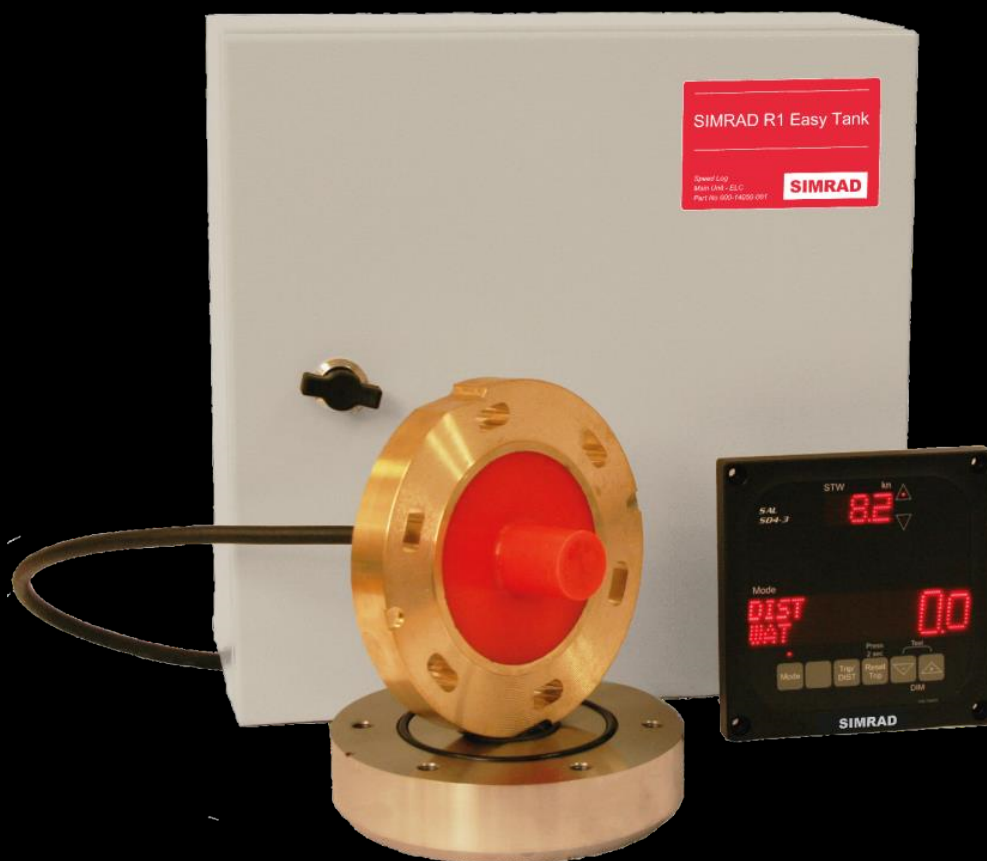


SAL R1

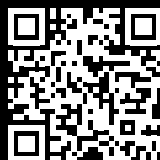
Easy Tank System

Installation manual

English



www.navico-commercial.com



Scan to save a copy

Disclaimer

 **WARNING:** Refer to important safety information in the operator manual and review all warnings, limitations, and disclaimers before using this product.

This product is not a substitute for proper training and prudent seamanship. It is the owner’s sole responsibility to install and use the equipment in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing maritime safety practices.

Navigational features that appear in this document are not a substitute for proper training and prudent seamanship. They do not replace a human navigator and SHOULD NOT be relied on as a sole or primary source of navigation. It is the operator’s sole responsibility to use more than one navigational method to ensure safe passage.

Navico Group AND ITS SUBSIDIARIES, BRANCHES AND AFFILIATES DISCLAIM ALL LIABILITY FOR ANY USE OF THIS PRODUCT IN A WAY THAT MAY CAUSE ACCIDENTS, DAMAGE OR THAT MAY VIOLATE THE LAW.

This document represents the product as at the time of printing. Navico Group and its subsidiaries, branches and affiliates reserve the right to make changes to the product and/or specifications at any time without notice. Please contact your nearest distributor if you require any further assistance.

Governing language

This statement, any instruction manuals, user guides and other information relating to the product (Documentation) may be translated to, or has been translated from, another language (Translation). In the event of any conflict between any Translation of the Documentation, the English language version of the Documentation will be the official version of the Documentation.

Copyright

©2025 Navico Group. All Rights Reserved. Navico Group is a division of Brunswick Corporation.

Trademarks

®Reg. U.S. Pat. & Tm. Off, and ™ common law marks. Visit www.navico.com/intellectual-property to review the global trademark rights and accreditations for Navico Group and other entities.

- Navico® is a trademark of Navico Group.
- Simrad® is a trademark of Kongsberg Maritime AS, licensed to Navico Group.
- Loctite® is a trademark of Henkel IP & Holding GmbH.
- NMEA®, NMEA 0183® and NMEA 2000® are trademarks of the National Marine Electronics Association.
- SD® and microSD® are trademarks of SD-3C, LLC.

Warranty

The warranty card is supplied as a separate document. In case of any queries, refer to the brand website of your unit or system:

www.navico-commercial.com

About this manual

Product features

Features described and illustrated in this document may vary from your unit due to continuous development of the software.

Revision

Date	Version	Author	Comment
2017-03-30	A01-A04	TE/AF/OM	Created as 703822C1-01, editorial, SIMRAD Part No. added WTU-Assy menu tree
2025-03-30	A05	TB	Updated to comply with new branding and updates to product name and revised software version.

More information

Document version 003

This document was prepared using software version 5400130A11

For the latest version of this document in supported languages, visit: www.navico-commercial.com.

CONTENTS

1	Transducer locating principles	5
2	Bottom parts / TRU installation.....	6
2.1	Parts.....	7
2.2	R1 Easy Tank mounting procedures	8
2.2.1	Welded joint grinding	8
2.2.2	Preparation of flange	9
2.2.3	Mounting the transducer onto the Steel flange.....	9
2.2.4	Mounting the transducer onto the aluminum flange	10
2.2.5	General recommendations	10
2.2.6	FWD and RED marking pointing in ship's forward direction.....	11
2.2.7	Adjusting for alignment.....	11
2.2.8	Running the Transducer unit (TRU) cable	11
3	Maintenance	15
3.1	Transducer replacement	15
3.2	General dry-docking and maintenance routines	15
4	ELC, Electronics Unit Installation	16
4.1	Mechanical installation	16
4.2	Electrical installation.....	17
5	Set-up guide	20
5.1	Procedure	20
6	SD4-3 display installation	21
6.1	Mechanical installation	21
6.2	Electrical installation.....	21
6.3	Speed Log Master Display	22
6.3.1	Positioning of the Speed Log Master Display	22
6.3.3	Positioning of the labels	22
7	Menu system.....	23
7.1	SD4-3 Menu system.....	23
7.1.1	SD4-3 in Menu Mode	24
7.1.2	Write and read only access	24
7.1.3	Menu functions	24
7.1.4	Standby STW	24
7.1.5	SD4-3 Menu function summary.....	25
7.2	WTU Menu system	27
7.2.1	Remote Connect: Accessing the WTU Menu system	27
7.2.2	Root menu	27
7.2.3	WTU Menu system	28

1 TRANSDUCER LOCATING PRINCIPLES

An optimized transducer unit (TRU) installation is of primary importance to achieve proper performance of the speed log system (See Basic System Information).

Following rules must then be considered:

- The TRU should, preferably, be installed in the foremost area of the vessel, in a perpendicular position in a flat, horizontal part of the bottom hull plating close to the keel line and not behind 1/3 of LOW (Length On Water-line).
- The TRU could be installed in a forepeak, or in a double bottom forepeak tank, or in the lower section of the bulb accessible for maintenance and service also when the ship is afloat.
- The TRU transmitting surface must always remain under water, even in heavy seas, in order to provide speed measurements.
- The outer shape of the vessel, especially in the forward vicinity of the TRU installation position, must be free from sudden projections, steps and sharp edges, welding seams etc., which can cause turbulence in the water flow passing the TRU.
- The TRU shall be installed at least 2 m forward of water inlets and outlets.
- The TRU shall be installed at least 2 m from any echo sounder transmitters and similar acoustic devices.
- On tankers, the TRU shall not be installed within the Ex-area.
- Sufficient headroom must be available at the TRU position to allow for its fitting and removal (see relevant chapter for appropriate bottom parts).

→ **Note:** The TRU cable shall run directly to the ELC and **must never be cut off, shortened, extended or by any other mean pass a junction box**. The cable must be laid free and accessible for dismounting if exchange of TRU will be necessary.

2 BOTTOM PARTS / TRU INSTALLATION

The R1 Easy Tank bottom part is very suitable for installation for small ships, which can be easily dry-docked or lifted out of the water, where a mounting location can be found directly in the bottom hull plating. It may also be used for ships where sufficient inboard space is not available for fitting with a sea valve. TRU exchange or maintenance is not recommended with the ship in water or at least not without diver assistance.

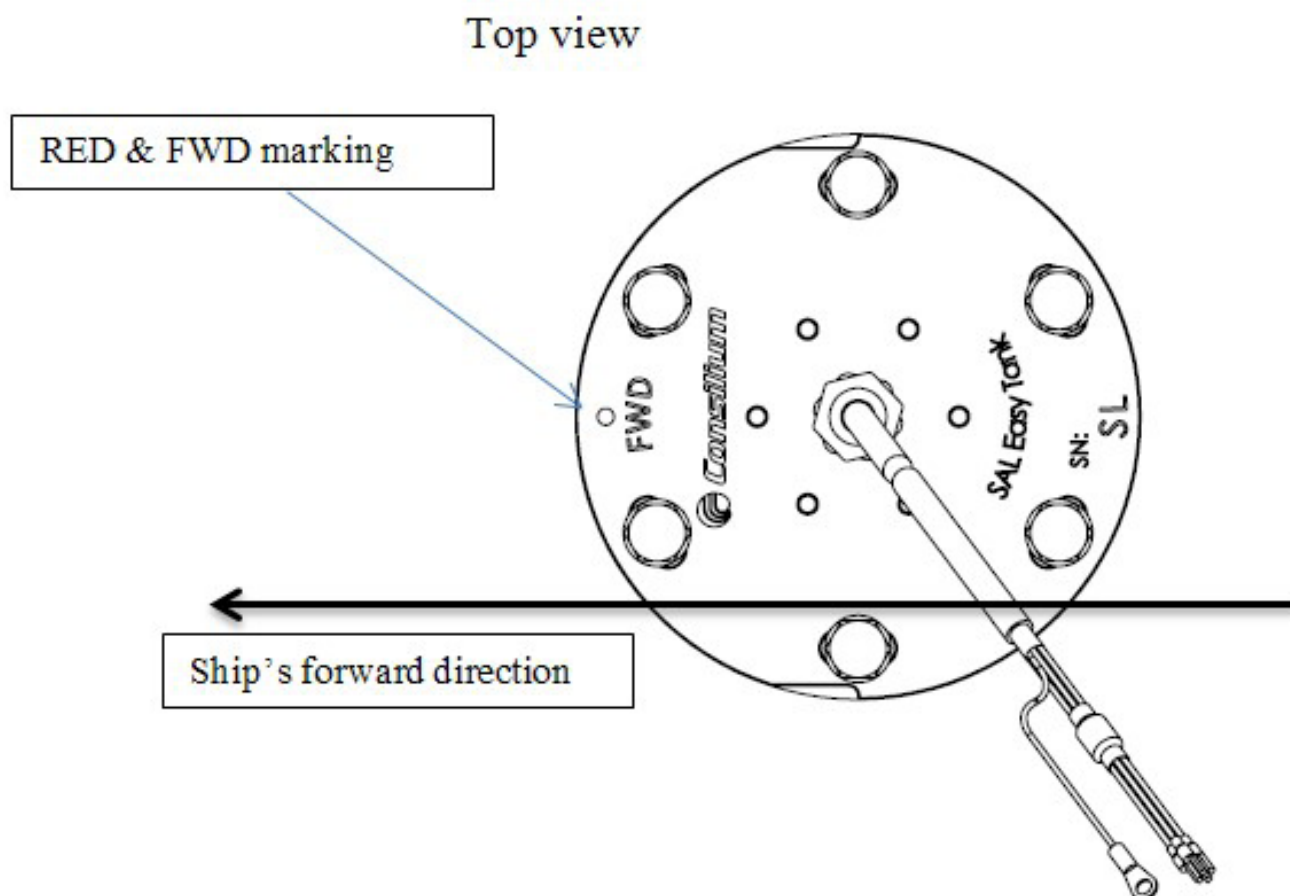
A complete R1 Easy Tank bottom part is divided in two parts; the transducer SAL R1 TRU Easy Tank with a water tight cable of 10 meters, and the flange R1 Easy Tank Flange. Alternative Flange for aluminum ships is the R1 Easy Tank flange ALU 5083.

The transducer is designed to be fitted flush with the hull. The transducer measures speed through the water STW (relative speed) approximately 130 mm below the ship's hull.

→ **Note:** The transducer and its cable are tested as a single unit. **DO NOT CUT OR MODIFY THE TRANSDUCER CABLE.** The relative speed measurement operates at a frequency sensitive to cable length, and any modifications can affect performance. Navico is not responsible for any issues arising from cable modifications.

The bottom flange is welded into a cut-out in the ship's bottom hull plate. The bottom flange also holds the transducers flush with the underside of the hull.

⚠ IMPORTANT: When welding the bottom flange to the hull the Red markings on the flange must be assured to point in the ship's forward direction.

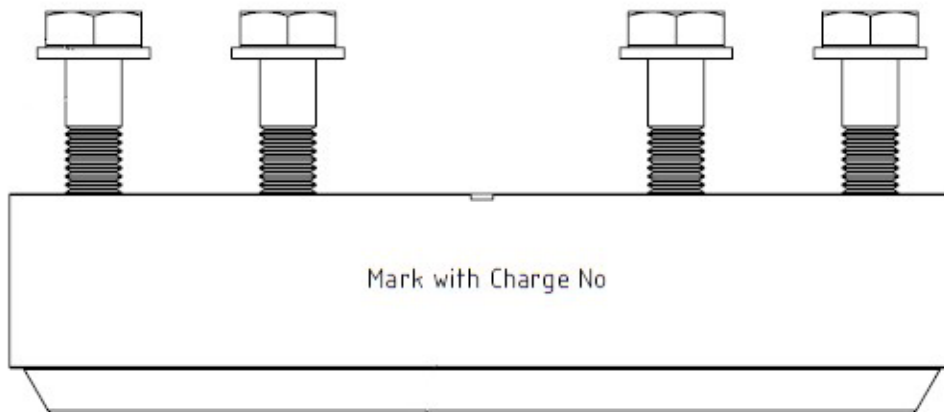


2.1 Parts

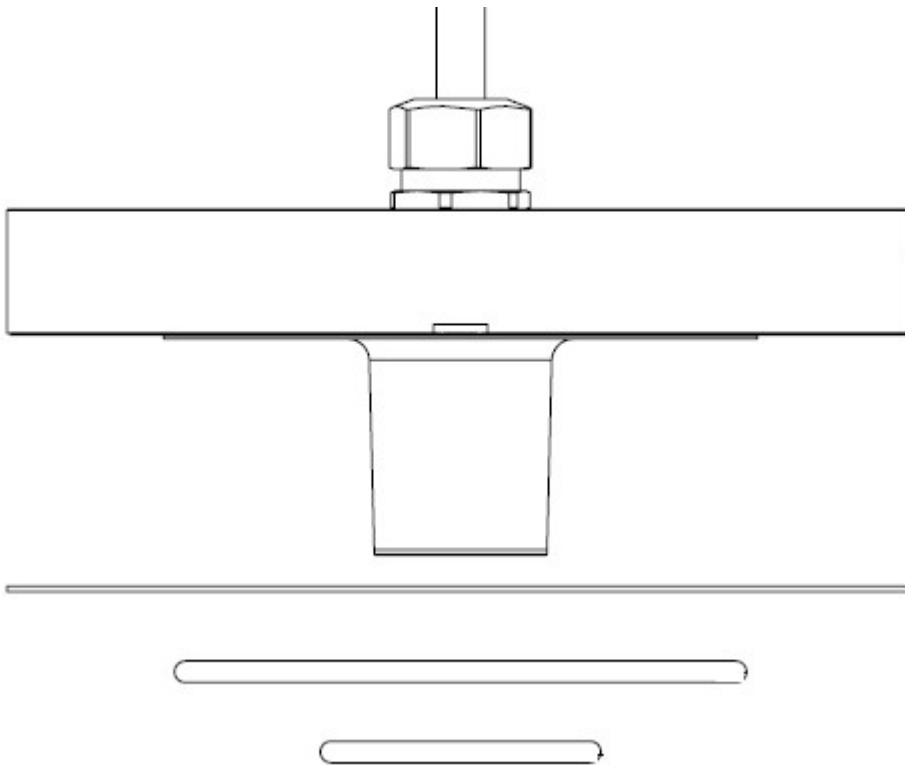
The components of the R1 Easy Tank assembly are supplied in kit form for mounting in the ship. Before starting the work, check the contents of the kit against the packing list.

The contents can be divided into two groups as shown in figures below:

- 1 R1 Easy Tank Flange with Screws and Washers for welding in the hull, steel version.



- 2 SAL R1 TRU Easy Tank (Transducer unit) with cable, O-Ring (s) and Gasket.



→ **Note:** The surfaces of transducer must never be painted!

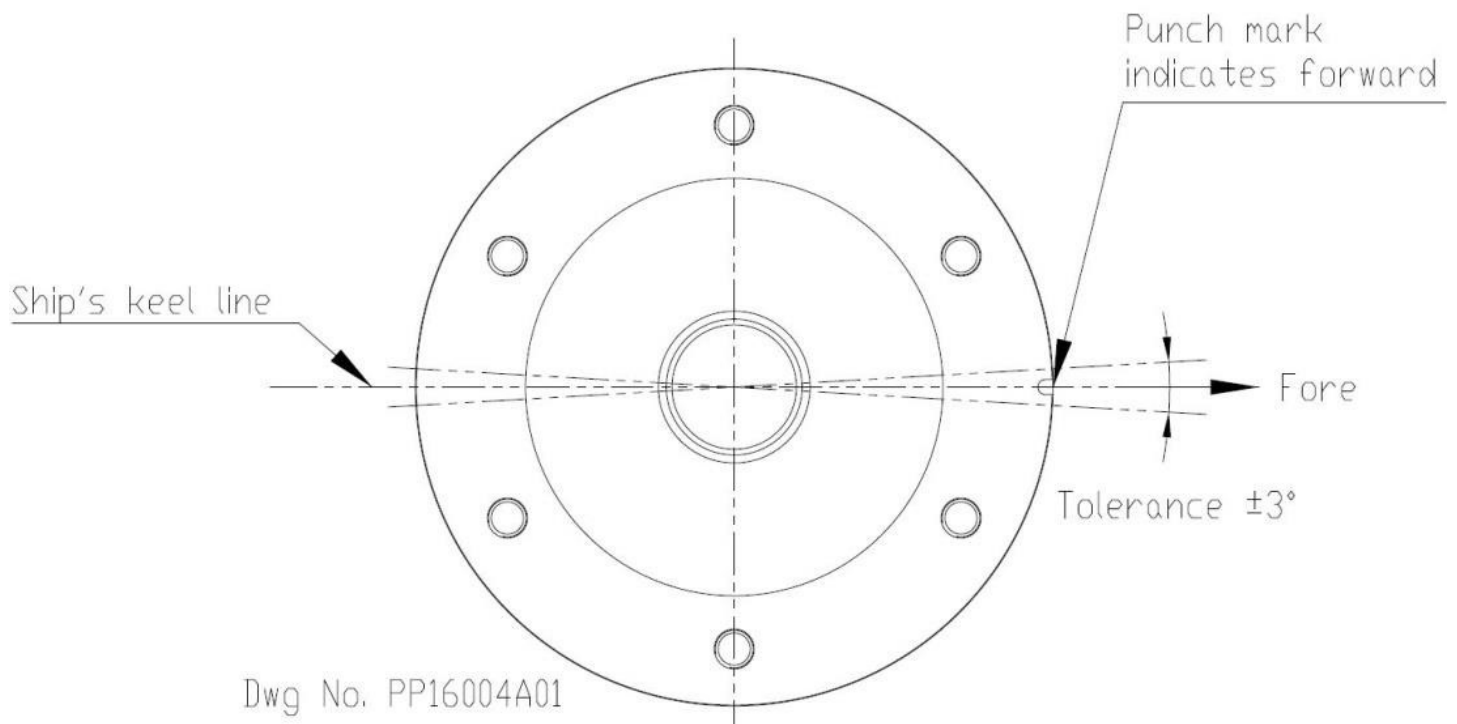
Weight Specifications:

SAL R1 TRU Easy Tank 10m WTC	5.5 kg (12.12 lb)
R1 Easy Tank Bottom Flange "Steel"	6.2 kg (13.6 lb)
R1 Easy Tank Bottom Flange ALU 5083	2.1 kg (4.6 lb)

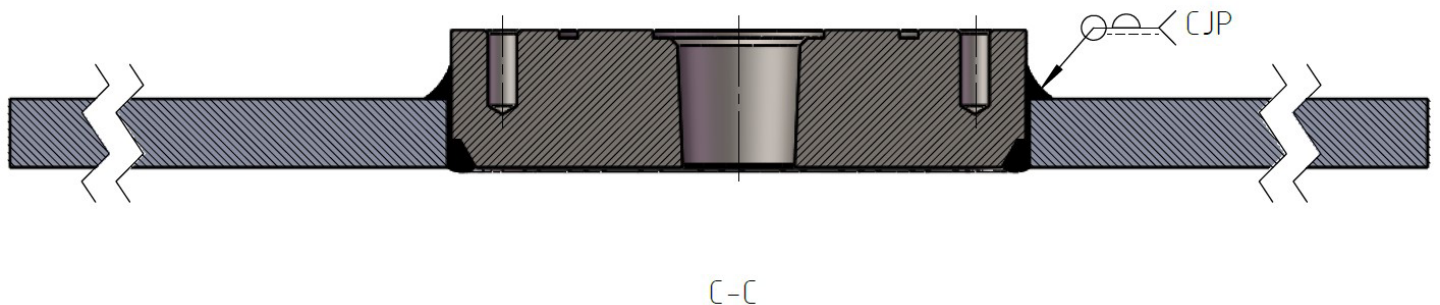
2.2 R1 Easy Tank mounting procedures

The flange must first be welded into a hole cut in the ship bottom. Cut a circular hole, diameter 170 mm (+10 / -0 mm) at the selected transducer position.

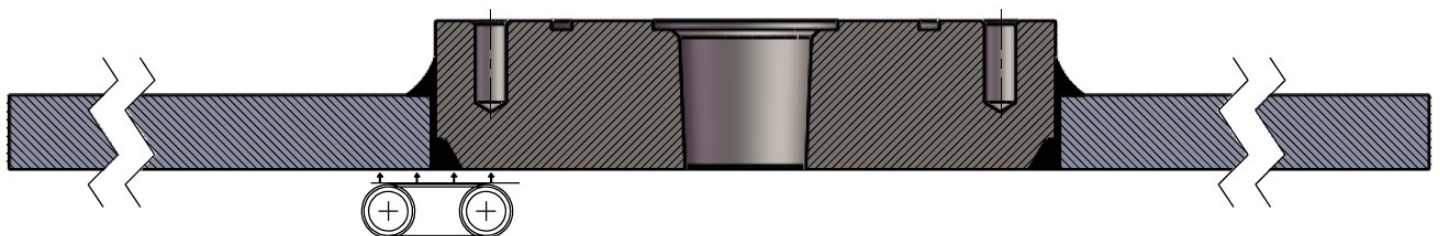
→ **Note:** A licensed welder, approved by the appropriate classification society, should carry out the welding work.



- Red markings aiming strictly ($\pm 3^\circ$) forward.
- Ensure that the bottom flange is **flush** with the outside of the hull.



2.2.1 Welded joint grinding

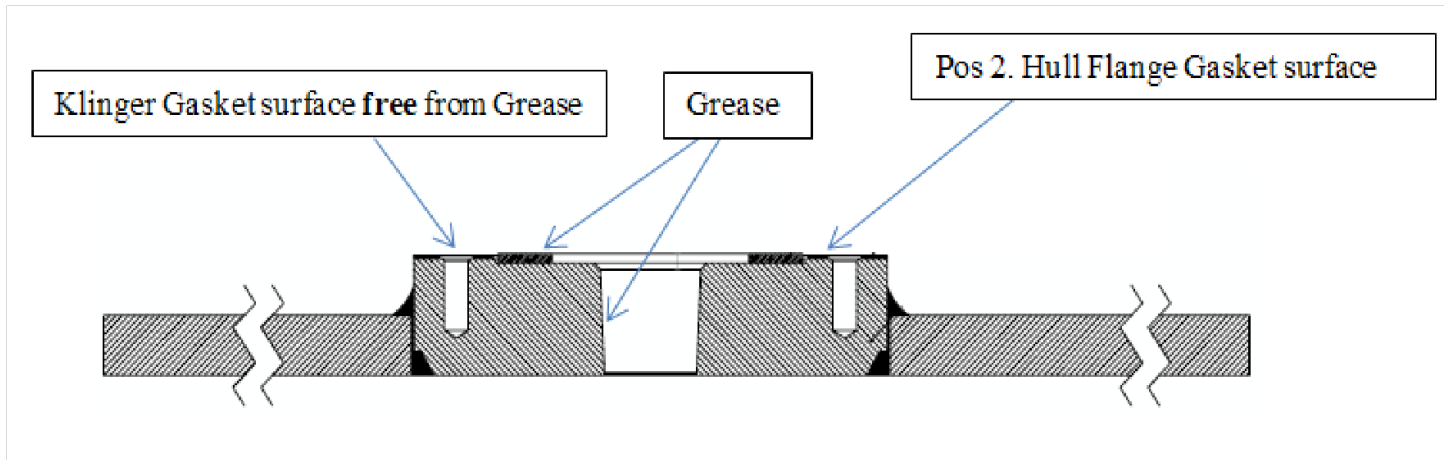


The welded joint must be ground smooth and flush with the hull. There must be no sharp edges that can cause turbulence in the water flow passing the transducer.

2.2.2 Preparation of flange

- Assure that the hull flange (Position 2) is clean.
- Apply a thin layer of Silicone based grease on the O-Rings and the surfaces inside the outer Klinger Gasket. Keep the outer Klinger Gasket area on the flange free from any grease.

→ **Note:** Do not use grease containing sulfur.



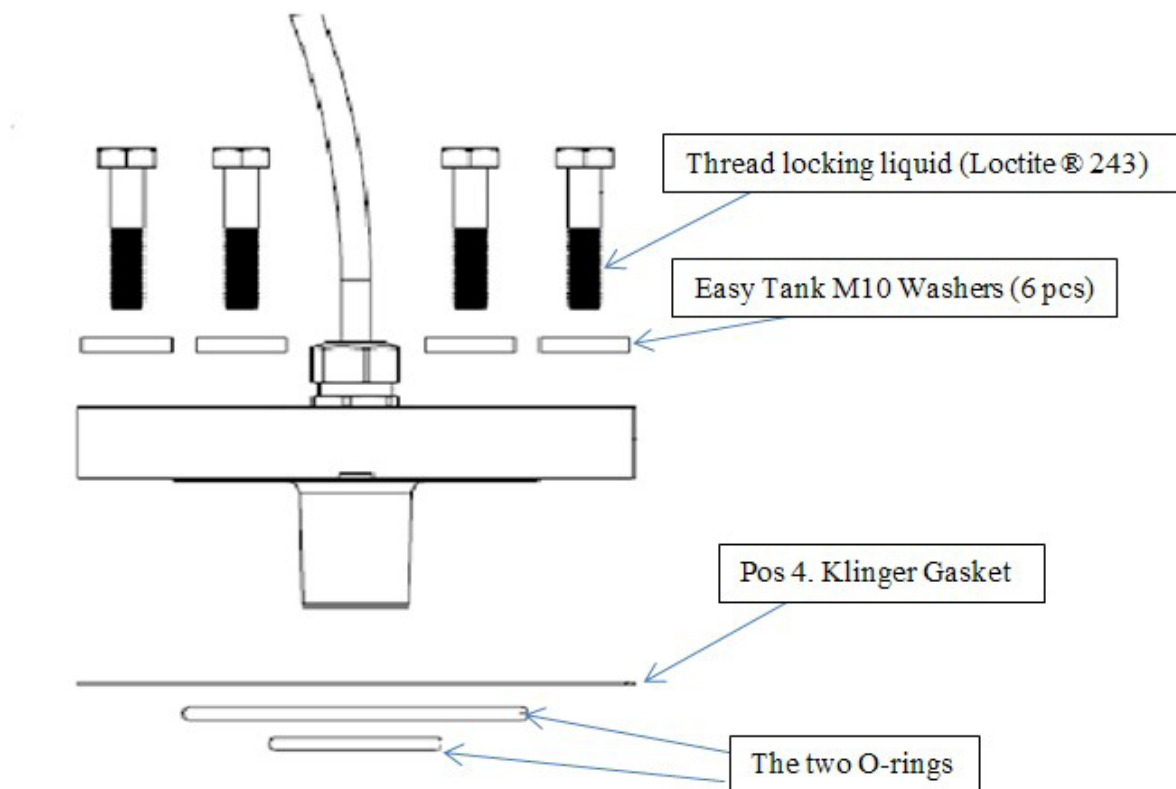
- Place the two O-Rings in the O-Ring slots
- Place the Klinger Gasket (Position 4) on the cleaned flange surface.

→ **Note:** If the steel version of the flange is to be installed submerged it is recommended to protect the side part of the flange with corrosion protective treatment, but never paint the top part which is made of bronze.

→ **Note:** The aluminum version of Easy Tank shall **not** be installed submerged.

2.2.3 Mounting the transducer onto the Steel flange

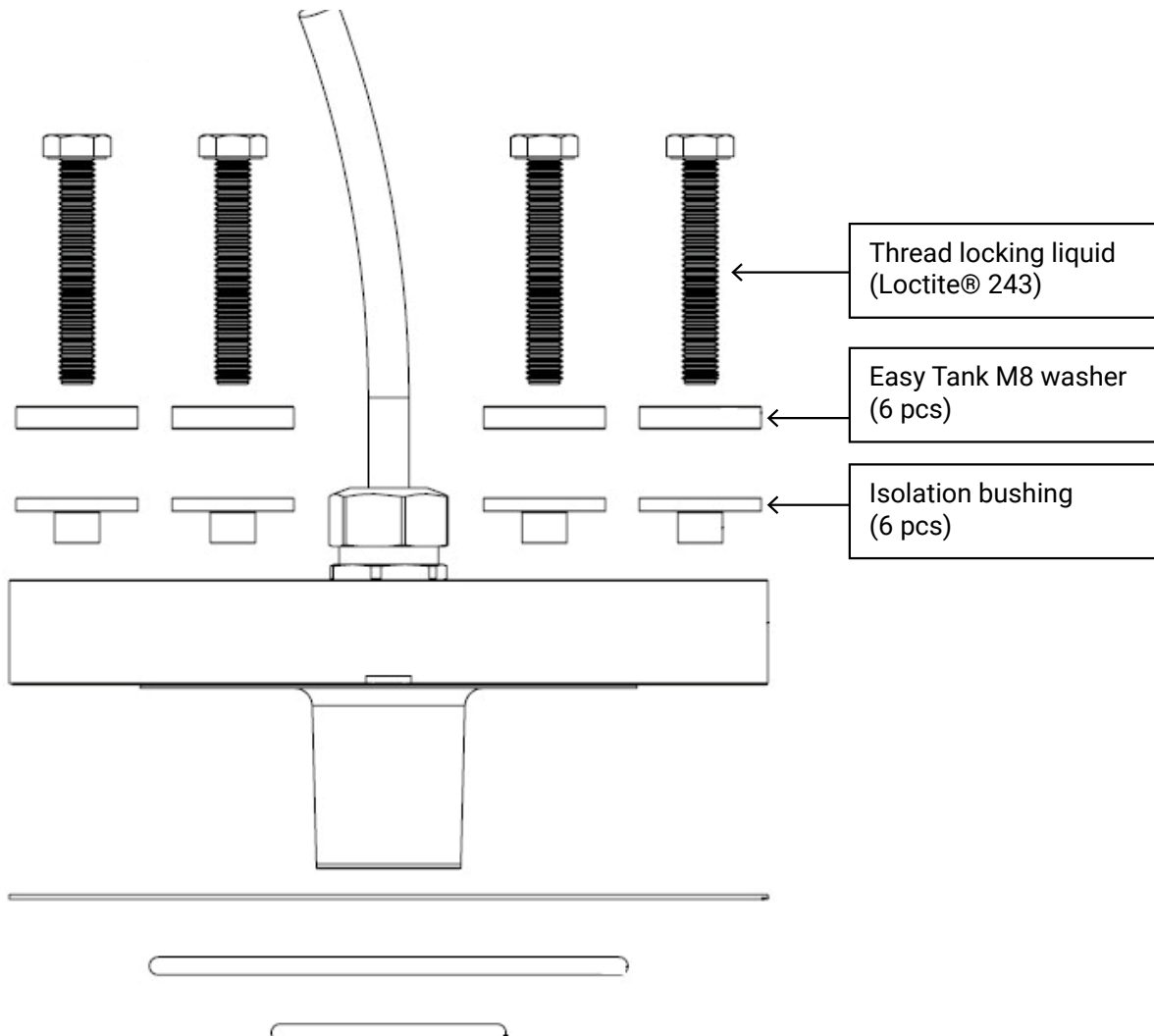
The transducer shall be mounted with the **Red and FWD markings** pointing in the ship's forward direction and in line with the Red markings on the bottom flange.



- Place the washers onto the screws and use universal thread locking liquid e.g., Loctite® 243 or equal on the screw treads and mount the washers and screws.
- Adjust the angle aiming strictly (+/-3°) forward and tighten the six M10 screws.

2.2.4 Mounting the transducer onto the aluminum flange

The transducer shall be mounted with the **Red and FWD markings** pointing in the ship's forward direction and in line with the red markings on the bottom flange.



- Place the washers and isolation bushings onto the screws and use universal thread locking liquid e.g., Loctite® 243 or equal on the screw treads and mount the washers and screws.
- Adjust the angle aiming strictly (+/-3°) forward and tighten the six M8 screws.

2.2.5 General recommendations

Use universal thread locking liquid e.g., Loctite® 243, Loctite 2400® or equal, when mounting the screws into the flange. Use Silicone grease when mounting the O-rings.

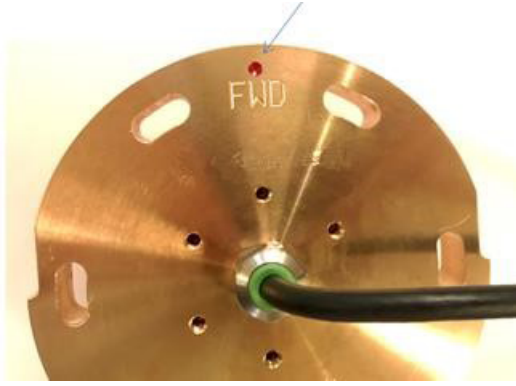
Recommended torque:

For Steel Flange	M10 Screws: 35 Nm.
For Aluminum Flange	M8 Screws: 25 Nm.

Do **not** overtighten the screws.

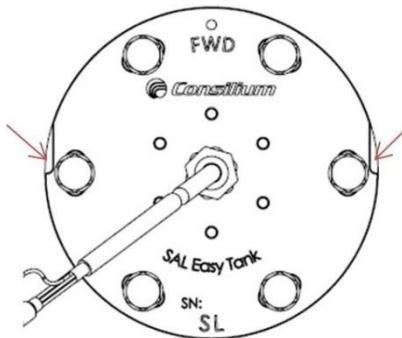
→ **Note:** Bolt should be tightening in a cross-wise sequence.

2.2.6 FWD and RED marking pointing in ship's forward direction



To be absolutely sure that the transducers are correctly seated and **FLUSH WITH THE HULL**, this must be **verified from outside the ship**. If necessary, this must be readjusted also after the above alignment procedure.

2.2.7 Adjusting for alignment



Untighten the bolts and use the cut-out on the side of the TRU or the lifting bolt to adjust the alignment.

2.2.8 Running the Transducer unit (TRU) cable

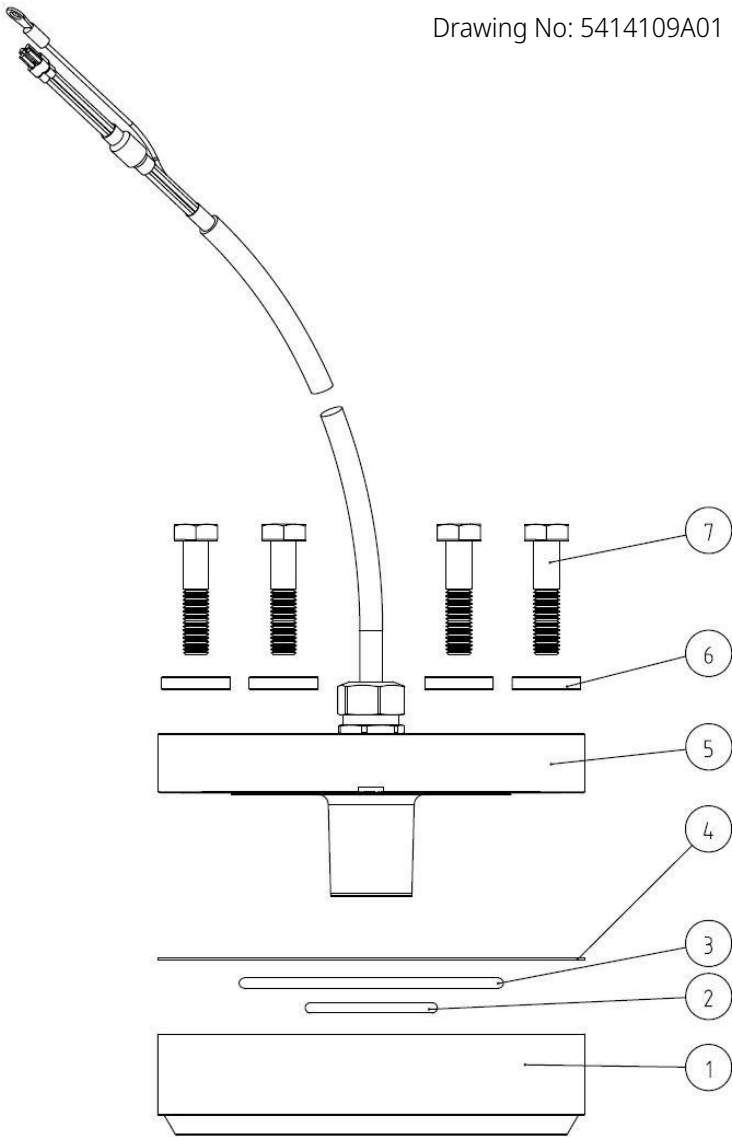
After the TRU has been mechanically mounted, the cable should be securely fastened to the bulkhead all the way to the mounting place for the ELC. Leave a coil of sufficient length of TRU cable close to the TRU, to allow for retraction. The cable coil must be strapped and may not hang down and swing freely.

→ **Note:** The TRU cable shall run directly to the ELC and **shall not be cut off, shortened, extended** or by any other mean pass a junction box. To make sure that the speed log performance is not affected, the cable shall not be laid close to other high voltage cables (440 VAC or more) or other high power or high frequency cables (e.g. sonar, echo sounder, etc.). Any excess cable length shall be coiled and strapped outside the ELC cabinet. Do not store any excess cable length inside the ELC. Any excess cable length inside will act as an antenna and may affect the electronics.

→ **Note:** The minimum coiling diameter is 90 mm (3.54 in) "WTC cable".

2.2.9 Part Numbers and Assembly Diagram with Steel Flange

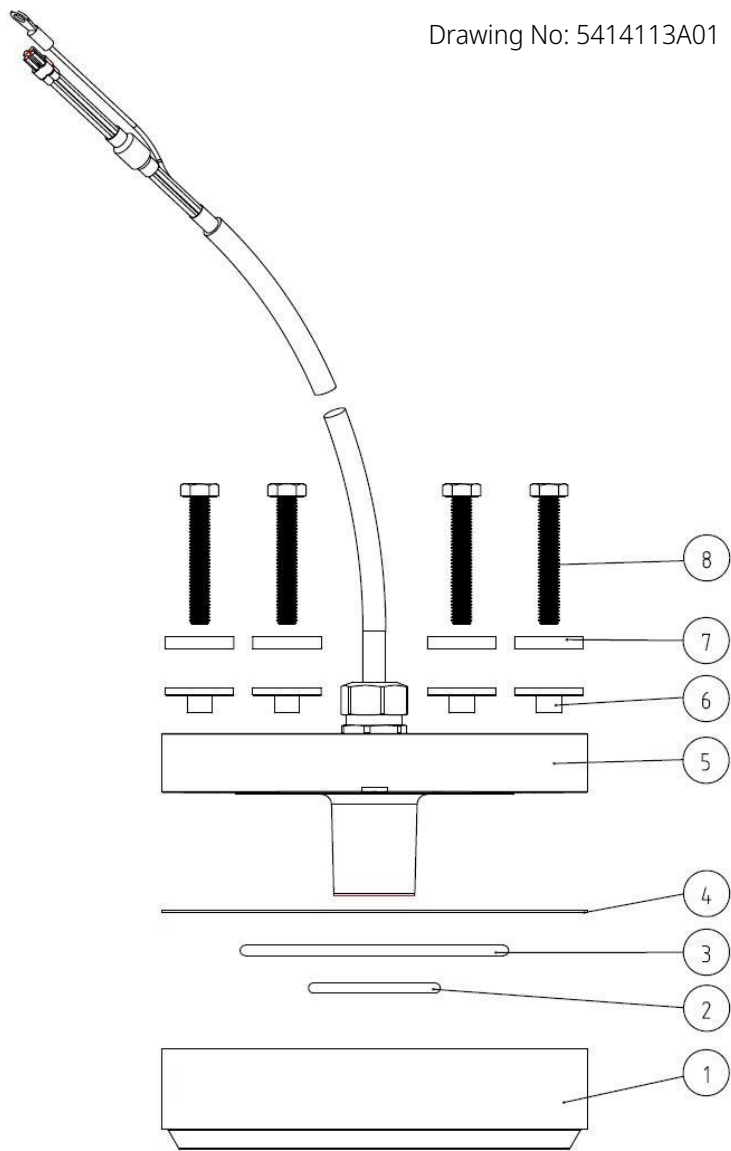
Drawing No: 5414109A01



Pos.	Qty.	Part no.	Description
1	1	000-14052-001	R1 Easy Tank Flange "kit"
6	6	- n/a	Easy Tank M10 Washer Included in 000-14052-001
7	6	SAL R1 TRU Easy Tank 10m	Screw M6S M10x45 SS Included in 000-14052-001
5	1	000-14051-001	SAL R1 TRU Easy Tank 10m
2	1	- n/a	O-Ring 42x4 Included in 000-14051-001
3	1	- n/a	O-Ring 96x4 Included in 000-14051-001
4	1	- n/a	Easy Tank Klinger Gasket Included in 000-14051-001

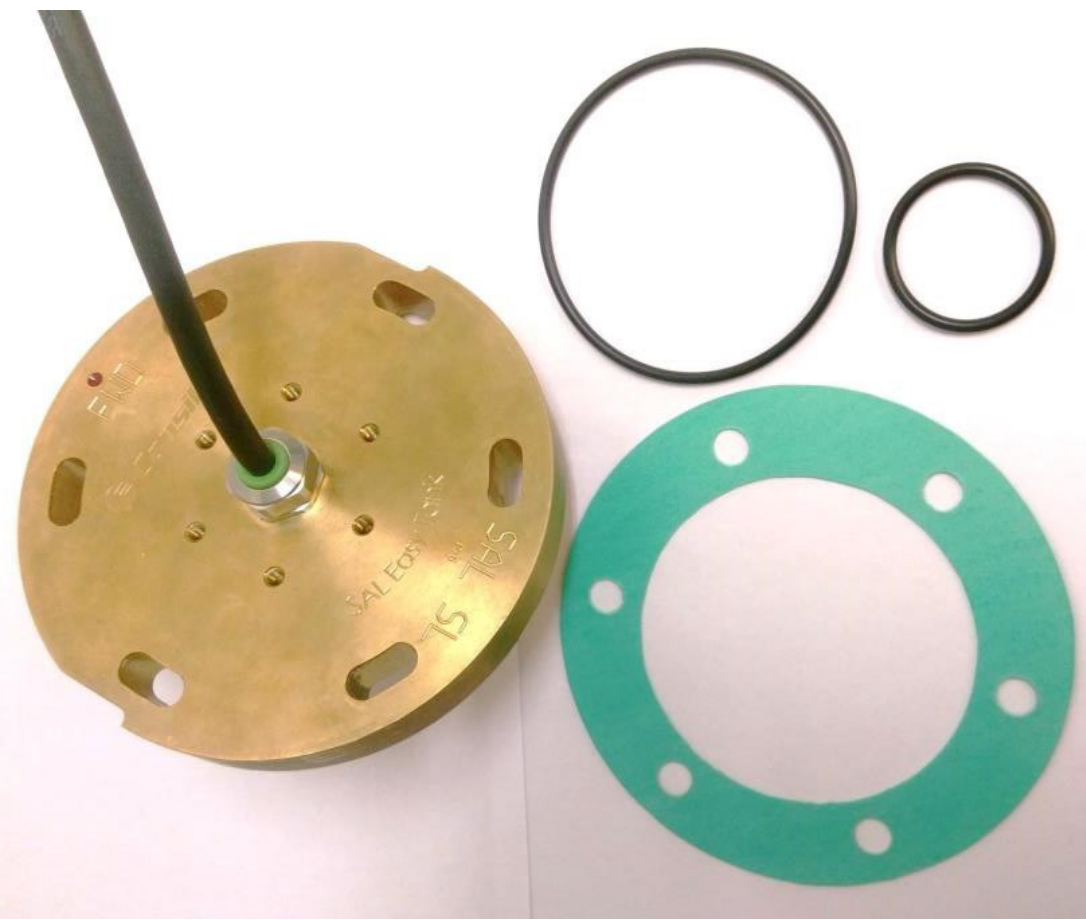
2.2.10 Part Numbers and Assembly Diagram with Alu Flange

Drawing No: 5414113A01

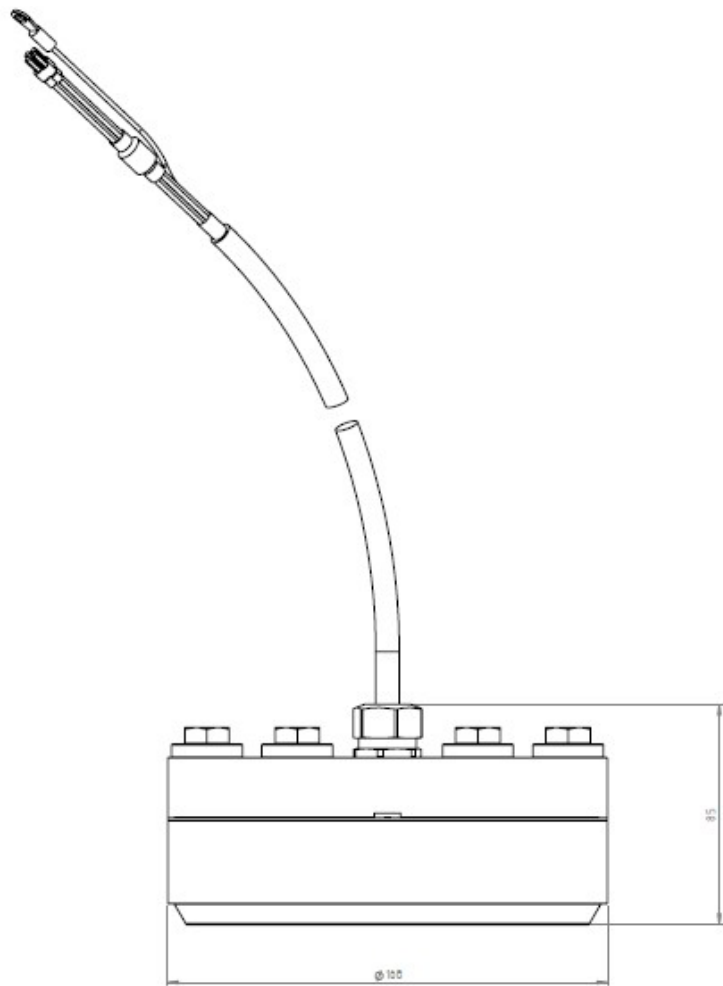


Pos.	Qty.	Part no.	Description
1	1	000-14053-001	R1 Easy Tank Flange Alu "kit"
7	6	- n/a	Easy Tank M8 Washer Included in 000-14053-001
6	6	- n/a	Aluminium Isolation Bushing Included in 000-14053-001
8	6	- n/a	Screw M6S M8x50 SS Included in 000-14053-001
5	1	000-14051-001	SAL R1 TRU Easy Tank 10m
2	1	- n/a	O-Ring 42x4 Included in 000-14051-001
3	1	- n/a	O-Ring 96x4 Included in 000-14051-001
4	1	- n/a	Easy Tank Klinger Gasket Included in 000-14051-001

Picture of **000-14051-001 SAL R1 TRU Easy Tank** with included O-Rings and Gasket:



2.2.11 Main dimensions



3 MAINTENANCE

3.1 Transducer replacement

Parts below are needed whenever a TRU is replaced and/or partly used when maintenance/service work is carried out.

1 pc	P/No: 000-14051-001	SAL R1 TRU Easy Tank 10m Including O-rings and Klinger Gasket
1 pc	TBD	Easy Tank Service kit, that consist of O-Rings, Gasket and 6 pcs M10 screws/Washers for the steel version of the flange; R1 Easy Tank Flange

Alternative for aluminium hull

1 pc	TBD	Easy Tank Service kit ALU that consist of O-Rings, Gasket and 6 pcs M8 screws, Washers, Isolation Bushing for the aluminium version of the flange; R1 Easy Tank Flange ALU 5083
------	-----	--

→ **Note:** The transducer has a lifting bolt attached, to make it easier for removal of the transducer.

3.2 General dry-docking and maintenance routines

At dry-docking it is recommended to inspect/clean the TRU surface.

Care and caution should be carefully considered in order to protect the TRU sensor surface during outside hull works, e.g. sand blasting, hull grinding, welding work, painting, etc., thus also any temporary protecting cover of the TRU should be properly removed/cleaned off before undocking as well as any marine growth should be carefully removed.

Use no sharp-edged metallic tools!

Wooden/Plastic or cloth/rag based tools are normally enough for marine growth removal.

Certain not too aggressive solvents may also be used with care.

Longer periods of slow steaming at low speed and/or extended periods of idling/berthing/anchoring (weeks/months), specifically in tropical waters, tend to result in rapid build-up of marine growth in the TRU vicinity as well as on the sensor surface, thus the TRU should be inspected / cleaning and/or diver assisted under hull cleaning.

Generally, also under normal sea-going operations, it is recommended to inspect the TRU as necessary each 3 to 6 months in order to prevent marine growth which may affect the speed log functionality and accuracy/reliability.

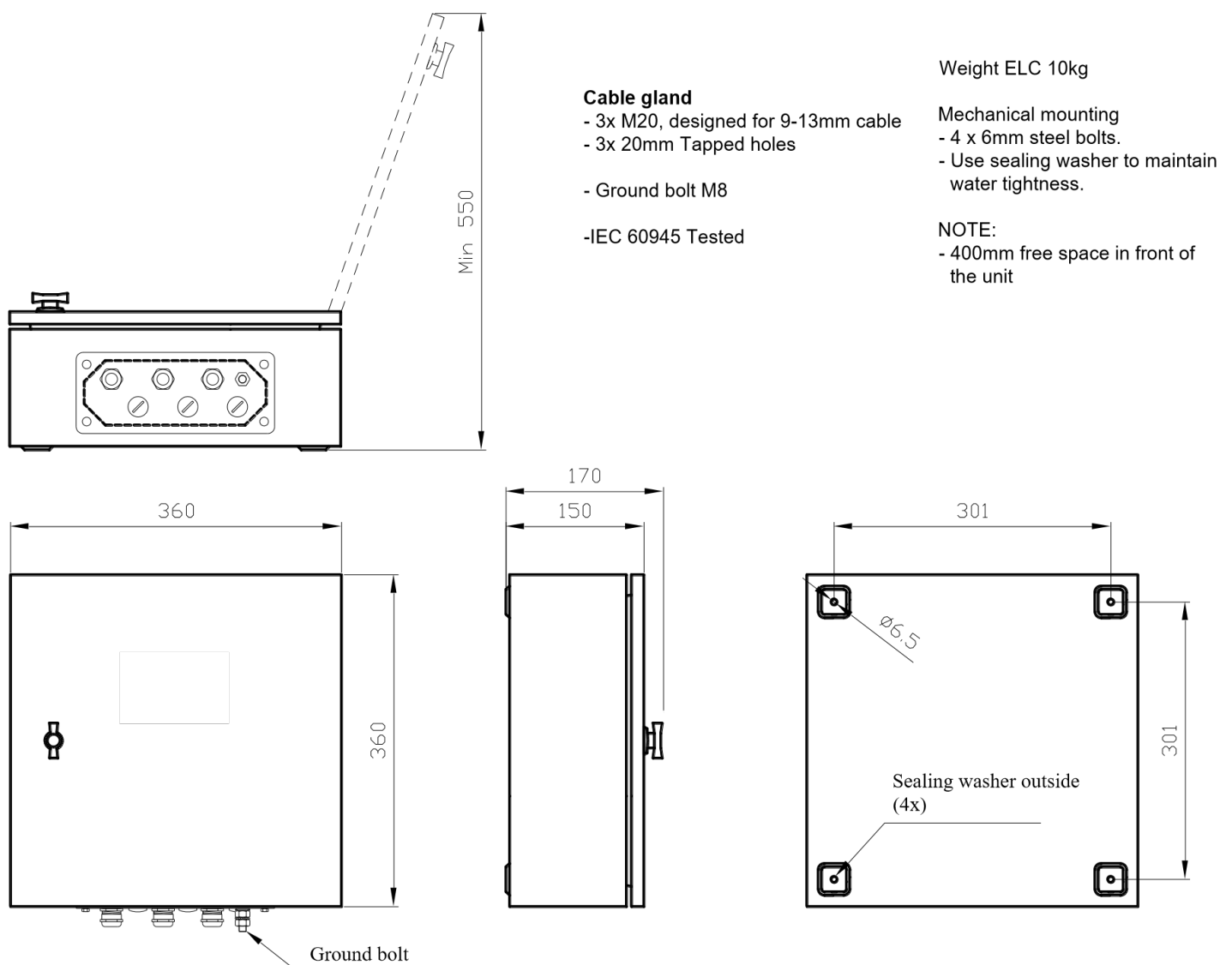
4 ELC, ELECTRONICS UNIT INSTALLATION

4.1 Mechanical installation

Selecting location:

- The ELC should be located within restricted access area to minimise the risk of tampering.
 - It must be possible to lay the 10 m cable from the TRU in such a way that it can be dismantled in case of a TRU replacement.
- **Note:** *The cable must not be cut or extended.*
- The location shall be easily accessible for installation and service. There must be minimum 350 mm free space in front of the unit for opening the door to access the electronics inside and there must be proper space for cables below the cabinet.
 - The location shall be protected from weather and should offer a stable temperature not outside the range 0°C - 40°C.
 - The location shall not expose the ELC for excessive vibration levels.
 - The location shall not be permanently exposed to water.
 - The location shall not be under open floor plates (gratings) or grating ladders.
 - The location shall be far from electrical installations giving excessive electric and/or magnetic fields, such as powerful electrical motors for ventilation, bow thrusters etc.
 - There must be a flat surface for mounting and to hold the four mounting screws/bolts.

The overall dimensions and mounting details for the ELC are given in the figure below. Dimensions:



4 pcs 6 mm steel screws shall be used for mounting. Use plastic sealing washers supplied to maintain water tightness.

4.2 Electrical installation

Consider the ship's specific wiring diagram, depending on which units are included in the order that may be delivered with this manual.

Wiring principles

- The ELC shall be firmly grounded to the ship's metal hull structure.
- All wires shall be electrically shielded and all signal wiring shall be twisted pairs. The mains supply will require a separate cable.
- For transmission of IEC 61162-1 Ed. 4/NMEA 0183 Ver. 4.00, analogue or pulse signals, a cross-section of 0.5 mm² or more is required
- **All connections to the ELC must be made with screened cables!**

At least five connections shall always be used:

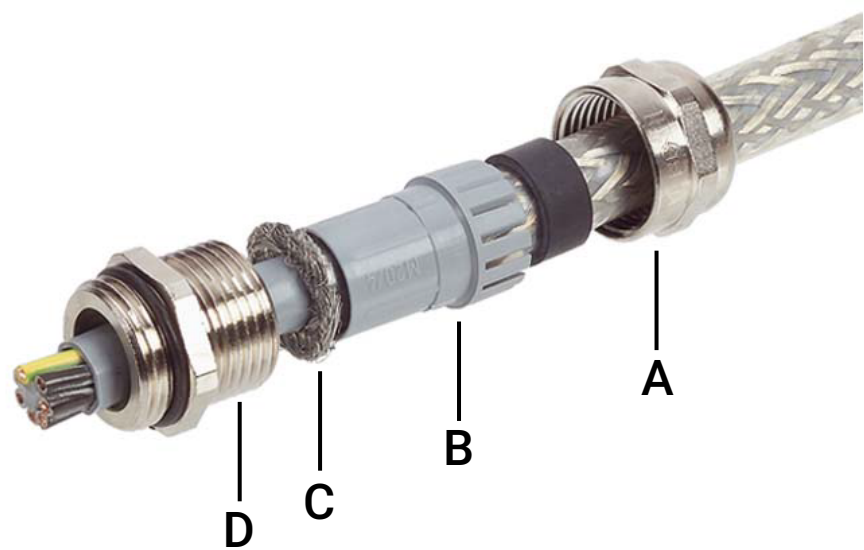
- A solid connection must be made between the ship's metal hull structure and the ground bolt at the bottom of the ELC cabinet. The cable area of this connection shall be at least 10 mm², preferably using copper braid.
- The AC power intake cable shall be brought to the 230 V AC terminals. Connect to L1, L2 and GND. If the ELC power supply is set for 115 V AC the same terminals may also be used for this voltage, see Mains Power options below.
- The TRU cable cores with terminal pins marked 1-2 and 4-5 must be connected to terminal 1-2, 4-5.
→ **Note:** Leave the terminal number 3 open/not connected on the ELC.
- Connect the ring cable shoe on the yellow-green ground core to the grounding bar at the bottom of the cabinet.
- Connect the TRU cable screen braid to the ELC cable gland as described below.
→ **Note:** Do not cut or alter the cable properties. If the cable is cut or violated the warranty will not be valid.
- The NMEA output cable and any other signal outputs should be brought through appropriate cable glands to other users. NMEA output is found on terminals 50 (A) and 51 (B). NMEA input is found on terminals 40 (A) and 41 (B). If an LPU2 (or other extension or distribution device) is used in the installation, the cable shields should be connected firmly there and not in the ELC. If cables are brought directly to users, displays, etc., grounding shall be done firmly in the ELC.
- All supplied cable glands are designed to terminate the cable screen braid directly to the ELC cabinet through the cable gland. This is a precaution to maintain proper EMC protection. If more cable glands than those supplied are needed, other EMC types maybe used.

Table 2 ELC connections

Terminal	Signal name	Function
1	TRU ch1	Transducer connection
2	TRU ch1	Transducer connection
3	TRU gnd	Not to be connected
4	TRU ch2	Transducer connection
5	TRU ch2	Transducer connection
7	0 V DC	Signal ground
8-9	200 p/NM relay1	Speed information (200 contact closures / NM)
10-11	200 p/NM relay2	Speed information (200 contact closures / NM)
18	Analog out	Speed information (0.1 V / knots)
19	0 V DC	Signal ground (for analog out)
24-25-26	LFA (NO-C-NC)	Log Fail Alarm
40	NMEA A in	NMEA in for Speed Log Master Display
41	NMEA B in	NMEA in for Speed Log Master Display
50	NMEA A out	NMEA out
51	NMEA B out	NMEA out
52	+ V DC for SD indicators	Power for SD4
53	0 V DC for SD indicators	Power for SD4

Terminal	Signal name	Function
54	+12 V DC in (optional supply)	Not to be connected
55	0 V DC in (optional supply)	Not to be connected
L1	230/115 V AC	Mains Power supply
L2	230/115 V AC	Mains Power supply
GND	PE	Protective Earth/Ground

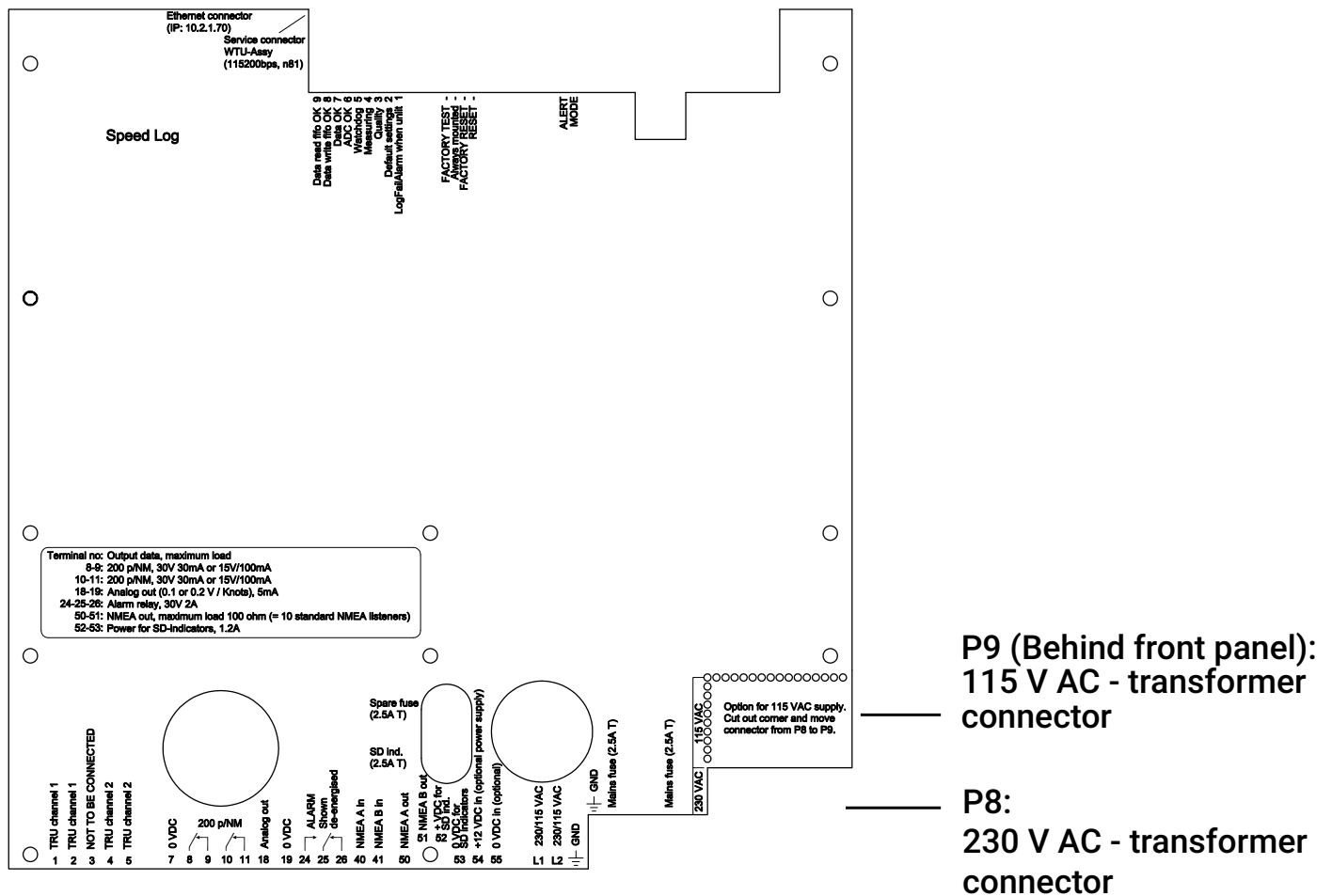
Correct mounting of EMC-type cable gland on TRU cable and on other cables:



- 1 Remove the protecting cover/strap on the cable, to expose and free the prepared screen braid for proper ground termination.
- 2 Push the parts **A** and **B** (with rubber packing) over the cable outer insulation sheath in the order shown.
- 3 "Push/Fold" down the screen braid **C** over the top of part **B**.
- 4 Push cable with **B** part firmly into the fixed part **D** of the cable gland ensuring that the screen braid makes contact inside **D**.
- 5 Firmly tighten cap nut **A**.

4.2.1 Mains Power options

At delivery the ELC is adapted to a nominal voltage of 230 V AC. It is however possible to change the nominal voltage to 115 V AC. When this is done precaution must be taken to prevent the ELC from being connected to 230 V AC, as this would damage the unit.



To change to a nominal voltage of 115 V AC, cut out the lower right corner of the front panel using a side cutter and move the transformer connector from position P8 to P9.

- ⚠ The optional 12 V DC input (terminal 54 / 55) can be used but with extra caution!
- ⚠ AC and DC input shall not be used / connected at the same time.
- ⚠ The optional 12 V DC input is NOT polarity protected! Wrong polarity will void the warranty!
- ⚠ The voltage to the optional 12 V DC shall be between 11.5 to 14.5 V DC.
- ⚠ An external fuse shall be used, approx. 3.15 A Slow Blow (start-up 2.8 A, running 1 A)
- ⚠ When the optional 12 V DC is in use, the SD power out (terminal 52/53) cannot be used (52/53 are de-energized)

5 SET-UP GUIDE

The Set-Up procedure includes all steps after the mechanical and electrical installations have been performed and up to the calibration of the speed log.

(For calibration details refer to Operator Manual)

The Set-Up Guide is limited to short instructions and it is therefore recommended to use it as a check list. For errors or disruptions during the Set-Up procedure, please refer to Trouble-Shooting Guide and/or re-check installation details.

5.1 Procedure

This paragraph provides information concerning the preparative checks and procedures to be done as a completion of the electrical installation before supplying the ELC unit with power:

→ **Note:** *Powering the Speed Log System is not included here.*

Each electrical installation needs to be completed by the procedure below. Therefore, it is recommended to double check the below points before connecting power to the unit:

- Clean out and remove any possible foreign particles and installation work residues from the cabinet(s).
- Carry out a visual inspection of the installed components and cables referring to the layout of the unit and to the interconnection drawings.
- Check that the connection terminals have a firm grip on the cable wires.
- Check that cable glands have a firm grip and tightened around the cables.
- Check that the Transducer/TRU cable screen braid is firmly grounded inside the cable gland of the Electronics unit/ELC.
- Check that the TRU cable is connected to intended terminals and that the yellow-green ground wire is connected to the ground bar.
- Any excess length of the TRU cable must be neatly coiled and strapped near the ELC. NEVER CUT THE CABLE or alter/ violate its properties!
- At the TRU site the cable shall have a sling/coil allowing retraction of TRU for service/maintenance.
- Check for proper cable bends to ensure they are not under stress.
- Check that ground connections to the ship's hull are duly tightened.
- Before power-up carefully verify the Mains power voltage and the integrity of the fuses.
- Also verify that the transducer is correctly installed fully down in working position/seated and longitudinally aligned. Refer to TRU mounting procedures.

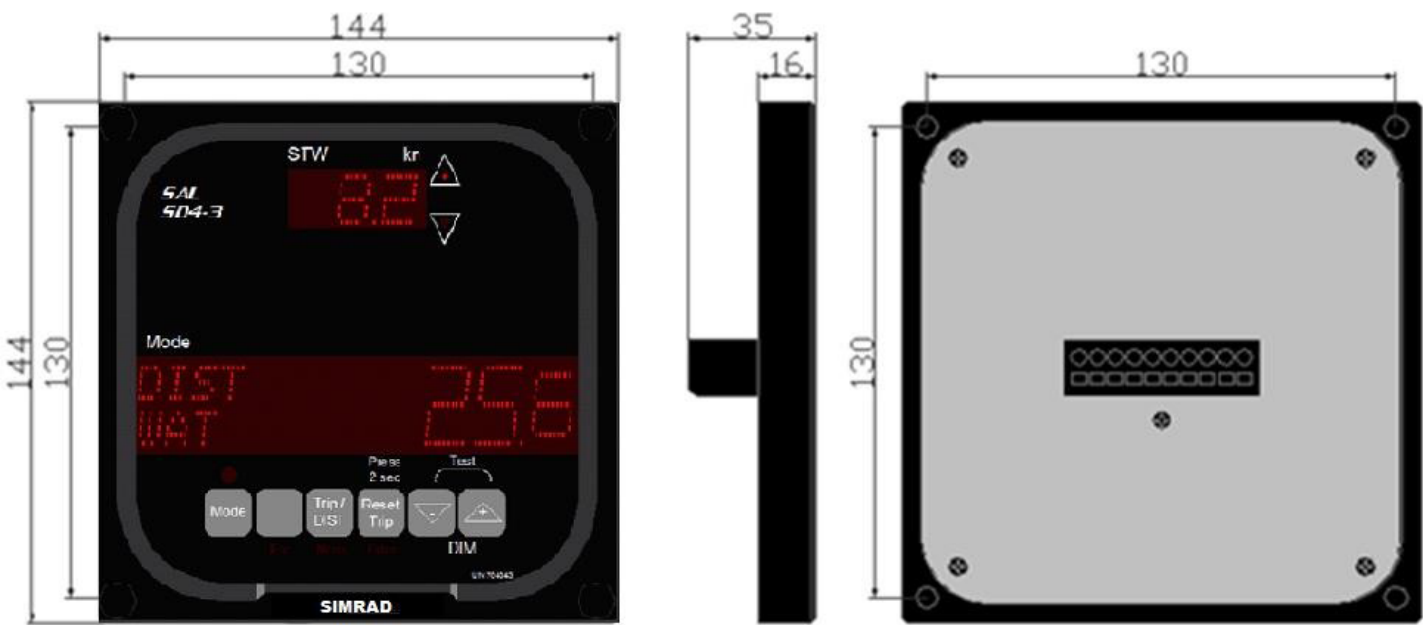
6 SD4-3 DISPLAY INSTALLATION

6.1 Mechanical installation

The display can be mounted on any flat panel or surface. The four mounting holes enable mounting of the display with four supplied M5 screws from the front using supplied M5 nuts on the backside or alternatively M5 threaded holes in the panel. A panel cut-out, shown below, must be made for the 10-pole cable connector.

The SD4 unit itself is watertight when mounted into and sealed with the supplied gasket, and the Teflon washers for the screw caps, against a flat panel/console with dry internal atmosphere.

Dimensions for the SD4-3 display:



6.2 Electrical installation

Consider the ship's specific wiring diagram, depending on which units are included in the complete scope of supply. The list of terminal Nos. and connections is labelled on backside of the unit. List of connections:

Terminal #	
1	NMEA A in
2	NMEA B in
3	NMEA A out
4	NMEA B out
5	Pulse output (Menu setting: LP6)
6	
7	Ext Dim -
8	Ext Dim +
9	0 V DC
10	10 - 32 V DC (12 or 24 V DC nominal)

A ground screw is located below the detachable connector on the backside of the SD4. Connect a grounding wire from this screw to ship's ground. Before powering the display:

- Carry out a visual inspection of the installed cables referring to the layouts of the unit and to the interconnection drawings.
- Check that cable terminations have a firm grip of the cable wires.

6.3 Speed Log Master Display

To remotely control the Menu system in speed logs and possible other equipment in the speed log system one SD4 display positioned on the bridge is used as a remote control. This SD4 display is named **Speed Log Master Display** and has to be marked in such a way that it is clearly distinguishable from all other displays connected to the log system.

The **Speed Log Master Display** can also be used to remotely control the dimming function in other SD4 displays connected to the system. In installations where more than one SD4 display are connected as **Speed Log Master Display**, those additional displays are primarily connected with remote control functionality to be able to control the dimming function in other SD4 displays but can also be used to control the Menu system in speed logs and other equipment.

Those additional remote displays do not have to be labeled but the remote-control function shall be clearly indicated in installation drawings and other documentation.

6.3.1 Positioning of the Speed Log Master Display

The **Speed Log Master Display** is preferably positioned on the bridge where it can be accessed without interfering with the normal operation of the ship, for example at the chart table.

6.3.2 Electrical connection

The **Speed Log Master Display** is connected with two-way communication to the Speed Log system. This means that it has to be connected with one pair of wires sending data to the display and one pair of wires sending data back to the ELC. Other displays without remote control functionality only have one pair of wires sending data to the display.

Speed Log Master Display:

4 wires for the serial communication

2 wires for DC power supply

Other slave displays:

2 wires for the serial communication

2 wires for DC power supply

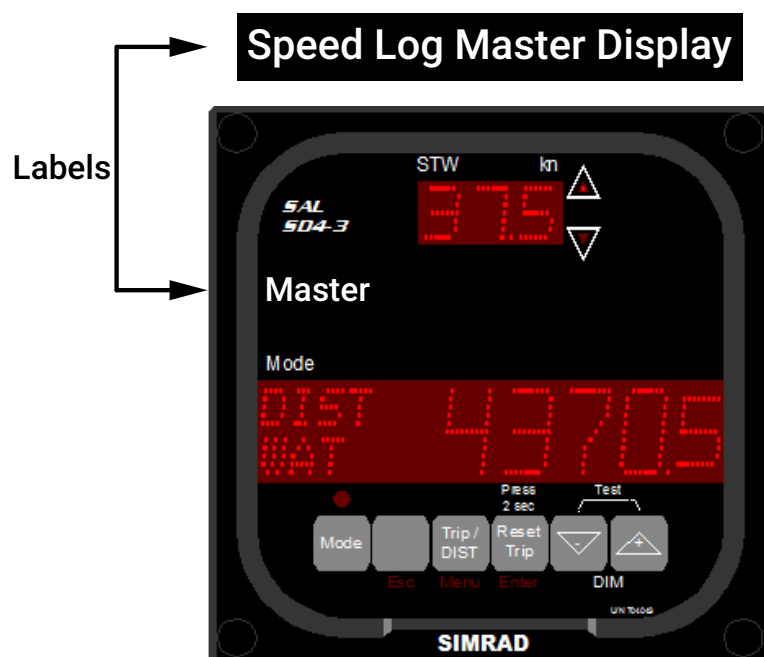
6.3.3 Positioning of the labels

In every shipment of a SAL speed log a set of two labels are included inside the Speed Log Main Unit – ELC. The installation company shall place these labels on and/or adjacent to the dedicated **Speed Log Master Display**.

One label, with the text “**Master**”, is intended for placing on the front foil surface of the display.

The other label, with the text “**Speed Log Master Display**”, is intended for placing on the bridge console surface adjacent to or on the frame of the display itself.

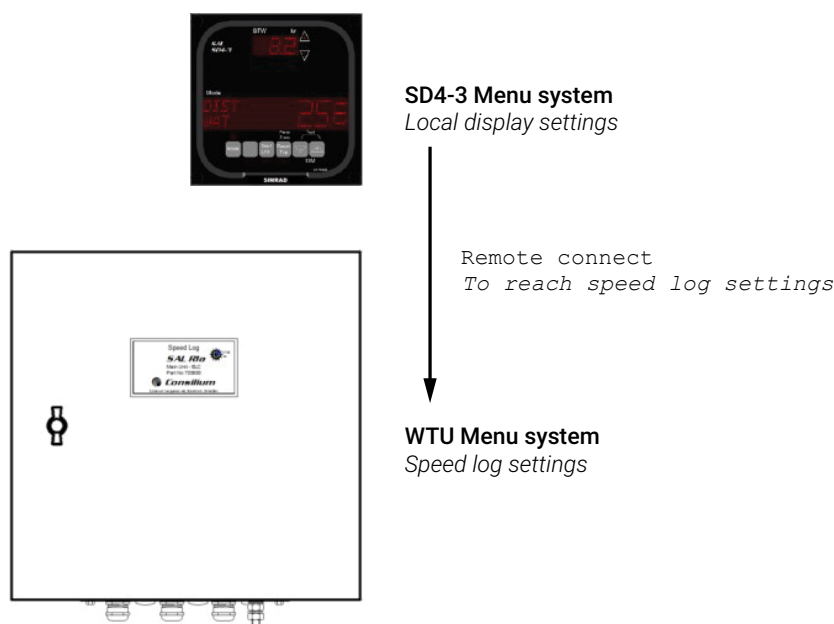
Figure 1: The picture below shows an SD4-3 with correctly positioned labels:



For set-up of desired local properties as well as intended functions, depending on actual optional equipment and/or accessories installed, the below table and “Menu mode” description provide adequate information.

7 MENU SYSTEM

The settings of the display (SD4-3 Menu) and the settings of the speed log (on the Water Track Unit inside the ELC) are physically separated. The speed log settings are reached by Remote Connect from the display menu.



7.1 SD4-3 Menu system

The Mode window of the SD4-3 Display can also be set to Menu mode. The Menu mode is used for internal settings of the display and when SD4-3 is used as a remote display for other units e.g. the WTU menu in the ELC or for remotely dimming of other SD-displays.

The Menu mode is reached by pressing the **Mode** button for minimum 5 seconds. The Mode window will switch to show the text "PRESS ENTER FOR MENU". Then press the **Enter** button (**Reset Trip**) within 5 seconds.

The Mode window will now show the current menu and the upper window will maintain the speed presentation sent out from the WTU.

Three buttons under the Mode window have now changed to alternative functions. These are lit in red text below relevant button. From left to right the buttons now have the following functions:

Mode: Will inform which remote device that is connected.

Esc: "Blank". When in "Remote Device menu" Esc is used to leave the "Remote Device menu" (i.e. the WTU menu). When not in "Remote Device menu" Esc has the same function as Menu and Enter pressed simultaneously (see Menu-button below).

Menu: "Trip/DIST". Is used alone, or together with Arrow down (-), or together with Enter, to move/navigate in the menus as described below.
Menu alone, will display next menu, i.e. step forward on same menu level. Menu and Arrow down (-) pressed simultaneously will display previous menu, i.e. step backwards on same menu level.
Menu and Enter pressed simultaneously will move up one menu level, except when leaving the "Remote Device menu". For this instead use Esc.

Enter: "Reset Trip" is used to save changed values/settings or to move to submenus.



"Arrow down" and "Arrow up" are used to change status, e.g. Write Access OFF/ON, and /or to change set values.

→ **Note:** When being in the Menu System and no button is pressed for 3 minutes, the Mode window will return to previous information displayed before the Menu System was entered.

7.1.1 SD4-3 in Menu Mode

The Menu mode has three “Local Menus” and one “Remote Device menu” on the first set-up level:

- SD4-3 LOCAL. This is the start menu when entering the Menu mode. If one or more other displays are remotely dimmed from the display, this menu shows a second text line and can easily be used to turn the remote dimming function ON/OFF.
- LP0 PROPERTIES. Local display settings. NB! Do not change to Write Access ON without special training.
- LS0 REMOTE SETUP. This menu contains sub-menus for setting-up e.g.
- DIMMING. NB! Do not change to Write Access ON without special training.
- R0 REMOTE DEV. This menu provides access to a Remote Device, e.g. WTU Menu system. NB! Verify the setting in menu LS7, normally ON is default.

7.1.2 Write and read only access

Default for sub-menus when entering the menu system is read only access, i.e. the Mode window shows WRITE ACCESS OFF. When changing to Write Access ON (“+” and confirmed by Enter) then sub-menus are accessible for changes. Be careful to change intended parameters only. When leaving sub-menus the write access is automatically set to OFF.

7.1.3 Menu functions

The complete list for fast indexing of the Menu System, available for the daily user, is included below under headline “Menu function summary”. A Menu Structure chart for the SD4-3/WTU is found under Section E Appendix.

7.1.4 Standby STW

This function can be used to temporarily deactivate the STW speed log. When using the standby function the SD4 has to be connected with two-way NMEA communication to the Speed Log system such as the **Speed Log Master Display**.

Set the local menu LP2.23, STANDBY STW, to ON.

⚠ WARNING: The standby mode is not valid / intended for normal operation. The standby mode must only be used for special purposes and under special circumstances to avoid or limit interfering and repeated alarm conditions from user systems disturbing bridge personnel.

Procedure for the user:

Press **Mode** to toggle the Mode window to show:

STW ACTIVE
[- +] FOR STANDBY

Press and release both DIM buttons, (- and +) simultaneously to deactivate the STW Speed Log.

When deactivated the **Mode** window will show:

STW DEACTIVATED
ANY KEY TO START

To start/activate the STW Speed Log, press **any** key.

If the SD4 Mode window shows:

STW UNIT STANDBY
NOT POSSIBLE

the SD4 did not establish contact with the STW Speed Log. Check the two-way connection.

7.1.5 SD4-3 Menu function summary

Menu no.		Menu name	Default setting		Function
			SD4-3	SD4-4	
BASIC MENU		SD4- LOCAL			
LP0		PROPERTIES			Select properties menu
	LP1	SD4 TYPE SD4- [X]	3	4	X = defines type of display, e.g. SD4-1.. SD4-4 (factory setting)
	LP2	MODE WINDOW			Lists user selected information to be shown in the MODE window ON = shown OFF = not shown
	LP2.01	DIST WATER	ON	OFF	Total distance counter of STW (resulting)
	LP2.04	TRIP WATER	ON	OFF	Trip distance counter of STW (resulting)
	LP2.09	DIST+TRP WAT	OFF	OFF	DIST WAT and TRIP WAT are displayed simultaneously
	LP2.15	SPEED STW-L	OFF	ON	STW longitudinal
	LP2.21	DIAGNOSTICS	ON	OFF	Display diagnostic codes (PSALW..)
	LP2.23	STANDBY STW	OFF	OFF	Deactivates valid STW NMEA to invalid STW NMEA
	LP3	STARTUP DIM [50%]	50%	50%	Default brightness after a reset.
	LP4	NEG SPD USE [OFF]	OFF	OFF	Longitudinal distance counters and pulse output off at negative/astern speed.
	LP5	LP5 EXT INPUT [DIM]	DIM	DIM	Sets functions of external inputs: DIM or SDR2
	LP6	LP6 EXT OUTPUT [200 P/NM STW-L]	STW-L	STW-L	200 P/NM STW-L 200 P/NM SOG-L Enables function of external output.
	LP7	NMEA GATE THROUGH [OFF]	OFF	OFF	CAUTION! Always OFF when connected back to the Speed Log system. (Only used if more displays are connected in series)
	LP8	NMEABAUDRATE [4800]	4800	4800	4800/(38400 not to be used!) CAUTION: Do not change!
	LP9	SW REVISION 704021xx			xx = current Software revision.
	LPB	SPEED VALUES 2 DECIMALS [OFF]	OFF	OFF	Displays speed values with two decimals, when enough space
	LPD	RESET TOTAL			
	LPD.01	RESET TOT CONFIRM [NO]	NO	NO	YES = resets internal total distance counter(s) of the SD4 to zero.
	LPE	SET DEFAULT MENU PARAMETERS			
	LPE.01	RESET MEN CONFIRM [NO]	NO	NO	YES = resets all menu parameters in the SD4 to default values. (Depending on type of SD4)
LS0		REMOTE SETUP			Select Remote setup menu
	LS1	SD4 ID [4]	4	4	ID number between 0-26. Other SD4 displays that have entered this ID in menu LS3 can remotely DIM this display.
	LS2	DIM OFFSET [0 %]	0	0	Offset from remote DIM command

Menu no.		Menu name	Default setting		Function
	LS3	REMOTE DIM ID			SD4 displays that have corresponding ID numbers will be remotely dimmed from this SD4. Maximum 4 IDs can be entered.
	LS3.01	REMOTE DIM ID []			The first SD4 ID to be entered.
	LS3.02	REMOTE DIM ID []			The second SD4 ID to be entered.
	LS3.03	REMOTE DIM ID []			The third SD4 ID to be entered.
	LS3.04	REMOTE DIM ID []			The fourth SD4 ID to be entered.
	LS4	HEARTBEAT TIMEOUT [30]S	30	30	Time between heartbeats are sent to the remote device.
	LS5	MENU ACKN. TIMEOUT [X]S	2	3	Maximum time for acknowledge signal from the remote device.
	LS6	SD2 REMOTE DIM [OFF]	OFF	OFF	On = makes it possible to remotely DIM old SD1/SD2 displays.
	LS7	R0 REMOTE ENABLED [ON]	ON	ON	Enables menu R0 to allow remote connection to other device(s). OFF = disables menu R0.
R0		REMOTE DEV CONNECT			Access to menu system in remote device(s). (LS7 defines if this menu shall be enabled)
	R1	DEVICE 1 OF X <NAME> (<ID>)			X: number of available remote device(s). NAME: name of the remote device. ID: remote device identity.
	R2	DEVICE 2 OF X <NAME> (<ID>)			X: number of available remote device(s). NAME: name of the remote device. ID: remote device identity.
	R3	..., etc.			There will be as many R menus as there are remote devices connected and identified.

7.2 WTU Menu system

7.2.1 Remote Connect: Accessing the WTU Menu system

The ELC has an internal menu system (WTU Menu) that can be accessed from the SD4-3 Speed log Master Display. Below follows an example of a menu walk in the R0 REMOTE DEV menu:

```
R0 REMOTE DEV
CONNECT
```

Press **Enter** to search for remote devices

```
SYNCHRONISING
(counting down from 3)
```

Wait 3 seconds while all available devices are found. Press Menu to see next available remote device in list if more than one device is found.

```
R2 DEVICE 1 OF 2
WTU 1          (R1)
```

Or press **Enter** to enter menu system of displayed device

```
R 10.42 C 10.67
C765 J1 Q558 S4
```

The root menu in will now be displayed in the SD4-3 Mode window.

To go deeper into the menu system, press Menu.

To exit back to local mode in the SD4-3, press Esc. The Esc button will always step out of the remotely controlled menu system.

7.2.2 Root menu

This is the “default” menu, which is shown when entering the menu system. If left in any other menu, the system will return to this menu after 5 minutes of idling.

R nn.nn:	Last measured Raw Speed nn.nn knots. + = ahead, – = astern C
nn.nn:	Filtered raw speed nn.nn knots. + = ahead, – = astern
Cnnn:	Correlation value nnn from last raw speed measurement, (0 ≤ nnn ≤ 999)
Mnn:	Used mode, Mode nn without cycle jitter (1 ≤ nn ≤ 13)
Jnn:	Used mode, Mode nn with cycle jitter (1 ≤ nn ≤ 13)
Qnnn:	Quality value nnn from last raw speed measurement, (0 ≤ nnn ≤ 999)
Dnnn:	Measuring Depth nnn (in mm) used in last raw speed measurement, (0 ≤ nnn ≤ 999)
Sn:	Confidence estimation of last measured speed, (1 – 4, 1 => unsure, 4 => very sure)

→ **Note:** that quality value and measuring depth uses the same position in the root menu window, but are alternating when presented on the screen readout.

7.2.3 WTU Menu system

The list is included for fast indexing. Menus in **bold font** are main menus.

Menus with access level "Expert" are not visible in "All Users" mode. "Expert" menus are only for development purpose. Only instructed personnel are intended to use these menus.

No.	Access Level	Name	Default	Function
R0		Root menu		Timeout to root menu after 30 seconds. Presentation according to 7.2.2 Root menu
A0	All Users	DIAGNOSTICS		Select menu to view log statistics since system start up
A1	All Users	TOTAL UPTIME		Show the WTU - Assy. system total uptime
A2	All Users	DIAG HISTORY		Press enter to access the history
	A2.1			- or + keys scroll history list
A3	All Users	ERASE HISTORY	DISABLED	Erase history list
C0	All Users	CALIBRATION		Select calibration menus
C1	All Users	DRAUGHT COND	FULL LOAD	Select one of three predefined draught condition
	C1.1			Set calibration factor for selected draught condition
C3	All Users	MULTI-P CAL.	ENABLED	Select Multiple Point Calibration edit/delete
	C3.1		ENABLED	Select first Multiple Point pair to edit/delete
	C3.11			Set speed at first point
	C3.111			Set calibration value for first speed
	C3.n		ENABLED	Select nth Multiple Point pair to edit/delete
	C3.n1			Set speed at nth point
	C3.n11			Set calibration value for nth speed
C4	All Users	TRU CALIBRAT	TC+000	Set engraved transducer calibration factor
C5	Expert	CALIBR RESET	DISABLED	Reset calibration values
D0	Expert	DEBUG		Select Debug menus
D1	Expert	DATA LOGGING	DISABLED	Put \$PSALD in NMEA output stream
D2	Expert	SAMPLE TO ETH	239.168.1.70	Stream binary signal data as UDP through the Ethernet connector
M0	All Users	MISCELLANEOUS		Select miscellaneous menus
M1	Expert	SET DEFAULT		Restore default values for all non-volatile settings except calibration factors
M2	All Users	RESET CPU	DISABLED	Reset CPU by disabling watchdog
M4	All Users	TOT. DISTANCE	DISABLED	Show and adjust the total distance counter
M5	All Users	TRIP DISTANCE		Reset trip counter
M6	All Users	SW revision		Display the application software revision 5400130 xxx
M7	Expert	APP revision		Display the application revision 6400331 xxx
M8	Expert	FW revision		Display the firmware revision 6400341 xxx
M9	Expert	HW revision		Display the HW revision 5490240 REV x

No.			Access Level	Name	Default	Function
M10			All Users	Access level		All Users: Only menus with access level "All Users" are visible Authorised Expert: All menus are visible
P0			Expert	PARAMETERS		Set Parameters menus
P1			Expert	Measure type	Auto	Set working mode of the log.
P2			Expert	Particle mode	Enabled	Enable/disable PARTICLE as one of the toggling modes during TEST mode
P3			Expert	Particle mode Depth	130	Desired measuring depth in PARTICLE mode.
P4			Expert	Particle mode Max Rx offset	2	Maximum number of simultaneously active transmissions in PARTICLE mode
P5			Expert	Particle mode Tx Length	28	Desired transmission length in PARTICLE mode
P6			Expert	Speckle mode	Enabled	Enable/disable SPECKLE as one of the toggling modes during TEST
P7			Expert	Speckle mode Depth	500	Desired measuring depth in SPECKLE mode.
P8			Expert	Speckle mode Max Rx	3	Maximum number of simultaneously active transmissions in SPECKLE mode
P9			Expert	Pulse mode	Enabled	Enable/disable PULSE as one of the toggling modes during TEST
P10			Expert	Pulse mode Max depth	130	Desired measuring depth in PULSE mode.
P11			Expert	Pulse mode Max Rx offset	0	Maximum number of simultaneously active transmissions in PULSE mode
P12			Expert	Dirty mode	Enabled	Enable/disable DIRTY as one of the toggling modes during TEST
P13			Expert	Dirty mode Depth	Enabled	Desired measuring depth in DIRTY mode.
P14			Expert	Dirty mode Max Rx offset	0	Maximum number of simultaneously active transmissions in DIRTY mode
P15			Expert	Forced cycle length	0	Force a constant cycle length independent of measuring mode
P16			Expert	Median filter length	5	Length of median filter applied to raw speed
P17			Expert	Adapt gain factor	1,25	Maximum allowed gain in adaptive gain filter following median filter
P18			Expert	Correlation threshold	100	Raw speed invalid if correlation < threshold
P19			Expert	Zero speed qual.thres	100	Raw speed invalid if quality < threshold
P20			Expert	Zero sp. ACF threshold	250	Zero speed qualifier threshold for ACF
P21			Expert	Manual h-spdthresh. disabled	Disabled	Enable manual adjustment of threshold for decision of mode transfer to high speed mode
	P21.1		Expert		Auto calc.	Set threshold for high speed mode transfer
P22			Expert	Layer jitter	40	Set jitter jump length in us
S0			All Users	SETTINGS		Select Settings menus

No.		Access Level	Name	Default	Function
S1		All Users	Average Low	10	Set averaging time constant in seconds for low speed range
S2		All Users	Threshold Low-Hi	3.0	Speed limit between low and high averaging time constant.
S3		All Users	Average High	10	Set averaging time constant in seconds for high speed range
S6		All Users	Lock Timeout	20	Timeout before speed is set invalid after speed loss [sec]
S7		Expert	NMEA Interval	1.0	NMEA message interval [sec]
S9		All Users	VBW Telegram	Extended	Control \$VDVBW telegram format
S10		All Users	VHW Telegram	Disabled	Add telegram \$VDVHW to NMEA stream
S11		Expert	LogFail-Alrm	PowerFail	Set Log Fail Alarm relay to power fail or invalid speed
S12		All Users	Analog Speed	Ahead + Astern	
T0		All Users	TEST		Selects Test menus
T1		All Users	Simulation	Disabled	Enable simulated speed as \$VDVBW in NMEA output stream
	T1.1	All Users	Simulation	8.00	Adjust simulated speed if desired
T2		All Users	Noise test	Disabled	Enable forced execution of noise level test
	T2.1	All Users	Noise level		View result of forced noise level test
T3		All Users	TRU S balance	Disabled	Enable forced execution of transducer signal balance test
	T3.1	All Users	Sig Balance		View result of forced signal balance test
T4		All Users	Loop test	Disabled	Enable forced execution of loop test
	T4.1	All Users	Loop test		View result of forced loop test
T5		All Users	Force test	Disabled	Enable forced execution of all self-diagnosis tests
	T5.1	All Users	Code		View diagnostic codes resulting from the forced self-diagnosis
T6		All Users	LogFail Alarm	Disabled	Enable forced switching of LFA relay
	T6.1	All Users	LFA Relay		Activate relay switching
V0		All Users	VIEW		Select menu to view log statistics since last power up
V1		All Users	System Uptime		Read uptime since last power on
V2		All Users	Noise levels		Read highest noise levels, last sequence
V3		All Users	TRU S balance		Read most unbalanced signal last sequence
V4		All Users	Loop test		Read average loop test result last sequence

