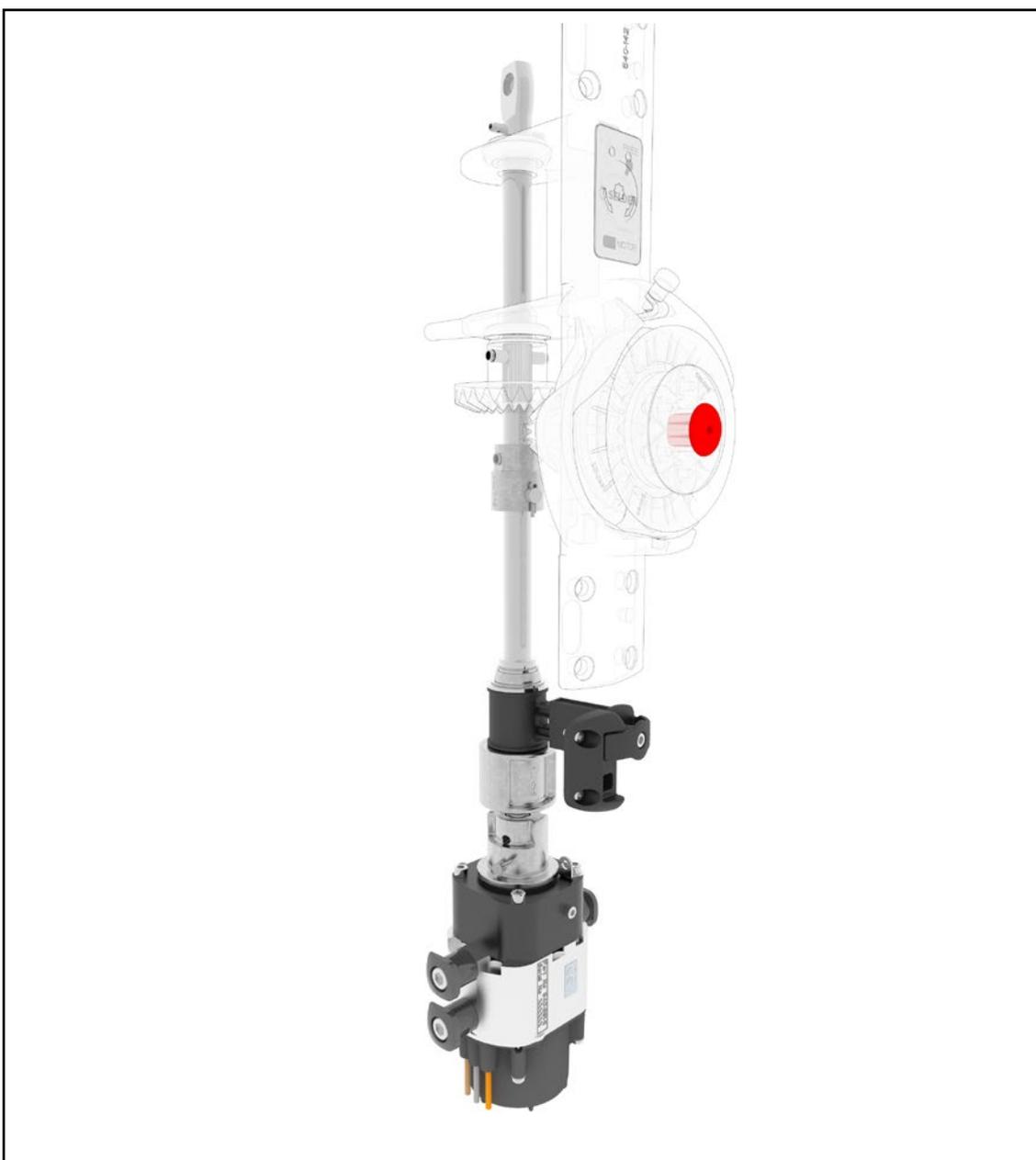


# SMF

SYNCHRONIZED MAIN FURLING

## Installation manual and user guide SMF retrofit kit Type RC



# Contents

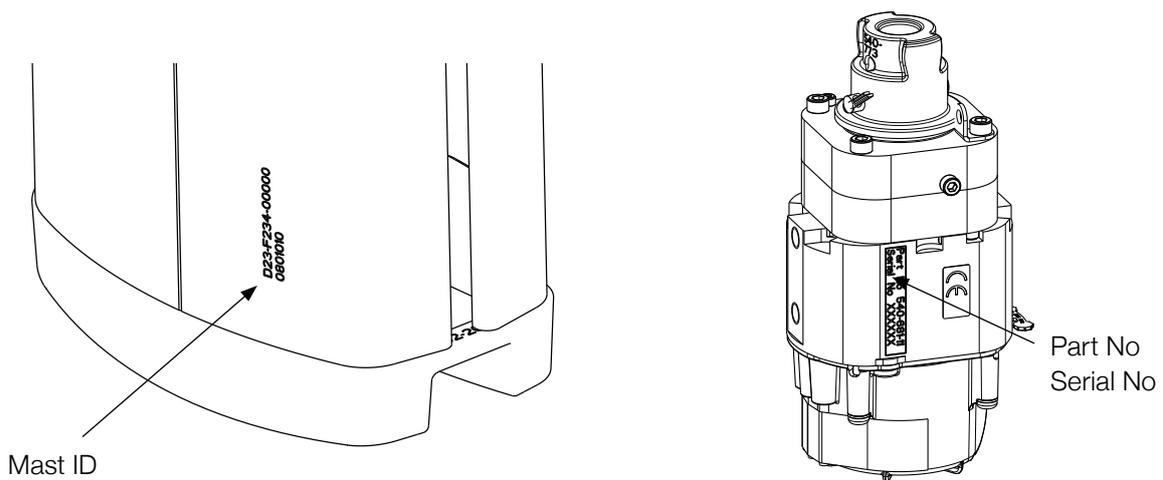
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# 1. Introduction

Congratulations on the purchase of your new SMF retrofit kit, type RC.

This manual covers operating guidelines for the system and installation instructions for the electric retrofit kit on mast sections R290, F265, F286, F305, F324, F252, F272, F291. The mast section is identified by the mast ID, engraved on port side at the bottom of the mast extrusion.

The part number and serial number of the mast motor is found on the aft side of the mast motor facing the sail groove. Always use the mast ID and part and serial number of mast motor as reference in any support case.



Please read the entire manual before installation and use of the product and keep it available for future reference. The latest version is available at [www.seldenmast.com](http://www.seldenmast.com).

## Related installation manuals and user guides:

597-275-E Installation of Seldén Power Supply and SEL-Bus system

597-283-E Seldén Power Supply and SEL-Bus system order guide

595-540-E Hints and Advise

## Installation of SMF retrofit kit

All Seldén dealers are listed at [www.seldenmast.com](http://www.seldenmast.com) and divided in categories describing their competence. For SMF retrofit installation we recommend dealers in the category “Advanced technical installations”.

## Safety notes

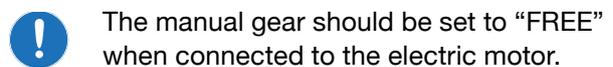
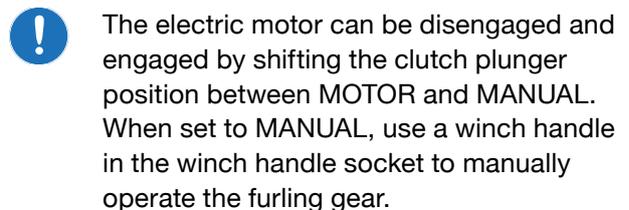
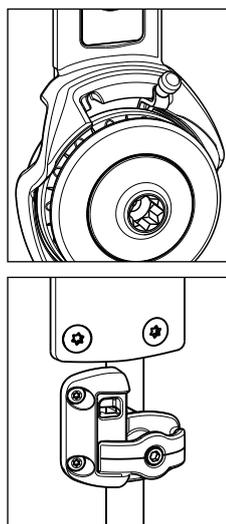
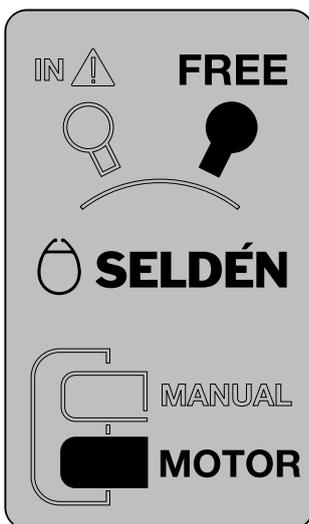
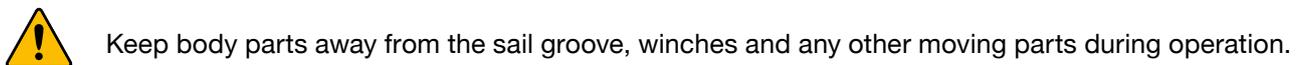
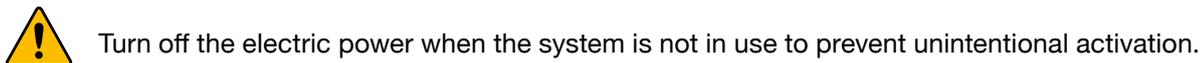
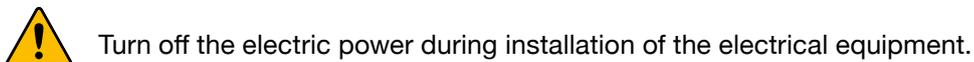
Pay careful attention to, and follow the instructions with the following symbols:



This symbol indicates a critical moment in the assembly or technical advice.



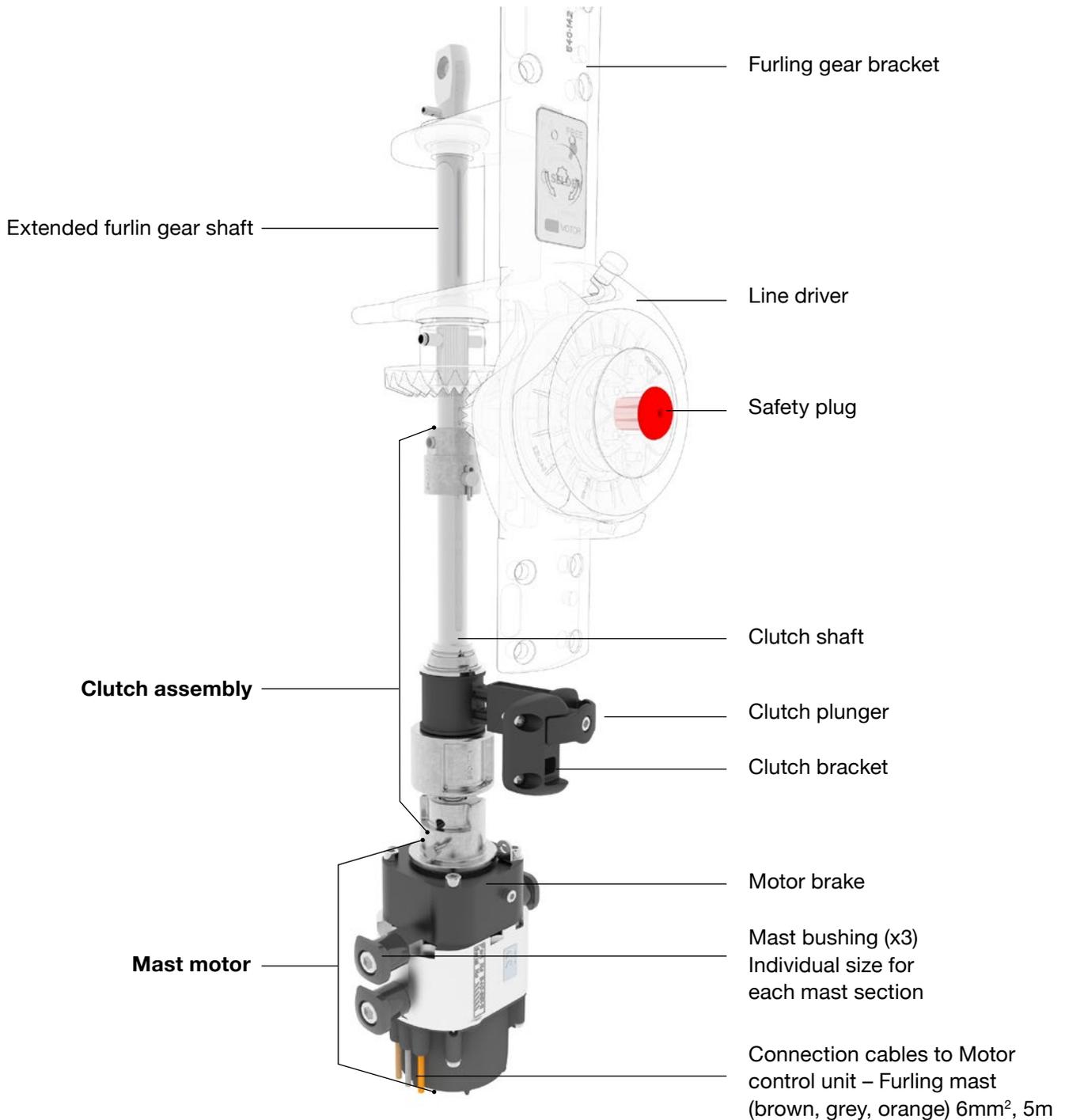
This symbol indicates a potentially hazardous situation. If not avoided, this could result in serious personal injury or damage to property.



# 2 Synchronized Main Furling

## 2.1 SMF Retrofit kit – mast motor and clutch

The SMF retrofit kit contains the electric mast motor and clutch assembly required to upgrade your existing manual line driver. The mast motor is installed inside the mast and controlled by connection cables linked to the Seldén Power Supply and SEL-Bus system.



## 2.2 Power supply and SEL-Bus system

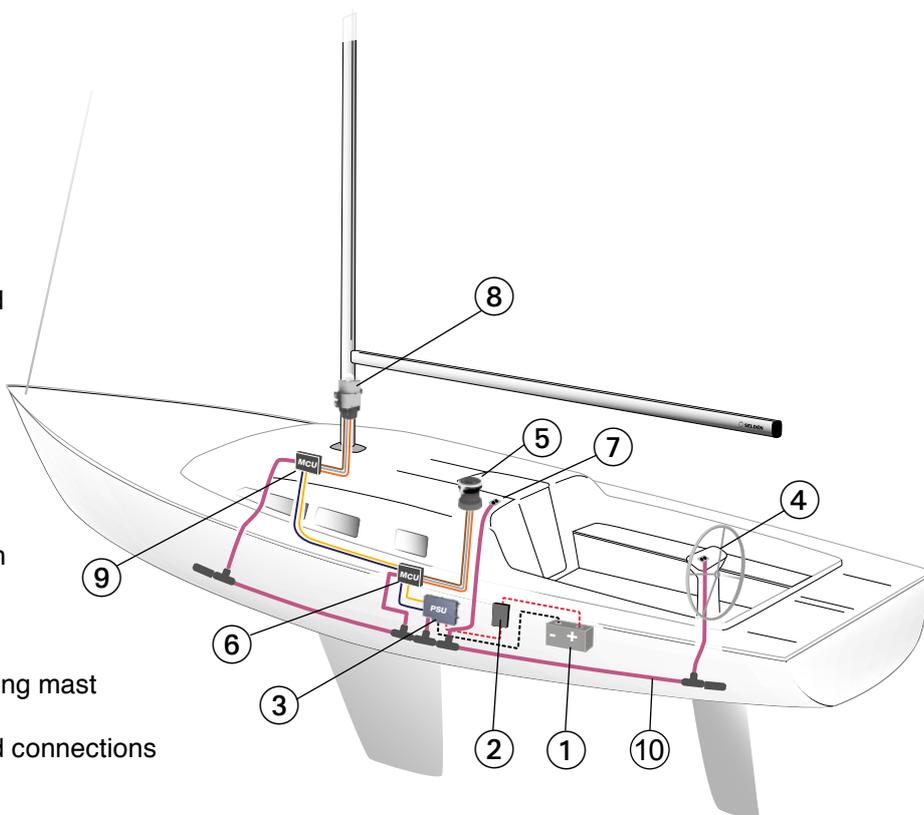
SMF retrofit is used together with a Seldén Power supply and SEL-Bus system, and a Seldén electric winch for synchronized outhaul.

The mast motor is connected to motor control unit (MCU) for furling masts. Via the SEL-Bus network, the furling mast MCU can communicate with the winch MCU and OUT/IN control buttons. Seldén's electric winch, all power supply and SEL-Bus system parts are sold separately. Parts and packages are described in Seldén Power Supply and SEL-Bus system: Order guide 597-283-E.

### System illustration

The illustration shows an example of a Synchronized Main Furling network installation. The complete Power Supply and SEL-Bus system of each customer will vary and can include additional units and functions.

1. Battery (not included)
2. Main switch/fuse
3. Power supply unit (PSU)  
Converts 12/24V to 42V
4. Push buttons for Synchronized Main Furling
5. Electric winch
6. Motor Control Unit (MCU),  
Electric winch
7. Push buttons for Electric winch
8. Mast motor
9. Motor Control Unit (MCU) Furling mast
10. SEL-Bus backbone cables and connections



## 2.3 Technical specification

Mast motor	OUT	IN	
Total Gear Ratio	81:1		
Peak Torque	16Nm	170Nm	
Low speed (max)	37 RPM	37 RPM	
High speed (max)	74 RPM	74 RPM	
Max power (full torque)	175W	740W	
Full load current*	12V 24V	- -	60A 29A
Nominal current*	12V 24V	15A 7,5A	20A 10A

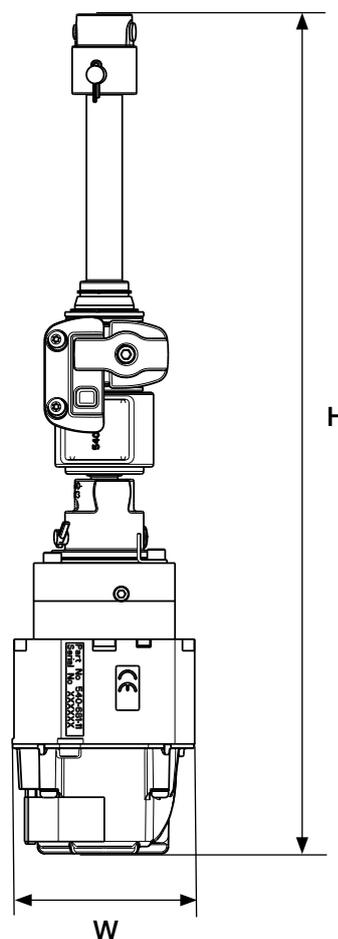
\*Consumption incl. MCU and PSU.

Synchronized winch	OUT
Limited outhaul force**	2200N

\*\*When used as an outhaul winch (using the MAIN control button "OUT"), the force is limited. When run as a standard winch (using the winch buttons "1" and "2"), the winch will not be limited or synchronized with the furling mast motor. For technical data of the winch, see separate winch manual.

Mast motor and clutch assembly	
Height, H [mm]	472
Width, W [mm]	102
Weight [kg]	5,3

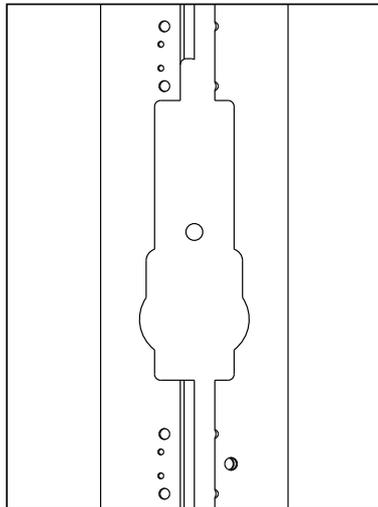
Mast motor and clutch fit inside the mast section.



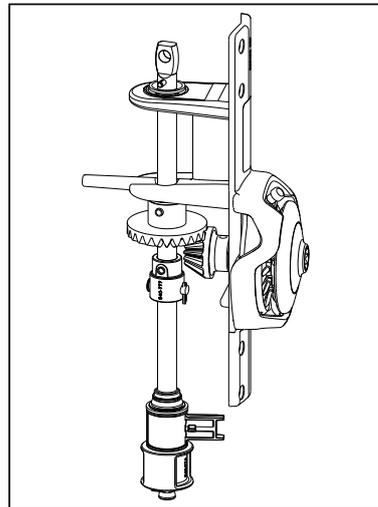
# 3 Retrofit installation

## 3.1 Installation preparations

The installation can be performed with the mast installed on the boat or unstepped. Some minor additions to the existing gear cutout are required to allow fitting of the modified gear with clutch added, and motor unit.



Extended gear cut out



Extended furling gear shaft with clutch assembly, schematic picture

- 

Carefully review the cut out drawing before starting installation. Remove any fittings that will interfere with the fixing holes on port and starboard sides (e.g. winch handle pocket, cleats).
- 

This instruction does not cover how to route the motor connection cables out of the mast as this may be unique to each installation e.g. mast type, mast heel/base configuration and individual preferences.

### Installation Cut-out drawing per Mast section

R290	597-847	<p><i>The mast section is identified by the mast ID, engraved on port side at the bottom of the mast extrusion (see page 3).</i></p> <p>1) Gear type 540-142 2) Gear type 540-350</p>
F265	597-848	
F286	597-849	
F305	597-850	
F324 <sup>1)</sup>	597-851	
F252	597-852	
F272	597-853	
F291	597-854	
F324 <sup>2)</sup>	597-855	

### Tools needed:

Screwdriver - Flat  
Torx key set  
Hex key set  
File (half round, medium/coarse)  
Hammer  
Punch  
Pliers (e.g. jaw pliers/adjustable spanner and long nose pliers)  
Power drill  
Drill bit Ø4.2, Ø6.4  
Hole saw (24mm)  
Tap M5  
Wedges (included in package)  
Pencil  
Measuring tape  
Line for lifting the mast motor during assembly (option B)

Pop rivet gun.  
-to replace mast heel, option "A".  
-to replace any removed fittings if needed.

Drill bit for pop rivets.  
-To remove mast heel, option "A".  
-To remove interfering fittings if needed.

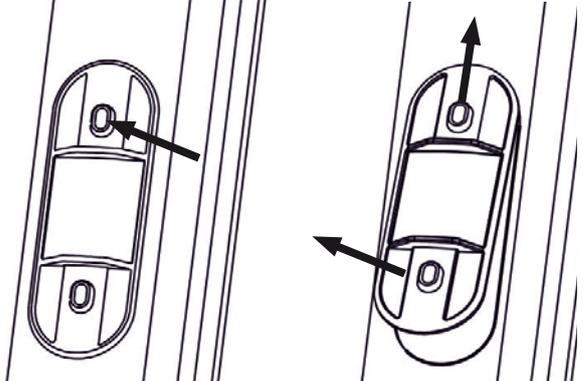
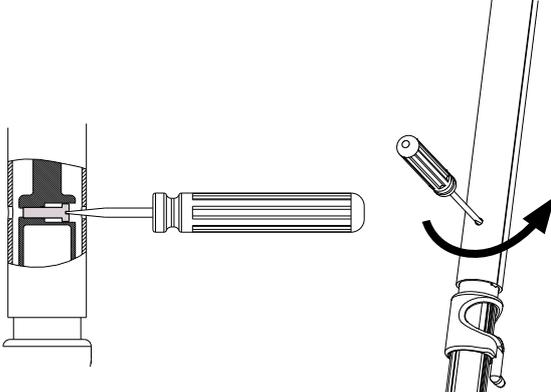
Jigsaw  
-to extend gear bracket cut out (option "B")

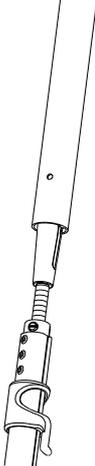
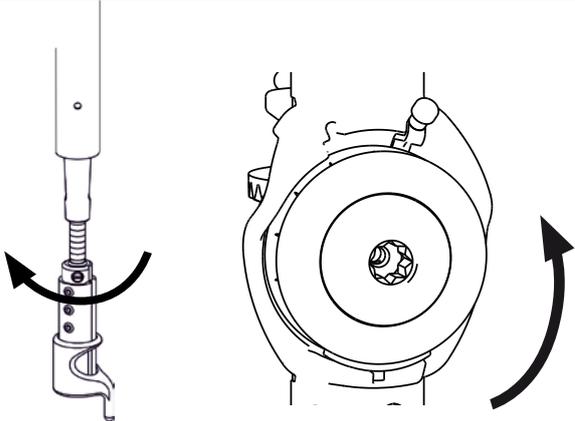
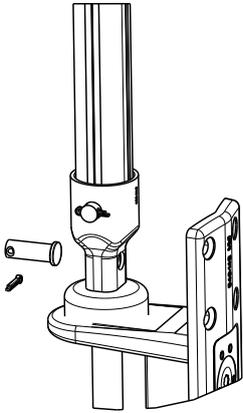
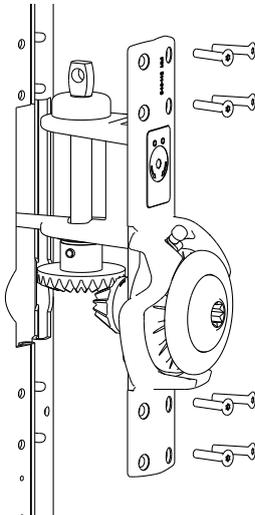
Ethanol  
Heat gun and shrink tube (to protect cables)  
Cleaning spirit, cleaning cloth  
Seldén grease 312-501 (included)  
Locking adhesive, 312-305 (included)  
Locking adhesive, medium strong  
Lubricant (WD-40 or similar)

## 3.2 Dismantle manual gear

### Free gear shaft from luff extrusion

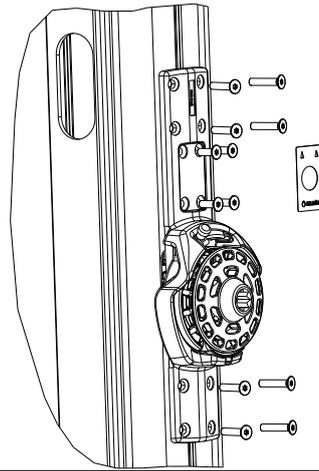
 Release backstay tension if working on a stepped mast.

<p>1. Remove the access cover and grease plug on the port side.</p>	
<p>2. Unscrew the retainer screw and push the locking tube upwards above the sail feeder.</p> <p> Spray a small amount of lubricant at the top of the locking tube to facilitate sliding.</p>	

<p>3. Lock the tube in the upper position and prevent the luff extrusion from turning.</p>	
<p>4. Insert a winch handle in the linedriver and turn it anti-clockwise until the luff extrusion is slack.</p>	
<p>5. Through the lower greasing hole on the port side, remove the split pin and clevis pin from the gear shaft adapter.</p> <p>Save the split pin and clevis pin.</p>	
<p>6. Remove screws and dismount furling gear bracket from mast.</p> <p>Note; Retrofit assembly 540-681-43 requires special procedure, see point 7-10.</p> <p> Releasing the rig tension can facilitate dismounting of the furling gear bracket, if needed.</p>	

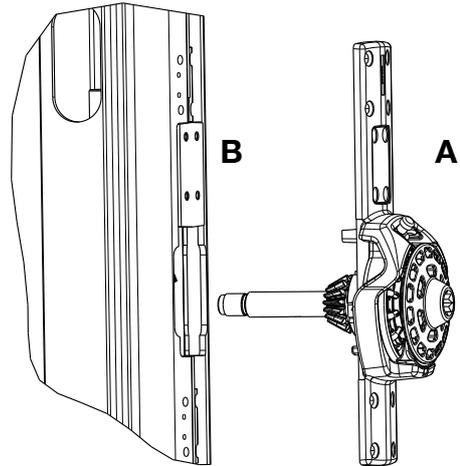
7.

Remove Label & screws (12x)



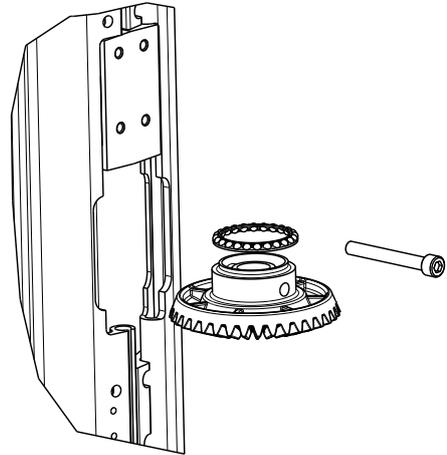
8.

Pull out gear front with linedriver (A).  
Take care not to pull out gear body. (B)



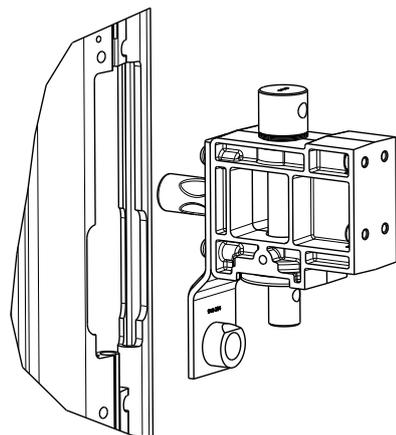
9.

Remove screw, large bevel gear and ball bearing.



10.

Remove gear body.



### **3.3: Gear modification.**

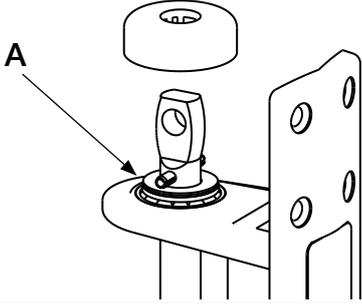
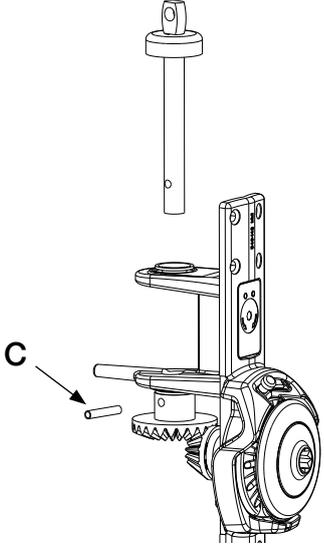
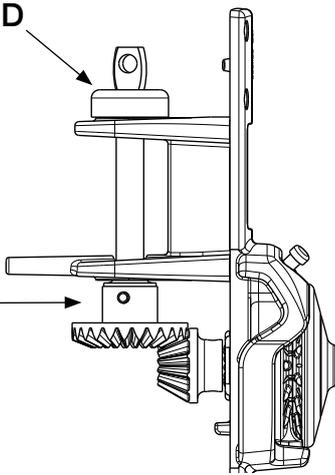
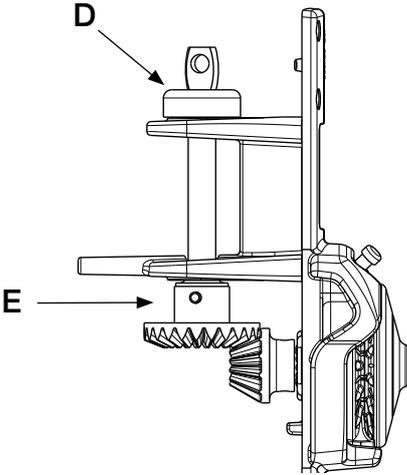
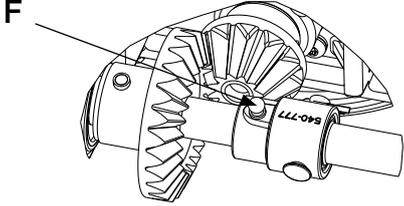
**Procedure vary between different gear assemblies;**

**Retrofit assemblies no. 540-681-35, -36, -37, -38 , -40, -41, -42;  
Only gear shaft is replaced. See chapter 3.3.1**

**Retrofit assemblies 540-681-39, -44, -45;  
Gear shaft and linedriver hub is replaced. See chapter 3.3.2.**

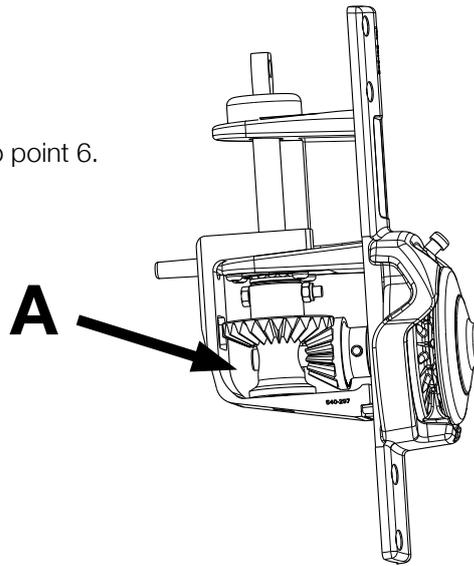
**Retrofit assembly 540-681-43;  
Gear shaft and linedriver hub is replaced. See chapter 3.3.3.**

### 3.3.1 Modification of gear, new shaft

<p>1. Remove the rubber cover. Note quantity and position of any washers and shims (A).</p>	
<p>2. Remove the spring pin (C) with a hammer and punch or equivalent.  Carefully remove the shaft, saving the free bearing balls, races and washers.  Spring pins will not be reused.</p> <p> Work on a surface where the loose bearing balls will not get lost. There should be 12 bearing balls in each ball race.</p>	
<p>3. Clean and apply grease on the ball bearings. The grease in the ball bearings will help keep the balls in position during reassembly.</p>	
<p>4. Install the new shaft and remount ball bearings and washers.  Fit rubber cover (D)  Remount the bevel gear. The hole in the bevel gear should be aligned with the hole in the shaft. Fit new spring pin: Ø8x45 (E).</p>	
<p>5. Connect clutch assembly to the extended gear shaft. Use the ball (F) and a hammer or a vise to deform and secure the rivet. If using a hammer, secure the ball to the rivet head with some adhesive tape while hammering.</p>	

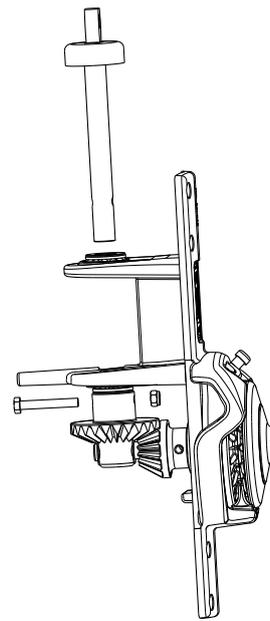
### 3.3.2 Modification of gear, new shaft & linedriver hub

If gear is equipped with reinforcement frame (A), continue to point 6.



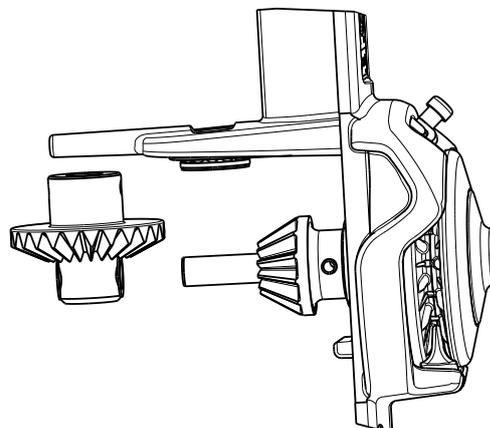
1.

Remove nut and screw and pull out vertical shaft.



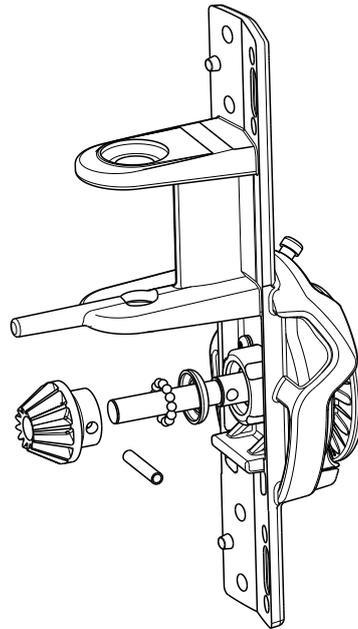
2.

Remove vertical gearwheel.

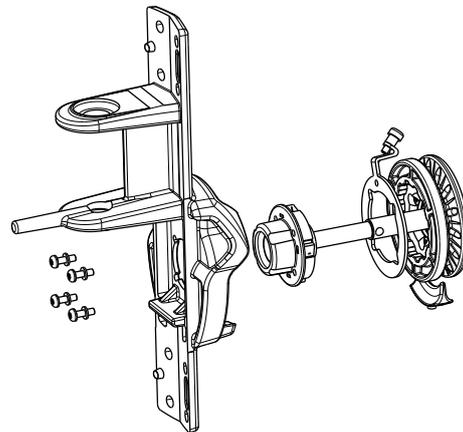


3.

Remove spring pin, horizontal gear and bearing.

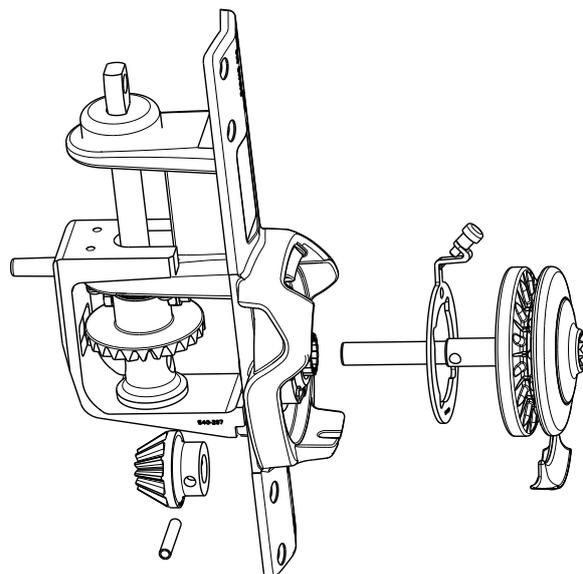


4.  
Unscrew 4x screws and pull out linedriver and linedriver hub.



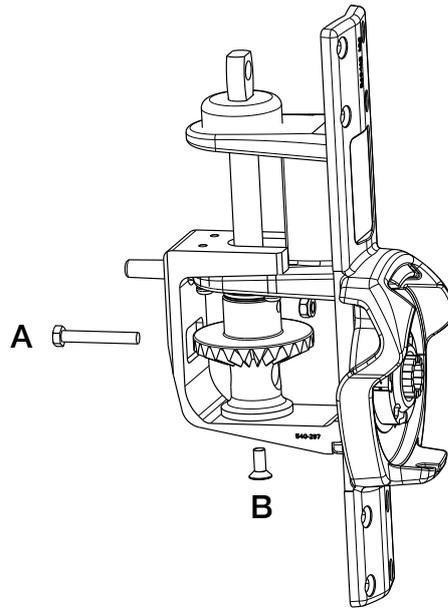
5. Continue to point 12.

6.  
Punch out spring pin and remove small bevel gear and linedriver wheel.



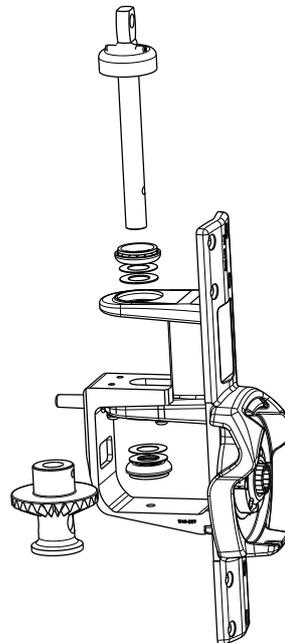
7.

Remove screws at pos A & B



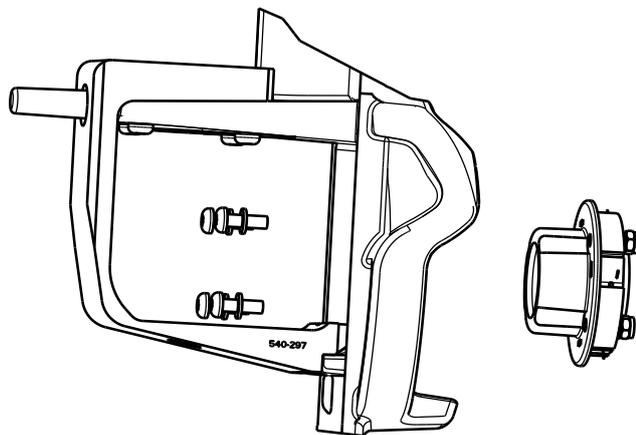
8.

Pull out shaft and remove gear, washers and bearings.



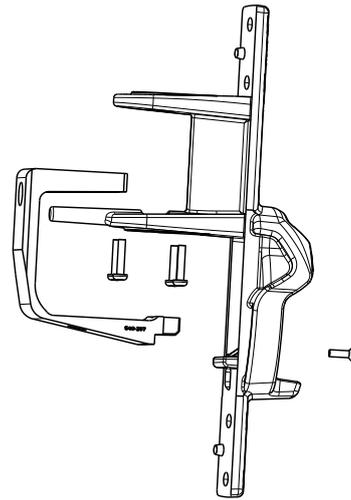
9.

Remove screws (4x) and linedriver hub



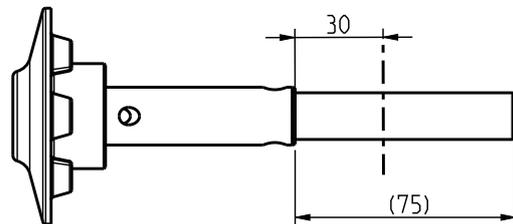
10.

Remove support bracket



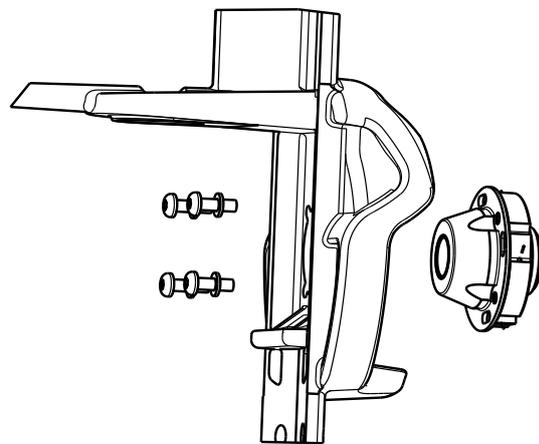
11.

Clean all parts. Shorten linedriver shaft by 45 mm as shown above. (Note that some shafts are detachable into two parts).



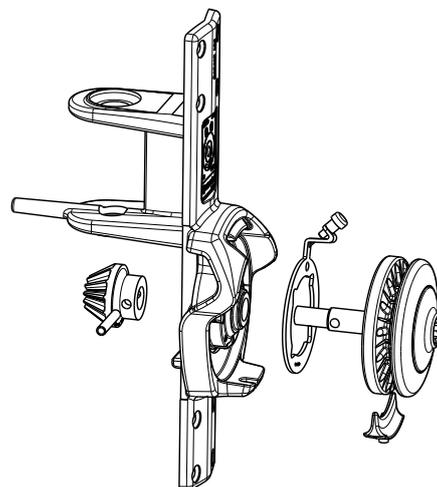
12.

Fit new linedriver hub. Use Loctite on screws.



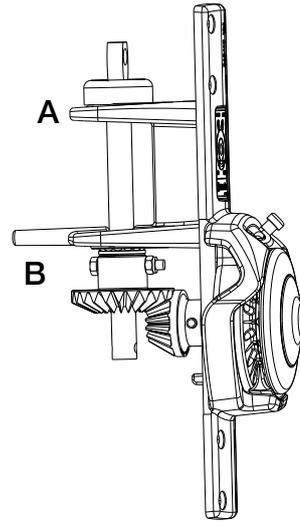
13.

Grease shaft and reassemble linedriver. Lock with new spring pin.

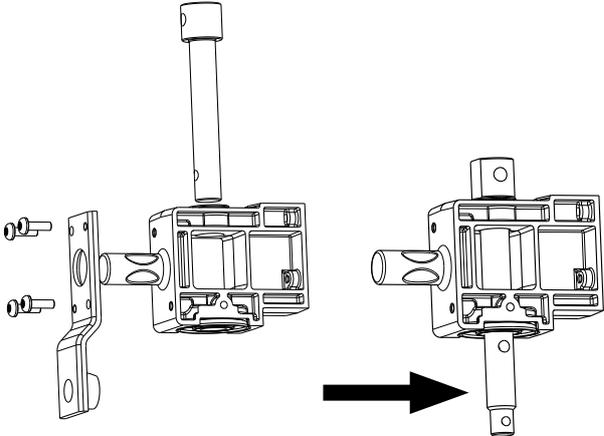
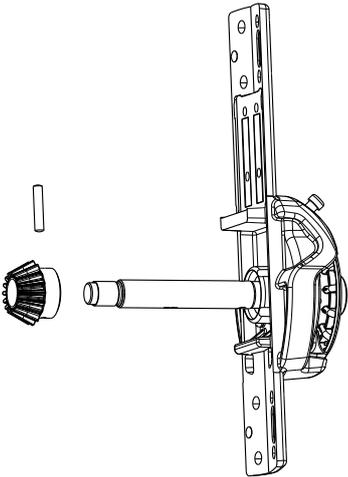
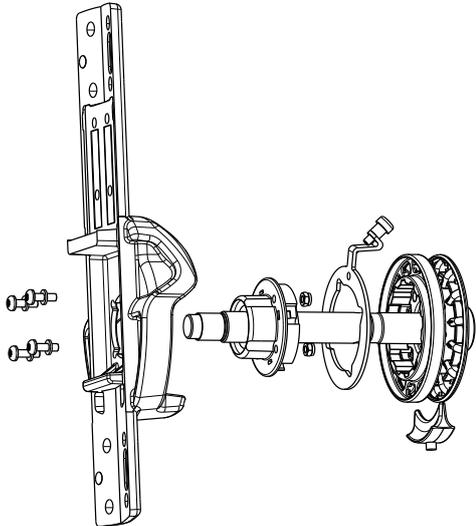


14.

Clean and apply grease on ball bearings. Install the new shaft and remount ball bearings and washers and vertical bevel gear. Adjust vertical position of shaft with washers at position A & B until the gear runs smoothly without excessive play.

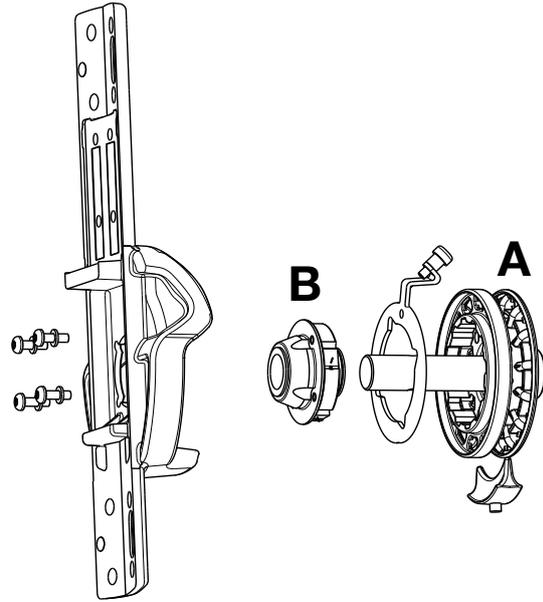


### 3.3.3 Modification of gear for retrofit assembly 540-681-43

<p>1.</p> <p>Remove screws, bracket and vertical shaft. Clean ball bearing race and insert new shaft.</p>	 <p>The diagram illustrates the first step of the modification. On the left, a vertical shaft is shown protruding from the top of a gear housing. A bracket is attached to the side of the housing, secured by two screws. A large black arrow points to the right, where the vertical shaft and bracket have been removed, leaving a clean opening in the housing.</p>
<p>2.</p> <p>Remove pin and horizontal gear. (Removal of pin requires a lot of force)</p> <p>.</p>	 <p>The diagram shows the second step. A horizontal shaft with a gear is shown protruding from the side of the housing. A small pin is inserted through the gear. A brush is shown next to the pin, indicating its removal. The gear is shown being pulled away from the shaft.</p>
<p>3.</p> <p>Unscrew 4x screws and pull out linedriver and linedriver hub.</p>	 <p>The diagram illustrates the third step. The linedriver and linedriver hub are shown being pulled out of the housing. Four screws are shown being removed from the housing, and the linedriver and hub are shown being pulled out of the housing.</p>

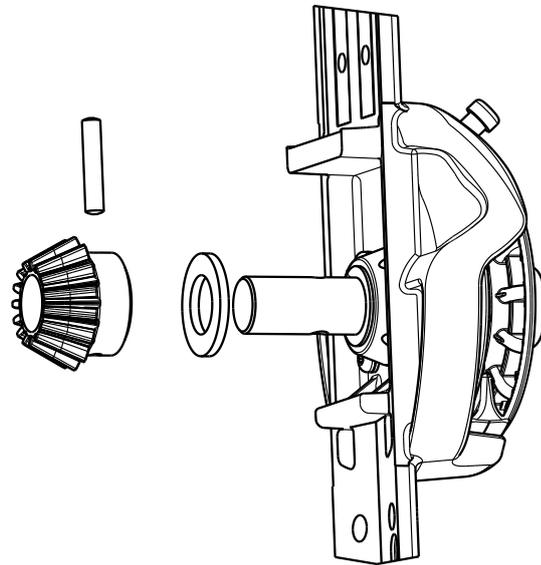
4.

Replace linedriver shaft (A) & hub (B) and assemble. Use loctite on screws.



5.

Fit washer and gear. Fit pin and lock by deforming edge of hole.



### 3.4 Installation of motor unit

Installation varies slightly between different gear assemblies;

Retrofit assemblies no. 540-681-35, -36, -37, -38 , -39,-40, -41, -42, -44, -45; See 3.4.1.

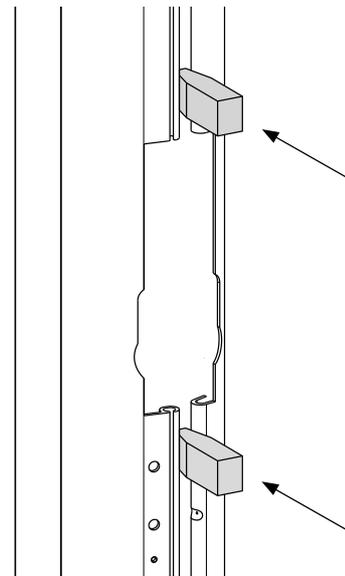
Retrofit assembly 540-681-43; See 3.4.2.

#### 3.4.1 Installation of motor unit, RC gear

<p>1.</p> <p>Expand the gear cut-out according to the provided installation cut out drawing, also cutting the backingplate. Avoid cutting in the nut. Grind edges carefully along the whole edge.</p> <p>Clean the cut out area.</p>	
<p>2.</p> <p>Drill locating holes for the mast motor to the dimensions found in the installation cut out drawing. Two holes on the port side, one hole on the starboard side.</p> <p>Use the center of the lower screw hole of the furling gear cut-out (A) as the reference for the vertical dimension.</p> <p>Use the B-line (vertical recess at the mast's widest point) as the reference for the horizontal dimension.</p> <p>Chamfer the holes carefully with a file. Prepare for cable routing.</p>	

3.

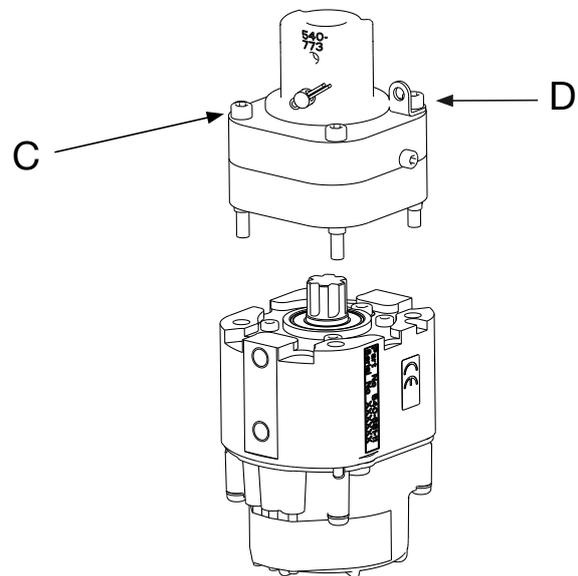
Plastic wedges supplied with the kit might be used to facilitate installation of motor and gear.



4.

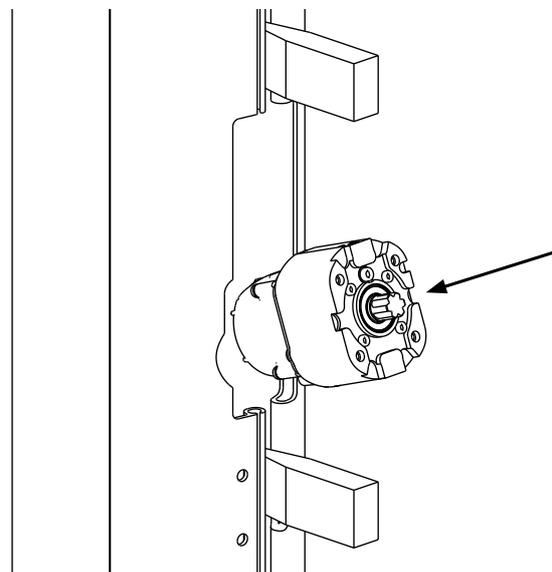
Undo the four top screws (C) of the mast motor and dismantle the motor brake.

Prepare the motor brake for later by attaching a line in the lifting eye (D).



5.

Feed the cables and insert the motor through the expanded hole.

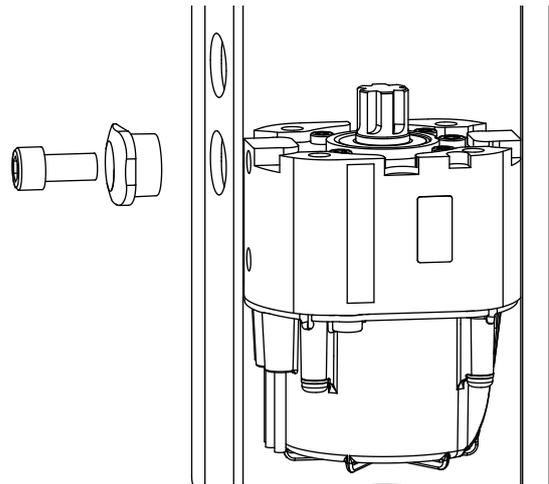


6.

Temporarily fasten the motor using the bushing and screw in the lower hole on the port side of the mast and the upper port hole of the motor i.e. the motor is positioned 37mm lower than its final position.

(The lower position is needed to be able to fit the gear- and clutch assembly after the motor brake is installed).

Remove wedges if these have been used.

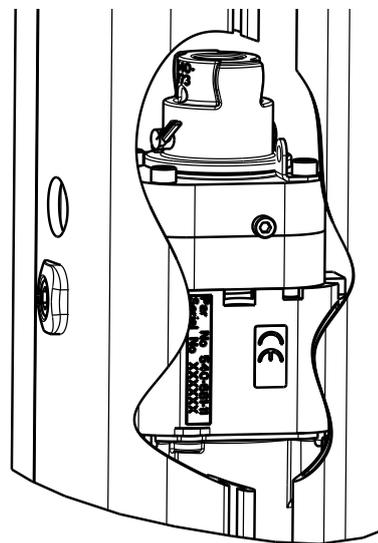


7.

Reinstall the motor brake through the gear cut out. Small screw on brake to face aft, see picture.

Let assembly hang on one plunger in its lower position. Use grease on screws.

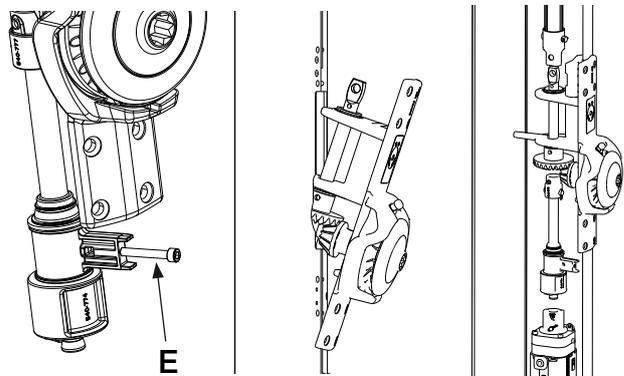
Tightening torque=7Nm.



8.

Insert gear and clutch assembly through the cut-out with the clutch arm facing towards the sail groove.

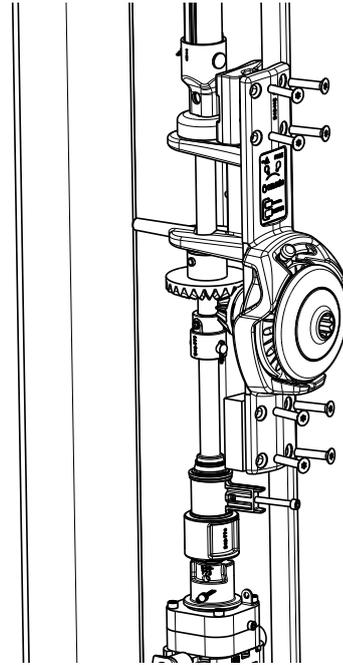
The M6x60 screw (E) can temporarily be attach to the clutch arm to facilitate guiding of the clutch through the sail groove.



9.

Apply grease on screws and fasten gear bracket.  
Connect mast motor.

Be careful not to push out the nuts from the  
backing plates.



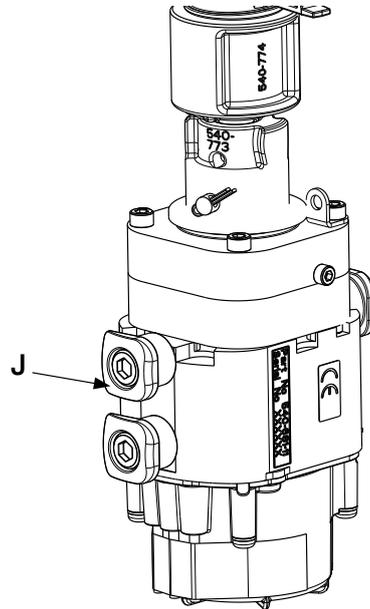
10.

Fix the mast motor to the mast wall with the  
included bushings and M10 screws.

Use pliers/adjustable spanner to keep the  
bushings from rotating. The thicker flange  
edge (J) should be facing aft. (Tape the pliers  
to prevent chafing the bushings).

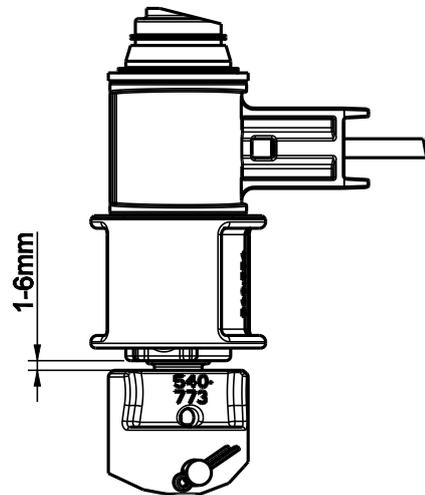


Check the clutch gap as described  
below before applying medium strong  
locking adhesive to screws.

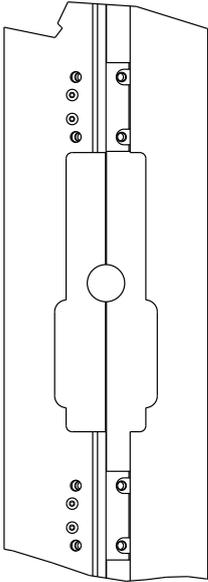
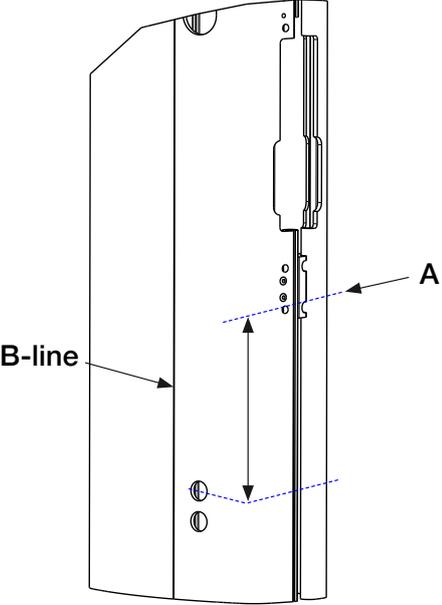
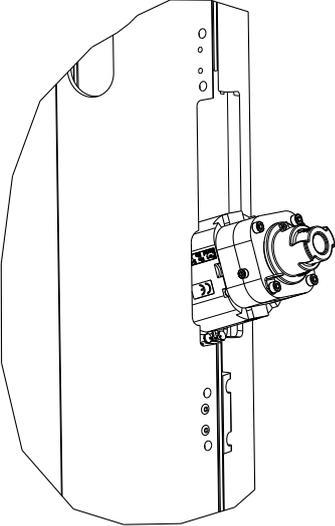


11.

Measure play as shown. If play is out of tolerance,  
contact your dealer.

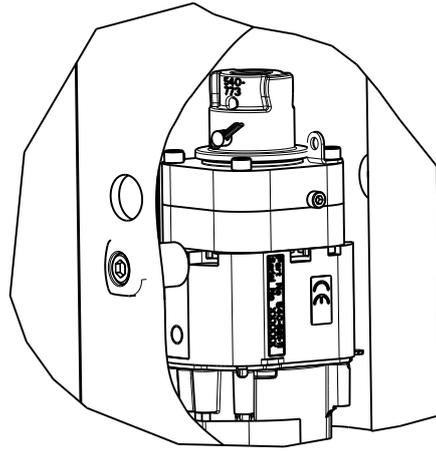


### 3.4.2 Installation of motor unit, assembly 540-681-43

<p>1.</p> <p>Expand the gear cut out according to the provided installation cut out drawing. Grind edges carefully along the whole edge. Clean the cut-out area.</p>	
<p>2.</p> <p>Drill locating holes for the mast motor to the dimensions found in the installation cut out drawing. Two holes on the port side, one hole on the starboard side.</p> <p>Use the center of the lower screw hole of the furling gear cut out (A) as the reference for the vertical dimension.</p> <p>Use the B-line (vertical recess at the mast widest point) as the reference for the horizontal dimension.</p> <p>Chamfer the holes carefully with a file. Prepare for cable routing</p>	
<p>3.</p> <p>Fit the motor unit through the lower end of the gear cut-out.</p>	

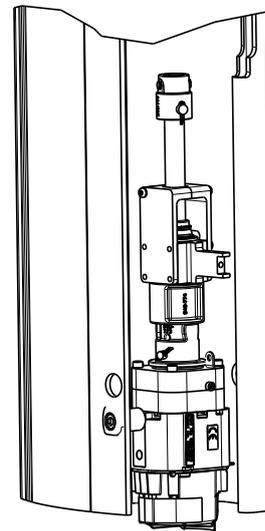
4.

Temporarily fasten the motor using the bushing and screw in the lower hole on the port side of the mast and the upper port hole of the motor i.e. the motor is positioned 37mm lower than its final position.  
(The lower position is needed to be able to fit the gear and clutch assembly after the motor brake is installed).



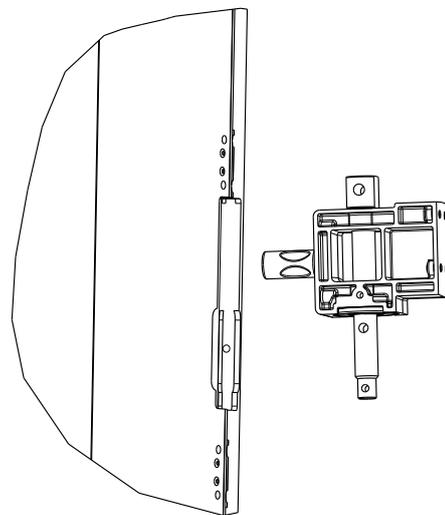
5.

Place clutch on top of mast motor.



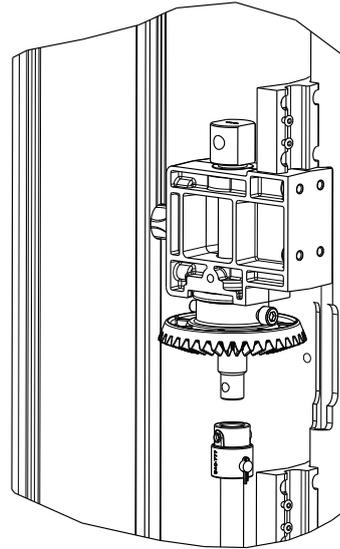
6.

Insert Gear body with new shaft



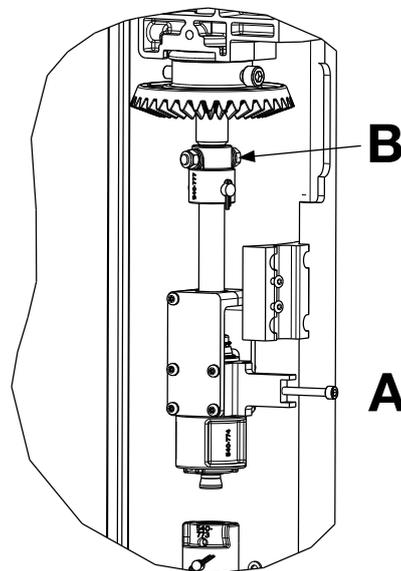
7.

Fit large gear wheel with cleaned and greased ball bearing and secure with screw.  
Use Loctite on screw.



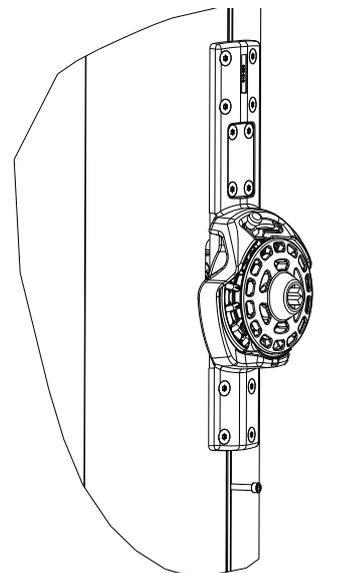
8.

Fit the screw (A) in the clutch bracket. Lift the clutch assembly and fit to gear with screw and nut (B). Place 2 washers each side of join. Fit nut with Loctite.



9.

Fit gear bracket front, first with 4x screws with grease to gear body and then 8x screws with Loctite to backing plates.



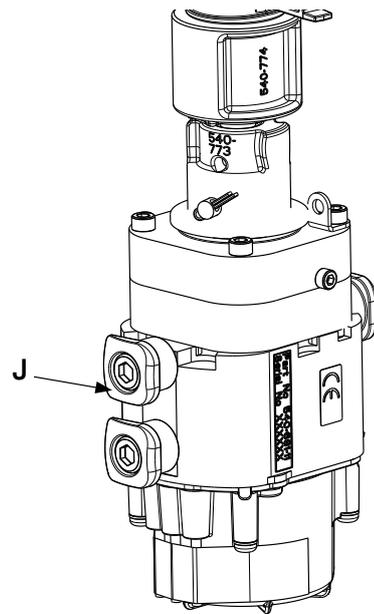
10.

Fix the mast motor to the mast wall with the included bushings and M10 screws.

Use pliers/adjustable spanner to keep the bushings from rotating. The thicker flange edge (J) should be facing aft. (Tape the pliers to prevent shafing the bushings).

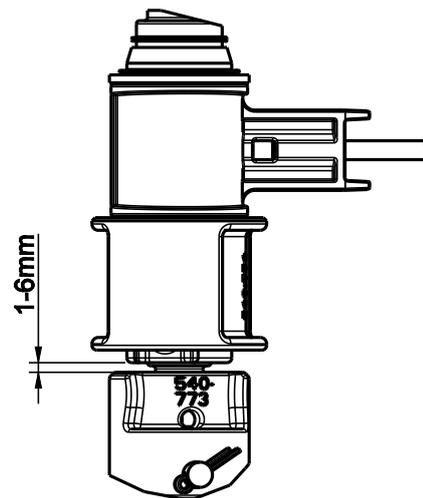


Check the clutch gap as described below before applying medium strong locking adhesive to screws.



11.

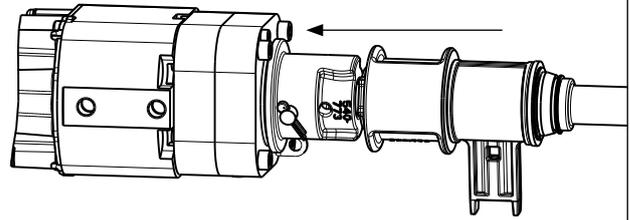
Measure play as shown. If play is out of tolerance, contact your dealer.



### 3.5 Installation of clutch plunger and bracket

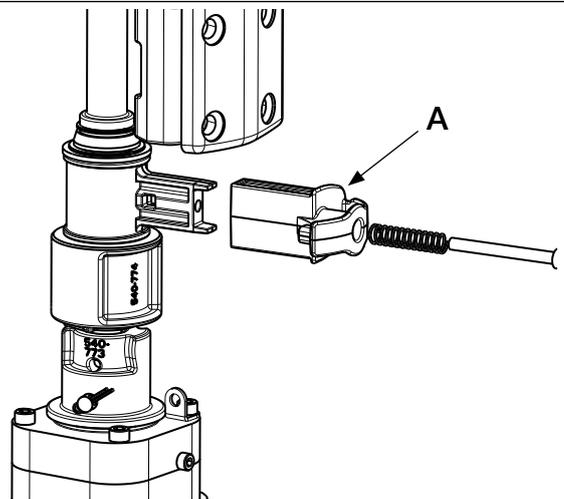
1.

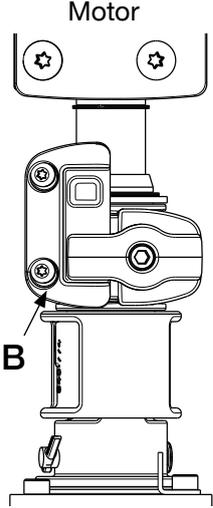
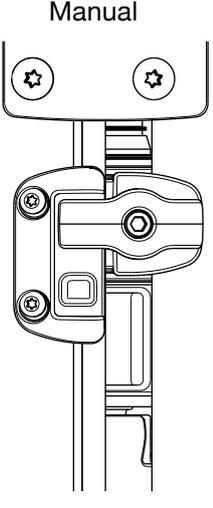
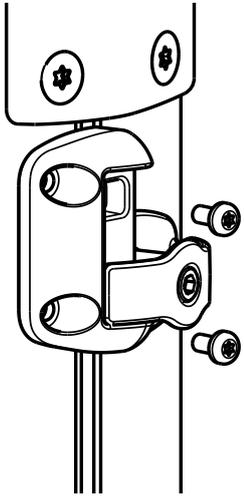
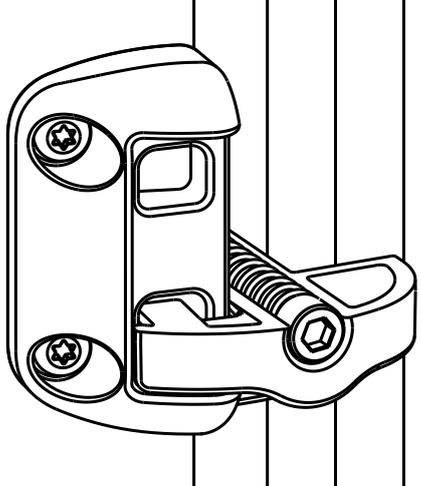
On an unstepped mast, push the clutch towards the mast motor (to simulate that it is standing on top of the mast motor).



2.

Through the sail groove, mount the clutch plunger (A) on to the clutch lever with screw and spring included in misc pack.



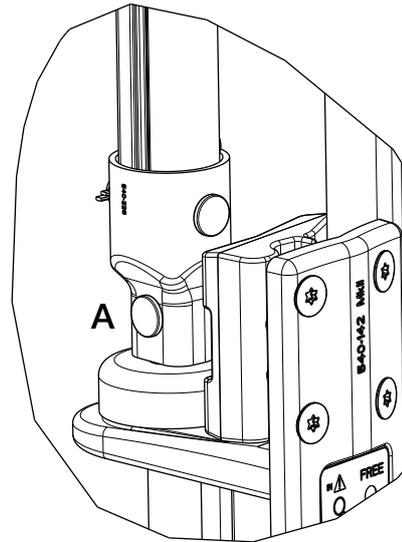
<p>3.</p> <p>Place the clutch bracket (B) on the mast wall, with the clutch plunger placed in the lower position “motor”.</p> <p>Make sure the clutch, clutch plunger and bracket is positioned as low as possible. Mark hole positions.</p> <p>Control position of the clutch bracket holes by changing between Motor and Manual mode. In Manual mode the torque connector should be completely disengaged from the motor unit.</p>	<p>Motor</p> 	<p>Manual</p> 
<p>4.</p> <p>Drill and tap 2xM5 holes.</p> <p>Fasten the clutch bracket, use locking adhesive.</p>		
<p>5.</p> <p>Remount the clutch screw with medium strong locking adhesive and align the screw head with the clutch plunger.</p>		

6.

Fit the clevis pin and split pin to fix the gear shaft to the adapter (A).

Open the split pin to min 20°

Re-tension luff profile to correct tension according to chapter 4.1.



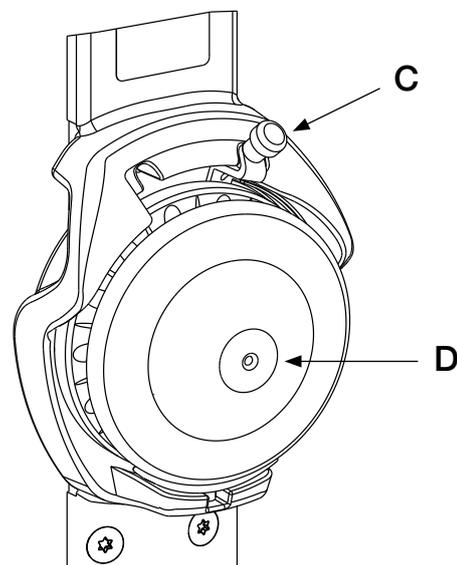
7.

Ensure that the gear controller arm is set in FREE mode (C) and put plug in winch socket (D).



The manual furling gear should always be be set to FREE when connected to the mast motor.

Reassemble plugs and covers for greasing and access holes on mast.

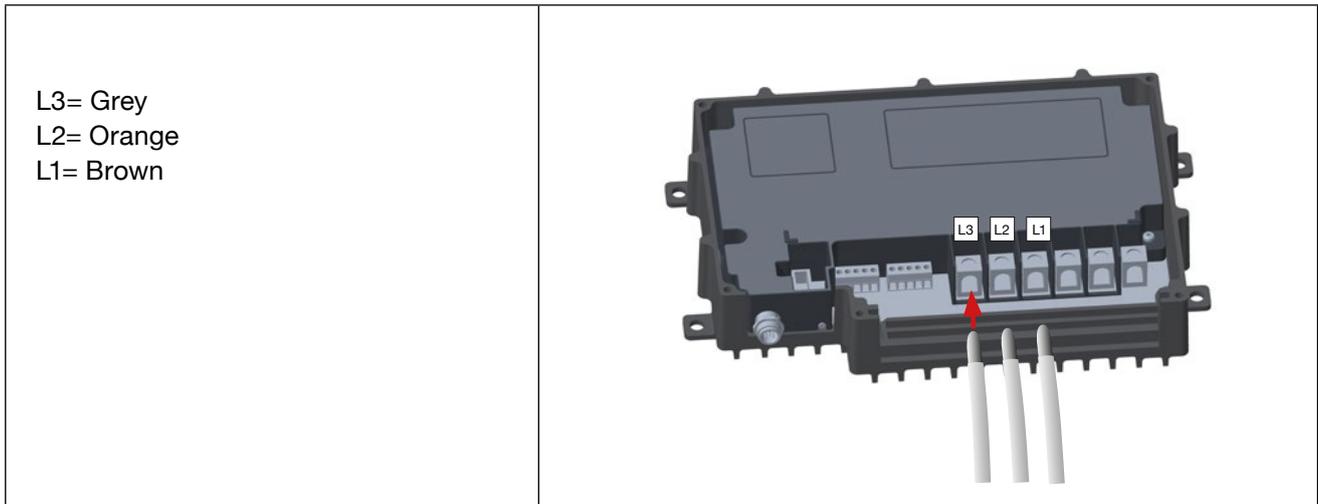


8.

Lead the mast motor connection cables out of mast. Remount mast heel, if applicable.

### 3.6 Connection to Seldén Power Supply and SEL-Bus system

Install the three control cables from the mast motor to the motor control unit (MCU) “Furling mast”. Carefully note the position of cable colour and connector:



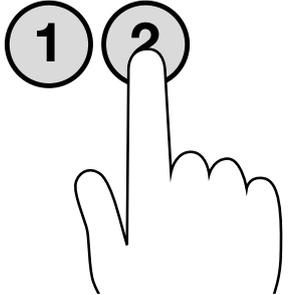
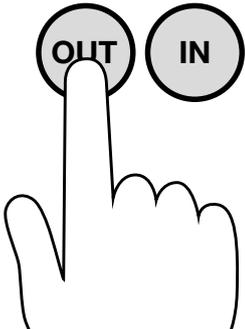
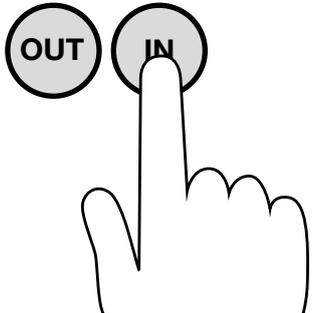
The cables need to be connected to the MCU in the correct position/sequence. Incorrect positioning of the cables can damage the mast motor and the break mechanism.

For correct positioning of the Motor Control Unit, installation of the complete Power supply and SEL-Bus system, see separate manual 597-275-E.

### 3.7 Configuration of control buttons for Synchronized Main Furling

For synchronized main furling, configuration of the control buttons for both the winch and furling mast must be done in the following order.

 For complete information about how to configure Motor control unit, MCU, to the control buttons, read installation manual 597-275-E.

<p>A. Configure winch MCU to winch buttons</p>	<p>Press the configuration button on <b>Winch MCU</b>.</p> <p>Push and hold winch button 1 or 2 until the winch generates the start-up signal.</p> 
<p>B. Configure winch MCU to the MAIN OUT button (for synchronized outhaul)</p>	<p>Press the configuration button on <b>Winch MCU</b>.</p> <p>Push and hold MAIN OUT until the winch generates the start-up signal.</p> 
<p>C. Configure furling mast MCU to the MAIN OUT/IN buttons</p>	<p>Press the configuration button, on <b>Furling mast MCU</b>.</p> <p>Push and hold IN until the mast motor generates the start-up signal.</p> 



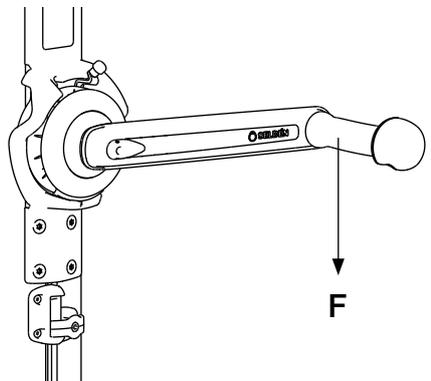
If the signal tone is generated when the Power supply and SEL-Bus system is turned on (without any button being pressed) turn the power off immediately. Inspect the push button connections; cables from SEL-Bus converter to push button must be installed as “normally open” not “normally closed”.

## 4 Preparations before sailing

### 4.1 Tensioning the luff extrusion

It is important that the luff extrusion inside the mast is correctly tensioned. An untensioned or over-tensioned luff extrusion can lead to increased furling load or unnecessary wear of the system. Control and adjustment of luff tension can be made on both a stepped and unstepped mast.

The luff extrusion should be prevented from rotating. Use a torque wrench in the furling gear winch handle socket to measure the tensioning torque. Alternatively, measure the torque with a spring balance or similar combined with an ordinary winch handle. Tension to the correct value as required. It is important that the mast is straight while tensioning.

Type	Torque	Force (F) Measured with 10" winch handle	
RC system	8 Nm	32 N	



Always release backstay tension before adjusting luff extrusion. Tensioning the luff extrusion with the backstay tensioned can damage the luff extrusion joints when the backstay tension is released.

### 4.2 Rig tuning

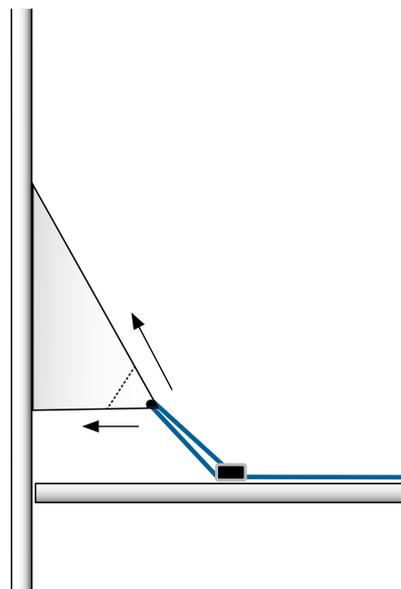
Furling in and out will work best on a mast tuned with limited prebend.

Read 595-540-E Hints and Advise for tuning instructions.

### 4.3 Outhaul car stop

The position of the outhaul car stop on the boom will affect tension in the sail foot and leech. E.g. if the outhaul is positioned too far aft, the force from the outhaul clew will keep the foot tighter than the leech which can cause the sail to jam in the top of the mast.

The ideal position can vary between boats due to rig, sail and batten designs. It is recommended to place the outhaul stop 500 mm from the aft mast wall as default, and then adjust it forward or aft if necessary.



### 4.4 Outhaul routing

Examine outhaul car and outhaul turning points for excessive friction. Replace old and worn blocks if needed. Outhaul routing with as low friction as possible will improve the unfurling process.

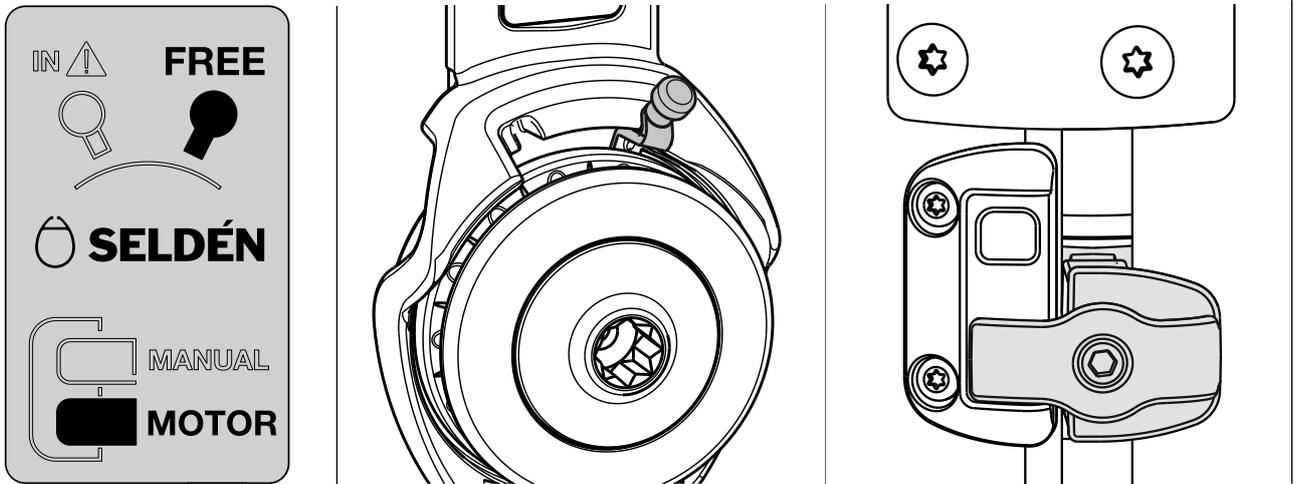
#### Synchronized outhaul winch



The force limit in the synchronized outhaul winch is based on the line force at winch entry. High friction in the outhaul routing will result in the actual force in the outhaul clew being significantly lower than at the winch, which can negatively affect the synchronization.

# 5 Sailing with Synchronized Main Furling

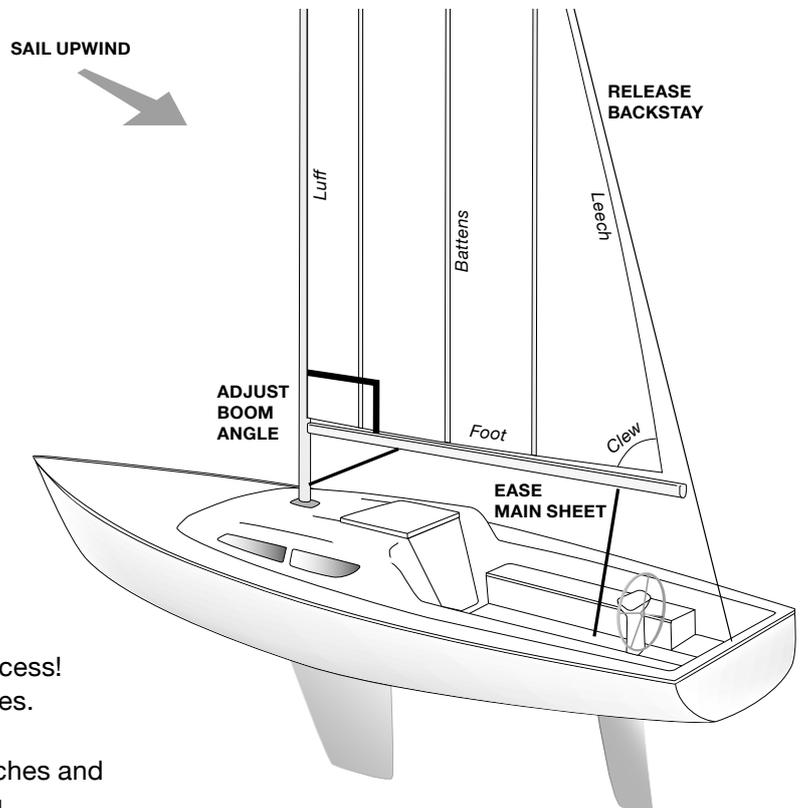
The manual furling gear must be set to FREE when connected to the electric motor. The clutch plunger should be positioned in the lower seat (MOTOR).



## 5.1 Preparations for furling and unfurling

There are many factors to consider for a successful furling operation. Get familiar with the furling system in light conditions and pay attention to the following details before furling out and in. How important these adjustments are for the furling result can vary between boats, sail designs and other factors.

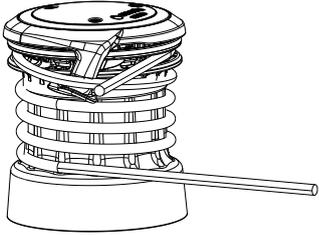
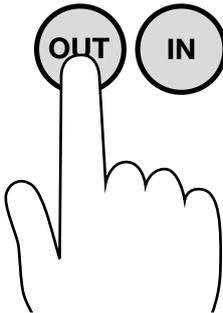
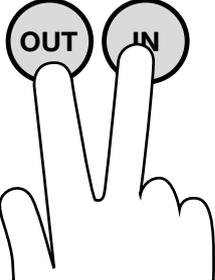
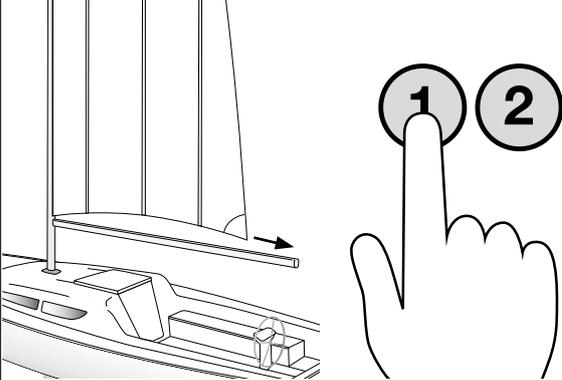
1. Sail upwind.
2. Release backstay tension (if very tight) to straighten the mast and increase the tension in the luff extrusion.
3. Adjust the boom angle to keep the leech tight and battens parallel to mast. Use kicker/topping lift.
4. Ease the main sheet.



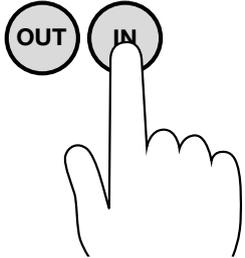
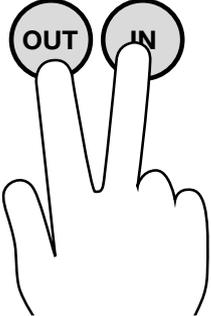
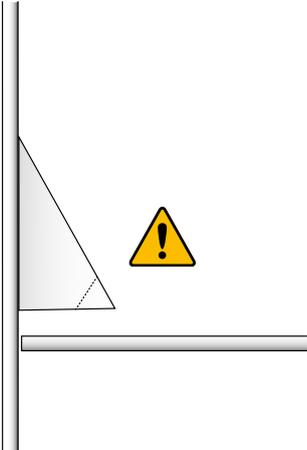
 Always observe the entire furling process!  
Stop immediately in case of any issues.

 Keep away from the sail groove, winches and any other moving parts during furling.

## 5.2 Unfurling

<p>1. Apply and secure the outhaul to the synchronized electric winch.</p>	
<p>2. Press “Furl Out”.</p> <p>The outhaul winch will make a short warning signal before starting to run.</p> <p> Remote control of a sailing winch is hazardous. Always observe the unfurling process and ensure nothing can interfere with the winch, outhaul line or sail groove in the mast.</p>	
<p>3. Whilst holding down “OUT”, press the second button to increase the speed, if wanted.</p>	
<p>4. <b>Full sail</b> Hold button(s) pressed. The synchronized system will recognize a fully unfurled sail and stop automatically.</p> <p><b>Reduced sail area</b> Release button(s) when sail is in desired position.</p>	<p> The motor will make a short rotation when unfurling is finished, to activate the break mechanism.</p>
<p>5. If needed, the outhaul can be trimmed using the winch buttons.</p> <p> Be careful when using the winch buttons, as this activates the full power of the winch.</p>	

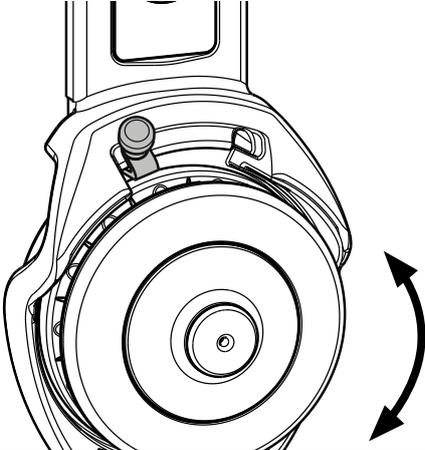
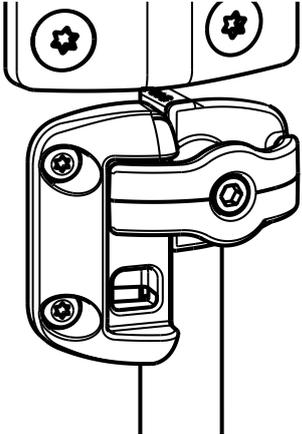
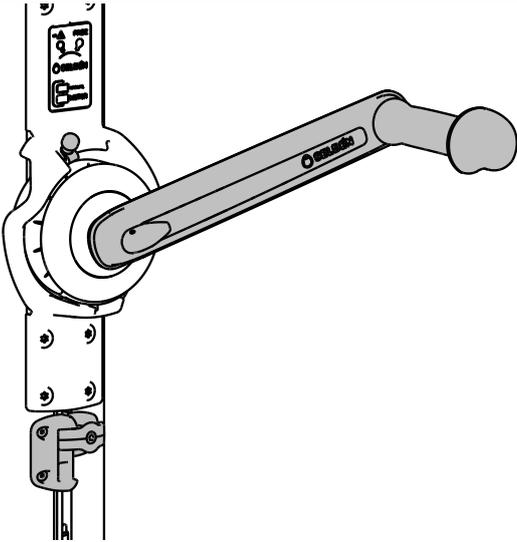
### 5.3 Furling

<p>1. Free the outhaul and keep it tensioned (about one turn on the winch). Press “IN” and simultaneously slacken the outhaul line while the sail is reefed.</p>	 <p>A line drawing of a right hand with the index finger pointing upwards to a circular button labeled 'IN'. To the left of the 'IN' button is another circular button labeled 'OUT'.</p>
<p>2. Whilst holding down “IN”, press the second button to increase the speed.</p>	 <p>A line drawing of a right hand with the index finger pointing to the 'IN' button and the middle finger pointing to the 'OUT' button.</p>
<p>3. Release the button(s) and stop reefing at desired sail area or when sail is fully furled in.</p> <p> The motor will <b>NOT</b> automatically stop during furl in. Run the last turns with low speed and keep attention to the position of the outhaul block to prevent it from being pushed into the sail groove and damage the mast.</p>	 <p>A diagram showing a vertical mast on the left and a horizontal groove on the right. A triangular sail is partially furled into the groove. A yellow warning triangle with an exclamation mark is placed in the groove.</p>

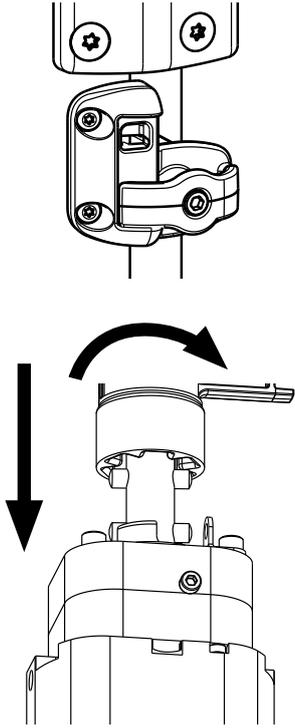
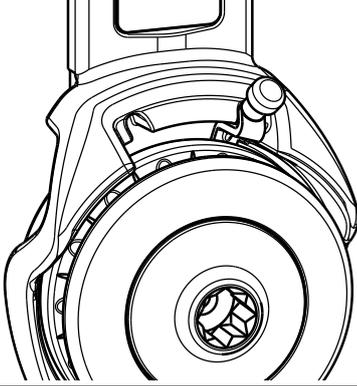
## 5.4 Manual drive

In case of electric or mast motor failure, the sail can be manually reefed by disengaging the motor from the manual gear:

### Disconnect mast motor

<p>1.</p> <p> Turn power off!</p> <p>Wiggle the line driver by hand to remove initial stress from the clutch.</p> <p>Furling/reefing: Put controller to the port side ("in"). This engages the ratchet function in the manual gear winch.</p> <p>Unfurling: Keep controller in "free" position.</p>	
<p>2.</p> <p>Pull the Clutch Plunger out and up, switching to the upper position.</p> <p>The mast motor is now disconnected from the furling gear.</p>	
<p>3.</p> <p>Furling/reefing: Remove the safety plug from the winch socket. Use a winch handle to manually furl in the sail at the mast.</p> <p>Unfurling: Pull the outhaul line manually or carefully use the electric winch. Do not use a winch handle in the line driver, as this will rotate very quickly if the wind catches the sail.</p> <p>For more frequent use without using the motor, a control line can be fitted like on any Seldén Manual furling gear.</p>	
<p>4.</p> <p> Remove winch handle from socket when done.</p>	

## Reconnect electric motor:

<p>1.</p> <p>Pull the Clutch Plunger out and down.</p> <p>If needed, rotate the linedriver to adjust the angle of the clutch shaft inside the mast, until the shaft connects to the motor.</p>	 <p>The diagram consists of two parts. The top part shows a close-up of a clutch plunger being pulled out of a housing. The bottom part shows the plunger being pushed down into a larger motor assembly. A curved arrow indicates the rotation of the linedriver to adjust the angle of the shaft, and a straight arrow points down to show the plunger's movement.</p>
<p>2.</p> <p>Put furling gear in FREE mode</p> <p> The gear should always be in FREE mode when motor is engaged.</p>	 <p>The diagram shows a close-up of the furling gear mechanism. A lever is shown in a position that indicates the gear is in 'FREE' mode.</p>
<p>3.</p> <p>Put the safety plug back into the winch socket.</p>	

## 5.5 Furling without synchronized winch

If the synchronized winch is not to be used, the outhaul can be pulled manually without disconnecting the furling mast motor.

1. Press and hold “MAIN OUT”. The mast motor will start to rotate but pauses automatically if the outhaul is not pulled, to avoid the sail being unfurled inside the mast.
2. Keep “MAIN OUT” button pressed. Pull the outhaul manually. The furling motor will start to rotate when it detects that the outhaul is being pulled. Proceed until desired sail area is reached. When OUT button is released, the mast motor will activate the rotation break.

## 6 Trouble shooting

Problem	Problem cause	Action
Mast motor makes a stuttering sound and unfurling does not work	Incorrectly installed connection cables to MCU.	Change position of connection cables in MCU according to section 3.6
<p>Mast motor makes a constant signal tone when Power Supply and SEL-Bus system is turned on.</p> <p>Mast motor starts to run when Power Supply and SEL-Bus system is turned on, and stops when Furling MAIN OUT/IN button is pressed.</p>	Cables from SEL-Bus converter to push button is installed as “Normally closed” instead of “Normally open”.	Change position of push button cables to “Normally open”, see separate instruction sheet for push button.
Synchronized unfurling is not smooth.	Incorrect tension in luff profile, rig tuning, outhaul car position, outhaul routing.	See chapter 4.
Top of sail is jamming	Incorrect tension in luff profile, rig tuning, outhaul car position, outhaul routing.	See chapter 4.
Unfurling is unusually slow (in cold conditions).	Cold motors.	<p>Disconnect mast motor from manual gear (see section 5.4).</p> <p>Remove outhaul line from winch.</p> <p>Idle run mast motor “IN”, minimum 30 sec.</p> <p>Idle run winch on high speed, minimum 30 sec.</p>

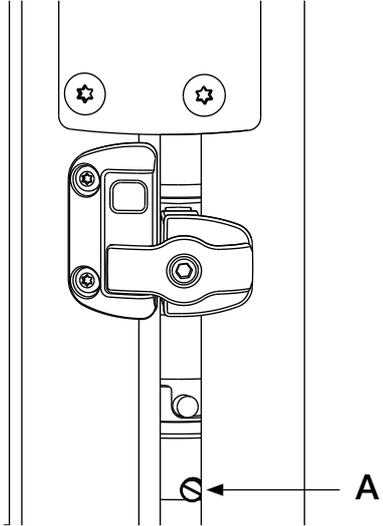
For trouble shooting of Seldén Power supply and SEL-Bus system, see installation and trouble shooting guide 597-275-E.

# 7 Service and maintenance

Always keep the manual furling system in good condition, following the service and maintenance procedures described in each respective manual furling mast instruction.

## 7.1 Annual maintenance

### Lubricate motor brake

<p>1. Through the sail groove, remove the screw to the lubrication hole (A).</p>	
<p>2. Apply WD-40 in the hole and simultaneously rotate the mast motor minimum one turn.</p> <p>Remount screw.</p>	

## 7.2 Extended maintenance

Professional service should be made on the mast motor every 5th year. Contact an authorized Seldén dealer for service management.

## 8 Disposal

The crossed out wheeie bin symbol on the product or product package means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points where it will be accepted free of charge. Alternatively, in some countries, you may be able to return your products to your local retailer upon purchase of an equivalent new product.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point.



## 9 Warranty

Seldén Mast AB guarantees SMF retrofit kit for 2 years. The guarantee covers faults arising from defective design, materials or workmanship.

The guarantee is only valid if the SMF retrofit kit is assembled, operated and maintained in accordance with this manual and is not subjected to loads in excess of those indicated in the brochure and instructions.

Complete shipment and warranty conditions are to be found on Seldén's website [www.seldenmast.com](http://www.seldenmast.com). See Resources/Partners information/General information/General conditions of sale (595-546-E).

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

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



[www.seldenmast.com](http://www.seldenmast.com)