

## Manual for Types RB & RC Hydraulic



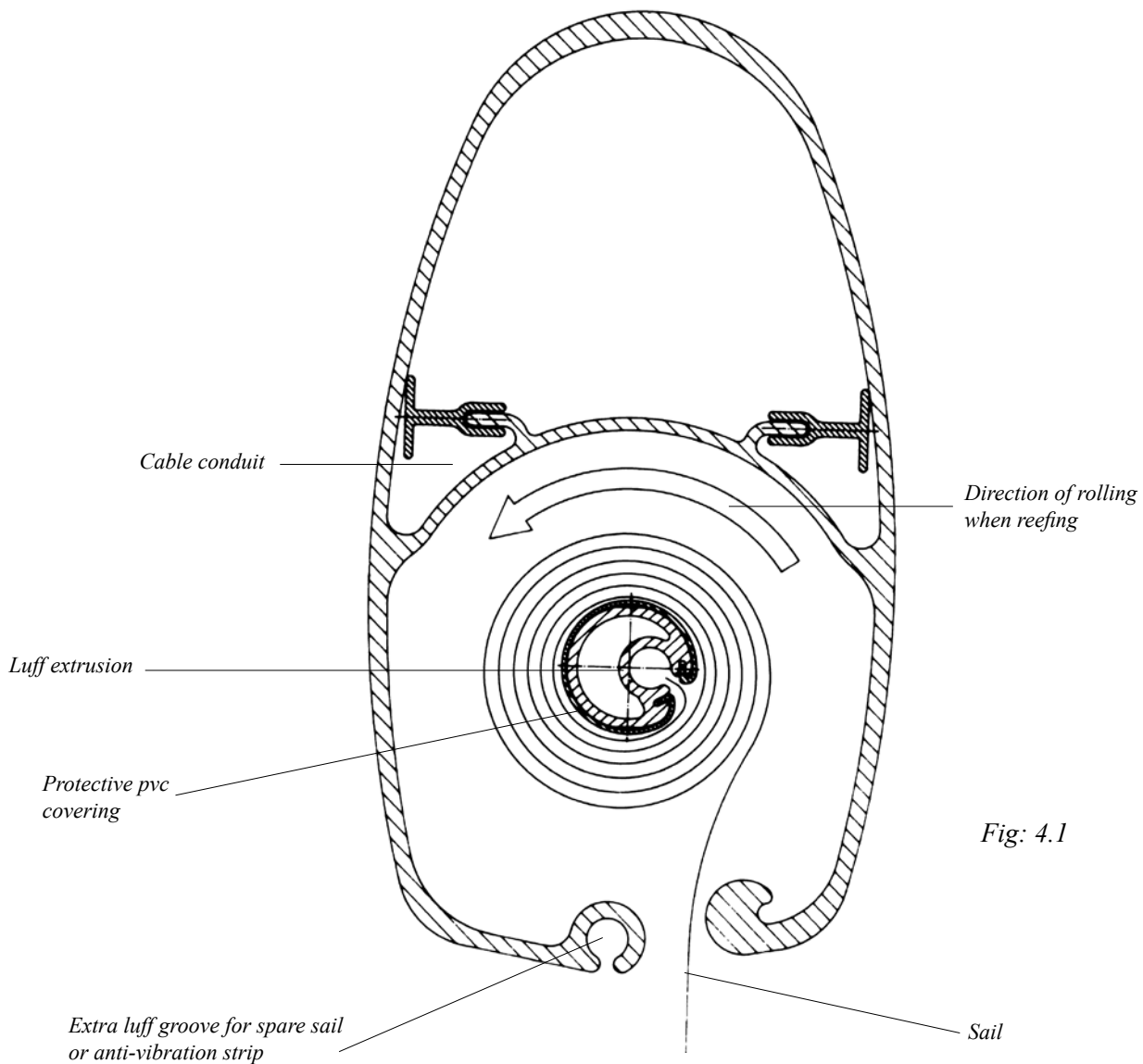
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## Product description

- Seldén's furling hydraulic mast is a hydraulically operated motor driven reefing and furling system for the mainsail. The design is based on Selden's long experience of roller reefing. The system is simple, reliable, and made for demanding conditions.
- Operation is controlled from the cockpit. The sail is set and rolled up on a luff extrusion in the sail compartment inside the mast (see fig: 4.1), and placed between a drive unit and a top swivel in the mast-head. A drive unit operated from the switch panel in the cockpit rotates the luff extrusion. A self tailing winch is used simultaneously to keep the clew outhaul line taught as the sail is being rolled in or out.
- Because the luff extrusion is under tension, it's mounted on ball bearings, and both the mast luff groove and the extrusion are asymmetrical, the sail is easy to roll in or out even under heavy loads.
- The drive unit is basically a hydraulic motor driving a self-locking worm gear which holds the sail securely when reefed.
- A high degree of efficiency is assured through the patented design with large ball bearings and few moving parts.
- Two hydraulic hoses run from the motor to a through-deck fitting. The latter has a built-in by-pass valve. With deck stepped masts the by-pass valve is sited on the deck, while with keel stepped masts the valve is placed on the mast itself. Quick couplings simplify masting and demasting.
- We recommend an ecologically sound hydraulic oil for the system. This oil is biologically degradable and is not harmful to either people or the environment.
- A standard winch handle can be used for manual operation.
- The mast extrusion has an extra luff groove for a storm trysail or spare main. In an emergency even a foresail with a hard line luff tape could be hoisted.
- The entire reefing mechanism can easily be dismantled and removed from the mast. Read and follow these instructions carefully, and we will guarantee you many years of pleasurable use from your furling mast.
- Follow Selden Mast's "**Hints and Advice**" on rigging and tuning masts.

## Mast cross section



### Spare mainsail

The extrusion is fitted with an extra luff groove for raising a storm trysail or spare mainsail. Foresails made for use with a luff extrusion can also be raised in this groove.

### Anti-vibration strip

Vibration can arise in any aluminium mast of normal design. With wind coming from approximately abeam at speeds of 4-12 knots the mast oscillates longitudinally at a rate of 3-6 cycles per second. Selden Mast AB sells an "anti-vibration strip" for hoisting in the spare luff groove to prevent vibration starting, and to reduce wind noise.

# The reefing system

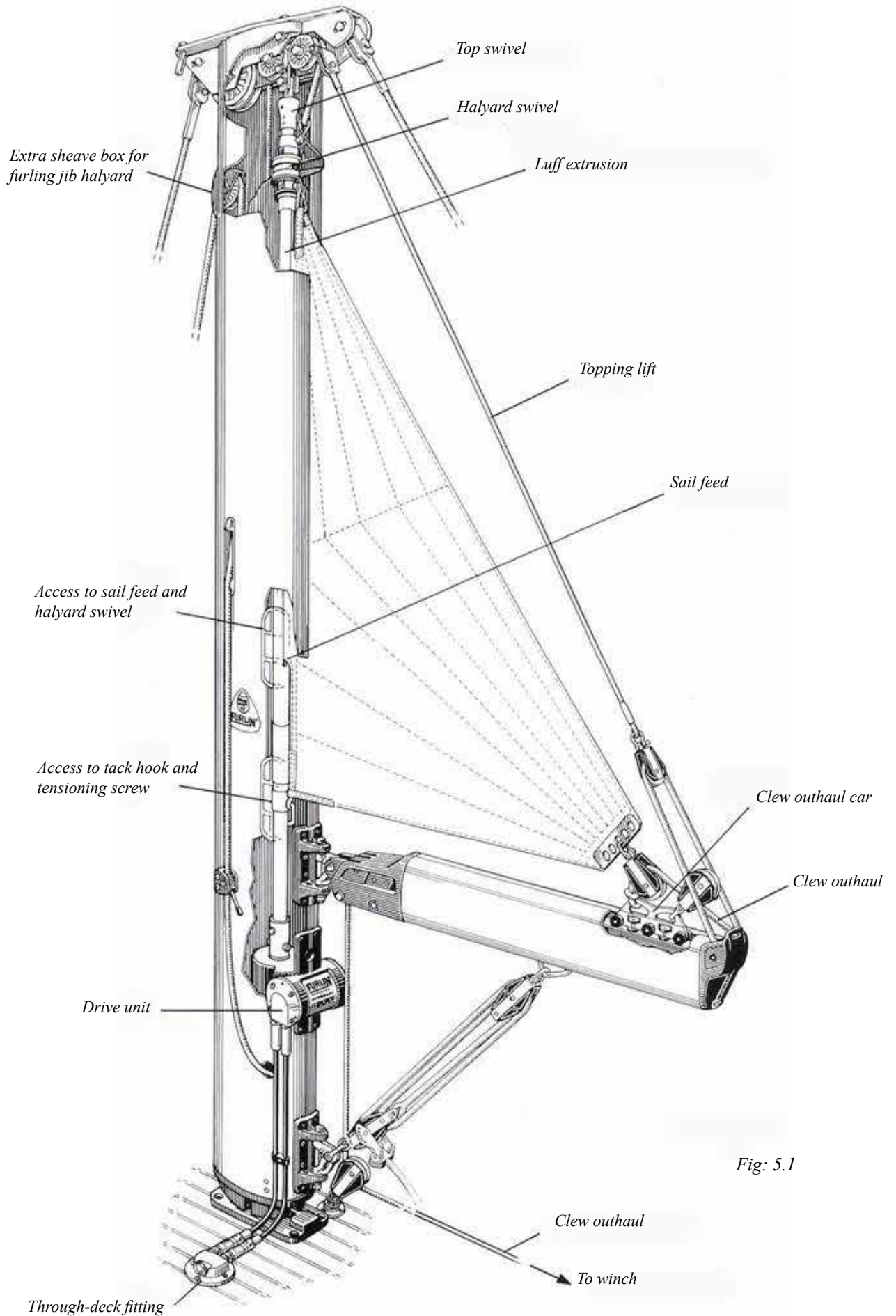


Fig: 5.1

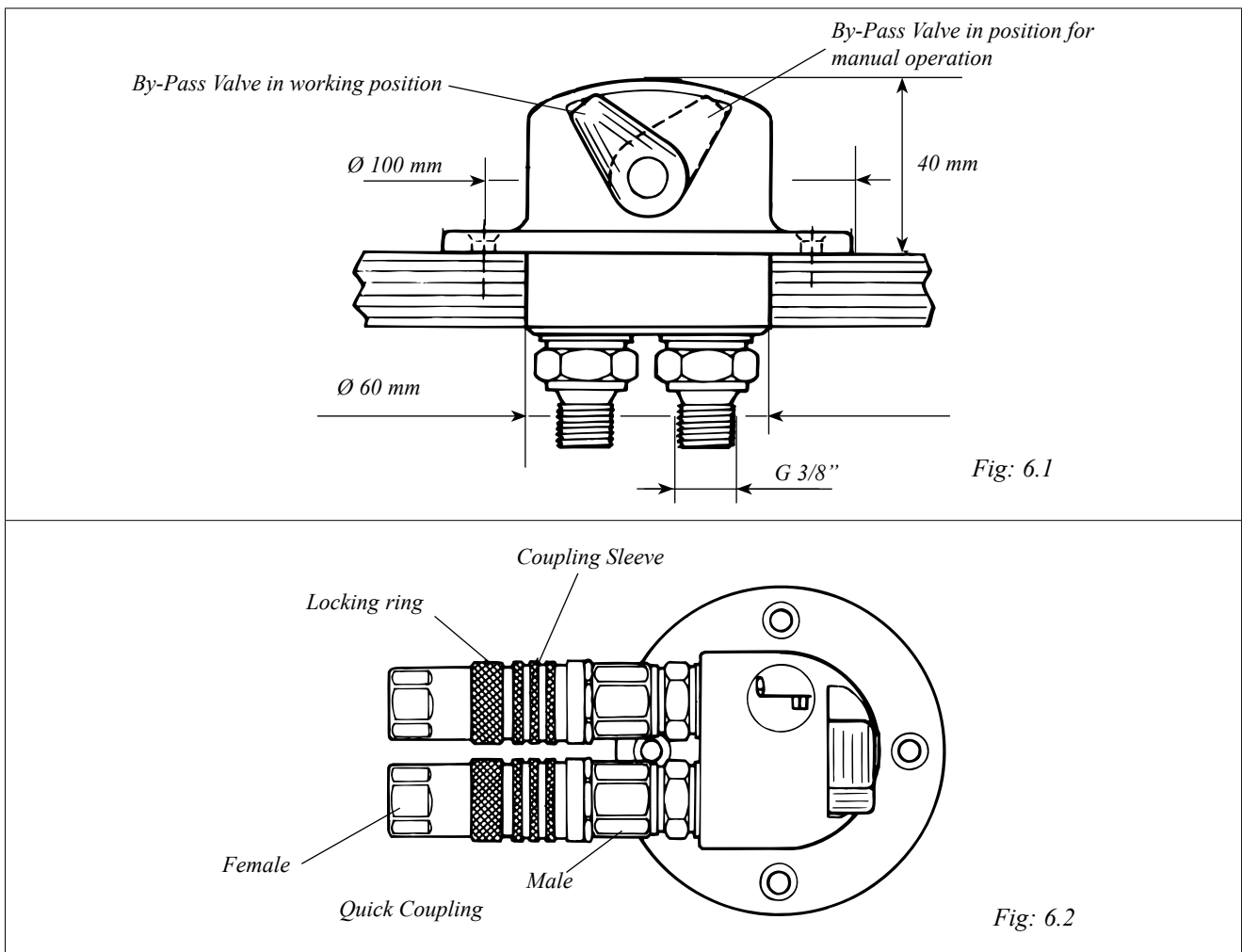
# Installation

## Hydraulic motor

- The reefing system with drive unit and hydraulic motor are prefitted to the mast and tested before delivery.
- The hydraulic motor is a Danfoss-OML 12.5 cm<sup>3</sup> revolution. Maximum recommended pressure:  
Mast sections 232/126 & 260/136 (RB): p = 120 bar  
Mast sections 290/150, 324/169 & 370/192 (RC/RD): p = 140 bar
- The oil flow, Q = 11 litres/min. gives a nominal speed n = 40 rpm.
- The normal working load when reefing or unfurling is p = 40 bar when Q is 10 litres/min.
- A 24-volt pump unit with an effect of P = 1,5 kW is usually sufficient.

## Through-Deck Fitting

The main installation dimensions are shown in fig: 6.1.



## Quick couplings

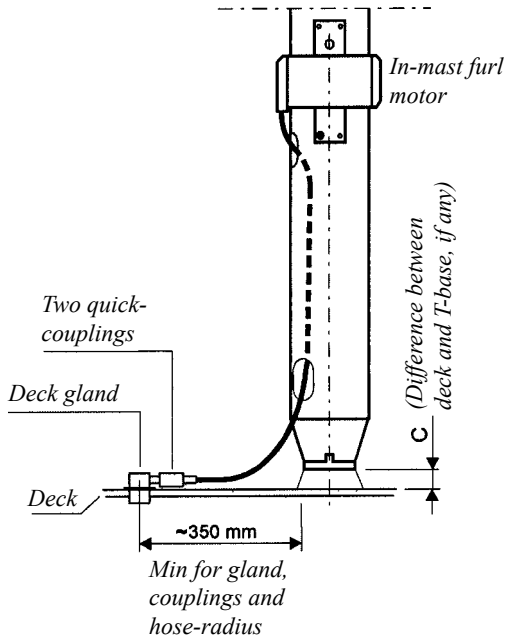
The quick couplings (fig: 6.2) are disconnected by pushing the knurled coupling sleeves out from the coupling. The coupling sleeves have **safety locks** to guard against involuntary disconnection. These are locking rings which are pushed against the coupling sleeves and then given a half turn. The locks are freed by twisting the locking rings until they release. Always check that the quick couplings are locked.

### Gland position for hydraulic mast-motor hoses, deckstepped mast

The position of the gland is optional. Please fill in these data and send the paper form to Seldén. We will then manufacture the two hydraulic hoses, tailor-made for your boat.

Note that the hoses from the hydraulic boom outhaul normally emerge through the same hole, and should be connected to a separate deckgland.

(For boom outhaul gland position, see paper form 595-169-E)



Boat	
Hose exit side	
Date	
Sign	

NOTE: It's important that you mark the position of the gland and the direction of the hoses (use gland symbol  $\odot=$ ) in your sketch. If gland position is not align or  $90^\circ$  to boat, please show this in the sketch and note down the value of the angle.

Make a note in your sketch on which side you want the exit hole (use hole symbol  $\square$ ).

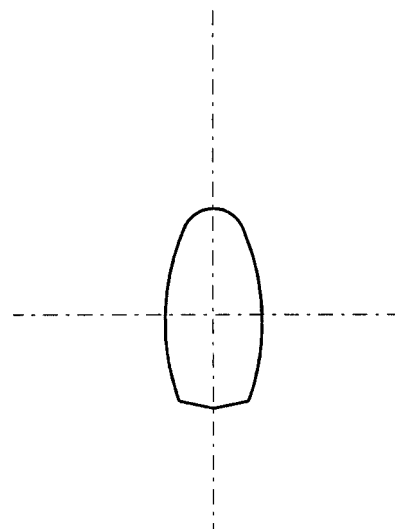
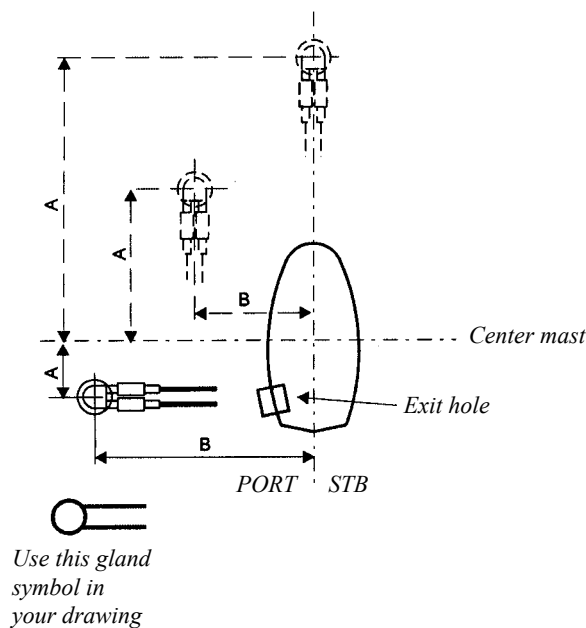
Also make sure that the gland position allows space for couplings and hose bends.

If T-base is above deck/gland please note the value for "C" down.

If you have hydraulic outhaul, consider its deck-gland position as well.

#### Our example

#### Your sketch



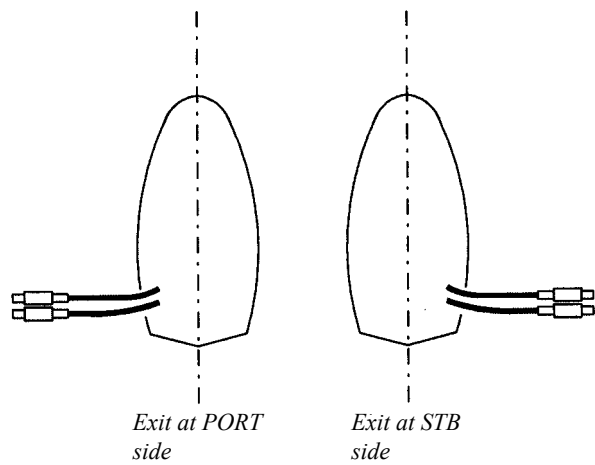
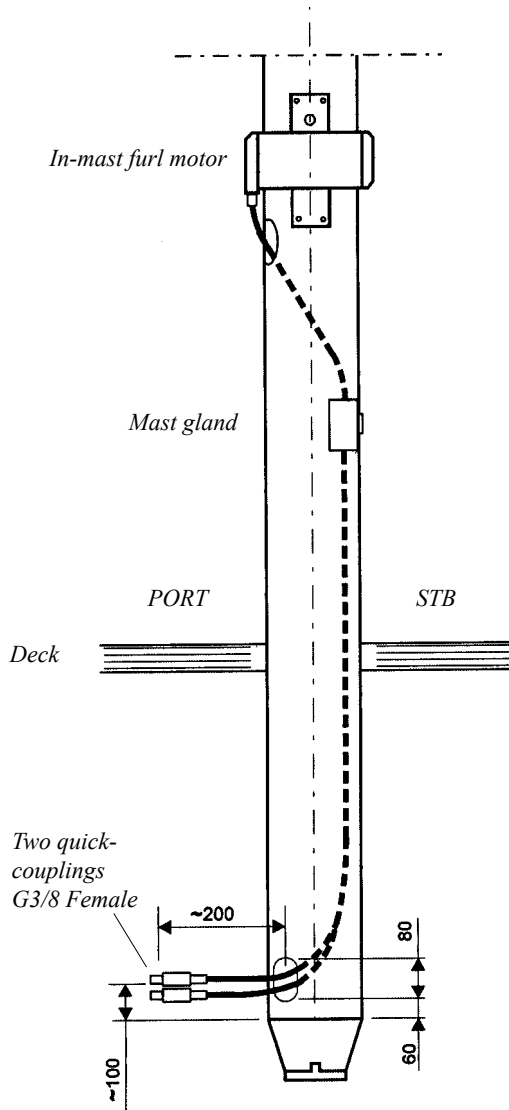
### Hydraulic mast-motor hoses, length and exit hole for keelstepped mast

The exit hole position and the length of the hoses coming out from the mast is optional. The exit hole is located close to the foot of the mast on port- or starboard aft edge as shown in the diagram.

Please fill in these data and send the paper form to Seldén. We will then manufacture the two hydraulic hoses, tailor-made for your boat.

Note that the hoses from hydraulic boom outhaul normally emerge through the same hole.

(For hydraulic outhaul hoses see paper form 595-170-E)



Boat	
Hose exit side	
Hose length (200 is standard)	mm
Date	
Sign	



## Hydraulic hoses

1. The hoses for below deck installations are **not supplied**. (See fig: 9.1).
2. The connecting threads are G3/8". (See figs: 7.1 & 8.1).
3. Use good quality hydraulic hoses corresponding to at least SAE 100R7-ISO3949. Minimum hose size 3/8": Minimum working pressure 140 bar. Recommended minimum bending radius 150 mm.

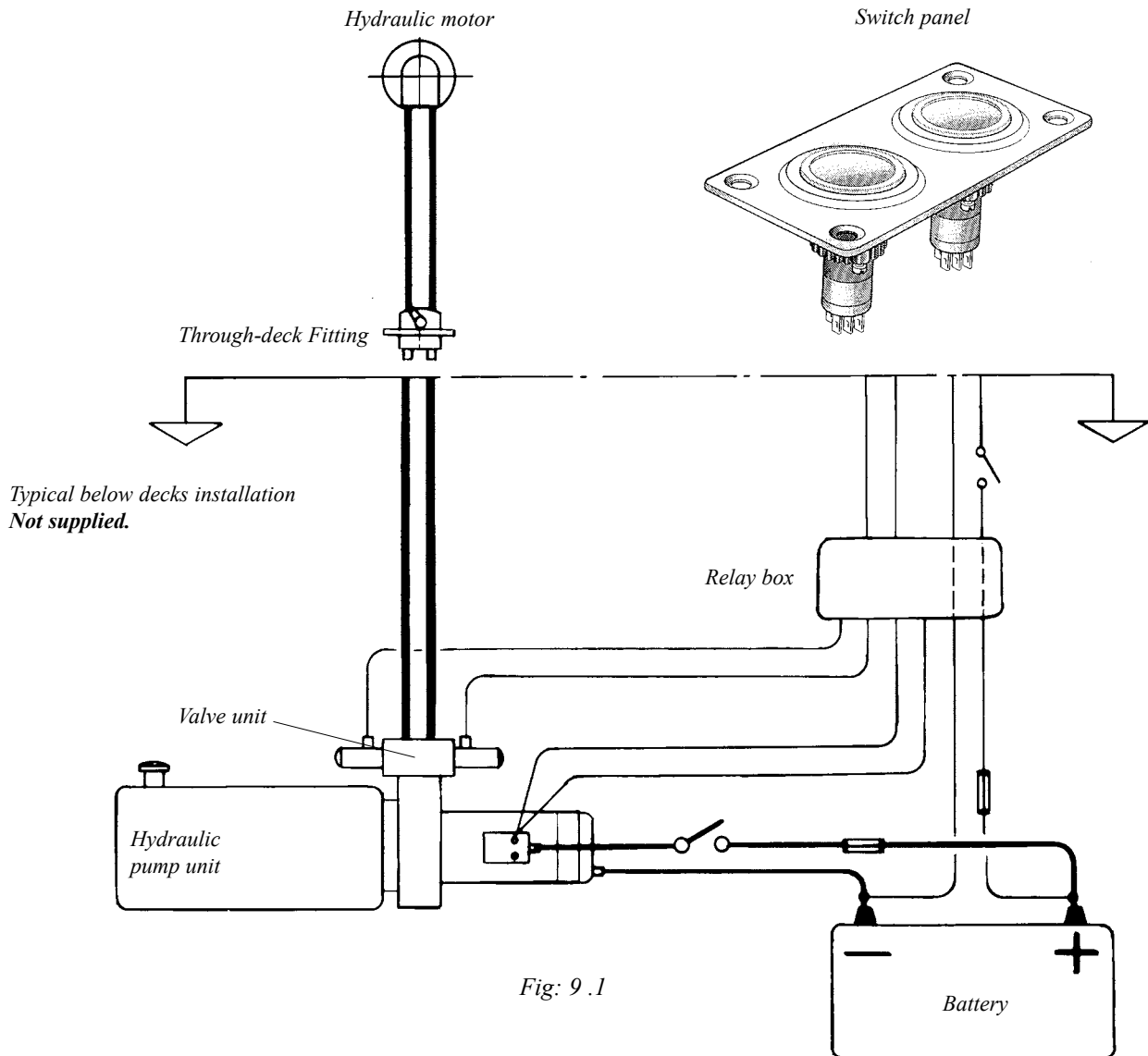


Fig: 9 .1

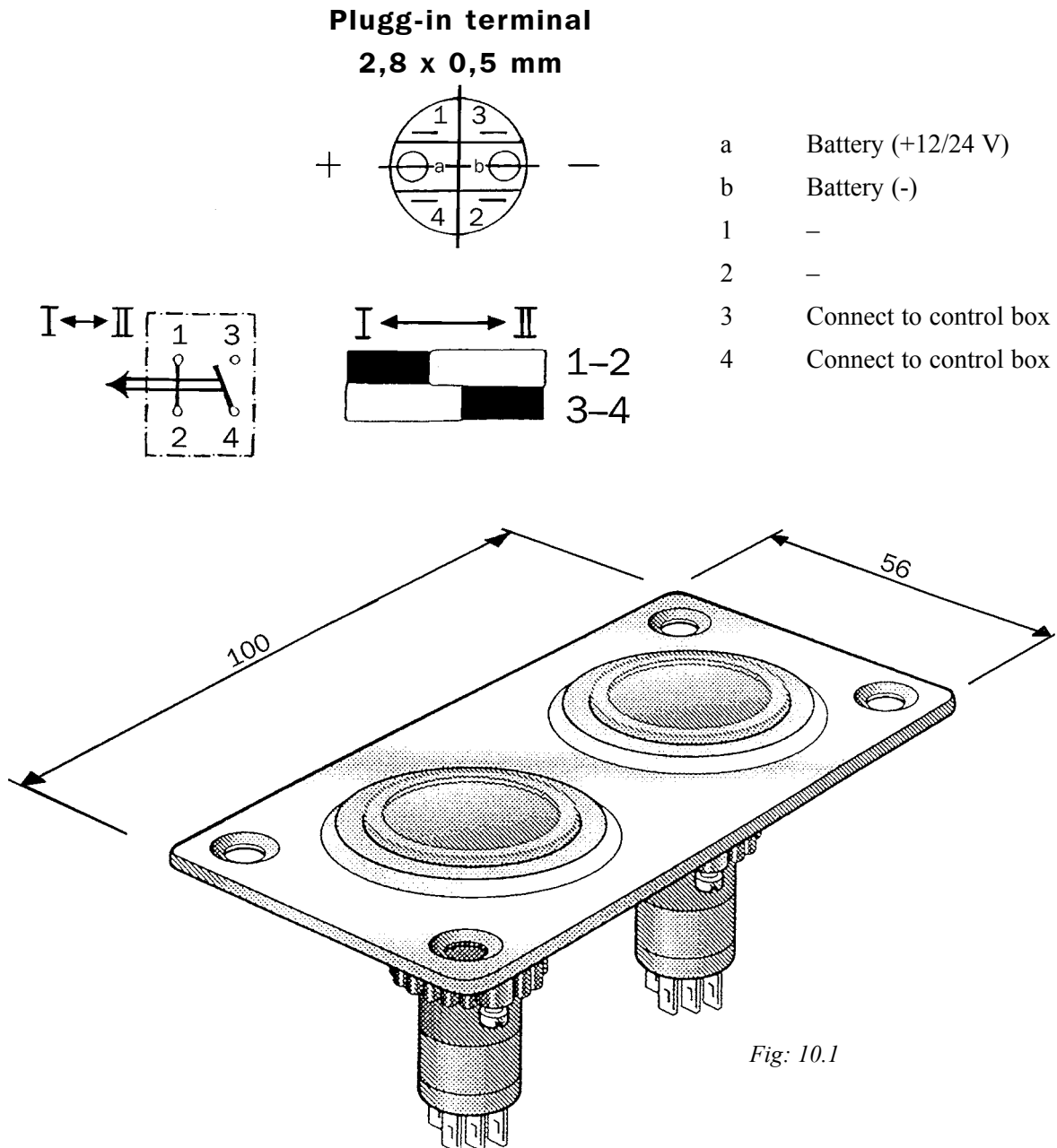


**IMPORTANT! Blow through all new hoses with compressed air before fitting them to clean them of possible dust and dirt. Check the system very thoroughly during assembly to ensure that no impurities are present. When disconnecting the quick coupling, always apply the protective covers and sleeves supplied.**

Put suitable marks on the hoses where they connect to the quick coupling. If they are switched over the operation of the hydraulic motor will be reversed.

## Switch panel

The switch panel (fig: 10.1) is waterproof and can be fitted anywhere in the cockpit.



## Checks

1. When installation has been completed, press the **reefing switch** and confirm that the **luff extrusion** rotates **anti-clockwise**. This is the direction of rotation for furling or reefing. (See fig: 4.1).
2. Then press the **unfurling switch** and check that the **luff extrusion** rotates **clockwise**. Change the yellow and green leads over if this is not the case.
3. Alternatively, cross the hydraulic hoses over.

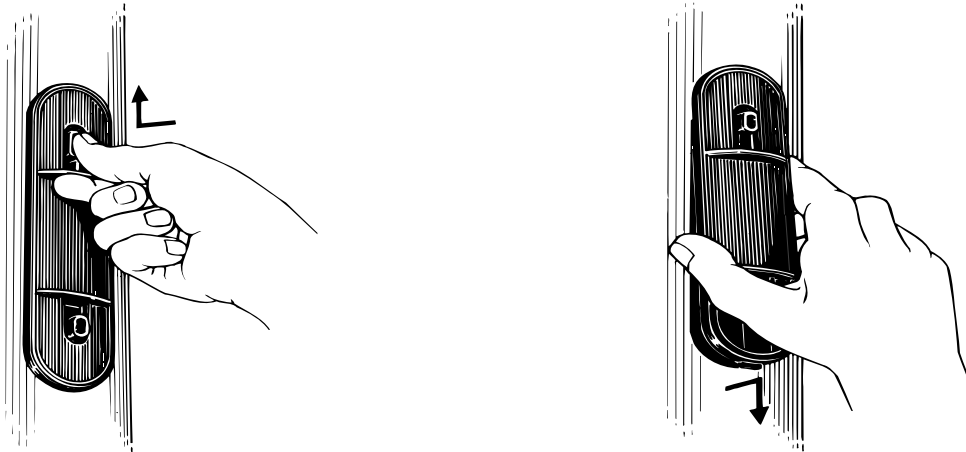
## Rigging

See Seldén Mast's "Hints and advice on rigging" attached.

# Fitting and hoisting the sail

1. Check that the tack and the head of the sail are made according to the instructions on pages 18 and 19. A wrongly executed tack can cause sail creases or hamper reefing.

2. Remove the covers.



Depress one button and push.

Lift the opposite end and remove.

Fig: 11.1

3. Join the head to the halyard swivel

4. Join the tack to the tack hook

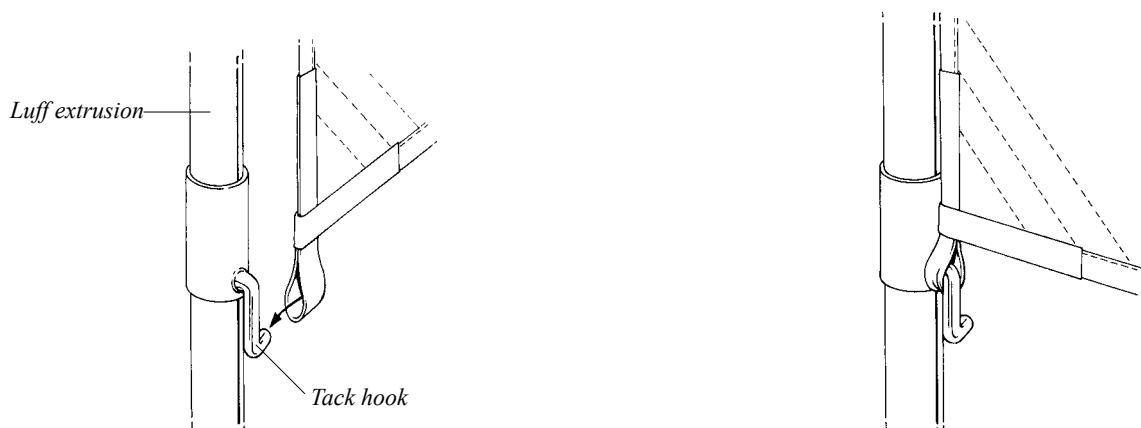


Fig: 11.2

5. Attach the clew to the outhaul car.
6. Lash the sail feeder as close to the aft face of the mast as possible. Then thread the sail feeder on the sail from the top of the luff.
7. Feed the luff into the luff extrusion sail feed, and hoist the sail while checking that the luff is feeding correctly.
8. Tension the halyard until horizontal folds disappear, and lock it with the stopper. Further halyard tensioning to obtain the best sail shape is undertaken when sailing. The halyard end can suitably be stowed through the hole in the mast just under the halyard winch.
9. Remove the sail feeder.
10. Furl the sail into the mast until only the clew is exposed. The mast and the luff extrusion are asymmetrical to ease rolling in in one direction. The sail should therefore always be rolled in on the starboard side of the extrusion.
11. Test furl the sail a few times while still in harbour to check all functions, and to ensure that the sail has been correctly dimensioned. Keep the aft face of the mast clear of all halyards and lines to avoid them being rolled in with the sail.

# Operation

## Rolling out

- Take home on the clew outhaul while simultaneously pressing the unfurling switch.
- Release the switch an instant if the motor should roll the sail out faster than it can be taken in on the outhaul.
- Do not use the motor without taking in on the outhaul.
- Stop the motor when the sail is fully rolled out. A red mark on the sail will indicate this (See fig: 18.2).
- Continuing to press the unfurling switch will start rolling in the sail in the wrong direction.

## Furling

- The leech and foot of the sail should be fairly taught. The sail will then form a tight roll around the luff extrusion.
- Leech tightness is adjusted with the topping lift and kicking strap. Foot tightness is controlled with the outhaul.
- Furling is done with the furling switch, but it is important that one is ready to pay off on the outhaul first. Lay the outhaul line one turn around the winch, and pay off as the sail is rolled in.
- Stop the motor before the clew goes into the mast.

## Reefing

- Follow the same procedure as for furling.
- The mainsail can be reefed by any desired amount.
- The sail is always securely held by the self-locking worm gear when the motor is stopped.
- Stretch the foot with the clew outhaul when the desired amount has been reefed.

## Outhaul line

We recommend a self tailing winch for the outhaul. A rope stopper is recommended for belaying. The stopper should be at the type that allows controlled paying out.

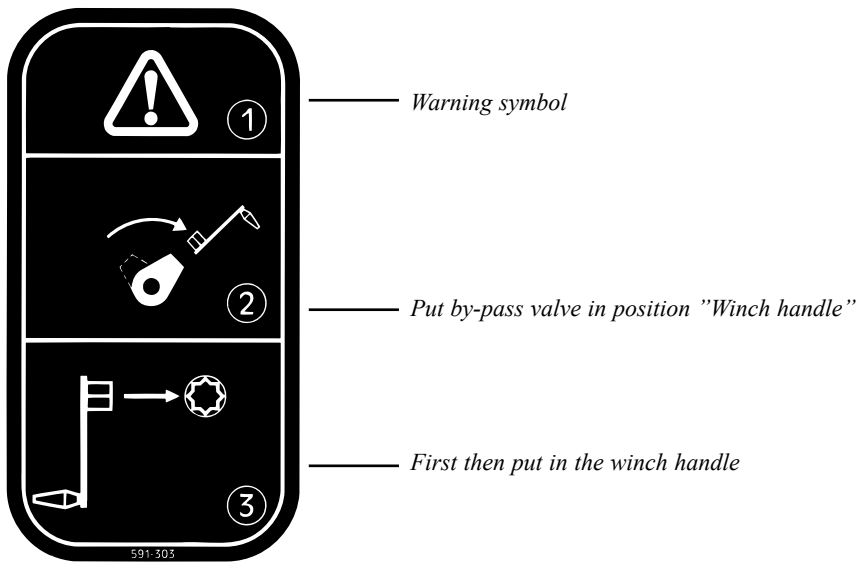
## Topping lift and kicking strap

We recommend that both topping lift and kicking strap are controlled from the cockpit. Their lines are best belayed with rope stoppers. The topping lift should have a stopper-knot to prevent it inadvertently running out, escaping, and allowing the boom to fall in to the cockpit. The stopper-knot should be put where the line exit from the boom, and be sited for the "lowest essential level" of the boom.

(NOTE! This is not essential if a rodkick is used).

## Manual operation

The system can be manually operated in the event of an electrical or hydraulic failure.



The by-pass valve is fitted to the trough-deck fitting (see fig: 6.1).

With the by-pass valve in the "Winch handle" position the hydraulic motor cannot be started, and one can operate manually in complete safety. The sail is rolled in when one turns the handle clockwise.



**Important! Never leave the winch handle in the drive unit. It will rotate very fast if the hydraulic motor is started.**

# Maintenance

It is important to periodically check and maintain the reefing system if it is to give you uninterrupted years of easy reefing and good service. Even if the system is well protected inside the mast, which reduces the need for maintenance, it should be given a thorough check at the end of each season. Follow the undernoted service points.

## Cleaning

When the mast has been laid on trestles and the sail removed, it is easy to get to everything for hosing down and cleaning with fresh water. Hose down well to remove all traces of salt.

**This is the most important service item.**

It is alright to use detergents provided that all traces are rinsed off afterwards. Most detergents contain elements that can corrode aluminium alloys.

Finish off by treating all aluminium surfaces with silicone-free boat polish or wax. They protect well and also reduce the dirtying of sails.

## Greasing

Avoid using too much grease. The swivel bearings should be greased with the tube of grease supplied with the mast. (Part No. 312-501).

**The top swivel** bearing is lubricated through the hole marked "Grease": This can be done through the sail slot on the mast.

**The halyard swivel** bearings are lubricated by injecting the grease through the gaps in the bearings into the ball races.

## Periodic servicing

The drive unit gearing is greased with a lithium-based grease (SKF LGEP 2/04). We recommend that you have the unit serviced at intervals of no more than 5 years in normal use. Servicing entails disassembly and cleaning of the unit, replacement of the glands and O-rings and re-greasing.

For boats used in charter operations or circumnavigation etc the unit should be serviced on a more frequent basis.

## Storage

Hose the mast down first to clean it of all dirt and traces of salt. Store the mast in a dry and well ventilated area. See that no wire halyards or standing rigging lie against the mast as they can cause galvanic damage.



**Important! Under no circumstances should a damp or dirty mast be kept in plastic or other impervious material.**

# Dismantling

All components can be removed from the mast. Stainless steel screws and stainless steel thread inserts have been used so that dismantling will be easy even after many years of use.

## Reefing system

1. Lay the mast horizontally on trestles.
2. Relieve the luff extrusion from tension by slackening the tensioning screw. (See fig: 17.2).
3. Separate the luff extrusion from the drive unit by removing the coupling screw through the hole in the drive unit flange (see fig:16.1). Use a 10 mm Allen key.
4. Free the drive unit drive shaft by fully reducing the length of the tensioning screw. An alternative method is to withdraw the luff extrusion following points 6 and 7.
5. Undo the four holding screws on the drive unit and lift the drive unit out of the mast.
6. Undo the nuts on top of the mast-head box. The head box can then be lifted off. Remove the swivel from the head box.
7. The luff extrusion and halyard swivel can now be removed from the mast.

## The drive unit

- The complete drive unit can be removed from the mast even when it is rigged. (See "Reefing system"; items 1-5).
- Further dismantling of the drive motor unit should be left to Selden Mast AB or one of their authorized service agents. (Exception: see "Hydraulic motor").

## Hydraulic motor

- The hydraulic motor should only be removed from the unit if it is impossible to turn it with the winch-handle, (see "Manual operation"; page 13); or if the motor has to be exchanged. In this case the most likely cause is dirt in the hydraulic oil.



**Important! See "Installation", page 9.**

- Remove the hydraulic hoses. Apply the protective plugs.
- Remove the four holding screws holding the stainless steel cover on the port side (5mm Allen key). Draw the cover out evenly by using the three dismantling screws (2,5mm Allen key). Then carefully remove the motor by hand. **Do not use any other tools.**
- Tightly and thoroughly cover the open hole where the motor was seated.
- Reefing can be manually undertaken even with the motor removed.



**Important! The motor and its cover comprise an exchange unit and must not themselves be dismantled or separated.**

The drive unit

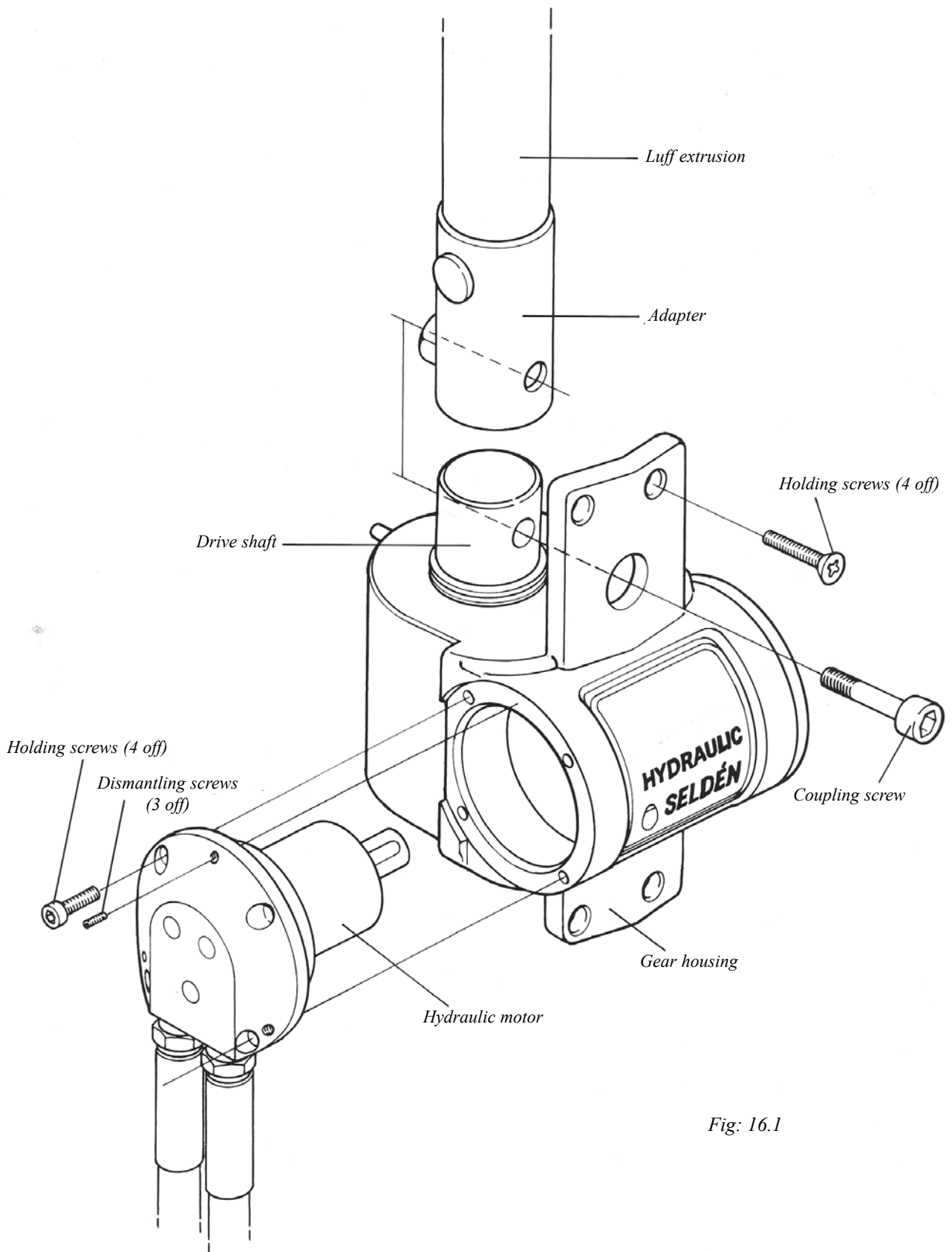


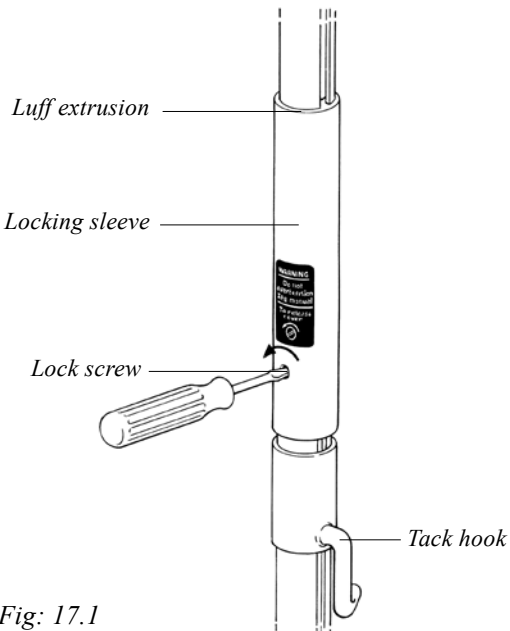
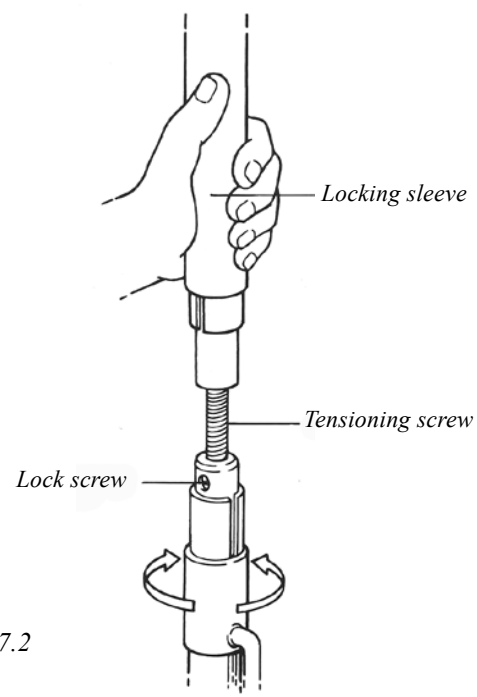
Fig: 16.1



## Tensioning the luff extrusion

- The luff extrusion is always correctly tensioned when it leaves the plant.
- Correct tension makes for easier rolling in and out.
- The luff extrusion will be drawn aft by the sail when sailing. Thus a larger part of the extrusion will be supported by the after face of the sail chamber.
- It is not normally necessary to adjust the luff extrusion tension until after many years of use, and only then if the extrusion feels too slack.
- WARNING!** Do not over-tension the luff extrusion. It will overload the system.
- Adjustment is carried out as follows** with the mainsail removed.

1. Remove the covers. (See fig: 11.1).

<p>2.</p>  <p><i>Fig: 17.1</i></p> <p>Loosen the lock screw sufficiently to free the locking screw.</p>	<p>3.</p>  <p><i>Fig: 17.2</i></p> <p>Push the locking sleeve level with the upper opening. Put in your hand and grasp the the locking sleeve firmly.</p>
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4. Turn the tensioning screw with a winch handle in the drive unit. When the locking sleeve slips round in your hand the luff extrusion is correctly tensioned.
5. Adjust the turn so that the locking sleeve can be pushed down over the lower part of the luff extrusion. Draw the locking sleeve down to the locked position. Replace the lock screw to hold the locking sleeve in place.

# The sails

Mast extrusion	A mm	B mm	C mm	T mm	
				Boom toggle size	
				80 mm	120 mm
232/126	650	400	100	80	125
260/136	650	400	100	80	125
290/150	700	500	200	90	135
324/169	700	500	200	90	135
370/192	700	500	300	-	135

Boom extrusion	OS mm
143/76	150
171/94	150
200/117	200
250/140	200

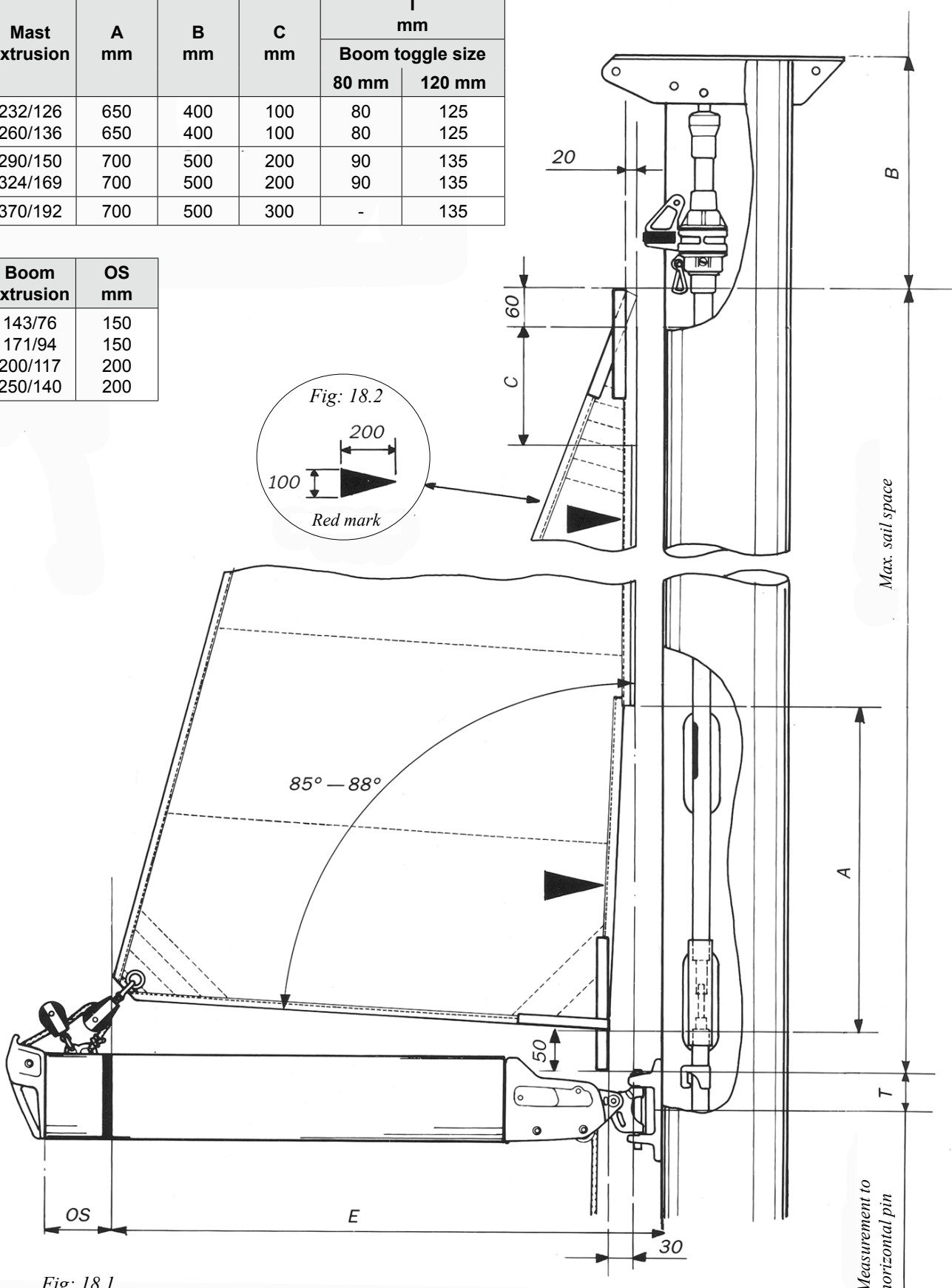
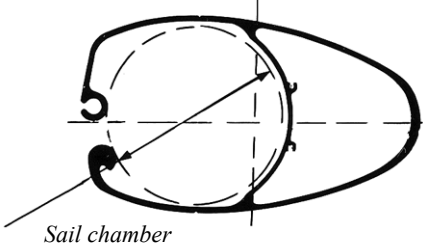
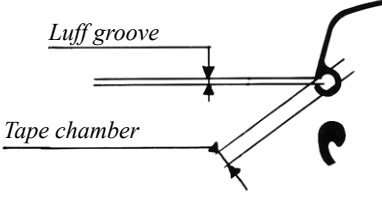
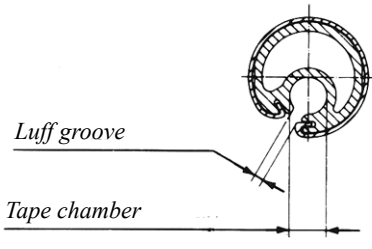


Fig: 18.1

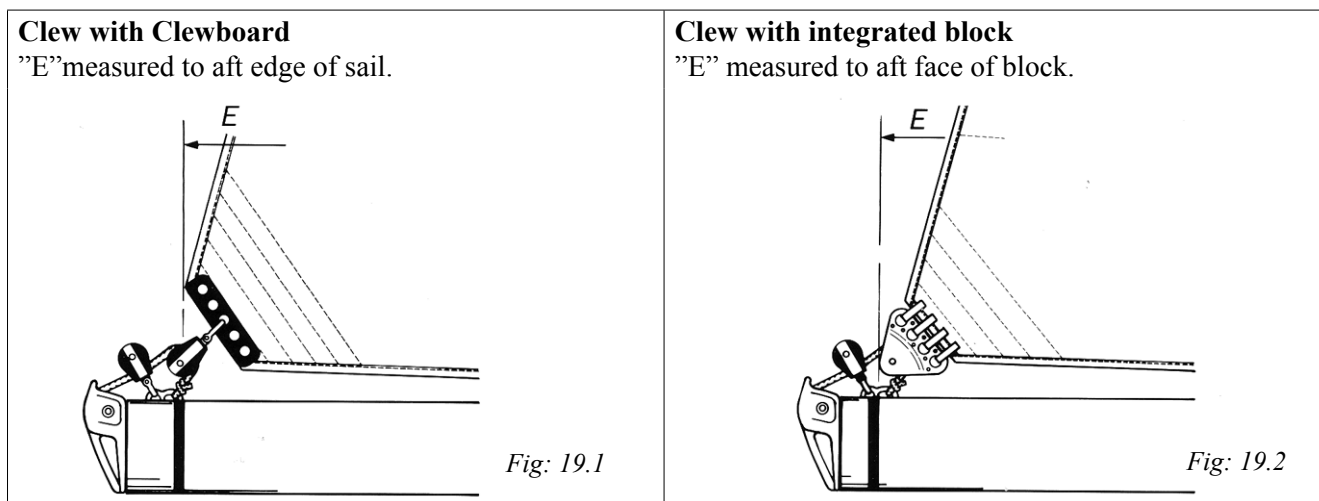
## Sail specifications

Mast extrusion						Luff extrusion			
									
Mast extrusion	Sail chamber	Max. luff length "E"	Spare luff groove in mast			Type	Dia-meter	Luff groove	Max space for tape
			Luff groove	Max. slot width for tape	Slide				
	mm	mm	mm	mm	mm			$\pm 0,25$ mm	mm
232/126 260/136	Ø114 Ø114	5500 5500	3,25	Ø10	AQUABATTEN AO32 OR RUTGERSSON 101	RB	Ø30	2,75	Ø8*
290/150 324/169	Ø124 Ø154	6000 7000	3,25 3,25	Ø10 Ø13	AQUABATTEN AO33 OR RUTGERSSON 102	RC	Ø38	3,25	Ø10,6
370/192	Ø174	7500	3,25	Ø13		RD	Ø58	3,25	Ø10,6

\* 1994 and earlier Ø10

- The luff extrusion has an asymmetrical cross section to reduce initial resistance against rolling in. Do not use too thick cloth at the luff.
- The head and tack tapes should be of soft type that can easily be folded. 20mm tape width is recommended. Do not use metal grammets.
- If battens are used, they should be on the port side of the sail. This will reduce the risk of their catching on the internal face of the sail chamber.
- The clew grammet for the outhaul block must not be thicker than 14mm.
- The upper part of the luff extrusion is centred by the halyard swivel, whilst the larger part of the extrusion will be supported by the after face of the sail chamber when sailing. The luff curve on the sail must therefore compensate for this with a wedge-shaped reduction of cloth at the head. Recommendation: Cut-back at head 30 reducing to 0 mm at a distance of 500 - 800mm down the luff
- Red marks at top and bottom at the luff (on both sides) show when the sail is fully out. (See fig: 18.2)

## Alternative clew executions



## Important reminders before starting to sail

- Haul home the outhaul when rolling out. Don't let the motor roll the sail out faster than you can haul in.
- The sail must always be rolled in on the starboard side of the extrusion. It will then be correctly rolled in the mast.
- The leech and toot must always be reasonably taught when rolling in. Use the topping lift, kicking strap and outhaul.
- Never let the winch handle remain in the drive unit when it's not being used. It will rotate very fast if the motor is started.
- Always set the by-pass valve to "Winch Handle" when operating manually.
- There must be a stopper knot on the topping lift to prevent the boom dropping down in the cockpit.

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