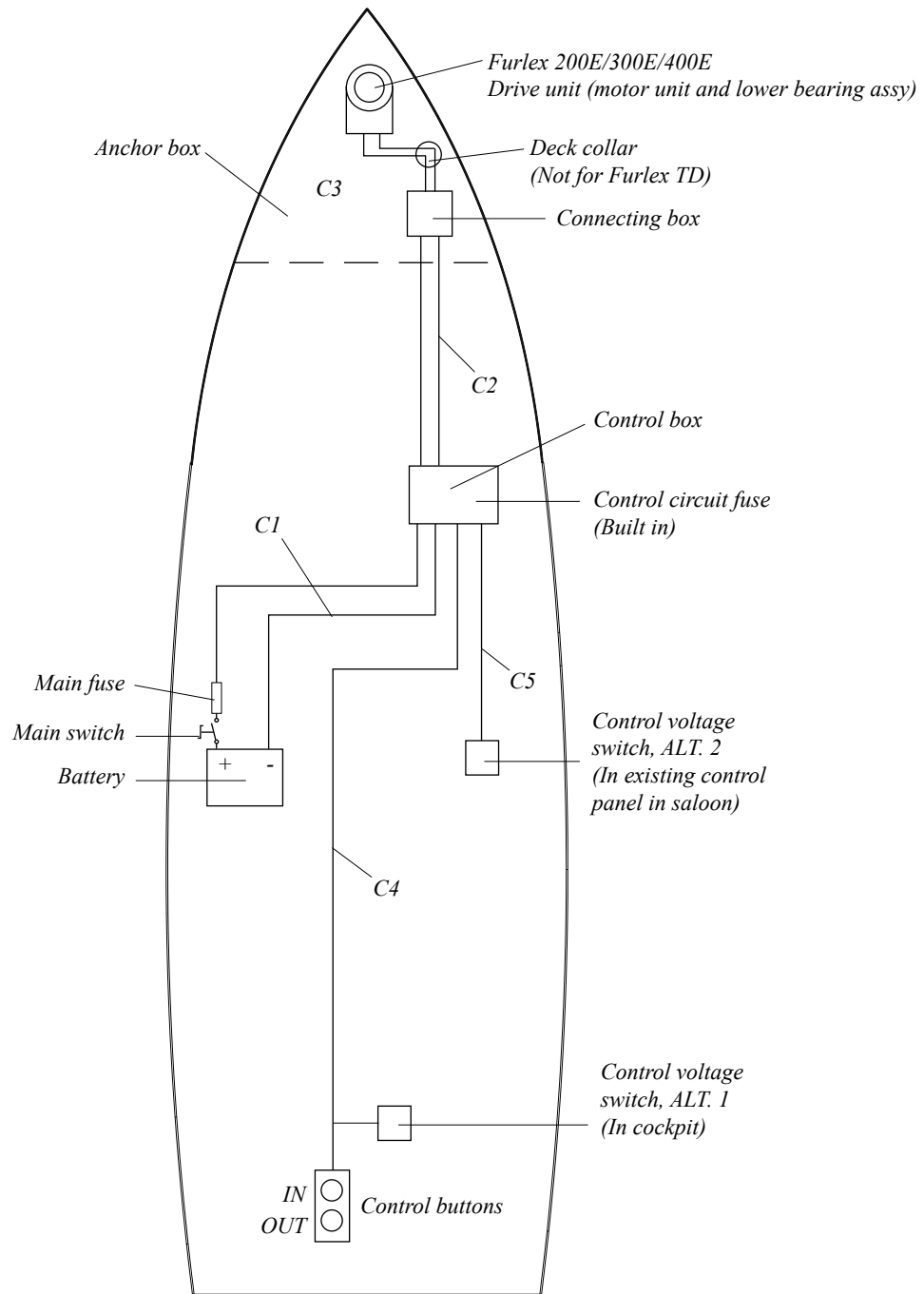
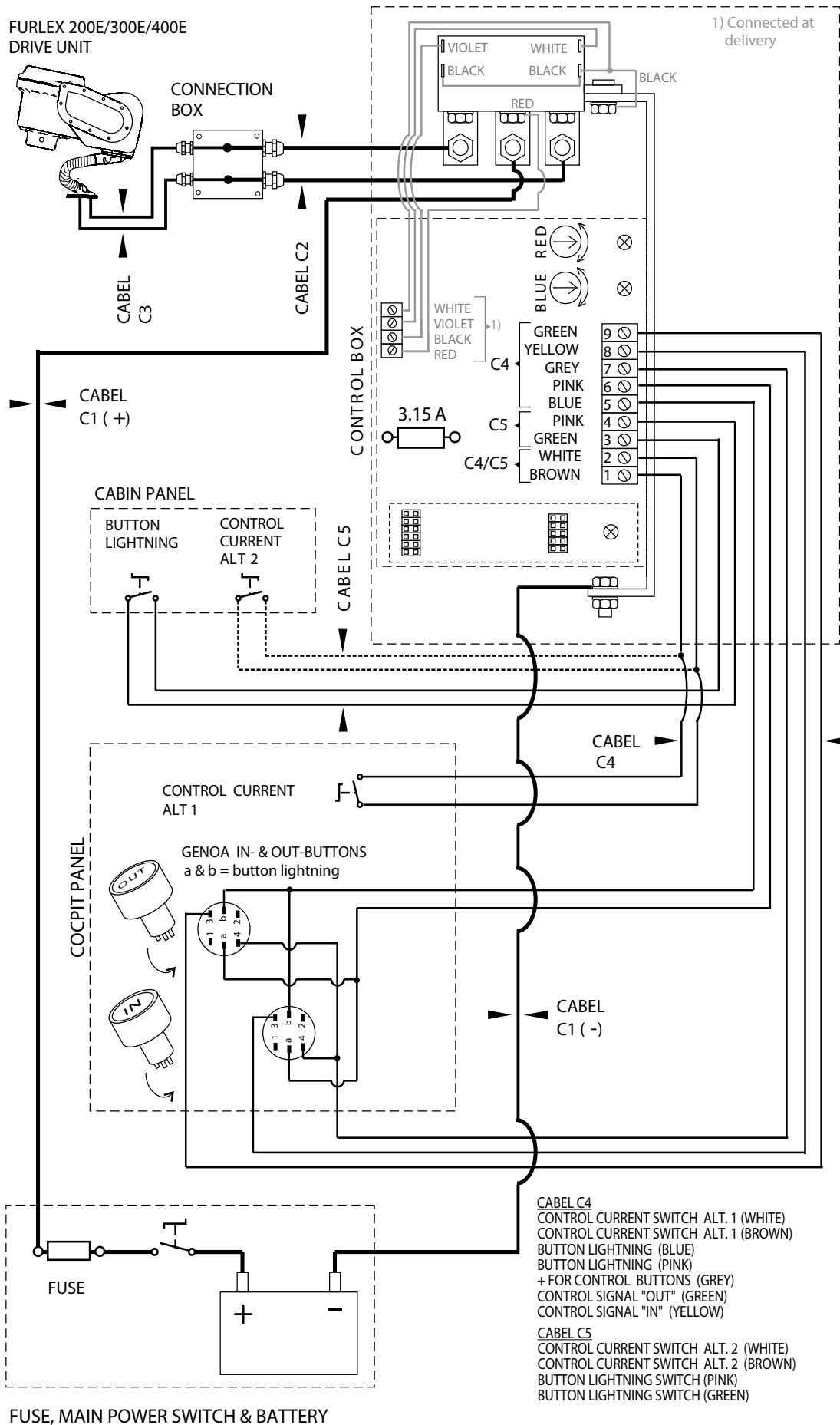


Fig. 4.1

4.2 Wiring diagram

Fig. 4.2



4.3 Planning the electrical installation

Check that the boat's existing battery capacity is sufficient. If extra batteries are required, their location must be carefully considered. See chap. 4.5.

To extract the best effect from the system, it is necessary to minimise the unavoidable voltage drop that occurs between the battery and the drive unit.

1. Minimise the cable length between the battery and the drive unit. Place the connectionbox so that the length of C3 is minimised.
2. Follow the recommended cable dimensions. See table 4.9.c.
3. Make sure you use cable terminations that provide a good contact surface when connecting up. We recommend crimped cable terminations. Connections in the connecting box are via DIN rail plinths.
4. Tinned conductors are recommended.

If a common supply cable is to be use to provide for more functions than the Furlex Electric with power (e.g. anchor winch and bow propeller) the following must shall be taken into consideration:

1. Cables, fuses and battery capacity must be dimensioned so that all functions can be operated simultaneously. Alternatively, a separate control function can be fitted to ensure that only one function can be operated at a time. (Contact your boat electrician for this)
2. Feeds from the supply cable to the various functions must be via the connection box.
3. The control box must be mounted after the connection box.
4. An existing fuse (mounted between the battery and connection box) provides short-circuit protection for cable C1, assuming the fuse does not exceed the value in table 4.9.a, when the cable cross-section corresponds to C1. If the existing fuse is too large, see fig. 4.9.b.

4.4 Control box

The control box should be mounted in a dry and easily accessible position on a bulkhead below deck, so that the cover can be removed easily for inspection. Also consider that the position should not make the cable run from the battery to the control box unnecessarily long.

The control box is mounted upright with the cable entries at the bottom.

Box dimensions; H=250, W=180 Depth=105.

The control box has a current protection circuit that cuts the power if the motor becomes overloaded, or if a short-circuit occurs between the control box and the motor. This protection is reset automatically a few seconds after the IN or OUT buttons are released. The protective circuit is correctly adjusted at delivery. The function is described in more detail in chap. 7.2 and in chap. 1.3 under heading "Control box".

Connect the cables according to fig. 4.4.b and wiring diagram fig. 4.2.

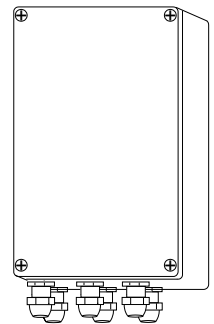


Fig. 4.4.a

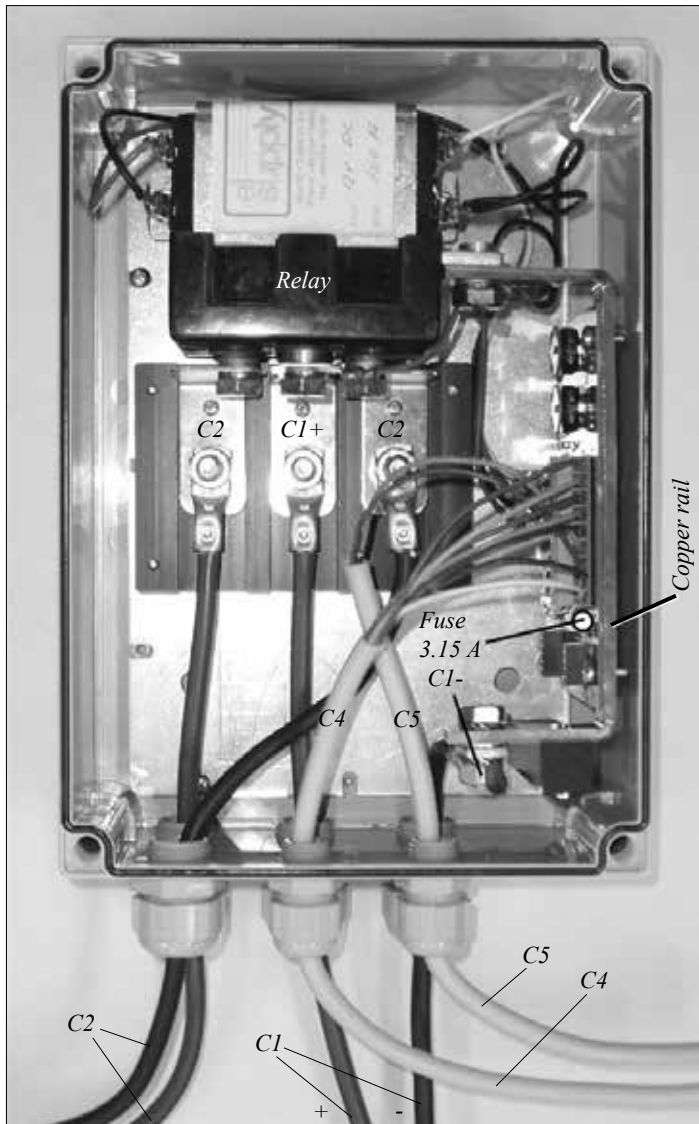


Fig. 4.4.b

The power cables (C1, C2) are fitted with cable lugs for the intended cable dimension and with a \varnothing 8 mm bolt hole. The signal cables (C4, C5) are connected to the plinths in the box.

Control current is taken internally from the box via a 3.15 A glass tube fuse, which is located in a holder on the green circuit board inside the control box. See fig. 4.4.c.

4.5 Battery

Avoid using the engine starter motor battery.

To minimise the voltage drop, the battery capacity for a Furlex 200E/300E/400E 12V should be at least 115 Ah and for a Furlex 300E/400E 24V at least 60 Ah.

Connection to the battery should always be via a fuse and battery isolator.

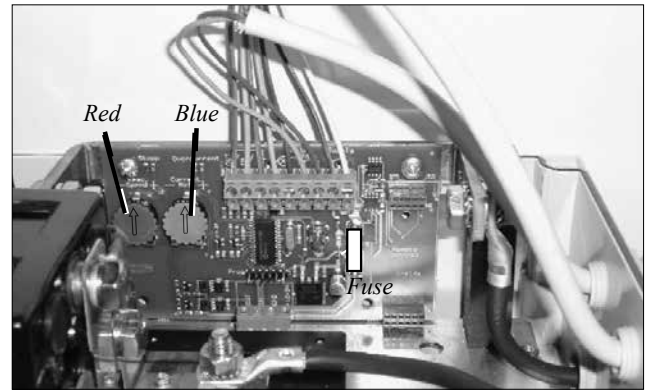


Fig. 4.4.c



Connection to the battery should always be via a fuse and battery isolator!

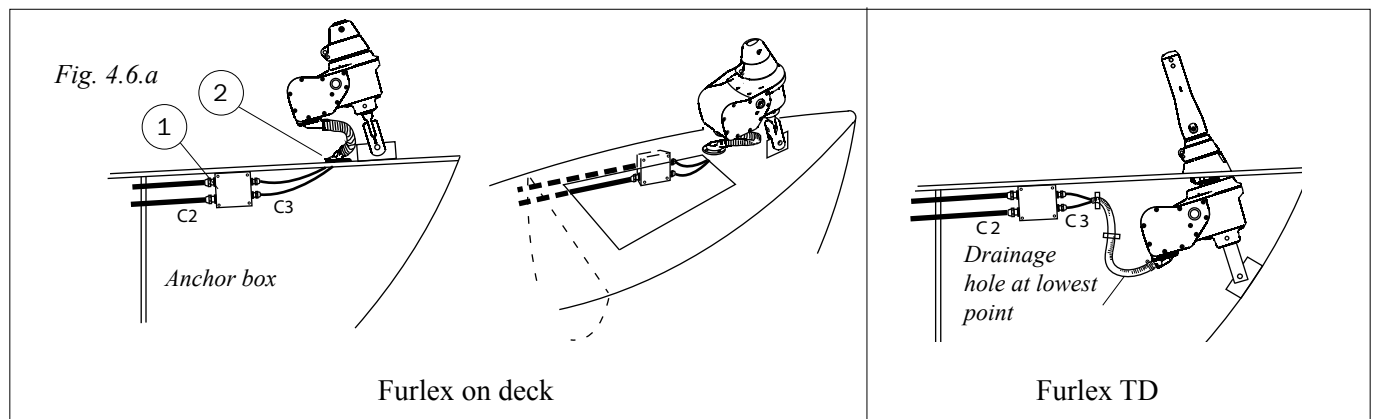
4.6 Connection box

The connection box ① is the dividing point when Furlex Electric drive unit is to be removed from the boat. See fig. 4.6.a.

The connection box is usually mounted in the anchor box. Position the box in such a way that the cover can easily be removed and the cables C3 released. Also try to fit it as close as possible to the deck collar ②, where the cables C3 come from the Furlex.

The cables (C2) from the control box should never need to be undone.

The cables (C3) between the connection box and deck collar must be installed below deck. A piece of plastic conduit can be positioned there to protect and hold the cables in place. This will make it easier to remove the cables when the drive unit is removed from the boat.



The connection box is fitted with DIN-rails for connection plinths. The plinths allow a maximum cable cross-section of 35 mm².

Connection box dimensions, incl cover; LxWxH=130 x 130 x 77 mm.

1. The C2 cables are stripped 12 mm and clamped in place. Tighten securely.
2. The cables C3 are to be stripped 12 mm and fitted with conductor collars (provided), crimped, and then fitted to the connection plinths. Tighten securely. When the cables are loosened at a later date, the collars will remain on the cables.
3. Tighten the cable feed-throughs so that they tighten around the cables.

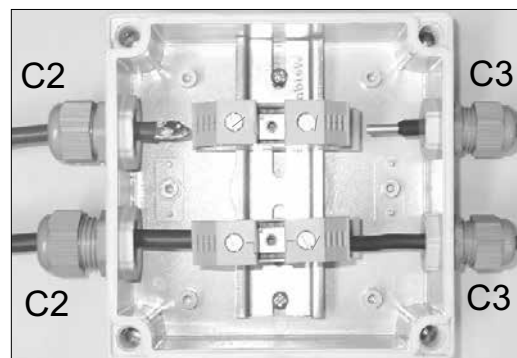


Fig. 4.6.b

4.7 Control functions

4.7.1 Description

The Furlex Electric can be controlled via the fixed control buttons and/or via a wireless remote control. We recommend that you always install the fixed control buttons, even when you use the remote control.

- Furlex Electric is supplied with or without control buttons, depending on the order number. Seldén's control buttons have built-in lighting and are marked "GENOA IN" and "GENOA OUT". Other types of closing-contact push buttons of high quality can also be used.
- It must be possible to disconnect the control current (See chap. 4.7.3).
- It must be possible to disconnect the button lighting (See chap. 4.7.4).
- A wireless remote control is available as an accessory. (See chap. 4.8).

4.7.2 Control buttons

The fixed control buttons should be mounted so that they are accessible for both the helmsman and the crew, at the same time as the furling-genua sheet can be handled. The operator must also have a view of the furling system to ensure correct furling of the sail.

It is also possible to purchase and install double control button sets, to install on both starboard and port sides. (Order no., see chap. 2.4).



The operator must have a view of the operation of the furling system, to ensure correct furling/unfurling of the fore-sail.

Installing the control buttons:

Seldén's control buttons can be installed directly in the boat's laminate, or be complemented with a stainless button panel. These are available for one or two control buttons. See fig. 4.7.2.b. (Order no., see chap. 2.4).

When correctly installed, Seldén's push buttons fulfil electrical class IP67.

1. When installing directly in the boat's laminate:

The seal between the button and the laminate is achieved by using the O-ring that is supplied with the button, see fig. 4.7.2.a. To ensure a proper seal, it is important that the fitting hole is not too large. Use a Ø 30 mm hole saw.

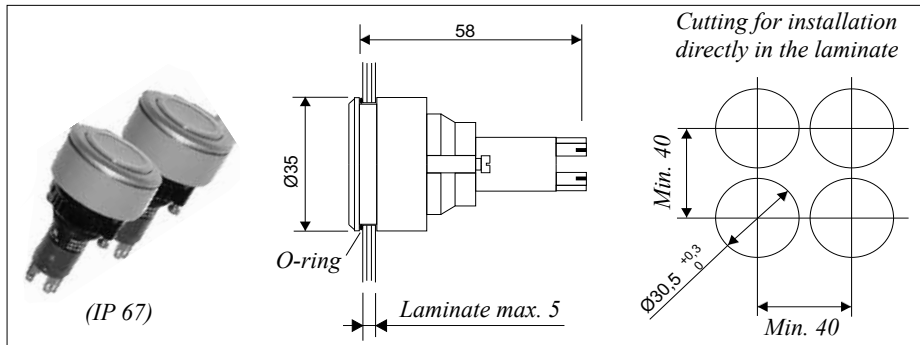


Fig. 4.7.2.a.

2. When installing in Seldén's button panel, either single or double type:

Mount the button in the stainless panel.

Use a Ø 37 mm hole saw to make space in the laminate. Put the button panel in position and drill the screw holes. Use the panel as a template.

Final assembly of the button panel is sealed with Sikaflex or similar against the laminate. The seal between the button and panel is via the O-ring.

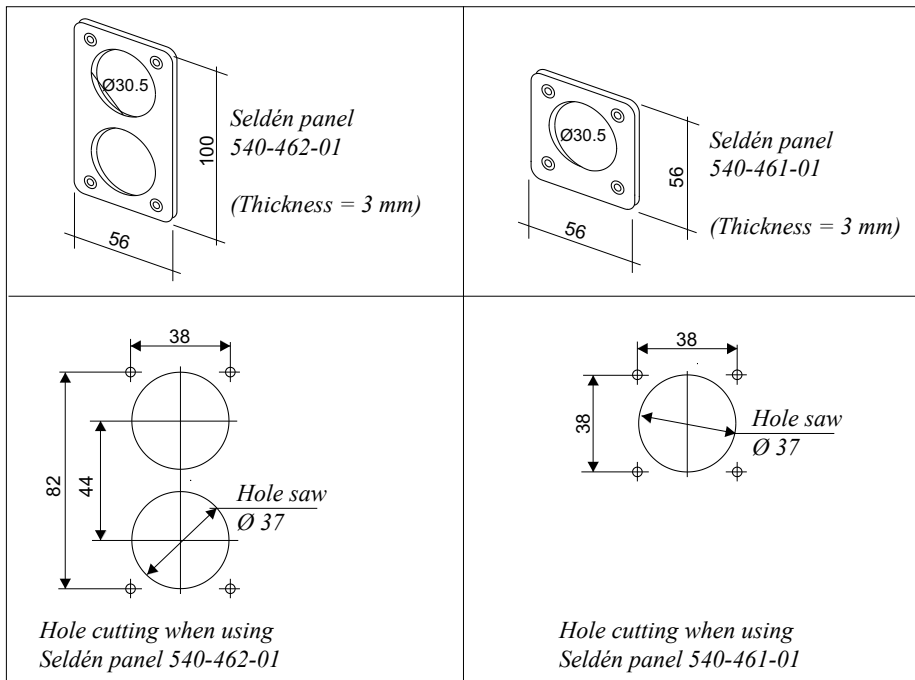


Fig. 4.7.2.b

3. Connect the control buttons to cable C4. Follow the wiring diagram, chap. 4.2. Seldéns buttons are supplied with the necessary spade connectors (size 2.8x0.5). See fig. 4.7.2.c.
If Seldéns 7-conductor cable is used, use the grey, yellow and green wires for control and the blue and pink wires for button lighting. See the wiring diagram for more details, chap. 4.2.

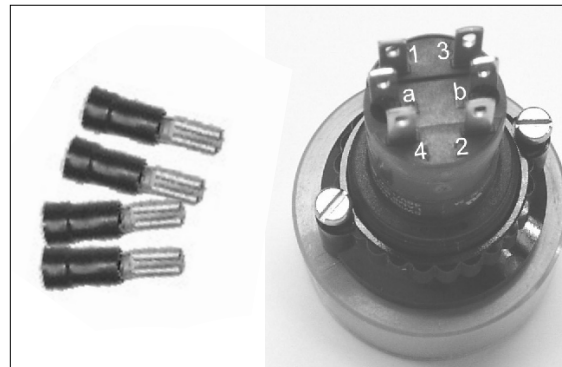


Fig. 4.7.2.c

If the luff extrusion rotates in the wrong direction when pressing the IN and OUT buttons, reverse cable C3's wires in the connection box, see fig. 4.7.2.d. Avoid switching the signal wires on the plinth in the control box, as this would cause IN and OUT not to correspond with the buttons on a remote control.

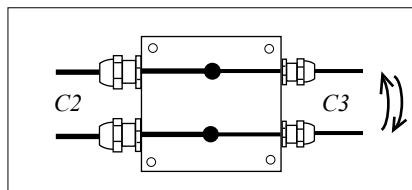


Fig. 4.7.2.d

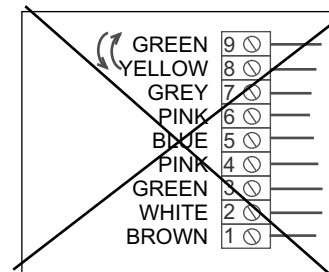


Fig. 4.7.2.e

4.7.3 Control current switch

It must be possible to disconnect the control current. For the purpose of safety, we recommend a 1-pole toggle switch close to the control buttons (ALT. 1, see wiring diagram, chap. 4.2). The switch should be protected against splashing and unintentional operation, e.g. in a cockpit side pocket. Disconnecting the control current prevents unintentional operation of the Furlex Electric, both from the fixed control buttons and any remote control (extra accessory).

An alternative to placing the control current switch in the cockpit is to mount it on the boat's control panel in the saloon (ALT. 2, see wiring diagram, chap. 4.2).

The toggle switch is not supplied with the Furlex Electric kit but is available as an accessory. Order no., see chap. 4.2.



Disconnecting the control current prevents unintentional operation of the Furlex Electric.

Connecting the control current switch:

If Seldéns 7-conductor cable is used, use the brown and white wires in cable C4 if connection is made according to ALT.1.

(ALT. 2; Brown and white wires in cable C5.) See the wiring diagram for more details, chap. 4.2.

4.7.4 Button lighting switch

It should also be possible to switch the internal lighting of Seldéns control buttons on or off. We suggest that the switch is located on the boat's electrical centre. Use a spare switch or add another 1-pole switch of the same type as the existing switches on the panel.

Connecting the switch for button lighting:

If Seldéns 7-conductor cable is used, use the pink and green wires in cable C5. See the wiring diagram for more details, chap. 4.2.

4.8 Wireless remote control

Furlex Electric can be equipped with wireless remote control as an accessory. In addition to the remote hand unit, an extra circuit board with control electronics is required (receiver board), to be mounted in the control box. The hand unit (transmitter) is equipped with a button panel for a total of four on/off functions (8 buttons). Controlling a Furlex Electric occupies one of these functions (2 buttons).



Fig. 4.8.a

Each receiver card can handle one function e.g. IN and OUT.



Fig. 4.8.b

The hand unit (transmitter) can handle four receiver cards

4.8.1 Mounting receiver card in control box

1. Disconnect the control power to the control box.
2. Remove the cover from the control box.
3. Bend the aerial according to fig. 4.8.1.a.
4. Fasten the two cable ties ① and ② close to the end of the aerial, according to fig. 4.8.1.b.

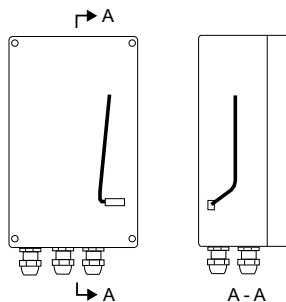


Fig. 4.8.1.a

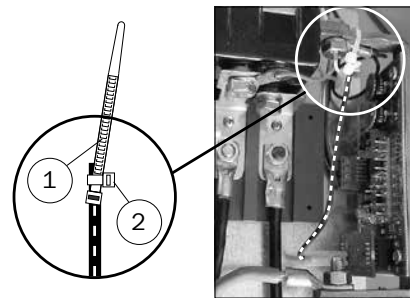


Fig. 4.8.1.b

5. Press the board in place on both pin connectors according to figs. 4.8.1.c and 4.8.1.d.

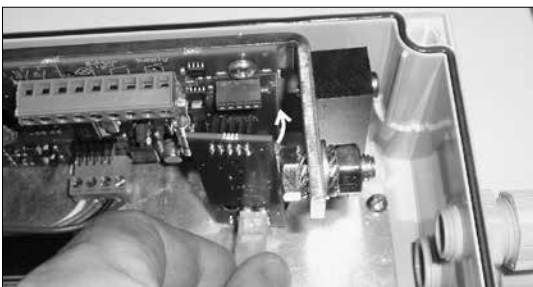


Fig. 4.8.1.c



Fig. 4.8.1.d

6. Attach the end of the aerial with cable ties, as shown in fig. 4.8.1.b. Make sure that the aerial remains clear of the other components in the box. Bend to adjust it if not.
7. Reconnect the control power.
8. Program according to chap. 4.8.2.

4.8.2 Programming the remote control

Simple programming is required to assign which buttons on the hand unit are to control a certain function (receiver board). This applies to either the hand unit delivered with the Furlex-unit, or one acquired at a later date.

1. Check that the control power is switched on and then open the cover on the control box. The receiver board must be in place as described in the previous chapter.

2. Un-program the remote receiver (see 4.8.3).
3. Set frequency on the receiver to 434,33MHz (see 4.8.4).
4. Set frequency on the hand unit to 434,33MHz (see 4.8.4).
5. There is a pushbutton beside the glass fuse on the larger circuit board with a yellow LED (Learn) beneath it. Hold the pushbutton in until the LED lights continuously (yellow). Release the button.
6. Select a button row on the hand unit and within three seconds press on either the OUT or IN button. Programming is completed.

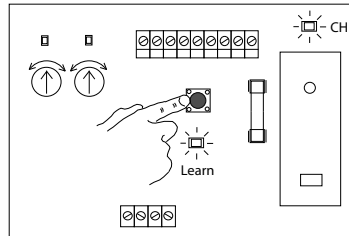


Fig. 4.8.2.a

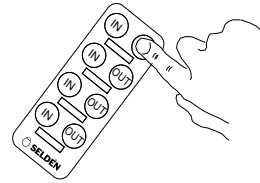


Fig. 4.8.2.b

4.8.3 Un-programming the remote control

To re-program the electronics in the control box so that it reacts to another button row, the board must first be unprogrammed.

1. Hold the pushbutton approx 10 seconds until the yellow LED (Learn) starts flashing. The board is now un-programmed and will not react to the hand unit's buttons.

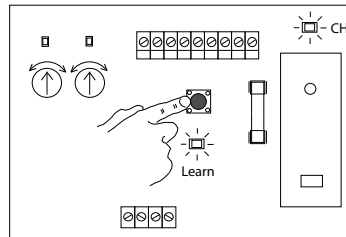


Fig. 4.8.3

2. Re-program it again according to points 5 to 6, chap. 4.8.2.

4.8.4 Switching of channels

Switch remote channel on receiver

Press pushbutton 4 times (within 3 seconds total time) to switch remote channel. Switch is confirmed by green LED (CH). See fig. 4.8.3.

CH-LED on: 434,33MHz

CH-LED off: 433,92MHz

Switch remote channel on hand-unit

Mk1 (no backside decal)

To choose 434.33MHz, simultaneously press and hold at least four seconds "OUT" on the top and bottom rows on the hand unit.

To choose 433.92MHz, simultaneously press and hold at least four seconds "OUT" on the top and bottom rows on the hand unit.

Mk2 (backside decal, see fig 4.8.4)

To choose 434.33MHz, simultaneously press and hold at least four seconds all the top four top buttons on the hand unit.

To choose 433.92MHz, simultaneously press and hold at least four seconds all the lower four lower buttons on the hand unit.

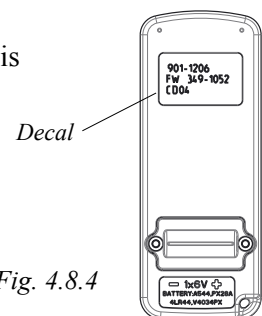


Fig. 4.8.4

4.8.5 Replacing batteries, hand unit

The remote control hand unit is powered by one 6 V battery, type **4LR44**.

(Equivalent battery designations; PX28A, A544, 28PXA, V4034PX, 4LR44, 476A, 4G13, 4SG13, GP476A, K28, V28, PX28AB, RPX28, L1325, 1414A).

The nominal life of the battery is about 25 operating hours, i.e. it can perform about 2000 operations of about 45 sec. The battery can self-discharge if the remote control is not used for a longer time, so a battery change is recommended before each season. A spare battery should be kept onboard.

To replace the battery, undo two screws holding the battery cover in place. There is an O-ring in a groove in the cover. Make sure the O-ring is properly located when refitting the cover.



Fig. 4.8.5.a

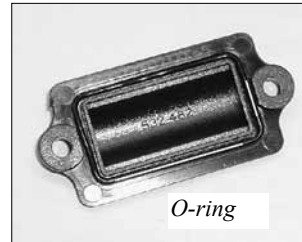


Fig. 4.8.5.b



In order for the remote control (receiver) to function, the control current switch for the control box must be ON.



Even when the remote control is used, it is recommended to install the fixed control buttons.

4.8.6 Compatibility between Mk1 and Mk2

Compatible units, Mk1:

Furlex Electric control boxes (with the software up to 1.7.0):

532-448 Control box FLX 200/300E 12V

532-459 Control box FLX 300/400E 24V

532-469 Control box FLX 400E 24V

Receiver plug-in card:

532-465-01 Remote control receiver card (Mk1, Mk2) Furlex E

Transmitter/hand unit Mk1:

532-460-01 Remote control hand unit, kit Mk1

Compatible units, Mk2:

Furlex Electric control boxes (with the software up to 2.0.0):

532-448 Control box FLX 200/300E 12V

532-459 Control box FLX 300/400E 24V

532-469 Control box FLX 400E 24V

Receiver plug-in card:

532-465-01 Remote control receiver card (Mk1, Mk2) Furlex E

Transmitter/hand unit Mk2:

532-460-11 Remote control hand unit, kit Mk2

4.9 Cables

The components in the Furlex Electric system are connected by cables C1-C6. See wiring diagram, chap. 4.2.

Cables C1 and C2 (not supplied)

Cable C1 provides the control box with power from the battery.

Battery cables are used here, two single conductors, e.g. black (-) and red (+). Tinned conductors and crimped cable lugs are recommended. The cable lugs for connection to the control box should have M8 bolt holes drilled.

Connection to the battery shall always be via a fuse and battery isolator (on the plus cable).

The fuse provides short-circuit protection for cable C1 and should be mounted close to the battery isolator/ battery. The main fuse is not supplied with the Furlex Electric kit but is available as an accessory. Order nr., see chap. 2.4.

Minimum fuse capacity (independent of cross-section; C1) Furlex 200/300E 12V = 125 A

Minimum fuse capacity (independent of cross-section; C1) Furlex 300E 24V = 60 A

Minimum fuse capacity (independent of cross-section; C1) Furlex 400E 12V = 150 A

Minimum fuse capacity (independent of cross-section; C1) Furlex 400E 24V = 80 A

Existing fuses that meet these requirements can be used. They must not exceed the values in table 4.9.a.

Cable cross-sectional area	Max. fuse	Applies to cable
16 mm ²	160 A	C1
25 mm ²	200 A	C1
35 mm ²	315 A	C1
50 mm ²	400 A	C1
70 mm ²	500 A	C1

Table 4.9.a

The maximum fuse size is dependant on the cross section of cable C1. See table 4.9.a.

If the existing fuse is too large, a new fuse must be fitted directly after the cable C1 is spliced into the main cable. See example in fig. 4.9.b.

(It would, however have been perfectly possible to splice in a 25 mm² cable without fitting an additional fuse since it would have sufficient short-circuit protection via the existing 200 A fuse.)

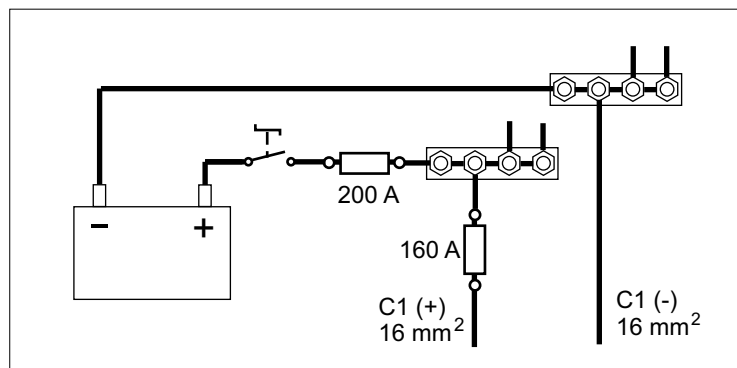


Fig. 4.9.b

Cable C2 connects the control box with the connection box. The same type and dimension of cable as for C1 is used here.

To minimise the voltage drop, the total length of C1 + C2 should not exceed the values in table 4.9.c. The cable length is defined as the length of one of the two conductors, i.e. either the plus or minus cable, see fig. 4.9.d.

Furlex 200E/300E

Cable cross-sectional area	Max. cable length C1+C2 12V	Max. cable length C1+C2 24V
16 mm ²	3.8 m	8 m
25 mm ²	6 m	12 m
35 mm ²	8 m	16 m
50 mm ²	12 m	24 m

Table 4.9.c

Furlex 400E

Cable cross-sectional area	Max. cable length C1+C2 12V	Max. cable length C1+C2 24V
16 mm ²	2.5 m	7 m
25 mm ²	3.8 m	11 m
35 mm ²	5.4 m	15 m
50 mm ²	7.5 m	22 m
70 mm ²	11 m	30 m

Table 4.9.d

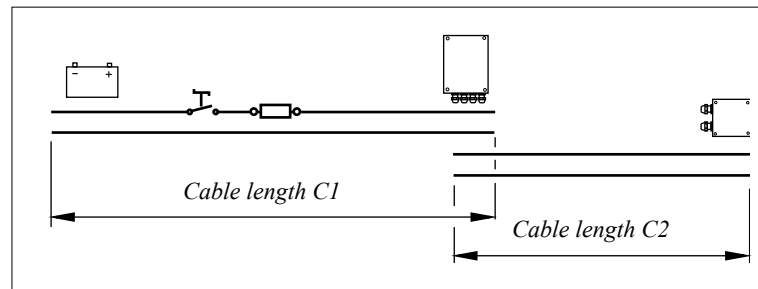


Fig. 4.9.d

Cable C3

Cable C3 is permanently attached to the drive unit (black and red wires). For Furlex 200E the cable cross section is 6mm² and for Furlex 300E/400E 16 mm². The wires are about 2 m long at delivery but should be kept as short as possible when installing. I.e, the connection box should be placed below deck, as close to the deck collar as possible. The length of the cables must not exceed 1.5 m, (for a 12V system, preferably shorter), to reduce the voltage drop.

Cable C4

The Furlex Electric kit includes 15 m of tinned, colour-coded multi-wire cable, 7 x 0.75 mm². Three wires are required for the control buttons, two wires for the internal button lighting and two wires to disconnect the control current to the control box (position ALT. 1).

The included cable can also be used as cable C5. For additional lengths of this cable, see chap. 4.2.

Cable C5

Cable C5 requires 4 wires x 0.75 mm². Two wires are used to turn the internal button lighting on/off. The other two are used to disconnect the control current (with location as ALT. 2). With ALT.1, a two-wire cable is sufficient. See the wiring diagram for more details in chap. 4.2.

Use part of the tinned, colour-coded cable, 7 x 0.75 mm², which is supplied with the Furlex Electric kit.

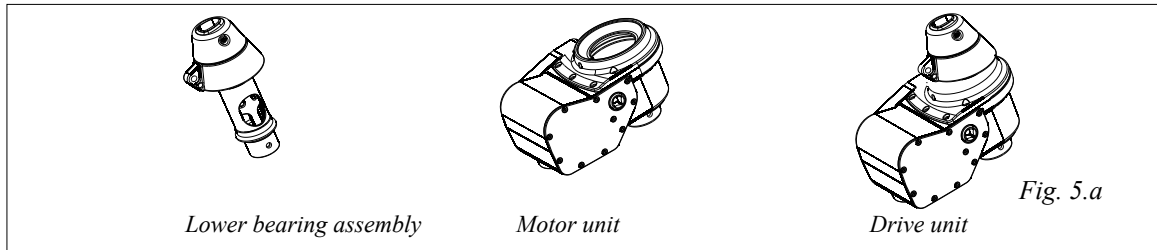
For additional lengths of this cable, see chap. 4.2.

Cables C4 and C5 (control circuit) are fused internally in the control box with a 3.15 A fuse. Concerning the type of fuse, see chap. 1.3 under “**Control box**”.

5. EF Installation of motor unit on existing lower bearing assembly

EF applies to all of chap. 5.

The drive unit and its major parts are named in accordance with fig. 5.a.



In order to install the motor unit on an existing lower bearing assembly, we recommend that the latter is removed from the Furlex system. This can be done relatively simply if the Furlex system is removed from the boat. This is described in chap. 5.2 - 5.8. Alternatively, the work can be performed on a rigged extrusion/profi le. Note however, that installation of the motor unit on the lower bearing assembly will be more awkward with this method. This alternative is described in chap. 5.9 - 5.12. For both methods, the sail must be removed from the Furlex system.

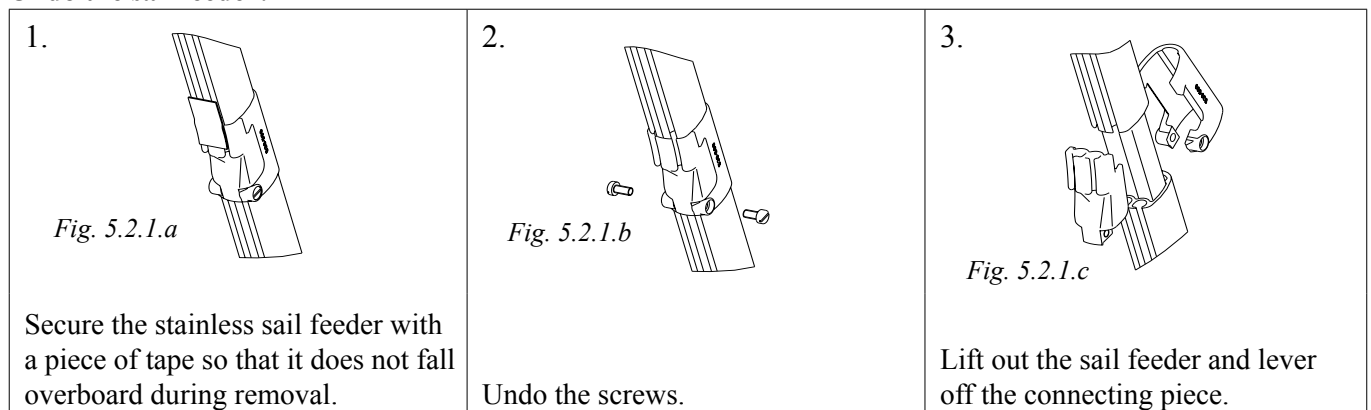
5.1 Checking the motor unit

1. Temporarily connect the motor unit to the connection box.
2. Activate the power supply from the battery to the control functions.
3. Test run both IN & OUT functions.
4. If the functions are OK; remove the cables from the connection box. If not, fault trace according to "Fault tracing diagram", chap. 9.

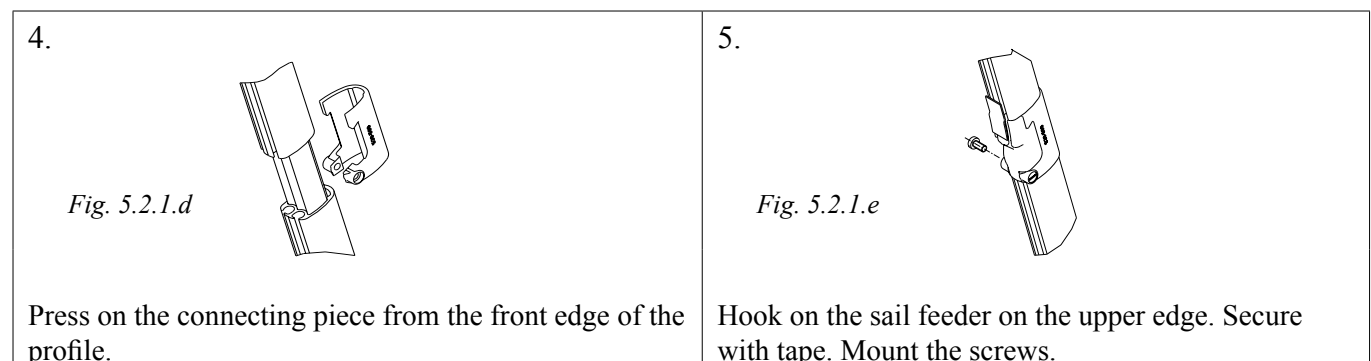
5.2 Removal of the Furlex system and disassembly

5.2.1 Sail feeder

Undo the sail feeder:

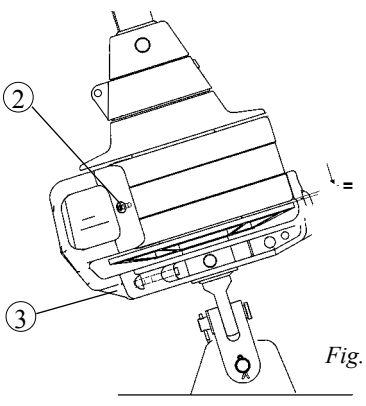
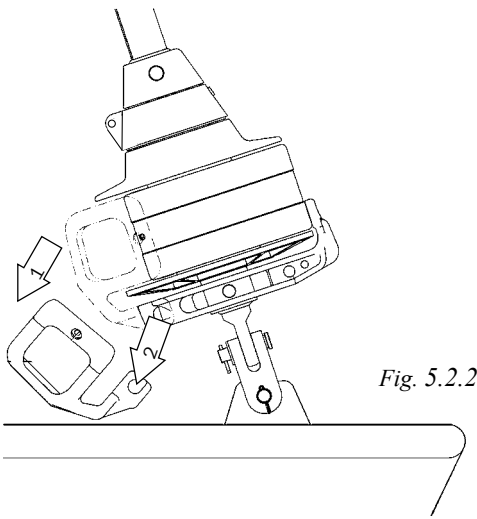


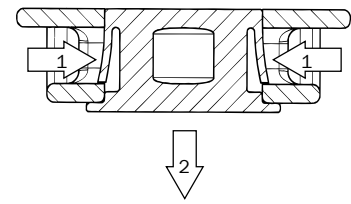
Refitting the sail feeder:



5.2.2 Undo the line guide, Furlex 200E/300E (For 400E see 595-116-E, chap 17.3)

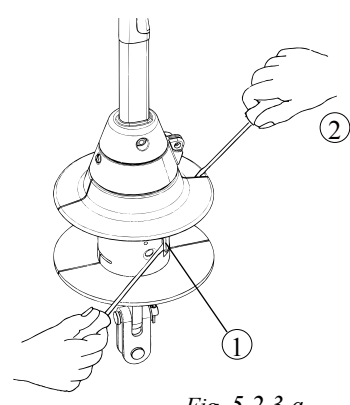
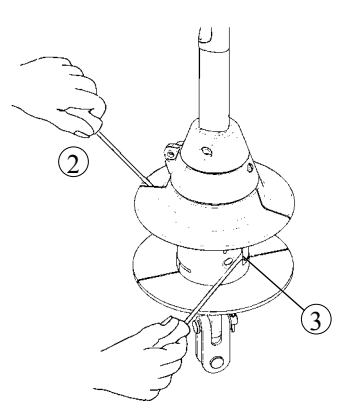
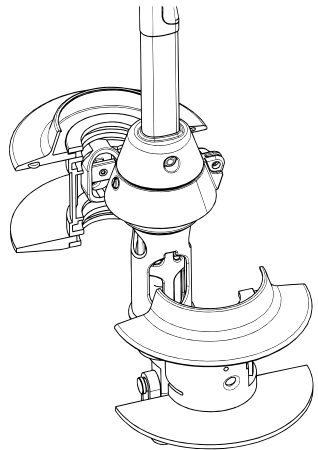
1. Roll off all the line from the line drum.

<p>2.</p>  <p style="text-align: right;"><i>Fig. 5.2.2.a</i></p> <p>Undo screws ②, and release screw ③ few turns.</p>	<p>3.</p>  <p style="text-align: right;"><i>Fig. 5.2.2.b</i></p> <p>Lower the line guide fitting and release it.</p>
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<p>4.</p>  <p style="text-align: right;"><i>Fig. 5.2.2.c</i></p> <p>Press in the spring loaded clips (arrow 1) and release the locking block downwards.</p>

5. Pull the line drum guard off the line drum.

5.2.3 Undo the line drum, Furlex 200E/300E (For 400E see 595-116-E, chap 17.4)

<p>1.</p>  <p style="text-align: right;"><i>Fig. 5.2.3.a</i></p> <p>Push a -screwdriver ① under one of the drum's "quick connectors". Push in another screwdriver ② between the drum halves on the same side so that these are pressed apart 3-4 mm.</p>	<p>2.</p>  <p style="text-align: right;"><i>Fig. 5.2.3.b</i></p> <p>Keep the screwdriver in place ② and turn the stay a half turn. Release the other drum half's ③ "quick connection". Undo the screws.</p>	<p>3.</p>  <p style="text-align: right;"><i>Fig. 5.2.3.c</i></p> <p>The line drum halves can now be removed.</p>
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5.2.4 De-rigging

1. Slacken the backstay as much as possible. But make sure that any rigging screw is not unscrewed so far that the threads are no longer visible “on the inside”. For masts with aft swept spreaders, the upper rigging screw must be slackened so much that the forestay can be disconnected. Slacken e.g. the aft stay + one of the upper rigging screws. Count the number of turns the upper rigging screw is slackened. This simplifies reassembly. Avoid changing the setting of any Furlex rigging screws. This simplifies reassembly.



Avoid changing the setting of any Furlex rigging screws.

2. Pull the masthead forward using the genoa halyard. Secure the halyard using a ”D” shackle or tie it to a strong deck fitting. If the halyard has a snap shackle, this should not be used for reasons of safety.



Always use a strong D-shackle or tie to the halyard.

3. ”Go up” in the mast and tie a running line around the Furlex profile with a strong flexible line. Make a double half-hitch in two places about 1 meter from the top. Tape over the knots so that they cannot slip.

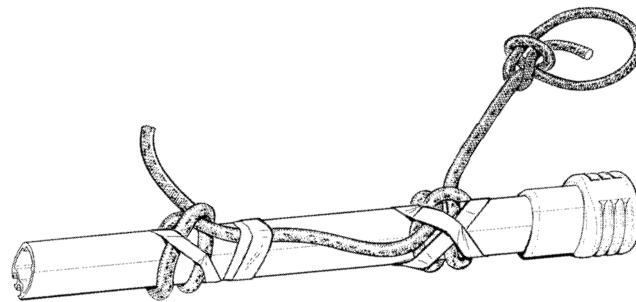


Fig. 5.2.4

4. Loosen the toggle from the deck fitting.
5. Connect the line to a free halyard and tighten so hard that the Furlex-system can be freed from the mast.
6. Lower the Furlex-system while another person watches over the lower part so that it is fed to the side until the whole system is laying on the ground .

5.2.5.1 Lower bearing assembly, Furlex 200E/300E

1. Loosen the top guard and pull the halyard swivel off.
2. Mark the position of the extrusion ① against the lower bearing assembly’s top with i.e. a lead pencil. Undo the screws ② (2 pcs.) that hold the extrusion to the lower bearing assembly.
3. Remove the split pin ③ and clevis pin ④ that hold the lower bearing assembly to the eye terminal.

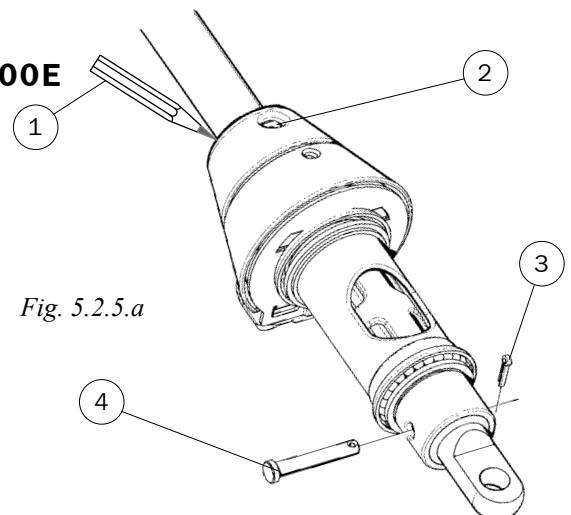


Fig. 5.2.5.a

4. Move the lower bearing assembly upwards on the extrusion so that the eye terminal is accessible. Place a piece of cloth or paper between the lower bearing assembly and the extrusion to protect against scratching the extrusion. Continue to pull the lower bearing assembly over the top of the extrusion.

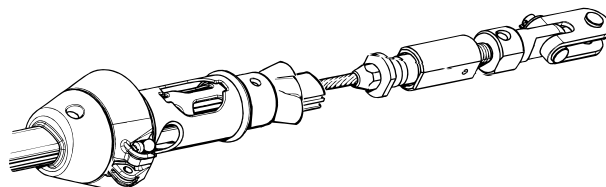
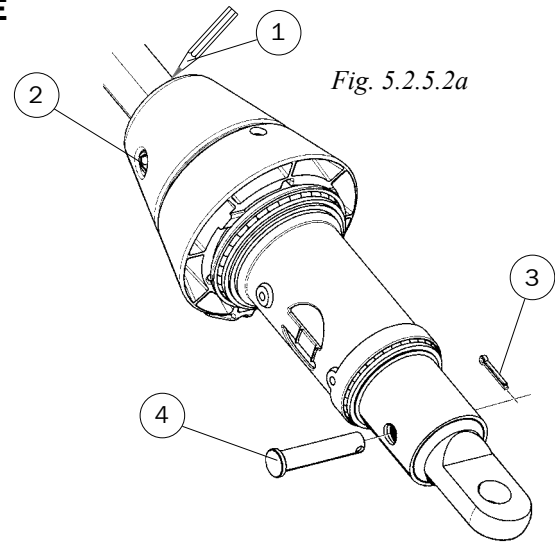


Fig. 5.2.5.b

5.2.5.2 Lower bearing assembly, Furlex 400E

Tools: Allen keys spanners 10 mm
1 pair of long-nosed pliers

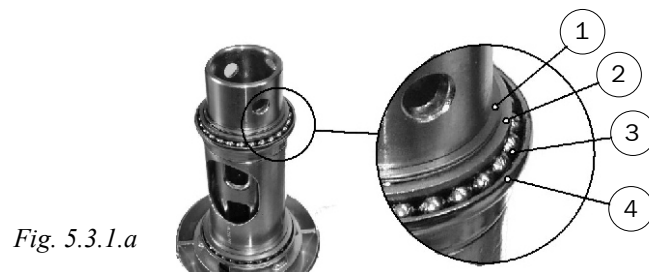
1. Loosen the top guard and pull the halyard swivel off.
2. Mark the position of the extrusion ① against the lower bearing assembly's top with i.e. a lead pencil. This simplifies later reassembly. Undo the screws ② (2 pcs) that hold the extrusion to the lower bearing assembly.
3. Remove the split pin ③ and clevis pin ④ that hold the lower bearing assembly to the eye terminal.



5.3.1 Mounting the motor unit, Furlex 200E/300E

In order to mount the motor unit to an existing lower bearing assembly, it is necessary to partially disassemble it.

1. Place the lower bearing assembly upside down (preferably in a box, to collect the ball-bearings) and remove the locking ring ① that holds the washer ② and ball-bearings ③ in place. On reassembly, the locking ring will be replaced with a new one from the kit.
2. Remove the washer, balls and bearing race ④. Clean the washer and bearing race for later refitting.



3. Mount the two flanges as illustrated. Note that the longest flange keys should point toward the top of the lower bearing assembly.

Flange ring with insulating washer

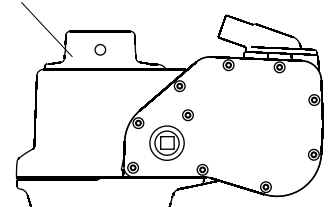


Fig. 5.3.1.b

Fig. 5.3.1.c

4. Turn the motor unit upside down. See fig. 5.3.c. Remove the flange ring and insulating washer. Turn the motor unit right way up.
5. Turn the lower bearing assembly right way up and fed it down into the motor unit. Guide the flangekeys into the grooves in the motor unit.

Due to variations in manufacture, certain older lower bearing assemblies can have a slightly larger outer diameter, which prevents the flange from entering fully. In such cases, remove one of the flanges and try again. 1 flange is quite sufficient to fulfil the function.

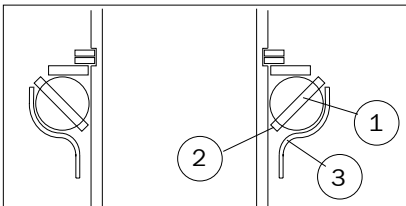
If this does not work either, then the flange must be modified to a suitable shape with a file.

Fig. 5.3.1.d



6. When the lower bearing assembly is in place, the whole unit is then turned upside down.
First mount the bearing race.
Apply bearing grease (supplied) and then mount the bearing cage with supplied bearings in the grease. Make sure that all the bearings are in place. (Any lost ball bearings can be replaced with old disassembled ball bearings).

Fig. 5.3.1.e



Note that the bearing cage ① is conical and that the "narrow" end ② must enter the bearing race ③ (towards the top of the lower bearing assembly).

Fig. 5.3.1.f

7. Mount the washer and the new supplied locking ring. (never re-use an old locking ring). In order to ensure that the locking ring bottoms, lift the hollow shaft while pressing the locking ring downwards.

Fig. 5.3.1.g



8. Put the insulation washer in place and remount the flange ring. Undo and remount the 8 screws one by one, apply locking fluid (supplied in the kit) and tighten the screws firmly.

Fig. 5.3.1.h

5.3.2 Mounting the motor unit, Furlex 400E

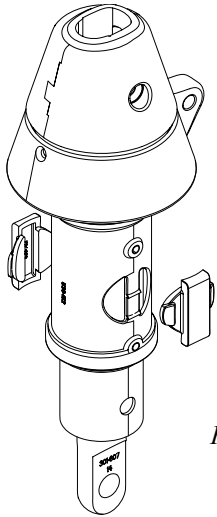


Fig. 5.3.2.a

1. Place the motor unit securely on a level surface.
2. Insert the two carriers according to fig. 5.3.2a. Secure with tape or hold them during assembly.

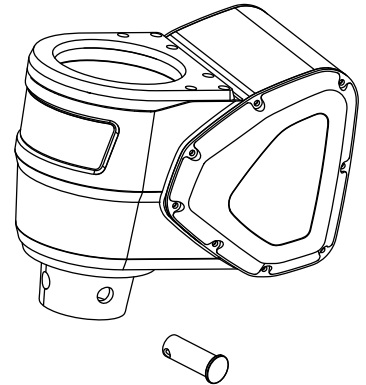


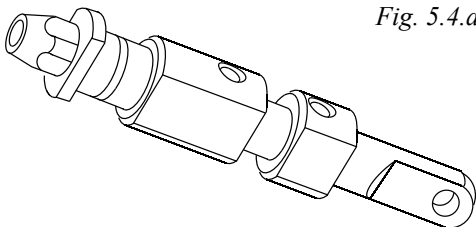
Fig. 5.3.2.b

3. Insert the lower bearing assembly into the motor unit and secure with clevis pin and split pin.

5.4 Replacement of existing toggle

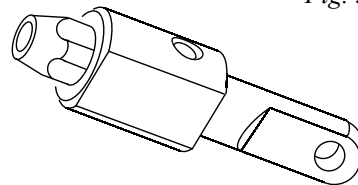
Furlex 200S/200E are used for 6.7 and 8 mm wire. Furlex 300S/300E are used for 8 and 10 mm wire. Furlex 400S/400E are used for 12 and 14 mm wire. Check that the correct toggle has been delivered with the kit. The part number is stamped on the toggle.

Furlex series	Wire dimension	Part number
200E	Ø 6 mm	539-658
	Ø 7 mm	539-659
	Ø 8 mm	539-660
300E	Ø 8 mm	539-660
	Ø 10 mm	539-667
400E	Ø 12 mm	539-783
	Ø 14 mm	539-784



Furlex rigging screw

Fig. 5.4.a



Terminal eye

Fig. 5.4.b

Existing Furlexes' are equipped with a built-in rigging screw or fixed terminal eye. Which ever is fitted, the existing toggle must be replaced with the supplied high-torque variant. The toggle is mounted with the arrow pointing upwards.

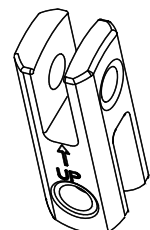


Fig. 5.4.c

When the toggle is mounted on the chain plate, the maximum number of shims should be placed in between to reduce the play. The toggle is supplied with four 0.8 mm shims. Fit the shims as evenly as possible on each side of the boat's forestay attachment (e.g 2+2 or 2+1). Extra shims can be ordered. (Order no., see chap. 2.4).

5.5 Drive unit cable collar

The drive unit's cables must be fed from the drive unit to the deck collar via the supplied protective sleeve. The sleeve has two functions. Partly to protect the cables (C3) from wear and partly to equalize the thrust differences that occur due to temperature variations in the drive unit's cavity (which is otherwise air tight).

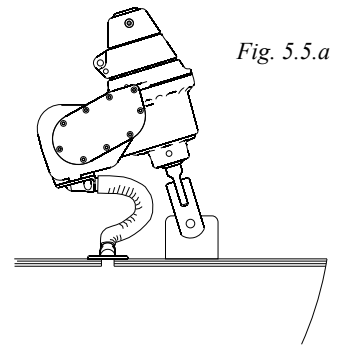


Fig. 5.5.a

The drive unit has a stainless steel collar ① from which both motor cables C3 appear. The collar is sealed with an O-ring and can be mounted in 8 different positions, dependant on the most suitable direction for the protective sleeve. (As delivered, it points straight forward). See fig. 5.5.b.

An identical collar must be fitted to the deck (deck collar).

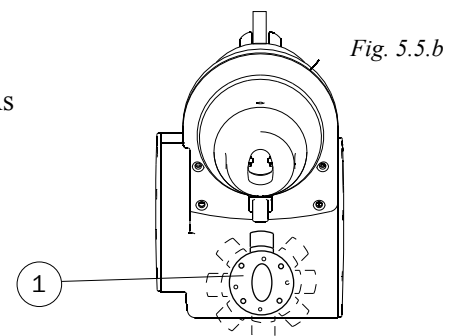


Fig. 5.5.b

5.6 Mounting the deck collar

EF Once the motor unit is mounted on the existing lower bearing assembly, one can decide where the deck collar should be fitted.

1. Connect the toggle and any extension link to the lower bearing assembly.
2. Adjust the collar on the ① drive unit for the probable direction, see chap. 5.5.
3. Feed the cables up through the supplied 600 mm long protective sleeve ② and fit the sleeve over the cable collar on the drive unit ①. Fix it temporarily with one of the supplied hose clamps.

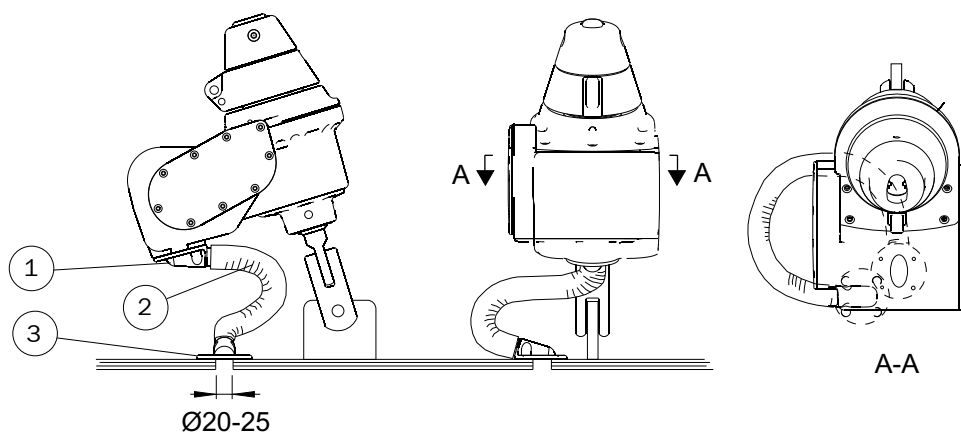


Fig. 5.6

4. Connect the drive unit to the boat's forestay plate and hold it in the direction of the forestay.

5. Lay the protection sleeve in an arc towards the deck collar and mark out the intended position of the deck collar (centre and four screw holes). Note that the sleeve must be arched so that movement of the drive unit can be taken up without the sleeve being stretched. The forestay can move up to 15° during sailing and this movement must also be taken up by the sleeve/cables. Even after the toggle has been shimmed in place, there can still be a certain amount of play. The drive unit will twist a few degrees in one direction or the other, depending on whether the sail is furling or unfurling.
6. Mark the cutting point on the sleeve.
7. **Pull the sleeve off of the cables** and cut to length.
8. Make a hole in the deck for the centre point of the collar. Use a hole saw, Ø 20-25 mm. (If the forestay already is mounted, it may be necessary to disconnect it and move it to one side. Otherwise the drive unit will be in the way of the hole saw).
9. Fig. 5.6 shows an example of mounting the collar and sleeve.
10. Drill holes for the 4 self-tapping screws (L=19 mm, torx T25) which are supplied with the kit. Use drill bit Ø 3.5-4.
11. Apply Sikaflex or similar to the deck collar and screw it in place.

5.7 Mounting the drive unit on the luff extrusion



The mounting sequence (points 1-5) assumes that the setting of the Furlex rigging screw has not been changed when de-rigging the stay/extrusion.

1. Feed the drive unit on from the top of the extrusion and feed it down to the terminal eye or Furlex rigging screw. Place a piece of cloth or paper between the lower bearing assembly and the extrusion to protect against scratching the extrusion.
2. If a Furlex rigging screw is used, the three flat surfaces of the rigging screw must all be aligned with each other. The lower bearing assembly's hollow shaft ③ has a corresponding flat surface internally. See fig. 5.7.a. Mount the clevis pin ① and split pin ② which hold the lower bearing assembly's hollow shaft ③ to both the motor unit's flange ring ④ and the terminal eye/rigging screw ⑤. Fig. 5.5.a shows the parts in the correct position, seen from below. The direction of the clevis pin mounting depends on if the forestay is oriented for & aft or athwart ships.

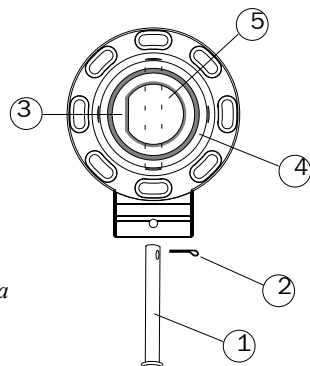


Fig. 5.7.a

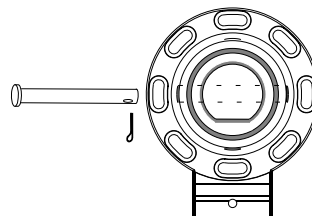


Fig. 5.7.b

3. Adjust the extrusion position so that the marks (made during point 5.2.5, Furlex 200/300E, 5.2.5.2 Furlex 400E) coincide with the lower bearing assembly's upper edge. Mount the two screws ② (fig. 5.2.5.a) in the black plastic adapter and tighten so that they bottom in the forestay extrusion. Loosen the screws one at a time and apply locking fluid to the threads. Tighten the screws firmly.
4. Remount the sail feeder according to fig. 5.2.1 points 4-5.
5. Fit the halyard swivel ⑥ fig. 5.7.b. Push it down to the sail feeder and secure in that position with a piece of tape. Remount the top guard as well ⑦. Tighten the screws so that they bottom, but do not over-tighten.

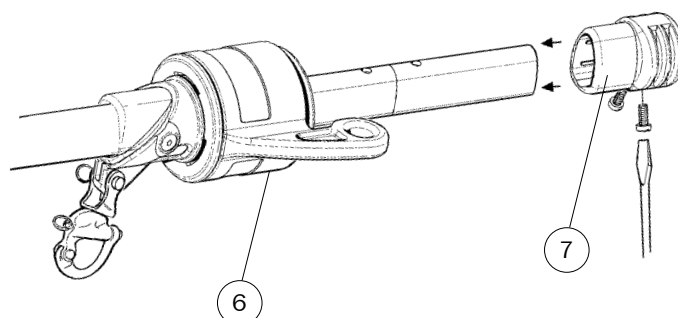


Fig. 5.7.c

5.8 Remounting the Furlex system on the boat

See Furlex instruction 595-104-E Furlex 200S/300S alt. 595-116-E Furlex 400S in chap. Rigging. Finally connect sleeve and cables according to points 1-3 below, see fig. 4.6.a.

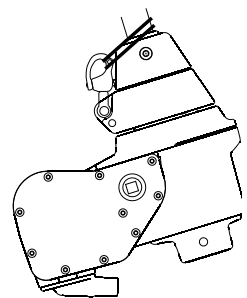
1. Feed the protective sleeve with the two supplied hose clamps, over the cables C3. Mount the sleeve on the drive unit cable collar. Use a driver with a hex socket intended for hose clamps and tighten firmly.
2. Feed the cables through the deck collar ② and then fit the sleeve.
3. Attach the cables below deck. Cut the cables to the correct length and connect to the plinths in the connection box ①. See chap. 4.6.
4. Check that the supplied emergency furling equipment can be mounted on the starboard side of the drive unit and then remove it again. See chap. 7.6.



Test the supplied emergency furling equipment and then remove it again.



Before test-running the unit, tie or tape the tack shackle to the extrusion so that the shackle does not strike the drive unit and damage it. Also check that the emergency furling equipment has been removed.



5.9 **EF** Alternative mounting of motor unit on existing lower bearing assembly

The description below explains how a Furlex Electric drive unit can be mounted on an existing lower bearing assembly without removing the Furlex system, including the forestay extrusion, from the boat. One does not need to remove the extrusion, but on the other hand, fitting the actual drive unit is more awkward.

Necessary disassembly

5.9.1 Undo the line guide, Furlex 200E/300E (Furlex 400E, see 595-116-E, kap. 17.3)

1. Roll off all the line from the line drum.

2.

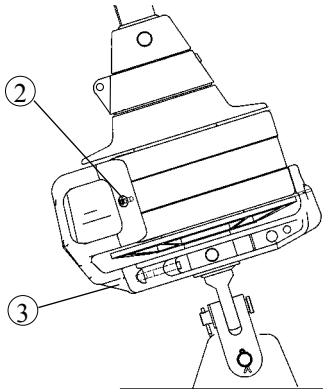


Fig. 5.9.1.a

Undo screws ②, and release screw ③ a few turns.

3.

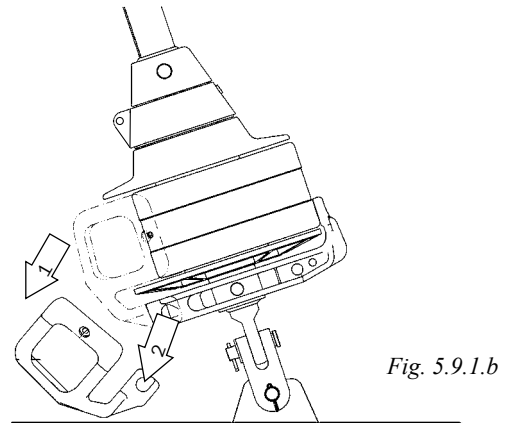


Fig. 5.9.1.b

Lower the line guide fitting and release it.

4.

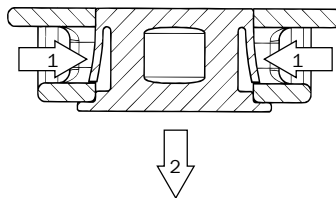
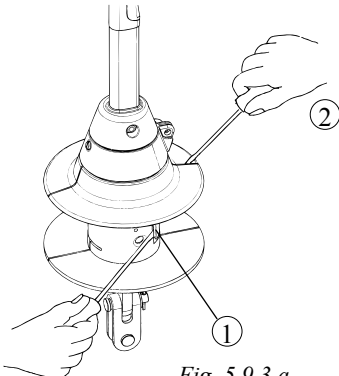
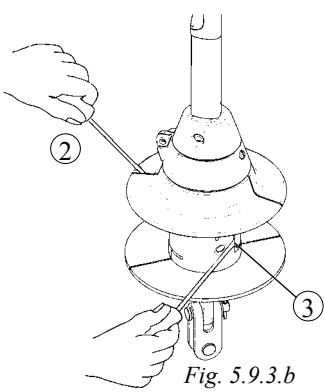
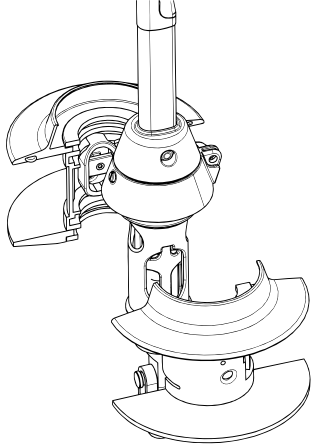


Fig. 5.9.1.c

Press in the spring loaded clips (arrow 1) and release the locking block downwards.

5. Pull the line drum guard off the line drum.

5.9.2 Undo the line drum, Furlex 200E/300E (Furlex 400E, see 595-116-E, kap. 17.4)

<p>1.</p>  <p><i>Fig. 5.9.3.a</i></p> <p>Push a -screwdriver ① under one of the drum's "quick connectors". Push in another screwdriver ② between the drum halves on the same side so that these are pressed apart 3-4 mm.</p>	<p>2.</p>  <p><i>Fig. 5.9.3.b</i></p> <p>Keep the screwdriver in place ② and turn the stay a half turn. Release the other drum half's ③ "quick connection".</p>	<p>3.</p>  <p><i>Fig. 5.9.3.c</i></p> <p>The line drum halves can now be removed.</p>
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5.10 De-rigging

- Slacken the backstay as much as possible. But make sure that any rigging screw is not unscrewed so far that the threads are no longer visible "on the inside". For masts with aft swept spreaders, the upper rigging screw must be slackened so much that the forestay can be disconnected. Slacken e.g. the aft stay + one of the upper rigging screws. Count the number of turns the upper rigging screw is slackened. This simplifies reassembly. Avoid changing the setting of any Furlex rigging screws. This simplifies reassembly.



Avoid changing the setting of any Furlex rigging screws.

- Pull the masthead forward using the genoa halyard. Secure the halyard using a "D" shackle or tie it to a strong deck fitting. For safety reasons, do not use the halyard snap shackle.



Always use a strong D-shackle or tie to the halyard.

5.11.1 Lower bearing assembly, Furlex 200E/300E

- Mark the position of the extrusion ① against the lower bearing assembly's top with i.e. a lead pencil. This simplifies later reassembly. Undo the screws ② (2 pcs.) that hold the extrusion to the lower bearing assembly.
- Remove the split pin ③ and clevis pin ④ that hold the lower bearing assembly to the eye terminal.
- Move the lower bearing assembly up towards the sail feeder on the extrusion so that the eye terminal is accessible. Place a piece of cloth or paper between the lower bearing assembly and the extrusion to protect against scratching the extrusion.
- Tie the lower bearing assembly's tack shackle to the halyard swivel shackle.

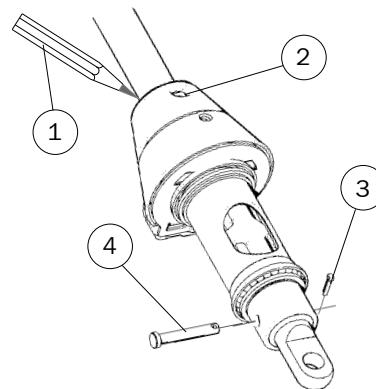


Fig. 5.11.a

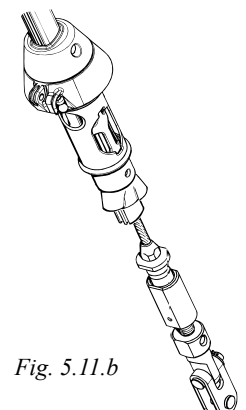


Fig. 5.11.b

5. Note in which direction the flat surface of the bearing assembly's hollow shaft is orientated. Mark the position of the flat surface on the edge of the hollow shaft and on the outside, with a marker pen. See fig. 5.11.c. This simplifies later reassembly.

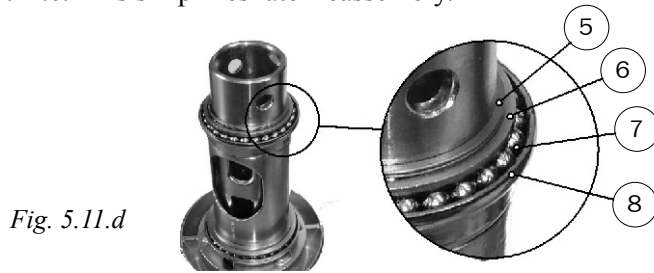


Fig. 5.11.d

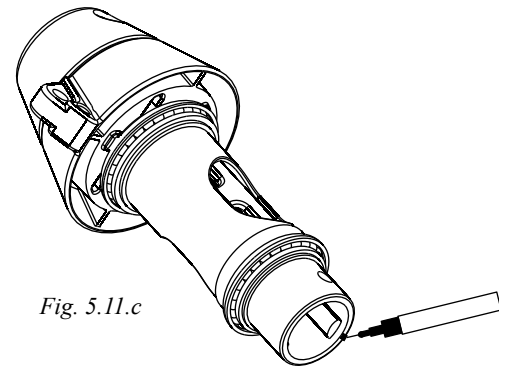


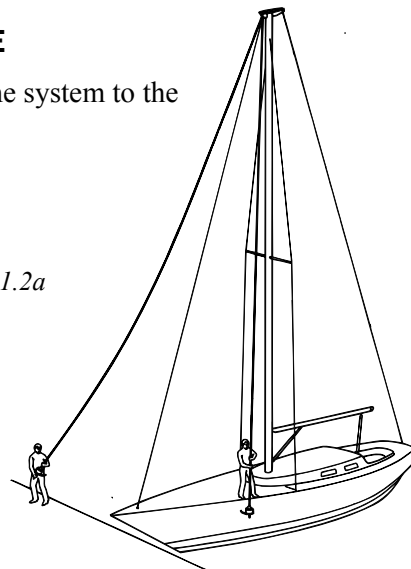
Fig. 5.11.c

6. Prepare for removal of the locking ring, washer, balls and bearing race by fixing a "collector" for the bearing balls under the bearing assembly. We suggest a slit plastic box or similar taped in place around the extrusion.
7. Remove the locking ring ⑤ (fig. 5.11.d) holding the washer ⑥ and ball bearings ⑦ in place. On reassembly, the locking ring will be replaced with a new one from the kit.
8. Remove the washer, balls and bearing race ⑧. Clean the washer and bearing race for later refitting.
9. Finally remove the existing toggle and any extension link.

5.11.2 Lower bearing assembly, Furlex 400E

Disconnect the toggle from the forestay attachment and move the system to the side.

Fig. 5.11.2a



Tools: Allen keys spanners 10 mm
1 pair of long-nosed pliers

1. Using a lead pencil, mark the extrusion ① where it enters the lower bearing assembly. This simplifies later reassembly
2. Undo the screws ② (2 pcs) that hold the extrusion to the lower bearing assembly.
3. Remove the split pin ③ and clevis pin ④ that hold the lower bearing assembly to the eye terminal.

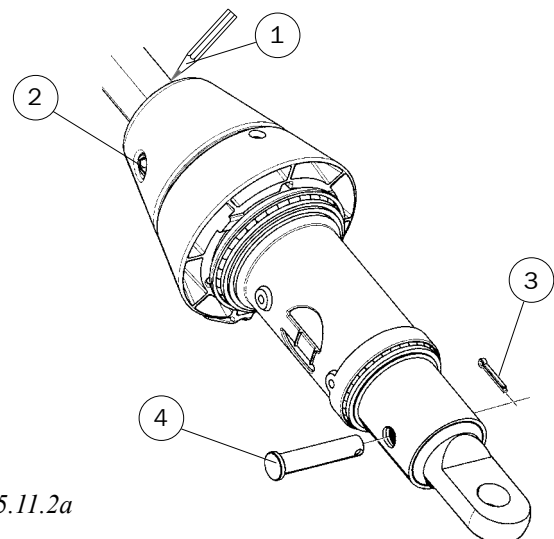


Fig. 5.11.2a

5.12.1 Installation of motor unit on lower bearing assembly, Furlex 200E/300E

1. Prepare the motor unit by removing the flange ring (8 pcs socket head screws) and plastic insulation between the flange ring and motor unit. See fig. 5.3.c. Fasten a rope around the motor unit to take its weight during the installation process. See fig. 5.12.a.

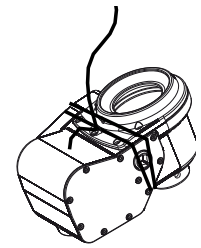


Fig. 5.12.a

2. Fit the two flanges ① in place on the lower bearing assembly. Note that the longest flange keys ② should point toward the top of the lower bearing assembly. See fig. 5.12.b. Secure them with a piece of tape.

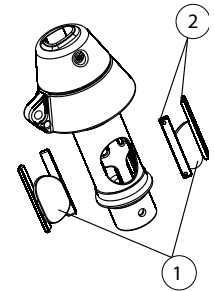


Fig. 5.12.b

3. Feed the motor unit over the lower part of the extrusion and then up past the lower bearing assembly, and align the flange keys in the grooves in the motor unit's bronze gear.

Due to variations in manufacture, certain older lower bearing assemblies can have a slightly larger outer diameter, which prevents the flange from entering fully. In such cases, remove one of the flanges and try again.

1 flange is quite sufficient to fulfil the function. *If this does not work either, then the flange must be modified to a suitable shape with a file.*

4. Hang up the motor unit using the previously fitted rope.
5. Then fit the bearing race. Apply bearing grease (supplied) and then mount the bearing cage with supplied bearings in the grease. Make sure that all the bearings are in place. (Any lost ball bearings can be replaced with old, disassembled ball bearings.)

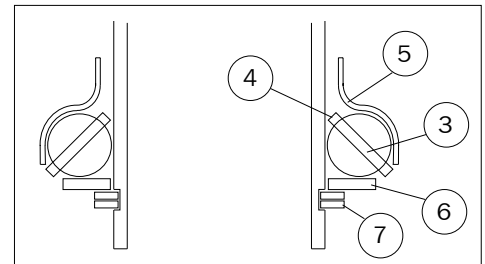


Fig. 5.12.c

- Note that the bearing cage ③ is conical and that the "narrow" end ④ must enter the bearing race ⑤ (towards the top of the lower bearing assembly). See fig. 5.12.c.
6. Mount the washer ⑥ and the new supplied locking ring ⑦. (Never re-use an old locking ring). In order to ensure that the locking ring bottoms, lift the motor unit while pressing the locking ring upwards.
 7. Hold the insulation washer in place and refit the flange ring. Undo and remount the 8 screws one by one, apply locking fluid (supplied in the kit) and tighten the screws firmly.
 8. Turn the lower bearing assembly's hollow shaft so that the clevis pin hole is aligned with the intended hole in the motor unit flange ring, see fig. 5.7.a. The orientation of the hollow shaft is determined by the flat side of the terminal eye/rigging screw. Use the previously made marker pen marks. Mount the clevis pin through the hole in one side of the flange ring and hollow shaft. The clevis pin is then in position when the hole in the terminal eye/rigging screw is to be found.
 9. Loosen the rope and lower the complete drive unit down over the terminal eye/rigging screw. Place a piece of cloth or paper between the lower bearing assembly's hollow shaft and the extrusion, to protect against scratching the extrusion. Also have cloth/paper between the clevis pin and the extrusion.
 10. Mount the clevis pin permanently with the split pin, so that the drive unit is fixed to the terminal eye/rigging screw. See fig. 5.7.a and 5.7.b. Open the split pin 20°.
 11. **Mount the cable collar and deck collar according to chap. 5.5 and 5.6.**
 12. Adjust the position of the extrusion so that the marks (made in chap. 5.11) coincide with the lower bearing assembly's upper edge. Mount the two screws ② (see fig. 5.11.a) in the black plastic adapter and tighten so that they bottom in the forestay extrusion. Loosen the screws one at a time and apply locking fluid to the threads. Tighten the screws firmly.

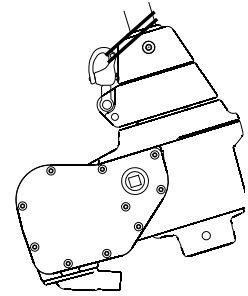
13. Feed the protective sleeve with the two supplied hose clamps, over the cables C3. Mount the sleeve on the drive unit cable collar ① (fig. 5.6). Use a driver with a hex socket intended for hose clamps and tighten firmly.
14. Feed the cables through the deck collar ③ (fig. 5.6) and then fit the sleeve.
15. Attach the cables below deck. Cut the cables to the correct length and connect to the plinths in the connection box. See chap. 4.6.
16. Check that the supplied emergency furling equipment can be mounted on the starboard side of the drive unit and then remove it again. See chap. 7.6.



Test the supplied emergency furling equipment and then remove it again.



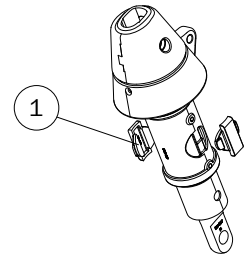
Before test-running the unit, tie or tape the tack hook to the extrusion so that the hook does not strike the drive unit and damage it. Also check that the emergency furling equipment is disconnected.



5.12.2 Installation of motor unit on lower bearing assembly, Furlex 400E

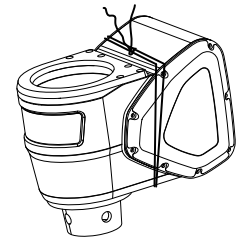
1. Place the two carriers ① on the lower bearing assembly. Secure with tape.

Fig. 5.12.2a



2. Fasten a rope around the motor unit to take its weight during the installation process.

Fig. 5.12.2b



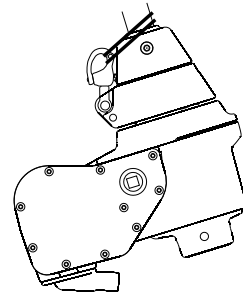
3. Feed the motor unit over the lower part of the extrusion and then up past the lower bearing assembly, and align the flange keys in the grooves in the motor unit's bronze gear.
4. Mount the clevis pin permanently with the split pin, so that the drive unit is fixed to the terminal eye/rigging screw. See fig. 5.7.a and 5.7.b. Open the split pin 20°.
5. **Mount the cable collar and deck collar according to chap. 5.5 and 5.6.**
6. Feed the protective sleeve with the two supplied hose clamps, over the cables C3. Mount the sleeve on the drive unit cable collar ① (fig. 5.6). Use a driver with a hex socket intended for hose clamps and tighten firmly.
7. Feed the cables through the deck collar ③ (fig. 5.6) and then fit the sleeve.
8. Attach the cables below deck. Cut the cables to the correct length and connect to the plinths in the connection box. See chap. 4.6.
9. Check that the supplied emergency furling equipment can be mounted on the starboard side of the drive unit and then remove it again. See chap. 7.6.



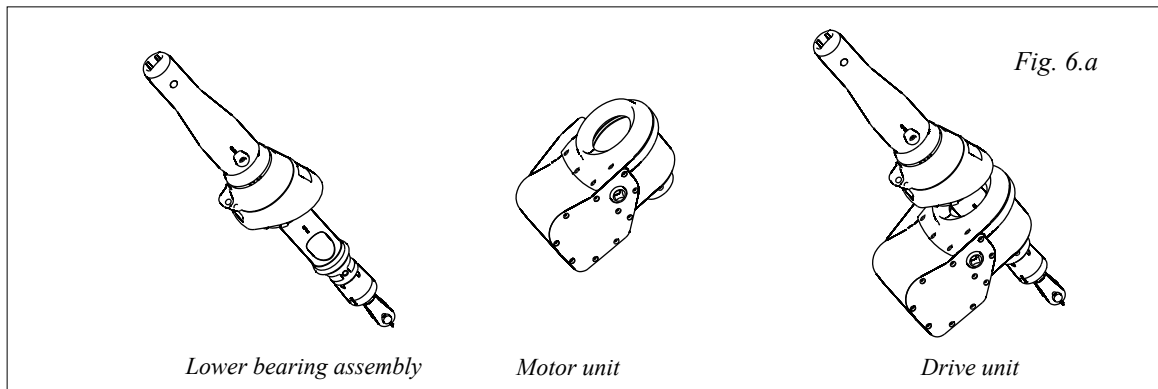
Test the supplied emergency furling equipment and then remove it again.



Before test-running the unit, tie or tape the tack hook to the extrusion so that the hook does not strike the drive unit and damage it. Also check that the emergency furling equipment is disconnected.



6. **TD** Installation of motor unit on TD (Furlex for below-deck installation)

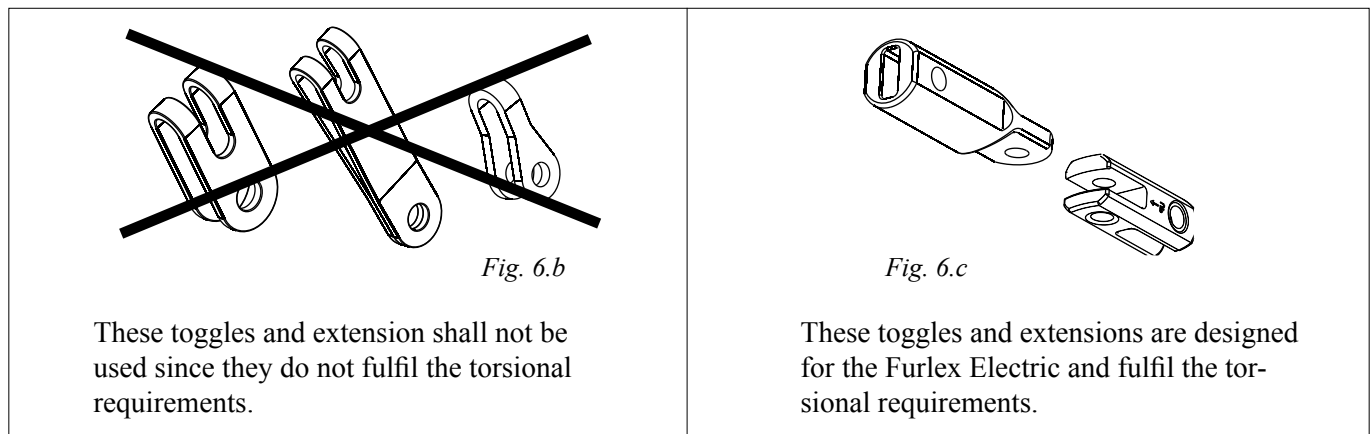


Preparation

NF For installation of the lower bearing assembly in the boat, refer to instruction 595-231-E (Instruction for Furlex 200TD & 300TD), 595-240-E (Instruction for Furlex 400TD).

Furlex 200TD/300TD/400TD

EF If a toggle or extension link is used between the fork and the boat's chain plate, it must be able to withstand the torsional forces created by the Furlex system. See table 3.2.1.



Check that the boat's forestay attachment is strong enough to take up the torsional forces from the Furlex Electric. Since there is no furling line to take up the torsional forces when, e.g. sailing with a reefed foresail, all of the torsional forces will be taken up by the drive unit and be transferred via the toggle to the boat's forestay attachment. See table 3.2.1 for the minimum torsional capacity of the forestay attachment.

The strength can be theoretically calculated or found via practical tests.

If the chainplate is not sufficiently strong, there are 4 threaded holes on the underside of the motor unit to which a torque absorber can be fitted. This must be individually adapted for the boat in question and is therefore not supplied by Seldén.

EF In order to install the motor unit on the lower bearing assembly, this must be removed from the boat. The sail must also be removed.

The connection box is mounted in the anchor box, as in chap. 4.6.

Furlex 400TD

When sailing with a reefed sail, torque generated in the luff extrusion is usually absorbed by the furling line.

Furlex 400TDE does not have a furling line, so torque loads must be opposed by a link between motor housing and hull. A rigging screw can be used as a link.

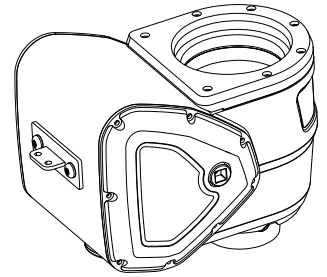


Fig. 6.d

6.1 Checking the motor unit

1. Temporarily connect the motor unit to the connection box.
2. Activate the power supply from the battery and turn on the control current.
3. Test run both IN & OUT functions.
4. If the functions are OK; remove the cables from the connection box. If not, fault trace according to “Fault tracing diagram”, Chap. 9.

6.2 EF Disassembly of the line guide unit, Furlex 200E/300E

Furlex 400E, see 595-116-E, chap. 17.3.

1. Roll off all the line from the line drum.

2.

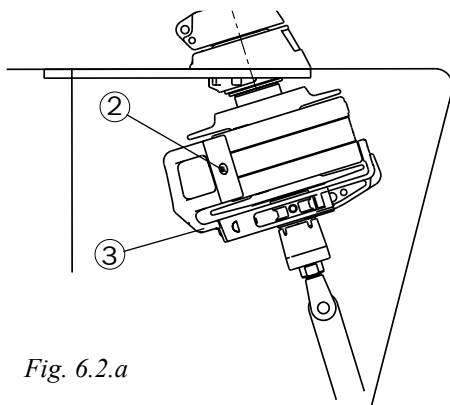


Fig. 6.2.a

Undo the screws ②, and release a few turns on screw ③.

3.

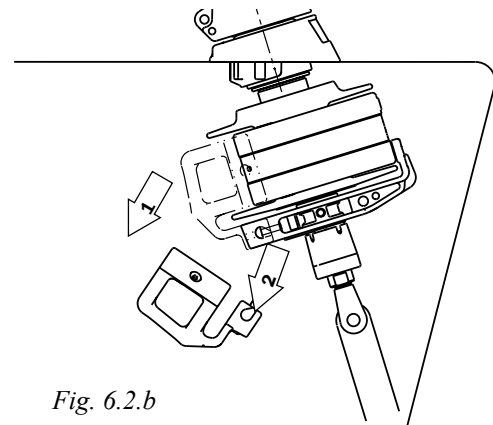


Fig. 6.2.b

Lower the line guide fitting and release it.

4.

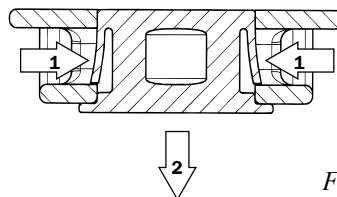


Fig. 6.2.c

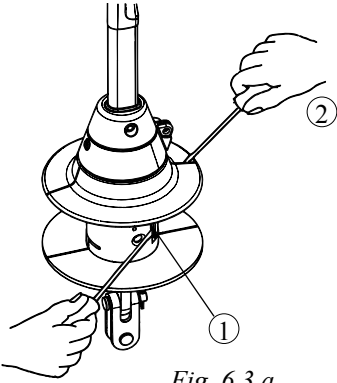
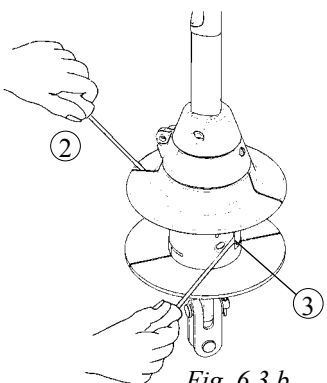
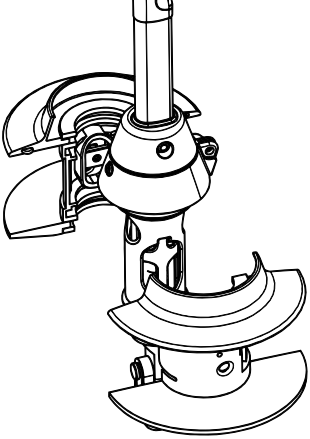
Press in the spring loaded clips (arrow 1) and release the locking block downwards.

5. Turn the line drum protector a half turn and pull it off the line drum.

6.3 EF Disassembly of the line drum, Furlex 200E/300E

Furlex 400E, see 595-116-E, chap. 17.4.

1. Disassemble the line drum halves.

<p>2.</p>  <p style="text-align: center;"><i>Fig. 6.3.a</i></p> <p>Push a screwdriver ① under one of the drum's "quick connectors". Push in another screwdriver ② between the drum halves on the same side so that these are pressed apart 3-4 mm.</p>	<p>3.</p>  <p style="text-align: center;"><i>Fig. 6.3.b</i></p> <p>Keep the screwdriver in place ② and turn the stay a half turn. Release the other drum half's ③ "quick connection".</p>	<p>3.</p>  <p style="text-align: center;"><i>Fig. 6.3.c</i></p> <p>The line drum halves can now be removed.</p>
---	--	--

6.4 EF Releasing the forestay

1. Slacken the backstay as much as possible. But make sure that any rigging screw is not unscrewed so far that the threads are no longer visible "on the inside".
For masts with aft swept spreaders, the upper rigging screw must be slackened so much that the forestay can be disconnected. E.g, slacken the backstay + one upper rigging screw, Count the number of turns the rigging screw is slackened. This simplifies reassembly.
Avoid changing the setting of any Furlex rigging screws. This simplifies reassembly.



Avoid changing the setting of any Furlex rigging screws.

2. Draw the top of the mast forward with the genoa halyard. Secure the halyard using a "D" shackle or tie it to a strong deck fitting. For safety reasons, do not use the halyard snap shackle.



Always use a strong D-shackle or tie to the halyard.

3. Mark the position of the extrusion against the adapter tube ① top with i.e. a lead pencil ②. This simplifies later reassembly. Undo the screws ③ holding the extrusion to the adapter tube. See fig. 6.4.a.
4. Undo the two bushes ④ that connect the adapter tube to the lower bearing assembly. Note! Loosen the smaller locking screw ⑤ before the larger socket cap screws ⑥ are released.
5. Move the adapter tube up along the extrusion to expose the forestay toggle. Place a piece of cloth or paper between the adapter tube and extrusion to protect against scratching. Secure the adapter tube in this position with tape.
6. Secure the locking pin in the lower end of the lower extrusion with tape. See fig. 6.4.b.
7. Disconnect the forestay by removing the toggle's lower clevis pin. Tie the forestay to a cleat or the pulpit until it is time for reassembly.

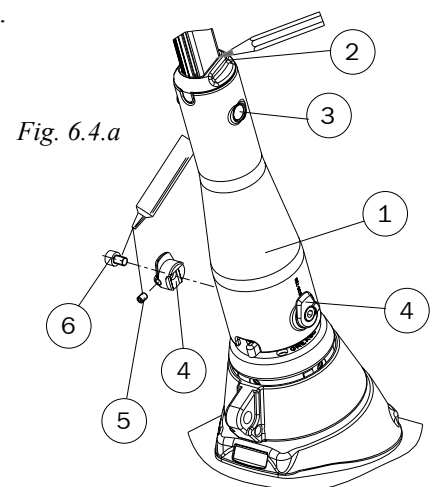
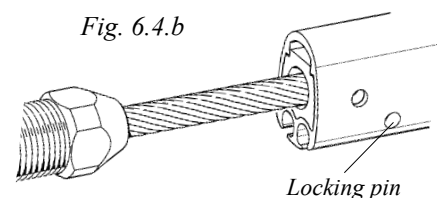


Fig. 6.4.b



6.5.1 Mounting the motor unit, Furlex 200TDE/300TDE

In order to mount the motor on the existing lower bearing assembly, it is necessary to partially disassemble it.

NF When fitting a new Furlex TDE, the lower bearing assembly should be test-fitted and adjusted before fitting the motor.

1. Prepare the motor unit by removing the flange ring (8 pcs socket head screws) and plastic insulation between the flange ring and motor unit. See fig. 6.5.a.
2. Release the lower bearing assembly from the boat's chain plate and lift it up through the deck collar.
3. Start by loosening both the locking screws ⑤, and then remove the fork termination ⑥. See fig. 6.5.b. (On an existing Furlex TD both the locking screws are sealed with locking fluid).
4. Place the lower bearing assembly upside down (preferably in a box, to collect the ballbearings) and remove the locking ring ① that holds the washer ② and ball-bearings ③ in place. See fig. 6.5.b. On reassembly, the locking ring will be replaced with a new one supplied with the kit.

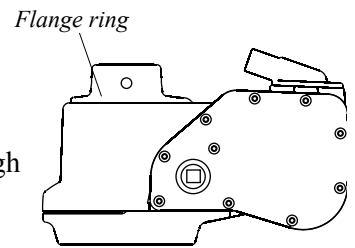


Fig. 6.5.a

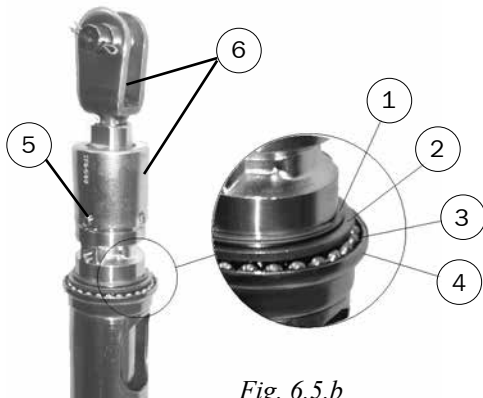


Fig. 6.5.b

5. Remove the washer ②, balls ③ and bearing race ④. Clean the washer and bearing race for later refitting.
6. Mount the two flanges on the lower bearing assembly as illustrated. Note that the longest flange keys should point toward the top of the lower bearing assembly. See fig. 6.5.c. Now try to feed the motor unit over the bearing assembly so that the keys engage in the grooves. Lift off the motor unit and secure the flanges with tape.

Due to variations in manufacture, certain older lower bearing assemblies can have a slightly larger outer diameter, which prevents the flange from entering fully. In such cases, remove one of the flanges and try again. 1 flange is quite sufficient to fulfil the function. If this does not work either, then the flange must be modified to a suitable shape with a file.

7. Undo the deck collar screws but leave it in place.
8. Place the motor unit under the hole in the deck. Lower the lower bearing assembly down through the deck collar and onto the motor unit. Align the flange keys in the grooves in the motor unit.
9. Secure the motor unit with a rope to prevent it falling down.
10. Apply a little grease to the bearing race and feed it down onto the lower bearing assembly. Then mount the bearing cage with supplied bearings in the grease. Make sure that no balls are missing. (Any lost ball bearings can be replaced with old disassembled ball bearings.) Note that the bearing cage ③ is conical and that the "narrow" end ⑦ shall face upwards and enter the bearing race ④. See fig. 6.5.d.

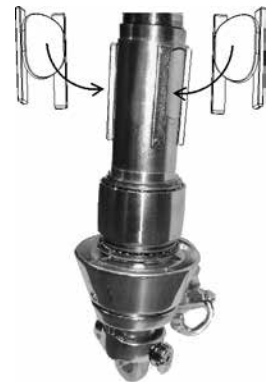


Fig. 6.5.c

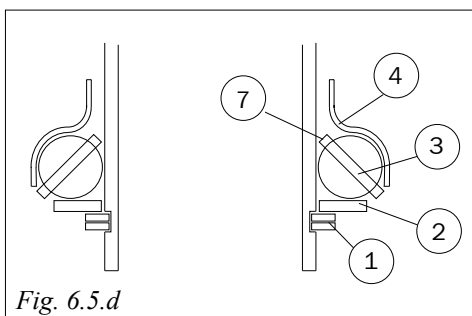
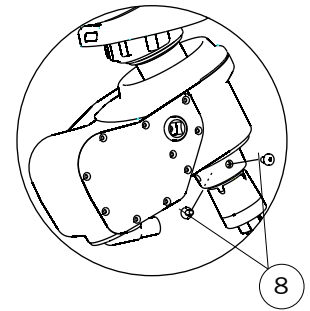


Fig. 6.5.d

11. Mount the washer ② and the new supplied locking ring ①. (Never re-use an old locking ring). In order to ensure that the locking ring bottoms in its groove, lift the motor unit a little while at the same time pressing the locking ring upwards.
12. Install the plastic insulating washer and the flange ring. Install the 8 screws and tighten moderately. Undo and refit the 8 screws one by one, apply locking fluid (supplied with the kit) and tighten the screws firmly.
13. Refit the fork termination ⑥. Apply a little locking fluid to both the locking screws ⑤ and then refit them. See fig. 6.5.b.

14. Remount the lower bearing assembly on the boat's chain plate. When the toggle is mounted on the chain plate, the maximum number of shims should be placed in between to reduce the play. The Furlex Electric-kit is supplied with 4 (four) 0.8 mm shims. Fit the shims as evenly as possible on each side of the boat's forestay attachment (e.g 2+2 or 1+2).
15. Apply locking fluid to the two screws ⑧ that hold the motor unit to the lower bearing assembly and fit them. See fig. 6.5.e.
(The assembled lower bearing assembly and motor unit will hereafter be called the "Drive unit").
16. Refit the deck collar with the four screws. If these screws do not have hexagonal heads, they should be replaced with ones that do. The limited space between the deck and drive unit does not allow the use of other tools than ring spanners and adjustable spanners.
17. Refit the forestay according to Furlex TD instruction 595-231-S. Chap. 16.6-16.8.
18. Check that the supplied emergency furling equipment can be mounted on the starboard side of the drive unit. See chap. 7.6.

Fig. 6.5.e



Test the supplied emergency furling equipment and then remove it again.

6.5.2 Mounting the motor unit, Furlex 400TDE

- NF** In case of a new Furlex TDE, it is easier to test and adjust the lower bearing assembly in place before the motorunit is fitted.
- EF** Remove the lower bearing assembly from the chainplate and raise it through the deck fitting. Ensure that the rigging screw settings are not changed, chap. 3.4.

1. Check that ① in fig. 6.5.2b fits inside the motorunit. On some early units the diameter can be to large. In that case please contact your Seldén representative.
2. Place the motorunit below deck. We suggest using a strong full width support underneath.
3. Insert the lower bearing assembly through the deck fitting until the two carriers can be mounted, fig. 6.5.2c.

Fig. 6.5.2b

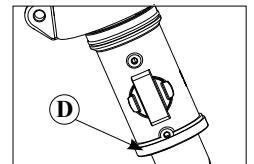
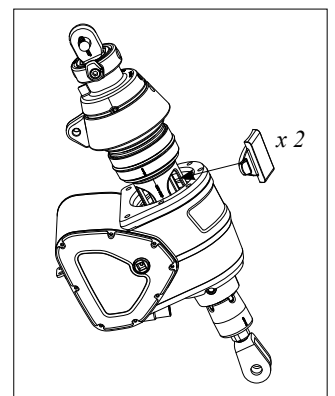
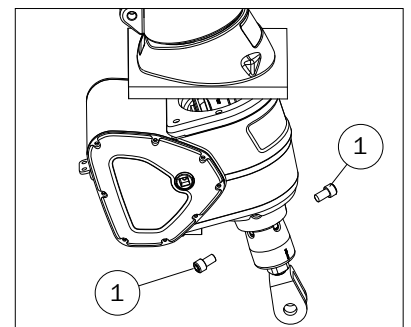


Fig. 6.5.2c



4. Continue lowering the bearing unit until it can be connected to the chainplate.
5. Fix the motorunit to the lower bearing assembly with the two screw. Use Loctite on the screws.

Fig. 6.5.2d



- Refit the forestay according to Furlex TD instruction 595-240-E chap. 4.2. Check that the supplied emergency furling equipment can be mounted on the starboard side of the drive unit. See chap. 7.6.



Test the supplied emergency furling equipment and then remove it again.

6.6 Connecting to the connection box

- Fit the supplied protective sleeve ① to feed the cables (C3) from the drive unit cable collar temporarily ② to the connection box ③. See fig 6.6.a.

Note that the sleeve must be arched so that movement of the drive unit can be taken up without the sleeve being stretched. After the toggle has been shimmed in place, there can still be a certain amount of play, the drive unit will twist a few degrees depending on whether the sail is furling or unfurling.

- Mark the cutting point on the sleeve.
- If the sleeve forms a lowest point ④ between the drive unit and connection box, a draining hole must be made ④ (approx. Ø 10), for any condensation to escape from. Mark the draining hole on the sleeve.
- Pull the sleeve off the cables**, cut to the correct length and make the draining hole.
- Fit the protective sleeve and the supplied hose clamp of the two cables. Mount the sleeve on the drive unit cable collar. Use a driver with a hex socket intended for hose clamps and tighten firmly.
- Fasten the sleeve under the decking ⑤, but be sure to make sufficient allowance for movement according to point 1. Cut the cables to the correct length and connect to the plinths in the connection box. See chap. 4.6.

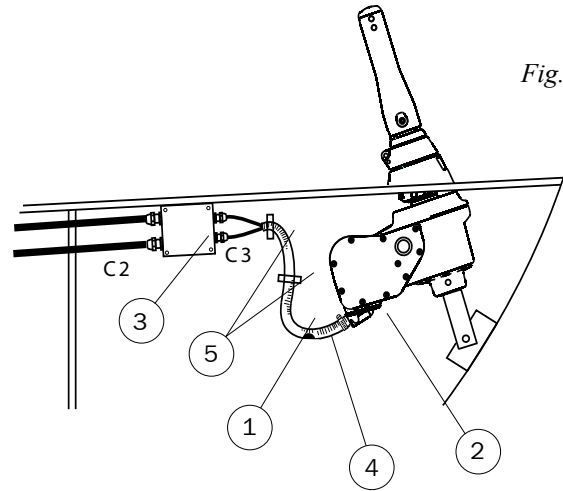
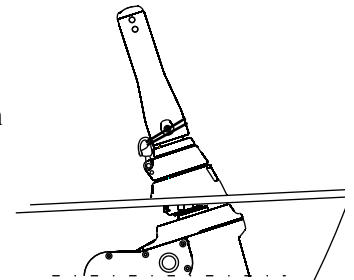


Fig. 6.6.a




Before test-running the unit, tie or tape the tack hook to the extrusion so that the hook does not strike the drive unit and damage it. Also check that the emergency furling equipment has been removed.



OPERATING INSTRUCTIONS

In order for you to gain the most benefit and enjoyment from your Furlex Electric system, we recommend that you study these operating instructions thoroughly. Some sections may refer to “Instructions for Furlex 200S & 300S” (595-104-E), “Instructions for Furlex 400S” (595-116-E) and “Instructions for Furlex 400TD” (595-240-E).

All safety-related information is indicated by the following symbol: 



This information must be followed to avoid damage to the system and the risk of personal injury. The guarantee conditions apply only with correct operation in accordance with these instructions.

Note that the electric motor in the Furlex E is not intended for continuous operation under high loading. The temperature of the electric motor increases significantly when furling under heavy loading, e.g. very heavy winds, or with heavy resistance from the sheet when furling. For this reason, do not furl and unfurl the sail repeatedly during such conditions.

Furlex users who have not personally installed the Furlex system do not need to read the entire installation instruction. The operating instruction do however, refer to selected parts of the installation instructions. It is very important that these instructions are read and observed.

7 Sailing with Furlex Electric

7.1 Setting the sail

Refer to “Instruction Furlex 200S & 300S” (595-104-E), chap. 11.1 or “Instruction Furlex 400S” (595-116-E), chap 11.1.

7.2 General information about furling

Using electric power removes some of the sensation of resistance or friction when furling & unfurling. One should therefore always keep an eye on the furling process and ensure that no external obstacle hinders the process and causes damage.

The current to the motor is limited electronically. If one does not slacken the sheet sufficiently when furling, the motor will be overloaded and the current will be cut automatically. When the IN or OUT button is released, the current protection is reset automatically after a few seconds. One can now continue furling/unfurling, but has received a warning that the load is too high. Read more about current limitation in chap. 1.3 “Control box”.



The current being automatically cut provides a warning that the load on the system is too high.

7.3 Unfurling

1. Turn the control current on.
2. Release the weather side of the genoa sheet. Place it so that it can run free during unfurling.
3. Place the lee-side sheet one turn around a winch and tension by hand.
4. Press on the control button/remote button GENOA OUT and pull on the lee-side sheet at the same time. The button should be held depressed during the entire unfurling process.
The best bow for unfurling is upwind. One can then take up the slack on the lee-side sheet and thus ensure that the sail does not flap too much.
5. Lay another turn of the sheet around the winch and adjust the sail to the desired shape.

7.4 Furling

1. Free up the weather-side sheet and make sure it can run free.
2. Release the lee-side sheet from the cleat or winch self-tailer. Hold against the sheet while at the same time reducing the number of turns around the winch so that only one remains.
3. Furl in the sail on the Furlex-extrusion by pressing the control button/remote button GENOA IN. Slacken the lee-side sheet as you go, so that the sail is evenly and firmly furled. A sail that is too loosely furled can blow out in hard winds. If the boat is left unattended, the sail can flap apart. A sail that is too loosely furled can also cause unnecessary wear when the sail rocks back and forth in the wind.
If the resistance in the sheet is too great when furling, the motor will be overloaded and the current will be automatically cut. Release the control button/remote button, slacken the sheet and then press on GENOA IN again.
4. Then switch off the control current so that no unintentional maneuvering can be performed.

7.5 Reefing

Refer to “Instruction Furlex 200S & 300S” (595-104-E), chap. 12 or “Instruction Furlex 400S” (595-116-E), chap 12 applicable sections. The process of manoeuvring with the furling line is replaced by manoeuvring with the control button/remote button.

Do not use Furlex E to sheet with.



Do not use Furlex E to sheet with.

7.6 Emergency furling

If, for any reason, the electrical function ceases to work (See Fault tracing diagram, chap. 9.) the Furlex Electric system can easily be operated by using the supplied emergency furling equipment. This equipment is connected to the drive unit via a ½" square fitting on the drive unit's starboard side. See fig. 7.6.a.

On the Furlex E, some of Seldén's ½" crank handles for electrically operated furling masts also fit. If the length of the crank handle interferes with e.g. the pulpit, an extension can be used. E.g. from a socket wrench set with ½" drive. The ½" crank is available in two lengths, as extra equipment. (Order no., see chap. 2.4).

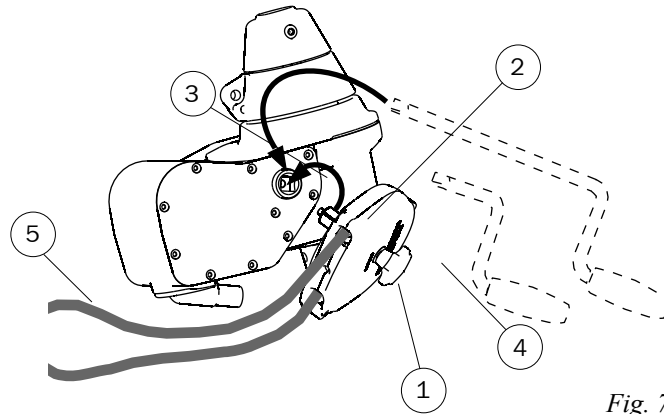


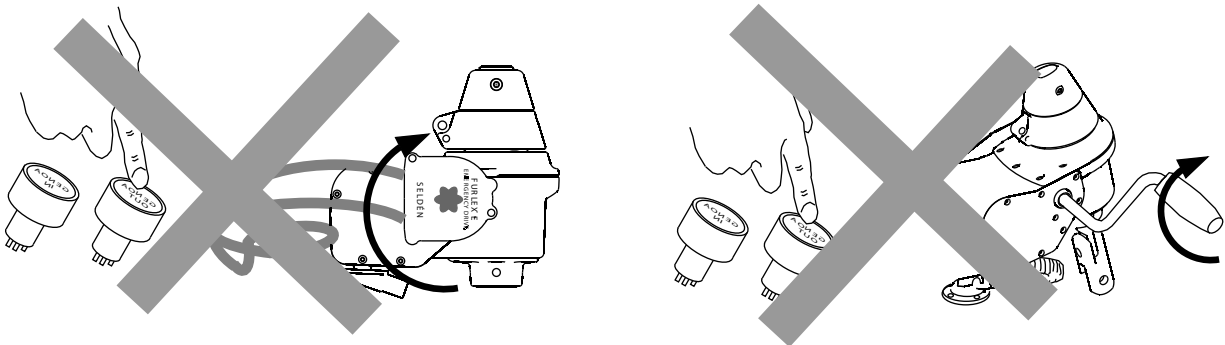
Fig. 7.6.a

1. Turn off the control current.
2. Connect the emergency furling equipment ① by mounting the square fitting of the central shaft ② into the drive unit's base ③. The bottom of the base has an M6 thread. Fasten the emergency furling equipment to the drive unit with the screw/plastic knob ④.
3. Furl or unfurl the sail by pulling on the short continuous line ⑤.

The emergency furling equipment (or crank) must never be connected when the system is operated electrically. It would rotate very rapidly when the electric motor started, with a great risk for personal injury or damage to property.



The emergency furling equipment or crank must never be connected when the system is operated electrically. It would rotate very rapidly when the electric motor started.



8 Care & Service

In order for your Furlex Electric system to function both mechanically and electrically and to rotate easily, year after year, a certain amount of system maintenance is required on a regular basis.

This care and service chapter is a complement to chapter 15 in "Instructions for Furlex 200S & 300S" (595-104-E).

8.1 Every week

Furlex Electric is designed to withstand a saltwater environment. However, it should be washed down with fresh water occasionally, e.g. when the deck is washed off. This also applies to a Furlex TDE located in the anchor box. Also check that the anchor box drainage functions satisfactorily and that the outlet is not blocked. A Furlex TDE is especially exposed if the box is filled with water.

8.2 Every year

Check for wear of the toggle: **200E/300E** (see instruction 595-104-E, chap. 15).
400E (see instruction 595-116-E, chap. 15).

Lubrication of the lower bearing assembly: **200E/300E** (see instruction 595-104-E, chap. 15.1).
400E (see instruction 595-116-E, chap. 15.1).

Lubrication of the halyard swivel: **200E/300E** (see instruction 595-104-E, chap. 15.2).
400E (see instruction 595-116-E, chap. 15.2).

The ball bearings are lubricated with Furlex-grease, which is supplied with the Furlex Electric kit.

Cleaning, etc. with de-rigging: **200/300E** (se instruktio 595-104-E, chap. 15.3).
400E (se instruktio 595-116-E, chap. 15.3).

Electric cables, protective sleeve and connection box

Inspect the protective sleeve, connection box and cables (C3) between the Furlex Electric unit and the connection box. Damaged protective sleeves and defective hose clamps must be replaced.

If the connection box is damaged by the anchor chain or similar, it must be replaced.

Remote control (extra equipment)

Replace the battery in the remote control hand unit. Make sure you have a spare battery onboard. For further information, see chap. 4.8.4.

8.3 Every 5th year

The reduction gear in the drive unit is lubricated with lithium-based grease (SKF LGEP 2/04). With normal use, the unit should be left to an authorised Seldén dealer for service at a maximum of 5 year intervals. Such a service includes disassembly and cleaning, replacement of seals, O-rings and drive belt, and re-greasing.

For boats that are used for chartering, long-distance sailing, etc. the unit should be left for service more frequently.

8.4 Storage

Furlex Electric drive unit

Should be flushed free from salt and dirt. The Furlex Electric drive unit can be easily removed from the forestay extrusion for separate storage, which is recommended. Move the drive unit upwards along the extrusion when being removed, see chap. 5.2.5. Store in a dry, well ventilated area. Always turn the hose ends downwards, so that water cannot run in and damage the electric motor, etc.

If the drive unit is stored on the forestay extrusion together with the mast, remember that the Furlex Electric drive unit is considerably heavier than a Furlex S lower bearing assembly. Fix a board or similar along the mast, for the extrusion and drive unit to be attached to. See fig. 8.4.a. Alternatively, the Furlex system can be removed from the forestay extrusion and be pushed up along the mast.

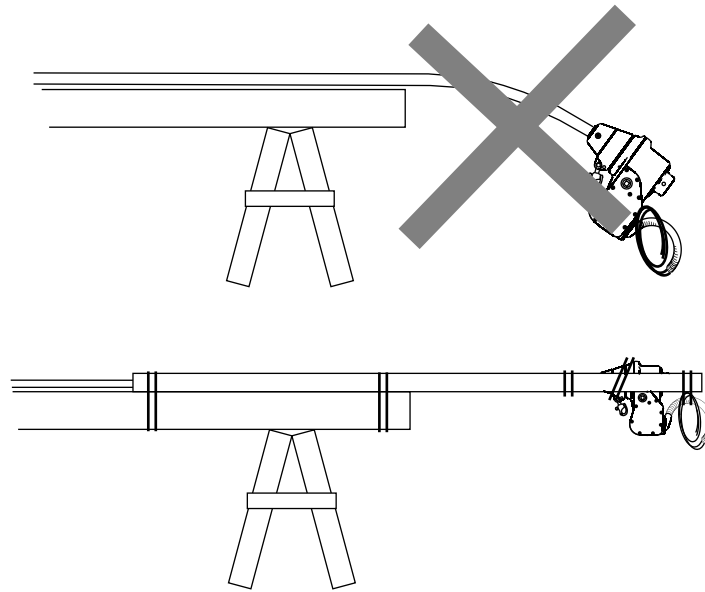


Fig. 8.4.a

Note that the protective sleeve for the cables must ALWAYS be facing downwards, to prevent water and dirt entering. See fig. 8.4.b.

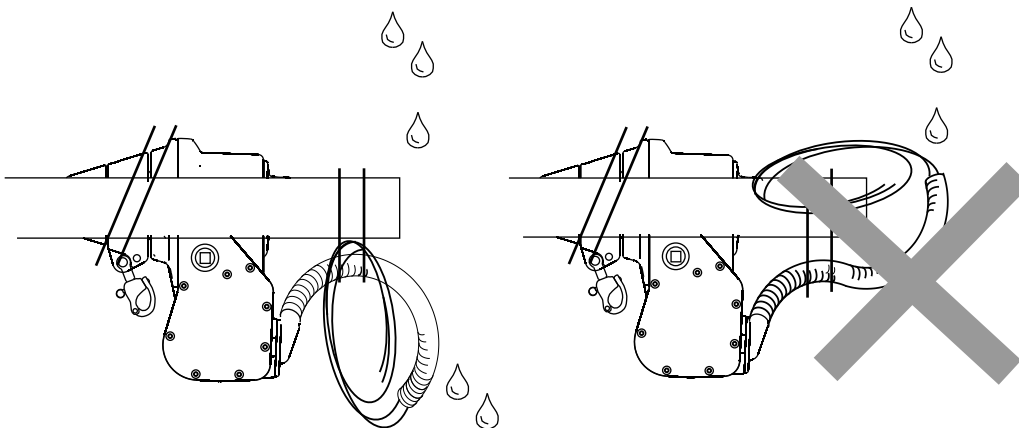


Fig. 8.4.b

A Furlex TDE can be stored over winter onboard the boat. The boat is covered and the anchor box cover should preferably be left open to ventilate the space.



Under no conditions may a Furlex Electric be stored in a tightly-fitting package. It must be stored in a dry, well ventilated place.

Forestay and extrusion

These can preferably be stored together with the mast (see instruction 595-104-E, chap. 15.4).

Remote control (extra equipment)

Store the remote control hand unit in a dry place with the battery removed. Remember to fit a new battery at the start of the new season! For further information, see chap. 4.8.

9 Fault tracing diagram

If the electric Furlex is not operating, check voltage at the following locations, with a control button activated	Connection box	OK	*		
		NOT OK	**		
	Control box output	OK			
		NOT OK	***		
	Control box input	OK			
		NOT OK	**		
	Main fuse	OK			
		NOT OK	****		
				Probable cause	Action
		* Check for sound indicating if the electric motor runs	Motor runs	Broken drive belt	Contact Seldén representative for service or ordering of spare parts.
			Motor does not run	Electric motor out of order	Check cables, if cables are OK contact Seldén representative for service or ordering of spare parts.
		**		Cables faulty or connectors loose/corroded	Clean and tighten connections, replace any damage cables.
*** Check the fuse at the circuit board in the control box	Fuse not OK				Replace fuse once, if problem persists contact Seldén representative.
	Fuse OK	Measure if contactor gets voltage for activation	OK	Contactor out of order	Contact Seldén representative for service or ordering of spare parts.
			Not OK	Circuit board or control buttons faulty	Contact Seldén representative for service or ordering of spare parts.
		**** Fuse not OK			Check that the fuse is properly sized. We recommend that a boat electrician investigate the cause for the fuse to trip.

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