JLN-900

SPEED LOG

INSTALLATION AND INSTRUCTION MANUAL

JRC Japan Radio Co., Ltd.

● Safety Cautions ●

Cautions for High Voltage

High voltages, ranging from several hundreds to tens of thousands of volts, are used in electronic apparatus, such as radio and radar instruments. These voltages are totally harmless in most operations. However, touching a component inside the unit is very dangerous. (Any person other than authorized service engineers should not maintain, inspect, or adjust the unit.)
High voltages on the order of tens of thousand volts are most likely to cause instant deaths from electrical shocks. At times, even voltages on the order of several hundred volts could lead to electrocution. To defend against electrical shock hazards, don't put your hand into the inside of apparatus. When you put in a hand unavoidably in case of urgent, it is strongly suggested to turn off the power switch and allow the capacitors, etc. to discharge with a wire having its one end positively grounded to remove residual charges. Before you put your hand into the inside of apparatus, make sure that internal parts are no longer charged. Extra protection is ensured by wearing dry cotton gloves at this time. Another important precaution to observe is to keep one hand in your pocket at a time, instead of using both hands at the same time.
It is also important to select a secure footing to work on, as the secondary effects of electrical shock hazards can be more serious. In the event of electrical shocks, disinfect the burnt site completely and obtain medical care immediately.

Precautions for Rescue of Victim of Electric Shock

When a victim of electric shock is found, turn off the power source and ground the circuit immediately. If this is impossible, move the victim away from the unit as quick as possible without touching him or her with bare hands. He or she can safely be moved if an insulating material such as dry wood plate or cloth is used.
Breathing may stop if current flows through the respiration center of brain due to electric shock. If the electric shock is not large, breathing can be restored by artificial respiration. A victim of electric shock looks pale and his or her pulse may become very

Method of First-Aid Treatment

☆Precautions for First-Aid Treatments

Apply artificial respiration to the person who collapsed, minimizing moving as much as possible avoiding risks. Once started, artificial respiration should be continued rhythmically.

(1) Refrain from touching the patient carelessly as a result of the accident; the first-aider could suffer from electrical shocks by himself or herself.

(2) Turn off the power calmly and certainly, and move the patient apart from the cable gently.

(3) Call or send for a physician or ambulance immediately, or ask someone to call doctor.

(4) Lay the patient on the back, loosening the necktie, clothes, belts and so on.

(5) (a) Feel the patient's pulse.
(b) Check the heartbeat by bringing your ear close to the patient's heart.
(c) Check for respiration by bringing your face or the back of your hand to the patient's face.
(d) Check the size of patient's pupils.

(6) Opening the patient's mouth, remove artificial teeth, cigarettes, chewing gum, etc. if any. With the patient's mouth open, stretch the tongue and insert a towel or the like into the mouth to prevent the tongue from being withdrawn into the throat. (If the patient clenches the teeth so tight that the mouth won't open, use a screwdriver or the like to force the mouth open and then insert a towel or the like into the mouth.)

(7) Wipe off the mouth to prevent foaming mucus and saliva from accumulating.

☆Treatment to Give When the Patient Has a Pulse Beating but Has Ceased to Breathe

∗ Performing mouth-to-mouth artificial respiration

(1) Bend the patient's face backward until it is directed to look back. (A pillow may be placed under the neck.)

(2) Pull up the lower jaw to open up the airway. (To spread the airway)

(3) Pinching the patient's nose, breathe deeply and blow your breath into the patient's mouth strongly, with care to close it completely. Then, move your mouth away and take a deep breath, and blow into his or her mouth. Repeat blowing at 10 to 15 times a minute (always with the patient's nostrils closed).

(4) Continue artificial respiration until natural respiration is restored.

(5) If the patient's mouth won't open easily, insert a pipe, such as one made of rubber or vinyl, into either nostril. Then, take a deep breath and blow into the nostril through the pipe, with the other nostril and the mouth completely closed.

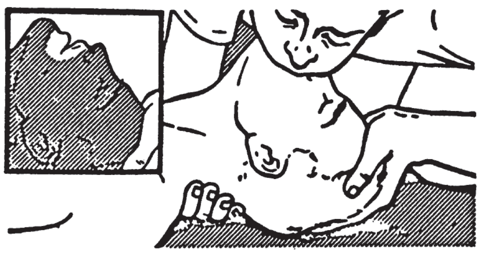
(6) The patient may stand up abruptly upon recovering consciousness. Keep the patient lying calmly, giving him or her coffee, tea or any other hot drink (but not alcoholic drink) to keep him or her warm.

Mouth-to-mouth artificial respiration with the patient's head lifted

[1]

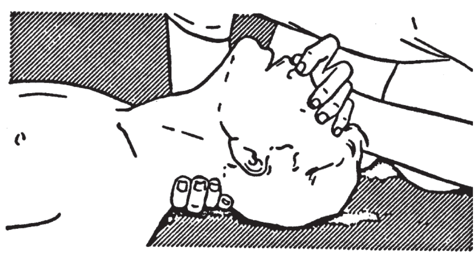
(1) Lift the back part of the patient's head. Support the forehead with one of your hand and the neck with the other hand.→ [1].
Many patients will have their airways opened by lifting their head in this way to ease mouth-to-mouth artificial respiration.

[2]



(2) Closing the patient's mouth with your mouth, press your cheek against the patient's nose→ [2].
Alternatively, hold the patient's nose with your finger to prevent air leak
→ [3].

[3]



(3) Blowing air into the patient's lungs.
Blow air into the patient's lungs until chest is seen to rise. The first 10 breaths must be blown as fast as possible.

Fig. 1 Mouth-to-mouth artificial respiration

Flow of Cardiopulmonary Resuscitation (CPR)

A person is collapsing.
- Secure the safety of the surrounding area.
- Prevent secondary disasters.

Check for response.
- Call while tapping the shoulder.

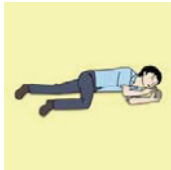
Responding → Listen to the appeal of the injured or ill person and give the necessary first-aid treatment.

Not responding or can not judge

Ask for help.
- Make an emergency call.
- Ask to bring an AED.

Check for breathing and judge for cardiopulmonary arrest.
- Check for breathing.

Breathing → Recovery position
- Lay the injured or ill person on his/her side and wait for the arrival of the emergency services.



Not breathing or can not judge

Artificial respiration   Twic Optional   Note (1)

Note (1) Omission of artificial respiration
If you are worried about infection due to damage in the oral cavity or if you are hesitant to use mouth-to-mouth artificial respiration,
If it takes time to prepare the mouthpiece for artificial respiration, skip the artificial respiration and proceed to the next.

Cardiopulmonary resuscitation
Chest compressions   30 times
Artificial respiration Twice Optional Note (1)

Chest compressions
- With each compression, Depress the chest wall to a depth of approximately 5 cm
- Perform uninterrupted chest compressions at the rate of about 100 to 120 times per minute.

Combination of chest compressions and rescue breaths; omittable Note(1)
- Untrained first-aiders only performs chest compressions.

Arrival of an AED
- Turn on the power.
- Use the AED by following its voice prompts. Fitting of the electrode pads, etc.

Automatic electrocardiogram analysis
- Do not touch the injured or ill person.

Electric shock is needed.

Delivery of electric shock

Electric shock is not needed.

The AED automatically analyzes the heart rhythm every 2 min.

Resume CPR from chest compressions by following the voice prompts of the AED.

When to stop CPR → When the injured or ill person has been handed over to the emergency services or has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

Specific Procedures for Cardiopulmonary Resuscitation (CPR)

1. Check the scene for safety to prevent secondary disasters

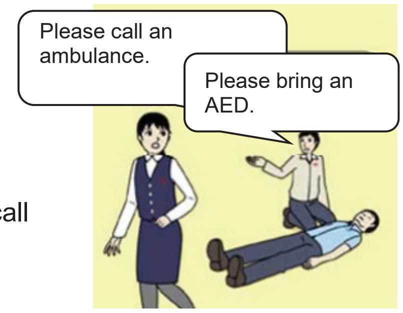
a) Do not touch the injured or ill person in panic when an accident has occurred. (Doing so may cause electric shock to the first-aiders.)

b) Do not panic and be sure to turn off the power. Then, gently move the injured or ill person to a safe place away from the electrical circuit.

2. Check for responsiveness

a) Tap the shoulder of the injured or ill and shout in the ear saying, "Are you OK?"

b) If the person opens his/her eyes or there is some response or gesture, determine it as "responding." But, if there is no response or gesture, determine it as "not responding."



3. If responding

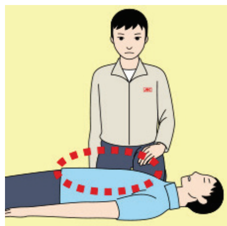
a) Give first-aid treatment.

4. If not responding

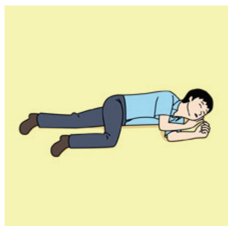
a) Ask for help loudly. Ask somebody to make an emergency call and bring an AED.

- Somebody has collapsed. Please help.
- Please call an ambulance.
- Please bring an **AED**.
- If there is nobody to help, call an ambulance yourself.

5. Check for breathing



a) Look to see if the chest and abdomen are rising and falling.



b) If the injured or ill person is breathing, place him/her in the recovery position and wait for the arrival of the emergency services.

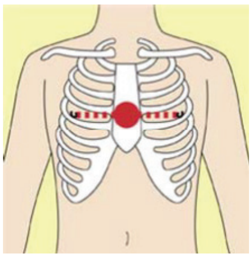
- Position the injured or ill person on his/her side.

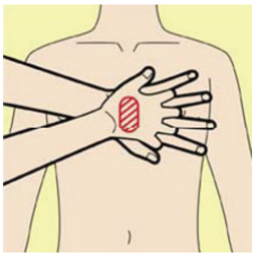
6. Cardiopulmonary resuscitation (CPR) (combination of chest compressions and rescue breaths)

a) Chest compressions

1) Position of chest compressions

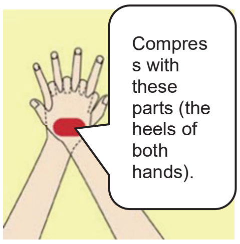
- Position the heel of one hand in the center of the chest, approximately between the nipples, and place your other hand on top of the one that is in position.

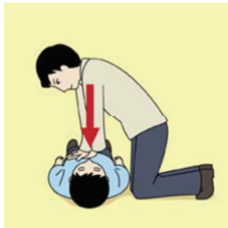




2) Perform chest compressions

- Perform uninterrupted chest compressions of 30 at the rate of about 100 to 120 times per minute.
  While locking your elbows positioning yourself vertically above your hands.
- With each compression, depress the chest wall to a depth of approximately 5 cm.





b) Combination of 30 chest compressions and 2 rescue breaths

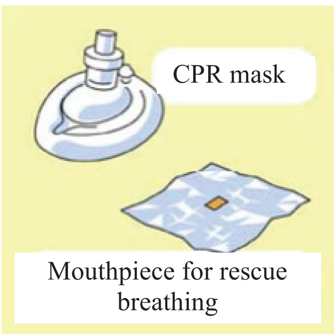
1) Untrained first-aiders only performs chest compressions.

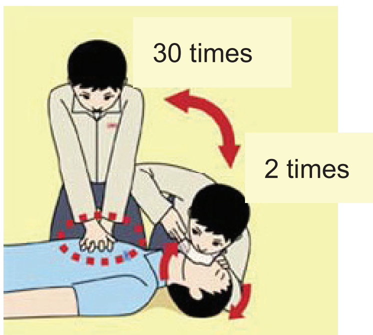
2) If trained first-aiders has the technique and a will to perform rescue breaths, give 2 rescue breaths after performing 30 chest compressions.

3) If there is a fear of infection, use a mouthpiece for rescue breathing and other protective devices to prevent infections.

4) Continuously perform the combination of 30 chest compressions and 2 rescue breaths without interruption.

5) If there are two or more first-aiders, alternate with each other approximately every two minutes (five cycles of compressions) without interruption.

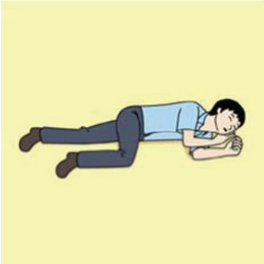




7. When to stop cardiopulmonary resuscitation (CPR)

a) When the injured or ill person has been handed over to the emergency services

b) When the injured or ill person has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

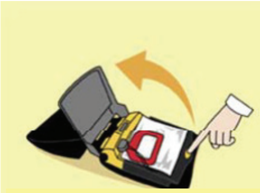


8. Arrival and preparation of an AED

a) Place the AED at an easy-to-use position. If there are multiple first-aiders, continue CPR until the AED becomes ready.

b) Turn on the power to the AED unit. Depending on the model of the AED, you may have to push the power on button, or the AED automatically turns on when you open the cover.

c) Follow the voice prompts of the AED.

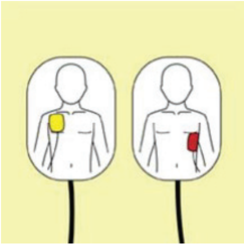


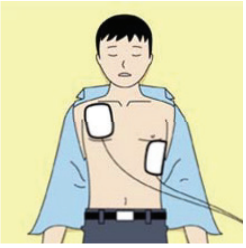
Turn on the power.

9. Attach the electrode pads to the injured or ill person's bare chest

a) Remove all clothing from the chest, abdomen, and arms.

b) Open the package of electrode pads, peel the pads off and securely place them on the chest of the injured or ill person, with the adhesive side facing the chest. If the pads are not securely attached to the chest, the AED may not function. Paste the pads exactly at the positions indicated on the pads, If the chest is wet with water, wipe dry with a dry towel and the like, and then paste the pads. If there is a pacemaker or implantable cardioverter defibrillator (ICD), paste the pads at least 3cm away from them. If a medical patch or plaster is present, peel it off and then paste the pads. If the injured or ill person's chest hair is thick, paste the pads on the chest hair once, peel them off to remove the chest hair, and then paste new pads.





c) Some AED models require to connect a connector by following voice prompts.

d) The electrode pads for small children should not be used for children over the age of 8 and for adults.

10. Electrocardiogram analysis

a) The AED automatically analyzes electrocardiograms. Follow the voice prompts of the AED and ensure that nobody is touching the injured or ill person while you are operating the AED.

b) On some AED models, you may need to push a button to analyze the heart rhythm.

11. Electric shock (defibrillation)

Press the shock button.

a) If the AED determines that electric shock is needed, the voice prompt saying, "Shock is needed" is issued and charging starts automatically.

b) When charging is completed, the voice prompt saying, "Press the shock button" is issued and the shock button flashes.

c) The first-aider must get away from the injured or ill person, make sure that no one is touching him/her, and then press the shock button.

d) When electric shock is delivered, the body of the injured or ill person may jerk.

12. Resume chest compressions

a) Resume chest compressions by following the voice prompts of the AED.

- With each compression, Depress the chest wall to a depth of approximately 5 cm
- Perform uninterrupted chest compressions of 30 at the rate of about 100 to 120 times per minute.

13. Automatic electrocardiogram analysis

a) When 2 minutes have elapsed since you resumed cardiopulmonary resuscitation (CPR), the AED automatically analyzes the electrocardiogram.

b) If you suspended CPR by following voice prompts and AED voice prompt informs you that shock is needed, give electric shock again by following the voice prompts.
If AED voice prompt informs you that no shock is needed, immediately resume CPR.

14. When to stop CPR (Keep the electrode pads on.)

a) When the injured or ill person has been handed over to the emergency services

b) When the injured or ill person has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

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1. Introduction

The purpose of this manual is to fulfil the needs for normal installation, commissioning, every-day use and also to give enough guidance for ship's crew and local service agents to pinpoint a faulty sub-unit.

Liability

All equipment described in this manual is designed for use on board ships to fulfil requirements specified in various IMO documents.

However, equipment may sometimes fail or work outside its performance specification due to component malfunction or depending on other factors.

JRC will not take any responsibility if this equipment is used in such a way that it's normal or abnormal function causes damage or creates situations that can be dangerous.

All specifications given in this manual are subject to changes without prior notice!

Risk Assessment

We, as a manufacturer, evaluate that applicable standards cover all reasonably foreseeable risks.

JRC

JLN-900Acoustic Correlation Dual Speed Log

System Description

The system measures one-axis relative speed as well as two-axis bottom track speed in a combined transducer.

In the JLN-900 the speed log device for STW (Speed Through the Water) is separated from the speed log device for SOG (Speed Over the Ground).

The data obtained from the JLN-900 are:

a) Longitudinal bottom track speed (= SOG longitudinal)

b) Transverse bottom track speed (= SOG transverse)

c) Longitudinal water track speed (= STW)

d) Docking log (if an optional Rate-of-Turn Gyro is connected to the system)

e) Depth information (= DPT)

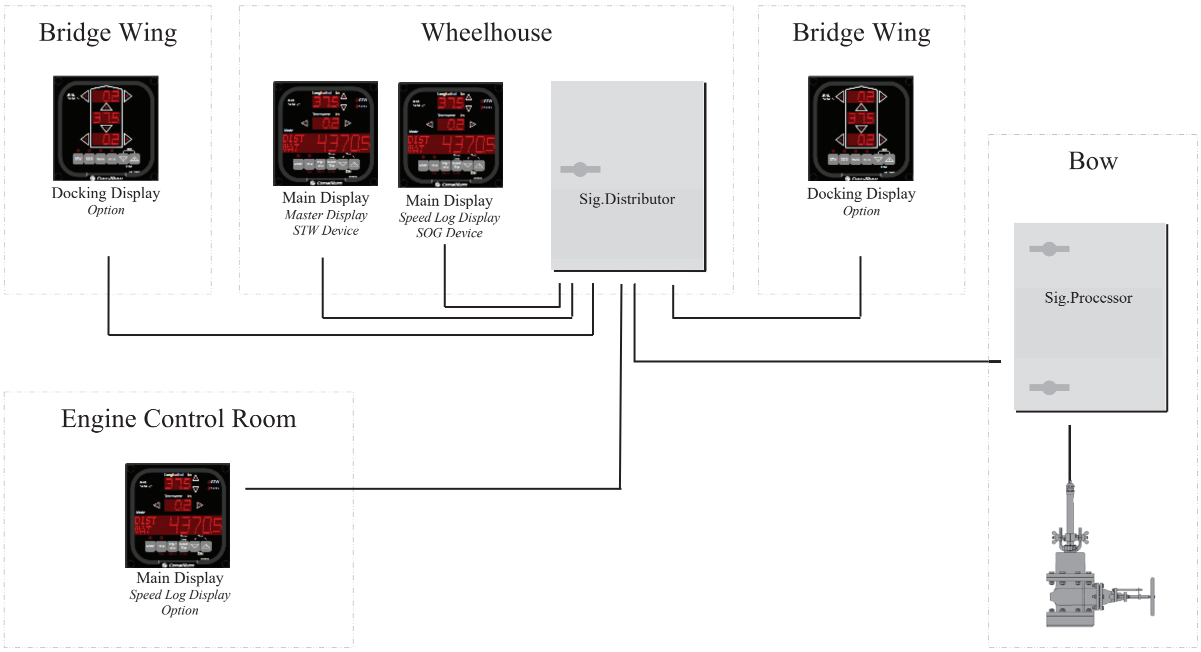
Sig.Distributor
Sig.Distributor is mounted on the bridge and receives the NMEA message from the Sig.Processor. The Sig.Distributor has various options to perform message conversion and calculations and has also a variety of inputs for taking data from other units. Outputs available are serial (NMEA), relay contacts, opto-couplers and analogue output. The Sig.Distributor can also take data from a connected turn-rate gyro. If the docking log option in the Sig.Distributor is enabled, the data from the log and the gyro are combined to create also docking log information that can be used by the docking log display .

MainDisplay
NWW-82 Main Display are versatile instruments used primarily as a display to indicate speed, distance and depth. It can also be used to remotely control such equipment, which is not easily accessible or has no user interface, for example a Sig.Processor, Sig.Distributor.

Transducer
The combined transducer is mounted in a sea valve arrangement suitable both for single and double bottom design. The transducer incorporates as standard a 30 metres cable for connection to the Sig.Processor. Both speeds and depth are measured with this single, combined transducer that is equipped with separate crystals for bottom track measurement (5 off) as well as for water track measurement (2 off).

1. Block diagrams

Block diagram for a typical JLN-900system:



Rate-of -Turn Gyro signal from external source to Sig.Distributor adds docking log functionality.

2. List of a JLN-900 System

Standard items for a system

Unit number	Name of unit	Description
NJC-80	Sig.Processor	Log main unit
NQA-4480	Sig.Distributor	Sig.Distributorhas a variety of inputs and outpus.
CFT-780 or CFT-780-4	Transducer	Transducer with 30m cable Transducer with 40m cable
NKF-980	Sea Valve	Mounting Set Single Bottom with Sea Valve Without Bottom Flange
NWW-82 NWW-82	Main Display Main Display	Serial Digital SOG/STW speed, total/trip distance. Also used as a remote log control unit, “Speed Log Master Display” **Note!** The JLN-900 system must consist of at least two NWW-82displays, one marked STW Device and one marked SOG Device. Each of these displays shall be connected according to JLN-900 drawings in this manual.

Optional items for a system

Unit number	Name of unit	Description
NWW-85	Docking Display	Serial Digital SOG/STW, docking log display
5HTAQ00006	BULKHEAD M BOX	Bulkhead mounting box Main/Docking Display
5HTAQ00007	EXTENSION BOARD	Extension board Main/Docking Display
NCM-1080	Dimmer Unit	External dimmer Main/Docking Display
NCM-1180	Control Unit	Remote Control Main/Docking Display
NWW-828	Analog Display	Analogue indicator, -8 +30kt Include with Potentionmeter

JLN-900
Technical Description

Contents:

Principle of operation

The JLN-900 Log system is actually two more or less independent log systems, one for sensing speed over ground (SOG), **Bottom Track Unit, (BTU),** and the other for sensing speed through water (STW), **Water Track Unit (WTU – Assy.)**.

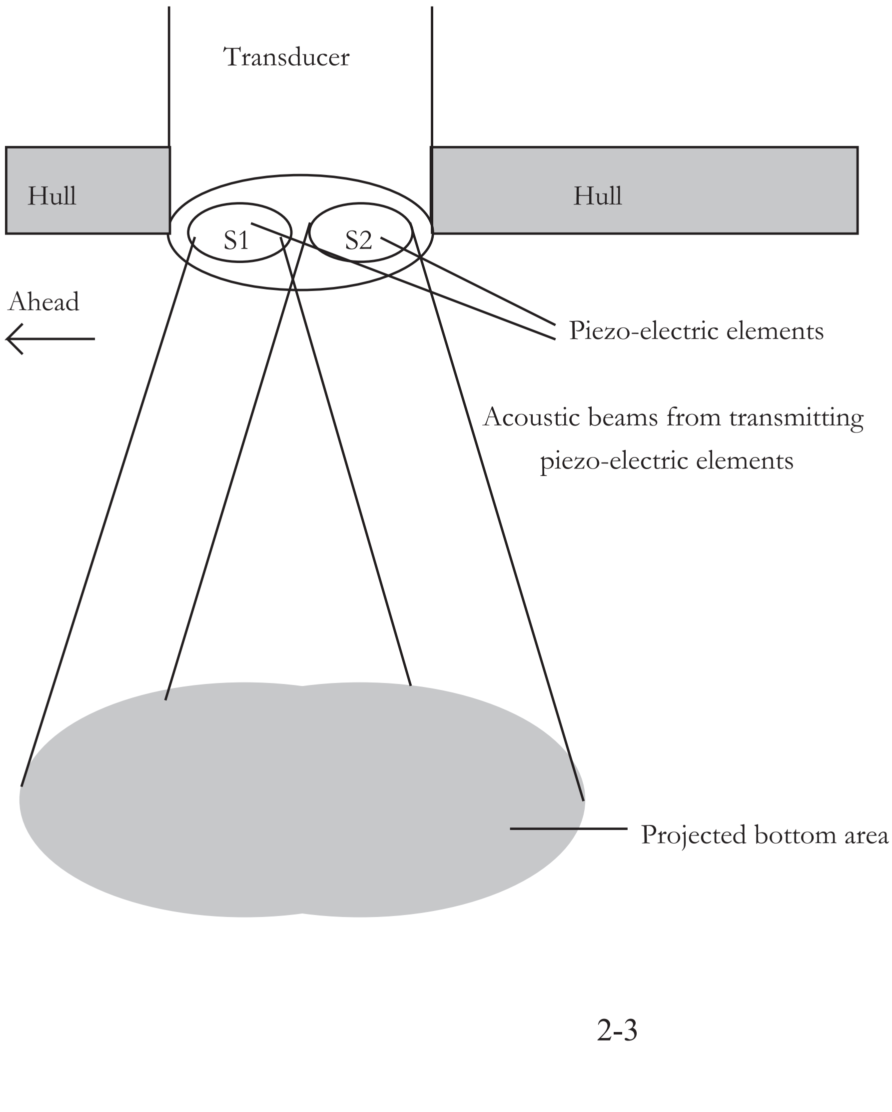
Although both sensor systems are based on correlation technique, sharing many common features, the principles are somewhat different. Accordingly, the WTU – Assy. Is described in its own document.

1 Speed over ground measurement

1.1 Acoustic transmission/reception

The correlation speed log uses acoustic waves in water. The transducer is mounted flush with the hull, see figure below. Waves are transmitted from the piezo-electric elements into the water, down to the sea-bed. The sea-bed reflects the signal back to the piezo-electric elements, which acts as receivers, when not used as transmitters. We use broad antenna lobes because we are not sensitive to lobe widths, compared to a system using Doppler technique.

Bottom track transmission



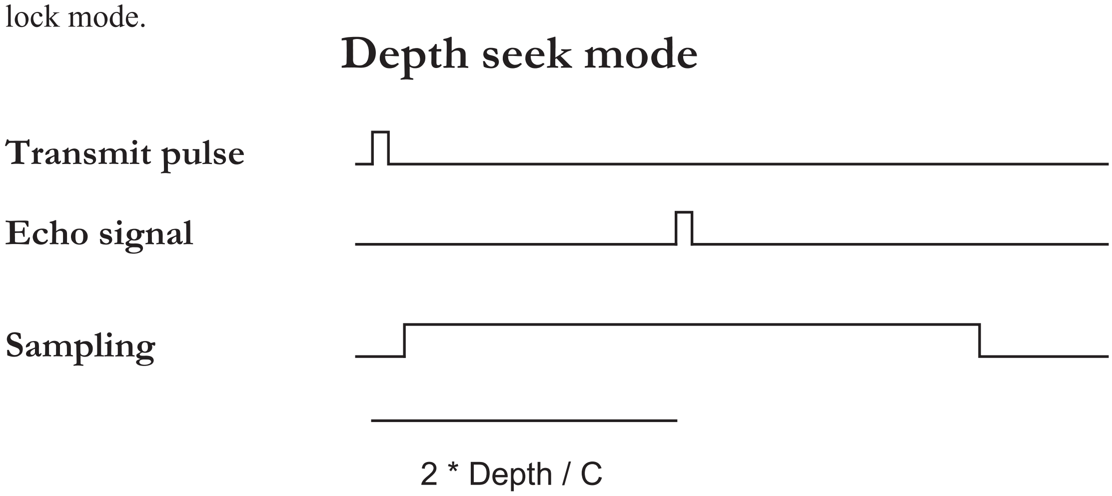
The beam travels down to the sea bed with a velocity of close to 1500 m/s. This velocity is almost constant for different frequencies. If we have a calibrated depth meter, we may have to compensate for salinity, density and temperature differences. The SOG correlation speed logs operate at 150 kHz, giving a wavelength of 10 mm.

1.2 Depth measurement

The depth measurement is divided into two phases: first we seek the depth by transmitting a pulse and wait for the echo to return. Once the depth has been measured we use a locked loop to adjust the depth to correct value.

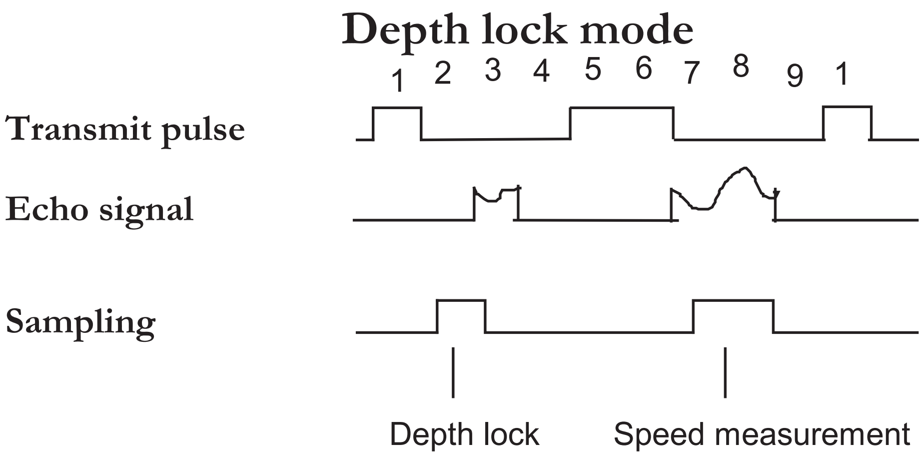
1.2.1 Seek mode

In the six predefined seek modes the log transmits a pulse. The pulse length varies between 0.3 and 67 ms corresponding to seek ranges from minimum depth 1 to maximum depth 400 meters. After the transmit pulse the receiver is sampled at regular intervals. The echo will have the same length as the transmitted pulse. The log correlates the transmitted pulse with the echo to form an echo function. The peak of this function corresponds to the time it takes for the pulse to travel from the hull to the sea-bed and back. If a valid echo is found the log enters the depth lock mode.



1.2.2 Lock mode

In the depth lock mode we use the known depth value to measure the depth more accurately. The depth lock mode is divided into 9 cycles, see figure below. During cycle 1 a pulse is transmitted. The length of this pulse is equal to the time it takes for the wave to travel from the transducer to the sea bottom. During cycle 2 this signal travels back to the transducer. During cycle 3 the echo pulse is active on the transducer elements. The positive edge of the returned echo is locked to always come at start of cycle 3, se figure below.



If the edge comes too late, the pulse duration is lengthened, if it comes too early, the pulse duration is shortened.
During cycle 5 and 6 a second pulse is transmitted. This pulse is equal to the time the signal travels from the transducer to the sea-bed and back again. During cycle 7 and 8 the echo is used for speed measurement.

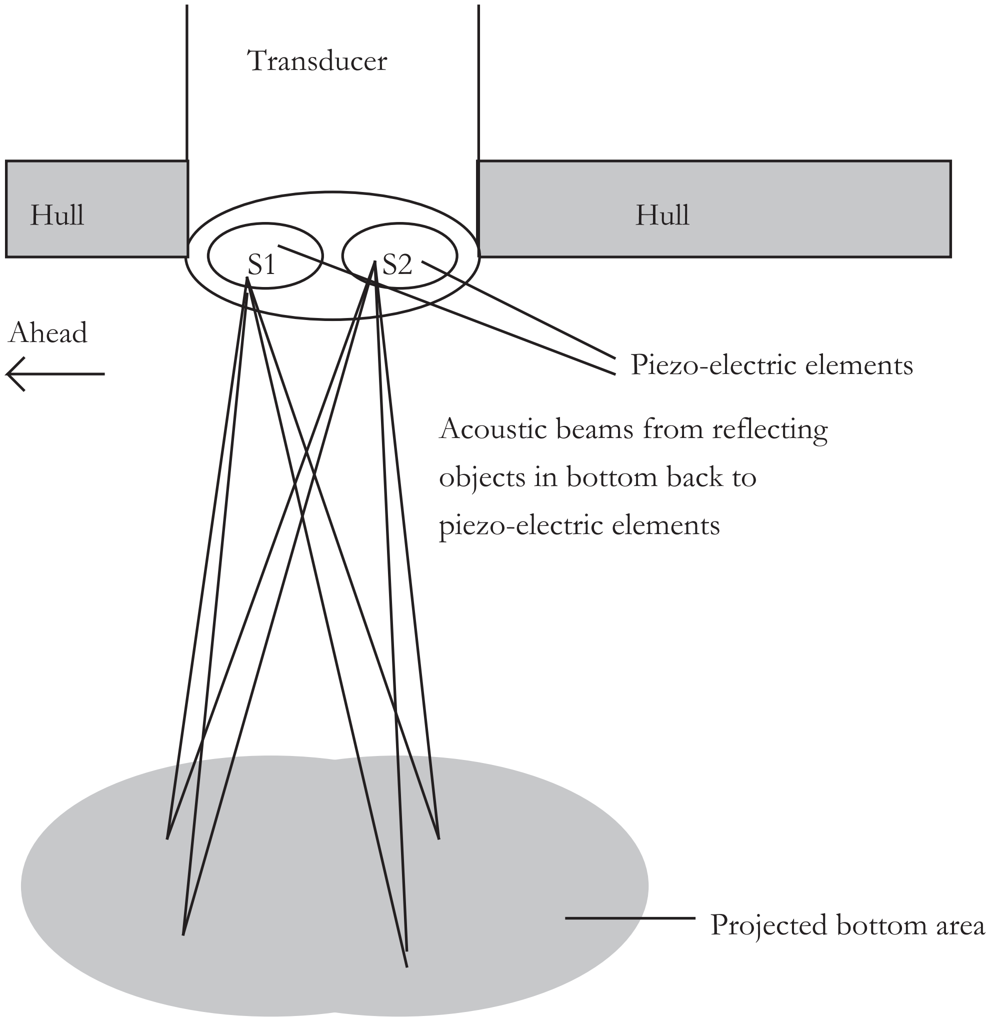
1.3 Speed measurement

The receiving sensor elements will see a speckle pattern. First we discuss this pattern, and then correlation technique to estimate the speed.

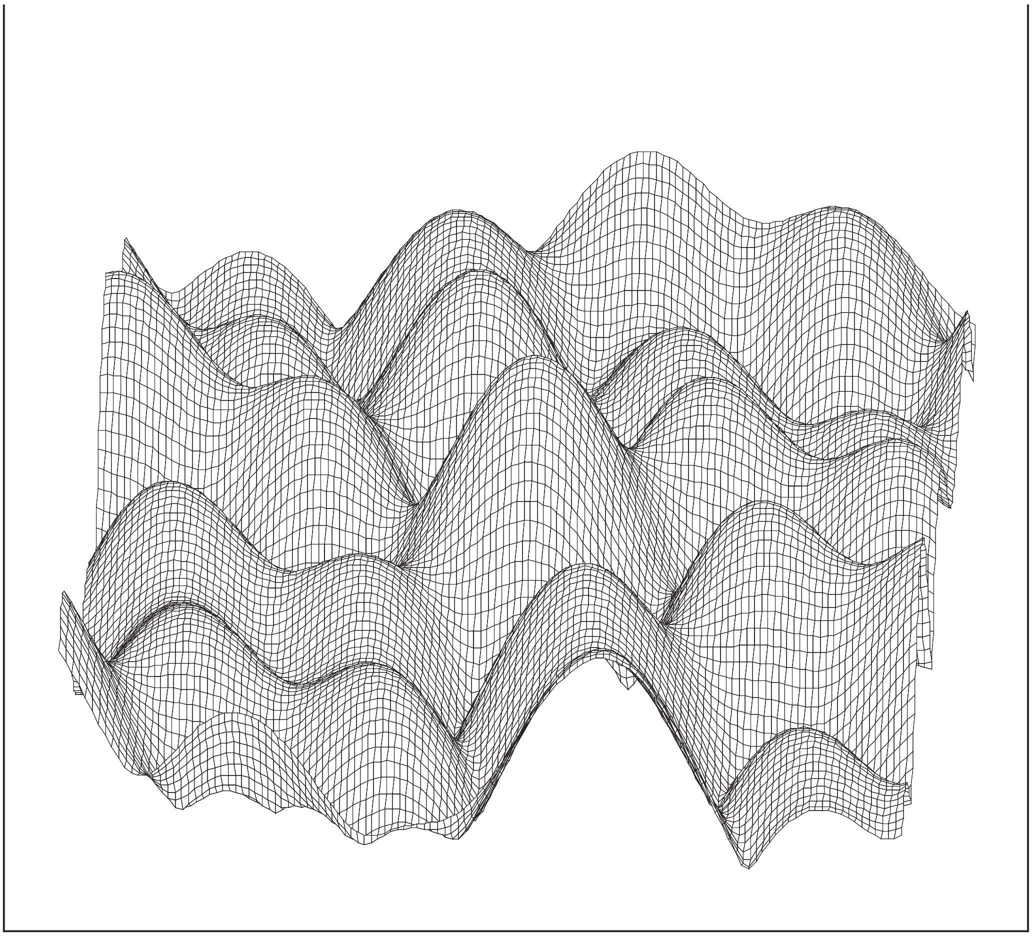
1.3.1 Speckle pattern

A coherent beam is transmitted towards the sea-bed. This means that the signal has both intensity and phase information. When the signal is reflected back, the signal will be modulated both in amplitude and phase. Each reflector will give a phase and amplitude modulation of the signal. If the bottom has a depth variation larger than the wavelength (10 mm) it will give a random phase modulation. All reflectors will sum up in one position depending on the distance to that position, see figure below.

Bottom track reception



In some spots the reflectors will cancel each other, while in other spots they will support each other. The same effect is used in holography, where also both phase and amplitude information is used. Thus we get a "holographic pattern" on the hull of the ship with loud and silent spots. It can be shown that the size of a loud spot is typically the same as the transmitter area.
The receivers measure the intensity as they travel over this pattern. One such computer simulated pattern with only five reflectors can be seen in the figure below.



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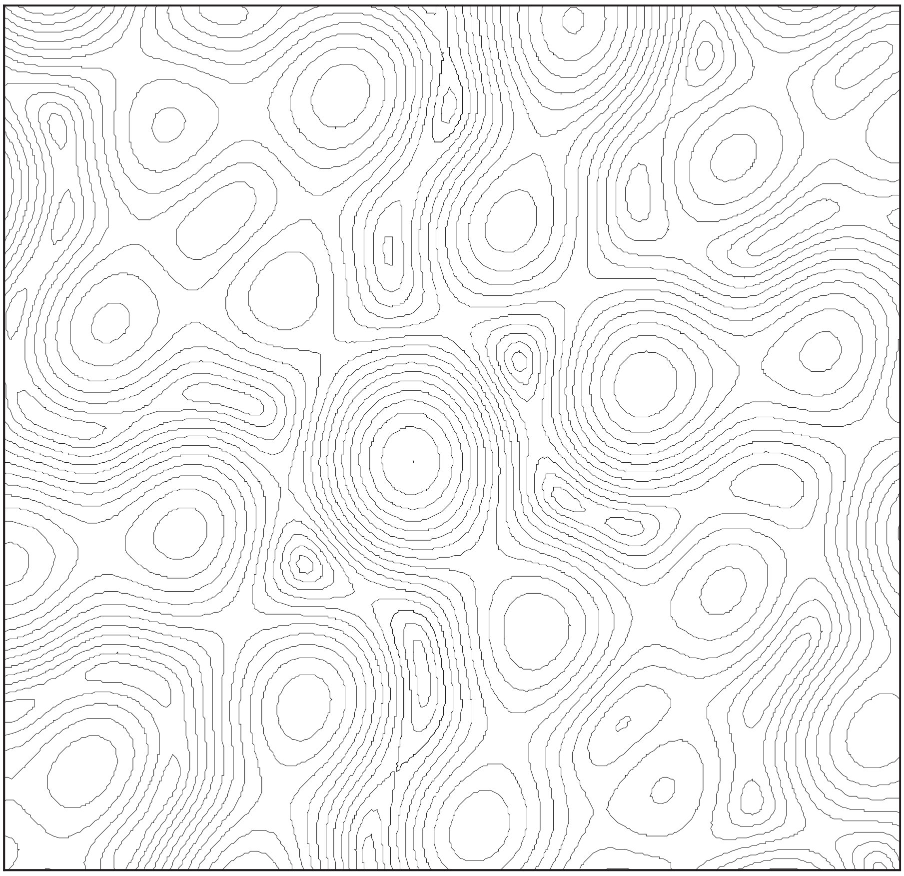
This pattern may also be visualised as a map with valleys and mountains representing the intensity at the position, see figure below.



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When the transducer is moved across this pattern the elements measure the intensity along the intersection of this map. Two sensors aligned with the motion may give the following result, see figure below.

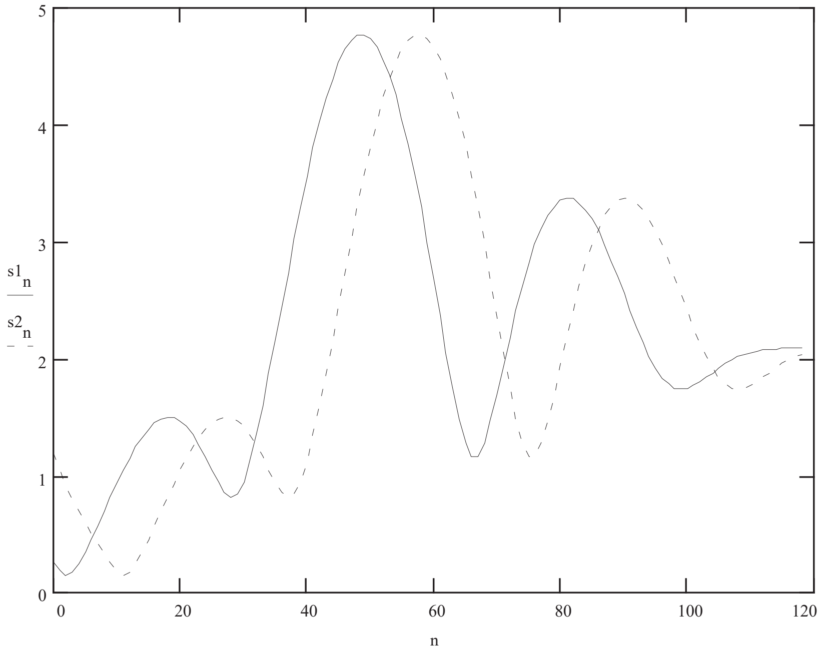
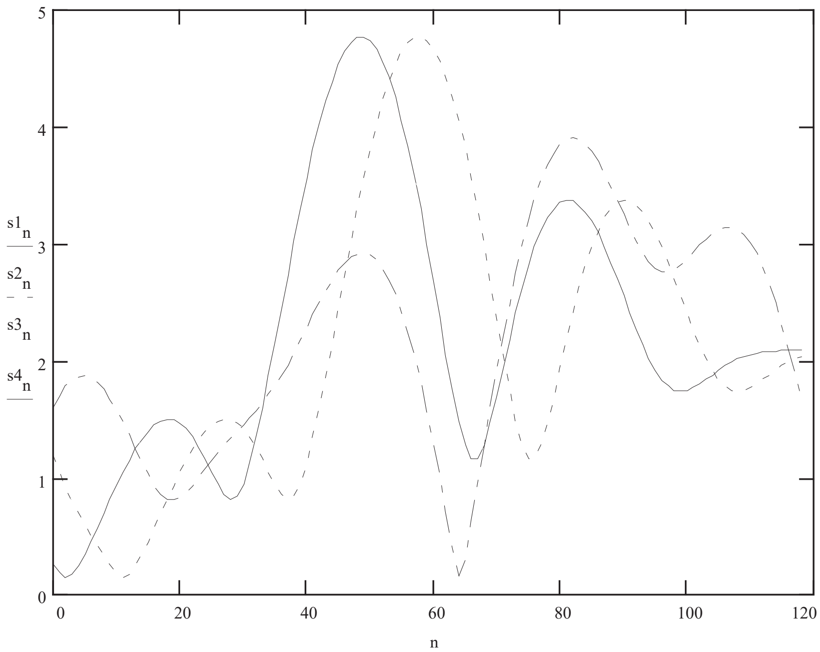


Figure: two identical signals with delay caused by displacement between sensors.

A complex sensor as the CFT-780 Transducer will measure intensity along several intersections of the map. The figure below shows the difference at 45º and a 90º relative to the motion. The similarity decreases, and the signal time displacement decreases.



The ship moves the transducer during both transmit and receive. This will be seen as a doubled speed of the speckle pattern during receive. The interference pattern will give signals with 100% modulation that are easy to detect. Side lobes give no false speed. The broad beam gives always some signal component back, compared to doppler using a narrow beam which may be missed if the ship is rolling. The interference pattern is also unaffected by salinity, temperature and density. A layer may give a signal component from that layer if it has time delay close to the bottom echo, but as long as the main signal comes from the bottom, this will be the main speed source.

1.3.2 Correlation technique

Correlation is a method of finding the similarity between signals. The definition we use is to calculate at what time difference between signal pairs the similarity is maximised. This time delay corresponds to the distance between the sensors. By dividing this distance by the time we get the speed.

In the "interpolation mode", when the time delay is larger than the maximum pulse length, we cannot calculate the speed directly. This limit is when the speed [in knots] multiplied with the depth [in metres] is less than 41. In this case signal statistics is used to estimate the speed. Accuracy is lower in this mode.

The two axis log calculates the velocity in six different directions and then weights them together to find the longitudinal and transversal component. The patented transducer configuration with only five elements gives the possibility to measure speed in all directions with a 30º resolution, see figure below.

CFT-780 Transducer configuration

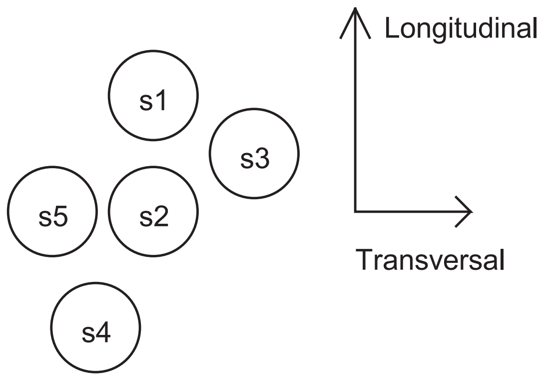


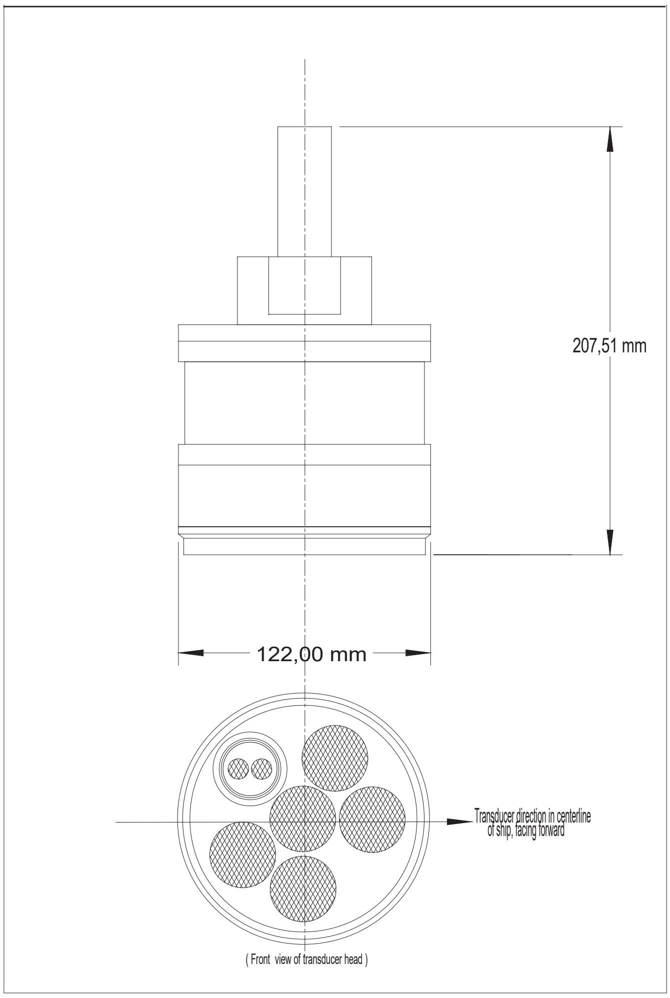
Fig: CFT-780 Transducer

Used measurement directions:

0º (s1–s2), +30º (s2–s4), -30º (s5–s4), +60º (s3–s2), -60º (s1–s3) and 90° (s5 - s2).

2 CFT-780 Transducer

The transducer is a highly refined product, containing piezoelectric sensor elements facing the water and containing some matching circuits to achieve good matching to the cable (30 m of cable is supplied as standard, option 40m).



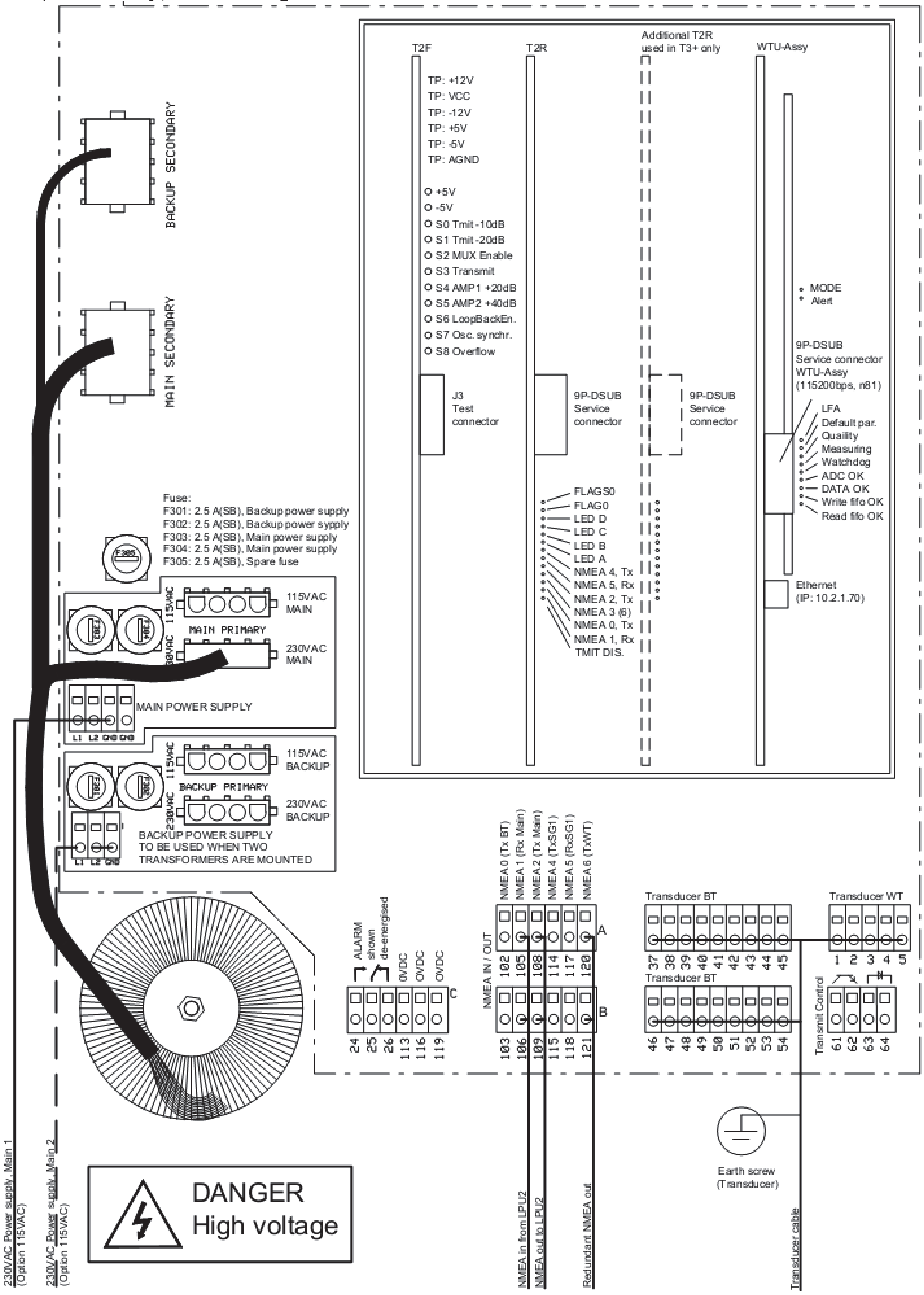
As seen, the transducer elements are clearly divided into the five SOG elements and the two STW elements in a separate casing.

Electrically, each sensor element is connected via a matching transformer to a separately shielded twisted pair. For transmission with the low frequency SOG part, a separate transmit cable pair is used, that connects the signal to the three transducer elements used for transmission.

The positioning of the transducer is very important. The water flow below the transducer must not be turbulent or affected by skew water flows. Turbulent flow gives no common signal between the two STW channels.

3 NJC-80 Sig.Processor

The Electronics Unit is from the functional point of view divided into two more or less separated units: SOG unit (BTU; T2F, T2R and transmitter integrated on T-M board) and STW unit (WTU-Assy). Block diagram is shown below:



3.1 BTU-PCB

The BTU-PCB unit consists of two boards T2F and T2R (one additional T2R in T3+), placed in a rack on the T2-M motherboard which also includes a power supply and an amplifier section for the transmit pulse.

T2F has the function to condition and amplify the signals received from the five piezo-electric elements in the transducer, T2R is the main processor board in the BT unit. The amplifier integrated on the T-M motherboard is used to amplify the transmit pulse which is generated by T2R.

3.2 WTU-Assy

The WTU – Assy. PCB consists of a double board assembly docked to the T-M motherboard in the same rack as the BTU-PCBs. The WTU PCB is powered from a separate power supply also included on the T2-M motherboard.

3.3 Data transmission / reception

Data is sent and received from the log as serial NMEA messages on standard IEC 61162-1 / NMEA (RS 422/485) output / input.

Serial NMEA messages used by the speed log are described in detail in document 700164.

The following NMEA sentences are transmitted in a standard setup:

Serial port	Function	NMEA sentences transmitted
NMEA0(TxBT) Terminal 102/103	This output carries basic information. Can be used by external users.	VDVBW, VDDPT
NMEA1(RxMain) Terminal 105/106	Main input.	-
NMEA2(TxMain) Terminal 108/109	Main output, also containing internal information.	VDVBW, VDDPT, VDVLW, PSALS, PSALX
NMEA4(Tx) Terminal 114/115	Not Used.	
NMEA5(Rx) Terminal 117/118	Not Used.	-
NMEA6(TxWT) Terminal 120/121	Messages are generated in the WTU. Used as a redundancy output that will continue to operate also if the BT unit is malfunctioning.	VDVBW, VDDPT, VDVLW, PSALS

Note that also other NMEA sentences than those mentioned above might be transmitted on any channel depending on setup and working mode.

NMEA-messages are also available through RS232 on two 9-pole D-sub-connector, one on T2R and one on WTU. It is used for data logging and software updates. Thus it is possible to read out information directly on an ordinary PC using for instance a terminal emulator program.

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JLN-900

Technical Specification

Abstract: Performance, environmental conditions and power requirements for the JLN-900 speed log system

Contents:

1 General

The technical specification in this section deals with the JLN-900 system, including the Transducer, Electronics unit, Log Processing Unit LPU2 and connected Display units. Operating performance limits like inaccuracies or certain measurement criteria are set by the speed sensors, i.e. the combination Transducer/Electronics unit.

2 Performance

The performance limits defined here are met when the log system is operating within the environmental conditions described in this section and if calibration is correctly done.

2.1 Principle of operation

Log measures acoustic correlation using vertical beams. The log system uses two different sensors, measuring Speed Through the Water (STW) and Speed Over the Ground (SOG) simultaneously and independently.

2.1.1 STW (Speed Through the Water = relative speed)

Frequencies: In the range 3.8 – 4.2 MHz
Speed is measured in a water volume 120–140 mm from the surface of the transducer.

Depth requirement: greater or equal to 3 m beneath the transducer.
Speed range: +/-50 knots sensed Speed Through the Water.

2.1.2 SOG (Speed Over the Ground = true speed)

Frequency: 150 kHz
Depth requirement: greater or equal to 2 m beneath the transducer.

Depth range: nominally 2 - 250 m below transducer.

Speed range: 40 knots in any direction.

2.2 Accuracy of measurement

2.2.1 STW

Speed error relative to sensed water speed: ≤ 0.1 knot or 1 %, whichever is greater.
Distance error relative to travelled distance (through the water): ≤ 1 %.

2.2.2 SOG

The SOG measurement system operates in different modes resulting in different accuracy of the measurement. The "Normal mode" provides better accuracy and is active when the speed and depth product (metres * knots) is above 67. The "Interpolation mode" is active when this condition is not met resulting in a lower accuracy.
Normal mode: ≤ 0.1 knot or 1 %, whichever is greater.
Interpolation mode: ≤ 0.2 knots or 2 %, whichever is greater.

Distance error will improve with distance due to averaging positive and negative instantaneous errors. Therefore, the error limit, expressed as a percentage of the travelled distance, will decrease with increased accumulated distance.

Travelled distance	Error
2 to 10 NM	≤ 0.2 %
10 to 50 NM	≤ 0.1 %
Over 50 NM	≤ 0.05 %

2.3 Functional limitations

2.3.1 STW

The STW part of the system is in operation when speed and distance is shown on the master display.

The speed measurement influence is within IEC 61023 specifications for pitching up to +/- 5 degrees and rolling at +/- 10 degrees.

The STW speed sensor is sensitive to the water flow at the transducer position. The ideal water flow is parallel with the longitudinal/keel line and non-turbulent. Air bubbles or ice will reduce or completely block the acoustic transmission making measurement impossible. Reduced STW performance may occur when many acoustic reflectors are present in the water, such as muddy water in rivers and canals, river inlets, harbour areas and similar shallow water areas with soft bottom structures. When normal conditions are not met, the STW may indicate zero speed at low speed or invalid status with digital indicators displaying “---”.

2.3.2 SOG

The SOG part of the system is in operation when SOG speed is shown on the master display.

The speed measurement influence is within IEC 61023 specifications for pitching up to +/- 5 degrees and rolling at +/- 10 degrees.

The SOG sensor is using acoustic signals, thus sensitive to blocked acoustic transmission. Moderate amount of air bubbles or ice will have a minor influence on measurement, but excessive amount makes measurement impossible. When normal conditions are not met, the SOG indication will show invalid status and digital indicators indicate “---”.

3 Environmental conditions

All units of the system meet the environmental conditions specified in IEC 60945.

Unit	Protected	Exposed	Submerged
Transducer/Bottom parts			X[1)]
Sig.Processor	X		
Sig.Distributor	X		
Display (flush surface mounted)	X	X[2)]	
Display (mounted in BMB)		X	

1) The transducer cable is not intended to be installed Submerged.
2) Front panel for Display provides watertight mounting to panel/console surface.

4 Interfaces

4.1 Serial interface & sentences

All serial interfaces comply with IEC 61162-1 Edition 4.0 2010-11 (NMEA 0183 standard version 4.00). Transmitted sentences are $VDVBW, $VDVLW and proprietary PSAL sentences for JLN-900 speed log.

4.1.1 NQA-4480 Sig.Distributor

NQA-4480 is intended to be connected to other systems. It has 23 serial outputs fed from 13 separately buffered drivers. NQA-4480 has various options to perform signal processing and calculations from the speed log and other inputs. Please refer to NQA-4480 Technical Manual for details.

4.1.2 NJC-80 Sig.Processor

NJC-80 is connected to NQA-4480. It has one serial output from SOG-unit and one serial output from STW-unit. Both serial outputs should be connected to NQA-4480 to obtain full redundancy between the STW- and SOG-units of the speed log.
One serial input channel is used to provide remote access for calibration and service.

4.1.3 NWW-82 Main Display

The Speed Log Master Display has one serial input and one serial output connected to NQA-4480 transferring the user interface for calibration and configuration to NJC-80.

4.2 Relays, opto-couplers and analogue outputs

The LPU2 provides relay, opto-coupler and analogue outputs.

Function	# of functions
Switch-over contact relay outputs:	4
Closing contact(s) relay outputs:	4
Opto-coupler outputs:	8

Two analogue outputs can be individually programmed to provide requested speed information.

5 Calibration

The JLN-900 speed log has calibration functions. The speed calibration factors and transducer alignment are entered into the speed log via the Speed Log Master Display, as appropriate for the SOG and STW respectively.

STW range:	-50.00% to +50.00% of sensed speed in 0.01% steps. Up to 3 different draught conditions. Up to 10 speed calibration points.
SOG range:	-50.00% to +50.00% of sensed speed in 0.01% steps
SOG transducer angle range:	-180.0º to +180.0º in 0.1º steps.

The STW-speed log generally needs calibration correction on all ships due to properties of water flow around the hull. The SOG log transducer angle calibration is only needed when correct mechanical transducer alignment is not fully obtained. The SOG log seldom needs calibration and requires extremely accurate reference data.

6 Power requirements and dimensions

NJC-80 Sig.Processor

Voltage:	220-230 V AC (198 – 253) 100 V AC (90 – 110) optionaly 115 V AC (100 - 126)
Frequency:	47.5 - 63 Hz
Power consumption:	typical 50 W, peak at start up: 300 W
Dimensions (WxHxD)	360x480x240 mm
Compass safe distance	5 m
IP-class	IP65
Weight	18 kg

NQA-4480 Sig.Distributor

Voltage:	220-230 V AC (198 – 253) 100 V AC (90 – 110) optionally 100-115 V AC (90 - 126)
Frequency:	47.5 - 63 Hz
Power consumption	typical 15 W including 3 pcs Display connected.
Dimensions (WxHxD)	500x500x200 mm
Compass safe distance	2 m
IP-class	IP22
Weight	20 kg

NWW-82 Main Display

Voltage	12-24 V DC (10 – 32)
Power consumption	typical 1.5 W peak 3 W, powered from the LPU2
Dimensions (WxHxD)	144x144x16 mm
Compass safe distance	0.3 m
IP-class front side	IP66, if mounted in BMB
Weight	0.6 kg

7 Liability

All equipment described in this manual is designed for use on board ships and fulfils relevant requirements specified by International Maritime Organization (IMO).

However, equipment may sometimes fail or work outside its performance specification due to component malfunction or depending on other factors.

The manufacturer will not take any responsibility if this equipment is used in such a way that normal or abnormal function causes damage or creates situations that can be dangerous.

All specifications given in this manual are subject to changes without prior notice!

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JLN-900
Installation of Transducer and Bottom Parts

TABLE OF CONTENTS

1. General

This part is intended to explain the various factors to be considered when selecting a position for the Transducer. The siting of the CFT-780 Transducer is an important factor in determining the accuracy and efficiency of the overall system.

The Transducer is designed to be fitted flush with the hull, along the longitudinal axis of the ship. It measures the SOG (***true speed)*** of the ship relative to the sea bed and the STW (***relative speed)*** will be measured in the water mass approximately 130 mm below the ship's hull. This makes it suitable to be installed on ships of all sizes.

NOTE: The Transducer is manufactured and tested with the integrated cable as one unit.
Do not cut or modify the Transducer cable! The relative speed measurement operates at a frequency where an undefined cable length may affect performance.
JRC takes no responsibility in case of cable modification.

General mounting recommendations

Use universal thread locking liquid e.g. Loctite® 243 or equal, when mounting Studs PS M16x40 (Part No. 71-22021-00) into flange (not grease).

Apply MoS2 grease on rest of screws threads.

Use Vaseline®, Silicone grease or similar to lubricate the *Lip Seals*

Recommended torque:
M10 approx. 35Nm.
M12 approx. 57Nm
M16 approx. 150Nm

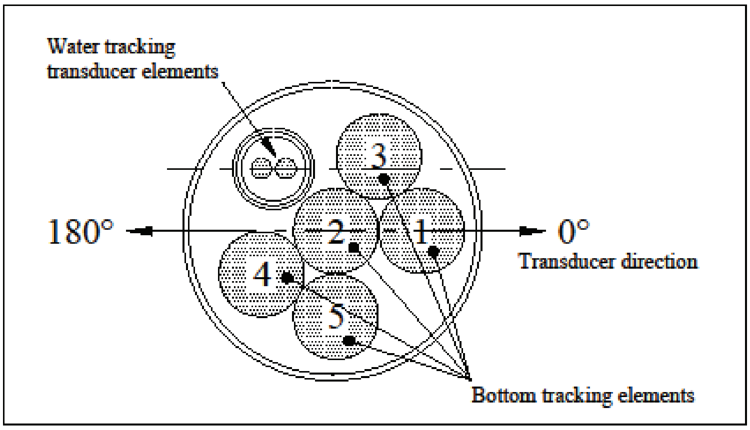
After mounting just before Sea trial and at every docking, check and retighten nuts and screws to recommended torque on the inside of the installation.

CF-780 Transducer

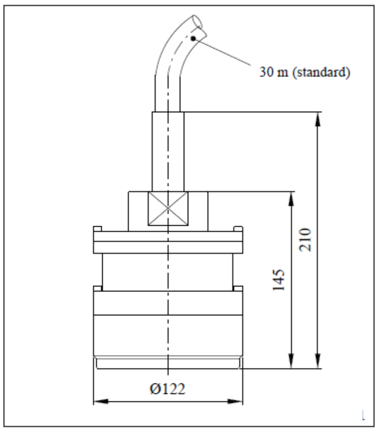
The Transducer comprises of one set (2 pcs) of piezo-electric elements for relative speed measurement and one set (5 pcs) of piezo-elements grouped in a patented array for true speed measurement. Both measurements are based on acoustic correlation principle.
The Transducer is used both for transmission and reception of the acoustic signals.
Refer to below figure **"Bottom View".**

The Transducer is delivered with a 30-metre standard cable, which is permanently connected to the Transducer head with watertight mould.
Transducer dimensions are given in below figure **"Profile"**.

Transducer "Bottom View" from hull underside



Transducer "Profile"

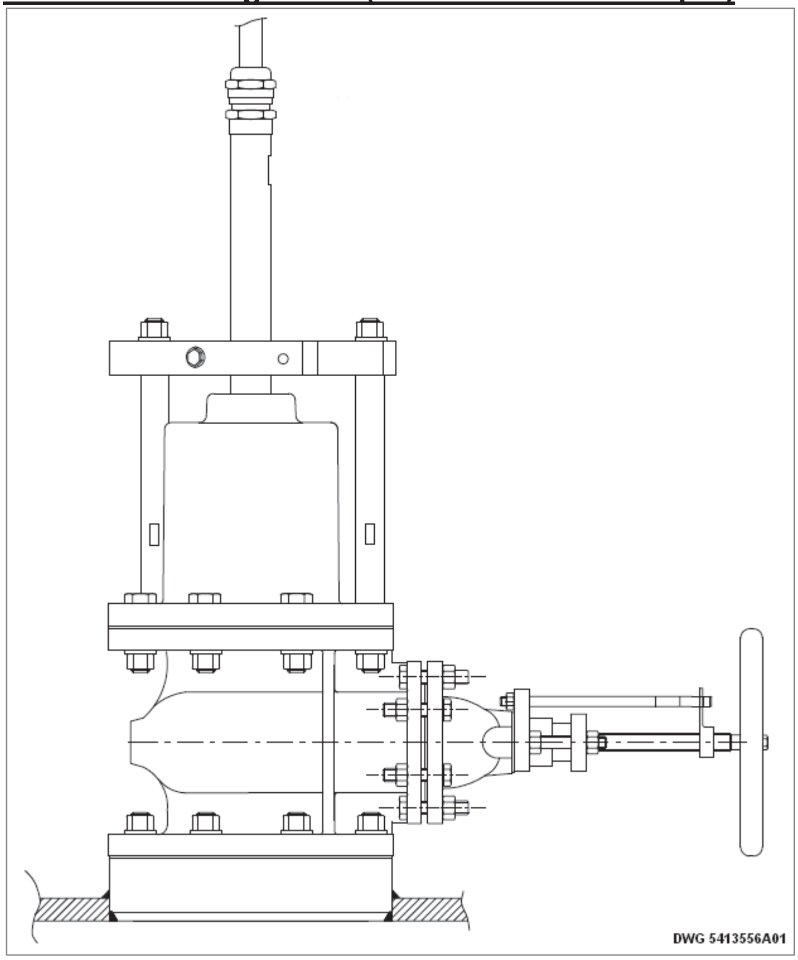


Bottom Parts

The two versions of Bottom Parts of the system are shown in **Fig. 1.1** and **Fig. 2.1**.
A steel flange is welded to a cut-out in the ship's bottom hull plating. The Bottom Flange, including the Guide Ring, positions the Transducer flush with the underside of the hull.
With the SeaValve arrangement the intention is to provide retraction/removal for service/maintenance or replacement of the Transducer while the ship is still afloat, thus dry docking is not needed.

The Connecting Tube with a Tube Bracket assembly holds the Transducer fixed in its position and has a watertight Cable Gland at its top end.

Sea Valve arrangement (MSSBSV H as example)



2. Transducer location requirements

To achieve proper performance of the speed log, special care must be taken to find the best area in respect of water streaming under the hull and the Transducer (CFT-780) sensor head. Selecting correct Transducer location shall be done in co-operation with **JRC**.
It is recommended to send General Arrangement (GA) drawings, showing suggested Transducer installation, to **JRC** for review and comments. The comments given will only refer to the hydro-dynamical requirement and not the inside design, such as installation height, access to closing valve or any inside obstacles that might occur and jeopardise the function or maintenance.

Following rules must then be considered:

1. For more detailed installation advices please read the complete instruction.
2. The Transducer should be installed in the foremost part of the vessel as close as possible to the keel line.
3. The bottom Sea Valve shall always be installed perpendicular to the ship's horizontal plane. Recommended vertical installation angle 0 - 2 degrees in the forward/longitudinal direction and +/- 2 degrees in the sideway/athwardship direction.
4. The Sea Valve arrangement and Transducer cable are not intended for submerged mounting in a water filled tank. If no other alternative is available a separate watertight (W.T.) compartment must be arranged housing the Sea Valve/Transducer assembly. The cable must be run in a watertight pipe conduit, connecting directly from the W.T. compartment to free/dry space where NJC-80 is normally installed.
5. The compartment in which the Transducer is installed may be sealed by a manhole or hatch but the compartment must always be accessible for service.
6. The Transducer cable must be installed in an accessible way to allow retraction/dismounting incase of service or replacement of a defective Transducer. Excessive cable length shall be left uncut and coiled, i.e. one coil/loop close to the Sea Valve/Transducer and remaining length close to NJC-80.

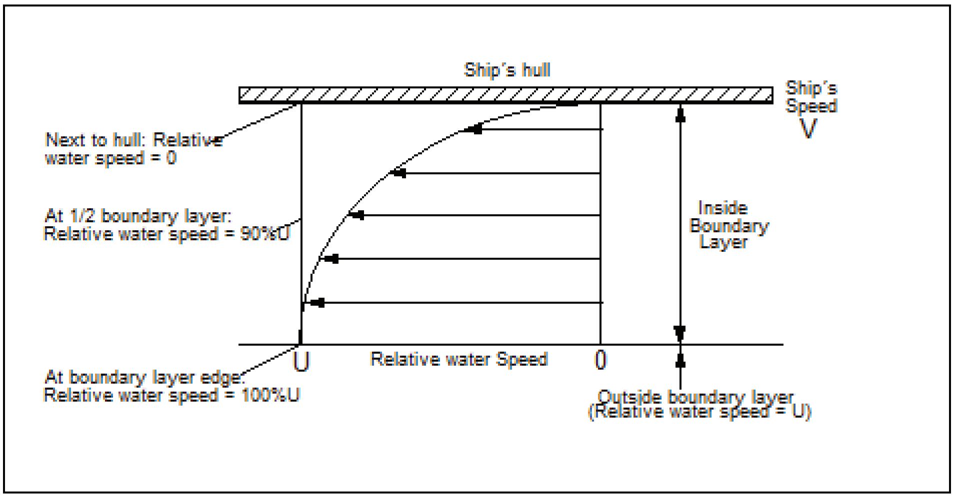
   <u>Do not cut the cable! Warranty is void if cable is cut or violated.</u>
7. Sufficient headroom must be available at the Transducer position to allow for its installation and removal (see details for appropriate Bottom Parts).
8. On tankers the Transducer location is not to be within the Ex–area. The Transducer must never come in contact with explosive cargo oil/fuel oil/gas or other hazardous cargo.
9. The Transducer cable shall run directly to the speed log NJC-80 and must **never be cut off, shortened, extended or by any other mean passing through a junction box!**
10. JLN-900 speed log operates with ultra-sonic frequencies of 145 - 155 kHz, and 3.8 MHz / 4.2 MHz. The Transducer location must be at least 2 metres from any echo sounder transmitters or other similar acoustic devices generating the same type of frequencies.
11. The Transducer cable must be separated from other cables to minimise risk of interference. The Transducer cable shall not share pipe with other cables.
12. In the vicinity of the Transducer location, the outside of the vessel must be free from sudden projections, welding joints, steps and sharp edges. Special care must be taken that no obstacles appear, especially forward of the Transducer. These conditions will cause water turbulence, which may give unreliable speed readings from the system.

13. Water inlets and outlets in the nearby vicinity may disturb the water flow. Therefore the Transducer should be located at least 2 metres forward of such openings.
14. For proper speed measurements the Transducer (sensor elements) must always remain submerged, even at a minimum draught as well as in rough seas.
    The Transducer is not affected or overheated by being powered when in air, e.g. during dry docking, but recommended to turn-off system when ship is not in water.
15. The compass safe distance for the Transducer is: 5 m

Boundary Layer

A moving ship's hull tends to drag a layer of water with it, causing a boundary region around the hull. The water speed at the hull is almost the same as the ship's speed, so that the relative water speed is almost zero. With successive water layers, the relative water speed increases until, at the boundary edge, the relative water speed becomes equal to the ship's speed. The thickness of this boundary layer is not uniform around the ship and can range from a few millimetres near the bow to more than one metre at the stern on a large ship.

The relative speed of successive water layers is not proportional to distance from the hull, but follows a theoretical curve as shown below:



Noise, Cavitations, Turbulences and Other Factors Affecting Acoustic Speed Logs

The Transducer operates on the acoustic principle and is therefore susceptible to interference from acoustic (noise) sources. In particular, the Transducer should be fitted well away from the propeller and other sources of noise to minimise the effects of noise, vibration and cavitations.

As well severe turbulences and diverted flow directions will affect, thus installation site and hull surface conditions in the vicinity of the Transducer shall be carefully considered.

The Transducer and NJC-80 are designed to respond principally to the acoustic reflections from water layer or sea bed denoting the speed of the ship. In some situations, however, the system may respond to false signals that can arise under adverse conditions.
A majority of acoustic devices are affected in a similar way.

3. Installation of Bottom Parts

Detailed instructions for installing the different Bottom Parts are given in the following sections. Refer to the section covering your particular application.

The Bottom Flange, which shall be welded into the ship's hull, is the same size whether it is for the single or double Bottom Parts.
The Bottom Flange dimensions can be seen in **Fig. 1.2** and **Fig. 2.2.**

Unpacking of Bottom Flange

The Bottom Flange, which shall be welded into the ship's hull, is made of construction steel. Humidity makes the surface of the flange corrode if not protected. The flange is therefore protected from corrosion during storage and transport by a special corrosion inhibitor bag. This bag should remain sealed during storage for the corrosion protection to have full effect. The bag shall be opened just before the flange is to be welded into the ship`s hull.

After completed welding work it is recommended to slightly oil/grease the flange surfaces in order to prevent further corrosion until installation is completed.
Do not paint the outboard interior of the Bottom Flange nor the inboard flange gasket area or threaded stud bolt holes!

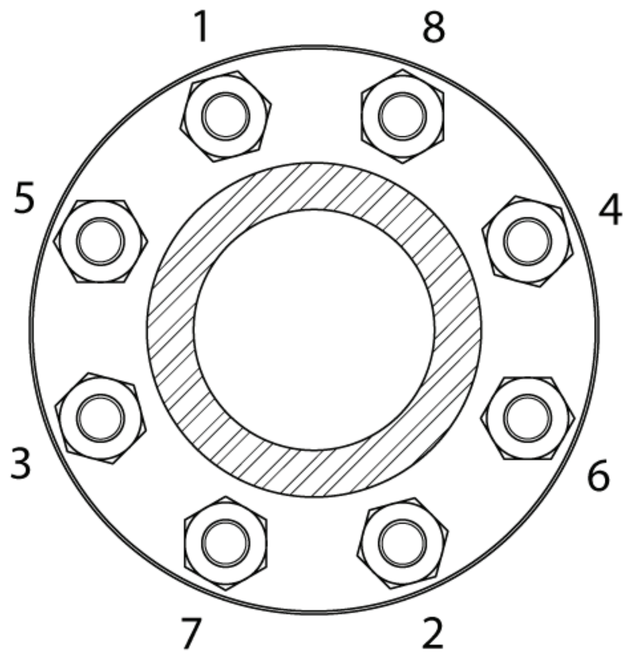
Slight normal corrosion on the flange surface will not affect the function, lifetime or quality.

Maintenance of Bottom Parts

Each bottom part assembly incorporates a Zinc Ring that acts as a sacrificial anode to prevent corrosion of the Transducer and Bottom Parts. The Zinc Ring should be checked, and changed if deteriorated, each time that the ship is dry-docked.
When maintaining the Bottom Parts it is also recommended to check and tighten the Tube Bracket clamping arrangement.
The Guide Ring, Zinc Ring or the TRU shall never be painted!

General recommendations for flange joints/connections

BOLT TIGHTENING SEQUENCE FOR FLANGES USING 8 BOLTS.



Lubricate bolt and nut threads and nut bearing face (where it contacts the flange).

After flange assembly and all nuts have been run down by hand, start wrench tightening following the sequence of the numbers indicated (marking the number on the flange with a crayon aids in keeping track of the tightening process).

Further instructions below where mounting of stainless steel screws, nuts and washers is described, it is generally recommended to use Molybdenum sulphide grease (MoS2 grease) on threads in order to obtain smooth engagement of threads and avoid severe friction which occasionally might obstruct or even damage threads.

Tools/Material recommended for normal installation/service/maintenance.

<u>Listed as follows from left to right on above picture:</u>

1 pc 55 mm width spanner/wrench (Transducer upper end)
1 pc 46 mm width spanner/wrench (Connecting Tube nut)
1 pc 40 mm width spanner/wrench (Cable Gland)
2 pcs 24 mm width spanner/wrench (Flange screws/nuts)
1 pc 17 mm width spanner/wrench (Tube Bracket screws)
1 pc 35 mm width adjustable spanner/wrench (Extra)
1 pc polygrip plier (Extra)
1 pc external circlip plier, max. tip diameter 2 mm (Tube Locking washer/Circlip)
1 pc straight bar 0.5 – 1 m length, approx. 15 x 15 mm (Recommended for alignment)
1 pc scraper/knife for eventual flange gasket removal (Not at initial installation)
1 pc screw driver, edge 2.5 x 14 mm (Guide Ring screws)
1 pc rope/sling (For Tube/Transducer/Valve Cover assembly lifting/hoisting)
1 pc measuring tape/ruler (For Tube height reference measurement)
Vaseline/Silicone Grease or similar (For lubrication of Lip Seals/Tube)
Insulation tape (For cable termination end wrapping/protection)

<u>Not shown on picture:</u>

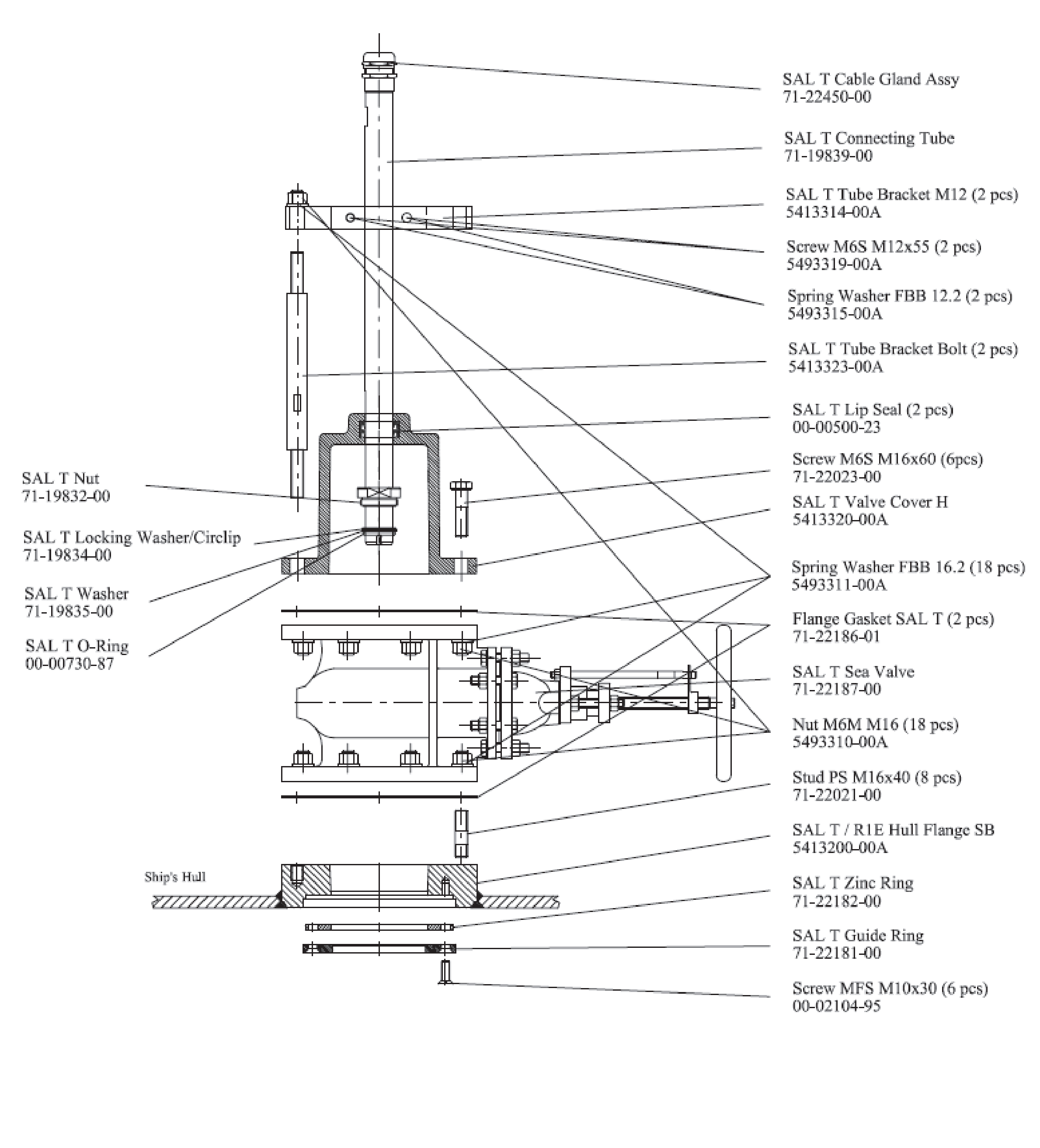
Plastic/Wooden scraper tool or cloth/rag (For careful removal of marine growth on Transducer sensor surface).
1 pc torque wrench (scale: 35, 57 & 150 Nm) M10, M12 and M16 nuts.
Loctite® 243 or similar (studs into flange)
MoS2 grease as needed (For lubrication of stainless steel screws/nuts)

4. Mounting Set Single Bottom Sea Valve (MSSBSV H)

This mounting set is suitable for ships where an installation site can be found directly in the bottom hull/skin of the ship, i.e. “single bottom”.

Before starting installation and assembly check the contents of the kit according to **Fig. 1.1**.

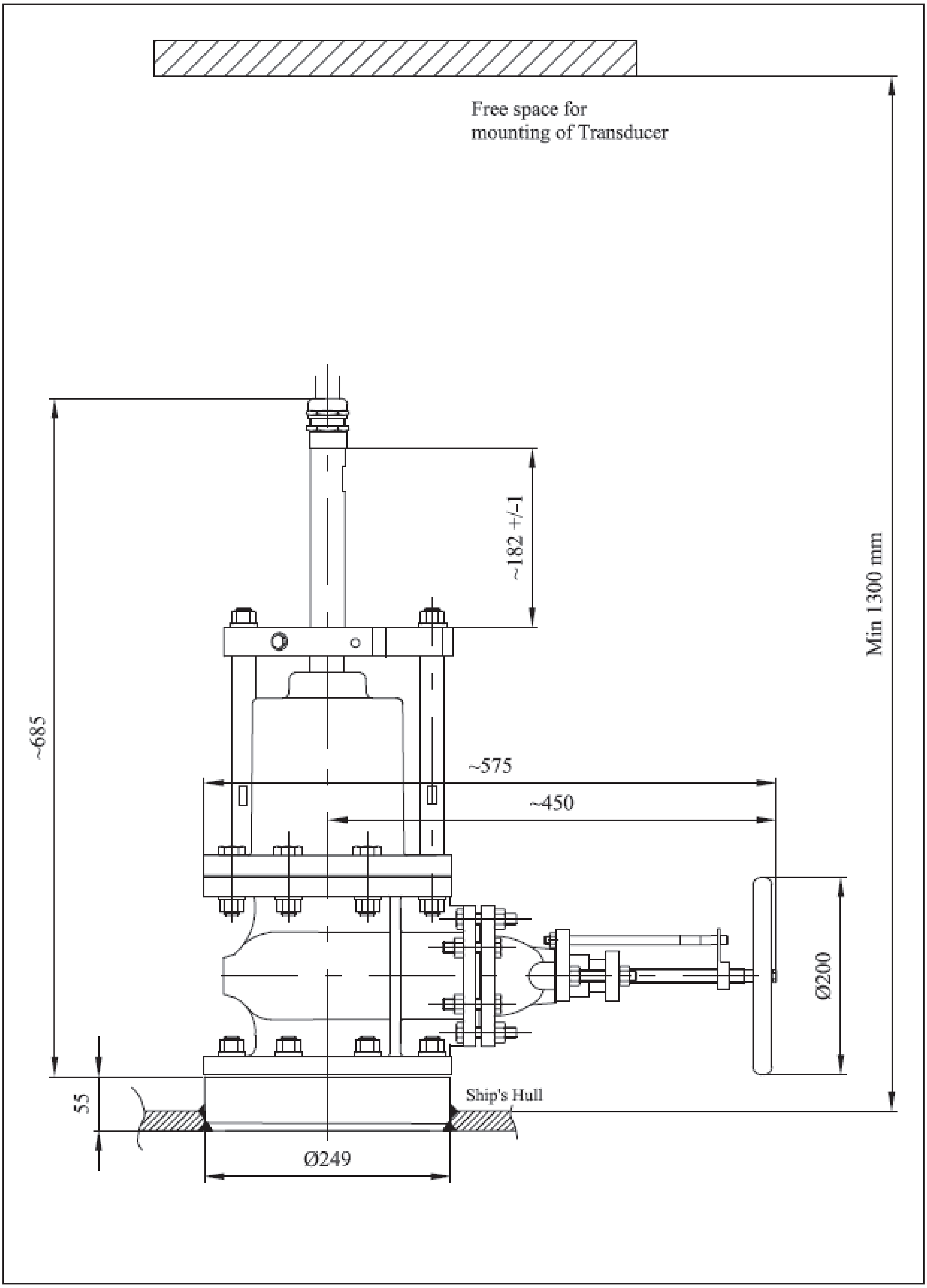
Fig. 1.1 MSSBSV H Assembly / Part Numbers



Note! The 5413314 SAL T Tube Brackets M12 are available as a komplete kit, part No. 5493308, that includes: 2pcs SAL T Tube Brackets M12, 2pcs M12x55 Screws and 2 pcs Spring Washers 12.2.

Overall dimensions of the final installation is shown in **Fig. 1.2**.

Fig.1.2 MSSBSV H Main dimensions

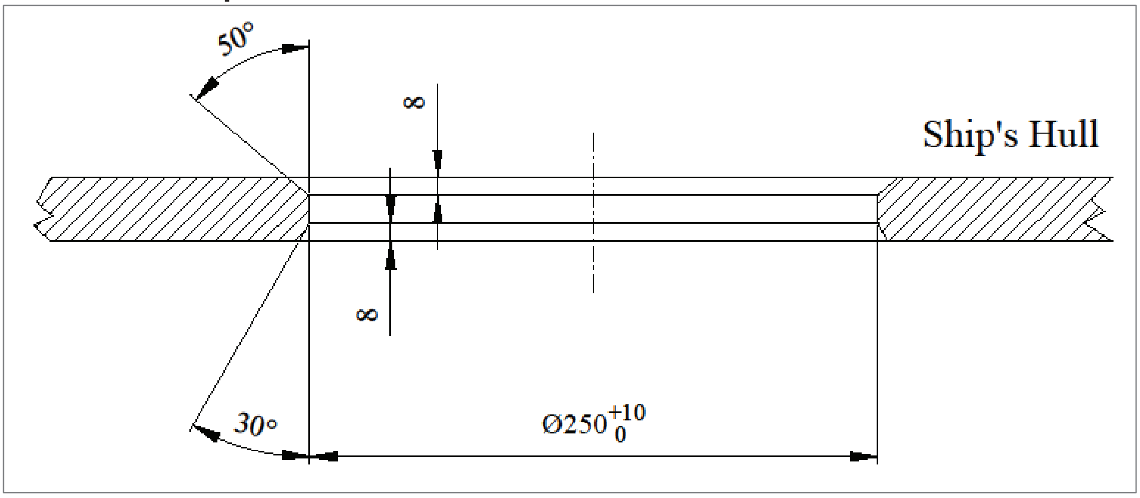


Bottom Flange hull mounting procedures

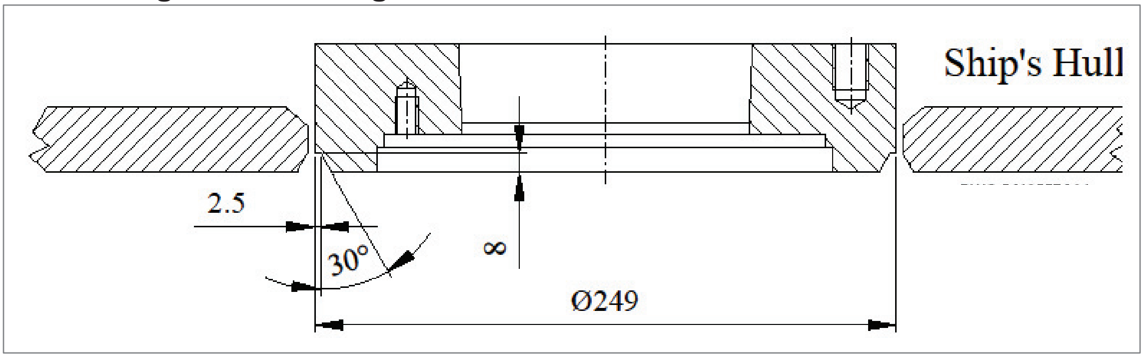
The Bottom Flange must first be welded into a hole cut in the ship's bottom hull.

1. Cut a circular hole (diameter 250mm +10/–0mm) at the selected Transducer position.

Hole cut in Ship's Hull



Positioning Bottom Flange flush with hull outside



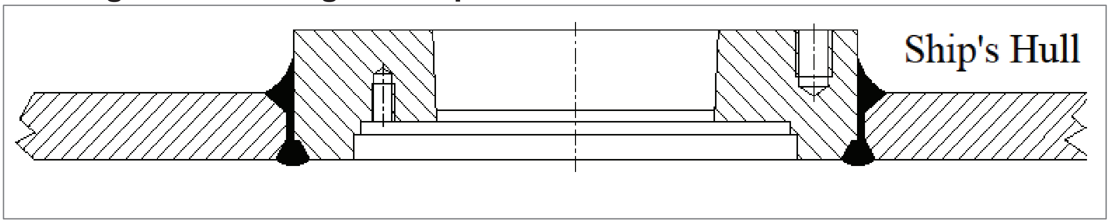
Notes:

- **IT IS IMPORTANT** that the outer (bottom) surface of the flange is flush with the hull and exactly vertical/perpendicular and horizontal in a flat area of the hull underside.
  For this kind of installation there is no direction requirement (longitudinal or transverse) of the flange. Disregard any markings (red dot/groove) on the flange. The markings are intended for other purpose and are not used here.

- Welding work shall be carried out by qualified personnel as required by the applicable classification society.

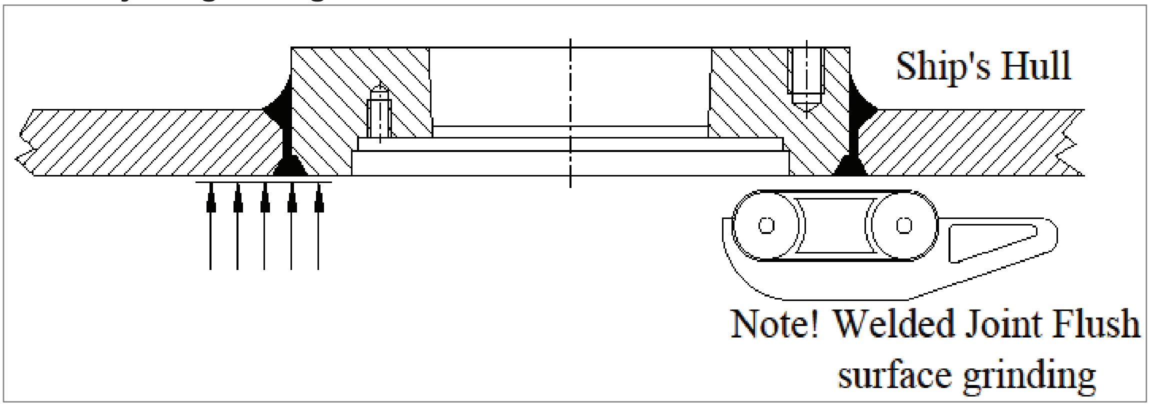
2. Weld the Bottom Flange into the hole, ensure that it is positioned so that the Sea Valve may be fitted inboard (in desired direction) without obstruction.

Welding Bottom Flange in Ship's Hull



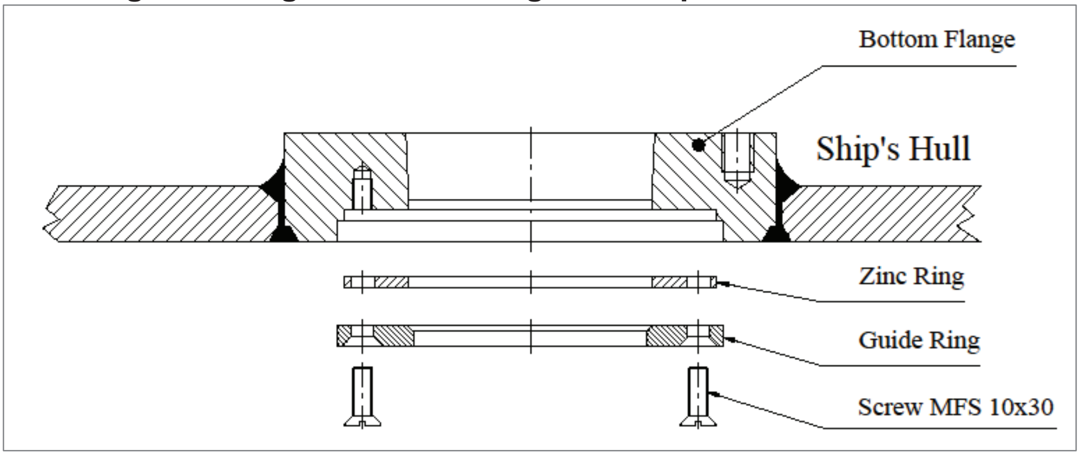
- The welded joint must be ground smooth and flush with the hull. There must be no sharp edges to interfere with the water flow around the Transducer.

Welded joint grinding



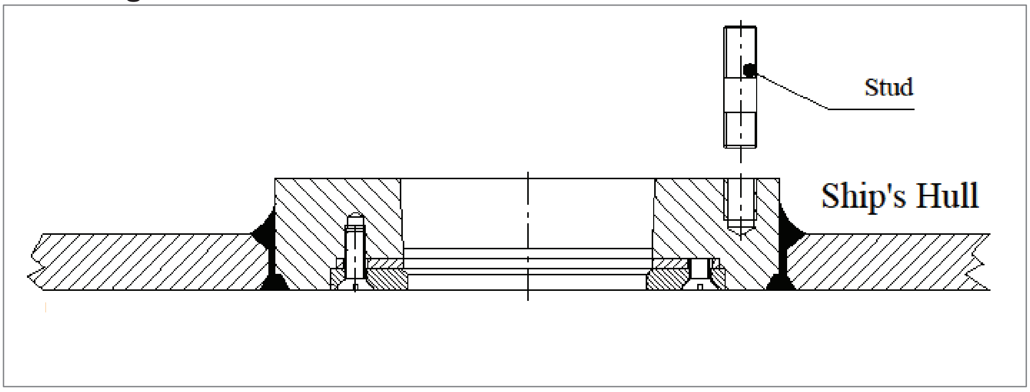
3. Fit the Zinc Ring and the Guide Ring into the outside base of the Bottom Flange and secure with the six MFS 10x30 screws, use MoS2 grease on the threads. Tighten the screws to approx. 35Nm.

Mounting Zinc Ring and Guide Ring from ship's outside



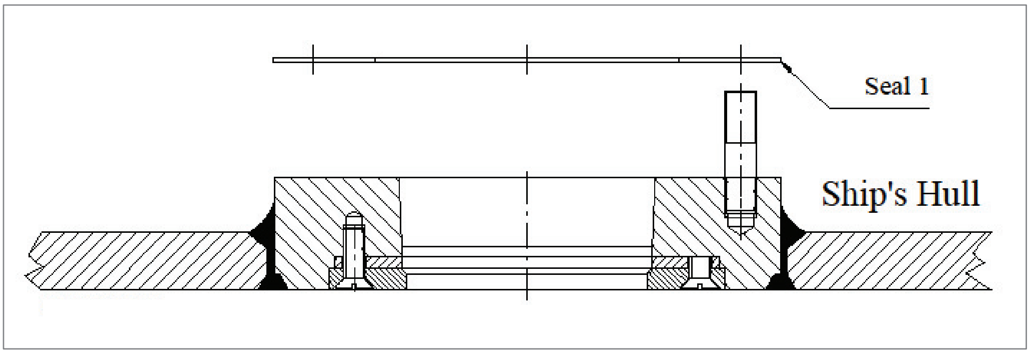
4. Screw the eight PS 16x40 Studs into the top side of the Bottom Flange.
Use Loctite® 243 or similar on the threads that goes into the flange.
Short threaded end downwards! Tighten to approx. 150N.

Mounting Studs



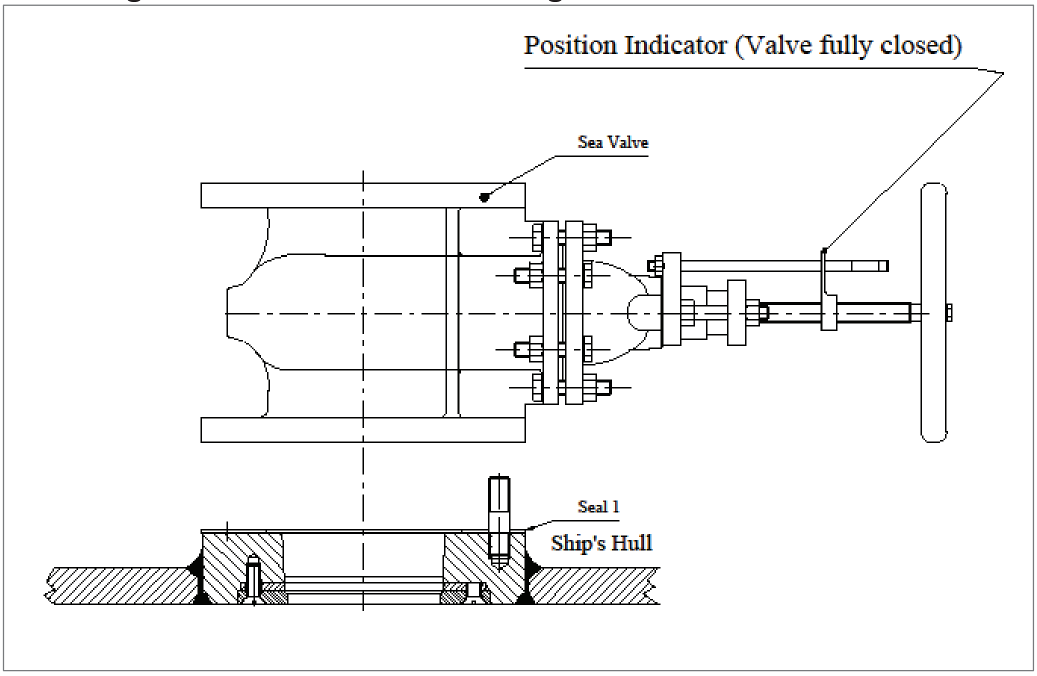
5. Ensure that the flange surface is clean. Place a gasket, Seal 1, on the flange.

Gasket Seal 1



6. Ensure that both Sea Valve flanges are clean.
   - Fit the Sea Valve over the studs with the Position Indicator pin upwards.
     - There is no directional requirement for the handwheel.
     - Mount as space allows and convenience for operation.
   - Centre on the flange and secure with eight Spring Washers and eight M6M M16 Nuts. Use MoS2 grease on the threads.
   - Slightly pre-tighten the nuts crosswise/diagonally.
   - Finish by tighten all nuts to approx. 150Nm again crosswise/diagonally.

Mounting Sea Valve on Bottom Flange



Transducer and Valve Cover Assembling

The Assembly consists of:

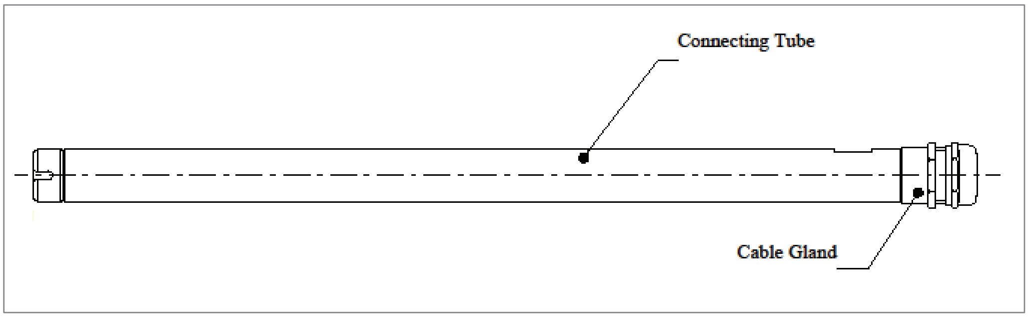
- Transducer with cable (30/40 m)
- Valve Cover with:
  - Connecting Tube with sealing items.
  - Tube Bracket with mounting items.

Assemble as follows:

1. The Valve Cover ***shall not yet*** be mounted on the Sea Valve.
   - Check that the two Lip Seals are correctly mounted inside the top end of the Valve Cover. Normally mounted from factory.
   - Assure Lip Seals to be clean and free from particles/dirt.
   - Slightly lubricate the Lip Seals with Vaseline®, Silicone grease or similar.

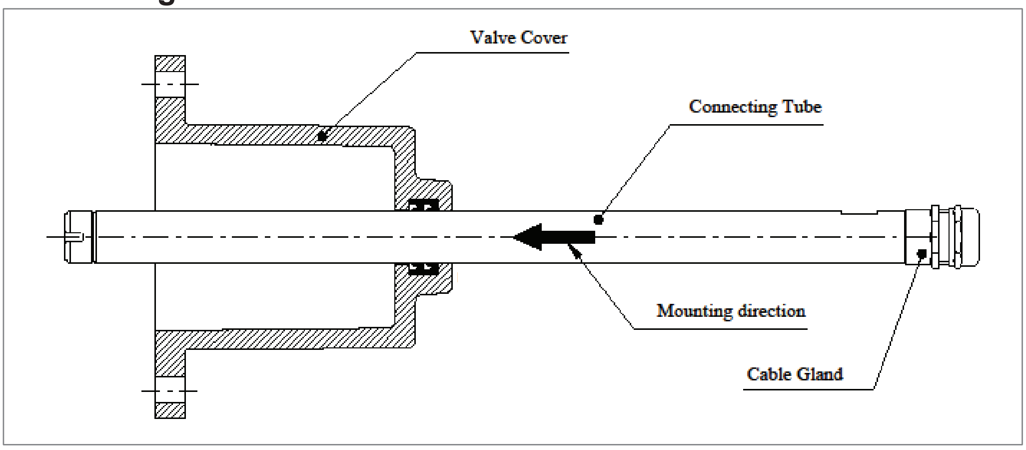
2. Mount the Cable Gland on the Connecting Tube.

Cable Gland mounted



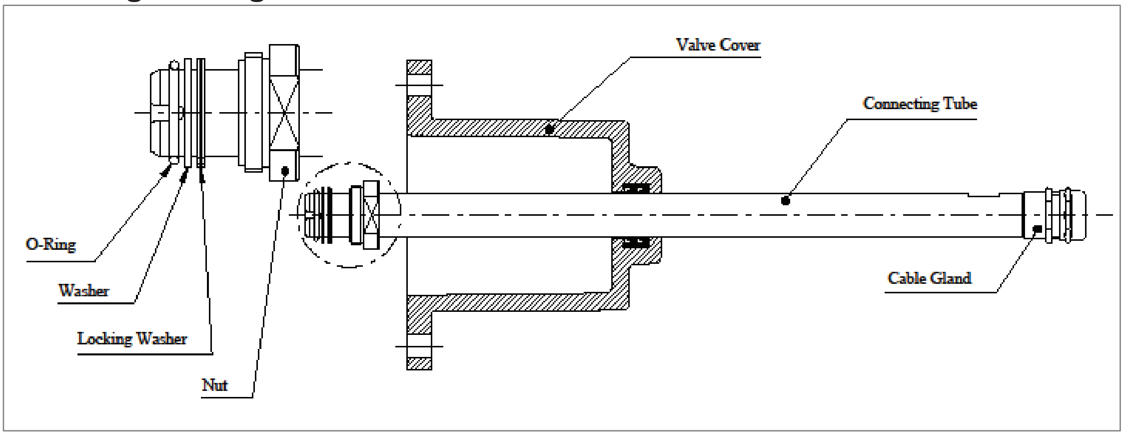
3. Gently push the Connecting Tube through the Valve Cover top end.
   Note: It is important that the Connecting Tube is ***inserted from top end*** of the Valve Cover. ***Never try to insert*** the opposite way, will damage the Lip Seals.

Connecting Tube inserted

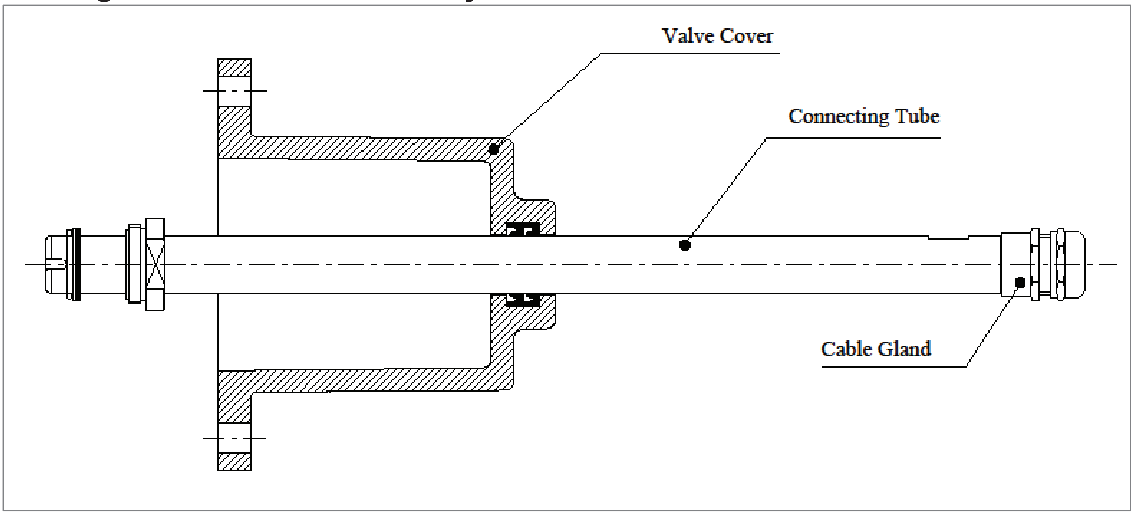


4. Mount the Nut, Locking Washer/Circlip, Washer and O-Ring onto the Connecting Tube ***strictly*** in the order shown below.

Mounting Sealing items

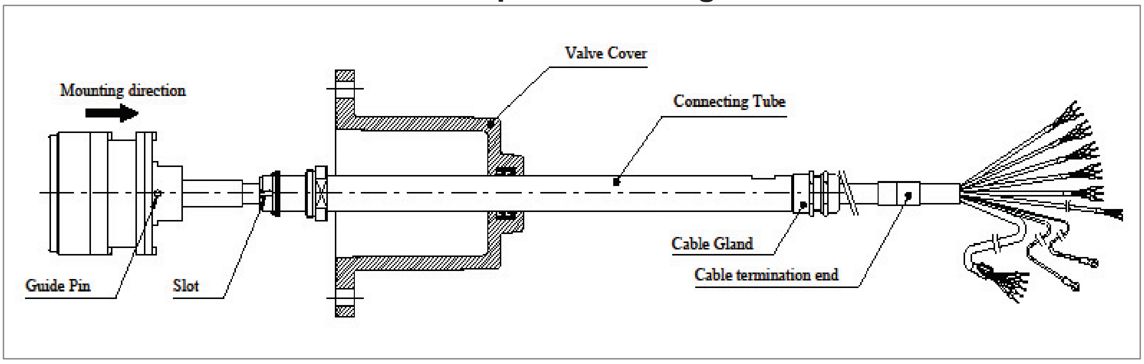


Sealing items mounted – Ready for Cable insertion



5. Uncoil and lay out the complete length of the Transducer cable to make it available for insertion through the Connecting Tube.
Maintain transport protection on the Transducer Head as far as possible and ***be careful during mounting procedures***.
   - It is recommended to temporarily wrap the termination pins with insulation tape to ease insertion and for protection throughout the installation work.
   - If necessary partly disassemble the Cable Gland to make it easier to feed the termination pins through the Gland.
   - Carefully feed the cable end through the tube and through the Cable Gland.
   - Re-assemble the Cable Gland when a short length of the cable is passed through.
   - Do not tighten the Cable Gland at this stage.
   - Pull the complete length of cable through the tube.

Cable Gland mounted and cable passed through



6. Remove the Transducer transport protection.

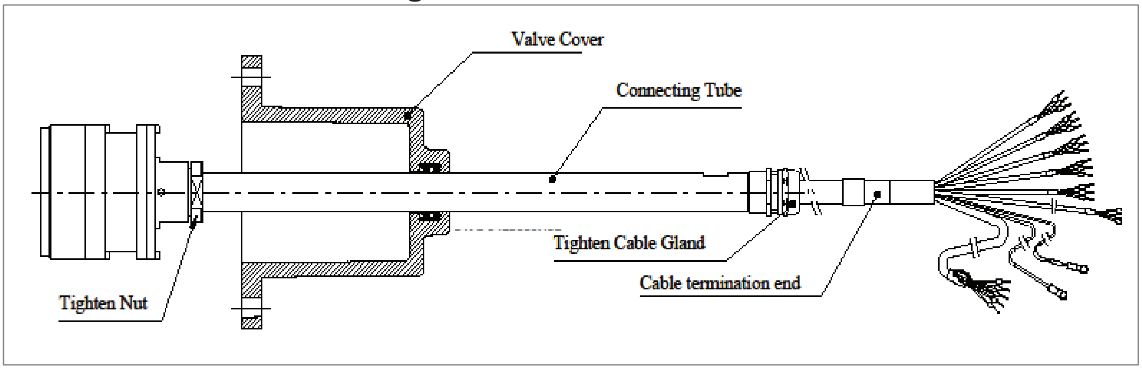
   Note: From this point and forward in the instruction the ***Transducer Head must be handled with proper care*** not to be damaged.

7. Push the Transducer onto the Connecting Tube ***checking carefully*** that the ***Slot*** in the Connecting Tube is ***correctly aligned*** with the ***Guide Pin*** in the Transducer.

8. Engage the Nut in the Transducer threads (only possible when Slot and Guide Pin are aligned!) and ***firmly tighten*** the Nut.

9. ***Securely tighten*** the Cable Gland around the cable.

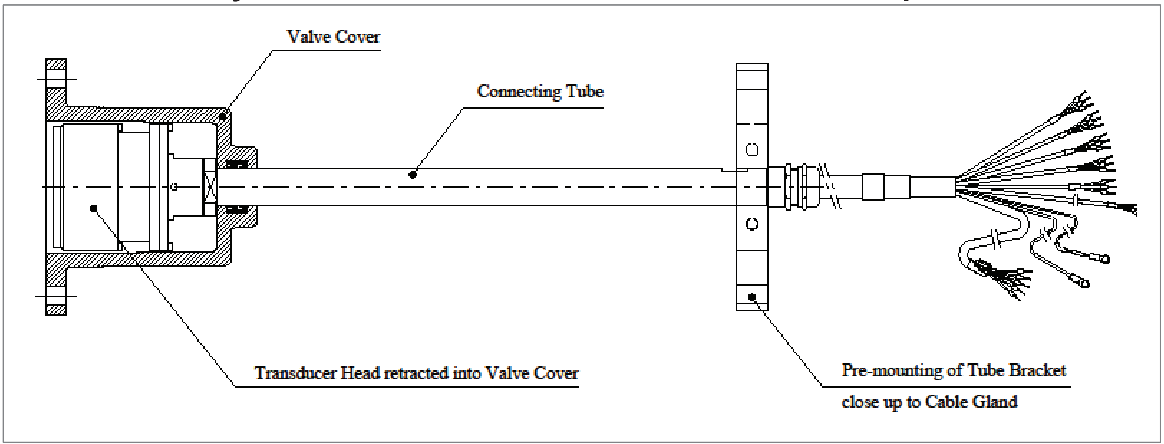
Transducer and Connecting Tube assembled



10. Push the Transducer/Tube assembly ***completely into*** the Valve Cover.
    Do not rest the Transducer on its sensor surface!

11. Pre-mounting of the Tube Bracket. **See picture below!**
- Ensure that the Connecting tube and the contact surface of the Tube brackets are clean.
- Use MoS2 grease on the Tube brackets M12 Screw threads.
- Mount the two clamping parts close up against the Cable Gland and ***slightly*** tighten the two M6S M12x55 Screws with Spring Washers in order to allow lifting the complete assembly by the Tube Bracket.

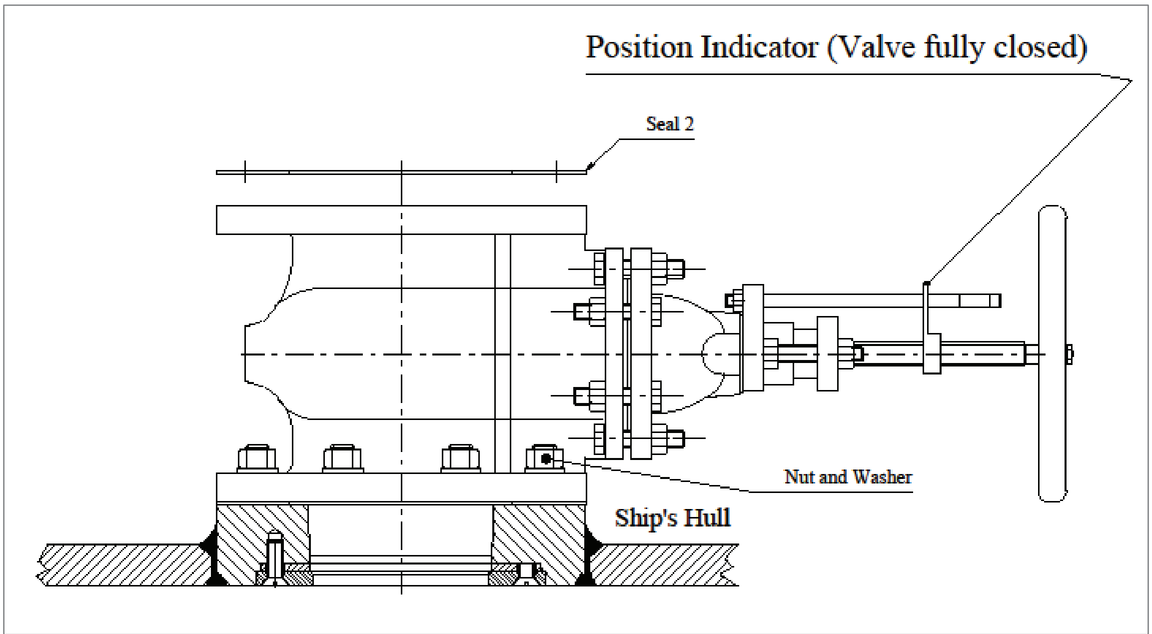
Transducer fully retracted into Valve Cover – Tube Bracket pre-mounted



12. Before lifting the assembly vertically, arrange assisting personnel or a support rope or sling around the Tube Bracket ***to securely hold*** the Transducer in fully retracted position inside the Valve Cover during the mounting procedure on the Sea Valve.

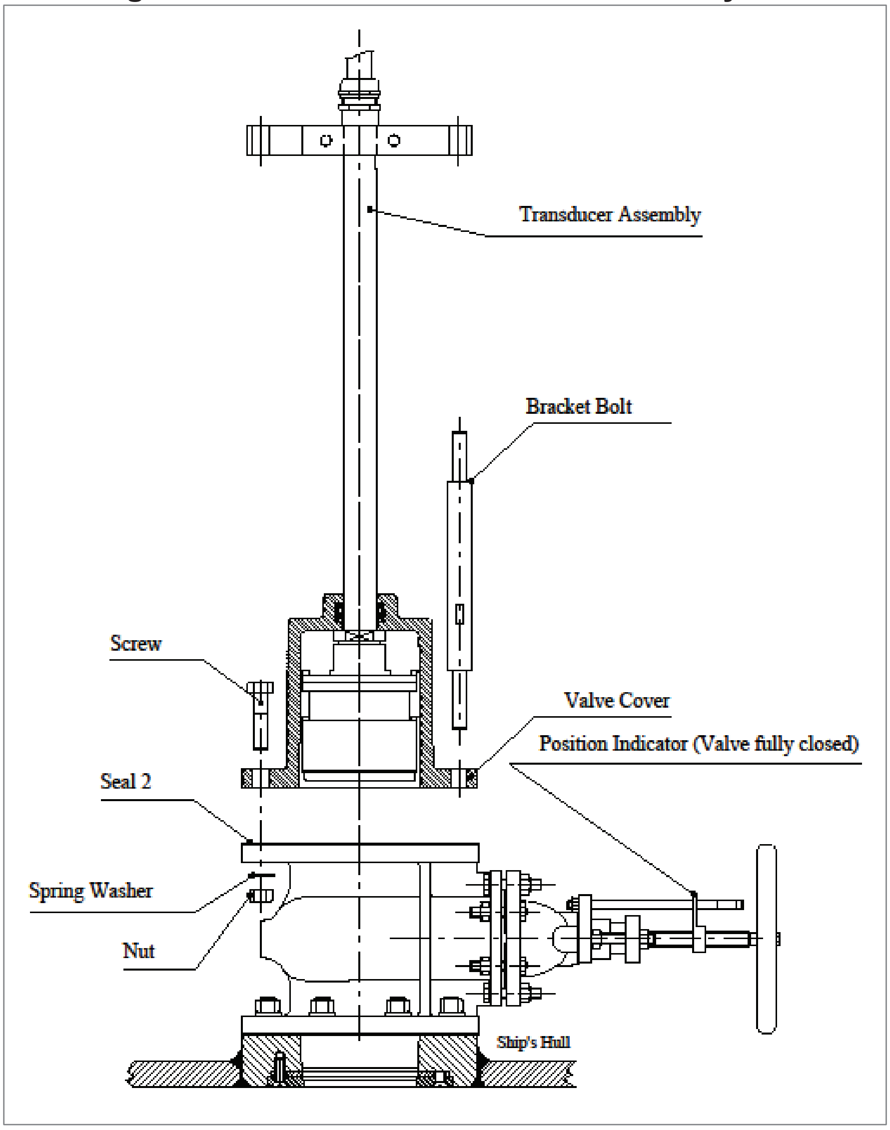
13. Place a gasket, Seal 2, centred with the screw holes on the clean Sea Valve top flange.

Gasket Seal 2



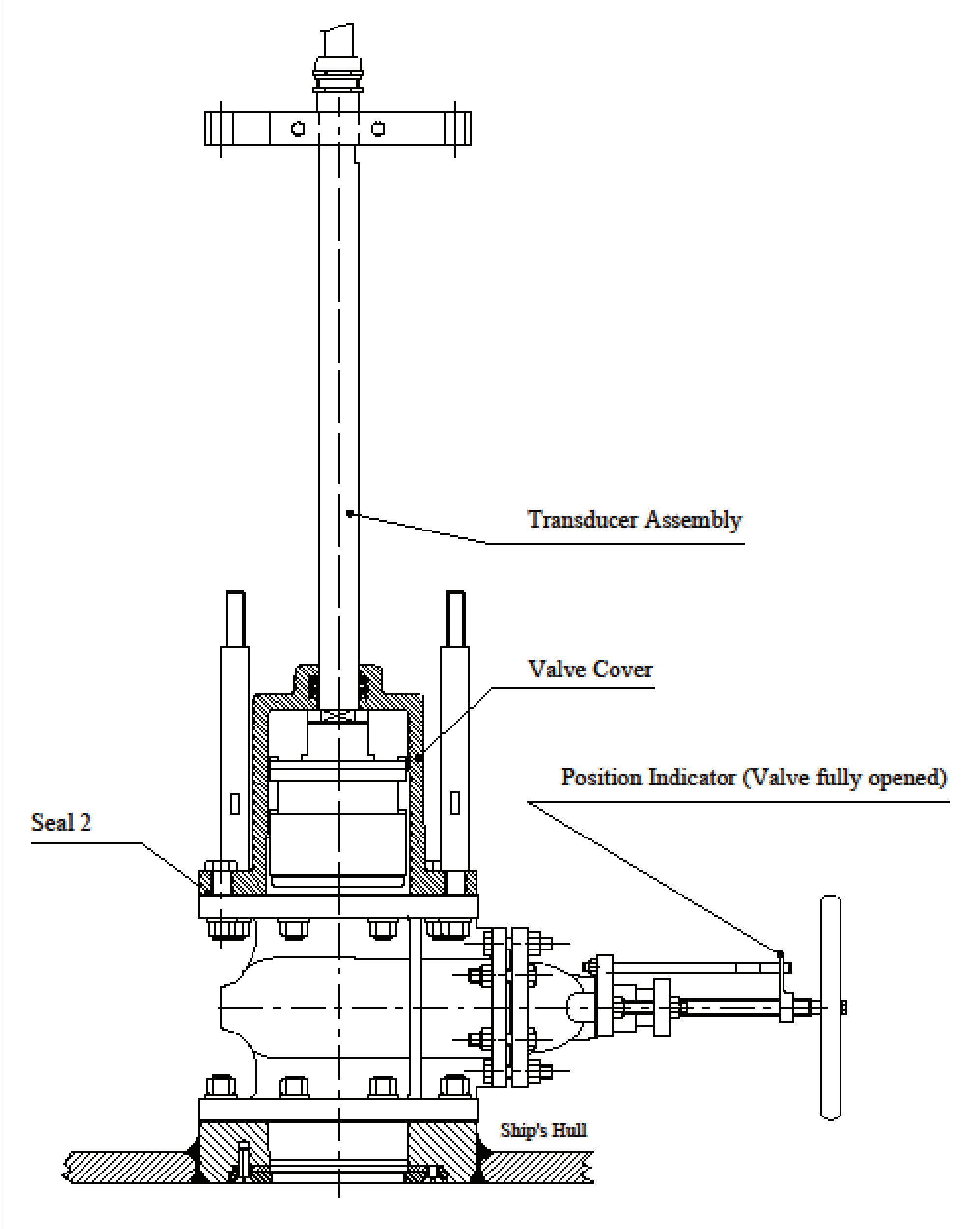
14. ***Carefully*** lift and place the Transducer and Valve Cover assembly on the Sea Valve flange properly centred with Seal 2 and flange holes.
Ensure that the Transducer is still maintained ***fully retracted*** into the Valve Cover and does ***not accidently hit*** any hard surfaces and ***do not lower*** the Transducer before the Sea Valve gate is fully opened!

Mounting Transducer and Valve Cover assembly on Sea Valve



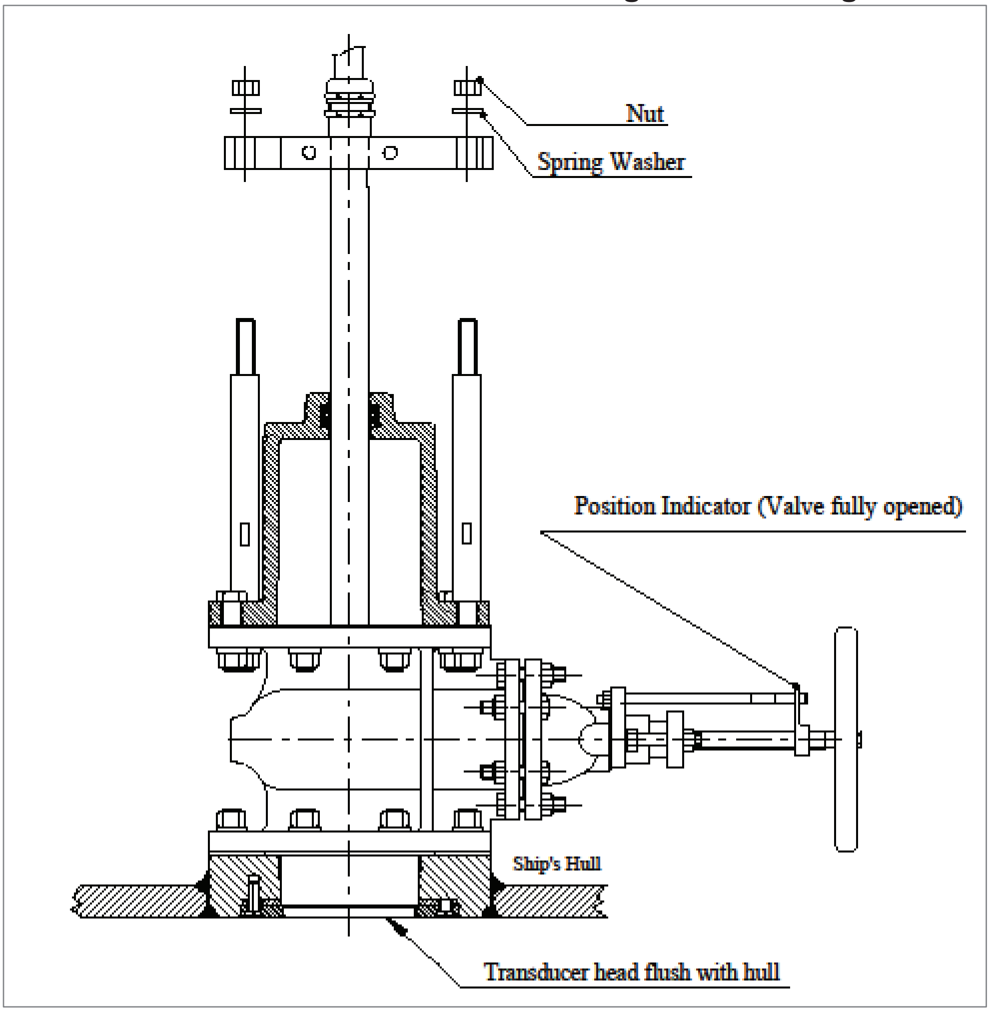
15. Crosswise loosely secure the Transducer and Valve Cover assembly on the Sea Valve using six M6S M16x60 Screws, six Spring Washers and six M6M M16 Nuts.
Use MoS2 grease on the threads. Leave two diagonally positioned flange screw holes free for the Bracket Bolts.
- Any diagonal position can be used.
- There is no direction requirement for the Valve Cover.
    - Mount the two Bracket Bolts in the two free flange screw holes assuring that the longer threaded ends are mounted downwards.
    - Loosely secure the Bracket Bolts at the lower ends with two Spring Washers and two M6M M16 Nuts, use MoS2 grease on the threads.
    - Finish by crosswise tighten all flange screws/bolts and nuts to approx. 150Nm

Transducer and Valve Cover mounted - Sea Valve fully opened



16. ***Fully open*** the Sea Valve, approximately 28 full turns counter-clockwise on the handwheel from fully closed to fully open.
   - Gently slide down the Connecting Tube to ***carefully lower*** the Transducer into the Sea Valve.
     A slight resistance might be felt when the Transducer sensor head edge enters the chamfered Guide Ring.
     When the tube reaches stop position the Transducer should be seated in the Guide Ring with a slight protrusion, less than 2mm.

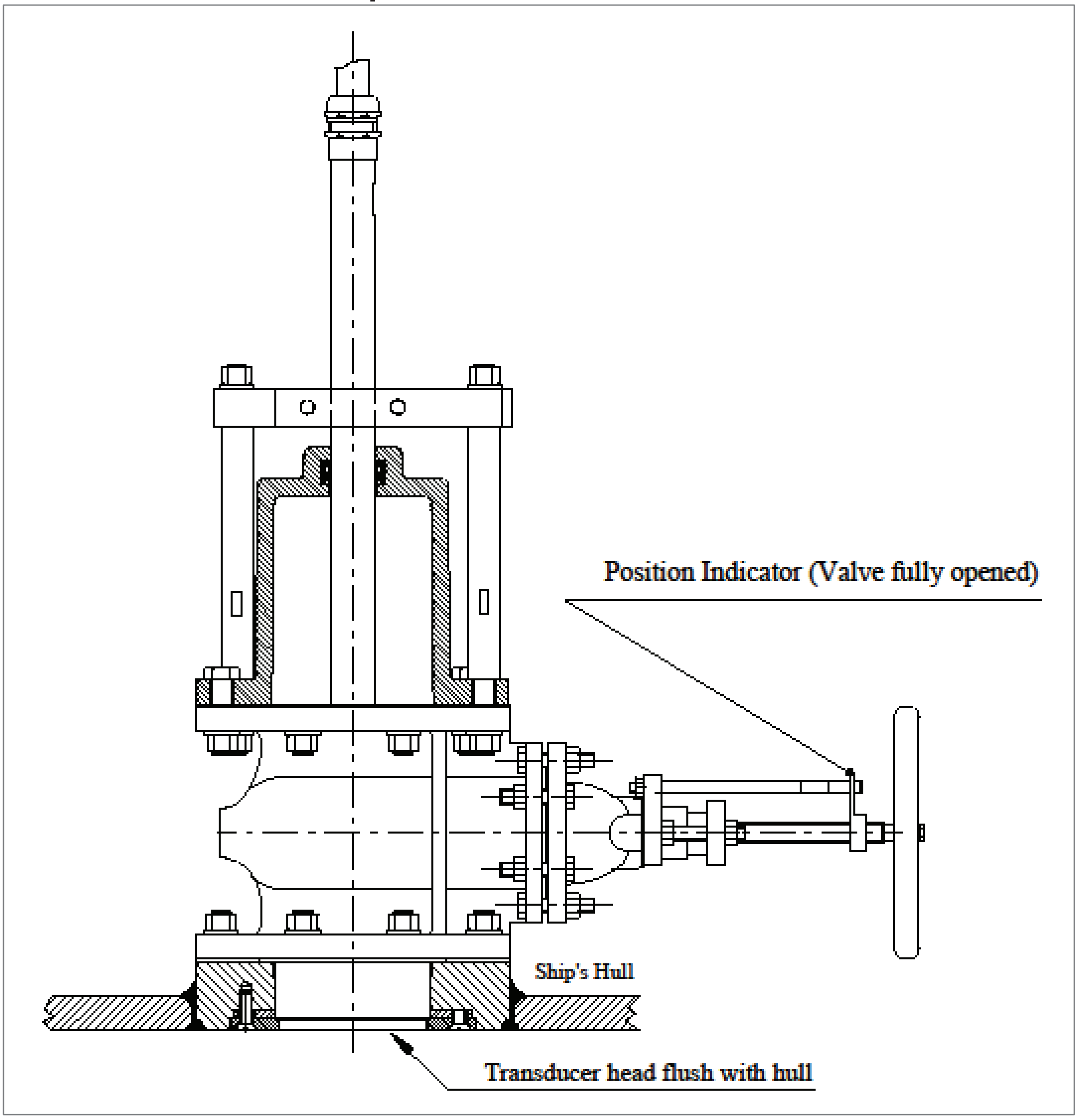
Transducer lowered down to flush seating in Guide Ring



17. Loosen the two clamping Screws (M6S M12x55) on the Tube Bracket a few turns to split the two clamping parts and gently slide down the Tube Bracket and rotate as necessary to align the Tube Bracket holes with the two Bracket Bolts.

- Ensure that the contact area between Connecting tube/Tube brackets is clean, free from any grease or silicone. Dismount and clean the surfaces if necessary.
- Verify that the Tube Bracket assembly is properly seated on the Bracket Bolts.
- Evenly secure the Bracket Bolts upper ends (short threads) in the Tube Bracket with two Spring Washers and two M6M M16 Nuts.Tighten to approx. 150Nm.
- Final adjustment for flush seating and keel/longitudinal line parallel alignment to follow below.
- A check measurement to Tube top end with Tube Bracket tightened in its final position is approximately ***182 +/-1 mm*** as indicated in **Fig. 1.2** above.

Tube Bracket in its final position with Transducer flush seated.



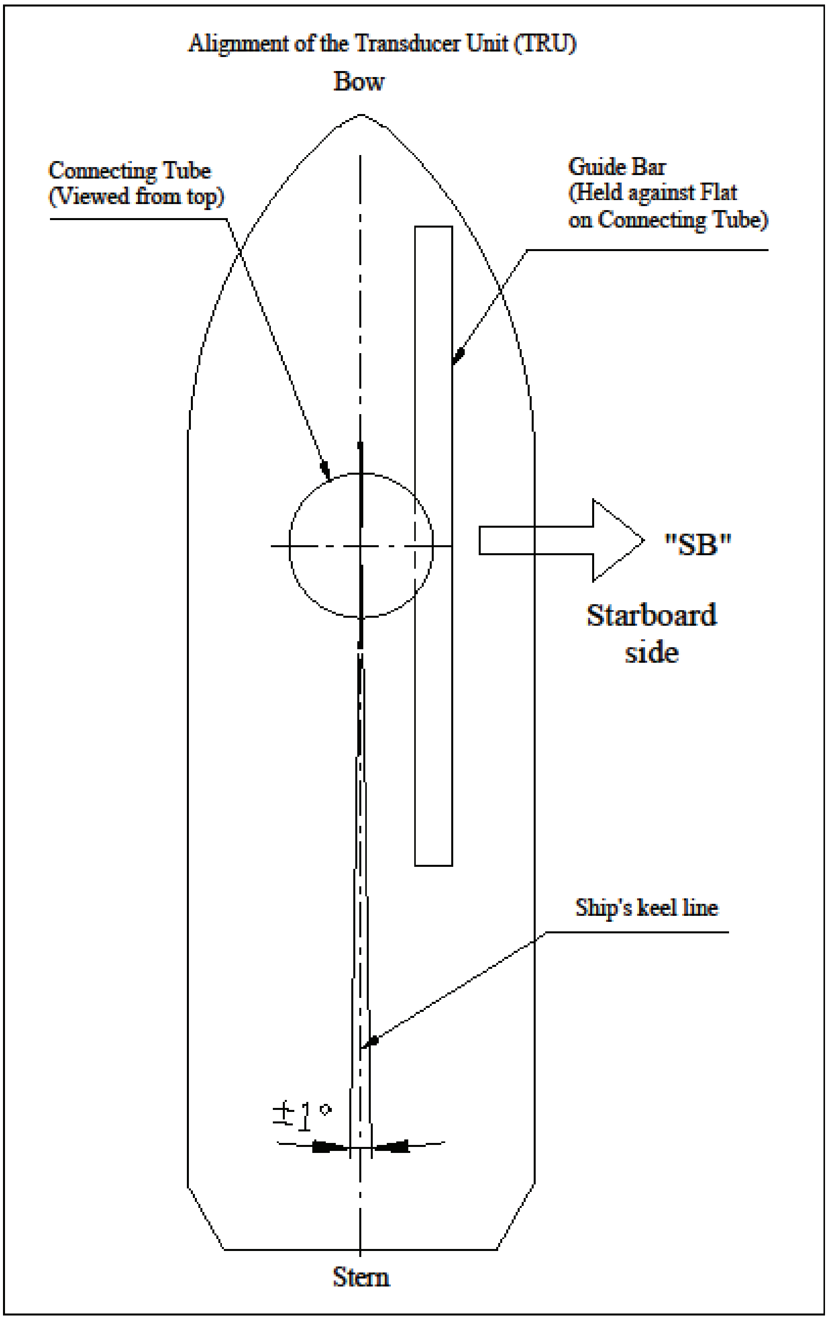
18. Complete the adjustments by aligning the Connection Tube "**SB**" flat mark as shown in **Fig. 1.3** below.

    Ensure that the Transducer is correctly seated at its lowest position.
    Verify this by checking the Transducer installation as possible from outside the ship's hull. For future records preferraby documented by photos.

    Note: IT IS IMPORTANT THAT THE TRANSDUCER IS CORRECTLY SEATED AND PROPERLY ALIGNED.

19. Ensure that the Tube Bracket clamping screws are loosened and freely turn the tube so that the ***flat area*** on the Connecting Tube faces ***strictly to StarBoard*** and ***aligned parallel*** with the keel line ***within ±1°.***
    - Use a straight guide bar held against the flat area to facilitate this, see **Fig 1.3**.
    - By thorough eye aiming, or measure with a ruler/meter tape, align parallel with any keel/longitudinal line reference (bulkhead, stiffener plate, girder, longitudinal weld seam or similar).
    - Tighten the Tube Bracket screws M12 to approx. 57Nm *or* if M10 to 35Nm.
    - Ensure that the two top nuts (M16M), fixating the tube brackets, are ***not pressing down*** the Transducer with force. The Transducer shall be seated on the Guide ring and shall not be pressed against it.
    - ***Re-check*** the tube height reference (assuring Transducer still properly seated) and then check and retighten Tube Bracket clamping screws (57Nm if M12, 35Nm if M10) at this position as well as the nuts on top of the Tube Bracket.

Fig. 1.3 Aligning Transducer Connecting Tube

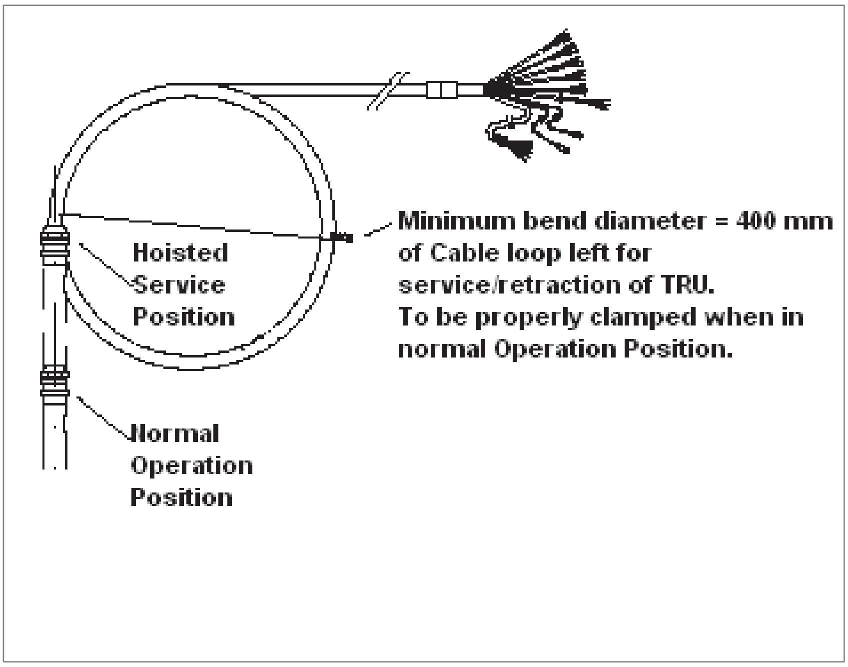


Transducer Cable to Sig.Processor NJC-80

- The Transducer cable must be installed/laid in a way to allow removal in case of service or replacement of a defective Transducer.
- Installation on cable trays or ladders should assure that the cable is accessible and not strapped together with other permanently installed cables.
- The cable must be separated at least 0.5 m from any other high power/frequency cable as well as avoid crossing such cables.
- Whenever installation conditions require use of conduit (e.g. pipe through water filled tank, etc.) the internal diameter should be adequate to enable easy cable traction/retraction. Transducer cable diameter is approximately 21 mm, thus a pipe inner diameter of 50 mm (~2 inches) is recommended or never less than 38 mm (~1.5 inch) much depending on number of bends on the conduit.
- Minimize the number of pipe bends as well as assure that the bend radius is never less than 0.5 m. Keep pipe as straight as possible.
- The cable bend radius shall never be less than 200 mm.

Never cut the cable! Warranty is void if cable is cutor violated.

- Excessive cable length.shall be coiled both close to NJC-80 as well as a service coil left nearby the Sea Valve, see figure blow:

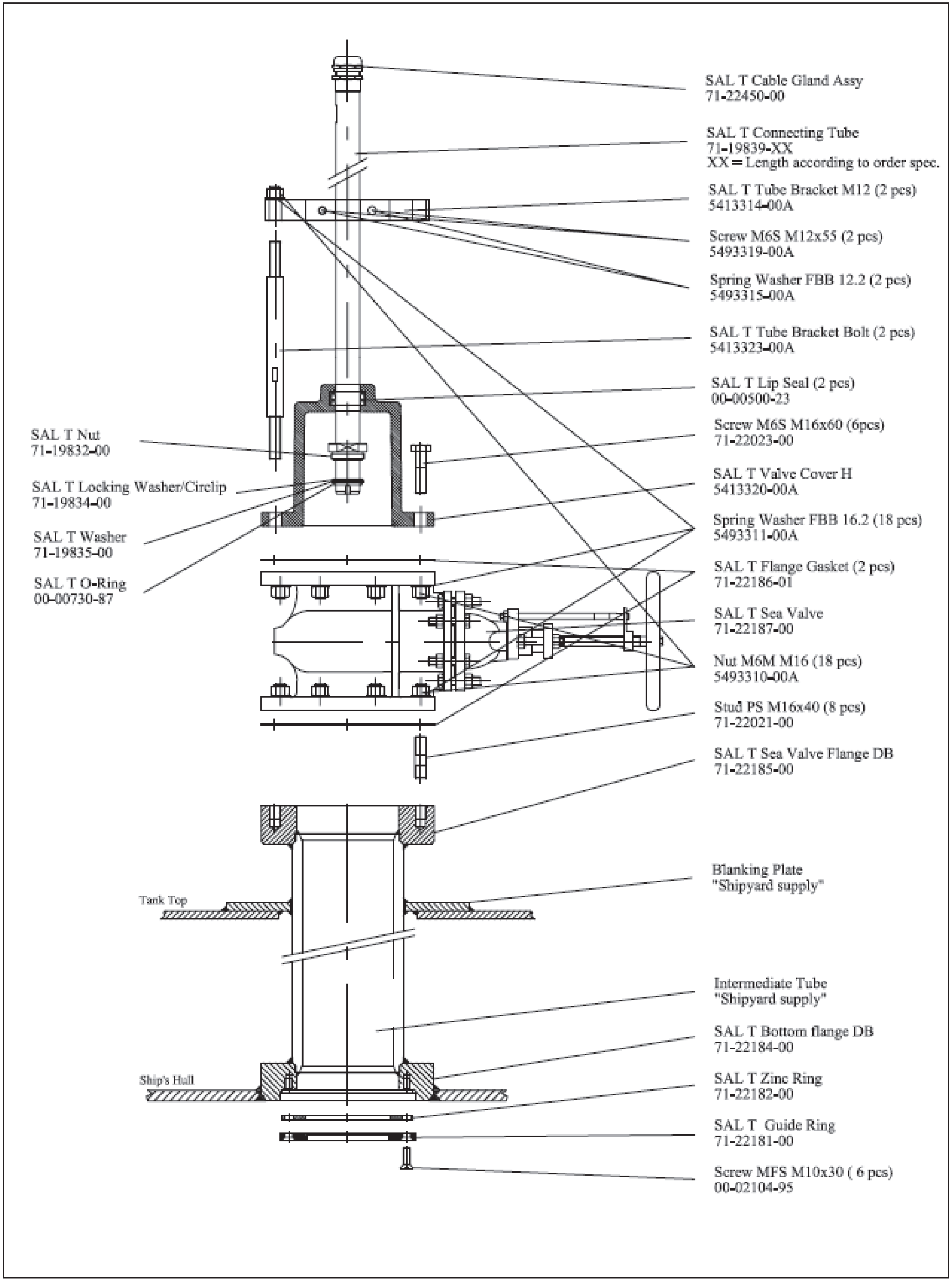


5. Mounting Set Double Bottom Sea Valve (MSDBSV H)

This mounting set is suitable for ships where an installation site can only be found penetrating any tank/double hull arrangement, i.e. “double bottom”, thus the Sea Valve needs to be located above the tank top in an accessible dry space.

Before starting installation and assembly check the contents of the kit according to **Fig. 2.1**.

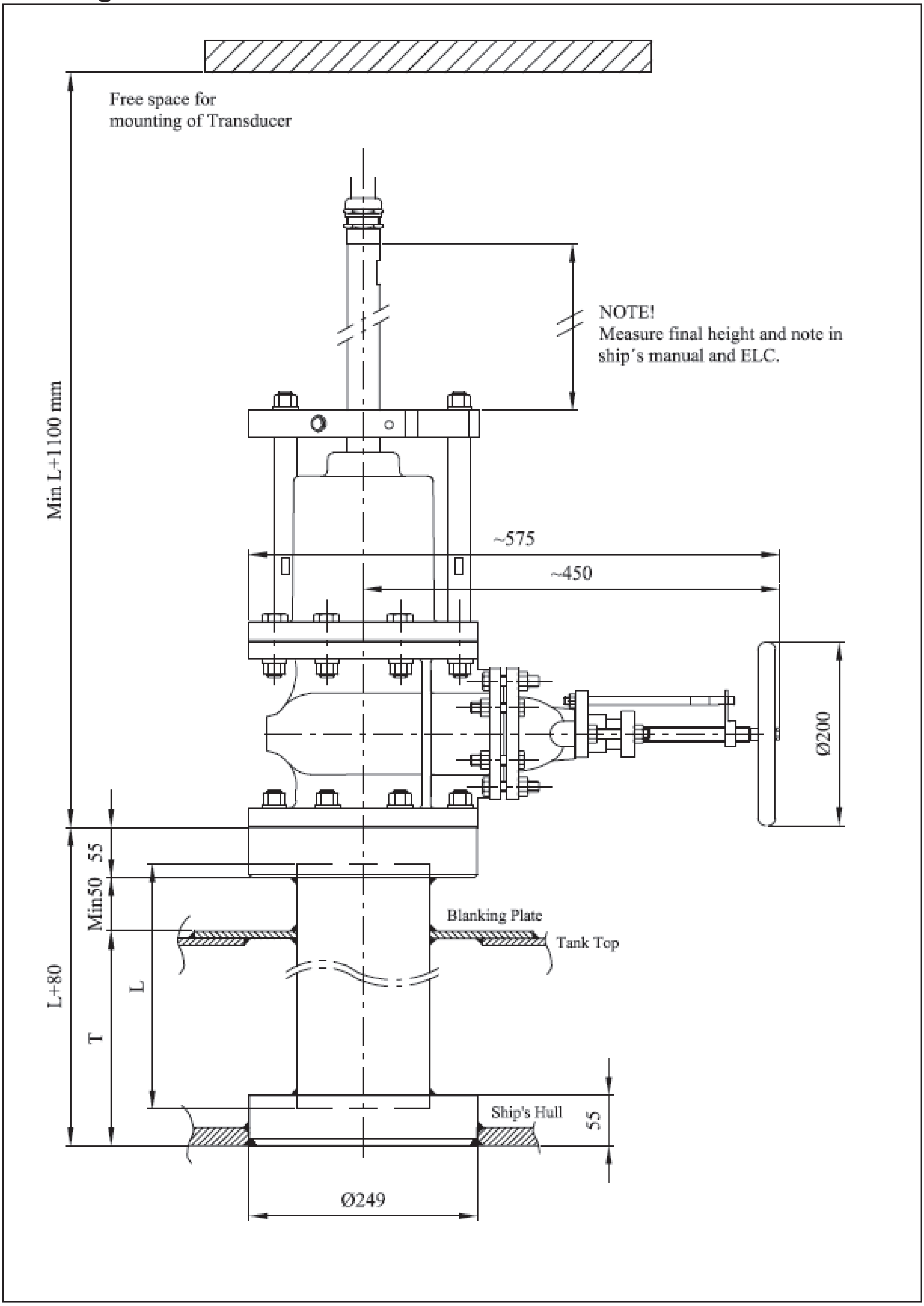
Fig. 2.1 MSDBSV H Assembly / Part Numbers



Note! The 5413314 SAL T Tube Brackets M12 are available as a komplete kit, part No. 5493308, that includes: 2pcs SAL T Tube Brackets M12, 2pcs M12x55 Screws and 2 pcs Spring Washers 12.2.

Overall dimensions of the final installation is shown in below **Fig. 2.2.**

Fig. 2.2 MSDBSV H Main dimensions



To complete the installation, the **Intermediate Tube** and **Blanking Plate MUST FIRST BE MANUFACTURED BY THE SHIPYARD** and further welded to the Upper Flange DB and the Bottom Flange DB.

Table 2.1
Intermediate Tube and Transducer Connecting Tube Lengths

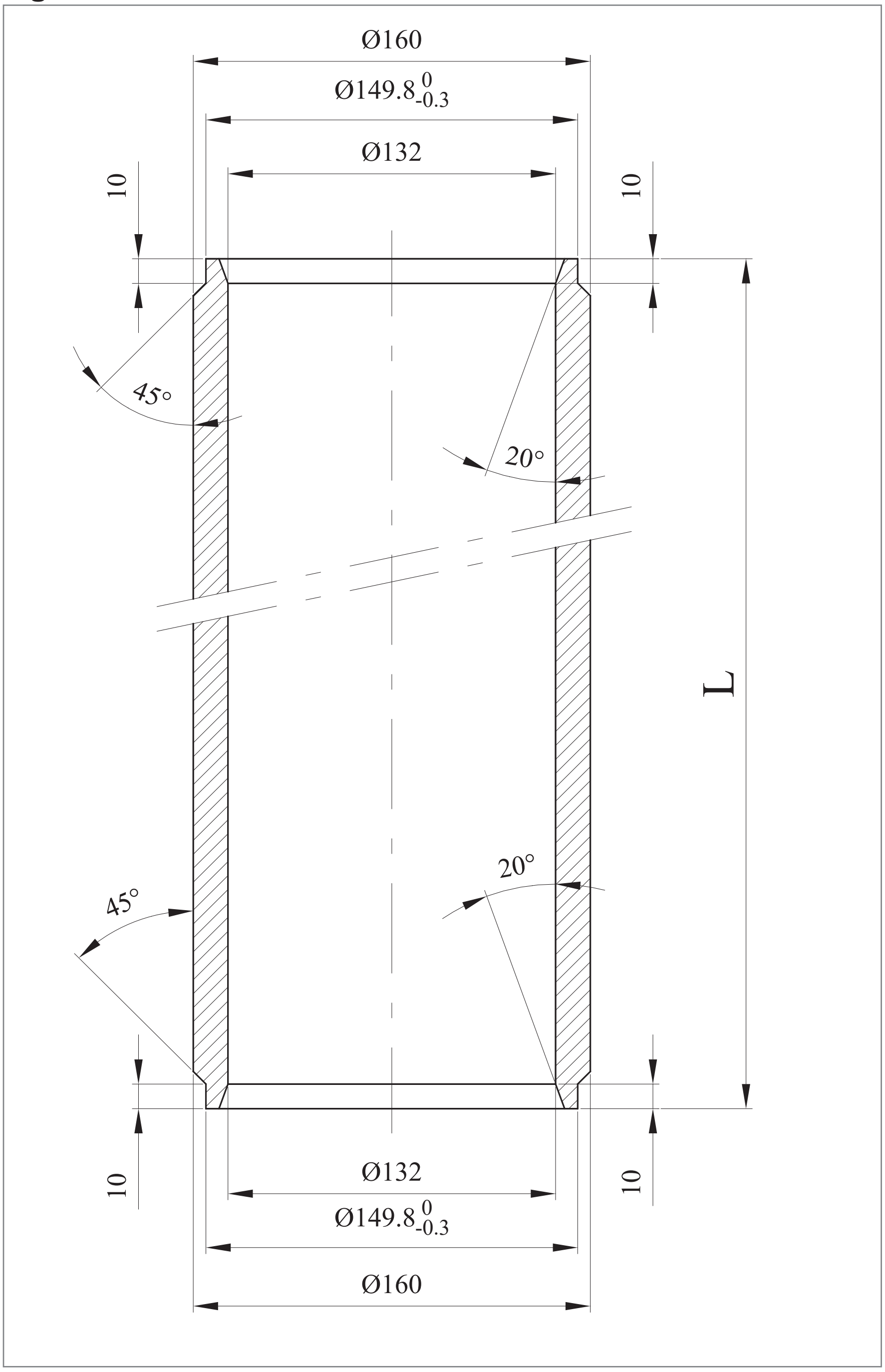
Tank Height T (See Fig. 2.2) (mm)	Intermediate Tube Length (mm)	Transducer Connecting Tube	
		Length (mm)	Part No.
Ship specific	Installation specific	700	71-19839-02
Ship specific	Installation specific	900	71-19839-03
Ship specific	Installation specific	1100	71-19839-04
< 700 / Ship specific	800	1300	71-19839-08
701-900	1000	1500	71-19839-10
901-1100	1200	1700	71-19839-12
1101-1300	1400	1900	71-19839-14
1301-1500	1600	2100	71-19839-16
1501-1700	1800	2300	71-19839-18
1701-1900	2000	2500	71-19839-20
1901-2100	2200	2700	71-19839-22
2101-2300	2400	2900	71-19839-24
2301-2500	2600	3100	71-19839-26
2501-2700	2800	3300	71-19839-28
2701-2900	3000	3500	71-19839-30
2901-3100	3200	3700	71-19839-32

Intermediate Tube and Blanking Plate Manufacture

1. Use **Table 2.1** above to choose the required Intermediate Tube length and the part number and the length of the Transducer Connecting Tube to be ordered or already supplied.

2. Prepare the Intermediate Tube according to the dimensions shown in **Fig. 2.3**. The material used should be steel, type ISO S355JR or equivalent.

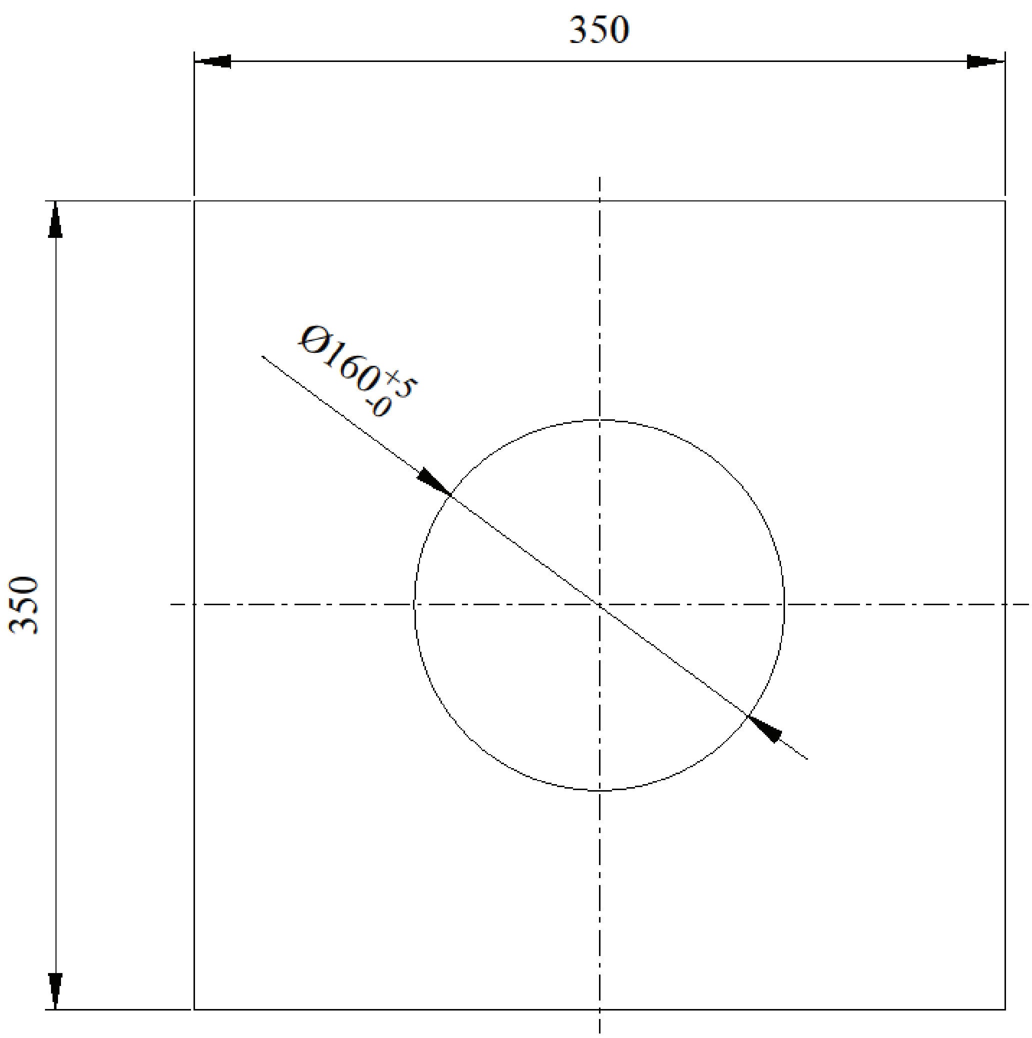
Fig. 2.3 Intermediate Tube



3. Prepare the Blanking Plate according to the dimensions shown in **Fig. 2.4**. The material used should be steel, type ISO S355JR or equivalent.

Fig. 2.4 Blanking Plate

Blanking Plate material: Sheet steel type ISO S355JR Thickness: Same as Tank top

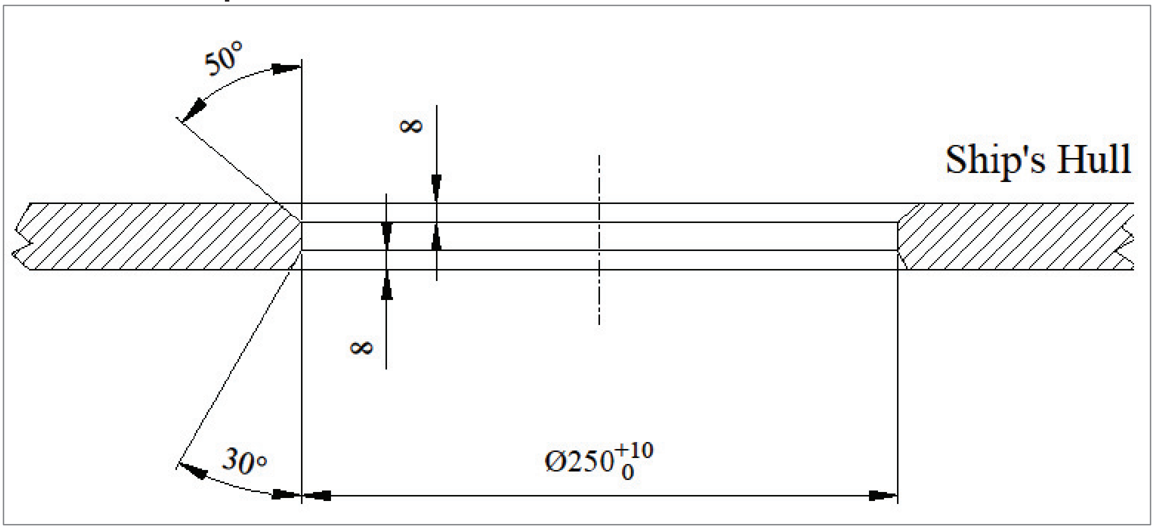


Bottom Flange DB hull mounting followed by Intermediate Tube, Blanking Plate and Upper Flange DB mounting procedures

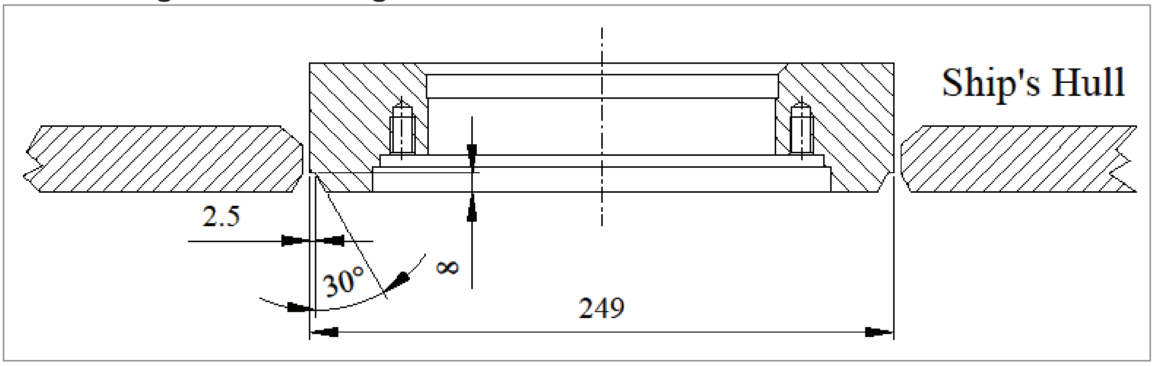
The Bottom Flange DB must first be welded into a hole cut in the ship's bottom hull.

1. Cut a circular hole (diameter 250mm +10/ –0mm) at the selected Transducer position.

Hole cut in Ship's Hull



Positioning Bottom Flange DB flush with hull outside

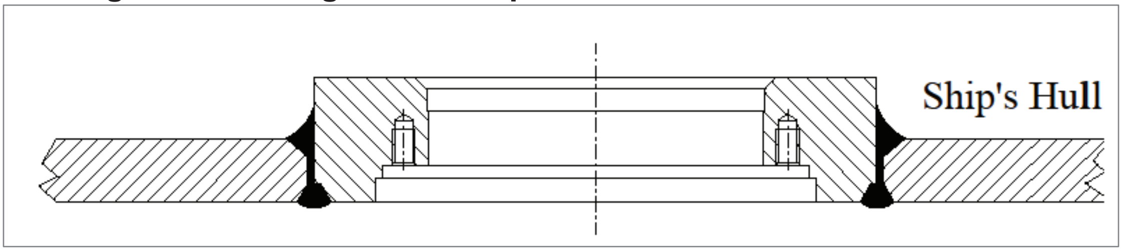


Notes:

- **IT IS IMPORTANT** that the outer (bottom) surface of the flange is flush with the hull and exactly vertical/perpendicular and horizontal in a flat area of the hull underside.
  For this kind of installation there is no direction requirement (longitudinal or transverse) of the flange.
- Welding work shall be carried out by qualified personnel as required by the applicable classification society.

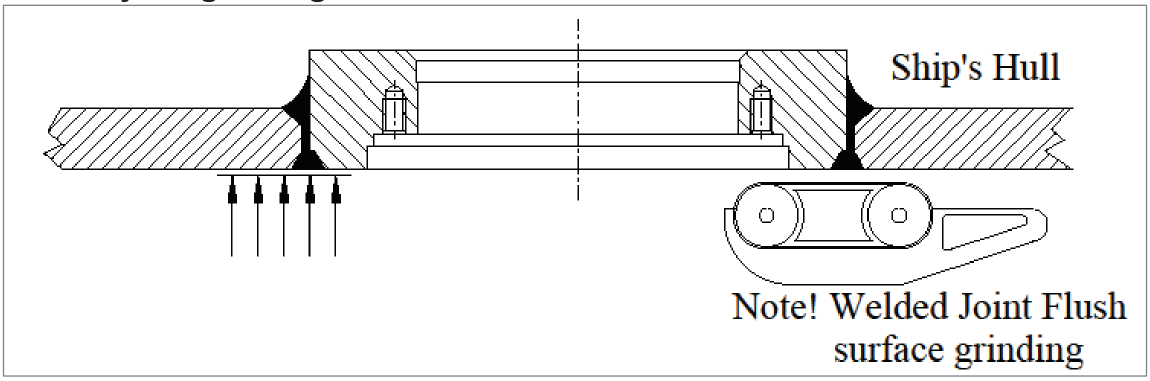
2. Weld the Bottom Flange into the hole; ensure that it is positioned so that the Sea Valve may be fitted inboard(in desired direction) without obstruction.

Welding Bottom Flange DB in Ship's Hull



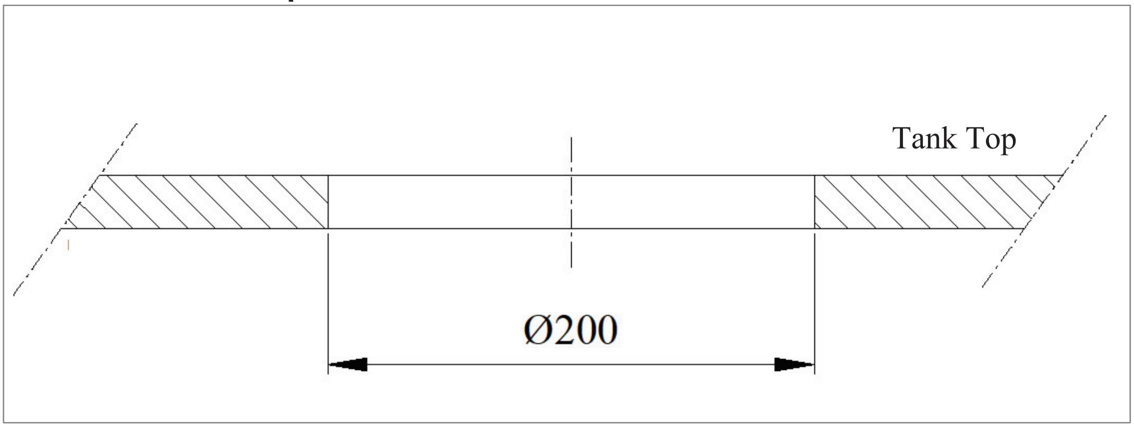
- The welded joint must be ground smooth and flush with the hull. There must be no sharp edges to interfere with the water flow around the Transducer.

Welded joint grinding



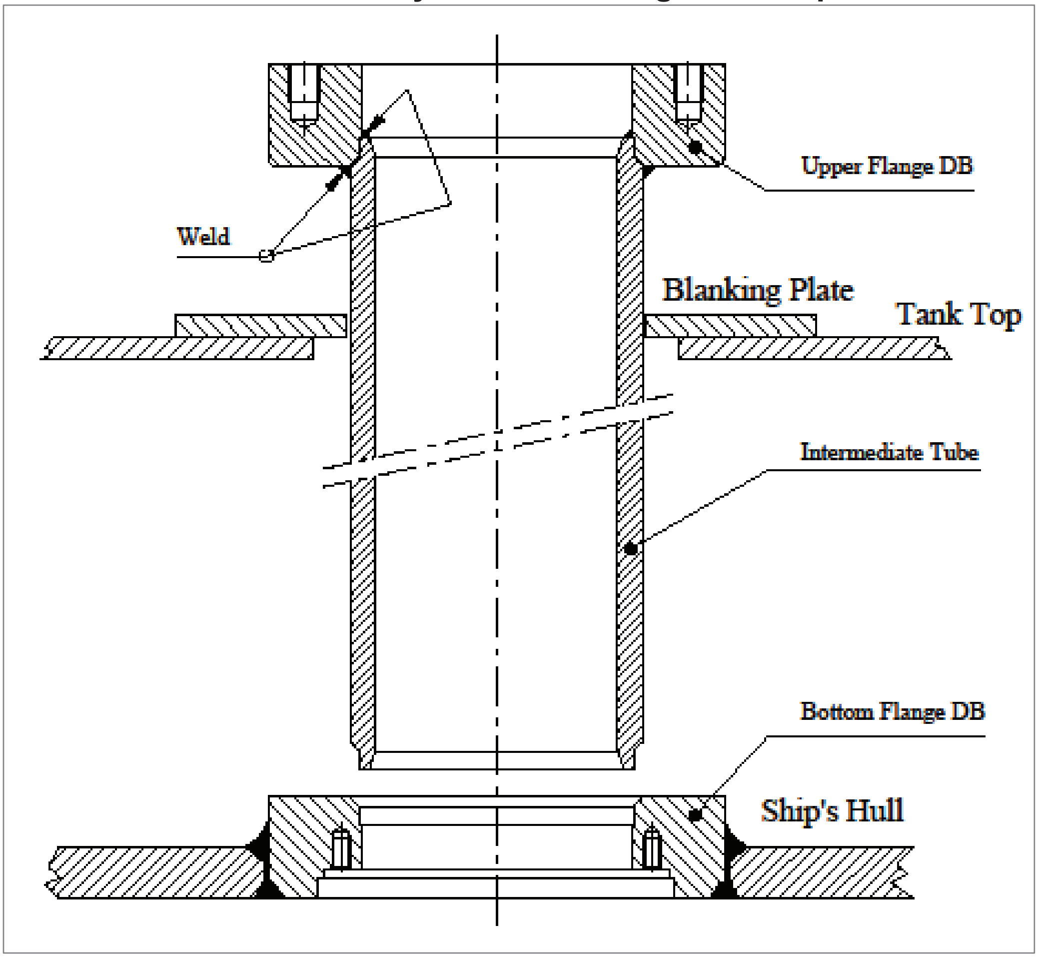
3. Cut a circular hole (diameter 200 mm) in the Tank top, ***vertically*** above the Bottom Flange DB position (refer to step 3.).

Hole cut in Tank top



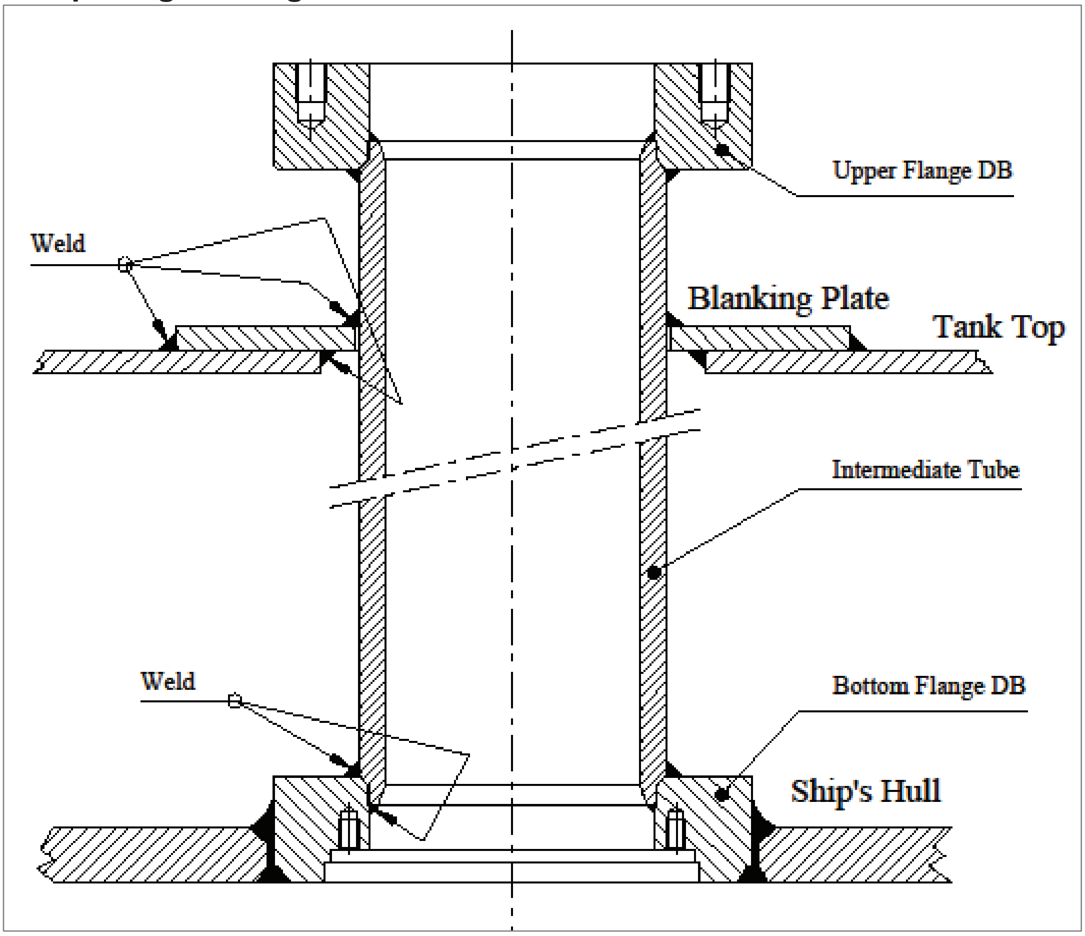
5. Insert the prepared Intermediate Tube, with the Upper Flange DB welded on top, into the Blanking Plate and Tank top down into the double bottom to align with the Bottom Flange DB.

Intermediate Tube assembly inserted through Tank top



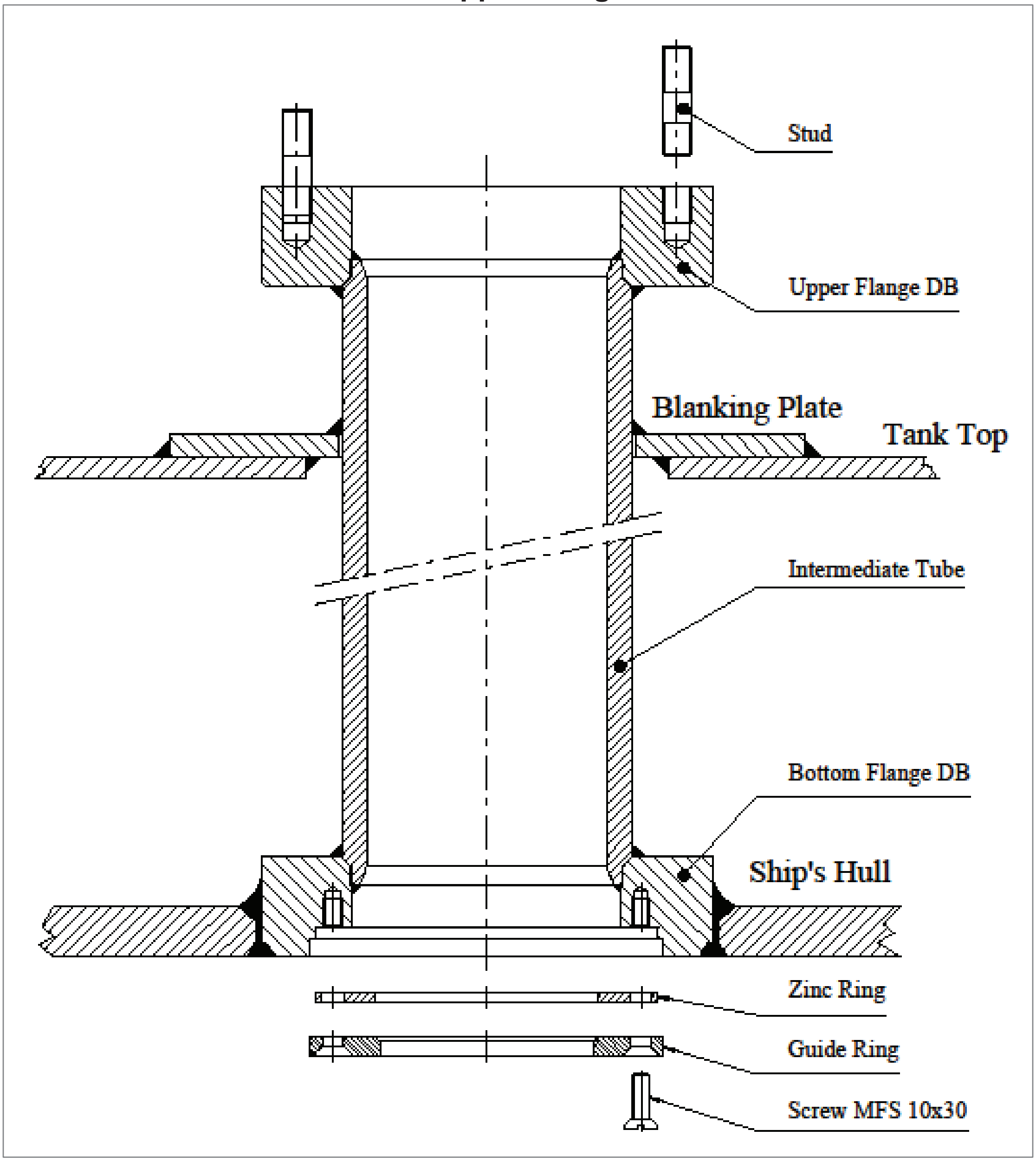
6. Align the Intermediate Tube vertically and complete welding to the Bottom Flange DB, Tank top/Blanking Plate and Blanking Plate/Intermediate Tube.

Completing welding



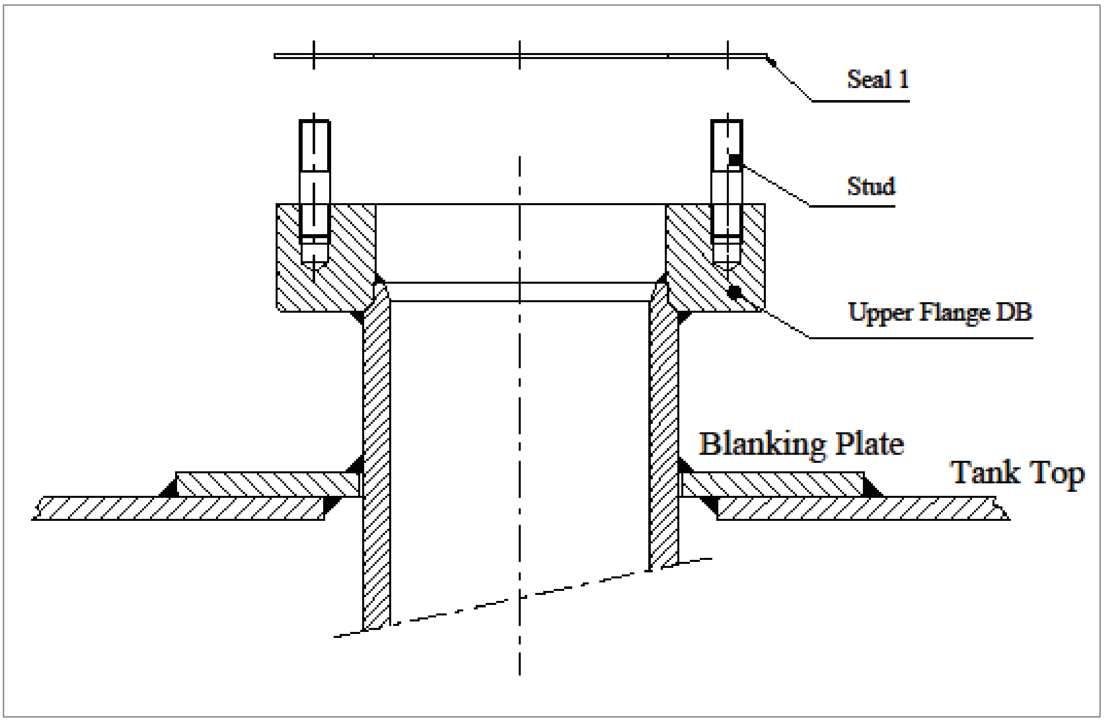
7. Fit the Zinc Ring and the Guide Ring into the outside base of the Bottom Flange DB and secure with six MFS 10x30 Screws, use MoS2 grease on the threads. Tighten the screws to approx. 35Nm.
8. Screw the eight PS 16x40 Studs into the top side of the Bottom Flange DB. Use Loctite® 243 or similar on the threads that goes into the flange ***Short threaded end downwards!*** Tighten to approx. 150Nm.

Mounting Zinc Ring and Guide Ring from ship's outside
Studs mounted from inside on Upper Flange DB



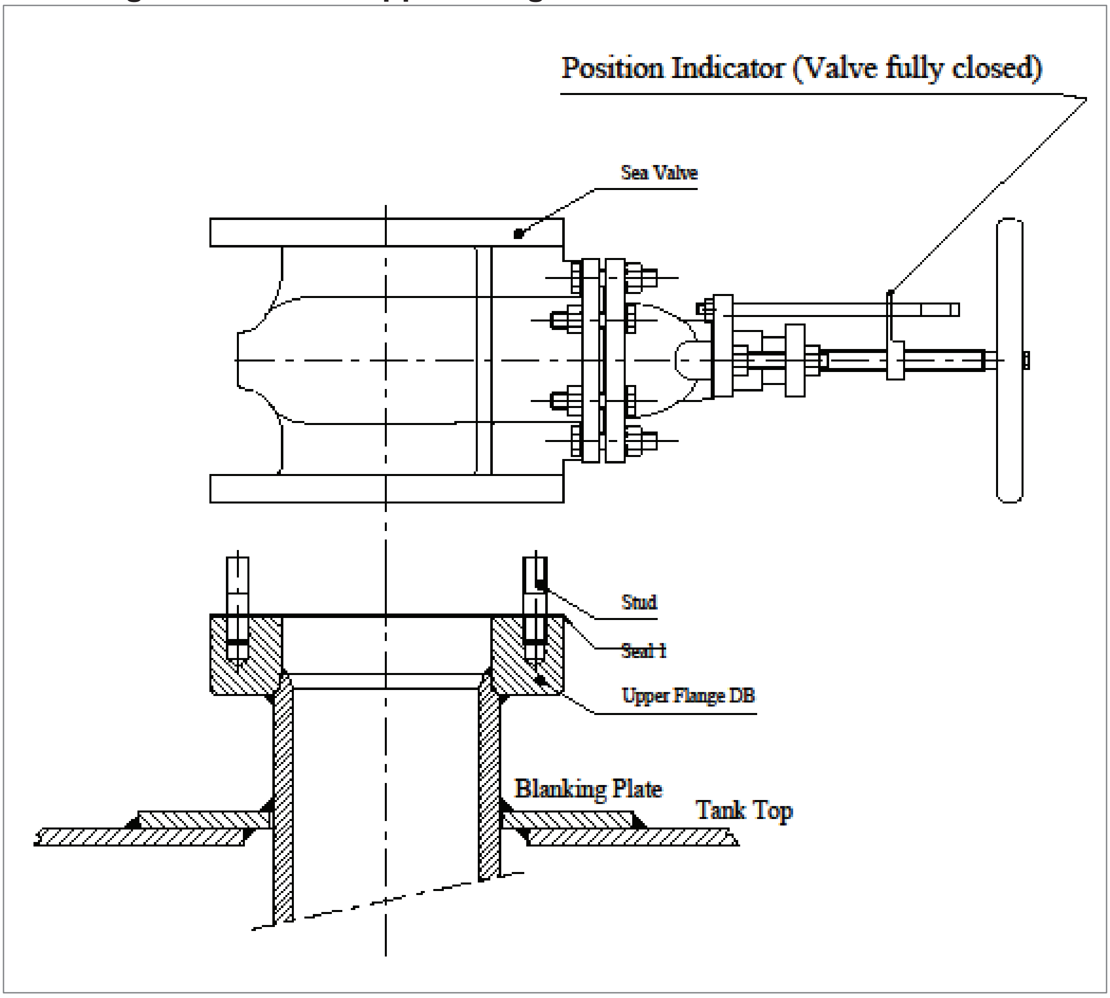
9. Ensure that the flange surface is clean. Place a gasket, Seal 1, on the flange.

Gasket Seal 1



10. Ensure that both Sea Valve flanges are clean.
    - Fit the Sea Valve over the studs with the Position Indicator pin upwards.
      - There is no directional requirement for the handwheel.
      - Mount as space allows and convenience for operation.
    - Centre on the flange and secure with eight Spring Washers and eight M6M M16 Nuts. Use MoS2 grease on the threads.
    - Slightly pre-tighten the nuts crosswise/diagonally.
    - Finish by tighten all nuts to approx. 150Nm again crosswise/diagonally.

Mounting Sea Valve on Upper Flange DB



Transducer and Valve Cover Assembling

The Assembly consists of:

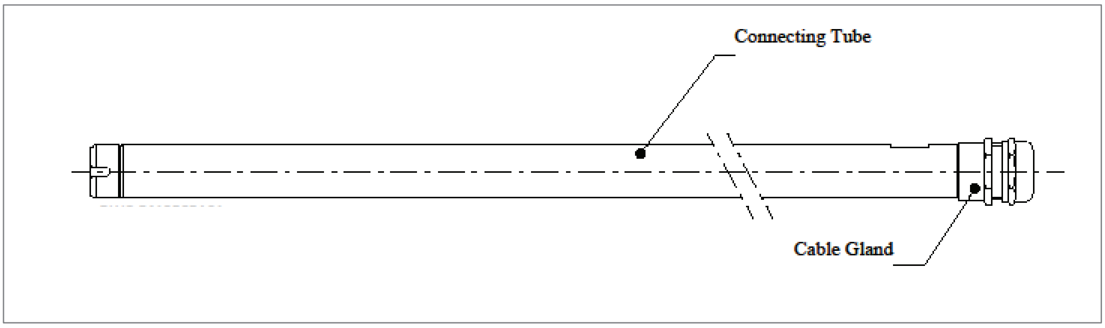
- Transducer with cable (30/40 m)
- Valve Cover with:
  - Ship Specific extended Connecting Tube with sealing items.
  - Tube Bracket with mounting items.

Assemble as follows:

1. The Valve Cover ***shall not yet*** be mounted on the Sea Valve.
   - Check that the two Lip Seals are correctly mounted inside the top end of the Valve Cover. Normally mounted from factory.
   - Assure Lip Seals to be clean and free from particles/dirt.
   - Slightly lubricate the Lip Seals with Vaseline®, Silicone Grease or similar.

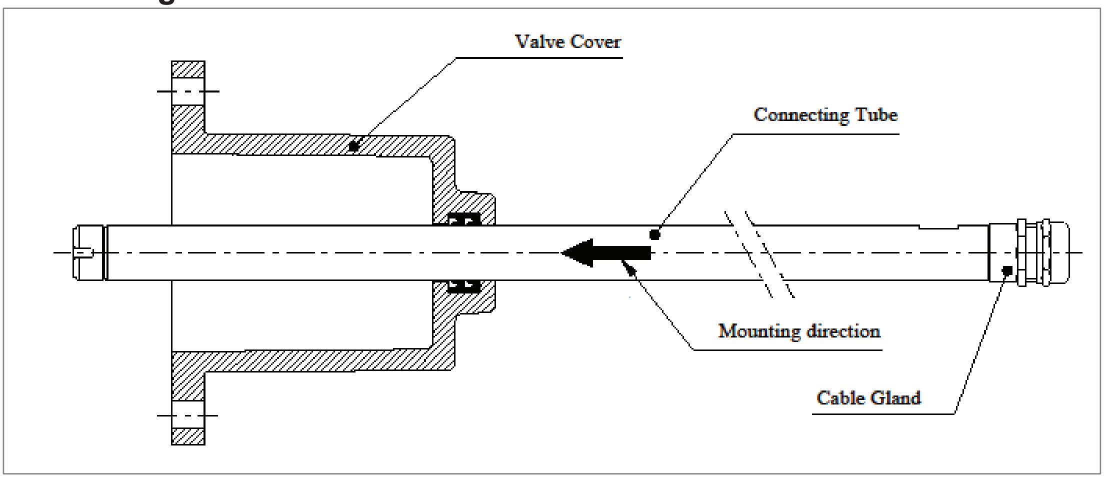
2. Mount the Cable Gland on the Connecting Tube.

Cable Gland mounted



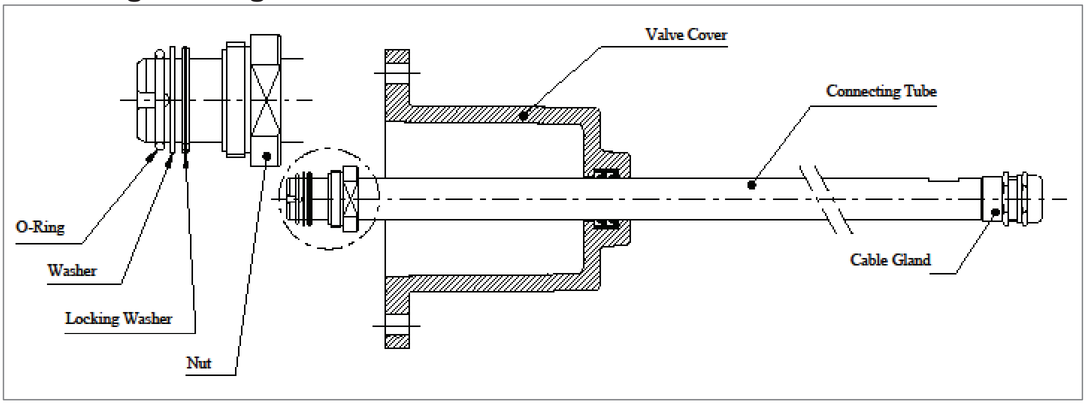
3. Gently push the Connecting Tube through the Valve Cover top end.
   Note: It is important that the Connecting Tube is ***inserted from top end*** of the Valve Cover. ***Never try to insert*** the opposite way, will damage the Lip Seals.

Connecting Tube inserted

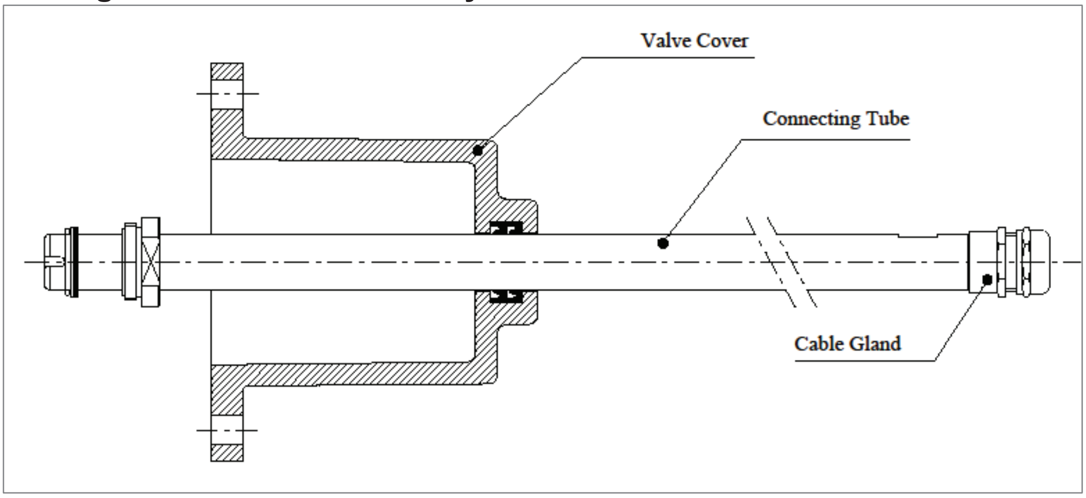


4. Mount the Nut, Locking Washer/Circlip, Washer and O-ring onto the Connecting Tube ***strictly*** in the order shown below.

Mounting Sealing items

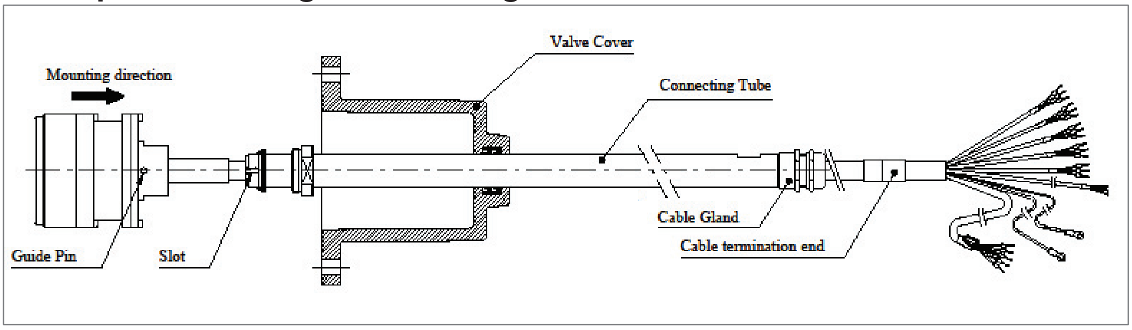


Sealing items mounted – Ready for Cable insertion



5. Uncoil and lay out the complete length of the Transducer cable to make it available for insertion through the Connecting Tube.
Maintain transport protection on the Transducer Head as far as possible and ***be careful during mounting procedures***.
   - It is recommended to temporarily wrap the termination pins with insulation tape to ease insertion and for protection throughout the installation work.
   - If necessary partly disassemble the Cable Gland to make it easier to feed the termination pins through the Gland.
   - Carefully feed the cable end through the tube and through the Cable Gland.
   - Re-assemble the Cable Gland when a short length of the cable is passed through.
   - Do not tighten the Cable Gland at this stage.
   - Pull the complete length of cable through the tube.

Cable passed through Connecting Tube



6. Remove the Transducer transport protection.

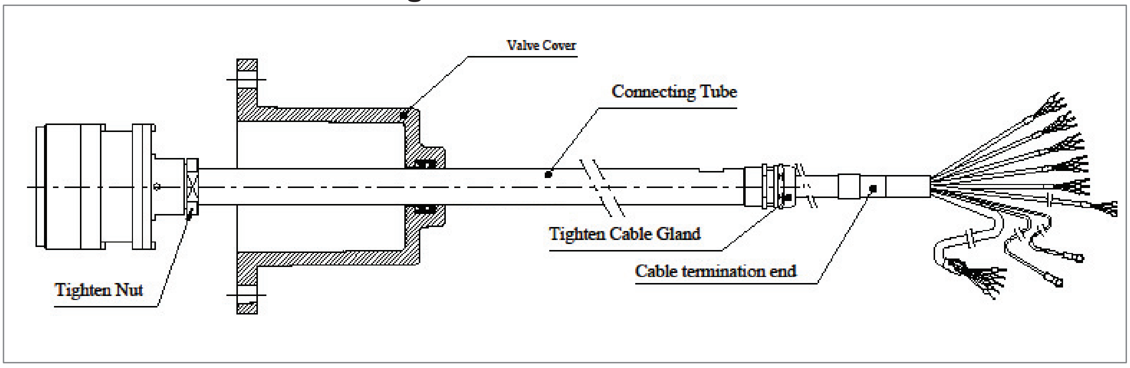
   Note: From this point and forward in the instruction the ***Transducer Head must be handled with proper care*** not to be damaged.

7. Push the Transducer onto the Connecting Tube ***checking carefully*** that the ***Slot*** in the Connecting Tube is ***correctly aligned*** with the ***Guide Pin*** in the Transducer.

8. Engage the Nut in the Transducer threads (only possible when Slot and Guide Pin are aligned!) and ***firmly tighten*** the Nut.

9. ***Securely tighten*** the Cable Gland around the cable.

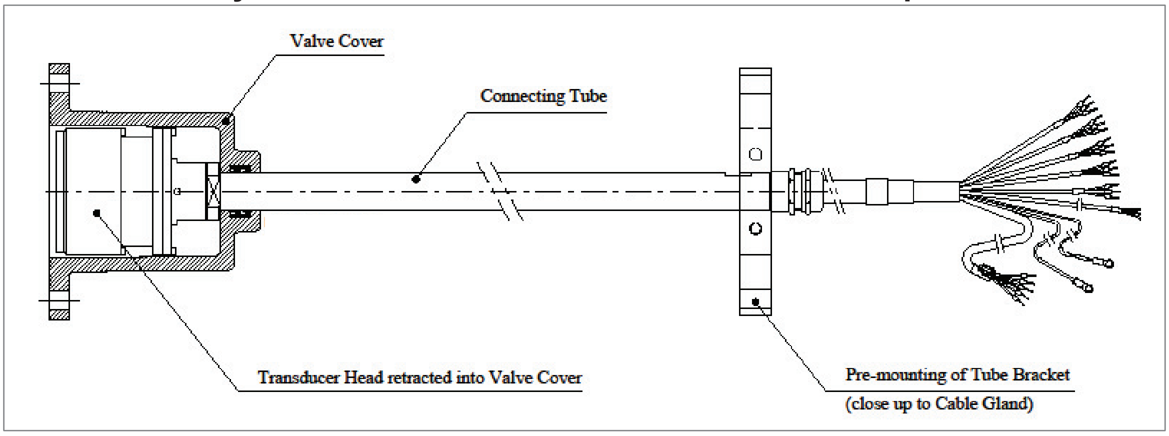
Transducer and Connecting Tube assembled



10. Push the Transducer/Tube assembly ***completely into*** the Valve Cover.
    Do not rest the Transducer on its sensor surface!

11. Pre-mounting of the Tube Bracket. **See picture below!**
- Ensure that the Connecting tube and contact surface of the Tube brakets are clean.
- Use MoS2 grease on the Tube brackets M12 Screw threads.
- Mount the two clamping parts close up against the Cable Gland and ***slightly*** tighten the two M6S M12x55 Screws with Spring Washers in order to allow lifting the complete assembly by the Tube Bracket.

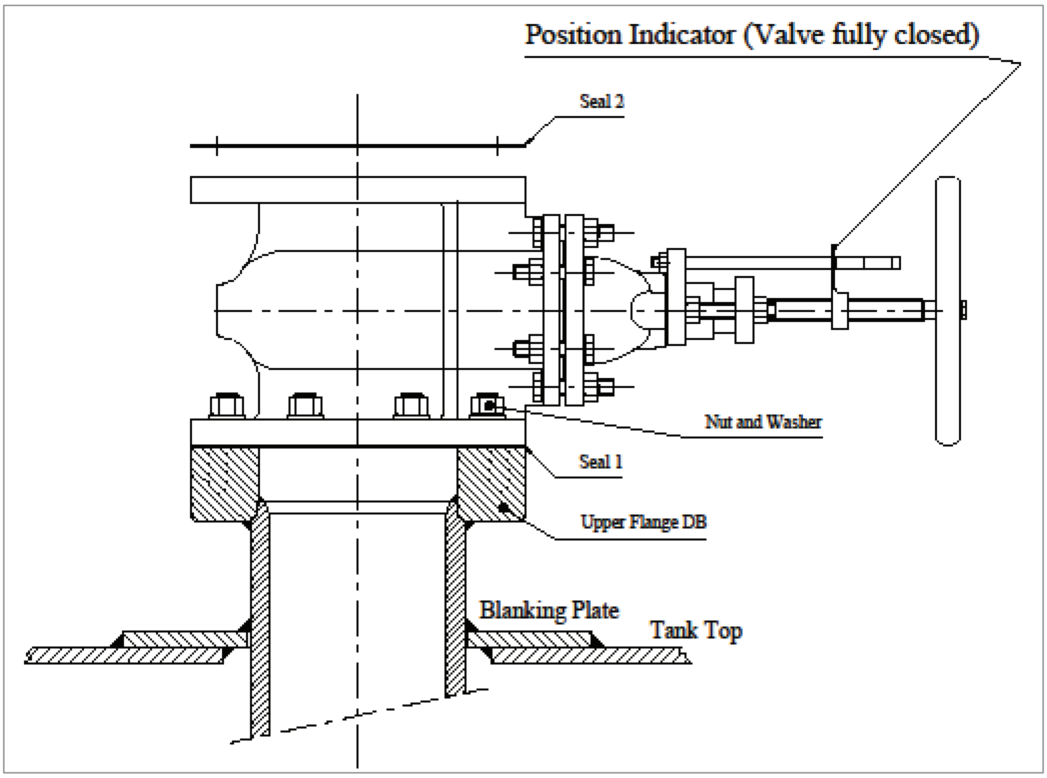
Transducer fully retracted into Valve Cover – Tube Bracket pre-mounted



12. Before raising and lifting the assembly vertically, arrange assisting personnel or a support rope or sling around the Tube Bracket ***to securely hold*** the Transducer in fully retracted position inside the Valve Cover during the mounting procedure on the Sea Valve and also to ***avoid accidently hitting*** any hard surfaces

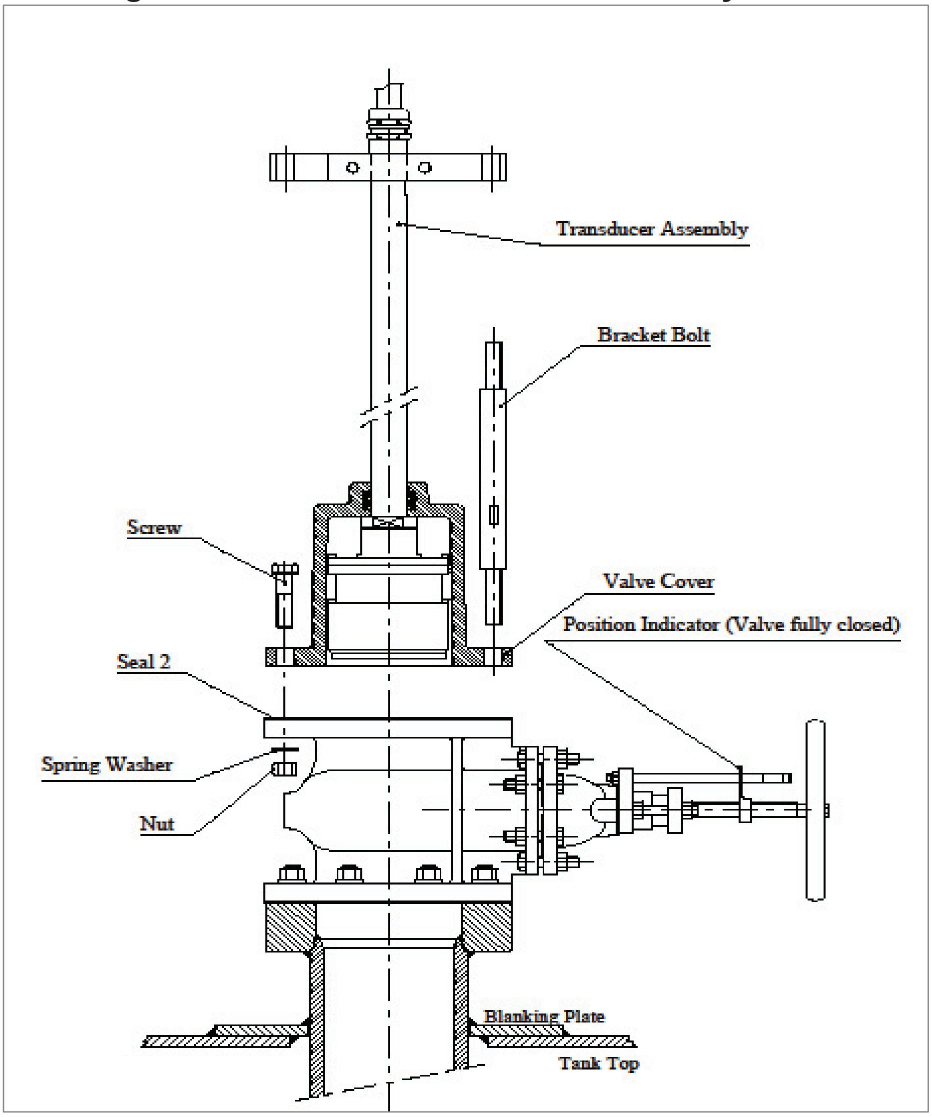
13. Place a gasket, Seal 2, centred with the screw holes on the clean Sea Valve top flange.

Gasket Seal 2



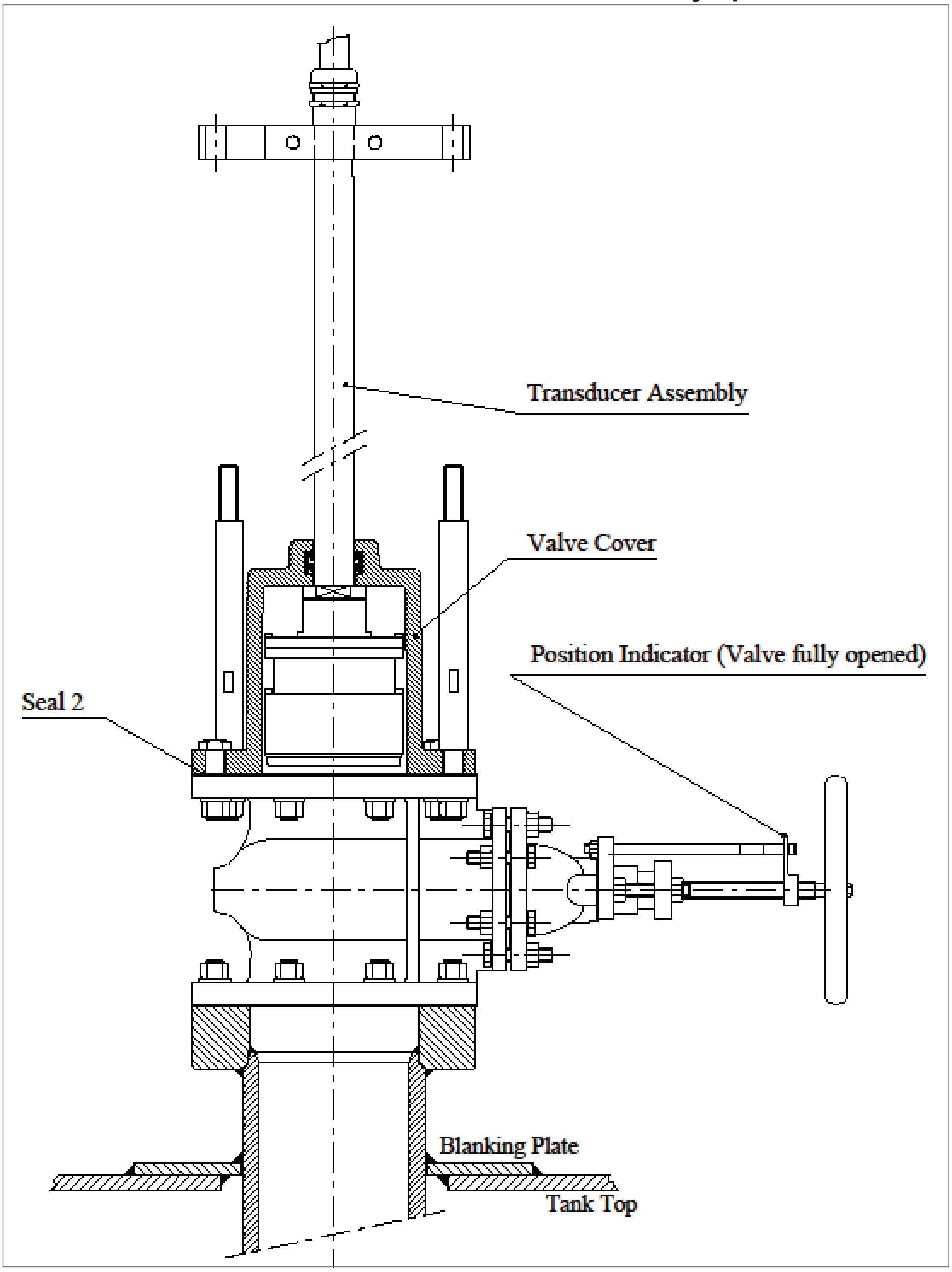
14. Mind the length of the tube and ***carefully*** lift and place the Transducer and Valve Cover assembly on the Sea Valve flange properly centred with Seal 2 and flange holes. Ensure that the Transducer is still maintained ***fully retracted*** into the Valve Cover and does ***not accidently hit*** any hard surfaces and ***do not lower*** the Transducer before the Sea Valve gate is fully opened!

Mounting Transducer and Valve Cover assembly on Sea Valve



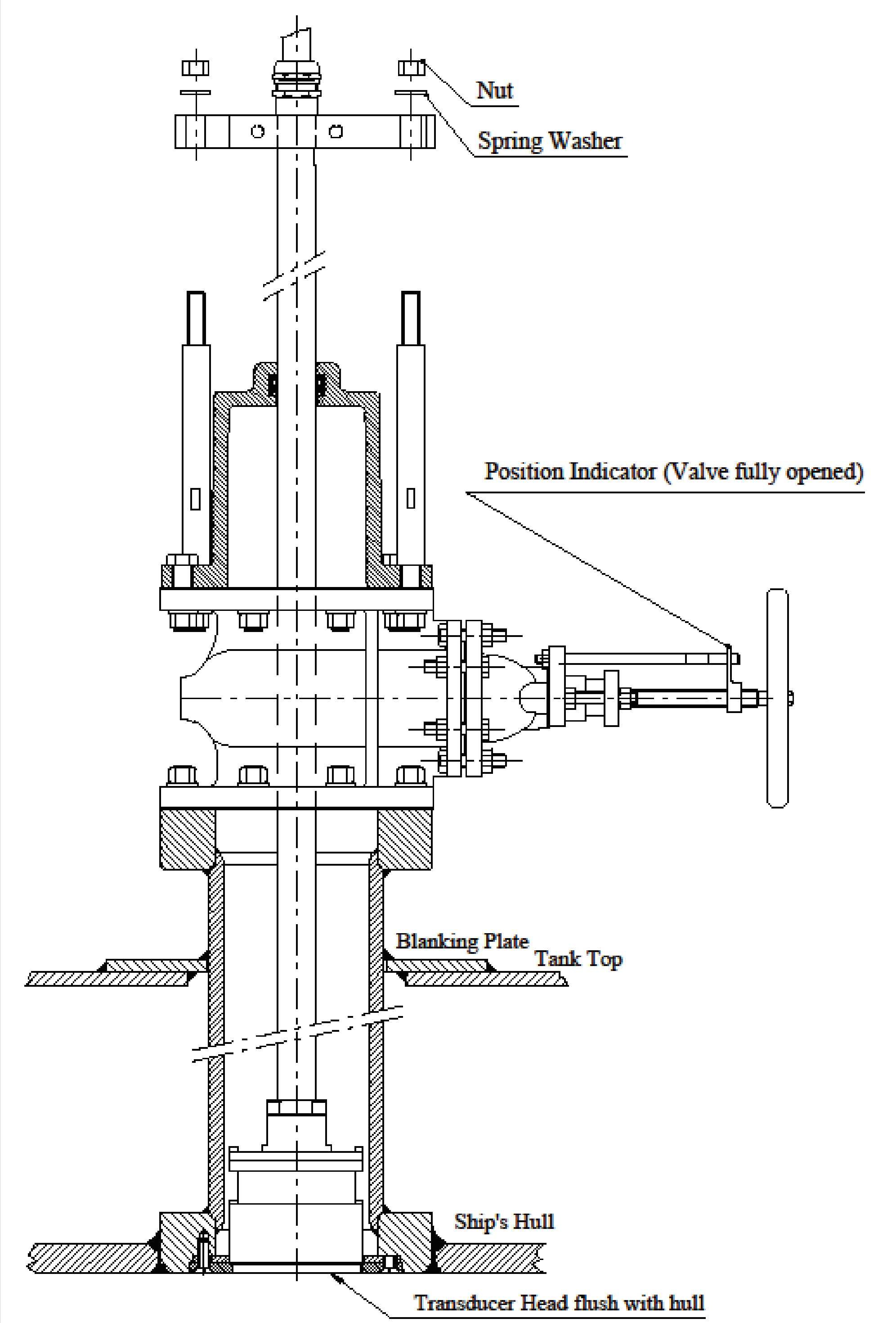
15. Crosswise loosely secure the Transducer and Valve Cover assembly on the Sea Valve using six M6S M16x60 Screws, six Spring Washers and six M6M M16 Nuts, use MoS2 grease on the threads. Leave two diagonally positioned flange screw holes free for the Bracket Bolts.
- Any diagonal position can be used.
- There is no direction requirement for the Valve Cover.
    - Mount the two Bracket Bolts in the two free flange screw holes assuring that the longer threaded ends are mounted downwards.
    - Loosely secure the Bracket Bolts at the lower ends with two Spring Washers and two M6M M16 Nuts, use MoS2 grease on the threads.
    - Finish by crosswise tighten all flange screws/bolts and nuts to approx. 150Nm.

Transducer and Valve Cover mounted - Sea Valve fully opened



16. ***Fully open*** the Sea Valve, approximately 28 full turns counter-clockwise on the handwheel from fully closed to fully open.
    - Gently slide down the Connecting Tube to ***carefully lower*** the Transducer into the Sea Valve.
      A slight resistance might be felt when the Transducer sensor head edge enters the chamfered Guide Ring.
      When the tube reaches stop position the Transducer should be seated in the Guide Ring with a slight protrusion, less than 2mm.

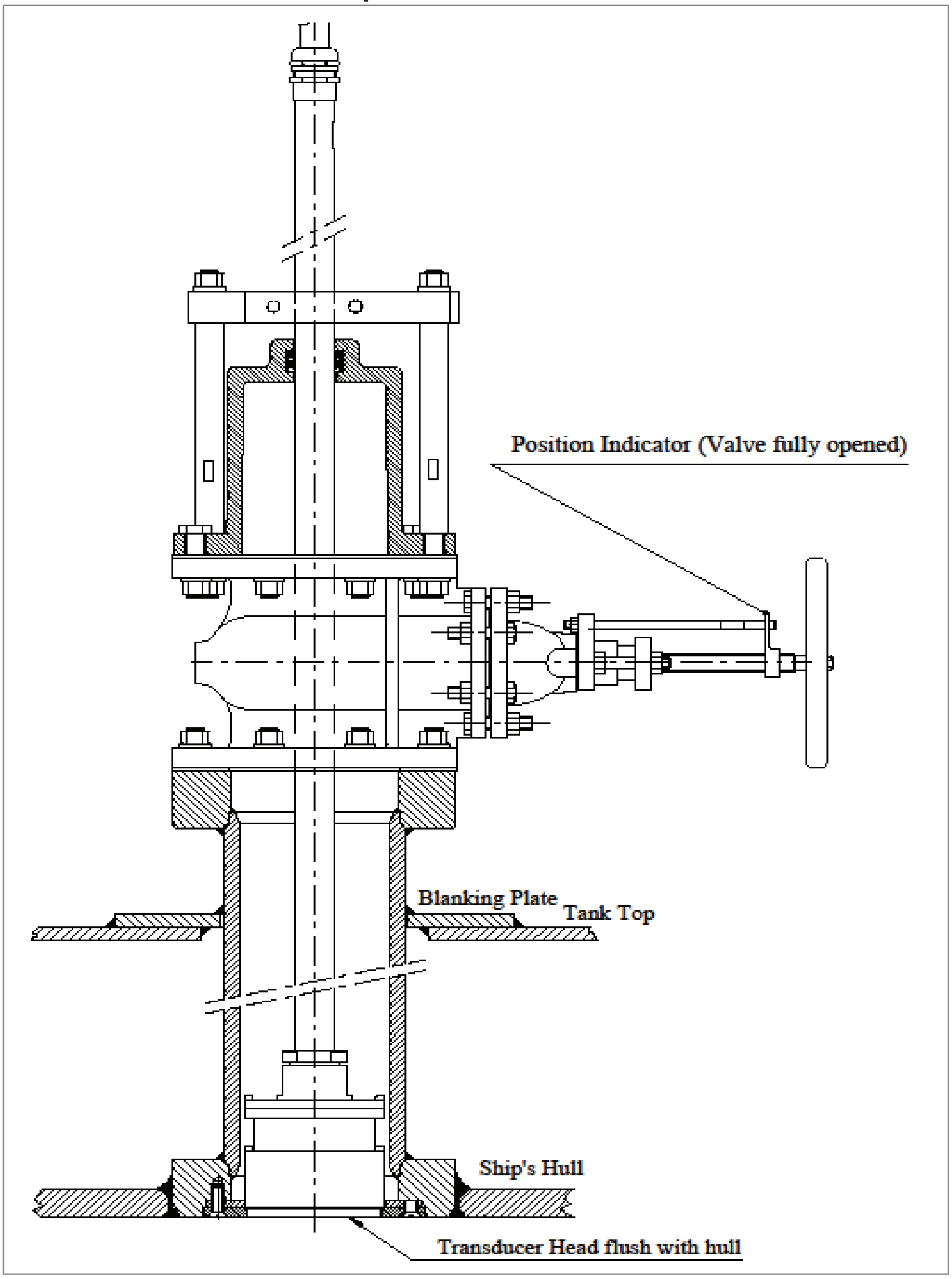
Transducer lowered down to flush seating in Guide Ring



17. Loosen the two clamping Screws (M6S M10x60) on the Tube Bracket a few turns to split the two clamping parts and gently slide down the Tube Bracket and rotate as necessary to align the Tube Bracket holes with the two Bracket Bolts.

- Ensure that the contact area between Connecting tube/Tube bracket is clean, free from any grease or silicone. Dismount and clean the surfaces if necessary.
- Verify that the Tube Bracket assembly is properly seated on the Bracket Bolts.
- Evenly secure the Bracket Bolts upper ends (short threads) in the Tube Bracket with two Spring Washers and two M6M M16 Nuts. Tighten to approx. 150Nm.
- Final adjustment for flush seating and keel/longitudinal line parallel alignment to follow below.
- Make a reference measurement to Tube top end with Tube Bracket tightened in its final position as individual for this ship's specific installation.
  Make a note in ELC and/or ship's manual.
  Refer to **Fig. 2.2** above.

Tube Bracket in its final position with Transducer flush seated.



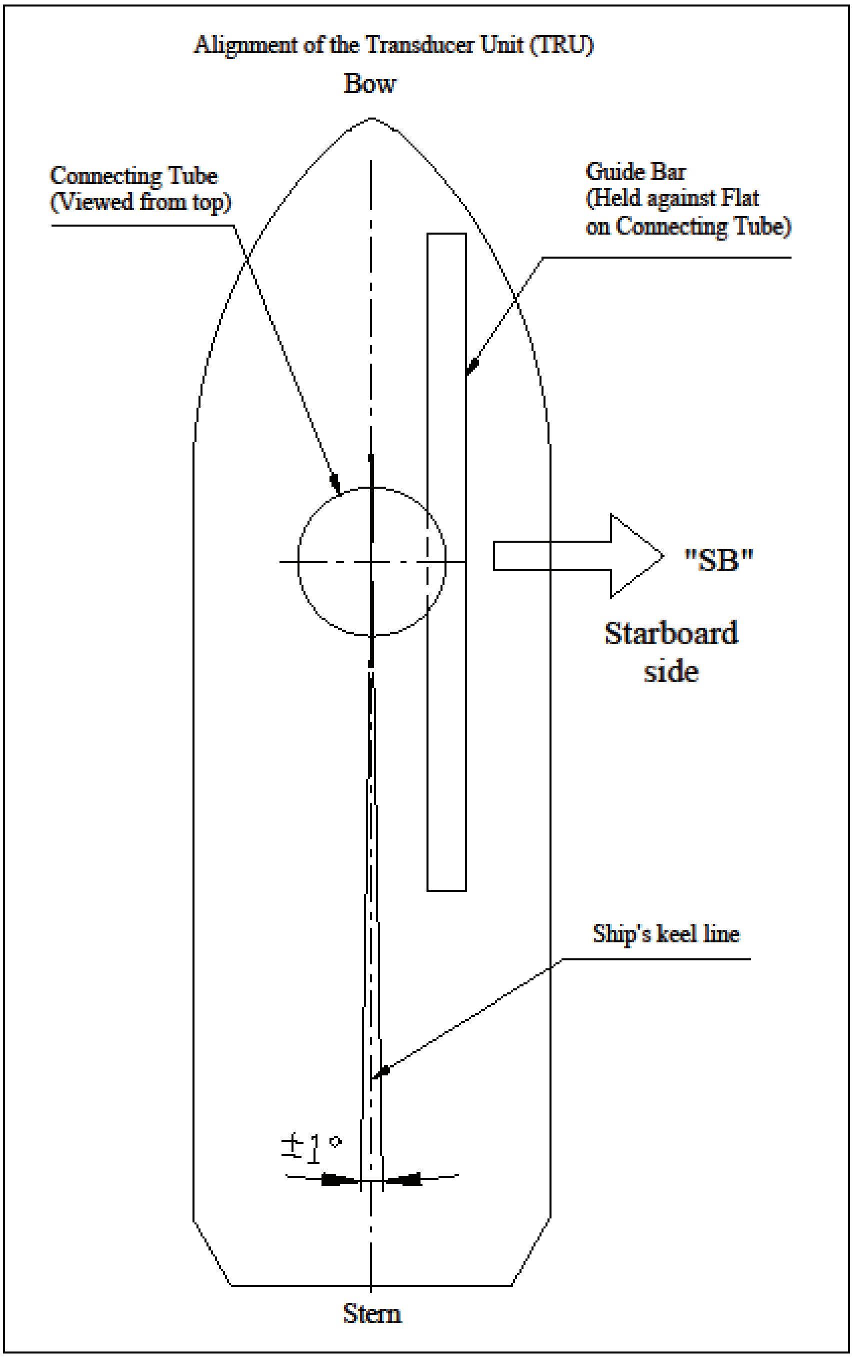
18. Complete the adjustments by aligning the Connection Tube "**SB**" flat mark as shown on **Fig. 2.5** below.

Ensure that the Transducer is correctly seated at its lowest position.
Verify this by checking the Transducer installation from outside the ship's hull. For future records preferraby documented by photos.

Note: IT IS IMPORTANT THAT THE TRANSDUCER IS CORRECTLY SEATED AND PROPERLY ALIGNED.

19. Ensure that the Tube Bracket clamping screws are loosened and freely turn the tube so that the ***flat area*** on the Connecting Tube faces **strictly to StarBoard** and ***aligned parallel*** with the keel line ***within ±1°.***
    - Use a straight guide bar held against the flat area to facilitate this, see **Fig 2.5**.
    - By thorough eye aiming, or measure with a ruler/meter tape, align parallel with any keel/longitudinal line reference (bulkhead, stiffener plate, girder, longitudinal weld seam or similar).
    - Tighten the Tube Bracket screws M12 to approx. 57Nm *or* if M10 to 35Nm.
    - Ensure that the two top nuts (M16M), fixating the tube brackets, are not pressing down the Transducer with force. The Transducer shall be seated on the Guide ring and shall not be pressed against it.
    - ***Re-check*** the tube height reference, **Fig. 2.2** above, (assuring Transducer still properly seated) and then check and retighten Tube Bracket clamping screws (57Nm if M12, 35Nm if M10) at this position as well as the nuts (150Nm) on top of the Tube Bracket.

Fig. 2.5 Aligning Transducer Connecting Tube

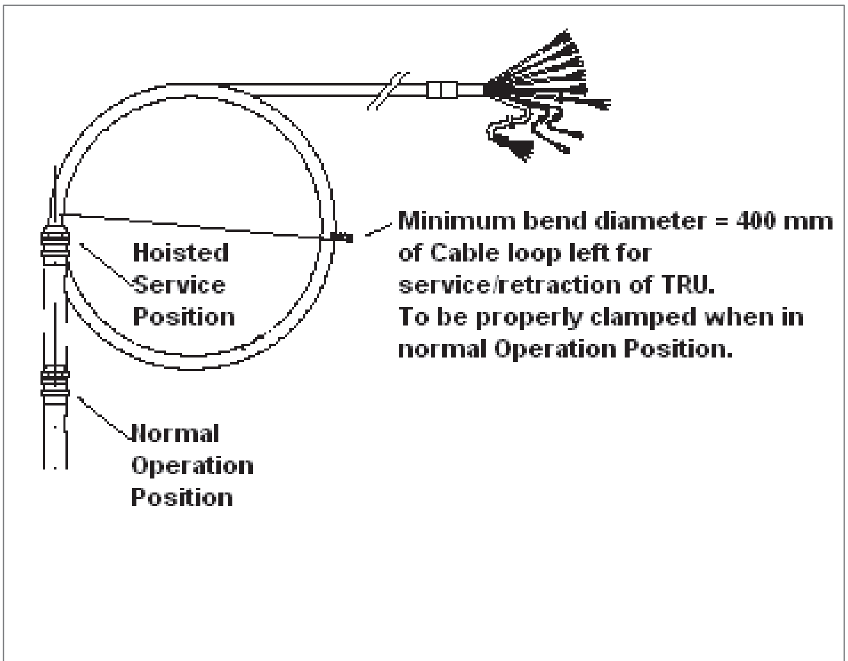


Transducer Cable to NJC-80 Sig.Processor

- The Transducer cable must be installed/laid in a way to allow removal in case of service or replacement of a defective Transducer.
- Installation on cable trays or ladders should assure that the cable is accessible and not strapped together with other permanently installed cables.
- The cable must be separated at least 0.5 m from any other high power/frequency cable as well as avoid crossing such cables.
- Whenever installation conditions require use of conduit (e.g. pipe through water filled tank, etc.) the internal diameter should be adequate to enable easy cable traction/retraction. TRU cable diameter is approximately 21 mm, thus a pipe inner diameter of 50 mm (~2 inches) is recommended or never less than 38 mm (~1.5 inch) much depending on number of bends on the conduit.
- Minimize the number of pipe bends as well as assure that the bend radius is never less than 0.5 m. Keep pipe as straight as possible.
- The cable bend radius shall never be less than 200 mm.

Never cut the cable! Warranty is void if cable is cut or violated.

- Excessive cable length.shall be coiled both close to NJC-80 as well as a service coil left nearby the Sea Valve, see figure blow:



6. Recommended spares and maintenance:

Transducer replacement:

Whenever a Transducer/TRU needs to be replaced and/or or ordered as spare, the following should be considered and specified:

- Presently installed TRU Serial Number as found inside NJC-80 on the cable termination end transparent screen core connected to the chassi plate ground screw. A yellow shrink tube is marked with black figures,
  - either:
    6-XXXX for a TRU with 30 metres cable length
    which defines ordering CODE CFT-780;
  - or:
    6-XXXX-40 for a TRU with 40 metres cable length
    which defines ordering CODE CFT-780-4;

Besides the TRU also a Sealings exchange kit is needed whenever the TRU is replaced and/or partly used when maintenance/service work is carried out.

A complete TRU Sealings exchange kit, ordering P/No: 71-22220-00, comprises:
(ordering P/Nos refer to previous **Fig. 1.1** and **Fig 2.1** above)

2 pcs	P/No: 00-00500-23	SAL T/860 LIP SEAL /DI 137
1 pc	P/No: 00-00730-87	O-RING 34.52 X 3.53
1 pc	P/No: 71-22186-01	SALT/860 FLANGE GASKET
1 pc	P/No: 71-22450-00	SAL T/860 TRU CABLE GLAND ASSY

General dry-docking and maintenance routines:

At dry-docking it is recommended to inspect/replace the Zinc Ring in the outer base of the Bottom Flange, (ordering P/No refers to previous **Fig. 1.1** and **Fig 2.1** above):

1 pc	P/No: 71-22102-00	SAL T Zinc Ring

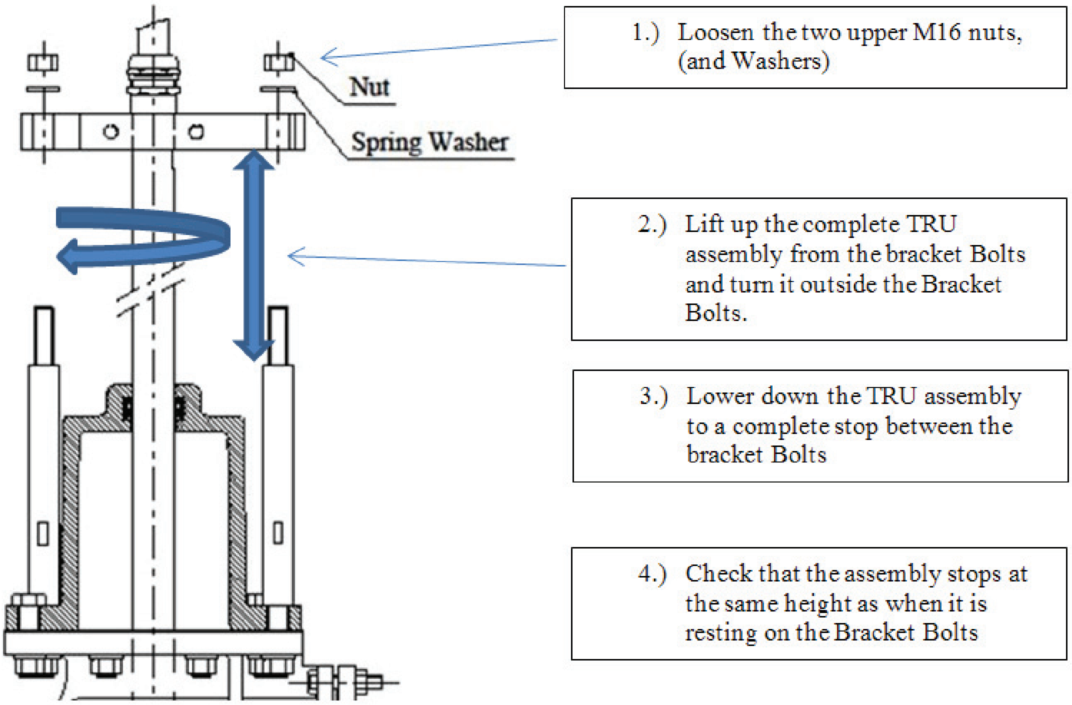
Care and caution should be carefully considered in order to protect the TRU sensor surface during outside hull works, e.g. sand blasting, hull grinding, welding work, painting, etc., thus also any temporary protecting cover of the TRU should be properly removed/cleaned off before undocking as well as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

Further recommendation to prevent the TRU from damage during dry-docking is to retract the TRU inboard to avoid possible accidental resting on drydock bottom blocks as well as other mechanical wear.

To retract the TRU inboard, loosen the two upper M16 nuts on the top off the Tube bracket bolts, ***do not*** loosen the Tube Bracket screws (M10) before lifting upp the TRU assembly.

TRU vertical position check

This can be done without drydocking.



If the TRU assembly stops futher down than when it is resting on the Bracket Bolts, a new aligning of the TRU assembly has to be done, e.g. TRU seating and “SB” marking strictly to StarBoard, decribed earlier in this manual.

Overhual and condition check-out of the Sea Valve should also be part of dry-docking routines, this to assure that the intended use of the Sea Valve arrangement for service/maintenance is safely provided also when the ship is afloat.

It is also recommended when maintening to check and retightening the M10 (or M12 version) bracket screws to 35Nm *or* if M12 version to 57Nm.
Do not overtightening the bracket screws.

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 retracted for inspection/cleaning and/or diver assisted under hull cleaning.

Generally, also under normal sea-going operations, it is recommended to retract the TRU for inspection and cleaning as necessary each 3 to 6 months in order to prevent marine growth which may affect the speed log functionality and accuracy/reliability.
Also this routine serves as condition checks and maintenance of the Sea Valve arrangement.

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JLN-900

Installation of NJC-80 Sig. Processor

Table of Contents

1 General

The purpose of this section is to provide enough information to have a good and reliable installation of the NJC-80 Sig.Processor in the JLN-900 Log system.

WARNING
This unit contains electrostatic sensitive devices.
Observe precautions for handling.

Note that this is only one of the manual sections needed for installation. A special and completely stand-alone section prior to this describes the important issue of installing the bottom parts and transducer. **It should be noted that a good transducer installation is of primary importance for achieving good performance of the log system.** Selecting correct transducer location shall be done in cooperation with JRC and JRC must approve the selected location!

1 Wiring

Depending on how the order was placed, a ship's specific wiring diagram may be delivered with this manual. If not, a typical wiring diagram is included.

In general, it is sufficient to fulfil some simple rules for having good electrical connections within the system.

- The Sig.Processor shall be firmly grounded to the ship's structure.
- All wires shall be electrically shielded and all signal wiring shall be twisted pairs.
- For IEC 61162-1/NMEA, a cross-section of 0.50 mm² is electrically sufficient, although dimensions like 0.75 mm² or more are more common in shipyards.

2 Installation of Sig.Processor

2.1 Selecting location

An obvious requirement for selecting a good location is the standard 30 m cable to the transducer. This cable must have no joints via any junction box of any kind, but be connected directly from the transducer! The Sig.Processor is designed to operate in an environment fulfilling the requirements specified in the section ”Technical Specification”. Recommended conditions for the chosen location are listed below:

- The location should be easily accessible for transducer replacement, calibration or other service.
- The location should be protected from weather and should offer a stable temperature not outside the range 0 - 55°C.
- The location should not expose the unit for excessive vibration levels.
- The location should 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 reasonably good way of laying the 30 m cable to the transducer in such a way that it is possible to replace for transducer replacement.

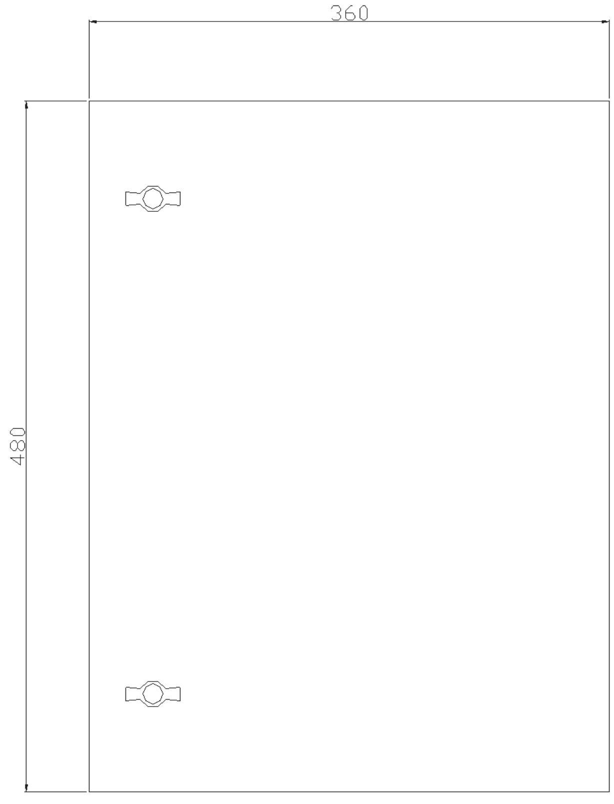
- The drawing below defines the mechanical dimensions. There must be a flat surface for mounting and it must also be possible to fit the four bolts. Note also that there must be enough room (400 mm free space in front of the unit) for opening the doors to access the electronics inside and that there is room for cables below the cabinet.
-

Dimensions:

H: 480 mm

W: 360 mm

D: 240 mm



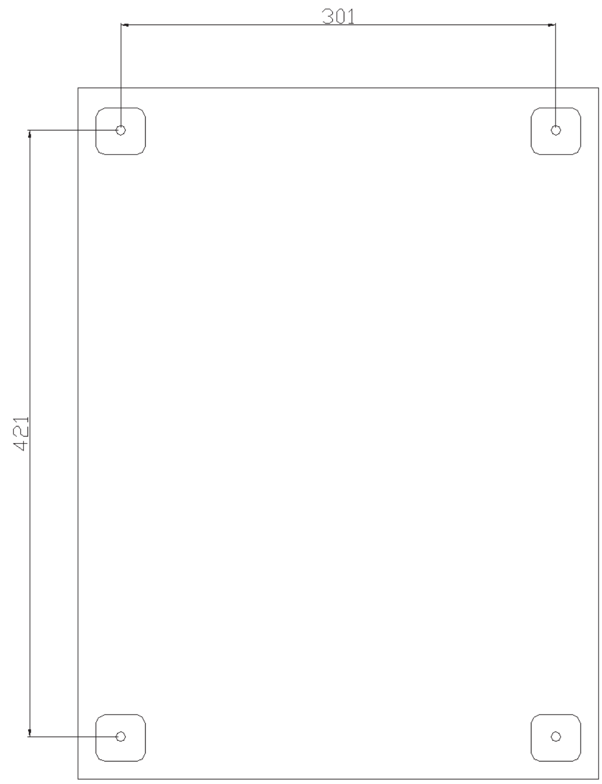
3.2. *Mechanical mounting*

The figure below defines the position of the mounting bolts.

Drilling:

Horr: 301 mm

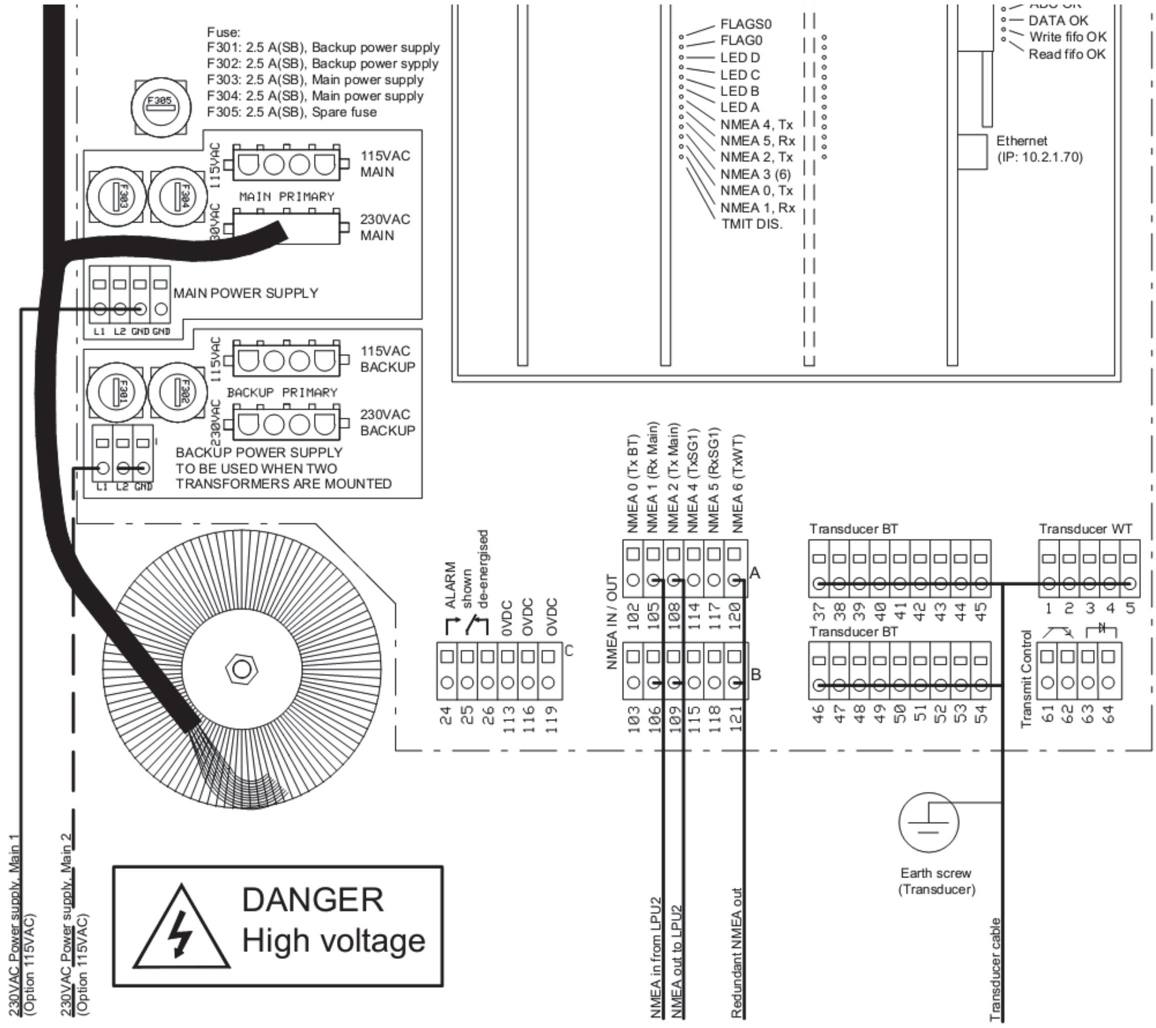
Vert: 421 mm



Use four pcs 6 mm steel bolts with fibre or plastic washers for mounting for sealing to maintain water tightness.

3.3 Electrical connections

The electrical connection to the Sig.Processor is fairly simple in a normal installation, since the number of cables to be connected in a standard installation is small. ***All connections to the Sig.Processor and to optional Sig. Distributor shall be made with screened cables!***



At least four connections shall always be used:

- An extremely solid connection is to be made between the metal structure of the hull and the grounding screw on the outside of the case. 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 100 / 230 V AC terminals at the MAIN_1 intake located in the lower left end corner of the Sig.Processor. Connect to L1, L2 and GND.
- The transducer cable shall be connected to terminal numbers 1 - 5 and 37 - 54. **Do not cut the cable. If the cable is cut the warranty will not be valid.**
  Connect terminals 1 – 5 to the WT connector numbered 1-5.

Connect terminals 37 – 54 to the BT connectors numbered 37 – 54.
Connect the two shield wires (red and blue) to the ground bolt (M5) in the Sig.Processor.
Connect the shield in the cable gland.

- The NMEA output cables and any other signal outputs/input should be brought through appropriate cable glands to other users.
  Main NMEA output is found on terminals 108 (A) and 109 (B).
  Main NMEA input is found on terminals 105 (A) and 106 (B).

- One additional NMEA out (Redundant WT) shall be connected from terminals 120 (A) and 121 (B) to the redundancy NMEA input 5 in the Sig. Distributor, described in the JLN-900 system drawing chapter if applicable.

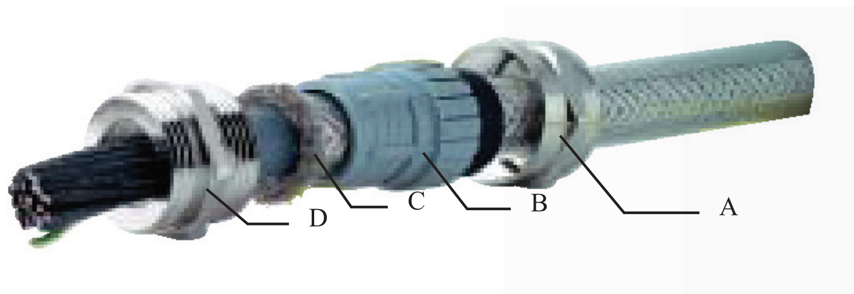
The following additional connections **shall** be made to increase redundancy between STW / SOG speed log parts of the Sig.Processor.
This additional connection **shall** also be made on the JLN-900 to separate power between the STW and SOG part of the Sig.Processor.

- One separately fused additional AC power intake shall be brought to the 100 / 230 V AC terminals at the MAIN_2 (BACKUP) intake located just below the MAIN_1 intake. Connect to L1, L2 and GND.

The cable shields for the NMEA output/input cables should be connected firmly in the Sig. Distributor and ***not in the Sig.Processor***.

All supplied cable glands are designed to terminate the cable shield directly to the outer enclosure in the cable gland. This is necessary precaution to maintain the EMC protection performance as verified in type approval testing. If more cable glands than those supplied are needed, types designed for cable screen termination must be used!

Correct mounting of cable gland on Transducer cable:



1. Remove the protecting cover to expose the outer shield and outer insulation of the cable.
2. Push the parts over the cable in the order shown.
3. “Push” down the screen over the top of part “B”
4. Push Cable/B part firmly into the fixed part of the cable gland.
5. Tighten nut “A” firmly.

3 Downloading of new Water Track Unit software

The Water Track Unit – WTU-Assy – in the Sig.Processor is delivered with the software installed in a flash memory. If, however, an update of software would become necessary, please refer to utility program WinFlash, 706080, available from JRC when required.

4 Downloading new Bottom Track Unit software

The Bottom Track Unit, T2R circuit board, in the Sig.Processor is delivered with the software installed in a flash memory. If, however, an update of software would become necessary Please refer to utility program WinFlash, 706080, available from JRC when required.

JLN-900

NQA-4480

Sig.Distributor

Technical Manual

Incl. installation, setting up and maintenance guidelines

Contents

1 Introduction

1.1 General

This document describes the Sig. Distributor, which serves as an interconnection device between speed logs, NWW-82/85 displays, indicators and other users, such as ARPA, auto-pilots etc. IEC61162/NMEA serial signals and how to connect these cables are described in document “IEC61162/NMEA0183 User Guide”.

1.2 Definitions and abbreviations

The performance standard IMO MSC.191(79) states that standardized terms and definitions shall be used. The speed logs have historically used the terms Bottom Track (BT) for Speed Over the Ground (SOG) and Water Track (WT) for Speed Through the Water (STW) related information. This document introduces the SOG and STW terms, but due to backward compatibility and existing menu system, both terms exist.

Abbreviation	**Description**
NMEA0183	IEC61162-1 ed2 serial interface standard
STW	Speed Trough the Water. This is equivalent to Water Track (WT) speed (relative)
WT	Water Track resulting speed or distance (relative)
WTL	Water Track Longitudinal and may refer to both speed and distance
WTT	Water Track Transverse and may refer to both speed or distance
SOG	Speed Over the Ground. This is equivalent to Bottom Track (BT) speed (true)
BT	Bottom Track resulting speed or distance (true)
BTL	Bottom Track Longitudinal and may refer to both speed and distance
BTT	Bottom Track Transverse speed or distance
TRIP	Trip distance counter
TOTAL	Total distance counter

1.3 Principle of operation

The Sig. Distributor distributes data between connected units (instruments etc.) in the speed log system, as well as it transmits speed and depth data to external systems. Serial speed/depth data from one or more speed logs is received by the Sig. Distributor and decoded to generate serial data as well as speed pulse signals. A large number of output connections are programmable. However, a default configuration is active on delivery and shall be used whenever possible. The unit is equipped with a power supply, able to provide power to NWW-82/85 displays.

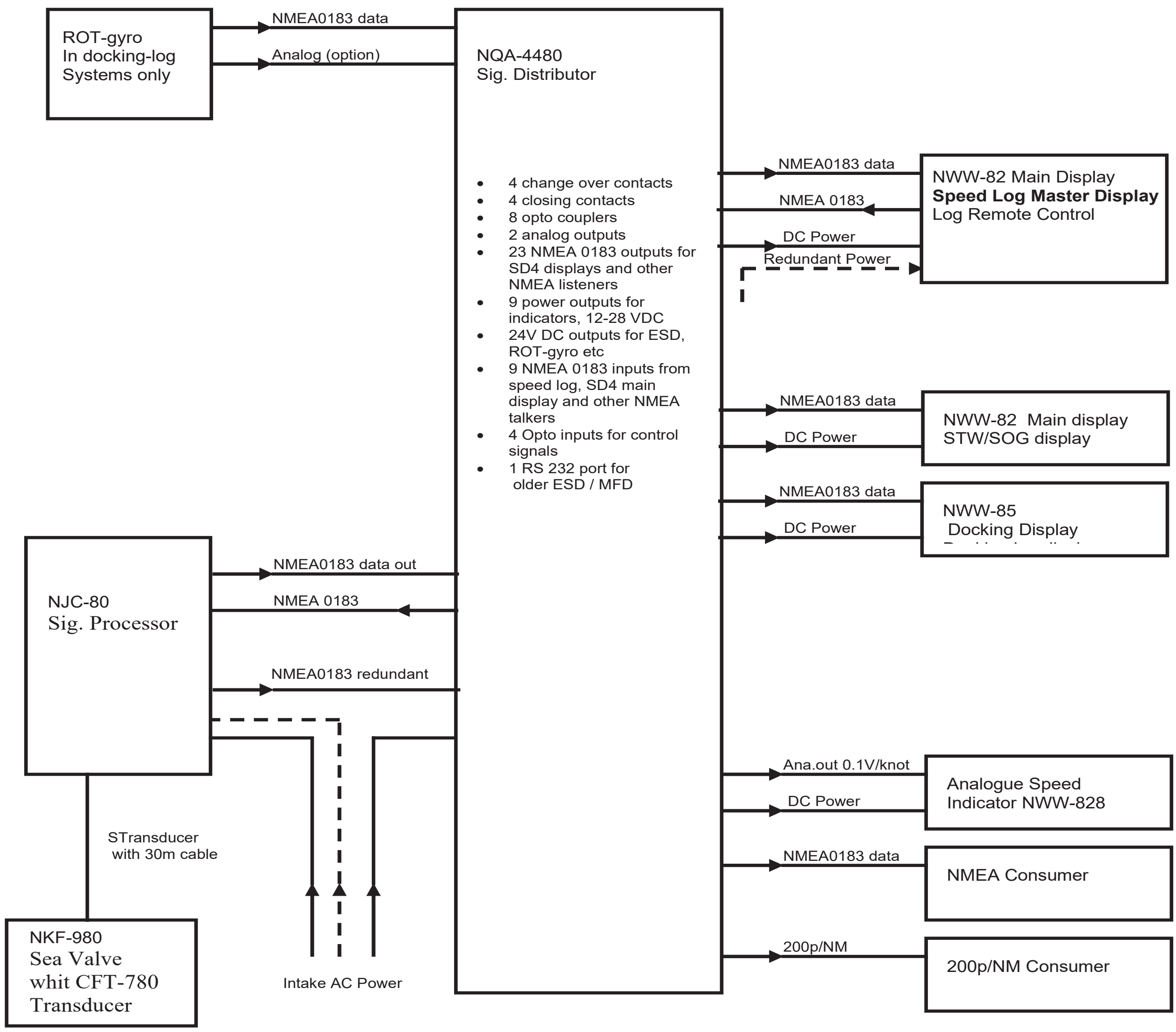
The Sig. Distributor is also used for docking log calculations. The output from a Rate Of Turn gyro can be connected to the Sig. Distributor via serial (NMEA) or analogue input. From this input and the received SOG from the speed log, the Sig. Distributor calculates transversal speeds of both ends of the ship, which can be fed to NWW-85 docking displays.

Remote Control is used to access the menu system in the Sig. Distributor as well as in connected speed logs. This Main Display shall be labeled as a Speed Log Master Display according to instructions in the NWW-82 Main Display chapter.

The Sig. Distributor is equipped with an Ethernet connection (RJ45) to access the Sig. Distributor web-interface. This web-interface can be used to access the Sig. Distributormenu system, display in/out going NMEA messages, display diagnostic lists, and for other service purposes.

The Sig. Distributor software is contained in Flash-memory, which can be updated on board from a USB memory stick or using the serial D-sub.

1.4 Block Diagram



This block diagram shows the general layout of the system. Data is received from the JLN-900 speed log and the ROT (rate of turn) gyro. Also a speed log (STW only) can be connected to the Sig. Distributor. Processing is done in the Sig. Distributor, which also serves as data distribution/interfacing unit. The exact wiring depends on each installation, depending on which displays are needed, what turn-rate gyro is used etc.

2 Technical Specification

Mechanical specification

Height:	500 mm + 60 mm under the cabinet for cable glands
Width:	500 mm
Depth:	211.5 mm
Weight:	19.7 kg

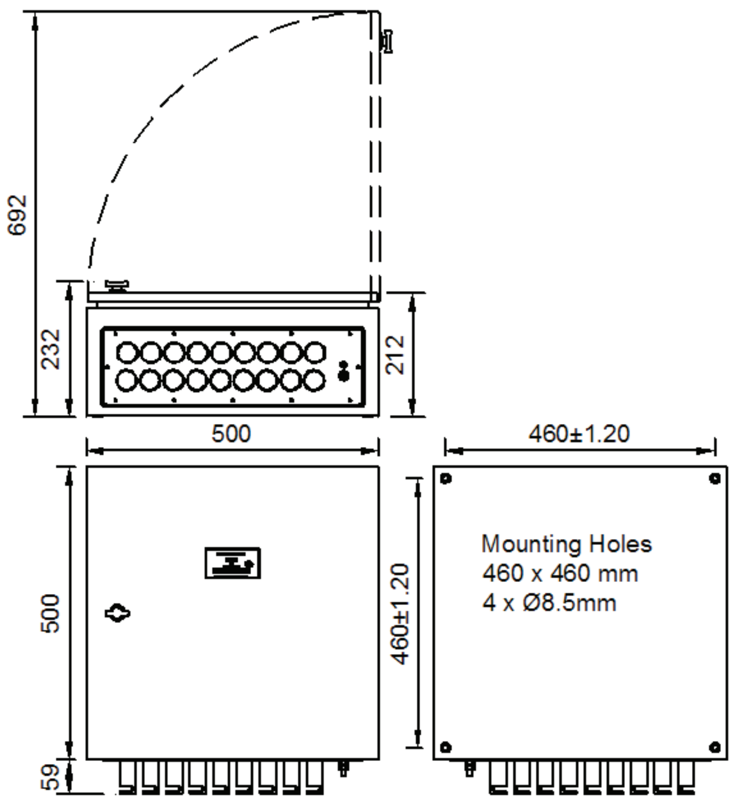
Electrical specification

Power intake:	1	100 VAC / 220–230 VAC +/-10% 50-60 Hz
Power consumption:		150 VA Maximum, typically 15 VA with 3 pcs SD4 connected or typically 50 VA with a ESD2 and 3 pcs SD4 connected
Display power output terminals:	9	12..28 VDC-outputs distributed over three fuses: 3 x 1A. Maximum total output load 3A
ESD power output:	1	18..32 VDC outputs distributed over one fuse. 1+2 spare terminals Maximum total output load: 1.5A
Serial inputs:	9	Standard IEC61162-1 / NMEA0183
Analogue inputs:	1	+/-10 V
Opto inputs:	4	Digital inputs that can detect a voltage above 3.5 V, maximum voltage 40 VDC
Serial output terminals:	23	IEC61162-1 / NMEA0183, totally 13 drivers (Divided into 8 channels)
Serial terminal:	1	RS232 For older generation ESD, in/out
Analogue outputs:	2	+/-5VDC, max load 10 mA
Switching relay outputs:	4	Switching: 30VDC / 1A Note! Not intended for distance pulses.
Closing relay outputs:	4	Closing: 50VDC / 0.5A 30V/30mA or 15V/100mA recommended max load when used as distance pulse relays.
Opto outputs:	8	5 to 40 VDC, max 50 mA
Ethernet connection	1	RJ45, DHCP server. Web-interface for service and set up.
USB Device	1	The USB Device slot is not used.
USB Host	2	Only the lower USB Host 1 slot is used
Service D-sub	1	RS232 for service purpose; terminal, Winflash.

Environmental specification

Enclosure material:	Steel plate
Enclosure protection:	IP22, splash proof
EMC:	IEC 60945, protected class
Heat dissipation (max)	= Power consumption
Colour:	RAL 7035
Recommended operating temperature	0°C to +40° C
Extreme operating temperature:	-15°C to +55° C
Extreme operating Humidity:	Less than 93 % RH (non-condensing) at 40°C

3 Mechanical installation



The Sig. Distributor is mounted in an IP22 drip-proof cabinet. All cables are brought into the case via cable glands in the bottom plate. Steel bolts in the dimension M8 shall be used for mounting. To assure that the cabinet is drip-proof, nylon washers must be used to seal the fixing holes.

3.1 Dimensions

Sig. Distributor : 500 x 500 x 212mm (H x W x D) + 60 mm under the Sig. Distributor for cable gland.

NOTE: When mounting, reserve a space of at least 150 mm under the cabinet for cable routing.

3.2 Cabinet location

- The Sig. Distributorcabinet shall be vertically mounted in a location where necessary cabling from bridge equipment can be brought to the unit, preferably on the bridge or a space close to the bridge.
- The location must have space enough to give sufficient space and accessibility for service of the unit.
- The location shall be protected from weather and shall offer a stable temperature.
- The location shall not expose the unit to excessive vibration levels.
- The location shall be far from electrical installations giving excessive electric and/or magnetic fields.
- The cabinet bottom shall be placed approximately 1.2 m from the floor where practical.
- Compass safe distance 2 meters.

3.3 Cable inlet with EMC protection and cable support

18 pieces EMC protected tubes with inside diameter 20mm are mounted on the bottom plate. More than one cable can be routed through each tube. On the inside of the cabinet each tube is equipped with a clamp plate for fixation of the cable screen. Cable support is provided by tighten a cable tie (zip tie), in the slit on the bottom of the tube, round the cable and the tube.

3.4 Grounding bolt

The bottom plate is equipped with a grounding bolt, which shall be connected to the metal structure of the ship's hull. The cable area of this connection shall be at least10mm^2, preferably using copper braid.

4 Electrical installation

4.1 General

To simplify the reading of this instruction, IEC61162/NMEA serial signals are named just NMEA.

Closer information about IEC61162/NMEA serial signals and how to connect cables carrying IEC61162.signals is described in document "IEC61162/NMEA0183 User Guide".

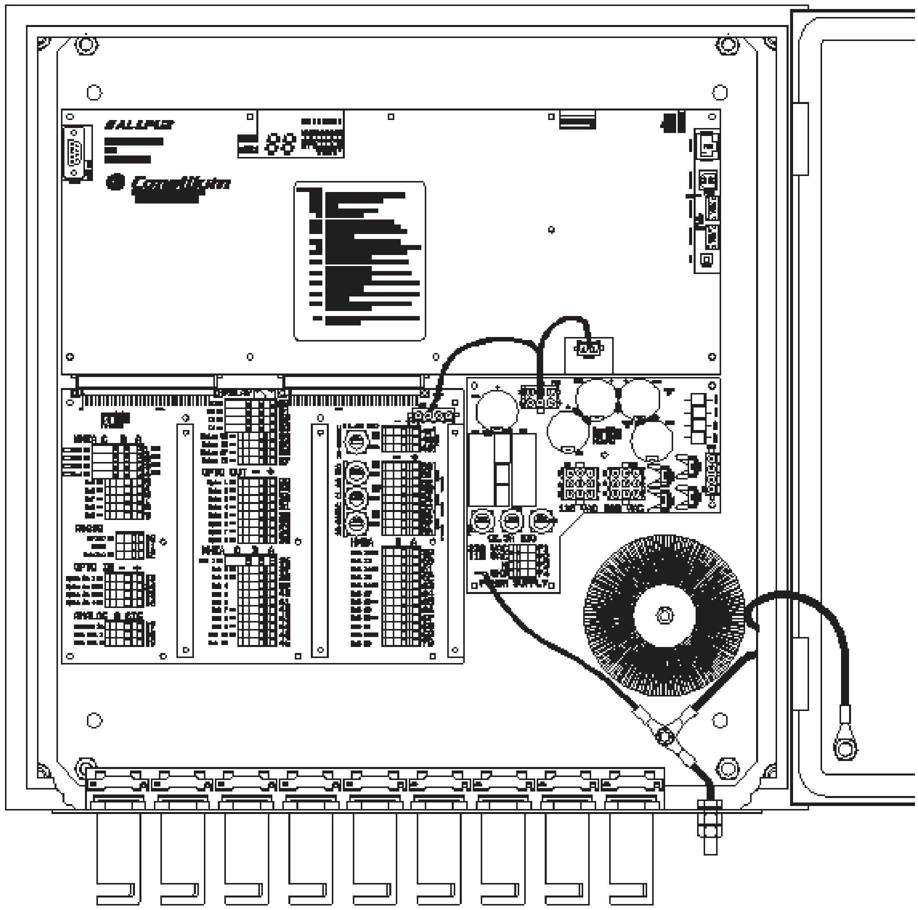
Also see Appendix 2 (Wiring Principles) below.

All cables shall be brought into the case via the provided cable inlet tubes in the bottom plate and all screens shall be properly terminated in the inlet tube clamp plate.
The cable screens between the Speed log Sig.Processor and the Sig. Distributor should only be connected to the Sig. Distributor and not to the Sig.Processor. Use a shielded cable with twisted pairs to connect the Speed Log Sig.Processor to the Sig. Distributor.

The connection terminals are positioned on the IO-PCB and the PSU-PCB. Terminals that are stacked on top of each other have the same number with an extra letter or mark, indicating column. For example NMEA in 1 has terminal numbers 1A, 1B and 1C, Opto out 1 has terminal numbers 28+ and 28-.

The terminals are designed for cable areas with a cross-section from 0,5mm^2 to maximum 2,5 mm^2 terminated without end caps.

4.2 Cabinet interior



The transformer and three Printed Circuit Boards are mounted on a plate inside the cabinet. The top PCB (CPU-PCB) is covered with a protection plate, in which holes are made for USB, Ethernet and RS232 connectors as well as the red 2 x LED digits. Also the Reboot pushbutton and the DIP switches are accessible without removing the front plate. All connection terminals are found on the two uncovered boards (IO- and PSU- PCB).

4.3 List of connections

Main power, 115 or 230 VAC (on PSU-PCB)

Term#	Function	Note
71	230 V AC	L1
72	100 V AC	(L1 if not 71 is connected)
73	N Neutral	L2
74	Protective ground	GND

Only one of the terminals 71 or 72 shall be connected. When powered from 230VAC, terminal 71-73-74 shall be used and the transformer connector shall be plugged into the 230 VAC contact.

If powered from 100 VAC, terminal 72-73-74 shall be used and the transformer connector shall be plugged into the 100 VAC contact.

The main fuses are positioned next to the main power terminals.

NOTE: There is no main switch. To switch the Sig. Distributor **AC power off, remove the fuses.**

Connections to Log 1 Sig.Processor

Term#	Function	Note
1A	NMEA in 1	Connect to T-Series speed Log NMEA "A" output
1B	NMEA in 1	Connect to T-Series speed Log NMEA "B" output
42A	NMEA out 7	Connect to Log control NMEA "A" input
42B	NMEA out 7	Connect to Log control NMEA "B" input

The NMEA in 1 connects to the NMEA out terminal 108 and 109 on the JLN-900 speed log Sig.Processor.

4.3.1 NOTE! NMEA in 1

NMEA in 1 is supervised by the Sig. Distributor: if there is no NMEA the relay K1 will drop. NMEA out 7 (terminal 42) connects to the NMEA in terminal on the Speed log Sig.ProcessorJLN-900.

Redundancy connections to Log 1 Sig.Processor

Term#	Function	Note
5A	NMEA in 5	Connect to Log NMEA "A" output (redundancy)
5B	NMEA in 5	Connect to Log NMEA "B" output (redundancy)

JLN-900: NMEA in 5 connects to the redundancy NMEA output (Redundant STW) in Log 1 terminal 120 and 121. This will improve the redundancy of the system. Even if the Sig. Distributor and/or the speed over ground log are malfunctioning, at least speed trough water will still be presented on the redundancy outputs.

Connections to Log 2 Sig.Processor (option)

Term#	Function	Note
2A	NMEA in 2	Connect to Log NMEA "A" output
2B	NMEA in 2	Connect to Log NMEA "B" output
43A	NMEA out 8	Connect to Log control NMEA "A" input
43B	NMEA out 8	Connect to Log control NMEA "B" input

A second Speed Log can be connected to the Sig. Distributor. The NMEA in 2 and NMEA out 8 shall be connected to the NMEA connections of the Log 2 Sig.Processor via a twisted pair cable.

NMEA out 1 will be directly connected, via redundancy relays, to NMEA in 1 (the main input from speed log1) in case of loss of power or a failure in the Sig. Distributor.

Connection to gyro (if docking-log option is used)

Term#	Function	Note
3A	NMEA in 3	Connect to NMEA "A" output terminal from gyro
3B	NMEA in 3	Connect to NMEA "B" output terminal from gyro

Instead of a serial NMEA interface an analogue signal can be used to obtain rate of turn information from the gyro.

Term#	Function	Note
17 Sign.	Analogue in	Connect to analogue output signal from gyro
17 0VDC	Analogue in	Connect to signal ground from gyro

Note! The gyro output impedance may not exceed 150Ω when using the analogue input.

NWW-82 Speed Log Master Display and redundancy displays

Term#	Function	Note
37A	NMEA out 2	Connect to NWW-82 NMEA "A" input
37B	NMEA out 2	Connect to NWW-82 NMEA "B" input
6A	NMEA in 6	Connect to NWW-82 NMEA "A" output
6B	NMEA in 6	Connect to NWW-82 NMEA "B" output
50+	+12 to 28 VDC	Connect to DC power input of display. Fuse F301
50-	0 VDC	Connect to DC power input of display

The speed logs and the Sig. Distributor menu system can be remotely accessed for calibration and setup of parameters from an NWW-82 Main Display(Master Display).

The NMEA out 2 and NMEA in 6 shall be connected to the NMEA in and out connections of the SD4 via a twisted pair cable. It is recommended to use a shielded cable with four twisted pairs to connect the SD4 to the Sig. Distributor, two pairs for NMEA, one pair for power and one pair as spare. NMEA out 2 will be directly connected, via redundancy relays, to NMEA in 5 (the redundancy output of speed log1) in case of loss of power or a failure in the Sig. Distributor.

2nd Display Log remote control

Term#	Function	Note
44A	NMEA out 9	Connect to NWW-82 NMEA "A" input
44B	NMEA out 9	Connect to NWW-82 NMEA "B" input
7A	NMEA in 7	Connect to NWW-82 NMEA "A" output
7B	NMEA in 7	Connect to NWW-82 NMEA "B" output
51+	+12 to 28 VDC	Connect to DC power input of display. Fuse F301
51	0 VDC	Connect to DC power input of display

A 2nd Display remote control can be connected to the system. It will have the same remote control functionality as the Speed log master display.

GPS input

Term#	Function	Note
8A	NMEA in 8	Connect to GPS NMEA "A" output
8B	NMEA in 8	Connect to GPS NMEA "B" output

GPS info received is only used for diagnostic purpose. This is an optional but recommended connection with the intention to simplify troubleshooting of the speed log system.

Alarm Acknowledge input

Term#	Function	Note
9A	NMEA in 9	Connect to bridge alarm panel
9B	NMEA in 9	Connect to bridge alarm panel

If an NMEA alarm ($xxALR,,,A,V,) is sent out from the Sig. Distributor to the bridge alarm panel, the alarm can be acknowledged using NMEA in 9.
E.g. to acknowledge an ESD alarm such as: $SDALR,,**150**,A,V,Shallow alarm, a corresponding: $SDACK,,**150** shall be sent to this input from the central alarm panel.

Digital inputs (opto-isolated)

Term#	Function	Note
14+	OPTO in2	LOG 1 SOG silent mode
14-	OPTO in2	

When Opto in 2 is activated, the acoustic transmission from the SOG part of log 1 stops, if applicable.

Term#	Function	Note
16+	OPTO in4	LOG 2 MAIN
16-	OPTO in4	

When activated LOG 2 becomes the active log

Input choices:
LOG 2 MAIN
LOG 1 SOG MUTE
LOG 2 SOG MUTE
Display INVERT OFF

These electrical inputs are galvanic separated from the Sig. Distributor by opto couplers. The OPTO inputs can detect an input voltage above 3,5VDC. Maximum input voltage is 40VDC.

NMEA out 10 – 15, connections to NMEA slave displays NWW-82/85

Provisions are made to connect NMEA output and DC power to slave displays. In total, including the Speed log master display, a maximum of 9 (nine) displays can be powered from the Sig. Distributor.

Term#	Function	Note
45A	NMEA out 10	Connect to NWW-82/85 NMEA "A" input
45B	NMEA out 10	Connect to NWW-82/85 NMEA "B" input
52+	+12 to 28 VDC	Connect to DC power input of display. Fuse F301
52-	0 VDC	Connect to DC power input of display

Term#	Function	Note
46A	NMEA out 11	Connect to NWW-82/85 NMEA "A" input
46B	NMEA out 11	Connect to NWW-82/85 NMEA "B" input
53+	+12 to 28 VDC	Connect to DC power input of display. Fuse 302
53-	0 VDC	Connect to DC power input of display

Term#	Function	Note
59A	NMEA out 12	Connect to NWW-82/85 NMEA "A" input
59B	NMEA out 12	Connect to NWW-82/85 NMEA "B" input
54+	+12 to 28 VDC	Connect to DC power input of display. Fuse F302
54-	0 VDC	Connect to DC power input of display

Term#	Function	Note
60A	NMEA out 13	Connect to NWW-82/85 NMEA "A" input
60B	NMEA out 13	Connect to NWW-82/85 NMEA "B" input
55+	+12 to 28 VDC	Connect to DC power input of display. Fuse F302
55-	0 VDC	Connect to DC power input of display

Term#	Function	Note
61A	NMEA out 14	Connect to NWW-82/85 NMEA "A" input
61B	NMEA out 14	Connect to NWW-82/85 NMEA "B" input
56+	+12 to 28 VDC	Connect to DC power input of display. Fuse F303
56-	0 VDC	Connect to DC power input of display

Term#	Function	Note
62A	NMEA out 15	Connect to NWW-82/85 NMEA "A" input
62B	NMEA out 15	Connect to NWW-82/85 NMEA "B" input
57+	+12 to 28 VDC	Connect to DC power input of display. Fuse F303
57-	0 VDC	Connect to DC power input of display

Term#	Function	Note
58+	+12 to 28 VDC	Connect to DC power input of display
58-	0 VDC	Connect to DC power input of display. Spare terminal. Fuse F303

The NMEA out A and B shall be connected to the NMEA in connections of the SD4 displays via a twisted pair cable. It is recommended to use a shielded cable with two twisted pairs to connect the slave SD displays to the Sig. Distributor, one pair for NMEA and one pair for power.

NMEA out 3 – 6 and 16 – 23, connections to external NMEA listeners

12 external NMEA listeners can be connected to the Sig. Distributor. Out 3 – 6 share driver and will be directly connected to NMEA in 5 (the redundancy output of speed log1) in case of loss of power or a failure in the Sig. Distributor.

Term#	Function	Note
38A	NMEA out 3	Connect to external NMEA listener, NMEA "A" input
38B	NMEA out 3	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
39A	NMEA out 4	Connect to external NMEA listener, NMEA "A" input
39B	NMEA out 4	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
40A	NMEA out 5	Connect to external NMEA listener, NMEA "A" input
40B	NMEA out 5	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
41A	NMEA out 6	Connect to external NMEA listener, NMEA "A" input
41B	NMEA out 6	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
63A	NMEA out 16	Connect to external NMEA listener, NMEA "A" input
63B	NMEA out 16	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
64A	NMEA out 17	Connect to external NMEA listener, NMEA "A" input
64B	NMEA out 17	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
65A	NMEA out 18	Connect to external NMEA listener, NMEA "A" input
65B	NMEA out 18	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
66A	NMEA out 19	Connect to external NMEA listener, NMEA "A" input
66B	NMEA out 19	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
67A	NMEA out 20	Connect to external NMEA listener, NMEA "A" input
67B	NMEA out 20	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
68A	NMEA out 21	Connect to external NMEA listener, NMEA "A" input
68B	NMEA out 21	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
69A	NMEA out 22	Connect to external NMEA listener, NMEA "A" input
69B	NMEA out 22	Connect to external NMEA listener, NMEA "B" input

Term#	Function	Note
70A	NMEA out 23	Connect to external NMEA listener, NMEA "A" input
70B	NMEA out 23	Connect to external NMEA listener, NMEA "B" input

Connections to relays and opto coupler outputs

There are 16 outputs of this kind: 4 switching relays, 4 closing relays and 8 opto couplers. The function of each relay/opto output can be programmed into the Sig. Distributor, using the commands and procedures defined in section 5, "Setting up Procedure".

Note! The switching relays K1-K4 are not intended for distance pulse function. First choice for pulse function is opto O1-O8, second K5-K8. Warranty cannot be claimed if K1, K2, K3 or K4 are used for distance pulse function.

Switching relays (NC=normally closed contact, CM=common, NO=normally open contact)

Relay#	Term#	Default signal
K1	**20:NC 20:CM** 20:NO	No NMEA Log 1 Main = de-energized
K2	**21:NC 21:CM** 21:NO	No NMEA Log 1 Redundancy = de-energized
K3	22:NC **22:CM 22:NO**	STW Astern = energized
K4	**23:NC 23:CM** 23:NO	ESD Alarm = de-energized

When energized, the corresponding LED will be lit and CM-NO will be electrically connected. In case of power fail of the Sig. Distributor, position NC-CM for the relays K1-K4 is valid.

The relays K1 and K2 supervise the NMEA in 1 and 5. The relays will be de-energized for no NMEA activity.

Relay K3 will be energised when STW indicates astern speed.

Relay K4 will be de-energized when an Echo sounder alarm occurs ($SDALR,,,A,V,) until acknowledged ($SDALR,,,A,A,).
Relay K4 can therefore be used as a contact for an external ESD buzzer.
If Opto in 1 is activated, K4 will be energized (external ESD buzzer mute).
If no ESD is connected to the Sig. Distributor the relay is de-energized.

Closing relays (NO=normally open contact, CM=common)

Relay#	Term#	Default signal
K5	24:CM 24:NO	Speed through water longitudinal 200p/nm, STW
K6	25:CM 25:NO	Speed through water longitudinal 200p/nm, STW
K7	26:CM 26:NO	Speed over ground resulting 200p/nm, BTR
K8	27:CM 27:NO	Speed over ground resulting 200p/nm, BTR

If no transversal SOG (BTT) is available, all BTR outputs will be calculated as if BTT=0, thus BTR outputs will be equal to BTL. This is applicable for analogue out, pulse relays and opto-couplers.

Opto-couplers

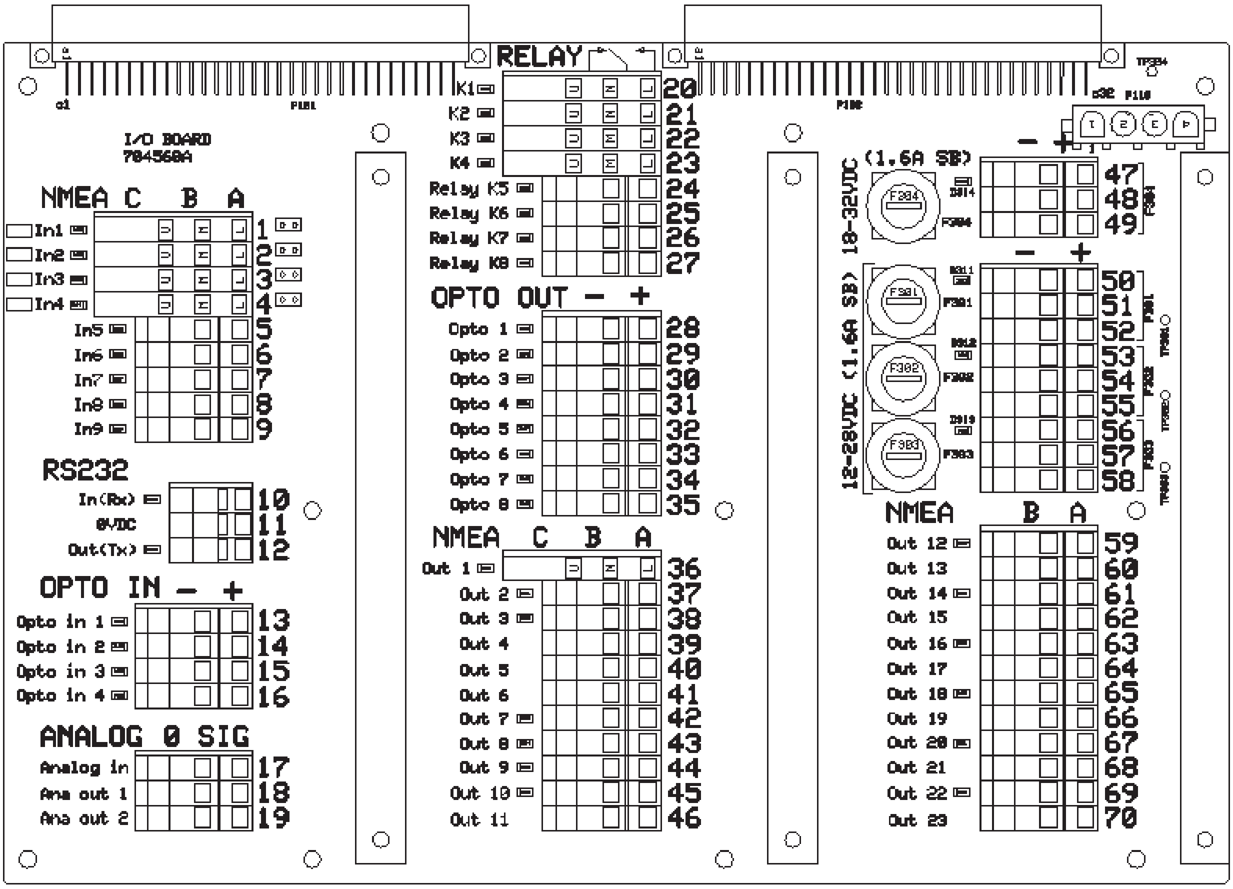
Opto#	Term#	Default signal
O1	28+ 28-	Speed through water longitudinal 200 p/nm, WTL
O2	29+ 29-	Speed through water longitudinal 200 p/nm, WTL
O3	30+ 30-	Speed through water longitudinal 200 p/nm, WTL
O4	31+ 31-	Speed through water longitudinal 200 p/nm, WTL
O5	32+ 32-	Speed over ground resulting 200 p/nm, BTR
O6	33+ 33-	Speed over ground resulting 200 p/nm, BTR
O7	34+ 34-	Speed over ground resulting 200 p/nm, BTR
O8	35+ 35-	Speed over ground resulting 200 p/nm, BTR

Analogue outputs

Output	Term#	Default signal
Ana out 1	18:Sign 18:0VDC	Speed through water longitudinal 0.1 V/knot, WTL
Ana out 2	19:Sign 19:0VDC	Speed over ground resulting 0.1 V/knot, BTR

4.4 Sig. Distributor Table of connections by numbers – summary

4.4.1 Terminals on I/O PCB:



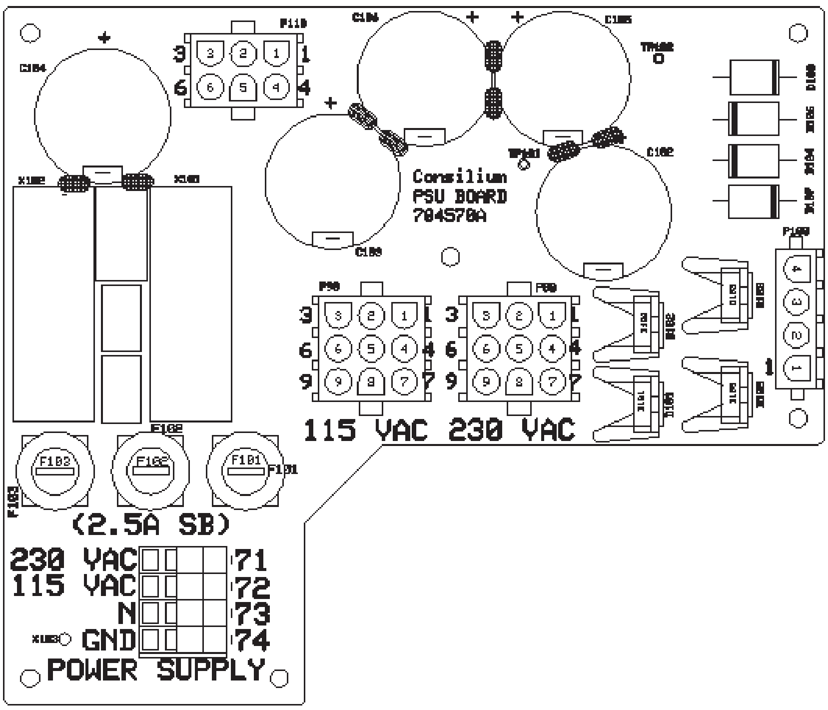
Terminal	Name	Function	Default use
1A	In 1 A	NMEA in 1	Speed log 1 Main, NOT R1a
1B	In 1 B		
1C		Not to be used	
2A	In 2 A	NMEA in 2	Speed log 2
2B	In 2 B		
2C		Not to be used	
3A	In 3 A	NMEA in 3	Gyro (ROT)
3B	In 3 B		
3C		Not to be used	
4A	In 4 A	NMEA in 4	ESD2 or E1 / E2
4B	In 4 B		
4C		Not to be used	
5A	In 5 A	NMEA in 5	Speed log 1 Redundancy/R1a
5B	In 5 B		
6A	In 6 A	NMEA in 6	NWW-82 Remote control – Speed Log Master Display
6B	In 6 B		
7A	In 7 A	NMEA in 7	NWW-82 Log remote control

Terminal	Name	Function	Default use
7B	In 7 B		
8A	In 8 A	NMEA in 8	GPS for diagnostic purpose / E1/E2
8B	In 8 B		
9A	In 9 A	NMEA in 9	Alarm Ack.
9B	In 9 B		
10	In (Rx)	RS232 In	Older Echo Sounder Display (Tx = Channel 0)
11	GND	RS232 GND	
12	Out(Tx)	RS232 Out	
13 +	Opto in1		External ESD Alarm mute, relay K4
13 -			
14 +	Opto in2		LOG 1 bottom track mute
14 -			
15 +	Opto in3		
15 -			
16 +	Opto in4		LOG 2 MAIN
16 -			
17 Sign	Analogue in		ROT Gyro (+-10V)
17 0VDC			
18 Sign	Ana out 1		Speed through water longitudinal, 0.1V/knot
18 0VDC			
19 Sign	Ana out 2		Speed over ground resulting, 0.1V/knot
19 0VDC			
20 NC	K1	Normally Closed	No NMEA Log 1 Main
20 CM		Common	
20 NO		Normally Open	
21 NC	K2	Normally Closed	No NMEA Log 1 Redundancy / R1a
21 CM		Common	
21 NO		Normally Open	
22 NC	K3	Normally Closed	STW Astern
22 CM		Common	
22 NO		Normally Open	
23 NC	K4	Normally Closed	
23 CM		Common	
23 NO		Normally Open	
24 CM	K5		Speed through water longitudinal 200p/nm
24 NO			
25 CM	K6		Speed through water longitudinal 200p/nm
25 NO			
26 CM	K7		Speed over ground resulting 200p/nm
26 NO			
27 CM	K8		Speed over ground resulting 200p/nm
27 NO			
28 +	Opto 1		Speed through water longitudinal 200p/nm
28 -			
29 +	Opto 2		Speed through water longitudinal 200p/nm
29 -			
30 +	Opto 3		Speed through water longitudinal 200p/nm
30 -			
31 +	Opto 4		Speed through water longitudinal 200p/nm
31 -			
32 +	Opto 5		Speed over ground resulting 200p/nm
32 -			
33 +	Opto 6		Speed over ground resulting 200p/nm
33 -			

Terminal	Name	Function	Default use
34 + 34 -	Opto 7		Speed over ground resulting 200p/nm
35 + 35 -	Opto 8		Speed over ground resulting 200p/nm
36 A 36 B	Out 1 A Out 1 B	NMEA out 1 (redundancy)	(Channel 0)
36 C		Not to be used	
37 A 37 B	Out 2 A Out 2 B	NMEA out 2 (redundancy)	NWW-82 Log remote control – Speed Log Master Display (Channel 1)
38 A 38 B	Out 3 A Out 3 B	NMEA out 3 (redundancy) (Out 3-6 share driver)	Connects to external NMEA listeners (Channel 2)
39 A 39 B	Out 4 A Out 4 B	NMEA out 4 (redundancy) (Out 3-6 share driver)	Connects to external NMEA listeners (Channel 2)
40 A 40 B	Out 5 A Out 5 B	NMEA out 5 (redundancy) (Out 3-6 share driver)	Connects to external NMEA listeners (Channel 2)
41 A 41 B	Out 6 A Out 6 B	NMEA out 6 (redundancy) (Out 3-6 share driver)	Connects to external NMEA listeners (Channel 2)
42 A 42 B	Out 7 A Out 7 B	NMEA out 7	Log 1 (Channel 3)
43 A 43 B	Out 8 A Out 8 B	NMEA out 8	Log 2 (Channel 4)
44 A 44 B	Out 9 A Out 9 B	NMEA out 9	2nd NWW-82 Log remote control (Channel 5)
45 A 45 B	Out 10 A Out 10 B	NMEA out 10 (Out 10-11 share driver)	Display (Channel 6)
46 A 46 B	Out 11 A Out 11 B	NMEA out 11 (Out 10-11 share driver)	Display (Channel 6)
47 + 47 -	18-32 VDC		Fuse F304
48 + 48 -	18-32 VDC		Spare. Fuse F304
49 + 49 -	18-32 VDC		Spare. Fuse F304
50 + 50 -	12-28 VDC		Power for Display. Fuse F301
51 + 51 -	12-28 VDC		Power for Display. Fuse F301
52 + 52 -	12-28 VDC		Power for Display. Fuse F301
53 + 53 -	12-28 VDC		Power for Display. Fuse F302
54 + 54 -	12-28 VDC		Power for Display. Fuse F302
55 + 55 -	12-28 VDC		Power for Display. Fuse F302
56 + 56 -	12-28 VDC		Power for Display. Fuse F303
57 + 57 -	12-28 VDC		Power for Display. Fuse F303
58 +	12-28 VDC		Power for Display. Fuse F303

Terminal	Name	Function	Default use
58 -			
59 A	Out 12 A	NMEA out 12	Display
59 B	Out 12 B	(Out 12-13 share driver)	(Channel 6)
60 A	Out 13 A	NMEA out 13	Display
60 B	Out 13 B	(Out 12-13 share driver)	(Channel 6)
61 A	Out 14 A	NMEA out 14	Display
61 B	Out 14 B	(Out 14-15 share driver)	(Channel 6)
62 A	Out 15 A	NMEA out 15	Display
62 B	Out 15 B	(Out 14-15 share driver)	(Channel 6)
63 A	Out 16 A	NMEA out 16	Connects to external NMEA listeners
63 B	Out 16 B	(Out 16-17 share driver)	(Channel 7)
64 A	Out 17 A	NMEA out 17	Connects to external NMEA listeners
64 B	Out 17 B	(Out 16-17 share driver)	(Channel 7)
65 A	Out 18 A	NMEA out 18	Connects to external NMEA listeners
65 B	Out 18 B	(Out 18-19 share driver)	(Channel 7)
66 A	Out 19 A	NMEA out 19	Connects to external NMEA listeners
66 B	Out 19 B	(Out 18-19 share driver)	(Channel 7)
67 A	Out 20 A	NMEA out 20	Connects to external NMEA listeners
67 B	Out 20 B	(Out 20-21 share driver)	(Channel 7)
68 A	Out 21 A	NMEA out 21	Connects to external NMEA listeners
68 B	Out 21 B	(Out 20-21 share driver)	(Channel 7)
69 A	Out 22 A	NMEA out 22	Connects to external NMEA listeners
69 B	Out 22 B	(Out 22-23 share driver)	(Channel 7)
70 A	Out 23 A	NMEA out 23	Connects to external NMEA listeners
70 B	Out 23 B	(Out 22-23 share driver)	(Channel 7)

4.4.2 Terminals on PSU PCB:



Terminal	Name	Function	Note
71	230 VAC	230 VAC Power supply (L1)	Fuse F101
72	115 VAC	100/115 VAC Power supply (L1)	Fuse F102
73	N	Neutral (L2)	Fuse F103
74	GND	Ground	

5 Setting up procedure

The Sig. Distributor has an internal menu system that can be accessed via a remote Speed Log Master Display or via the web-interface. At setup the menu system is used for:

1) changing the default setup of input- and output channels. See Menu I, N and O.
2) enter speed log transducer (TRU) position to enable docking log calculations. See 5.2.7 Menu S.
3) enter system type: T-Series, R1a or Dual Log. See 5.2.7 Menu S.
4) access the internal diagnostics list for troubleshooting. See 5.2.2 Menu A.

The settings are stored in non-volatile memory and will therefore also be active after a reboot or power shut-down. After the setting up is finished and the system is tested, no further actions are required during normal operation.

5.1 Accessing the Sig. Distributor Menu system

The Sig. Distributor Menu system is accessed from an Speed Log Master Display unit or the web-interface. Here follows a short guide to access the menu system in the Sig. Distributor via the Speed Log Master Display. (For a detailed description of the menu system in the Master Display, see document "Main Display Technical description".)

5.1.1 Reaching NWW-82 Menu Mode

The Mode window of the NWW-82 Display can be set to Menu Mode, which is used for internal settings of the display and can be used to connect to a remote unit such as the Sig. Distributor.

The Menu Mode is reached by pressing the Mode button for minimum 5 sec. The Mode Window will show the text "PRESS ENTER FOR MENU". Then press the "Enter button (4th button from left)" within 5 seconds.

The Mode Window will now show the start menu in the Main Display. The six buttons under the Mode Window have now got alternative functions. The alternative functions are lit in red text below relevant button.

The buttons now have the following functions:

Mode: "1st button from left". Will inform which remote device is connected in remote mode.

Esc: "2nd button from left". The Escape function is used in the "Remote Device menu" to escape from the menu system in a remotely connected unit (E.g. the Sig. Distributor menu system) and step back to the local menu system in the Main Daiplay unit.

Menu: "3rd button from left". Is used alone, or together with the Minus (-) button, or together with the Enter button, to move in the menus as described below.
Menu button alone, will display next menu i.e. step forward on same menu level.
Menu button and Minus (-) buttons pressed simultaneously will display previous menu,

i.e. step back on the same menu level.
Menu button and Enter buttons pressed simultaneously will move up one menu level, except when leaving the “Remote Device menu”. (see Esc-button)

Enter: “4th button from left” is used to store changed values or to move to sub-menus.

\- + “Minus button” and “Plus button” are used to change values or status (E.g. write access OFF/ON) and /or to change device values.

Note: The Menu System will exit automatically if no button has been pressed for 5 minutes when being in the local SD4 Menu System, when connected to a remote device there is no timeout and the Escape button must be used to exit from a remotely connected device.

5.1.2 Main Display in Menu Mode

The Menu Mode in the Main Display has three “Local Menus” and one “Remote Device menu”:

- SD4 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 were the remote dimming function can easily be turned ON/OFF.
- LP0 PROPERTIES. This menu contains sub menus for local setting up of the display. **Note: Do not turn write access ON without special training.**
- LS0 REMOTE SETUP. This menu contains sub menus for setting up when the display is used as a Speed log Master Display /Remote Device for other units and displays. **Note: Do not turn write access ON without special training**
- R0 REMOTE DEV. On designated Speed Log Master Displays this menu provides access to a remote device, e.g. the WTU-unit, BTU-unit or the Sig. Distributor menu structure.
  Note: Verify that the setting in SD4 menu LS7 is “R0 REMOTE ENABLED [ON]” to be able to connect to remote devices.

To connect to the menu system in the Sig. Distributor**:**
When in SD4 LOCAL (the start menu) step to R0 REMOTE DEV menu by pressing the MENU button three times.

When pressing ENTER in the R0 menu the Main Display will establish communication with all connected equipment and display them in a list of menu choices.

Press the MENU button until the LPU is displayed and press ENTER to start communicating with the Sig. Distributor.

ESC is used to step back.

Example of a menu walk in the R0 REMOTE DEV menu:

```
R0 REMOTE DEV
CONNECT
```

press[Enter]

```
SYNCHRONISING
(counting down from 5)
```

wait 3 seconds

```
R1 DEVICE 1 OF 3
BTU 1     (T2A)
```

press[MENU]

```
R2 DEVICE 2 OF 3
LPU 1     (LP1)
```

press[ENTER]

```
W+XX.X   DXXX.X
BL+XX.X  T+X.XX
```

Access to the main menu in the Sig. Distributor. Press MENU to go deeper into the Sig. Distributor menu system. To exit back to local mode in the SD4 the ESC button must be used. The ESC button will always step out of the remotely controlled menu system.

MENU+ENTER is used to step back within the remotely controlled menu system.

press[ESC]

```
R2 DEVICE 2 OF 3
LPU 1     (LP1)
```

press[ESC or MENU+ENTER]

```
R0 REMOTE DEV
CONNECT
```

5.2 Sig. Distributor Menus

The function of each menu in the Sig. Distributor is defined below.

5.2.1 Main Menu

```
W+XX.X   DXXX
BL+XX.X  T+X.XX
```

W+XX.X:	Longitudinal water speed, X.XX or XX.X knots.	+ = ahead, - =astern
DXXX:	Depth in meters below transducer. XXX or XX.X.	
BL+XX.X:	Longitudinal ground speed, X.XX or XX.X knots.	Sign as above.
T+X.XX:	Transversal ground speed, X.XX or XX.X knots.	+ = starboard, - = port.

This is the "default" menu, which is shown during normal operation. If left in any other menu, the system will return to this menu after 2 minutes of idling.

5.2.2 Menu A, Diagnostics list

When pressing the MENU button in the Main menu, A0 DIAGNOSTICS list is displayed.

```
A0 DIAGNOSTICS
0 ACTIVE
```

This menu displays the number of active diagnostic codes in the speed log system. External alarms ($xxALR), except Echo Sounder alarms ($**SD**ALR), are also shown.

Press ENTER to enter sub menu A1, listing active diagnostic codes. Use the +/- or MENU button to scroll the list.

See also the list of Sig. Distributor diagnostic codes in this document.

5.2.3 Menu I, Inputs

When pressing the MENU button in the Diagnostics list MENU, I0 INPUTS is displayed.

```
I0 INPUTS
WRITE ACCESS OFF
```

Settings concerning NMEA- and OPTO- inputs are set under this menu.

NMEA talkers:

```
I1 NMEA IN1
LOG 1 MAIN
```

to

```
I9 NMEA IN9
ALARM MUTE
```

Which type of NMEA talkers that are connected to the Sig. Distributor can be set in menu I1 to I9. These settings control which type of NMEA messages that will be let through on each input. Menu I1 to I9 can also be set to correct and let through incoming NMEA with missing or corrupt checksum. Each NMEA talker is filtered according to the *filter*-file in use, see *6 NMEA filtering*.

NOTE! Each of the four default input functions: LOG 1 MAIN, LOG 1 REDUNDANCY, GYRO or ESD shall never be set to more than one NMEA input.

OPTO inputs:

I10 OPTO IN 1 ALARM MUTE

to

I13 OPTO IN 4 LOG 2 MAIN

The Sig. Distributor is equipped with four opto-isolated inputs that can be used to control the system. Each input can be set according to the following list:

OPTO inputs	Function
ALARM MUTE	Mute an ESD Alarm
ES 2 MAIN	ES 2 (LOG 2) becomes the active Echo Sounder
LOG 2 MAIN	LOG 2 becomes the active log
LOG 1 BT MUTE	Mutes the BT / SOG transmitter of LOG 1
LOG 2 BT MUTE	Mutes the BT / SOG transmitter of LOG 2
SD4 INVERT OFF	Deactivates the inverting function for an SD4 INVERTED output channel. When active, the SD4 INVERTED nmea output channels are identical to an SD4 nmea output.

Table 1 OPTO input list

5.2.4 Menu M, Miscellaneous

When pressing the MENU button in the I0 INPUTS menu, M0 MISC is displayed.

M0 MISC WRITE ACCESS OFF

Example of settings:
- Restore to default menu settings
- CPU Reboot
- Display SoftWare REVISION
- Display FirmWare REVISION
- Display HardWare REVISION
- ACCESS LEVEL

See table "Menu function summary" For a complete MENU list.

5.2.5 Menu N, NMEA out

When pressing the MENU button in the M0 MISC menu, N0 NMEA OUT is displayed.

NO NMEA OUT WRITE ACCESS OFF

Setting concerning NMEA outputs are set under this menu.
For example:
- NMEA listeners
- Transmit baud rate

NMEA listeners:

N1 NMEA OUT1 ESD

to

```
N8 NMEA O 16-23
SPEED+DEPTH
```

Which type of NMEA listeners that are connected to the Sig. Distributor can be set in menu N1 to N8. These settings control which NMEA messages are transmitted on each output. Each NMEA output is filtered according to the *filter-file* in use, see *6 NMEA filtering*.

5.2.6 Menu O, Outputs

When pressing the MENU button in the N0 NMEA OUT menu, O0 OUTPUTS is displayed.

```
O0 OUTPUTS
WRITE ACCESS OFF
```

Setting concerning analogue, relay and opto outputs are set under this menu.

Analogue outputs:

```
O1 ANALOG OUT 1
WTL
```

Longitudinal water speed

```
O1.01 ANA OUT 1
0.1 V/KNOTS
```

Scale factor for output 1

```
O2 ANALOG OUT 2
BTR
```

Resulting ground speed

```
O2.01 ANA OUT 2
0.1 V/KNOTS
```

Scale factor for output 2

Relay and OPTO outputs:

```
O3 RELAY K1
FAIL LOG 1 REDUN
```

to

```
O18 OPTO 8
PULSE F BTR 200P
```

Program a threshold value for relay and / or OPTO outputs:

Example to set OPTO out 1 to a threshold value of WTL higher than 8kn:

Use the MENU button to go to menu O11

```
O11 OPTO 1
PULSE A WTL 200P
```

Use the + button to go to the function WTL HIGH THAN 0

```
O11 OPTO 1
WTL HIGH THAN 0
```

Press the ENTER button

```
O11 OPTO 1
SAVING...
```

Press the ENTER button once more to reach sub menu O11.1

O11.1 OPTO 1
WTL HIGH THAN 0

Use the + button to set the value 8kn

O11.1 OPTO 1
WTL HIGH THAN 8

Press the ENTER button to save the value 8kn

Each relay and opto output can be programmed to indicate a specific function (see table below).

Relay + opto out	Function
FAIL LOG 1 MAIN	No NMEA from LOG 1 main (power fail)
FAIL LOG 2 MAIN	No NMEA from LOG 2 (power fail)
FAIL LOG 1 REDUN	No NMEA from LOG 1 redundancy (power fail)
ESD ALARM	Alarm from Echo Sounder Display
PULSE A WTL 200P	Pulse timer A (Default set to WTL 200P/NM) Menu S9
PULSE B WTT 200P	Pulse timer B (Default set to WTT 200P/NM) Menu S10
PULSE C WTR 200P	Pulse timer C (Default set to WTR 200P/NM) Menu S11
PULSE D BTL 200P	Pulse timer D (Default set to BTL 200P/NM) Menu S12
PULSE E BTT 200P	Pulse timer E (Default set to BTT 200P/NM) Menu S13
PULSE F BTR 200P	Pulse timer F (Default set to BTR 200P/NM) Menu S14
WTL ASTERN	WTL Forward or Astern, Energized relay (Closed contact) = Astern
WTT PORT	WTT Port or Starboard, Energized relay (Closed contact) = Port
WT INVALID	De-energized relay (Open contact) = Invalid STW / WT
BTL ASTERN	SOG longitudinal (BTL) Forward or Astern, Energized relay (Closed contact) = Astern
BTT PORT	SOG transverse (BTT) Port or Starboard, Energized relay (Closed contact) = Port
BT INVALID	De-energized relay (Open contact) = Invalid SOG
BT DEPTH INVALID	De-energized relay (Open contact) = Invalid BT DEPTH
WTL HIGH.THAN XX	XX is the longitudinal STW threshold value in knots
WTT HIGH.THAN XX	XX is the transversal STW threshold value in knots
WTR HIGH.THAN XX	XX is the resulting STW threshold value in knots
BTL HIGH.THAN XX	XX is the longitudinal SOG threshold value in knots
BTT HIGH.THAN XX	XX is the transversal SOG threshold value in knots
BTR HIGH.THAN XX	XX is the resulting SOG threshold value in knots
WTL LOW.THAN XX	XX is the longitudinal STW threshold value in knots
WTT LOW.THAN XX	XX is the transversal STW threshold value in knots
WTR LOW.THAN XX	XX is the resulting STW threshold value in knots
BTL LOW.THAN XX	XX is the longitudinal SOG threshold value in knots
BTT LOW.THAN XX	XX is the transversal SOG threshold value in knots
BTR LOW.THAN XX	XX is the resulting SOG threshold value in knots

Table 2 Relay and OPTO out

5.2.7 Menu S, Settings

When pressing the MENU button in the O0 OUTPUTS menu, S0 SETTINGS is displayed.

S0 SETTINGS WRITE ACCESS OFF

Setting concerning docking-log, NMEA syntax, NMEA delay, BT speed (SOG) input, pulse timers, speed averaging, USB handling and network IP-address can be accessed under this menu.

S1, System type

S1 SYSTEM TYPE AUTO SENSE

The system can automatically detect connected speed logs and set-up the system accordingly. When the menu is set to AUTO SENSE it will make a new scan of the inputs and choose a new system setup. The decision is made 5 seconds after the first valid NMEA input on LOG1 Main, LOG1 Redundancy or LOG2. The chosen system type is displayed when the menu S1 is entered again. Alternatively, this menu can be used to manually set the type of system according to following table.

SYSTEM TYPE	Function
AUTO SENSE	
T SERIES	STW and SOG speed from log 1 are supervised, In 5 and In 1
R1a	STW speed from log 1 is supervised, In 5
DUAL LOG	STW and SOG speed from log 1 and 2 are supervised, In 5, In 1 and In 2

When the setting in menu S1 is made, manually or with the AUTO SENSE function and the systems detects incoming NMEA on these 3 inputs and this NMEA traffic does not match current setting in menu S1, the system will set the LED code 05 on the red 2 x LED digits on the CPU-PCB.

S2 – S5, Docking Log

S2 DL GYRO INPUT NMEA

The rate of turn signal from the gyro can be fed to the Sig. Distributor, either via a serial NMEA interface or an analogue DC voltage. If ANALOGUE is chosen, an additional menu S2.2 will be used to set the scale factor of the analogue input.

S3 DL GEO BOW 0 M

Docking-log geometry, distance transducer to bow.

S4 DL GEO STERN 0 M

Docking-log geometry, distance transducer to stern.

Requirements for Docking log:

To calculate transversal speed of both ends of the ship the Sig. Distributor needs settings and inputs accordingly.

- SOG speed input, longitudinal and transversal.
- Rate-Of-Turn input, NMEA ($xxROT) or analogue, setting is made in menu S2.
- Geometry of the ship referring to the transducer mounting. These settings are made in menu S3 and S4. Both must be set to more than zero in order to activate the docking log calculations.

When these three conditions are fulfilled the Sig. Distributor starts to calculate docking log information to be presented on e.g. docking log display SD4-5 Docking Display.

The Sig. Distributor will not calculate docking-log information if the menu S1 is set to R1a.

```
S5 DL NMEA
VDVBW
```

Specifies in which format the docking-log information is transmitted over the serial NMEA interface. Can be set to VDVBW, PSALL or PSALL/VBW STERN

VDVBW: This is the standard Velocity Doppler log format, which includes two fields for transversal speed. The first field shows transversal speed in the bow and the second field shows transversal speed in the stern of the ship. If no docking-log calculation takes place, only the first transversal field is used, indicating transversal transducer speed.

PSALL: This is a propriety message containing the docking-log information. The VDVBW message is transmitted simultaneously, with only the first transversal field used indicating transducer speed.

PSALL/VBW STER: The PSALL message and the VDVBW message are both transmitted. The PSALL message containing the docking-log information, and the VDVBW message, using the first transversal field for transducer speed and the second transversal field for speed in the stern.

S6, VBW format

```
S6 VBW FORMAT
EXTENDED
```

IEC 61162-1 edition 2 adds docking-log information fields to the VDVBW message for stern transversal speed. Some older listeners might not support those new fields in the message. Setting this menu to SHORT, forces the Sig. Distributor to output the VDVBW message in the shorter format without stern transversal speed.

Note if SHORT version of the VDVBW message is used menu S5 must be set to PSALL for the docking-log info to be transmitted to the listeners, e.g. NWW-85 Docking Display.

S7, TX delay

S7 TX DELAY
0 MS

This menu controls the interval between serial data messages. The delay can be used to lower data rate for slow receiver devices unable to handle messages back to back. The value is adjustable in 10 ms steps from 0 up to 60-70 ms (default delay is 0 ms). For maximum throughput the value shall be set as low as possible. When using the MFD5 we recommend setting this value to 60-70ms.

S8, BT Speed Inp

S8 BT SPEED INP
LOG

Currently not implemented, but will extend the use of the Sig. Distributor to also calculate docking-log information from other speed sources.

S9 – S14, Pulses

S9 PULSE A
WTL 200 P / NM

to

S14 PULSE F
BTR 200 P / NM

There are 6 different pulse timers (A-F) used to generate speed pulses that can be chosen for relay and opto outputs. Following listed speeds can be set under Menu S9 – S14.

Pulse timer settings	Function
WTL 100P	Longitudinal STW 100 pulses / NM
WTL 200P	Longitudinal STW 200 pulses / NM (Default for Pulse timer A)
WTL 400P	Longitudinal STW 400 pulses / NM
WTL 500P	Longitudinal STW 500 pulses / NM
WTT 100P	Transversal STW 100 pulses / NM
WTT 200P	Transversal STW 200 pulses / NM (Default for Pulse timer B)
WTT 400P	Transversal STW 400 pulses / NM
WTT 500P	Transversal STW 500 pulses / NM
WTR 100P	Resulting STW 100 pulses / NM
WTR 200P	Resulting STW 200 pulses / NM (Default for Pulse timer C)
WTR 400P	Resulting STW 400 pulses / NM
WTR 500P	Resulting STW 500 pulses / NM
BTL 100P	Longitudinal SOG 100 pulses / NM
BTL 200P	Longitudinal SOG 200 pulses / NM (Default for Pulse timer D)
BTL 400P	Longitudinal SOG 400 pulses / NM
BTL 500P	Longitudinal SOG 500 pulses / NM
BTT 100P	Transversal SOG 100 pulses / NM
BTT 200P	Transversal SOG 200 pulses / NM (Default for Pulse timer E)
BTT 400P	Transversal SOG 400 pulses / NM
BTT 500P	Transversal SOG 500 pulses / NM

Pulse timer settings	Function
BTR 100P	Resulting SOG 100 pulses / NM
BTR 200P	Resulting SOG 200 pulses / NM (Default for Pulse timer F)
BTR 400P	Resulting SOG 400 pulses / NM
BTR 500P	Resulting SOG 500 pulses / NM

Table 3 Pulse timer settings

S15, SPD Average

```
S15 SPD AVERAGE
0 SEC
```

This menu will affect analogue and pulse outputs as well as those NMEA outputs programmed for NMEA listeners “SPD AVERAGE +DPT”. Rapid changes of speed will be slowed down by the set value in this menu. If, for example, this menu is set to 5 sec, it will take 5 seconds for a speed change to be fully indicated on the output. When choosing this setting on an NMEA output, speed is filtered according to the time setting but transmitted DPT is unchanged

S16, USB storage

```
S16 USB STORAGE
FILL UP
```

An USB memory stick can be used to store all received and transmitted NMEA messages in the Sig. Distributor. This menu enables activation or deactivation of the NMEA storage. Please reboot the Sig. Distributor before inserting USB memory stick. Average storage on USB memory stick is approx. 300 MB/24h. Menu can be set to OFF, FILL UP or NFS. Use the FILL UP option for USB storage. Use the NFS option for NFS-disk storage on the network. The NFS-disk network address is set in the Sig. Distributor Web interface as AUTHORISED EXPERT.

S17, USB Erase

```
S17 USB ERASE
DISABLED
```

This menu gives the possibility to completely erase and format an USB memory. However, it might fail depending on Sig. Distributor load and the type of USB memory.

S18 – S19, IP-Addresses

```
S18 LPU2 ADDRESS
IP 192.168.5.17
```

Specifies the IP address of the Sig. Distributor. Last digit is default set to 17 and should normally not be changed. As “authorized” it may be set from 1 to 50. If set outside this range, it will use 1 or 50.

```
S19 SERVICE PC
IP 192.168.5.56
```

Specifies which IP address the Sig. Distributor shall connect to when accessing a service tool.

S20, BAM

S20 BAM SERIAL DISABLED

Enables or disables serial Bridge Alert Management sentences (IEC 62923-1).

5.2.8 Menu T, Test

When pressing the MENU button in the S0 SETTINGS menu, T0 TEST is displayed.

T0 TEST WRITE ACCESS OFF

Incoming NMEA can be simulated using the menu T1.

If the setting in menu S1 is T-SERIES, the Sig. Distributor simulates incoming NMEA as below:

T1 TEST NMEA T-SERIES

NMEA input signals are simulated internally by the Sig. Distributor with the following setting:

Log1Main:	WTL = 20.10, BTL = 21.10, BTT = 1.10, Depth = 99.1
Log1Redundancy:	WTL = 24.50, BTL = 25.50, BTT = 1.50, Depth = 99.5
GYRO_ROT:	ROT = 5.30

NOTE echo sounder depth is not simulated, $SDDPT, only speed log depth $VDDPT.

If the setting in menu S1 is R1A, the Sig. Distributor simulates incoming NMEA as below:

T1 TEST NMEA R1A

NMEA input signals are simulated internally in the Sig. Distributor with the following setting:

Log1Redundancy:	WTL = 24.50

If the setting in menu S1 is DUAL_LOG, the Sig. Distributor simulates incoming NMEA as below:

T1 TEST NMEA DUAL LOG

NMEA input signals are simulated internally in the Sig. Distributor with the following setting:

Log1Main:	WTL = 20.10, BTL = 21.10, BTT = 1.10, Depth = 99.1
Log1Redundancy:	WTL = 24.50, BTL = 25.50, BTT = 1.50, Depth = 99.5
Log2Main:	WTL = 22.20, BTL = 23.20, BTT = 1.20, Depth = 99.2
GYRO_ROT:	ROT = 5.30

If the setting in menu S1 is AUTO SENSE this information is shown:

T1 TEST NMEA CAN NOT SIMULATE AUTO

Please set menu S1 before simulate NMEA.

5.3 Menu function summary

No	Name	Default setting	Function
MAIN MENU	W+XX.XX DXXX.X BL+XX.X T+X.XX		
A0	DIAGNOSTICS		Displays the number of active diagnostic codes
A1	DIAGNOSTICS		List of active diagnostic codes
I0	INPUTS		
I1	NMEA IN1	LOG 1 MAIN	*
I1.01	NMEA IN1	CHECKSUMTEST ON	OFF or ON *
I1.02	NMEA IN1	BAUDRATE 4800	4800 or 38400 *
I2	NMEA IN2	LOG 2 MAIN	
I2.01	NMEA IN2	CHECKSUMTEST ON	OFF or ON
I2.02	NMEA IN2	BAUDRATE 4800	4800 or 38400
I3	NMEA IN3	GYRO (ROT)	*
I3.01	NMEA IN3	CHECKSUMTEST ON	OFF or ON
I3.02	NMEA IN3	BAUDRATE 4800	4800 or 38400 *
I4	NMEA IN4	ESD	*
I4.01	NMEA IN4	CHECKSUMTEST ON	OFF or ON *
I4.02	NMEA IN4	BAUDRATE 4800	4800 or 38400 *
I5	NMEA IN5	LOG 1 REDUNDANCY	*
I5.01	NMEA IN5	CHECKSUMTEST ON	OFF or ON *
I6	NMEA IN6	SD4	Speed Log Master Display *
I6.01	NMEA IN6	CHECKSUMTEST ON	OFF or ON *
I7	NMEA IN7	SD4	
I7.01	NMEA IN7	CHECKSUMTEST ON	OFF or ON
I8	NMEA IN8	GPS	Diagnostic function
I8.01	NMEA IN8	CHECKSUMTEST ON	OFF or ON
I9	NMEA IN9	ALARM MUTE	
I9.01	NMEA IN9	CHECKSUMTEST ON	OFF or ON
I10	OPTO IN 1	ALARM MUTE	
I11	OPTO IN 2	LOG 1 BT MUTE	Turns off the SOG transmission
I12	OPTO IN 3	ES 2 MAIN	
I13	OPTO IN 4	LOG 2 MAIN	*
I14	ANALOG IN	GYRO (ROT)	*
M0	MISCELLANEOUS		
M1	MENU DEFAULTS	DISABLED	
M2	MENU FROM USB	DISABLED	*
M3	MENU TO USB	DISABLED	*
M4	CONF DEFAULTS	DISABLED	*
M5	CONF FROM USB	DISABLED	*
M6	CONF TO USB	DISABLED	*
M7	USB UPDATES	DISABLED	*
M8	BACKUP TO USB	DISABLED	*

No	Name	Default setting	Function
M9	CPU REBOOT	DISABLED	
M10	SW REVISION	704519xx	xx = actual revision
M11	FW REVISION	704517xx	xx = actual revision
M12	HW REVISION	704510xx	xx = actual revision
M13	ACCESS LEVEL	ALL USER	
N0	NMEA OUT		
N1	NMEA OUT 1	ESD	*
N1.01	NMEA O 1	BAUDRATE 4800	4800 or 38400 *
N2	NMEA OUT 2	SD4 MASTER	*
N3	NMEA OUT 3-6	SPEED+DEPTH	
N4	NMEA OUT 7	LOG 1	*
N5	NMEA OUT 8	LOG 2	
N6	NMEA OUT 9	SD4 MASTER	
N7	NMEA OUT 10-15	SD4	
N8	NMEA OUT 16-23	SPEED+DEPTH	
O0	OUTPUTS		
O1	ANALOG OUT 1	WTL	WTL, BTL, BTR
O1.01	ANALOG OUT 1	0.1 V/KNOTS	0.1, 0.2, 0.3, 0.4, 0.5
O2	ANALOG OUT 2	BTR	WTL, BTL or BTR
O2.01	ANALOG OUT 2	0.1 V/KNOTS	0.1, 0.2, 0.3, 0.4, 0.5
O3	RELAY K1	Fail Log 1	Main NMEA fail *
O4	RELAY K2	Fail Log 1	Redundant NMEA fail *
O5	RELAY K3	WTL ASTERN	
O6	RELAY K4	ESD ALARM	
O7	RELAY K5	PULSE A WTL 200P	
O8	RELAY K6	PULSE A WTL 200P	
O9	RELAY K7	PULSE F BTR 200P	
O10	RELAY K8	PULSE F BTR 200P	
O11	OPTO 1	PULSE A WTL 200P	
O12	OPTO 2	PULSE A WTL 200P	
O13	OPTO 3	PULSE A WTL 200P	
O14	OPTO 4	PULSE A WTL 200P	
O15	OPTO 5	PULSE F BTR 200P	
O16	OPTO 6	PULSE F BTR 200P	
O17	OPTO 7	PULSE F BTR 200P	
O18	OPTO 8	PULSE F BTR 200P	
S0	SETTINGS		
S1	SYSTEM TYPE	AUTO SENSE	AUTO SENSE, T-SERIES, R1a or DUAL LOG
S2	DL GYRO INPUT	NMEA	(NMEA or ANA)
S2	DL GYRO INPUT	ANA +180/MIN=10V	
S2.01	DL AIN SCALE	+180/MIN = +10V	Not visible when S2 is set to NMEA
S3	DL GEO BOW	0 M	Distance from transducer 1 to the bow of the ship [0-999m]
S4	DL GEO STERN	0 M	Distance from transducer

No		Name	Default setting	Function
				1 to the stern of the ship [0-999m]
	S5	DL NMEA	VDVBW	VDVBW, PSALL or PSALL/VBW STERN *
	S6	VDVBW FORMAT	EXTENDED	SHORT/EXTENDED *
	S7	TX DELAY	0 MS	0-63ms (6bits) *
	S8	BT SPEED INP	LOG	(For future use) *
	S9	PULSE A	WTL 200 P / NM	*
	S10	PULSE B	WTT 200 P / NM	*
	S11	PULSE C	WTR 200 P / NM	*
	S12	PULSE D	BTL 200 P / NM	*
	S13	PULSE E	BTT 200 P / NM	*
	S14	PULSE F	BTR 200 P / NM	*
	S15	SPD AVERAGE	0 SEC	0 to 255s *
	S16	USB STORAGE	FILL UP	FILL_UP or OFF
	S17	USB ERASE	DISABLED	Formats and erase
	S18	LPU2 ADDRESS	IP 192.168.5.17	17 can be set from 1-50 *
	S19	SERVICE PC	IP 192.168.5.56	192.168.5.56 is fixed *
	S20	BAM SERIAL	DISABLED	Controls ALF, ALC and ARC sentences
T0		TEST	WRITE ACCESS OFF	
	T1	TEST NMEA	T-SERIES	T-SERIES, R1a or DUAL-LOG

Note!

***)** Not changeable.

Grey field indicates non-visible menus. These settings are for development purposes only and shall never be changed. They are only accessible when M13 is changed.

6 NMEA filtering

Inputs are filtered according to a *filter*-file. The table below describes input filtering when *filter*-file `NMEAfilterT_rev.txt` is in use. The question mark “?” is used as a wildcard and can be replaced by any character.

NMEA talkers	Not filtered messages are starting with:
LOG 1 MAIN	VD; PSAL
LOG 1 REDUNDANCY	VD; PSALS; PSALD; PSALW
LOG 2	VD; PSAL
GYRO (ROT)	??ROT
ES	SDDPT; SDSTN
ESD	SD; VDTXT; PSALC
SD4	PSALS,0; PSALS,1; PSALS,2; PSALS,3; PSALS,4; PSALR; PSALC; VDTXT; ??ACK
ALARM MUTE	??ACK; ??HBT; ??ACN
GPS	G??
GYRO (HDT)	??HDT
GYRO (ROT+HDT)	??HDT; ??ROT
OTHER	Not yet implemented

Table 4 NMEA talker list

This table is stored in a *filter*-file that is specific for the system type chosen in menu S1.
The *filter*-files also contain NMEA output filtering according to NMEA listeners table below.
There are totally three default *filte*r-files in the Sig. Distributor application:
`NMEAfilterT_rev.txt`, `NMEAfilterR1a_rev.txt` and `NMEAfilterDual_rev.txt`.
Example: a T-series system will use the file `NMEAfilterT_rev.txt`.

Note! The *filter*-files shall never be changed and are only changeable when M13 is changed and only for development purposes.

The *filter*-file type in use can be imported / exported to an USB memory stick. Using the menu M6 CONF TO USB the Sig. Distributor will create a folder on the USB memory stick named `LPU2store_restore` and export (copy) the *filter*-file in use from the Sig. Distributor into the `LPU2store_restore` folder on the USB memory stick.

A *filter*-file can be imported into the Sig. Distributor using menu M5 CONF. FROM USB. The USB memory stick has to have a folder named `LPU2store_restore` on the root where the *filter*-file is placed.

The NMEA messages are routed according to the following default NMEA talkers list if the `NMEAfilterT_rev.txt` *filter*-file is in use. The following table is stored in the *filter*-file.

NMEA listeners	Transmitted messages are starting with
SPEED + DEPTH	VDVBW; VDVLW; ##DPT; ??ALR; PSALL; VDHBT; VDALF; VDALC; VDARC
SPD AVERAGE +DPT	@@VBW; VDVLW; ##DPT; ??ALR; @@ALL
SD4 DUAL LOG	VDVBW; PSALS,5; PSALS,6; PSALS,9; PSALc; PSALR,,; PSALU,1; SDSTN
SD4 MASTER	VDVBW; VDVLW; ??DPT; VDALR; PSALS,5; PSALS,6; PSALS,9; ??ROT; PSALL; PSALR,,, PSALW; SDSTN
SD4 INVERTED	@@VBW; VDVLW; ##DPT; ??ROT; @@ALL; PSALR; SDSTN
SD4	VDVBW; VDVLW; ##DPT; ??ROT; PSALL; PSALR; SDSTN
LOG 1	PSALS,0; PSALS,1,; PSALS,1?,; PSALS,10; PSALC; VDACK
LOG 2	PSALS,0; PSALS,1,; PSALS,1?,; PSALS,10; PSALC; VDACK
ESD	VDDPT; SDACK; PSALX; VDVBW; PSALW; G??; SDSTN
VDR	VDVBW; VDVLW; ##DPT; ??ALR; PSALc; SDSTN
MFD	VD; ??ROT; PSALL
GPS	G??
OTHER	Not yet implemented

Table 5 NMEA listeners

Transmit VDDPT instead of SDDPT if no valid SDDPT for 10 sec.

@@ Modified data output. Averaged speed according to time constant in menu S15, or negative (inverted) speed for a SD4 INVERTED nmea output channel.

?? The question mark "?" is used as a wildcard and can be replaced by any character.

6.1 SD4 INVERTED

If an NMEA output channel is set to be an SD4 INVERTED listener, all VBW and PSALL messages on that channel will have inverted signs of the speed and direction information fields. This is useful for DAT (Double Acting Tankers) and double-ended ferries. For example, an SD4-3 display on that channel will show 5 kn in the vessel's astern direction instead of 5 kn in the vessel's ahead direction, and an SD4-5 Docking Display will show 1 kn starboard at the bow instead of 1 kn port at the stern.

It is possible to deactivate the SD4 INVERTED function by using an OPTO input. See section 5.2.3 Menu I, Inputs.

Note! The SD4-2 Main Display transverse speed window only reads the "bow speed" field in the NMEA sentence. Therefore, the docking log functionality has to be activated in order to get the correct data in a transverse speed window of the SD4 INVERTED.

If there is a rot-gyro NMEA input to the Sig. Distributor, enter the following in the menu system:

- S2 DL GYRO INPUT = **NMEA**

- S3 GEO BOW = **enter the distance from the transducer to the bow in meters**
- S4 GEO STERN = **enter the distance from the transducer to the stern in meters**

If there is no rot-gyro input to the Sig. Distributor, then force gyro input to zero by entering the following:

- S2 DL GYRO INPUT = **ANALOGUE**
    - S2.1 DL GYRO INPUT = **0**
- S3 GEO BOW = **1**
- S4 GEO STERN = **1**

In this case, the transverse speed window on the SD4-2 Main Display will indicate the transverse speed at the transducer location.

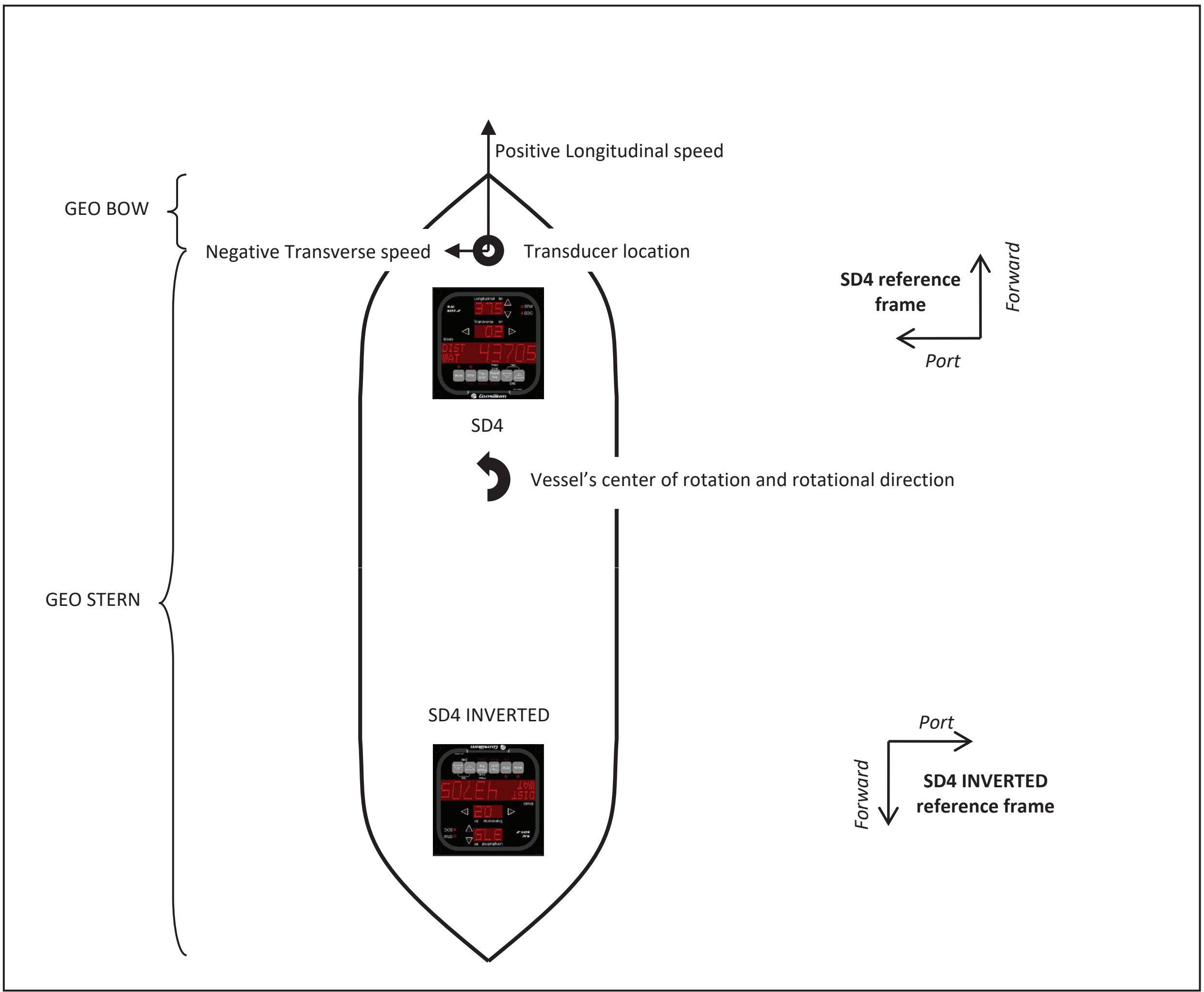


Figure 1. Example of SD4 INVERTED. The transducer senses positive longitudinal and negative transverse speed and the vessel rotates counter clockwise, as indicated by filled arrows. The indicators will display according to their different reference frames:

- The SD4 will display forward and port speed.
- The SD4 INVERTED will display backward and port speed.

7 Testing Procedure

Connected equipment may be tested in two ways:

1) Using ordinary input from the Log Sig.Processor and the ROT gyro (optional), either during normal operation or using internal test modes to produce a known Log ESig.Processor output. For setting these test modes, please consult the operating/installation manuals for the speed log and ROT gyro.

2) Using simulated NMEA input, self-generated by the Sig. Distributor. For setting these modes, please see Menu T. Only equipment connected to the output can be tested.

8 Service and maintenance

Two red 7-segment LED digits on the Sig. Distributor PCB are used to display status. At normal operation the LED digits displays LED code: 00.

A service web interface is also available at the Sig. Distributor IP-address, see menu S18 and S19.

8.1 Supervision and diagnostic codes

The Sig. Distributor supervises functions according to the table below. Diagnostic codes 400 – 499 are reserved for the Sig. Distributor. Active diagnostics are presented in Menu A, accessible both from the Speed Log Master Display and the Sig. Distributor Web interface. The last hundred diagnostics are saved in a history list only accessible from the Web interface.

The LED code (the two last digits of the diagnostic code) will be displayed on the red 2 x LED digits on the CPU-PCB. If more than one diagnostic is active, only the highest LED code (highest priority) will be displayed. All active diagnostic codes are listed in Menu A.
Note! $SDALR messages from Echo Sounder Display are not supervised.

LED code *	Diagnostic code	Text	Description
00	(400)**	NORMAL OPERATION	
***	405	SYSTEM MISMATCH	NMEA input mismatch. Check System Type (Menu S1)
07	407	SOG LOG FAIL	Check SOG system. NMEA from SOG log 1 missing. Check IN1 / System Type
08	408	STW LOG FAIL	Check STW system. NMEA from STW log 1 missing. Check IN5 (always supervised)
09	409	SPEED LOG FAIL	Check LOG system. NMEA from speed log 2 missing. Check IN2 / System Type
***	410	ROT MISSING	NMEA from Gyro missing (Docking: Menu S3 and S4 > 0)
21	421	SOG SERVICE REQ	Check SOG system
22	422	STW SERVICE REQ	Check STW system
23	423	LOG SERVICE REQ	Check Sig. Distributor equipment. Check menu system Diagnostics.
31	(431)**	OVERFLOW OUT 1	NMEA overflow on Out_1, terminal 36 (channel 0)
32	(432)**	OVERFLOW OUT 2	NMEA overflow on Out _2, terminal 37 (channel 1)
33	(433)**	OVERFLOW OUT 3-6	NMEA overflow on Out _3-6, terminal 38-41 (channel 2)
34	(434)**	OVERFLOW OUT 7	NMEA overflow on Out_7, terminal 42 (channel 3)
35	(435)**	OVERFLOW OUT 8	NMEA overflow on Out_8, terminal 43 (channel 4)
36	(436)**	OVERFLOW OUT 9	NMEA overflow on Out_9, terminal 44 (channel 5)
37	(437)**	OVERFLOW OUT 10-15	NMEA overflow on Out_10-15, terminal 45-46, 59-62 (channel 6)
38	(438)**	OVERFLOW OUT 16-23	NMEA overflow on Out_16-23, terminal 63-70 (channel 7)
44	(440)**	NMEA OVERFLOW	NMEA inputs overflow. Too high total serial data load.
4X	44X	CORRUPT / BAUD IN X	NMEA corrupt or wrong baud rate In_X (X = Input 1..9)
5X	45X	POL / BAUD IN X	NMEA polarity or baudrate error In_X (X = Input 1..9)
6X	46X	CHECKSUM ERR IN X	Checksum error on NMEA In_X (X = Input 1..9)

LED code *	Diagnostic code	Text	Description
71	(471)**	HW ERR OUT 1	Hardware error NMEA Out_1, terminal 36 (channel 0)
72	(472)**	HW ERR OUT 2	Hardware error NMEA Out_2, terminal 37 (channel 1)
73	(473)**	HW ERR OUT 3-6	Hardware error NMEA Out_3-6, terminal 38-41 (channel 2)
74	(474)**	HW ERR OUT 7	Hardware error NMEA Out_7, terminal 42 (channel 3)
75	(475)**	HW ERR OUT 8	Hardware error NMEA Out_8, terminal 43 (channel 4)
76	(476)**	HW ERR OUT 9	Hardware error NMEA Out_9, terminal 44 (channel 5)
77	(477)**	HW ERR OUT 10-15	Hardware error NMEA Out_10-15, terminal 45-46, 59-62 (channel 6)
78	(478)**	HW ERR OUT 16-23	Hardware error NMEA Out_16-23, terminal 63-70 (channel 7)
84	(484)**	LPU EEPROM ERROR	EEPROM read failure (Default parameters are used)
88	488	LOG SIMULATION	Simulated speed and depth (LPU Menu T)
	489	FUSE F304 47-49	Fault fuse F304 / green LED, terminals 47-49
	490	FUSE F301 50-52	Fault fuse F301 / green LED, terminals 50-52
	491	FUSE F302 53-55	Fault fuse F302 / green LED, terminals 53-55
	492	FUSE F303 56-58	Fault fuse F303 / green LED, terminals 56-58
	493	POWER FAIL +6V	Internal power fail +6V / green LED CPU Board
	494	POWER FAIL -6V	Internal power fail -6V / green LED CPU Board
	495	POWER FAIL +5V_1	Internal power fail +5V_1 / green LED CPU Board
	496	POWER FAIL +5V_2	Internal power fail +5V_2 / green LED CPU Board
	497	POWER FAIL +5V_3	Internal power fail +5V_3 / green LED CPU Board
	498	POWER FAIL +5V_4	Internal power fail +5V_4 / green LED CPU Board
	499	POWER FAIL +5V	Internal power fail +5V / green LED CPU Board
E0	-	REDUNDANCY MODE	NMEA only routed via redundancy relays
*) Note: LED codes are shown on the red 2 x LED digits.			
**) Note: 400, 431-438, 440 and 471-484 are visible as LED code and in Sig. Distributor menu Diagnostics, but are NOT sent out on NMEA			
***) Note: 405 and 410 are included in and will trigger 423.			

Table 6 List of diagnostic codes

The actual revision of the loaded software can be checked in the Sig. Distributor Menu System M10 and M11.

8.2 Service modes and DIP switches

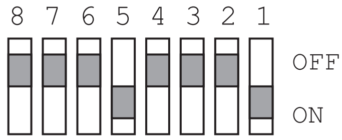
A set of 8 DIP switches are located on the CPU-board close to the upper right corner.

DIP switches 1-6 shall always be set to: DIP 1 and 5 = ON and DIP 2, 3, 4, and 6 = OFF.
Note! DIP position Down = ON.

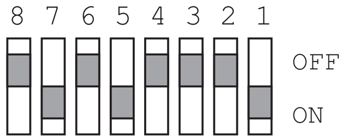
DIP 7 and 8 controls in which mode that is selected when rebooting the Sig. Distributor.

Four different modes can be selected:

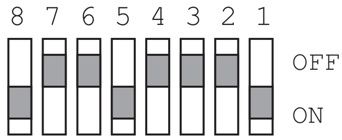
Mode 0: Normal operation



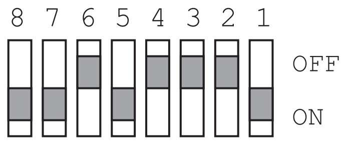
Mode 1: Software update from USB



Mode 2: Factory reset



Mode 3: Service and factory test



The mode is selected by first setting DIP switch 7 and 8 as follows and then press and release the Reboot button on the CPU-board. During the first seconds after a reboot both S1 and S2 are off, before the start-up procedure enters the selected boot mode. Then each mode is indicated by the two red LEDs S1 and S2 on the CPU board.

(During normal operation, Mode 0, LED S1, S3 and S4 are lit and LED S2 flickers.

8.3 Performing updating sequence

MODE 0: Regular software update

Regular software updates are performed using the flashing utility software WinFlash, 706080. DIP switches shall be in default setting, i.e. DIP 7 and 8 Mode 0. The image file for Sig. Distributor is named “704580Rr.lpu”, where Rr is the revision number. When performing this update, connect a serial cable to the service RS232 D-sub located in the upper left corner of the Sig. Distributor and to a PC. Menu settings will not be overwritten when updating the software using WinFlash.

Press and release the Reboot button on the CPU-board and within a few seconds click “Start” in WinFlash. If not succeeded try once more.

MODE 1: USB software update

The Sig. Distributor may be updated with smaller modifications from an USB memory stick. The following softwares are supported for updates from USB:

704517, LPU2 PCB Firmware

704519, LPU2 PCB Software

First, prepare a USB memory stick by placing the software update(s) in a directory called “`LPU2updates`” at the top directory level. It is important to use capital letters for “LPU” and small letters for “updates”. Then, place the USB stick in either one of the two USB connections.

Set DIP to Mode 1, DIP switch 8=off and 7=on. Press and release the Reboot button and the following process begin:

1: LED S1 and S2 = OFF (a few seconds)

2: LED S1 = ON and LED S2 = OFF

3: As a safety procedure, all previous files in the update directory on the LPU2 are backed up to the USB stick top level directory “`LPU2backup`”.

4: The updates are copied from the USB stick. All files in the `LPU2updates` directory on the USB stick are copied to the Sig. Distributor.

5: To indicate that the update procedure is finished, LED S1 goes OFF.

LED S1 and S2 also indicate if something went wrong, by flashing repeatedly. Please check USB stick and try again. Information about the installation progress is shown in a hyper terminal if connected to the service RS232 D-sub (115k 8N1).

When the software update procedure is finished, take out the USB Memory stick and set the DIP switch back to normal operation, Mode 0, and press and release the Reboot button.

MODE 0: Normal operation

Set dipswitch 8=off and 7=off. Press and release the Reboot button and the following process begin:

1: S1 = off and S2 = off

2: Executes software upgrade if available, otherwise default software is executed.

3: S1, S2, S3 and S4 are now under the Sig. Distributor software control. S1, S3 and S4 are lit, S2 flickers.

8.4 Performing factory reset

WARNING: A factory reset will erase all menu settings and configuration normally done during commissioning. If a software update from USB is interrupted by e.g. a power failure, a factory reset will be necessary.

MODE 2: factory reset

Set dipswitch to Mode 2 (from default move DIP 8=ON). Press and release the Reboot button and the following process begin:

1: LED S2 = OFF (only a few seconds)

2: LED S2 = ON

3: Previous updates will be erased

4: The EPROM will be reset with the factory default menu settings and config.

5: To indicate that the factory reset procedure is finished, LED S2 goes OFF.

The factory reset takes totally about 1 minute and 30 seconds.

The LEDs (S1 and S2) may also indicate if something went wrong, by flashing repeatedly. Press the Reboot button to try once more. Information about the factory-reset progress is sent to a Hyper Terminal if connected to the service RS232 D-sub (115k 8N1).

When factory reset is finished, set the DIP switch back to Mode 0 (back to default, move DIP 8=off), normal operation and press and release the Reboot button. After about 45 seconds the system is up and running.

8.5 USB

Either one of the two USB connections can be used, but not simultaneously.

8.5.1 USB memory stick requirements

The USB memory stick must be formatted with a file system of type FAT32.
Menu S17 can be used to erase and format an inserted USB memory sticks. However, it might fail depending on Sig. Distributor load and the type of USB memory. If Menu S17 fails, use a PC to format the USB memory to FAT 32.

8.5.2 Recording NMEA to a USB memory stick

It is possible to store all incoming and outgoing NMEA messages to a USB Memory stick. This enables long time monitoring of system functionality. The USB memory stick can later be sent for analysis. All incoming and outgoing NMEA messages are stored in a folder named `LPU2recordings` on the USB memory stick.

1: Insert an empty USB memory stick.

2: Reboot the Sig. Distributor using the Reboot button or menu M9.

3: Start the NMEA recording by enabling menu S16. This menu is by default enabled.

If already enabled, the recording will start by itself. The USB memory stick is updated once every minute. The recording will not overwrite any data when USB memory stick is full.

8.6 Troubleshooting

The Sig. Distributor is equipped with several functions for easy troubleshooting.

- Fuses

  3 pcs 5x20mm 2,5A SB (F101 ⇔ 230V, F102 ⇔ 100/115V, F103 ⇔ Common, N) located at the PSU board. These fuses power the Sig. Distributor.

  4 pcs 5x20mm 1,6A SB supplying DC out, located at the IO board.
  Each of these fuses supplies 3 terminals, i.e. the upper fuse supply terminals 47-49, the second fuse supply terminals 50-52 etc. Each fuse has a green control LED to the right of the fuse. At normal operation these four LEDs shall be lit.

- Green LEDs
  8 green LEDs for internal voltage supervision are located at the upper edge of the CPU board. In normal operation these 8 LEDs shall be lit.
- 4 red LEDs
  4 red LEDs are controlled by the software, LED S1, S2, S3 and S4.
  In normal operation, S1, S3 and S4 are lit, S2 flickers.
- Red 2 x LED digits
  Red 2 x LED digits display for diagnostic status. Code 00 shall be displayed during normal operation, see ***8.1 Supervision and diagnostic*** .
- DIP 1-8
  A set of 8 DIP switches are located on the CPU-board close to the upper right corner. In normal operation these DIPs shall be set to: 1 and 5 = ON, the rest = OFF. Note! ON = down.
- NMEA inputs
  Each NMEA input is supervised by a control LED. Whenever NMEA telegrams are received the corresponding LED shall flicker.
- NMEA outputs
  Each NMEA output is supervised by a control LED. Whenever NMEA telegrams are transmitted the corresponding LED shall flicker.
- Opto and relay terminals
  Each Opto and relay terminal is supervised by a control LED that is turned on when the output is active.
- Web interface
  The built-in web interface has functions for trouble shooting such as a diagnostic history list, and an NMEA display function with all incoming and outgoing NMEA. The web interface can also remotely access the menu systems in the Sig.Processor for the STW and SOG devices.
- USB interface
  A USB memory stick can be used to record incoming/outgoing NMEA traffic for later analysis.

Annex Wiring principles

Cable Dimensions and Standards

Make sure that the all cables are approved for marine environment usage.

Signal Cables

- All cables used for signal interconnection of the Speed-log system units shall have a cross section of at least 0.5 mm^2 with a voltage rating of at least 60 volts and be screened, either an aluminium foil screen with an inlaid, blank, stranded conductor, or tinned copper braid should be used.
- If the specifications state "twisted pair", such cable should be used.

It is recommended to use a cable with numbered conductors. This makes identification much easier, and minimizes the risk of miss-connections.

DC Power Cables

- All cables specified to be DC power cables in the Speed-log system shall have a cross section of at least 1.5 mm^2 with a voltage rating of at least 120 volts. Using any other cable type will void warranty.
- The installation directions may specify a heavier cross section.

It is recommended to increase the cross section at longer runs of cable (e.g. exceeding 10 meter) to avoid problems with voltage drops.
It is also recommended to use cable with coloured conductors, preferable one red part for the positive voltage and one black part for negative return.

AC Power Cable

- All cables used for supplying AC power in the Speed-log system shall have a cross section of at least 1.5 mm^2 with a voltage rating of at least 500 volts.
- The cable must be UL registered, for the environment in which it is used. Failing to use UL registered cable will void warranty.
- The cable must have three conductors, coloured blue, brown and yellow-green. The yellow-green part is to be used for grounding only.

Follow established electrical safety regulations when selecting and using high voltage cabling.

Comments to signal cabling

Noise

All cables with two or more parts are twisted (stranded) for manufacturing reasons. This does not mean any two-conductor cable is a "Twisted Pair".
• "Twisted pair" means two separated and isolated wires, twisted together in a special noise-cancelling configuration.
• "Two twisted pairs" means two separate sets of such two wires, twisted together, not four wires twisted together.
The twisted pair is a unit that by its twist protects itself from the environment, and protects the environment (such as, the pair next to it) from itself. The pitch of the twist is carefully calculated to maximize the noise-cancelling properties, which is not the case with ordinary multi-pole cable. Thus, when using "Two twisted pairs" make sure using the two wires twisted together and not one wire from each twisted pair.

Do not use twisted quads or ordinary multi-pole cable, which also has somewhat twisted parts. In a twisted quad the signals in one pair will cross-couple to the other pair, because they are so close, and because one pair has no means of protecting itself from the other pair. In an ordinary multi-pole cable, the noise-cancelling properties are random or unknown i.e. cross-coupling between the individual wires is bound to occur.

EMI

Electromagnetic Interference (EMI) is everywhere. It is the unwanted signal component that disrupts a system, creates unwanted noise in the audio channels, or causes the system to go down at irregular intervals. If EMI is not counter-acted at installation time, it will be very costly to troubleshoot and change the system later. Intermittent faults with an EMI background can be impossible to find.
The Speed-log units has been designed and tested with EMI protection in mind, but defective wiring may destroy that protection.

Termination of Signal Cables

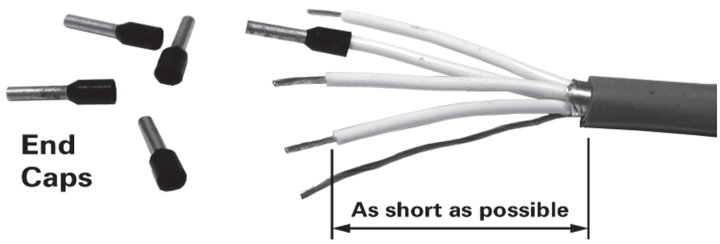
To reduce the risk of

- EMI induction
- Excessive noise on audio channels
- Short circuits
- Intermittent faults
- Entanglement
- Mix-ups

and to ease re-dressing of cabling and re-connections after service
All signal cables must be connected carefully and by using described method depending on type of connection block terminal.

1. **Where the connection block terminals are of press-type we recommend to use bare wires**
2. **Where the connection block terminals are of screw-type we recommend to press end-caps on the bare wire ends as described below**

Same principles can be used on power cables.



The free ends should be as short as possible. This tends to make connecting more difficult, but greatly reduces the risk of EMI induction.
The end caps must be crimped with the proper tool to attain a proper connection. Never use pliers or crimp-tools intended for anything else than end caps.

Examples of proper tools for crimping end caps, and a strip of end caps

Shields

Grounding a screen “for safety” or “for good measure” could ruin noise immunity. Forming a ground loop will let noise slip into the system.

Note: Shields shall never be connected in both ends of a signal cable, unless expressly noted.

The reason for this is that the chassis (bulkhead) potential is never the same in both ends of the cable. Although the ship is made of steel, large currents flowing through the hull may easily generate a potential difference of several volts between different sections of the ship. The result is that noise current will start flowing from the “high” end of the screen to the “low” end, maybe several amperes. On the way, it will induce into the signal leads, causing signal degradation and improper operation of the Speed-log system.

The screen shall not be routed into the cabinet. It shall be connected to ground in the cable inlet, either in the cable gland or in the ground rail directly when entering the cabinet. If the shield is not to be connected it shall be cut of and isolated directly when entering the cabinet.

Where there is a risk that the shield wire can make short circuit to anything, solder traces, other wires, chassis, bulkhead, etc., it must be protected with a slip-on plastic tube or shrink tubing. Remember that the screen is not meant to carry any current or signal, it is only a screen.

Cable installation

Never strap high-current, noisy cables together with sensitive signal cables, shielded or unshielded. The reason is once again to avoid noise induction. Two cables lying tightly together work like a transformer and the noise in one cable is easily coupling to the other. The cheapest measure of noise reduction is to keep sensitive cables away from noisy cables. Doing this at the installation stage is much cheaper than fault-finding and re-engineering it later.

Note: All cables must be properly ID-marked (numbered) in both ends!

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JLN-900

Display

Technical Description

NMEA universal Display, Technical Description

1 Background

The JLN-900 display is a versatile display used primarily as a display to indicate speed, distance and depth. It can also be used to remotely control such equipment, which is not easily accessible or has no user interface, for example a speed log or an interface cabinet.

1.1 Definitions and abbreviations

The new performance standard IMO MSC.191(79) states that standardised terms and definitions shall be used. The JLN-900 Speed Logs have historically used the terms Bottom Track (BT) for Speed Over the Ground (SOG) and Water Track (WT) for Speed Through the Water (STW) related information.

Abbreviation	Description
SDx	Serial Display family (NWW-82 /85)
SD4	Serial Display (NWW-82 /85)
NMEA0183	IEC 61162-1 / NMEA 0183 serial interface standard
STW	Speed Through the Water. This is equivalent to Water Track (WT) speed (relative)
STW -L	Speed Through the Water -Longitudinal
STW -T	Speed Through the Water -Transverse
WAT	WATer - refers to resulting distance (relative)
WAT -L, -T	WATer - refers to distance, -Longitudinal, -Transverse
SOG	Speed Over the Ground. This is equivalent to Bottom Track (BT) speed (true)
SOG -L	Speed Over the Ground -Longitudinal
SOG -T	Speed Over the Ground -Transverse
SOG BOW	Bow Speed Over the Ground -Transverse
SOG STERN	Stern Speed Over the Ground -Transverse
GND	GrouND –refers to resulting distance (true)
GND -L, -T	GrouND –refers to distance, -Longitudinal, -Transverse
Trip	Trip distance counter, resettable
DIST	Total DISTance counter
ROT	Rate-Of-Turn
ESD	Echo Sounder Display

2 Design, general

2.1 Display windows

There are two small and one large display windows on the internal Printed Circuit Board. Depending on type of Display some windows can be partly or completely covered by the front panel foil. The two small windows are positioned above each other in the upper area of the front, from here on called SPEED WINDOW 1 and SPEED WINDOW 2.
The large window is positioned in the lower area of the front, from here on called MODE WINDOW. An exemption is made for type NWW-85 Docking Display where only the centre area of the MODE WINDOW is used as SPEED WINDOW 3.
The display elements in each SPEED WINDOW consist of 90 surface mounted Light Emitting Diodes/LEDs positioned to perform three digits in a 7-segment manner.
The MODE WINDOW consists of 1056 LEDs positioned in 11 rows by 96 columns making it possible to display both text and digits in various sizes (alpha-numeric).

2.2 Direction arrows, status indications and backlight

71 LEDs are used for direction arrows, status indication and backlight illumination of text printed on the panel foil.

2.3 Push buttons

To operate the Display, there are 6 push buttons positioned below the MODE WINDOW.

3 Function, general

All Display versions will decode all defined messages and display all possible information as available. Generally, all Displays can enter all requested modes.

3.1 MODE WINDOW

The MODE WINDOW can display a range of information, e.g. distance counter(s), speed(s), depth and Rate-of-Turn depending on which presentation modes are enabled in the Display set-up (See ***6. Set-up of Display*** for detailed information). All Displays are delivered with certain modes pre-set as default that corresponds to the specific Display version but all modes can be enabled in the Display set-up as desired by the user.

Every time the Mode button is pressed, the MODE WINDOW will display the next option from the list of chosen options. When Mode and ▽ buttons are pressed simultaneously the previous option (= going backwards) in the list will be displayed.

When the Trip/DIST button is pressed and Trip or DIST is not displayed, the first Trip or DIST will be displayed.
When the Trip/DIST button is pressed and Trip or DIST is displayed the next Trip or DIST in the list will be displayed.
When the Trip/DIST button is pressed and the last Trip or DIST is displayed the first Trip or DIST will be displayed.

When trip value is presented and the Reset Trip button is pressed for 2 seconds the displayed trip distance value will be reset to zero.

3.2 Distance and trip counters

8 counters are used for distance run information.

DIST WAT	Total	Distance through WATer (resulting). Note: if no transverse speed information is available, this distance is counted as if transverse speed is 0.00 kn.
TRIP WAT	Trip	Distance through WATer (resulting), resettable. Note: if no transverse speed information is available, this distance is counted as if transverse speed is 0.00 kn.
TRIP WAT-L	Trip	Distance through WATer -Longitudinal, resettable. This trip is not incremented (as default) when speed is astern.
TRIP WAT-T	Trip	Distance through WATer -Transverse, resettable. Transverse speed to Port decreases counter value as well as alters sign when passing zero from SB to P and vice versa.
DIST GND	Total	Distance over GrouND (resulting). Note: if no transverse speed information is available, this distance is counted as if transverse speed is 0.00 kn.
TRIP GND -L	Trip	Distance over GrouND -Longitudinal, resettable. This distance is not incremented (as default) when speed is astern.
TRIP GND -T	Trip	Distance over GrouND -Transverse, resettable. Transverse speed to Port decreases counter value as well as alters sign when passing zero from SB to P and vice versa.
TRIP GND	Trip	Distance over GrouND (resulting), resettable. Note: if no transverse speed information is available, this distance is counted as if transverse speed is 0.00 kn.

When $VDVLW message containing distance information is received from the speed log system the total resulting distance counter(s) in the Display will be synchronised with the Total resulting distance counter(s) in the speed log and thus will show the same value(s) in all connected Displays.
The Trip counter(s) will not be synchronised with the $VDVLW message and therefore always locally calculated in the Display.
Total counters can present a maximum value of 99999.9 NM.
Trip counters can present a maximum value of 9999.99 NM.
At maximum value individual counters will roll-over and commence from 0.00 NM.

All distance counters locally in the Display will be stored in a non-volatile E2PROM in case of a power failure/loss or intentionally powered off.

3.3 Lamp test

By pressing both ▽- △+ buttons simultaneously during normal operation the Display will lit all segments and LED indicators to confirm functionality.

3.4 Illumination of push buttons

"EL" (ElectroLuminiscent) backlight of the membrane switches is integrated in the panel foil. The EL lamp has an estimated lifetime of 20,000 hours, which means that we could guarantee functionality for only 2.3 years if the EL lamp was active continuously. To avoid this, the EL lamp is normally off and will be activated when needed as soon as any push button is pressed and will stay on for 2 minutes after last button operation.

3.5 Invalid/unavailable information

Depending on the NMEA formats invalid data can be indicated by certain status characters or by missing (NULL) data fields. In this case the corresponding display field will be unlit or indicate “---“. In some cases, it will also force the display window to another presentation mode.

3.6 Incorrect/missing NMEA messages

If syntactically correct NMEA messages are not received within an approximate time frame of 10 seconds the Display will display *NO NMEA* in the MODE WINDOW and *Err* in upper SPEED WINDOW(S).
For NWW-85 Docking Display *ERR* will be displayed in the SPEED WINDOW 3 (lower) only.
This condition shall always be seen as an interruption in NMEA sentence messaging and reason should be investigated.

E.g. this means that if a speed display receives properly formatted depth data ***only*** (or any other correct NMEA sentence) it will ***not*** show *NO NMEA* and will continue decoding and treat certain input data as invalid, except for the depth data, thus will show “---“ in SPEED WINDOW(S) and continue showing local distance counter(s) in MODE WINDOW. “---“ shall be seen as invalid data contained in a properly formatted NMEA sentence and not an NMEA sentence error.

3.7 External Dim

External dimming is possible by using a dimmer switch or two external push buttons, or a toggle switch, connected between terminals 7-9 (Ext Dim-) and 8-9 (Ext Dim+). The inputs are normally in a High state and an activation of a push button/switch will force the input Low.

3.8 Remote Dim message

All Display versions have the feature of receiving and processing the remote $PSALR message transmitted from another Display. When this is done the receiving Display changes its brightness level to the same intensity as on the message transmitting Display. (See ***6. Set-up of Display***).

3.9 200 p/NM speed output pulses

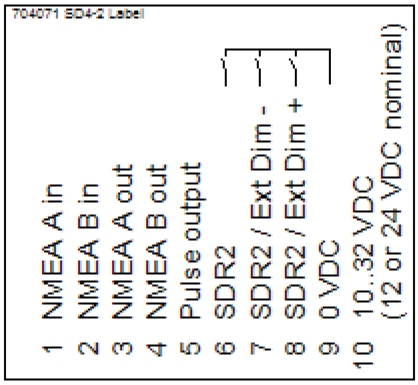
All Display versions are able to convert the received speed value to 200 pulses/NM on the output. The output can provide +5VDC, maximum 35mA.
A menu setting is used to choose function of the output. (See ***6. Set-up of Display***)

If potential free relay contact is needed the Display can be equipped with an Extension Board containing relays and needs to be ordered separately.
(See Accessories and ***6. Set-up of Display***)

4 Function, Display versions

4.1 NWW-82 Main Display Two axis SOG and one axis STW

Display with corresponding distances for JLN-900 Speed Log systems.
In the top right corner two LEDs will indicate if STW or SOG is displayed.
By default SOG will be displayed in both SPEED WINDOWS if available and valid.
If SOG is not available STW will be displayed automatically if available and valid.
Generally if no valid speed is available "---" will be displayed.
It is possible to force the NWW-82 Main Display to indicate STW by pressing the STW button. The LED above the STW button will then be lit confirming that STW is chosen by the user and only STW will be displayed in the SPEED WINDOWS until the STW button is pressed/released again, i.e. LED unlit.



SPEED WINDOW 1

STW or SOG (longitudinal) [88.8]. Arrows indicate ahead or astern direction.

SPEED WINDOW 2

Transverse SOG [88.8]. Arrows indicate port or starboard direction. If the NWW-82 Main Display is in STW display mode and no transverse STW is available, as for LN-900 Speed Log systems, this window and its indication arrows will be blank/unlit.

MODE WINDOW

Pre-set/default display modes:

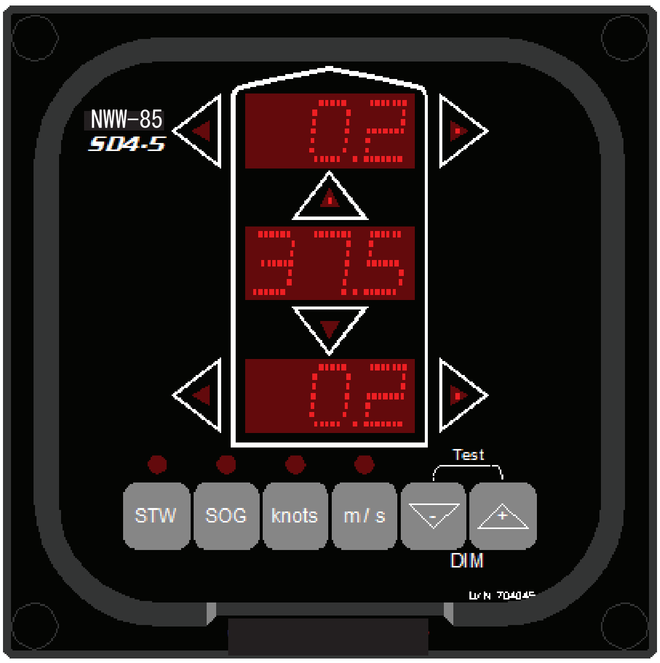
- DIST WAT
- TRIP WAT
- TRIP GND

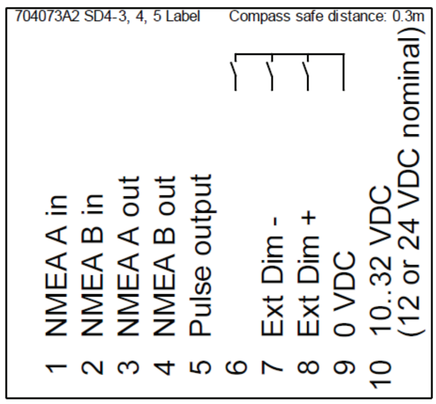
4.2 NWW-85 Docking isplay

NWW-85 Display exclusively designed for Docking log applications and displays by default transverse SOG of bow and stern and longitudinal SOG.
The NWW-85 Docking Display will automatically switch to STW when no SOG is available, i.e. invalid.
The SOG and STW red LED indicators will be lit to indicate active mode.

When the NMEA sentence does not contain valid docking log information the transverse SPEED WINDOWS will only show “---“ to indicate that docking log information is not available.

When in STW mode and no transverse speeds are available (as STW from the JLN-900 Speed log) the transverse SPEED WINDOWS and indicating arrows will be blank/unlit.





SPEED WINDOW 1
Transverse SOG or STW in bow [88.8]. Arrows indicate port or starboard direction.

SPEED WINDOW 2
Longitudinal SOG or STW [88.8]. Arrows indicate forward or aft direction.

SPEED WINDOW 3
Transverse SOG or STW in stern [88.8]. Arrows indicate port or starboard direction.

As there is no Menu system in the NWW-85 Docking Display the flexibility is somewhat limited compared to the rest of the other Display.

- Remote dimming ID is default set to number 5 and cannot be changed.
- 200 p/NM speed output is pulsing the currently displayed SOG or STW speed.
- External inputs are default set to terminals 7-9 (Ext Dim-) and 8-9 (Ext Dim+).
- To enable speed displayed with two decimals power-up the display with a permanent connection between terminals 6 and 9.
  Speed with values >9.99 kn will be displayed with one decimal.

5 Set-up of Display

5.1 Entering the Menu system

If the Mode button is pressed for 5 seconds a red text will appear below the push buttons and the text PRESS ENTER FOR MENU will be displayed in the MODE WINDOW. Provided Enter is pressed within next 5 seconds, access to the Menu system is granted, otherwise the MODE WINDOW will return to its previous mode.

When having entered the Menu system and no button is pressed for 3 minutes, the MODE WINDOW will return to its previous mode as it was before the Menu system was entered.

5.2 Menu navigation

The Menu system is built up in the same way as in the JLN-900 Speed Logs. Parameters in the local Display always start with an L, e.g. LP for Local Properties.

The Menu button is used to step to the next menu or input field.
Menu and ▽ pressed simultaneously is used to step back to the previous menu or input field. Enter is used to go into a submenu and to store changed values.
▽ △ buttons are used to change values. Esc, or Menu and Enter pressed simultaneously, is used to step back to a previous/higher submenu level in Local mode.

In REMOTE DEV mode (when Display operates as a remote user interface /“Master Display”) Esc will always break the connection to the remotely controlled equipment and return to the REMOTE menu R2 therefore only Menu and Enter pressed simultaneously (and not Esc) shall be used as menu level step-back when navigating the Menu system in remotely connected equipment.

Information that is possible to change in the Menu by pressing ▽ △ buttons is displayed within brackets [ ] in the MODE WINDOW lower line.

5.2.1 BASIC Menu

This is the start menu when entering the Menu system. It can look different depending on present settings in the Local Settings Menu.

```
SD4-2 LOCAL

```

Typical BASIC Menu with Display, pre-set in Menu LP1.

```
SD4-2 LOCAL
REMOTE DIM [OFF]
```

Typical BASIC Menu if one or more ID for REMOTE DIM is set in Menu LS2, REMOTE DIM of other Display is displayed. The REMOTE DIM can be set to either ON, OFF or EXTERNAL.
See chapter ***6.3. Remote Dim set-up*** for more information.

5.2.2 Local Properties Menu (LP0 PROPERTIES):

When pressing Menu button when in the BASIC Menu, *LP0 PROPERTIES* is displayed. Setting of Local Properties is done under this menu.
For example:

- Display type
- Select options to display in the MODE WINDOW
- Start-up DIM
- External inputs / outputs
- …

See chapter ***6.5. Menu function summary*** for a complete list of Menu choices.

5.2.3 Remote Setup Menu (LS0 REMOTE SETUP):

When pressing Menu button when in the LP0 Menu, *LS0 REMOTE SETUP* is displayed. Setting of Remote Properties is done under this menu.
For example:

- Display ID
- DIM offset
- Remote Dim ID
- …

See chapter ***6.5. Menu function summary*** for a complete list of Menu choices.

5.2.4 Remote operation Menu (R0 REMOTE DEV):

Remote User interface /"Master Display" to other equipment/device.
By pressing Enter in menu R0 the Display will establish communication with all connected devices and display them in a list of device choices. When a choice is made the communication starts with that device.
Esc is used to step back when needed to select equipment.

Examples of a Menu walk in the R0 Menu with two devices connected in the system:

R0 REMOTE DEV *CONNECT*

Press Enter

SYNCHRONISING (counting down…3…2…1)

Wait 3 seconds!

R1 DEVICE 1 OF 2 *BTU 1 (T2A)*

Press Menu

R2 DEVICE 2 OF 2 *WTU 1 (R1A)*

Press Enter

LHC 7.89 7.91 *RC=495 1055:1055*

Access is made to the Menu system in the WT Unit. To exit back to Local mode the Esc button shall be used. The Esc button will always step out from the Menu system of the remotely controlled device.
Menu and Enter pressed simultaneously is used to step back within the remotely controlled device Menu system.

Press Esc

```
R1 DEVICE 1 OF 2
BTU 1          (T2A)
```

Press Esc (or Menu and Enter simultaneously)

```
R0 REMOTE DEV
CONNECT
```

If the Mode button is pressed while a device Menu system is accessed, a short help text will be displayed referring to actual device presently accessed, e.g. when inside the Menu system of the WT unit the following text will be displayed as long as the Mode button is pressed:

```
REMOTE:  R1A
```

5.3 Remote Dim set-up

It is possible to remotely control the Display brightness from another Display.
ID numbers of up to four Displays which are to be controlled can be chosen in menu LS3. Displays with an ID that corresponds with this set-up will have the same brightness as the Master Display. This gives possibility to have the same brightness on up to four Displays on the bridge, without Display(s) in other locations being affected. (More Displays can use the same ID, which makes it possible to actually dim more than four Displays.)

The ID number of the NWW-85 Docking Display can not be changed and is by default set to 5.

When REMOTE DIM is activated in menu LS3 the lower line of the BASIC Menu will display *REMOTE DIM [OFF]*.

- As long as this setting is *OFF* this display will not send out any remote dim messages.
- When set to *ON*, remote dim messages will be sent out to other Displays when pressing the DIM push buttons - + on the display or when the external inputs are used for dimming.
- When set to EXT this Display will not send out any remote dim messages when the push buttons on the display are used for dimming but when the external input is used remote dim messages will be sent out.
  See ***6.4.2. External DIM set-up (Terminals 7 + 8)*** for more information.

5.4 External output/inputs

The Display has one output and three inputs.
Function of the output and inputs are set with parameters in the Menu system.

<table>
<tr><th>Terminal</th><th>Function</th><th></th></tr>
<tr><td>5</td><td>Pulse output</td><td>The output can provide +5VDC, maximum 35mA. Function is set in Menu LP6.</td></tr>
<tr><td>6</td><td>Control Unit (IN1)</td><td rowspan="3">The inputs are activated by connecting them with 0VDC, not activated inputs are pulled up to +5VDC. Function is set in Menu LP5.</td></tr>
<tr><td>7</td><td>Ext DIM- / Control Unit (IN2)</td></tr>
<tr><td>8</td><td>Ext DIM+/ Control Unit (IN3)</td></tr>
</table>

5.4.1 200 p/NM speed output pulses set-up (Terminal 5)

It is possible to use the Display as an interface converting incoming NMEA speed values to industry-standard 200 pulses/NM on the output. Function is set in Menu LP6.

Note! Exemption is made for NWW-85 Docking Display which has a fixed setting to instead provide pulses referring to the currently displayed speed mode, i.e. automatic alteration when displayed speed mode is changed.

5.4.2 External DIM set-up (Terminals 7 + 8)

External DIM is used to DIM the Display by means of two push buttons or a toggle switch. When Menu LP5 is set to DIM, the activation of IN2/Terminal 7 has the same function as pressing - button on the Display itself and activation of IN3/Terminal 8 has the same function as pressing + button.

5.4.3 External Remote Control Unit set-up (Terminal 6 + 7 + 8)

Control Unit is a simple remote control panel connected to the local Display mirroring the 6 push buttons on the Display front. This function is activated in Menu LP5 when set to Control Unit.

Note! Exemption is made for NWW-85 Docking Display which has a fixed setting, DIM, to only enable external dim switch/button connection, thus the use of Control Unit is not possible.

5.5 Menu function summary

No.			Name	Default setting SD 4-2	SD 4-3	SD 4-4	Function
			Display- LOCAL				**BASIC MENU**
LP0			**PROPERTIES**				**Select properties menu**
	LP1		SD4 TYPE SD4- [ ]	2	3	4	Sets type of SD4 display SD4-2(Main Display), -3, -4 (factory setting)
	LP2		MODE WINDOW				*List of information to be displayed in the MODE WINDOW:*
		LP2.01	DIST WATER	**ON**	**ON**	OFF	Total distance counter of STW (resulting)
		LP2.02	TRIP WAT-L	OFF	OFF	OFF	Trip distance counter of STW longitudinal
		LP2.03	TRIP WAT-T	OFF	OFF	OFF	Trip distance counter of STW transverse
		LP2.04	TRIP WATER	**ON**	**ON**	OFF	Trip distance counter of STW (resulting)
		LP2.05	DIST GROUND	OFF	OFF	OFF	Total distance counter of SOG (resulting)
		LP2.06	TRIP GND-L	OFF	OFF	OFF	Trip distance counter of SOG longitudinal
		LP2.07	TRIP GND-T	OFF	OFF	OFF	Trip distance counter of SOG transverse
		LP2.08	TRIP GROUND	**ON**	OFF	OFF	Trip distance counter of SOG (resulting)
		LP2.09	DIST+TRP WAT	OFF	OFF	OFF	DIST WAT and TRIP WAT are displayed simultaneously
		LP2.10	DIST+TRP GND	OFF	OFF	OFF	DIST GND and TRIP GND are displayed simultaneously
		LP2.11	TRIP WAT+GND	OFF	OFF	OFF	TRIP WAT and TRIP GND are displayed simultaneously
		LP2.12	SPEED SOG-L	OFF	OFF	OFF	SOG longitudinal
		LP2.13	SPEED SOG-T	OFF	OFF	OFF	SOG transversal
		LP2.14	SPEED SOG	OFF	OFF	OFF	SOG (resulting)
		LP2.15	SPEED STW-L	OFF	OFF	**ON**	STW longitudinal
		LP2.16	SPEED STW-T	OFF	OFF	OFF	STW transversal
		LP2.17	SPEED STW	OFF	OFF	OFF	STW (resulting)
		LP2.18	DEPTH (ESD) SENSOR: No offset KEEL: Negative offset SURF: Positive offset	OFF	OFF	OFF	Depth from Echo sounder display with offset according to $SDDPT message. $SDSTN Id displayed if available
		LP2.19	DEPTH (LOG)	OFF	OFF	OFF	Depth from speed log. (not to be used for navigation)
		LP2.20	ROT	OFF	OFF	OFF	Rate-of-Turn (only available if a gyro is connected to the system)

No.			Name	Default setting			Function
				SD 4-2	SD 4-3	SD 4-4	
		LP2.21	DIAGNOSTICS	OFF	OFF	OFF	Display diagnostic codes (PSALW)
		LP2.22	DOCKINGLOG	OFF	OFF	OFF	SOG transversal of the BOW and STERN
		LP2.23	STANDBY STW	OFF	OFF	OFF	Deactivates valid STW NMEA to invalid STW NMEA
	LP3		STARTUP DIM [50%]	50%	50%	50%	Default brightness after a reset
	LP4		NEG SPD USE [OFF]	OFF	OFF	OFF	Longitudinal distance counters and pulse output off at negative speed
	LP5		LP5 EXT INPUT [DIM]	DIM	DIM	DIM	Sets function of external inputs. DIM or SDR2 (Control Unit)
	LP6		LP6 EXT OUTPUT [200 P/NM STW-L]	STW -L	STW -L	STW -L	Sets function of external output: 200 P/NM STW-L 200 P/NM SOG-L
	LP7		NMEA GATE THROUGH [OFF]	OFF	OFF	OFF	NOTE. Always OFF when connected back to the Log system, (Can be used if more displays are connected in series)
	LP8		NMEABAUDRATE [4800]				4800 /38400 NOTE. Do not change.
	LP9		PREFERRED DEPTH [AUTO]	AUTO	AUTO	AUTO	[AUTO] (KEEL/SENSOR/SURFACE) Displays most shallow depth if SDDPT with different offset is received. [SURFACE] If both + and - offset, displays SURFACE depth [SENSOR] Only displays SENSOR depth
	LPA		AUTO STW WHEN NO SOG[ON]	ON	ON	ON	Speed windows switch to STW when SOG out of range.
	LPB		SPEED VALUE 2 DECIMALS [OFF]	OFF	OFF	OFF	Displays speed values with two decimals, when enough space.
	LPC		SW REVISION 704021xx				704021xx for SD4-2 (Main Display), -3 704024xx for SD4-4
	LPD		RESET TOTAL LOCAL DISTANCE				
		LPD.01	RESET TOT CONFIRM [NO]	NO	NO	NO	Resets all total distance counters in the display to 0.
	LPE		SET DEFAULT MENU PARAMETERS				
		LPE.01	RESET MEN CONFIRM [NO]	NO	NO	NO	Sets all menu parameters in the Display to default value. (Depending on type of Display)

No.			Name	Default setting			Function
				SD 4-2	SD 4-3	SD 4-4	
LS0			**REMOTE SETUP**				**Select Remote setup menu**
	LS1		SD4 ID [4]	4	4	4	ID number between 0-26. Other Displays that have entered this ID in Menu LS3 can remotely DIM this Display
	LS2		DIM OFFSET [0 %]	0	0	0	Offset from remote DIM command
	LS3		REMOTE DIM ID				SD4 Displays that have ID numbers corresponding will be remotely dimmed from this Display. Max 4 ID can be entered.
		LS3.01	REMOTE DIM ID [ ]				The first Display ID can be entered
		LS3.02	REMOTE DIM ID [ ]				The second Display ID can be entered
		LS3.03	REMOTE DIM ID [ ]				The third Display ID can be entered
		LS3.04	REMOTE DIM ID [ ]				The fourth Display ID can be entered
	LS4		HEARTBEAT TIMEOUT [30]S	30	30	30	Time between heartbeat is sent to the remote device
	LS5		MENU ACKN TIMEOUT [3]S	3	2	2	Maximum time for acknowledge signal from the remote device
	LS6		SD2 REMOTE DIM [OFF]	OFF	OFF	OFF	Makes it possible to remotely DIM old SD1/SD2 instruments
	LS7		R0 REMOTE ACCESS [ENABLED]	EN	EN	EN	Enables menu R0 making it possible to remotely connect to other devices. [SUSPEND] [ENABLED] (Default) [DISABLED]
R0			**REMOTE DEV CONNECT**				Access to Menu system in remote devices**.** (LS7 to be set if this menu shall be enabled)
	R1		DEVICE 1 OF x) <NAME> (<ID>)				x: Number of available remote devices ID: ID of the remote device NAME: Name of the remote device
	R2		DEVICE 2 OF x) <NAME> (<ID>)				x: Number of available remote devices ID: ID of the remote device NAME: Name of the remote device
	R3		…nn				There will be as many R menus as

No.		Name	Default setting			Function
			SD 4-2	SD 4-3	SD 4-4	
						there are remote systems connected.

6 Serial Data message definitions

The messages that are used for the Displays are defined in section 11. Please consult this for complete message definitions.

7 Technical data

Powering

Input voltage:	10 - 32 VDC (12 to 24 VDC nominal)
Current:	Maximum 200 mA at 15VDC, typical 100mA
Power Consumption:	Maximum 3 Watt, typical 1.5 Watt

Environmental conditions

As required by IEC 60945 4th edition. If panel mounted on a watertight flat surface or in a BULKHEAD M BOX "exposed" category id fulfilled, otherwise "protected" category.

Watertight as required by IEC 529 category IP66 if mounted in BULKHEAD M BOX, or panel mounted on a flat surface.

Compass safe distance: 0.3m

Nominal viewing distance

- Fixed information printed on the front foil: 1m
- Speed windows: 3.7m
- Small font in Mode window: 2.7m
- Large font in Mode window: 6.2m

Inputs and outputs

Serial:	Isolated IEC61162-1 (NMEA 0183) standard input.
	Standard IEC61162-1 (NMEA 0183) output, based on RS485 driver
Remote inputs:	3 inputs with internal pull-up to +5V, activated by grounding to 0V.
+5VDC output:	One output with 35mA current capacity.

Connections

Connections of power, inputs and output are done via a 10-pole plug-in terminal, maximum cable area 1.5 mm².

Dimensions

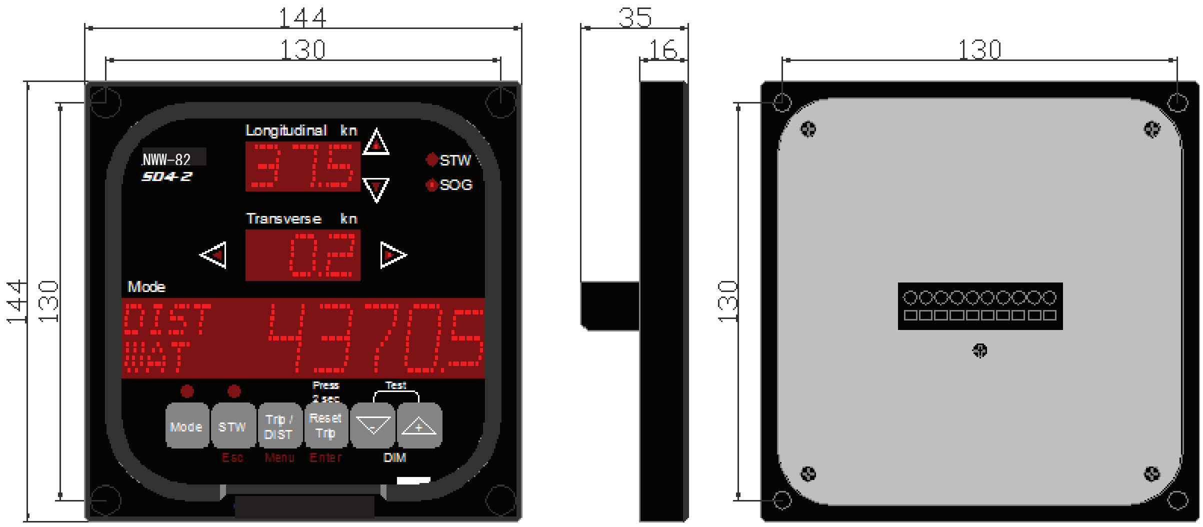
144 x 144 x 15 mm, mounts in a defined panel cut-out with screw holes pattern.

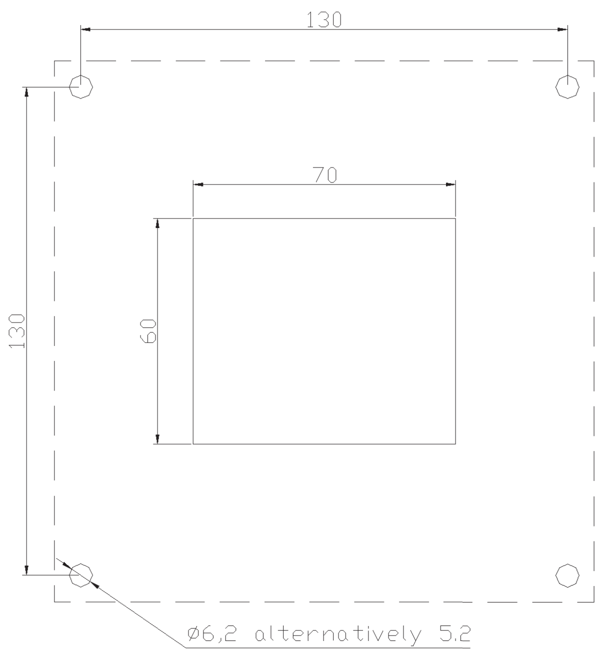
8 Installation and testing

8.1 Mounting

The four attaching holes in the Display are threaded with an M6 thread making it possible to mount the Display either with four M6 screws from the rear or with four M5 screws from the front using nuts on the backside of the console. When the Display is mounted on a flat surface using M5 screws with nylon washers from the front and the provided neoprene gasket is used, a protection class of IP66 is achieved.

Mechanical dimensions and panel cut-out:





8.2 Downloading of new software

The JLN-900 Display is delivered with the software installed in a flash memory.
If, however, an update of software would become necessary, please refer to utility program WinFlash.

8.3 FAT Testing

*This FAT Test is done by the factory and **shall** normally not be used.*
If the Display is programmed/set to type SD4-**0** in menu LP1 an internal test sequence is performed. After the test assure that the Display is set to proper type, see below.

(This test is ***not*** valid for NWW-85 Docking Display)

1. LED test:
   A number of test patterns are displayed to ensure that all LEDs are OK.
   Press any button to step to the next pattern
2. Input test:
   IN1, IN2 and IN3 is displayed together with status information.
   Press both DIM buttons ▽ △ simultaneously to step to the next test.
3. Output test:
   The output is pulsed with a frequency of 1 Hz.
   Press both DIM buttons ▽ △ simultaneously to step to the next test.
4. Buttons test:
   When a button is pressed a button number is displayed.
   Press both DIM buttons ▽ △ simultaneously to end the test and jump to Menu LP1 SD4 TYPE where the actual Display type is/shall be entered, such as **NWW-82 (Main Display)**.

9 Speed Log Master Display

9.1 General

To remotely control the Menu system in speed logs and other equipment in the speed log system, one Display conveniently positioned on the bridge/wheelhouse is used as a remote control. This 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 speed log system.

The **Speed Log Master Display** can also be used to remotely control the dimming function on other Displays connected to the system.
(In installations where more than one Display is connected as **Speed Log Master Display**, those additional Displays are primarily connected with remote control functionality to be able to control the dimming function on other Displays but can also be used to control the Menu system in speed logs and other connected equipment. Those additional remote Displays do not have to be labelled but the remote control function shall be clearly indicated in installation drawings and other documentation).

9.2 Positioning of the Speed Log Master Display

The **Speed Log Master Display** is preferably positioned chart Table/Wheelhouse where it can be accessed without interfering with the normal operation of the ship, Recommendation are at the Chart Table or other conveniently accessible location.

9.3 Electrical connection

The **Speed Log Master Display** is connected with two-way communication to the speed log system normally via an Sig. Distributor or directly to the main unit, Sig. Processor.
This means that there shall be a connection with one pair of wires transmitting NMEA data to the **Speed Log Master Display** and one pair of wires transmitting NMEA data in return to the speed log system. Other Displays without remote control functionality only have one pair of wires transmitting data to the Display.

Speed Log Master Display:
4 wires for the serial NMEA communication
2 wires for DC power supply
Other Display:
2 wires for the serial NMEA communication
2 wires for DC power supply

9.4 Positioning of labels

In every shipment of a JLN-900 Speed Log a set of two labels is included inside the JLN-900 Speed Log main unit electrical cabinet, Sig.Processor. The installation company shall place those labels on or by the **Speed Log Master Display**.

One label, with the text “Master”, is intended for placing on the front foil surface of the **Speed Log Master Display** below the model name. The other label, with the text “Speed Log Master Display”, shall be placed on the console surface adjacent to the Display frame or directly on the upper frame surface.

10 Standby STW

This function can be used to temporarily de-activate speed information from the STW speed log.
To utilize the Standby function the Display 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 for normal operation.
The Standby mode must only be used for special purposes.
Note! The software in the WTU (Water Track Unit) has to be 700210E2 or later.

Use the Mode button to toggle until the MODE WINDOW shows;

STW ACTIVE
[-+] FOR STANDBY

Press and release both DIM buttons ▽ △ simultaneously to de-activate the STW speed log.
When the STW speed log is de-activated the MODE WINDOW shows:

STW DEACTIVATED
ANY KEY TO START

To start/activate the STW speed log, press any key.

If the Display MODE WINDOW shows:

STW UNIT STANDBY
NOT POSSIBLE

Display did not establish contact with the STW speed log (Sig.Processor) due to older software in the WTU and/or that the Display is not connected with two-way communication to the JLN-900 Speed Log system.

11 Suspend of remote equipment

To establish communication with some remote devices it might be necessary to first suspend serial data transmission from other part of that particular devicet, e.g. the slave T2R PCB (BTUS1, T2B) used for redundancy in a SAL T3+ Speed Log system can only be accessed when the primary T2R PCB (BTU 1, T2A) in the same speed log is suspended.

Suspend of a remote unit can be done in Menu R0 REMOTE DEV provided that the SUSPEND function is activated in Menu LS7 R0 REMOTE ACCESS.

To suspend a unit go to Menu R0 as described in Chapter ***6. Set-up of Display*** and follow as listed below:

R0 REMOTE DEV
CONNECT

Press Enter

SYNCHRONISING
. . . 3

Wait 3 seconds.

Then press Menu to choose BTU 1 (T2A) in the list of connected devices:

R2 DEVICE 2 OF 3
BTU 1 (T2A)

To suspend BTU 1 (T2A) device first press + or - to display the text SUSPEND:

R2 DEVICE 2 OF 3
SUSPEND (T2A)

Press Enter

SUSPENDING T2A
. . . 12

Wait 12 seconds, then a new synchronising will start:

SYNCHRONISING
. . . 3

Wait 3 seconds

Then press Menu to choose BTUS1 (T2B) in the list of connected devices:

R2 DEVICE 2 OF 3
BTUS1 (T2B)

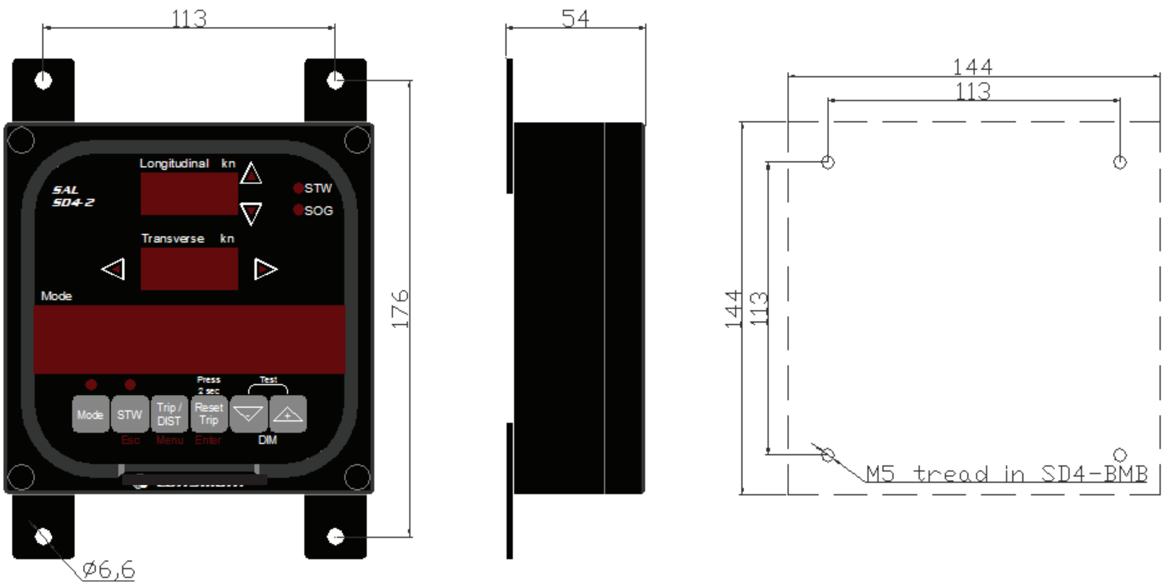
Confirm device to connect to by pressing Enter. Now you should be connected to the slave T2R PCB (BTUS1, T2B) to proceed intended actions.

As soon as you return to Menu R0 REMOTE DEV or leaving the Menu system the suspended unit will be re-activated and all functions back to normal.

12 Accessories

The Display can be equipped with a number of optional accessories as presented and specified below.

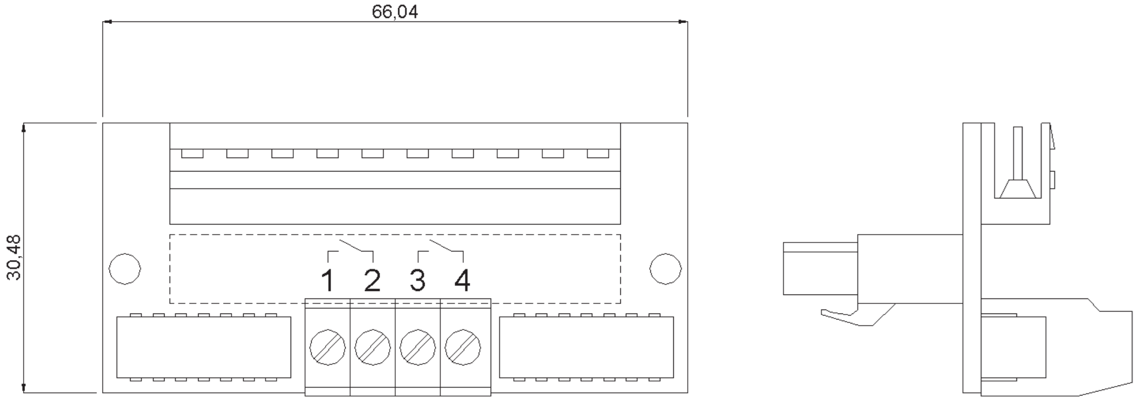
12.1 BULKHEAD M BOX



The BULKHEAD M BOX can be used to mount the NWW-82/85 on any flat surface indoor or outdoor. Mounting is done either from the front using the supplied mounting brackets or from the rear with M5 screws substituting the brackets.
The cable intake is supplied with a cable gland for IP66 protection for cable diameters in the range 9 - 13 mm.

The BULKHEAD M BOX assures that the Display is maintained watertight according to IP66. The Display unit itself is also watertight when mounted onto a flat and even panel/console surface.
Always assure to mount with supplied cable gland, sealing gasket and washers.

12.2 EXTENSION BOARD



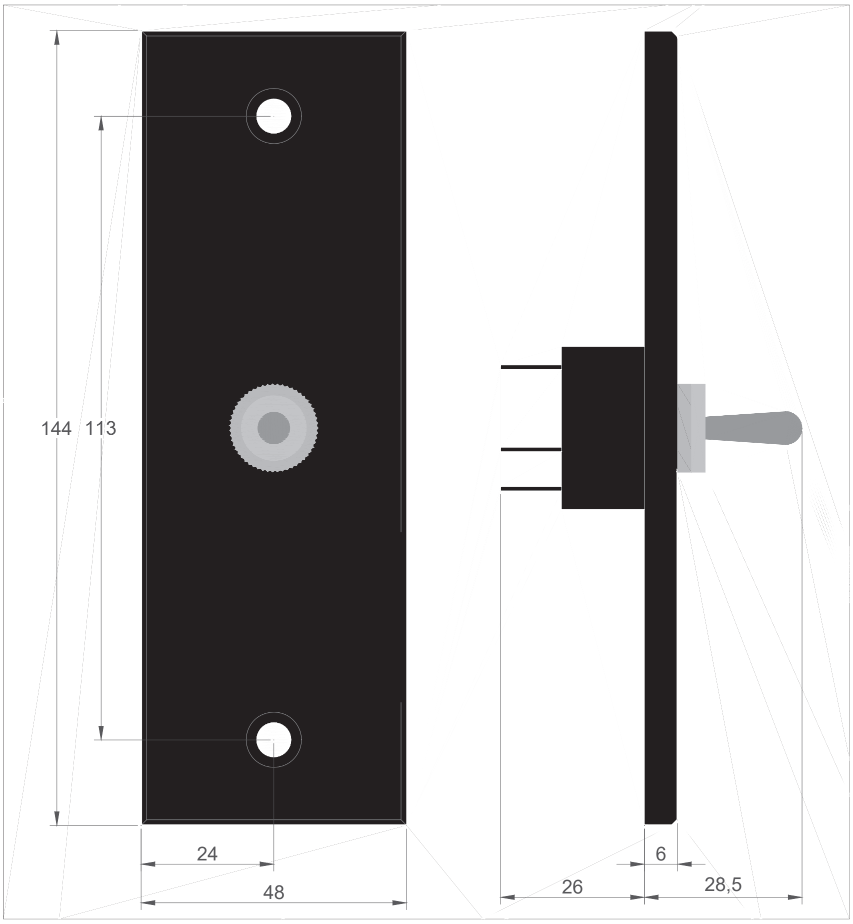
The EXTENSION BOARD is equipped with two relays, which can be used to obtain 200p/NM speed pulses from two dry/voltage free contacts or for other use in special installation.
Menu LP6 is used to choose function of the output. (See ***6. Set-up of Display***)

12.2.1 Installation

The board is installed directly on the rear of the Display. Unplug the 10-pole terminal plug from the Display, plug in the EXTENSION BOARD in its place and plug the 10-pole terminal plug in the top contact of the EXTENSION BOARD. The two relay contacts can now be accessed via screw terminals #1-4 on the EXTENSION BOARD.

EXTENSION BOARD	Note
Terminal 1	Relay 1 normally open, max load 30V/30mA or 15V/100mA
Terminal 2	
Terminal 3	Relay 2 normally open, max load 30V/30mA or 15V/100mA
Terminal 4	

12.3 Dimmer Unit NCM-1080



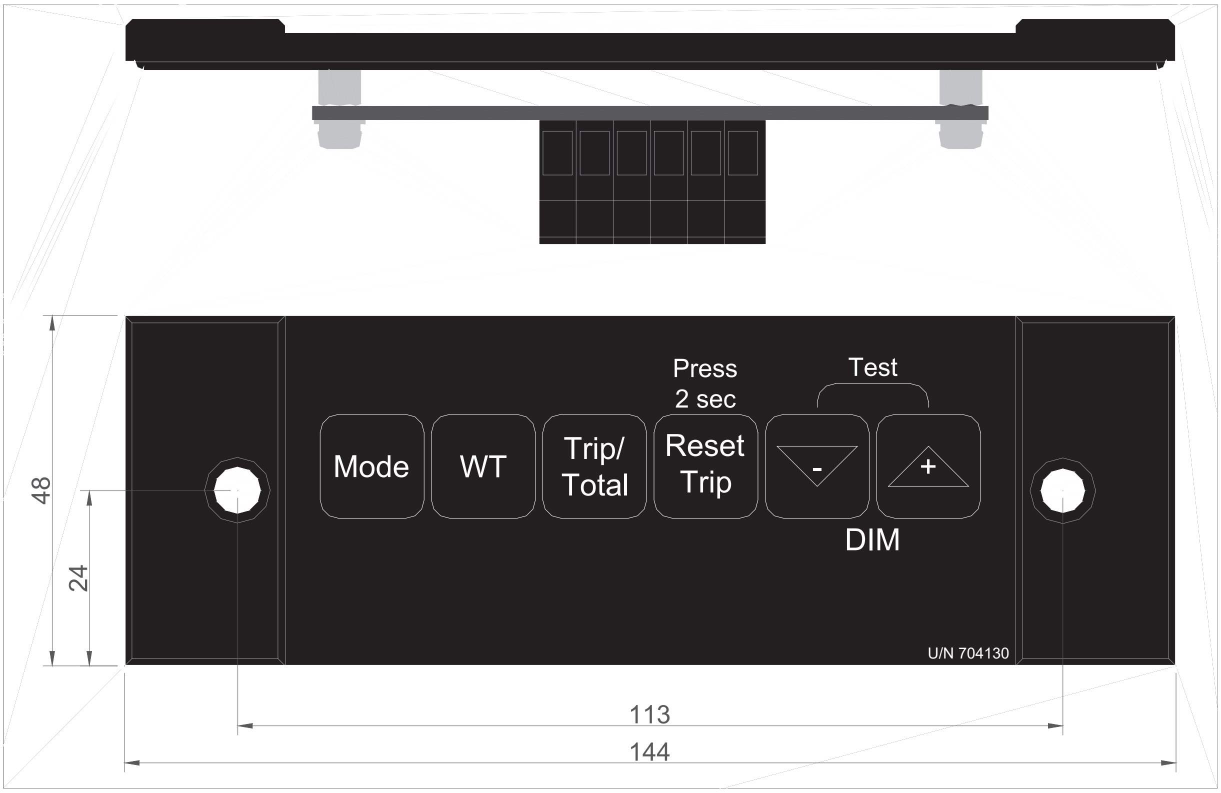
The Dimmer Unit is used to dim a Display from a remote position.
Menu LP5 EXTERNAL INPUTS shall be set to [DIM] for the dimmer to function correctly. (See ***6. Set-up of Display***)

More Displays can be connected to the same dimmer if they are powered from the same source. All connected Displays will be dimmed but the intensity level on different Displays will ***not*** be the same. It is therefore recommended to use serial Remote DIM message when more Displays shall be dimmed to the same intensity. (See chapter ***4.8. Remote Dim message***)

12.3.1 Installation

Display	Dimmer Unit	Function
Terminal 7	Terminal 3	Dim down
Terminal 8	Terminal 1	Dim up
Terminal 9	Terminal 2	0 VDC

12.4 Control Unit, NCM-1180



The Control Unit is used to access the NWW-82 Main Display buttons from a remote position.
Menu LP5 EXTERNAL INPUTS shall be set to [SDR2] for the remote control to function correctly (See ***6. Set-up of Display***

Note! The Control Unit is not intended for e.g. calibration and only for the NWW-82 Main Display.

12.4.1 Installation

Display	Control Unit	Function
Terminal 6	Terminal 1	Control Unit (IN 1)
Terminal 7	Terminal 2	Control Unit (IN 2)
Terminal 8	Terminal 3	Control unit (IN 3)
	Terminal 4	Not used
Terminal 9	Terminal 5	0 VDC
Terminal 10	Terminal 6	10..32 VDC (12 to 24 VDC nominal)

JLN-900
Analog Display
Technical Manual

Contents

1 Introduction

1.1 General

This document describes the article NWW-828 Analog Display, Speed Indicator Analogue used for the JLN-900 speed logs.
The indicator range is: 8 knots astern (-0.8V DC) to 30 knots ahead (+3.0V DC).
The Analog Display is based on microprocessor-controlled x-coil system and therefor it needs to be connected to an external power supply (DC 12-24V).

Note! Pointer position is random until external power supply is connected.

1.2 Definitions and abbreviations

Abbreviation	**Description**
Display	NWW-82 / 85 Display
Sig.Distributor	JLN-900 Signal Distributor

1.3 Electrical installation

- Connect external power to terminals 1 (-) and 2 (+). Terminals 1 and 2 are located on the separate two-terminal detachable plug. DC power out for e.g. Display on JLN-900 Sig. Distributor can be used as source.

  Terminals 3 to 8 are found on the other detachable plug, six-terminal plug.
- Terminal 3 (analogue + in) connects to the analogue out on JLN-900 Sig. Distributor and terminal 4 (GND) to analogue out (0V DC) on JLN-900 Sig.Distributor.
- Terminals 6 (+) and 7 (-) are used for illumination. When dimmable illumination is desired connect a potentiometer to adjust the voltage on terminal 6.

- Terminals 5 and 8 are not used

2 Technical Specification

Mechanical specification

Panel allocation	148.5 x 148.5 mm
Panel cut out:	138.5 x 138.5 mm
Depth:	96 mm, whereof 90.5 behind panel front
Maximum panel thickness	18 mm
Weight:	0.5 Kg

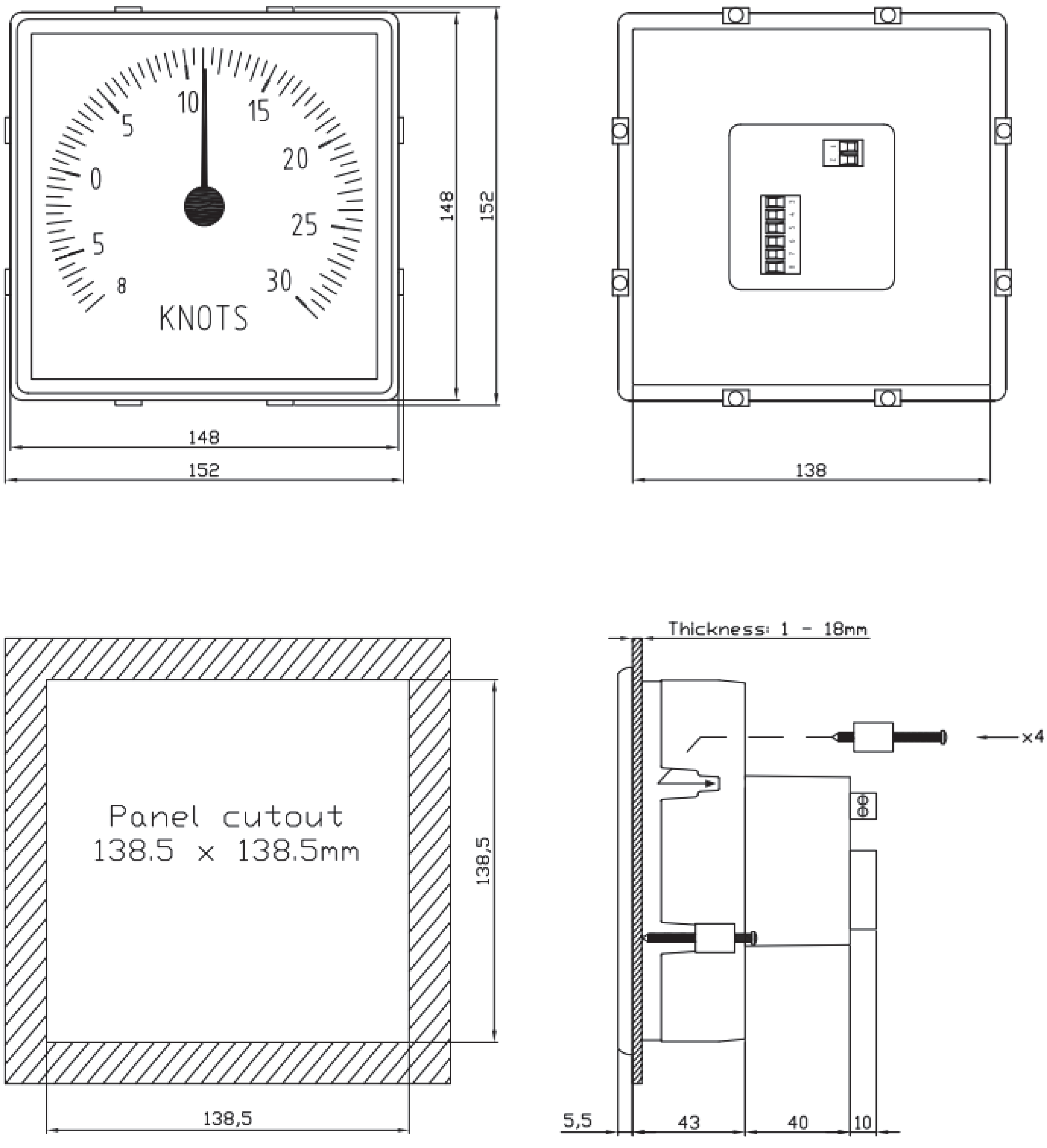
Electrical specification

Measuring range	-8 to 30 kn; 0.1 V DC / knot
Power intake:	Nominal 12-24 V DC. (18 – 31.2V DC) Reverse polarity protected. Start-up minimum 9.6V DC
Power consumption:	150mA
Illumination	Dimmer range 7 …30V DC Consumption max 30 mA. Yellow LEDs
Analogue input	4 …20 mA
Accuracy	Class 0.5 Measured at 360 degrees deflection, +/- 1.8 degree error
Terminals	Pluggable screw terminals 0,2 …2,5mm2
Galvanic separation	600V AC: Aux. supply ;Analogue in ;Dimmer
Mounting angle	0…150° horizontal. DIN 16257
Response time	Maximum pointer speed 90 degrees per second, ramped to prevent overshoot.
Pointer	Transparent polycarbonate with white print, illuminated
Scale	Black with white text, numbered each 5 kn and scale design showing each 0.5 kn
Internal error LED	Amber coloured LED in the lower right corner, when lit or flashing the indicator is out of order. Try to power cycle unit. During start-up this LED flashes a few seconds.

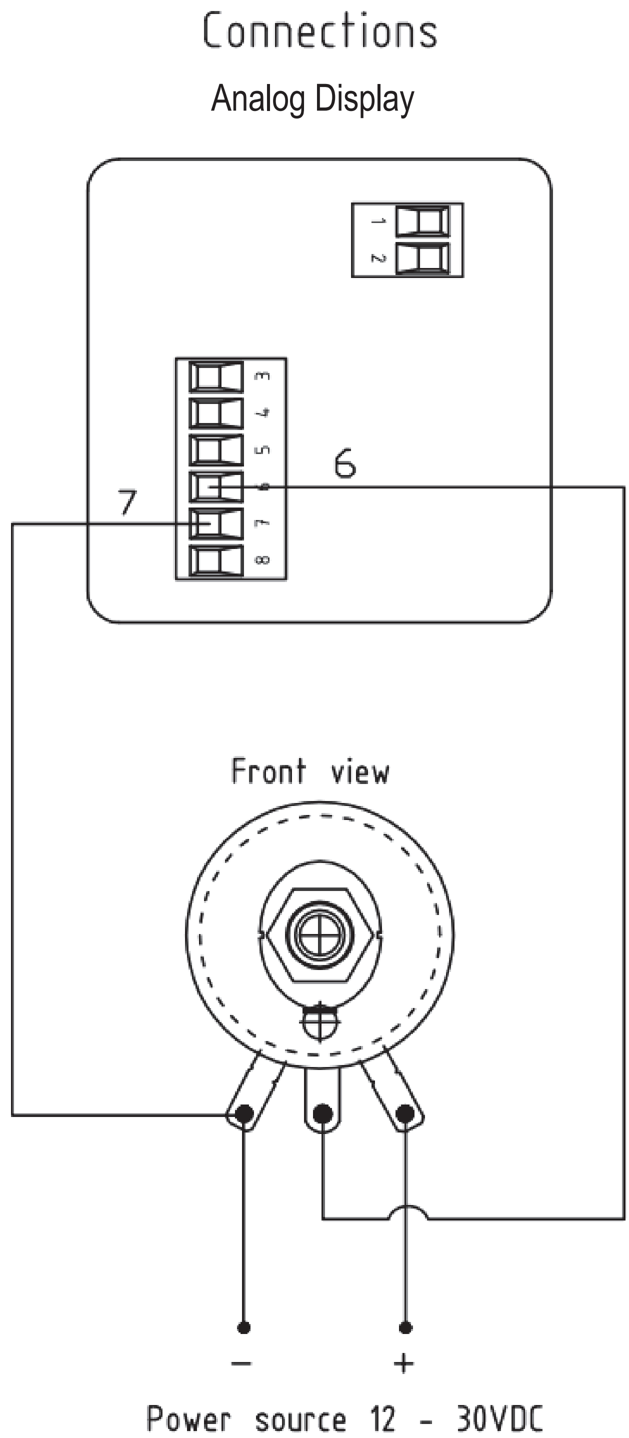
Environmental specification

Enclosure material:	Plastic, ASA/PC LURAN-S
Window:	3 mm transparent polycarbonate with UV blocking
EMC and Vibration:	EN 60945
Compass safety distance	Steering compass: 0.60m, emergency: 0.40m
Colour:	Black
Protection	Front IP52 when mounted in panel, rear IP20
Extreme operating temperature:	-25°C…70°C
Extreme operating Humidity:	Class H S E, short term condensing allowed
Safety	300V – CAT.III. Pollution deg 2

2.1 Main Dimensions NWW-828 Analog Display

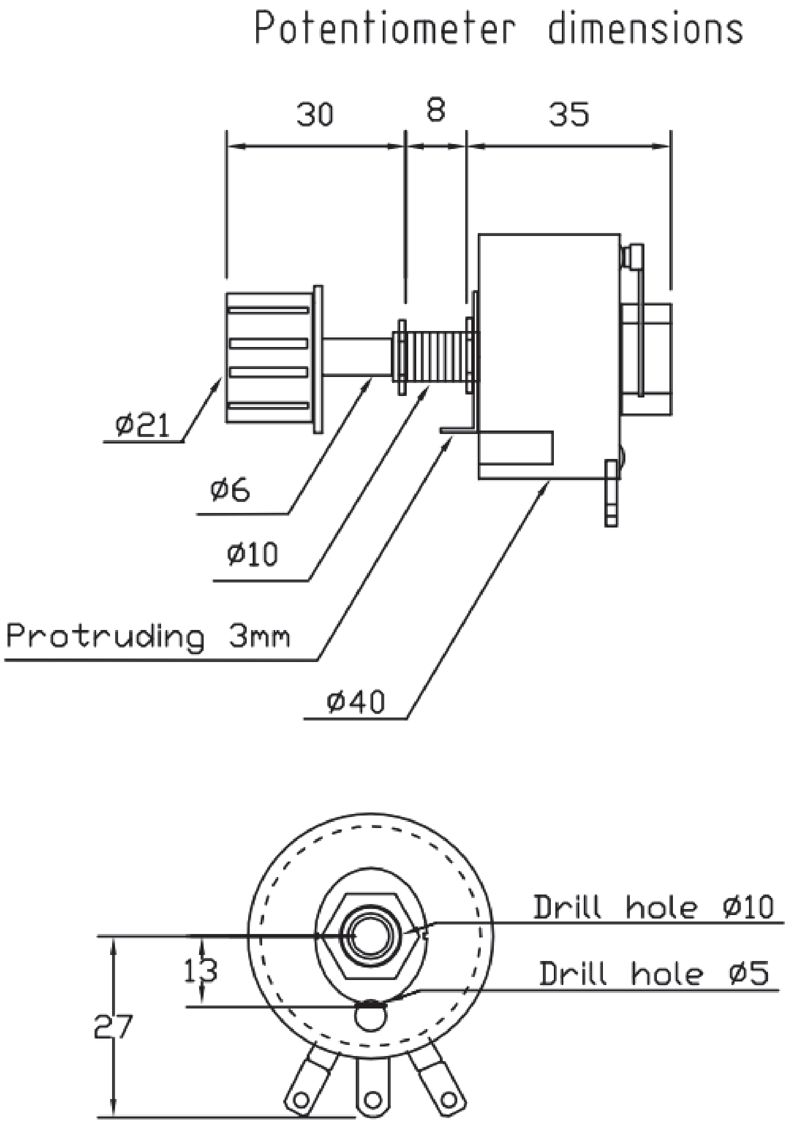


2.2 Dimmer Potentiometer connection



2.3 Dimmer Potentiometer dimension

Dimension drawing



Specifications given are subject to changes without prior notice.

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JLN-900
Menu System

1 Background

This document gives a brief overview of JLN-900 Speed Log menu system and use.

2 Jumper settings

2.1 Boot mode selection with JP5

At reset a boot loading process starts up JLN-900 Speed Log. The log boots from a Flash memory. With a jumper in position JP5, the log boots into the normal operational mode. Without jumper in position JP5, the log boot into the production test program.

2.2 Forced test mode with bottom tracking with JP4

When the log is running in normal operation mode and the jumper in position JP5 is moved to position JP4, the log is forced into a test mode with fix depth. The depth corresponds to the depth value entered in menu T1.
This mode generates repetitive transmit patterns to facilitate oscilloscope triggering during trouble shooting.

2.3 Baud rate setting with JP3

The 9-pin DSUB on the RECEIVER PCB can be set to two different baud rates.
When the JP3 is ON the baud-rate is set to 4800, when OFF the baud rate is 115200. When running e.g. SD4com on the DSUB the setting should be 4800. The setting should be 115200 when running e.g. DrSal or updating the software.

2.4 Watchdog activation via JP21

Watchdog is enabled via JP21. Remove jumper to disable watchdog. Set jumper JP21 to position 1-2 to get reset pulses every 1.6 seconds. Set jumper JP21 to default position 2-3 for normal operation.

3 Program update via WinFlash

Program update is possible from a PC running MS-windows. Set JP3 to OFF, baud rate 115200. Connect the PC to the 9-pin DSUB and run the program. Program update is usually not interfering with normal operation except that changes to the menu system are not allowed via remote operation. Always reset the RECEIVER PCB after updating the software, by moving JP21 to position 1-2 for more than 1,6sec and then back to position 2-3. It is also possible to reset by using the menu CPU reset in the menu system, or power cycle the system.

4 Menu system

The menu system, controlled via a remote indicator i.e. the Speed Log Master Display, enables controls and user interaction of the SAL T-series log. The communication commands are described below. Keys available are "**MENU**", "**ENTER**", "**+**" and "**-**".

4.1 Normal operation

The log in normal operation calculates the speed from the sensor signals. When a new measurement value is available, it may be shown on the remote indicator. In normal operation within depth range the readout mainly uses the following field descriptors:

```
BTL±xx.xxT±yy.yy
DT ddd.ddS±sss.s
```

The definition for the field descriptors is found in the table below.

Descriptor	Explanation
±xx.xx / --.--	Sensed longitudinal speed in knots from transducer. Field is --.-- if no valid speed is available.
±yy.yy / --.--	Sensed transversal speed in knots from transducer. Field is --.-- if no valid speed is available.
±ddd.dd / --.-	Sensed depth below transducer. Field is --.-- if no valid depth is available.
±sss.s / --.-	Sensed signal strength in dB from transducer. Field is --.-- if no valid signal is available.

4.2 Menu settings

The menus for parameters and internal settings have a two digit alphanumeric field **Aa** to the left followed by a menu name or abbreviation on the first line on the Speed Log Master Display.

The second line is reserved for value or parameter setting. The readout thus looks like:

```
Aa FUNCTION
VALUE OR SETTING
```

When using the menu system the following key combinations are possible:

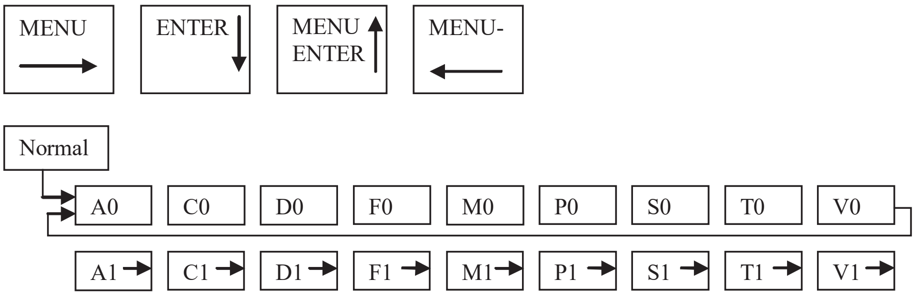
KEY combination	Explanation
MENU	Go to next menu on the same level
MENU +	Same as MENU
MENU -	Go to previous menu on the same level
MENU ENTER	Return to the above menu level
ENTER	Activate menu by executing command or continue on sub menu level

+	Increment setting in current menu
–	Decrement setting in current menu

4.2.1 Menu walk

The keys above can change the current position in the menu tree. Pressing "Menu" steps to the next menu on the same level. Pressing "Enter" goes down one level, or if at the lowest level saves current value in non-volatile memory. Pressing "plus" or "minus" changes the content for the current menu.

Example to go from Normal operation to menu M2:
press MENU five times followed by ENTER once, then MENU once more.



4.2.2 Write and read-only access

First level menus include the possibility to select read-only or write access to the menus on the level below.”. Use "+" or "-" to select write or read-only access before pressing ENTER to continue on sub menu level. Displayed readout for write access to submenus thus appears as:

```
Aa FUNCTION
WRITE ACCESS ON
```

and the readout for read-only access appears as:

```
Aa FUNCTION
WRITE ACCESS OFF
```

4.2.3 Access Denied Menus

Some first level menus show “Access Denied” as they are intended for experts only. To access these menus the access level must be changed from “All Users” to “Authorised Expert”.

NOTE: For “Authorised Expert” all menus are visible and possible to enter. The “Authorised Expert” access level shall only be used by instructed service personnel.

```
Aa FUNCTION
ACCESS DENIED
```

4.2.4 Saving menu content

When saving menu content by pressing ENTER, the following menu appears for one second:

```
Aa FUNCTION
SAVE OK
```

or, when unsuccessful:

```
Aa FUNCTION
SAVE FAIL
```

before returning to the normal menu text. NOTE: A save fail may depend on a busy flash memory and thus further save attempts may resolve the problem.

If read-only access has been selected, the "no write access" text appears for one second and the write operation is inhibited:

```
Aa FUNCTION
NO WRITE ACCESS
```

4.2.5 Menu function summary

The list is included for fast indexing.

Menus with access level “All users” are directly accessible.

NOTE: Menus with access level “*Authorised expert*” must be unlocked and should only be used by trained service personnel. Note that some non-default combinations of menu values may result in strange behaviour of the SAL T-series speed log / echo sounder system.

No	Access Level	Name	Default	Range / info	Function
MM		**(NORMAL OPERATION)**		**speed info presented**	**Timeout to normal operation after 180 seconds. Displayed presentation according to chapter "Normal operation".**
A0	**All Users**	**Internal PSALW diagnostics**			**Number of active and acknowledged diagnostic codes, intended for service use**
A101	All Users	ES SIMULATION			Diagnostic code depth simulation status
A110	All Users	ES ALARM TEST		NORMAL / ACTIVE / ACTIVE ACK	Diagnostic code ES Test Alarms status
A140	All Users	POWER SUPPLY LOW			Diagnostic code (transmitter) Power Supply Low status
A201	All Users	SOG SIMULATION			Diagnostic code speed over ground simulation status
A205	All Users	T2R MASTER FAIL			Diagnostic code T2R Master Fail status (slave T2R / JP26)
A210	All Users	SOG Phase Roll			Diagnostic code Phase Roll test status
A220	All Users	SOG Sig Balance			Diagnostic code SOG Signal Balance test status

No	Access Level	Name	Default	Range / info	Function
A230	All Users	SOG T2T Failure			Diagnostic code (transmitter) T2T test status
A240	All Users	SOG/ES TX MUTE			Diagnostic code external SOG / ES TX Mute (transmitter muted) status
C0	**All Users**	**CALIBRATION**			**Selects calibration menus**
C1	All Users	BT Speed Cal	+0.00%	(-50% to +50%)	Bottom track speed calibration factor in %. step=0.01%
C2	All Users	BT angle Cal	+0.0deg	(–180.0 to +180.0deg)	Bottom track angular calibration factor in degrees. step=0.1deg
D0	***Authorised Expert***	**DEBUG**			**Selects Debug menus, only intended for trained service personnel**
F0	***Authorised Expert***	**Force Testing**			**Selects Forced testing menus, only intended for trained service personnel**
M0	All Users	**MISCELLANEOUS**			**Selects miscellaneous menus**
M1	All Users	EepromRestore	Disabled		Restore default values for all EEPROM settings. Remember to do a system reset after EEPROM restore command.
M2	All Users	CPU Reset	Disabled	(Not stored)	Force a watchdog timeout that will reset the log.
M4	All Users	BT Total Dist	Dist=xxx		Total BT distance in nautical miles
M5	All Users	BT Trip Dist	Dist=xxx	(Reset)	BT trip distance in nautical miles. Command ENTER resets the trip counter.
M6	All Users	SW Revision	Rev=xxx		The software revision of the program
M7	All Users	Access Level	All Users		All Users: Some first level menus are locked Authorised Expert: No menus are locked
P0	***Authorised Expert***	**PARAMETERS**			**Selects Parameters menus, only intended for trained service personnel**
S0	**All Users**	**SETTINGS**			**Selects Settings menus**
S1	All Users	PSALX telegram	Enabled		Depth profile information for SAL ESD (Echo Sounder Display)
S2	All Users	WATC telegram	Disabled		Shall always be set to Disabled
S3	All Users	PSALW telegrm	Enabled		Internal diagnostics code transmission (PSALW)
S4	All Users	Max Ahead	41		Maximum speed magnitude [kn]
S6	All Users	Lock Timeout	20		Serial data output timeout when losing depth lock [sec]
S7	All Users	NMEA Interval	1.00		Serial NMEA sentence interval [s]
S8	All Users	PSALN telegrm	Disabled		Measurement quality information transmission (PSALN)
S9	All Users	VBW format	Extended		Select IEC61162-1 *extended* sentence format with stern speeds or earlier *short* sentence format (Ed 1)
Sa	All Users	Operating frequency	150000	145000 Hz to 155000 Hz	Select operating frequency in steps of 500 Hz. Default frequency value (150.000 Hz) should always be used

No	Access Level	Name	Default	Range / info	Function
					unless contact with manufacturer recommends another value.
T0	**All Users**	**TEST**			**Selects Test menus, intended for service use**
T1	All Users	Simulation value for BTL	12.00	Simulation values from menus T1-T3	Transmit simulated speed [$VDVBW) and depth ($VDDPT). The BT longitudinal value is adjusted with this menu.
T2	All Users	Simulation value for BTT	0.09	Simulation values from menus T1-T3	Transmit simulated speed [$VDVBW) and depth ($VDDPT). The BT transverse value is adjusted with this menu.
T3	All Users	Simulation value for Depth	10.0	Simulation values from menus T1-T3	Transmit simulated speed [$VDVBW) and depth ($VDDPT). The depth value is adjusted with this menu.
T4	All Users	Simulation no valid data			Transmit simulated data with status invalid for depth ($VDDPT) and speed ($VDVBW).
V0	**All Users**	**VIEW**			**View of information base menu, intended for maintenance and service**
V1	All Users	System Uptime		0-49710 days	Shows uptime for system and different modes. Total 4 sub menus
V2	All Users	SIG		1e-9 to 1	Instant channel levels from sensor
V3	All Users	AVG		1e-9 to 1	Average channel levels from sensor
V4	All Users	DEPTHSEEK OVF			Count of echo level overflow during depth seek
V5	All Users	DEPTH-TRK OVF			Count of echo level overflow during depth track
V6	All Users	DEPTH-TRK HI			Count of high echo level during depth track
V7	All Users	DEPTH-TRK LOW			Count of low echo level during depth track
V8	All Users	SPEED-TRK OVF			Count of overflow echo level during speed track
V9	All Users	SPEED-TRK HI			Count of high echo level during speed track
VA	All Users	DEPTH-TRK LOW			Count of low echo level during speed track
VB	All Users	SERIAL-IN-ERR			Count of serial lines decoding errors
VC	All Users	SER-0 ERRORS			Count of serial port 0 receive errors
VD	All Users	SER-1 ERRORS			Count of serial port 1 receive errors
VE	All Users	SER-2 ERRORS			Count of serial port 2 receive errors
VF	All Users	SER-3 ERRORS			Count of serial port 3 receive errors
VG	All Users	DPT-TRK Fails			Count of failed depth track occurrences
VH	All Users	T2T Failures			Count of transmitter failures
VI	All Users	PHA		-99.9 to 99.9	Count of phase roll compensation

4.2.6 Menu A0 Internal diagnostics

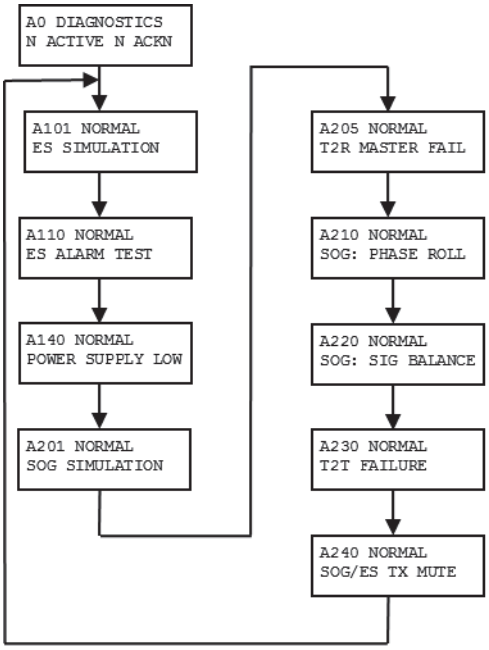
The internal diagnostic code list is intended for service use to inspect internal status. Menu A0 displays number of active and acknowledged codes.

```
A0 DIAGNOSTICS
0 ACTIVE 0 ACKN
```

Press ENTER to go into signal list sub menus. The status in the sub menus can be:

NORMAL:	Normal condition (nothing to report).
ACTIVE:	Active diagnostic condition (not acknowledged).
ACTIVE ACKN:	Active diagnostic condition (acknowledged).

NOTE: Active diagnostic conditions may be transmitted on the main serial output as $PSALW sentences if enabled in menu S3.



4.2.6.1 Menu A101 ES Simulation

This menu shows status of the echo sounder (ES) simulation (active when menus T1–T4 for ES simulation is enabled). If the code is active it can be acknowledged by pressing ENTER.

```
A101 NORMAL
ES SIMULATION
```

4.2.6.2 Menu A110 ES Alarm test

This menu shows status of the echo sounder (ES) test alarm (active when Menu F1 is enabled). If the code is active it can be acknowledged by pressing ENTER.

```
A110 NORMAL
ES ALARM TEST
```

4.2.6.3 Menu A140 Power supply low

This menu shows status of the echo sounder Power supply low test (transmitter power). If the code is active it can be acknowledged by pressing ENTER.

```
A140 NORMAL
POWER SUPPLY LOW
```

4.2.6.4 Menu A201 SOG Simulation

This menu shows status of the SOG simulation code (active when menus T1–T4 for SOG simulation is enabled). If the code is active it can be acknowledged by pressing ENTER.

```
A201 NORMAL
SOG SIMULATION
```

4.2.6.5 Resserved

4.2.6.6 Menu A210 SOG Phase roll

This menu shows status of the SOG phase roll test. If the code is active it can be acknowledged by pressing ENTER.

```
A210 NORMAL
SOG PHASE ROLL
```

4.2.6.7 Menu A220 SOG Sig Balance

This menu shows status of the SOG signal level balance test. If the code is active it can be acknowledged by pressing ENTER.

```
A220 NORMAL
SOG SIG BALANCE
```

4.2.6.8 Menu A230 SOG Transmitting failure

This menu shows status of the Transmission supervision test (active when the test fails). If the code is active it can be acknowledged by pressing ENTER.

```
A230 NORMAL
SOG T2T fail
```

4.2.6.9 Menu A240 SOG / ES TX Mute

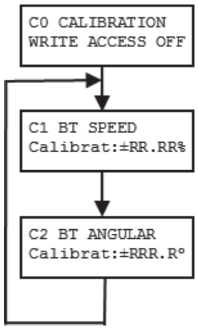
This menu shows status of the SOG / ES TX Mute signal (active when SOG / ES TX Mute is enabled). If the code is active it can be acknowledged by pressing ENTER.

```
A240 NORMAL
SOG/ES TX MUTE
```

4.2.7 Menu C0 Calibration

The calibration menus are used to change calibration parameters for SAL T-series log. Ordinary users may use all menus. Press "+" or "-" to select write access on or off, ENTER to go into calibration sub menus.

```
C0 CALIBRATION
WRITE ACCESS OFF
```



4.2.7.1 Menu C1 BT speed calibration

The bottomtrack transducer speed (magnitude) calibration factor in percent is set with this menu. Press "+" or "-" to change the calibration value to correspond to the result of the mile run. Save value by pressing ENTER.

```
C1 BT Speed
Calibrat:±RR.RR%
```

4.2.7.2 Menu C2 BT angular calibration

The bottomtrack transducer angular calibration in degrees is set with this menu. Press "+" or "-" to change the calibration value to correspond to the result of the mile run. Save value by pressing ENTER.

```
C2 BT Angular
Calibrat:±RRR.R°
```

4.2.8 Menu D0 DEBUG menus

Only authorised service personnel are allowed to use these menus. These menu change internals in the JLN-900 log and this may affect performance. Press "+" or "-" to select write or read-only access, ENTER to go into settings sub menus.

```
D0 DEBUG
ACCESS DENIED
```

4.2.9 Menu F0 Forced testing menus

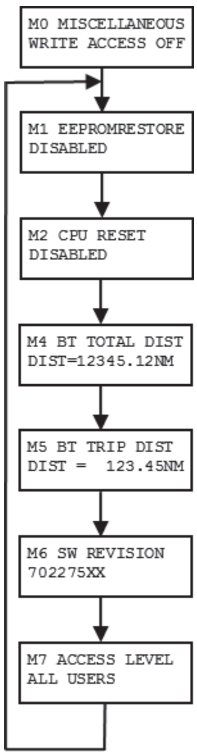
Only instructed service personnel are allowed to use these menus. Some menus forces test mode resulting in no normal speed to be calculated in the JLN-900 log. Press "+" or "-" to select write or read-only access, ENTER to go into settings sub menus.

```
F0 FORCE TESTING
ACCESS DENIED
```

4.2.10 Menu M0 Miscellaneous menus

Only instructed service personnel are intended to use these menus. The menus change internals in the JLN-900 log. Press "+" or "-" to select write or read-only access, ENTER to go into settings sub menus.

```
M0 MISCELLANEOUS
WRITE ACCESS OFF
```



4.2.10.1 Menu M1 Restore EEPROM to default values

This menu restores the settings for all parameters of the EEPROM to default values. WARNING: activating this menu erases all calibration data and user specific settings. Press “+” to enable.

```
M1 EEPROMRestore
Disabled
```

Press ENTER to activate:

```
M1 EEPROMRestore
Enabled
```

Successful restore is presented as:

```
M1 EEPROMRestore
SETTINGSRESTORED
```

and unsuccessful restore is presented as:

```
M1 EEPROMRestore
ERROR IN RESTORE
```

4.2.10.2 Menu M2 CPU RESET

By activating this menu the retriggering of the watchdog circuitry is inhibited, and thus a timeout forces the JLN-900 log to reset.

```
M2 CPU Reset
Disabled
```

Press + to enable.

```
M2 CPU Reset
Enabled
```

Press ENTER to activate. As the menu system is only seen on a remote display, communication is lost.

4.2.10.3 Menu M4 BT Total distance

This menu shows the total (SOG resulting) distance for bottom track log. Press "+" or "-" to change the distance value. Save value by pressing ENTER.

```
M4 BT TOTAL DIST
DIST =RRRRR.RRNM
```

4.2.10.4 Menu M5 BT Trip distance

This menu shows the trip (SOG) distance since last reset for bottom track log. Press ENTER to reset the distance to zero.

```
M4 BT TRIP DIST
DIST =RRRRR.RRNM
```

4.2.10.5 Menu M6 SW Revision

This menu shows the software revision of the application code.

```
M4 SW revision
Rev 702275XX
```

4.2.10.6 Menu M7 Access Level

Change access level for some first level menus. Step to the menu by pressing "Menu". Press "+" or "-" to select access level. Save value by pressing ENTER.

```
M5 Access Level
All Users
```

NOTE: For **“**All Users” some first level menus are locked.

Or

```
M5 Access Level
AuthorisedExpert
```

NOTE: For “Authorised Expert” all menus are visible and possible to enter. The Authorised Expert access level shall only be used by instructed service personnel.

4.2.11 Menu P0 Parameters for technical set-up

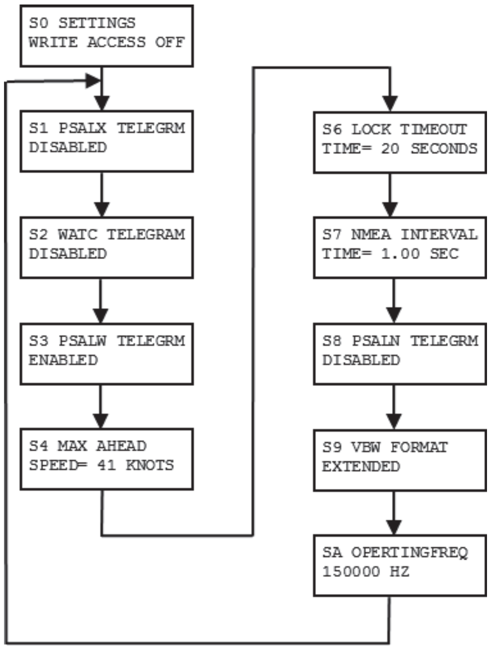
Only instructed service personnel are intended to use these menus. The menus change internals in the SAL T-series log. Press "+" or "-" to select write or read-only access, ENTER to go into settings sub menus.

```
P0 PARAMETERS
ACCESS DENIED
```

4.2.12 Menu S0 Settings for end user

The setting menus are used to change end user parameters for JLN-900 log. Ordinary users may set all menus. Press "+" or "-" to select write or read-only access, ENTER to go into settings sub menus.

```
S0 SETTINGS
WRITE ACCESS OFF
```



4.2.12.1 Reserved

4.2.12.2 Menu S2 WATC telegram

Shall always be set to Disabled.

```
S2 WATC Telegrm
Disabled
```

4.2.12.3 Menu S3 PSALW telegram

The transmission of the proprietary PSALW telegram used for internal diagnostic codes is enabled with this menu. Press "+" or "-" to change value. Save selected value by pressing ENTER.

```
S3 PSALW Telegrm
ENABLED
```

4.2.12.4 Menu S4 Maximum speed magnitude

The maximum speed magnitude is set with this menu. No speed above this limit is presented. Step to the threshold menu by pressing "Menu". Press "+" or "-" to change the value. Save value by pressing ENTER. Speed value cannot be above MAXSPEED.

```
S4 Max Ahead
Speed=NN knots
```

4.2.12.5 Menu S6 Lock timeout

The NMEA sentence transmission timeout for invalid data since last valid measurement is set with this menu. Press "+" or "-" to change the value. Time resolution is 1 second. Save selected value by pressing ENTER.

```
S6 Lock Timeout
Time=NNN seconds
```

4.2.12.6 Menu S7 NMEA interval

The requested NMEA sentence transmission interval is set with this menu. Press "+" or "-" to change the value. Time resolution is 0.01 seconds. Save selected value by pressing ENTER.

```
S7 NMEA interval
Time= R.RR sec
```

4.2.12.7 Menu S8 PSALN telegram

The transmission of the proprietary PSALN telegram used for measurement quality is enabled with this menu. Press "+" or "-" to change value. Save selected value by pressing ENTER.

```
S8 PSALN Telegrm
DISABLED
```

4.2.12.8 Menu S9 VBW format

The IEC 61162-1 /NMEA 0183 VBW sentence version is set with this menu. Press "+" or "-" to change the format to extended (with stern speeds) or short (first edition). Save selected value by pressing ENTER.

```
S9 VBW Format
Extended
```

4.2.12.9 Menu Sa Operating frequency

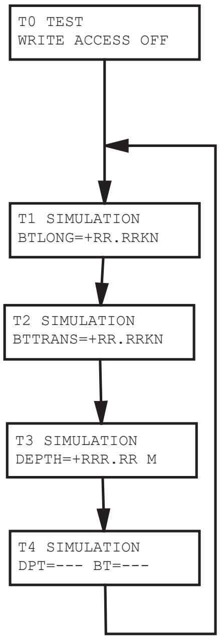
The transmission frequency is set with this menu. Press "+" or "-" to change the value in steps of 500 Hz. Default frequency value 150 kHz should always be used unless contact with manufacturer recommends another value. Available frequency values are between 145000 - 155000 Hz. Save selected value by pressing ENTER.

```
SA OperatingFreq
150000 Hz
```

4.2.13 Menu T0 TEST menus

End user and service personnel are intended to use these menus for test. WARNING: the log stops to operate when any test menu is selected. Press "+"to change to “WRITE ACCESS ON” and then ENTER to go into settings sub menus.

```
T0 TEST
WRITE ACCESS OFF
```



4.2.13.1 Menu T1 BT longitudinal Speed simulation

WARNING: the log stops to operate when in this mode. This menu sets JLN-900 log in speed and depth simulation mode and the output stream contains NMEA sentences with the bottom track longitudinal speed set to the value on the display. NOTE: Simulation starts when the menu is accessed. Press "+" or "-" to adjust the speed momentarily, ENTER to save current simulated speed value.

```
T1 Simulation
BTLong=±RR.RRKN
```

4.2.13.2 Menu T2 BT transversal Speed simulation

WARNING: the log stops to operate when in this mode. This menu sets JLN-900 log in speed and depth simulation mode and the output stream contains NMEA sentences with the bottom track transversal speed set to the value on the display.

```
T2 Simulation
BTTrans=±RR.RRKN
```

4.2.13.3 Menu T3 Depth simulation

WARNING: the log stops to operate when in this mode. This menu sets SAL T-series log in speed and depth simulation mode and the output stream contains NMEA sentences with the depth set to the value on the display. NOTE: Simulation starts when the menu is accessed. Press "+" or "-" to adjust the depth momentarily, ENTER to save current simulated depth value.

```
T3 Simulation
Depth=RRR.RR m
```

4.2.13.4 Menu T4 Simulation with invalid status

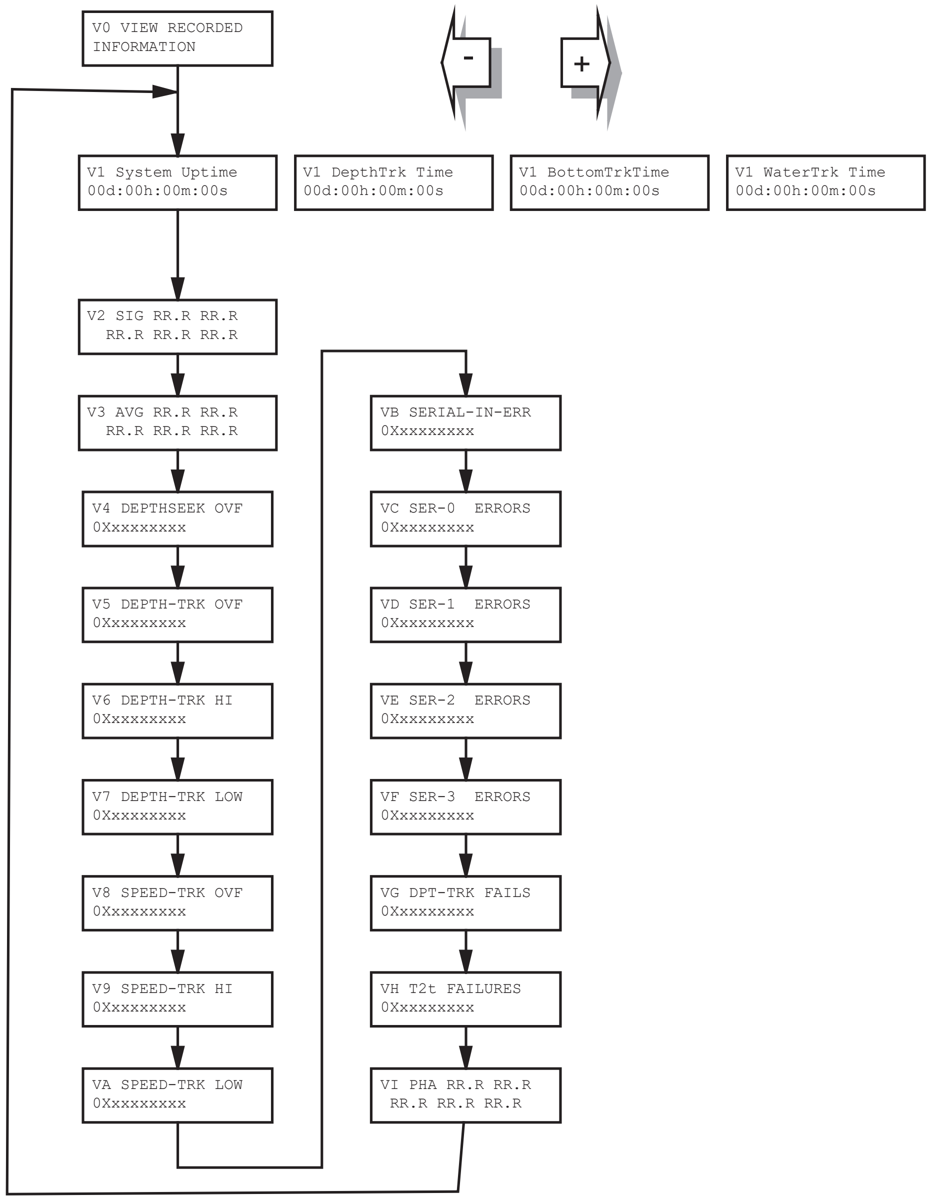
WARNING: the log stops to operate when in this mode. This menu sets JLN-900 log in speed and depth simulation mode and the output stream contains NMEA sentences with the depth and speed set to invalid.

```
T4 Simulation
D=--- BT=---
```

4.2.14 Menu V0 VIEW menus

End user and service personnel are intended to use these menus to gather statistics since last power-on / CPU reset. Press ENTER to go into sub menus. All menus are read only.

```
V0 VIEW RECORDED
INFORMATION
```



4.2.14.1 Menu V1 System up time

System uptime since last power on can be displayed in this menu. First menu shows total uptime (in “days:hours:minutes:seconds” format). From 1000 days the seconds are skipped. By pressing “+” or “-“ the sequence for information is: total uptime, depth track time, bottom track time and water track time.

```
V1 SYSTEM UPTIME
0d:00h:00m:00s
```

```
V1 DEPTHTRK TIME
0d:00h:00m:00s
```

```
V1 BOTTOMTRKTIME
0d:00h:00m:00s
```

```
V1 WATERTRK TIME
0d:00h:00m:00s
```

4.2.14.2 Menu V2 SIG

Sensed signal channel levels in dB to check balance direct from a depth measurement. This menu presents the instant and varying channel balance. Pressing “+” or “-” or Enter, updates the displayed information.

NOTE: Balance should be within 6 dB for a moving vessel within depth range. A vessel at quay will from time to time give a large unbalance. This is normal and due to signal statistics.

```
V2 SIG RR.R RR.R
  RR.R RR.R RR.R
```

4.2.14.3 Menu V3 AVG

Average signal channel levels to check balance from bottom track measurements. This menu presents the average channel balance in dB. Pressing “+” or “-” or Enter, updates the displayed information.
NOTE: The information is only updated when the vessel is moving above 2 knots. This makes it possible to inspect the channel balance for a vessel returning to quay. Balance should be within 6 dB for a moving vessel within depth range.

```
V3 AVG RR.R RR.R
  RR.R RR.R RR.R
```

4.2.14.4 Menu V4 DEPTHSEEK OVF

Count for overflow during depth search. This menu presents the total count for overflow during depth search. NOTE: An increasing value is not an error indication. It indicates that overflow detection is functional.

```
V4 DEPTHSEEK OVF
```

```
0X00000000
```

4.2.14.5 Menu V5 DEPTH-TRK OVF

Count for overflow during depth track. This menu presents the total count for overflow during depth track. NOTE: An increasing value is not an error indication. It indicates that overflow detection is functional.

```
V5 DEPTH-TRK OVF
0X00000000
```

4.2.14.6 Menu V6 DEPTH-TRK HI

Count for high signal levels during depth track. This menu presents the total count for high signal during depth track. NOTE: An increasing value is not an error indication. It indicates that signal threshold detection is functional.

```
V6 DEPTH-TRK HI
0X00000000
```

4.2.14.7 Menu V7 DEPTH-TRK LOW

Count for low signal level during depth track. This menu presents the total count for low signal during depth track. NOTE: An increasing value is not an error indication. It indicates that signal threshold detection is functional.

```
V7 DEPTH-TRK LOW
0X00000000
```

4.2.14.8 Menu V8 SPEED-TRK OVF

Count for overflow during speed track. This menu presents the total count for overflow during speed track. NOTE: An increasing value is not an error indication. It indicates that overflow detection is functional.

```
V8 SPEED-TRK OVF
0X00000000
```

4.2.14.9 Menu V9 SPEED-TRK HI

Count for high signal level during speed track. This menu presents the total count for high signal during speed track. NOTE: An increasing value is not an error indication. It indicates that signal threshold detection is functional.

```
V9 SPEED-TRK HI
0X00000000
```

4.2.14.10 Menu Va SPEED-TRK LOW

Count for low signal level during speed track. This menu presents the total count for low signal during speed track. NOTE: An increasing value is not an error indication. It indicates that signal threshold detection is functional.

```
VA SPEED-TRK LOW
0X00000000
```

4.2.14.11 Menu Vb SERIAL-IN-ERR

Serial lines decoding errors. This menu presents the total count for decoding errors during serial input data parsing. NOTE: An increasing value may indicate poor connections to other systems.

```
VB SERIAL-IN-ERR
0X00000000
```

4.2.14.12 Menu Vc SER-0 ERRORS

Serial port 0 receive errors. This menu presents the total count for port 0.

```
VC SER-0  ERRORS
0X00000000
```

4.2.14.13 Menu Vd SER-1 ERRORS

Serial port 1 receive errors. This menu presents the total count for port 1.

```
VD SER-1  ERRORS
0X00000000
```

4.2.14.14 Menu Ve SER-2 ERRORS

Serial port 2 receive errors. This menu presents the total count for port 2.

```
VE SER-2  ERRORS
0X00000000
```

4.2.14.15 Menu Vf SER-3 ERRORS

Serial port 3 receive errors. This menu presents the total count for port 3.

```
VF SER-3  ERRORS
0X00000000
```

4.2.14.16 Menu Vg DPT-TRK Fails

Count for when depth track is lost. This menu presents the total count for lost depth tracking. NOTE: An increasing value is normal and may indicate a rapidly varying depth profile.

```
VG DPT-TRK FAILS
0X00000000
```

4.2.14.17 Menu Vh T2T FAILURES

Count for transmitter failures. This menu presents the total count reported by the transmitter supervision circuit. NOTE: A nonzero value indicates a potential transmitter problem.

```
VH T2T FAILURES
0X00000000
```

4.2.14.18 Menu Vi PHA

Cumulative phase roll compensation in Hz. NOTE: Values beyond 100 Hz are indicated by “++.+” or “--.-”. Such large values indicate a potential hardware problem in the RECEIVER PCB.

```
VI PHA ±RR.R ±RR.R
 ±RR.R ±RR.R ±RR.R
```

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JLN-900
WATER TRACK
Technical Manual
including
Menu system

Contents

1 Introduction

1.1 Basic Functional Description

WATER TRACK U is an electronic Speed and Distance Measuring Equipment board designed to be used in JLN-900 Speed Log. To create a working log the WATER TRACK U docks to a motherboard within the Sig.Processor where the measuring sensor (transducer), speed indicators and optional repeaters are also connected. The signals from the transducer are processed within the WATER TRACK U and the result can be read from IEC 61162/NMEA telegram syntax and how to connect cables carrying IEC 61162-serial signals are described in **document Section 11**.

The speed-log works technically like two small, synchronized echo sounders built together, comparing echoes from water particles close to the hull. The calculation is based on cross-correlation, a mathematical method to estimate the similarity of two waveforms (described below), which entails that it is very dependable and reliable in all kinds of waters. Logs based on WATER TRACK U has no moving parts and no parts extending below the hull of the ship.

1.2 Definitions and abbreviations

Abbreviation	**Description**
Sig.Processor	Main Unit JLN-900 Speed Log
NMEA0183	IEC 61162-1 serial interface standard
JLN-900 Speed Log	Combined SOG and STW log.
STW	Speed Through the Water. This is equivalent to Water Track (WT) speed (relative)
SOG	Speed Over the Ground. This is equivalent to Bottom Track (BT) speed (true)
TRU	Transducer

2 Technical Specification

2.1 Performance data

Working principle:	Acoustic correlation
Operating frequencies:	Jumping frequencies in the range 3.8 MHz to 4.2 MHz
Measuring distance:	130 mm from the surface of the transducer.
Speed Range:	+/- 50 knots sensed speed
Speed Accuracy:	Better than 1% or 0.1 knots relative to sensed water flow whichever is the greatest
Distance Accuracy:	Better than 1%

2.2 Electrical specification

Input voltage:	8V – 15V DC (internal supply from Sig.Processor)
Power consumption:	< 30 VA nominal
Main Speed output:	IEC 61162-1 / NMEA0183. Serial driver RS 422; max load 100 ohm (10 Main displays)
Alarm relay outputs:	Switching relay, default setting: power failure (30V/2A recommended max load)
Serial input:	used for PC interface / software update

2.3 User interfaces

LED (external status):	LED 1 => Log fail alarm inactive, Led is turned off if log fail alarm activates. LED 2 => Default settings applied, LED is turned off if default settings changed. LED 3 => Signal Quality OK, LED is turned on if measure exceeds a predefined quality threshold. LED 4 => Measuring, LED toggles for each new speed calculation. LED 5 => Application alive, LED toggles each time the watchdog is kicked.
LED (internal status):	LED 6 => ADC OK, LED is turned off if LVDS receiver doesn't lock on incoming data. LED 7 => Data qualified OK, LED is turned off if cycle, transmitter and/or receiver timing don't match (internal SW error). LED 8 => Data write OK, LED is turned off if FIFO is full or an internal error occurred. LED 9 => Data read OK, LED is turned off if FIFO overflows.

LED (notification):	ALERT => LED is on if a diagnostic code is active. The diagnostic code will also be transmitted as an NMEA proprietary telegram ($PSALW). MODE => LED is turned on when measuring in normal mode (PARTICLE).
Service connection 1:	9-pole female D-sub serial data connector (RS 232, for additional PC based user interface and software upgrade)
Service connection 2:	RJ45 Ethernet connector for system supervision.

3 Principle of Operation

3.1 Acoustic transmission/reception

3.1.1 Transmitter

The transducer will send two parallel sine waves into the water. During normal operation the forward crystal (TRU cables 1 and 2) will alter between frequencies 3.800 MHz, 3.875 MHz and 3.950 MHz while the astern crystal (TRU cables 4 and 5) will alter between frequencies 4.050 MHz, 4.125 MHz and 4.200 MHz. See ***Figure 1***.

Transmitting amplitude is approximately 40 Vpp into 120 ohms (R1a) resp. 70 ohms (T-series), giving an electrical output of approx. 1.7 W (R1a) resp. 3 W (T-series).

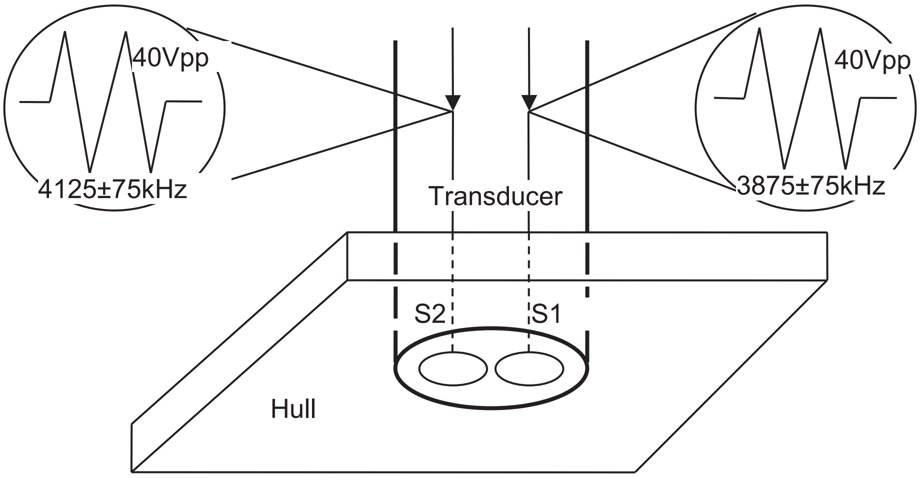


Figure 1 Transmit pulses

The operating frequency, centred on 4 MHz, has been empirically optimised. It is a trade-off between signal decay, lobe function and transducer design.

3.1.2 Receiver

The signals from the transducer move out into the water. A small amount of the signals are reflected by objects in the water and move back to the transducer. The time delay for the signal echo is proportional to the speed of sound in water multiplied with two times the distance to the object. Depending on receiver duration (i.e. how long the receiver is active) a correspondingly sized volume is selected, which may give echo at a given echo delay time. ***Figure 2*** shows the water volume which may give an echo for one specific receiver duration. The WATER TRACK U log takes nine samples within each echo volume and stores for later correlation.

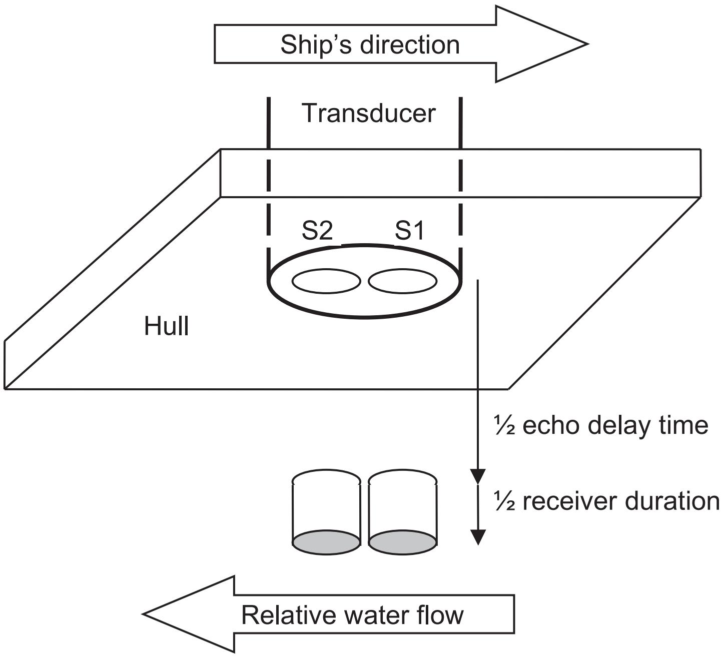


Figure 2 Active echo volumes

The signals received can be regarded as two times nine layers of "snapshots" of the flow of particles under the ship. Using correlation technique it is possible to compare how much the signals differ in time. Knowing the distance between the crystals it is easy to calculate the speed of the particles and hence the speed of the ship through the water.

Depending on ship dimensions and transducer location the measured volume may lie within the boundary layer of the ship and necessitate speed calibration (see ***3.3.1 Boundary layer and calibration***).

3.2 Signal processing

The echo signal measured from the water volume will change in intensity depending on the particles that exist within the measured water volume. This modulation will create a time varying signal pattern. All that is needed to calculate the speed is finding the displacement needed for a pattern to repeat in the other channel.

3.3 Correlation functions

Correlation technique is used to calculate the time delay τ (tau) between signal S1 and S2. The largest value of the correlation function maximises the similarity of the signals.

3.3.1 Boundary layer and calibration

When making speed through the water the ship will push and drag water in the travelling direction. The effect is that water close to the hull moves slower relative to the ship than water further away. The affected layer with lower relative speed is called the boundary layer, see ***Figure 3***.

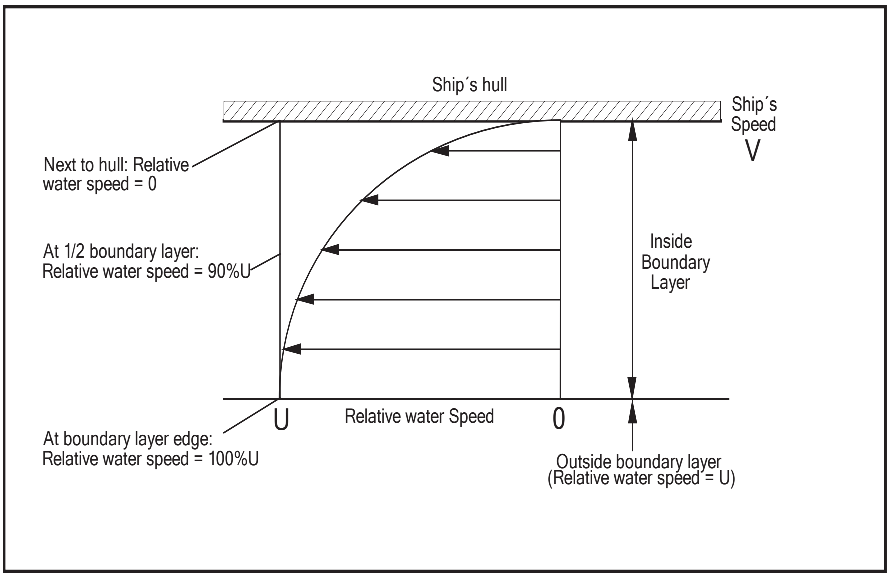


Figure 3 Boundary layer

WATER TRACK U measures speed relatively close to the hull, and may thus measure a lower speed. When the ship is in shallow water, the boundary layer may be different from normal. This physical effect will affect all logs measuring relative speed.

The positioning of the TRU is very important. The water flow below the TRU must not be turbulent or affected by skew water flows. Turbulent flow gives no common signal between the two channels.

Calibration is needed to compensate the measured speed if measured within the boundary layer.

The calibration may be set at one speed, called single point calibration, or more than one speed, called multiple point calibration.

3.3.2 Distance calculation

The speed value is integrated into distance. The distance information is sent in separate NMEA telegrams.

3.3.3 Adverse conditions

It is important to remember that what WATER TRACK U measures is actually the speed when passing a discrete number of reflectors within a small water volume under the hull. In order to interpret the echoed signal it is anticipated that both transducer sensors are moving over the same water volume. If the transducer has been installed at a non-preference location of the hull the water flow might be turbulent at the site of the transducer. Under these conditions there is no guarantee for the log to work. See section on installation of bottom parts for correct transducer installation.

In the low speed range, the distance travelled per time interval is low yielding limited information to the correlation function. Travelling in water with very high particle content might give “foggy” reflections due to too many particles in the same water volume. Both these conditions influences accuracy and may impose lost speed track conditions.

4 Functional Description

4.1 WATER TRACK U user interface

Configuration of log functions may be performed using the built-in menu system in WATER TRACK U. The menu system is accessed using the Speed Log Master Display.

For status indication ten green and one red LED are also available on the WATER TRACK U board. See ***2.3 User interfaces*** for a closer description of what each LED indicates and ***4.3 Menu system*** for details about the menu system.

4.2 Application Software

The STW-log application software has different working modes as described below.

4.2.1 Power on / software update

At power on the speed log runs a boot loader program that tests if the application software is present and not corrupted. If the software is found and correct, the log starts to execute in normal operation. The boot loader may also be used to download updated log software applications when released. During update the boot loader controls erase of the old application as well as storing of the new updated application.

4.2.2 Normal operation

Two different tasks are cyclically performed during normal operation:

- Ten consecutive speed measurements.
- One self-diagnosis cycle.

This sequence is repeated indefinitely and will only be interrupted if a menu command forcing the log into test mode is externally requested from the NWW-82 Speed Log Master Display or elsewhere.

4.2.3 Speed measurement

Speed measurement is the highest prioritised task and will be executed ten times in a row. The measurement can be executed in several different modes depending on previous events and measuring environment.

- Zero mode (4)
- Particle mode (1)
- Dirty mode (10)
- Clear mode (13)
- High speed mode (7)

Zero-mode is used if speed is below 1 knot and High speed mode is used at speeds above 40 knots. Between these two extremes Particle mode is normally used.

Should the echo signal be very strong due to high particle contents in the water, mode is changed to Dirty mode. On the contrary if a very weak signal is returned the mode is changed to Clear mode.

The numbers within parenthesis corresponds to the internal mode number also shown in the mode position in the root menu window, see ***4.4.1 Root Menu***.

4.2.4 Self-Diagnosis

After ten speed measurements, the self-diagnosis is performed. The self-diagnosis checks:

- Transmitter
- Receiver
- Internal signal data paths
- ADC (Analogue to Digital Converter)
- High speed (LVDS) interface integrity
- Transducer
- External noise
- Input signal balance

If a detected failure persists for at least 14 diagnosis cycles, a diagnostic code will be sent as an NMEA telegram with the proprietary sentence PSALW. Also the ALERT LED at the WATER TRACK U board will be turned on.

4.3 Menu system

The WATER TRACK U has an internal menu system that can be accessed via a serial interface connected to a remote display such as the NWW-82 Speed log Master Display.

The information is presented as two lines with 16 characters. All WATER TRACK U settings, calibration, etc., can be changed through the menu system.

The settings are stored in non-volatile memory and will therefore also be active after a reboot or power shut-down.

4.3.1 Accessing the Menu system

Here follows a short guide to access the menu system in WATER TRACK U via an NWW-82 Speed Log Master Display. (For a detailed description of the NWW-82 menu system, see Section 7).

4.3.2 Reaching NWW-82 Menu Mode

The Mode window of the NWW-82 Display can be set to Menu Mode, which is used for internal settings of the display and can be used to connect to a remote unit such as WATER TRACK U.

The Menu Mode is reached by pressing the Mode button for minimum 5 seconds. The Mode Window will show the text "PRESS ENTER FOR MENU". Then press the Enter (4^{th} button from left) within 5 seconds.

The Mode Window will now show the start menu in the NWW-82. The six buttons under the Mode Window have now got alternative functions. The alternative functions are lit in red text below relevant button.

The buttons now have the following functions:

Mode	Esc.	Menu	Enter	-	+

Mode: "1st button from left". Will inform which remote device is connected in remote mode.

Esc: "2nd button from left". The Escape function is used in the "Remote Device menu" to escape from the menu system in a remotely connected unit (E.g. the WATER TRACK U. menu system) and step back to the local menu system in the NWW-82 Display unit.

Menu: "3rd button from left". Is used alone, or together with the Minus (-) button, or together with the Enter button, to move in the menus as described below.
Menu button alone, will display next menu i.e. step forward on same menu level.
Menu button and Minus (-) buttons pressed simultaneously will display previous menu, i.e. step back on the same menu level.
Menu button and Enter buttons pressed simultaneously will move up one menu level, except when leaving the "Remote Device menu". (See Esc-button)

Enter: "4th button from left" is used to store changed values or to move to sub-menus.

- +: "Minus button" and "Plus button" are used to change values or status (E.g. write access OFF/ON) and /or to change device values.

Note: The Menu System will exit automatically if no button has been pressed for 5 minutes when being in the local NWW-82 Display Menu System, when connected to a remote device there is no timeout and the Esc button must be used to exit from a remotely connected device.

To connect to the menu system in the WATER TRACK U:

When in NWW-82 Display LOCAL (the start menu) step to R0 REMOTE DEV menu by pressing the Menu button three times.

When pressing Enter in the R0 menu the NWW-82 Display will establish communication with all connected equipment and display them in a list of menu choices.

Press the Menu button until WATER TRACK U is displayed and press Enter to start communicating with the WATER TRACK U.

Esc is used to step back.

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     (R1A)
```

Or press Enter to enter menu system of displayed device

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

The root menu in WATER TRACK U will now be displayed in the NWW-82 Display Mode window.
To go deeper into WATER TRACK U menu system, press Menu.
To exit back to local mode in the NWW-82 Display, press Esc. The Esc button will always step out of the remotely controlled menu system.

Press [Esc] to go back to the list of accessible remote devices

```
R2 DEVICE 2 OF 2
LPU 1     (LP1)
```

Press Esc to go back into NWW-82 Display local menu system

```
R0 REMOTE DEV
CONNECT
```

4.4 WATER TRACK U menus

The function of each menu in the WATER TRACK U is defined below.

4.4.1 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  C nn.nn
Cnnn Mnn Qnnn Sn
```

or

```
R nn.nn  C nn.nn
Cnnn Jnn Qnnn Sn
```

or

```
R nn.nn  C nn.nn
Cnnn Mnn Dnnn Sn
```

or

```
R nn.nn  C nn.nn
Cnnn Jnn Dnnn Sn
```

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.

4.4.2 Menu Access level

The menu system contains two levels, "All User" and "Authorized Expert". Only "All User" menus are visible in normal operation mode.

"Authorized Expert" menus are only for development purpose. Only instructed personnel are intended to use these menus.

"Authorized Expert" menus are not described in this document but shown for indexing in the *Menu function summary table* in the end of this document.

4.4.3 Menu A, diagnostics

The A-menus are used to view WATER TRACK U uptime and diagnostic code history. To be able to make changes to sub-menus write access must be activated (changed to ON) before menu is entered.

```
A0 DIAGNOSTICS
WRITE ACCESS OFF
```

```
A1 TOTAL UPTIME
12D:13H:14M
```

Menu A1 shows WATER TRACK U total uptime in days, hours and minutes.

```
A2 DIAG HISTORY
- OR + TO SCROLL
```

Menu A2 shows the 10 latest diagnostic codes within WATER TRACK U. Press Enter to see first entrance in the list.

01D:23H:45M 354
STW SIG. BALANCE

When entering menu A2.1 the first entrance in the list is shown. This example code 354 occurred 01 days, 23 hours and 45 minutes after system start (viewable in menu A1) and indicates a problem with the signal balance. Use – or + keys to scroll the list.

A2.1 DIAG 2/10

As soon as + (or –) is pressed the next (or previous) list position is shown for one second.

01D:23H:45M 354
STW SIG. BALANCE

The corresponding entrance in the list is then automatically shown.

A3 ERASE HISTORY
DISABLED

Menu A3 erases the history. Use + to enable the menu and then Enter to erase history.

4.4.4 Menu C, Calibration

The calibration menus are used to change calibration parameters for WATER TRACK U. To be able to make changes to sub-menus write access must be activated (changed to ON) before menu is entered.

C0 CALIBRATION
WRITE ACCESS OFF

C1 DRAUGHT COND.
FULL LOAD 0.00%

Three draught conditions are predefined: FULL LOAD, BALLAST1 and BALLAST2. Menu C1 selects which one of the draught conditions to use. The draught condition adjusts the output speed with the given calibration factor. Scroll between load conditions with – or + keys. Select a condition with Enter which will bring you to the next sub menu level.

C1.1 DRAUGHT COND.
FULL LOAD 0.00%

Menu C1.1 sets calibration factor for the selected draught condition. Use – or + key to adjust calibration factor and then Enter to save.

C3 MULTI-P CAL.
ENABLED

Menu C3 is used to store multi point calibration coefficients. Menu must be enabled (change with + if disabled) to set or delete calibration points. Press Enter to go down to enter the first calibration point.

C3.1 MULTI-P 1
UNUSED POINT

Menu C3.1 shows status for the first calibration point. If not previously used row 2 will state “UNUSED POINT”. Use + key to enable the calibration point.

C3.1 MULTI-P 1
ENABLE POINT

When point is enabled or previously used, press Enter to step down to next sub-menu level.

C3.11 MULTI-P 1
EXPECTED 0.0KN

Use – and + to set which speed to be calibrated for (expected) at that point (i.e. the speed used at the calibration run). Then press Enter to go to the next level.

C3.111 CAL-VALUE
10.0KN   23.45%

Use – and + to set calibration value and Enter to save.

C3.2 MULTI-P 2
15.00KN   34.56%

Use – key to delete an existing calibration point.

```
C3.2 MULTI-P 2
DELETE POINT
```

Confirm with Enter to execute.

```
C4 TRU CALIBRAT.
MARKING: TC+123
```

The transducer (TRU) calibration is set with menu C4. Use – or + keys to adjust the TC value to correspond to the engraved marking on the transducer housing or cable #1 and then press Enter to save. Example TC+123 means calibration factor +1.23%, TC–101 means calibration factor –1.01%.

4.4.5 Menu M, Miscellaneous

This menu contains miscellaneous settings and information about the system. To be able to make changes to sub menus write access must be activated (changed to ON) before menu is entered.

```
M0 MISCELLANEOUS
WRITE ACCESS OFF
```

```
M2 RESET CPU
DISABLED
```

Menu M2 restarts the system. Menu system will be closed and must be re-entered.
Use + to enable the menu and then Enter to restart.

```
M4 TOT. DISTANCE
DIST=12345.30 NM
```

Menu M4 can be used to adjust the total distance counter.
Use – and + to change the value and then Enter to save.
NOTE: the distance counter values are sent as $VDVLW messages on the serial output.

```
M5 TRIP DISTANCE
DIST=45.30 NM
```

The trip distance counter is reset with this menu.
Reset value by pressing Enter.
NOTE: the distance counter values are sent as $VDVLW message on the serial output.

```
M6 SW REVISION
5400130 A01
```

Menu M6 shows the revision of the presently running software image.

M10 ACCESS LEVEL
ALL USERS

Menu M10 sets the menu system access level.
Use + to change to "Authorised expert" and then Enter to set user level.

4.4.6 Menu S, Settings

The setting menus are used to change end user parameters for WATER TRACK U. To be able to make changes to sub menus write access must be activated (changed to ON) before menu is entered

S0 SETTINGS
WRITE ACCESS OFF

S1 AVERAGE LOW
TIME= 10 SECONDS

Time constant to control output filter when in low speed, i.e. speed is below threshold set in menu S2.
Use – or + to change time constant and then Enter to save.

S2 THRES LOW-HI
THRESHOLD= 3.0 KN

Menu S2 sets the threshold when filter time constant shall be controlled by menu S1 or S3.
Use – or + to change threshold and then Enter to save.

S3 AVERAGE HIGH
TIME= 10 SECONDS

Time constant to control output filter when in high speed, i.e. speed is above threshold set in menu S2.
Use – or – to change time constant and then Enter to save.

S6 LOCK TIMEOUT
TIME= 20 SECONDS

Menu S6 controls maximum lock time, i.e. how long the latest speed value is kept if new measured speed is invalid.
Use –+ or +– to change lock timeout and then Enter to save.

S9 VBW FORMAT
EXTENDED

Menu S9 controls the $VDVBW telegram format.
EXTENDED (default, newer standard) or
SHORT (the older standard)
Use – or + to select desired alternative and then Enter to save.

S10 VHW TELEGRAM
DISABLED

Menu S10 enables $VDVHW telegrams.
Use – or + to enable/disable and then Enter to save.

S12 ANALOG SPEED
AHEAD + ASTERN

Menu S12 controls analogue speed readout. Analogue speed reading may be output in both directions or just ahead.
AHEAD + ASTERN (default) or
AHEAD ONLY
Use – or + to select desired alternative and then Enter to save.

4.4.7 Menu T, Test menus

The test menus are used to force one specific or all built-in self-diagnosis and explicitly show the result in the NWW-82 Display Mode window. To be able to make changes to sub menus write access must be activated (changed to ON) before menu is entered.

Note!! Test menus T2 to T5 will force the internal self-diagnosis to be executed much more often (every second speed measurement) than during normal operation.
This might degrade the accuracy of the calculated speed while the test is active.

T0 TEST
WRITE ACCESS OFF

T1 SIMULATION
DISABLED

Menu T1 outputs a simulated speed instead of the real speed measured by the log.
Use + to change menu to ENABLED and then Enter to start speed simulation and go to next sub-level where the simulated speed value may be changed.

Note!! The real measured speed to all systems and displays on the ship will be replaced by the simulated speed.

T1.1 SIMULATION
SIM.SPD=8.00KN

In menu T1.1 the simulated speed may be changed.
Use – or + to change the speed and then Enter to save.

```
T2 NOISE TEST
DISABLED
```

Menu T2 forces the built-in self-diagnosis noise test to be executed and the result is displayed in the NWW-82 Display Mode window.
Use + to change menu to ENABLED and then Enter to start the test and go to next sub-level where the test result will be displayed.

```
T2.1 NOISE LEVEL
        654 :: 732
```

Menu T2.1 shows the measured noise level in channel 1 to the left and in channel 2 to the right.
Noise levels from an undisturbed log system shall show values below 700 over time. Low values are better than high.

```
T3 TRU S BALANCE
DISABLED
```

Menu T3 forces the built-in self-diagnosis TRU signal balance test to be executed and the result is displayed in the NWW-82 Display Mode window.
Use + to change menu to ENABLED and then Enter to start the test and go to next sub-level where the test result will be displayed.

```
T3.1 SIG BALANCE
Q MAX=  78% OK
```

Menu T3.1 shows the measured signal balance as a quote between the channels. Signal balances in the interval 50% - 200% are accepted as OK100% is the theoretically perfect value.
Note!! If the ship doesn’t move the signal balance test might indicate fail even if there is no problem with the signal balance. Under such circumstances use the test with caution.

```
T4 LOOP TEST
DISABLED
```

Menu T4 forces the built-in self-diagnosis loop test to be executed and the result is displayed in the NWW-82 Display Mode window.
Use + to change menu to ENABLED and then Enter to start the test and go to next sub-level where the test result will be displayed.

```
T4.1 LOOP TEST
        0 : 82 : 0
```

The loop test generates transmit signals that are looped back to the receiver and then correlated. Menu T4.1 shows the correlation function at three different delays (lags).
The test is passed if the first and last value < 2 and the

middle value lie in the interval 40 – 120. The middle value shall be stable during the test. The value depends on transducer load.

```
T5 RUN SELFTESTS
DISABLED
```

Menu T5 forces all built-in self-diagnostic tests to be executed. The A2 DIAG HISTORY list is cleared at start of test. If any self-test fails a diagnostic code will be activated.
Use + to change menu to ENABLED and then Enter to start the test and go to next sub-level where the test result will be displayed.

```
T5.1 NO CODES
        IN LIST
```

Menu T5.1 will continuously show the latest generated diagnostic code. The list will be cleared upon entering this menu. Any new code activated as a result of the forced test (it can take several seconds) will be shown in the order of appearance.

```
T6 LOGFAIL ALARM
DISABLED
```

Menu T6 forces the log fail alarm relay to be set from this menu instead of internal status.
Use + to change menu to ENABLED and then Enter to start the test and go to next sub-level where the relay can be toggled.

```
T6.1 LFA RELAY
NO ALARM POS.
```

Menu T6.1 displays the present LFA relay position.
NO ALARM POS. (if relay is not in alarm position) or
ALARM POSITION (if relay is in alarm position)
Use – or + to select desired relay position and then Enter to physically set the relay.

4.4.8 Menu V, View menus

End user and service personnel are intended to use these menus to gather statistics.

Press Enter to go into sub-menus. All menus are read only. To interpret the values please refer to corresponding T menus.

```
V0 VIEW RECORDED
WRITE ACCESS OFF
```

```
V1 SYSTEM UPTIME
01D:23H:45M
```

Menu V1 shows system uptime since last power on.

```
V2 NOISE LEVELS
        654 :: 732
```

Menu V2 shows average noise level since last measuring sequence (~10 sec).

```
V3 TRU S BALANCE
Q MAX=  93% OK
```

Menu V3 shows the most unbalanced TRU signal value during last measuring sequence (~10 sec).

```
V4 LOOP TEST
        0 : 59: 0
```

Menu V4 shows loop test values during the last measuring sequence (~10 sec).

4.5 Menu function summary

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 *4.4.1 Root Menu***
A0	**All Users**	**DIAGNOSTICS**		**Select menu to view log statistics since system start up**
A1	All Users	TOTAL UPTIME		Show the WATER TRACK U. system total uptime
A2	All Users	DIAG HISTORY		Press enter to access the history
A2.1	All Users			– 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	All Users			Set calibration factor for selected draught condition
C3	All Users	MULTI-P CAL.	ENABLED	Select Multiple Point Calibration edit/delete
C3.1	All Users		ENABLED	Select first Multiple Point pair to edit/delete
C3.11	All Users			Set speed at first point
C3.111	All Users			Set calibration value for first speed
C3.n	All Users		ENABLED	Select n^{th} Multiple Point pair to edit/delete
C3.n1	All Users			Set speed at n^{th} point
C3.n11	All Users			Set calibration value for n^{th} 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	DISABLED	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		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
M10	All Users	Access level		All Users: Only menus with access level "All Users" are visible Authorised Expert: All menus are visible

No.	Access Level	Name	Default	Function
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-spd thresh.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

No.	Access Level	Name	Default	Function
S0	**All Users**	**`SETTINGS`**		**Select Settings menus**
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`	`Power-Fail`	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

JLN-900
IEC 61162/NMEA 0183
User Guide

Table of Contents

1 Introduction

1.1 General

The purpose of this document is to define the most common serial messages that are used by JRC speed logs, voyage data recorders and interface units as well as specify the hardware used for serial communication.

The document is intended to be used as a sub-document to operator manuals.

1.2 References

- IEC 61162-1 / NMEA 0183 standard.
- IEC 61162-2 / NMEA 0183 (HS) standard.

1.3 Background

The National Marine Electronics Association (NMEA) has developed a specification that defines the interface between marine electronic equipments called NMEA 0183. This standard is closely aligned with the standard IEC 61162-1 from International Electrotechnical Commission (IEC) which is specified by International Maritime Organization (IMO) to meet the International convention for the Safety of Life at Sea (SOLAS) regulations.

In this document, we refer to this standard as IEC 61162-1/NMEA or IEC 61162-2/NMEA for the high speed version of the same standard.

The idea of IEC 61162/NMEA is to send a line of data called a sentence that is self-contained and independent from other sentences. There are standard sentences for each device category and a capability exist to define own / proprietary sentences for use by manufacturers.

2 Hardware

The IEC 61162-1/NMEA and IEC 61162-2/NMEA standard specifies serial data links with one talker and multiple listeners, using for each talker a separate signal pair with all listeners opto-isolated.

Both standards, IEC 61162-1 and IEC 61162-2, use the same serial data message definition but the hardware has some differences on the receiving side. IEC 61162-2 uses a more complex receiver stage as it is designed for a higher speed, 38400 b/s (bit per second) compared to 4800 b/s used in IEC 61162-1.

The serial data drivers are designed with driver circuits complying with IEC 61162-1 and IEC 61162-2 standard using differential outputs swinging in the range 0 to +5 Volts. The polarities of the signals are defined by "A" and "B". In the idling state the "A" terminal carries 0 Volt and the "B" terminal +5 Volts. Maximum load on each driver circuits is 100 ohm which is equal to ten IEC 61162-1/NMEA inputs in parallel.

The IEC 61162-1/NMEA inputs use opto-couplers to assure isolation between the talker and the listener according to the IEC standard.

The IEC 61162-2/NMEA inputs uses opto-isolated RS485 receivers with a DC power supply which is isolated from case ground as well as from the DC power in the receiving unit.

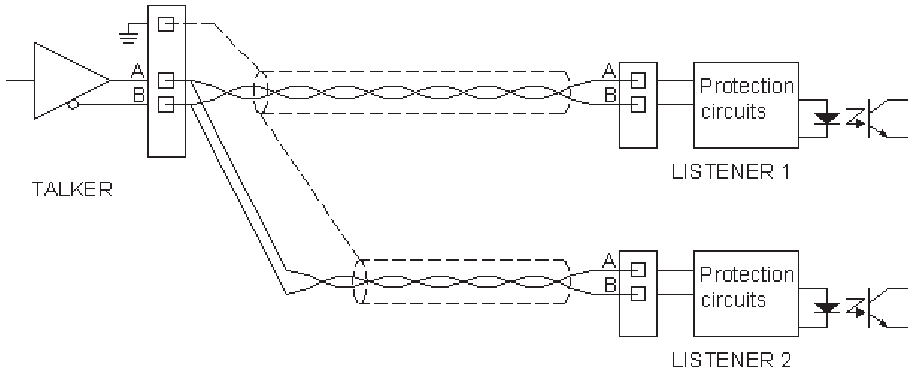
We do not recommend any other technical solution, than those mentioned above, for connecting equipment to NMEA networks were our products are connected as talkers or listeners. Some early proposals for the IEC 1162-1 permitted also the use of RS422 receivers, having a DC path between case ground and the receiver circuit. We strongly discourage such use and recommend the use of a separate, opto-isolated buffer unit if it is necessary to feed such devices.

The interface speed for IEC 61162-1/NMEA is 4800 b/s with 8 bits of data, no parity, and one stop bit. At 4800 b/s you can only send 480 characters in one second. Since an NMEA sentence can be as long as 82 characters you can be limited to less than 6 different sentences per second. The actual limit is determined by the specific sentences used, but this shows that it is easy to overrun the capacity of the interface.

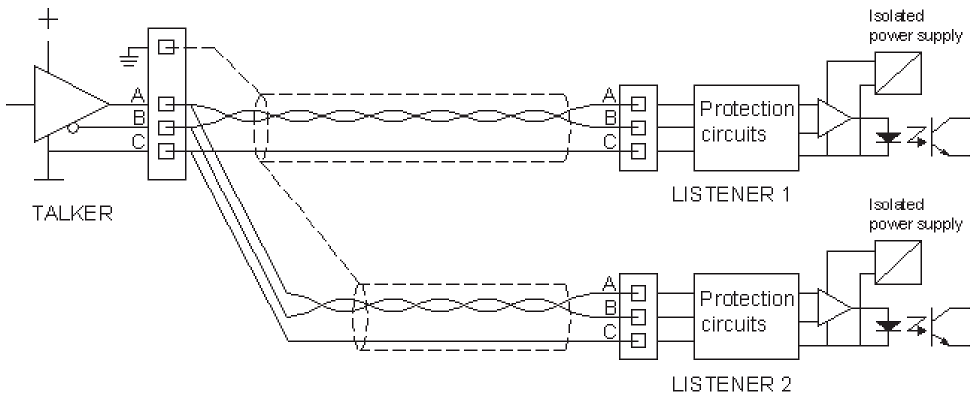
2.1 Connection of cables for serial communication

All cables used for serial communication shall be twisted pair and properly shielded. Maximum recommended cable length is 1000 meter with a minimum cross-section area of 0.5 mm^2.

IEC 61162-1/NMEA uses two wires in one pair connected as signal "A" and "B" between talker and listener.



IEC 61162-2/NMEA uses three wires, two wires in one pair connected as signal "A" and "B" and a third wire from a separate pair connected as "C" (ground connection between the transmitting unit and the isolated input stage).



3 Serial Data message definitions

Two classes of messages are described in this document: industry-standard IEC 61162/NMEA messages and special proprietary JRC messages.

Each sentence begins with a '$' (or '!') and ends with a carriage return/line feed sequence and can be no longer than 80 characters of valid characters (plus the line terminators <CR><LF>). The data is contained within this single line with data items separated by commas. The data itself is just ASCII text and is normally fully contained in one variable length sentence. The data may vary in the amount of precision contained in the message. Programs that read the data should only use the commas to determine the field boundaries and not depend on column positions. There is a provision for a checksum at the end of each sentence. The checksum is mandatory and calculated as the eight-bit EXCLUSIVE OR of the ASCII representation for all characters between the **$** and ***** in the message. Typical messages including checksum are shown below.

```
$VDDPT,24.5,,400*57
$VDVBW,7.53,,A,7.83,0.51,A,,V,0.26,A*4B
$TIROT,16.88,A*3C
```

Note that some early implementations erroneously included the '**$**' character in the checksum calculation!

The checksum is omitted in all examples that follow in this document.

The used definitions follow the IEC 61162/NMEA standard with the addition of a variable length integer field to simplify understanding for readers. Note that fields may be empty, i.e. without any character at all and immediately followed by the comma separator.

Field Type	Symbol	Definition
Status	A	Single character field: A=data valid, V=data invalid.
Variable length floating	x.x	Normal definition of a floating format variable. The integer version separated into a new definition.
Variable length integer	i.	JRC extension with variable length field. Normal definition of a short integer format variable.
Fixed hex	hh-	Hex field with same number of hexadecimal characters as specified. MSB (Most Significant Bit) to the left.
Variable text	c—c	Valid character field of variable length.
Fixed alpha	aa-	Upper & lower case alpha characters [0..9, Aa, Bb, Cc, Dd, Ee, Ff].
Fixed number	xx-	Fixed length integer value.
Fixed text	cc-	Fixed length valid characters.

3.1 Standard IEC 61162-1 / NMEA 0183

The implementation of the sentences were according to the IEC 61162-1 (NMEA 0183) standard valid at the time of approval. All outputs will, whenever possible, refer only to messages defined in these documents. Later editions of sentences may have additional fields.

The first two characters after the $ sign define the talker identifier. Our products use the following identifiers:

IN Integrated Navigation
SD Sounder, depth
TI Turn rate indicator
VD Velocity sensors: Doppler, other/general
VR Voyage data recorder

(See IEC 61162-1 standard for a complete list of talker identifiers.)

3.1.1 Alarm Acknowledge (--ACK)

This sentence is used to acknowledge an alarm condition reported by a device.

```
 1      2   3
$--ACK,xxx*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Alarm acknowledge	VD = Log, VR = VDR, SD = Depth Sounder
2	Xxx	Local alarm number	
3	Hh	Check sum	

3.1.2 Alert command (--ACN)

Used for acknowledge, silence, responsibility transfer and to request repeat of alert.

```
 1      2         3    4    5    6 7 8
$--ACN,hhmmss.ss,AAA,x.x,x.x,A,A*hh <CR><LF>
```

Field #	Field Type	Definition	Note
1	--	Talker id	
2	hhmmss.ss	Time of alarm condition	UTC
3	AAA	Manufacturer mnemonic code	SAL
4	x.x	Alert identifier	Log: 20000 + PSALW no. VDR: 10000 + Alarm no.
5	x.x	Alert instance	**1** to 999999
6	A	Alert command	A: acknowledge Q: request / repeat information O: responsibility transfer S: silence
7	A	Sentence status flag	C: command
8	Hh	Check sum	

3.1.3 Cyclic alert list (ALC)

```
 1      2  3  4  5   6   7   8   9     10  11  12  13  14
$--ALC,xx,xx,xx,x.x,AAA,x.x,x.x,x.x,…,AAA,x.x,x.x,x.x*hh <CR><LF>
```

Field #	Field Type	Definition	Note
1	--	Talker id	**VD** = Log, VR = VDR, SD=Depth Sounder
2	Xx	Total no. of sentences used for message	01to 99
3	Xx	Sentence number	01 to 99
4	Xx	Sequential message identifier	00 to 99
5	x.x	Number of alert entries	Number of alert entries transported within this sentence
6	AAA	Manufacturer mnemonic code	SAL
7	x.x	Alert identifier	Log: 20000 + PSALW no. VDR: 10000 + Alarm no.
8	x.x	Alert instance	**1** to 999999
9	x.x	Revision counter	1 to 99
10	AAA	Manufacturer Identifier n	Alert entry 0 to n
11	x.x	Alert identifier n	Alert entry 0 to n
12	x.x	Alert instance n	Alert entry 0 to n
13	x.x	Revision counter n	Alert entry 0 to n
14	Hh	Check sum	

3.1.4 Alert sentence (--ALF)

This sentence is used to report an alert condition and the alert state of a device.

```
 1     2 3 4 5         6 7 8 9   10  11  12  13 14 15
$--ALF,x,x,x,hhmmss.ss,A,A,A,AAA,x.x,x.x,x.x,x,c-c*hh <CR><LF>
```

Field #	**Field Type**	**Definition**	**Note**
1	`--`	Talker id	**VD** = Log, VR = VDR, SD = Depth Sounder
2	`X`	No. of ALF sentences in message	**1** to 2
3	`X`	Sentence number	**1** to 2
4	`X`	Sequential message identifier	0 to 9
5	`hhmmss.ss`	Time of alarm condition	UTC
6	`A`	Alert category	A: ES B: SDME C:
7	`A`	Alert priority	**A**: Alarm W: Warning C: Caution
8	`A`	Alert state	**V**: active - unacknowledged S: active - silenced **A**: active – acknowledged O: active – responsibility transferred U: rectified - unacknowledged **N**: normal
9	`AAA`	Manufacturer mnemonic code	SAL
10	`x.x`	Alert identifier	Log: 20000 + PSALW no. VDR: 10000 + Alarm no.
11	`x.x`	Alert instance	**1** to 999999
12	`x.x`	Revision counter	1 to 99
13	`X`	Escalation counter	0 to 9
14	`c—c`	Alarm's description text	
15	`Hh`	Check sum	

3.1.5 Alarm (--ALR)

This sentence is used to report an alarm condition on a device and its current state of acknowledgement.

```
 1      2          3    4 5 6     7
$--ALR,hhmmss.ss,xxx,A,A,c--c*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Alarm	VD = Log, VR = VDR, SD = Depth Sounder
2	hhmmss.ss	Time of alarm condition	UTC (Coordinated Universal Time)
3	xxx	Local alarm number	100 .. 199 ESD, 200 .. 299 SOG-unit, 300 .. 399 STW-unit, 400 .. 499 Sig.Distributor
4	A	Alarm condition	A = alarm, V = no alarm
5	A	Acknowledge condition	A = Acknowledged, V = not
6	c—c	Alarm's description text	
7	hh	Check sum	

3.1.6 Alert command refused (--ARC)

```
 1      2          3    4    5    6 7
$--ARC,hhmmss.ss,AAA,x.x,x.x,A*hh <CR><LF>
```

Field #	Field Type	Definition	Note
1	--	Talker id	**VD** = Log, VR = VDR, SD=Depth Sounder
2	hhmmss.ss	Time of alarm condition	UTC
3	AAA	Manufacturer mnemonic code	SAL
4	x.x	Alert identifier	Log: 20000 + PSALW no. VDR: 10000 + Alarm no.
5	x.x	Alert instance	**1** to 999999
6	A	Refused alert command	A: acknowledge Q: request / repeat information O: responsibility transfer S: silence
7	Hh	Check sum	

3.1.7 Depth (--DPT)

```
 1      2    3    4    5
$--DPT,x.x,x.x,x.x*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Depth	VD = Log, SD = Depth sounder
2	x.x	Depth below transducer [m]	Null field indicates out of range
3	x.x	Depth between transducer and keel or water line[m]	This figure is unknown to the log system, so a null field is transmitted here.
4	x.x	Maximum range scale in use	(Fix set to 400 m)
5	hh	Checksum	

Example: Data from JLN-900 speed log (depth measured to 30.0 m):

```
$VDDPT,30.0,,400*
$SDDPT,30.0,,400*
```

3.1.8 Heartbeat supervision sentence (--HBT)

```
1      2    3 4 5
$--HBT,x.x,A,x*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	--	Talker id	**VD** = Log, VR = VDR, SD=Depth Sounder
2	x.x	Configured repeat interval	In seconds
3	A	Equipment status	A: Normal operation V: Not normal operation
4	X	Sequential sentence identifier	0 to 9
5	Hh	Check sum	

3.1.9 Rate of turn (--ROT)

```
 1      2    3 4
$--ROT,x.x,A*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Rate of turn	TIROT, HEROT, INROT
2	x.x	Rate of turn [degrees / minute]	"-" is bow turns to port
3	A	Status	A = data valid, V = data invalid
4	hh	Checksum	

Example: Data from rate of turn gyro (30 degrees / minute clockwise):

```
$TIROT,30.0,*
```

3.1.10 Text Transmission (--TXT)

```
 1     2  3  4  5   6
$--TXT,xx,xx,xx,c—c*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Text transmission	VD = Log, VR = VDR
2	xx	Total number of sentences	
3	xx	Sentence number	
4	xx	Text identifier	
5	c-c	Text message	
6	hh	Check sum	

Example: Text message from SD2-16.

VRTXT,01,01,01,START BACKUP*

3.1.11 Dual Doppler Velocities (--VBW)

Water-referenced and ground-referenced speed data.
Note that this sentence has been extended. The speed logs may transmit the shorter version of the sentence with only the first seven fields plus the checksum field.

```
 1      2   3   4 5   6   7 8   9 A   B C
$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Water-referenced and ground-referenced speed data	VDVBW
2	x.x	Longitudinal water speed	knots
3	x.x	Transversal water speed	knots
4	A	Status water speed	A = data valid, V = data invalid
5	x.x	Longitudinal ground speed	knots
6	x.x	Transversal ground speed	knots
7	A	Status ground speed	A = data valid, V = data invalid
8	x.x	Stern Transversal water speed	knots
9	A	Status stern transversal water speed	A = data valid, V = data invalid
A	x.x	Stern Transversal ground speed	knots
B	A	Status stern transversal ground speed	A = data valid, V = data invalid
C	hh	Check sum	

Unavailable data are transmitted as null fields.
Example: speed through water 10.05 knots, longitudinal speed over ground 11.02 knots, transversal speed over ground -0,05 knots.

$VDVBW,10.05,,A,11.02,-0.05,A,,V,,V*

3.1.12 Water speed and heading (--VHW)

```
1       2   3 4   5 6   7 8   9 A
$--VHW,x.x,T,x.x,M,x.x,N,x.x,K*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Water-referenced and ground-referenced speed data	VDVHW
2	x.x	Heading	
3	T	Degrees true	
4	x.x	Heading	
5	M	Degrees magnetic	
6	x.x	Speed	
7	N	Knots	
8	x.x	Speed	
9	K	Km/h	
A	hh	Check sum	

3.1.13 Distance travelled through the water and over the ground (--VLW)

Note that this sentence was extended. Older systems might still transmit the shorter version of the sentence with only the first five fields plus the checksum field.

```
 1      2    3 4    5 6    7 8    9   A
$--VLW,x.x,T,x.x,T,x.x,T,x.x,T *hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Distance through water	VDVLW
2	x.x	Total water distance [nautical miles]	minimum range 9999.9
3	T	Type	N = Nautical mile
4	x.x	Trip water distance [nautical miles]	
5	T	Type	N = Nautical mile
6	x.x	Total ground distance [nautical miles]	minimum range 9999.9
7	T	Type	N = Nautical mile
8	x.x	Trip ground distance [nautical miles]	
9	T	Type	N = Nautical mile
A	hh	Checksum	

3.2 JLN-900 Proprietary Messages

JLN-900 has been allocated the proprietary mnemonic "SAL" by NMEA. This means that any message starting with "$PSAL..." emanates from JRC equipment and that any letters following can be chosen by us. However, to comply with standard NMEA messages, all these messages uses a five-character combination **`$PSAL-`** before the first delimiter.

These proprietary messages are mainly used for internal programming, trouble-shooting, etc and are only used in normal operation where no good alternatives are available.
These messages may be changed without notice.

3.2.1 Log control messages (PSALC)

<u>3.2.1.1 Log control message 2: Bottom track transmit control</u>

```
 1     2 3 4
$PSALC,2,i*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL Control	PSALC
2	i.	Control message type	2: SAL T2 BT control
3	i.	Bottom track transmission	0: Set transmit mode off 1: Set transmit mode on
4	hh	Check sum	

Example: Force acoustic transmitter off:
`$PSALC,2,0*`

<u>3.2.1.2 Unit control message 3 (transmit status)</u>

This message is intended for switching NMEA message transmission on or off. The primary use is to switch off units when information is not needed by sending transmit status "Silent", and to reactivate by sending "Active".

```
 1     2 3 4
$PSALC,3,c*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Serial control message	PSALC
2	i.	Control message type	3: Transmit status
3	c	Transmission status	'A'=Active, 'S'=Silent
4	hh	Checksum	

Example: Turn off NMEA transmission:
`$PSALC,3,S*`

3.2.1.3 Log control message 4: Active speed units

```
 1     2 3   4   5
$PSALC,4,ccc,ccc*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL Control	PSALC
2	i.	Control message type	4: Active speed control
3	ccc	Activate WT speed unit	VD1: Log 1 VD2: Log 2 VD9: Simulated Log
4	ccc	Activate BT speed unit	VD1: Log 1 VD2: Log 2 GP1: GPS VD9: Simulated Log
5	hh	Check sum	

Example: Activate WT speed from Log1 and BT speed from Log 2:
$PSALC,4,VD1,VD2*

3.2.1.4 Log control message 5: Active depth unit

```
 1     2 3   4
$PSALC,5,ccc*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL Control	PSALC
2	i.	Control message type	5: Active depth control
3	ccc	Activate depth unit	VD1: Log 1 VD2: Log 2 SD1: External echosounder VD9: Simulated Log
4	hh	Check sum	

Example: Activate Log2 as depth unit:
$PSALC,5,VD2*

3.2.2 Log status messages (PSALc)

This status message is used as the acknowledge message for some $PSALC messages.

3.2.2.1 Log status message 2: Bottom track transmit status

```
 1     2 3 4
$PSALc,2,i*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL status	PSALc
2	i.	Control message type	2: SAL T2 BT status
3	i.	Bottom track transmission	0: Transmit mode is off 1: Transmit mode is on
5	hh	Check sum	

Example: Status is acoustic transmitter on:
$PSALc,2,1*

3.2.2.2 Log status message 4: Actived speed units

```
 1      2 3   4   5
$PSALc,4,ccc,ccc*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL status	PSALc
2	i.	Control message type	4: Activated speed
3	ccc	Activated WT speed unit	VD1: Log 1 VD2: Log 2 VD9: Simulated Log
4	ccc	Activated BT speed unit	VD1: Log 1 VD2: Log 2 GP1: GPS VD9: Simulated Log
5	hh	Check sum	

Example: Log1 is the activated WT speed unit and Log 2 is the activated BT speed unit:
$PSALc,4,VD1,VD2*

3.2.2.3 Log status message 5: Activated depth unit

```
 1      2 3   4
$PSALc,5,ccc*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Proprietary SAL status	PSALc
2	i.	Control message type	5: Activated depth unit
3	ccc	Activated depth unit	VD1: Log 1 VD2: Log 2 SD1: External echosounder VD9: Simulated Log
4	hh	Check sum	

Example: Log2 is the activated depth unit:
$PSALc,5,VD2*

3.2.3 Docking log (PSALL)

Note this sentence was created when the VBW sentence lacked the capability to present stern speed. The standardised sentence should be used whenever possible.

```
 1     2   3   4   5 6
$PSALL,x.x,x.x,x.x,c*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	SAL docking Log	PSALL?
2	x.x	Longitudinal ground speed	knots
3	x.x	Transversal ground speed of bow	knots
4	x.x	Transversal ground speed of stern	knots
5	c	Log status character	'B'=valid bottom track, 'W'=valid water track (only long) 'L'=valid bottom track, unvalid rate of turn information. Field 3 contains transversal speed from log, ?field 4 is invalid? 'E'=log error
6	hh	Checksum	

Example: longitudinal speed 1.32 knots, bow -1.11 knots, stern +0.44 knots:

$PSALL,1.32,-1.11,0.44,B*

3.2.4 Remote dimming message (PSALR)

```
 1     2 3 4  5
$PSALR,c,c,i.*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Remote dimming	PSALR?
2	c	Dimmer direction	"+" = increase light, "-" = decrease light
3	c-c	ID of instruments to be dimmed	“A” – “Z”
4	i.	Dim value	0% – 100%
5	hh	Checksum	

This message is intended for using the NMEA network to control groups of indicators. Whenever a $PSALR message is received by any indicator it adjusts the light level accordingly. $PSALR messages are generated by SD indicators having remote dimmer controls. (SD1 and SD2 indicators only uses field 2).

Example:

Increase light on SD1/SD2:

$PSALR,+,,*

Set a light level of 70% on instruments with id E:

$PSALR,,E,70*

3.2.5 Remote control message (PSALS)

The signal used for remote control of the menu system in remote units is `$PSALS`. The message includes a signal number, identity and a string data field.

```
 1      2  3   4   5
$PSALS,i.,c—c,c—c*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Signal data	PSALS
2	i.	Signal number	*
3	c—c	Identity (for remote unit)	** Information coded as ASCII
4	c—c	String data	Information coded as ASCII
5	hh	Checksum	

Example: Heartbeat

$PSALS,1,R1A,1234*

* Field 2, signal number:

Signals with number 0 through 49 are used for signals from indicator to log. Signals with number 50 through 99 are used for signals from log to indicator. Identity is a character field. Status is the content of the LCD or equivalent presentation unit.

Number	Name	Content
0	Identify	MasterID, informative text
1	Heartbeat	ID, any test data
2	SDataLog request	ID, port
3-9		Reserved
10-19	RemoteCmd	ID
20-29		Reserved
30-35	ParameterCmd	ID,parameterName
36-45		Reserved
46	Activate	ID
47	Deactivate	ID
48	ResumeCmd	ID
49	SuspendCmd	ID
50	Identity	SlaveID, informative text
51	HeartAck	ID, any test data
52	SDataLog acknowl	ID, port
53-59		Reserved
60-69	RemoteAck	ID, status
70-79		Reserved
80-85	ParameterAck	ID,
86-95		Reserved
96	Activate ackn.	ID
97	Deactivate ackn.	ID
98	StatusInfo	ID, Status (23 char LCD) info
99	SignalUnknown	ID, signal number
100-		Reserved

** Field 3, identity:

Identity	Comment
IN#	Indicator #, # = A to Z, (INA - INZ corresponds to ID 1 - 26)
IND	Indicator 4 (# = D), master of the system
LPU	Sig.Distributor
R1A	First WT unit in the system
R1B	Second WT unit in the system
R1C	Third WT unit in the system
T2A	First BT unit in the system
T2B	Second BT unit in the system
T2C	Third BT unit in the system
T2D	Fourth BT unit in the system
LP1	First Sig.Distributor in the system
LP2	Second Sig.Distributor in the system
ES1	Echo Sounder TRU1
ES2	Echo Sounder TRU2
ES3	Echo Sounder TRU3
ES4	Echo Sounder TRU4
ED1	Echo Sounder Display 1
ED2	Echo Sounder Display 2
TC1	TIC 1
TC2	TIC 2
TC3	TIC 3

3.2.6 Multiple Units message (PSALU)

When more than one unit of the same type is installed in a system, (for example two speed logs), PSALU messages are used to distinguish from which unit the data originate.

3.2.6.1 Multiple Units message 1, speed data

```
 1     2 3   4   5   6   7
$PSALU,1,ccc,x.x,x.x,x.x*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Multiple units message	PSALU?
2	i.	Message type	1: Speed data
3	ccc	Unit ID	VD1: Log 1 VD2: Log 2 GP1: GPS VD9: Simulated Log
4	x.x	Longitudinal water speed WTL	Null field indicates no valid data
5	x.x	Longitudinal ground speed BTL	Null field indicates no valid data
6	x.x	Transversal ground speed BTT	Null field indicates no valid data
7	hh	Checksum	

Example: From log 2, WTL = 20.06, BTL = 21.07, BTT = ”null”:

$PSALU,1,VD2,20.06,21.07,*

3.2.6.2 Multiple Units message 2, depth data

```
 1     2 3   4   5   6   7
$PSALU,2,ccc,x.x,x.x,x.x*hh<CR><LF>
```

Field #	Field Type	Definition	Note
1	Name	Multiple units message	PSALU?
2	i.	Message type	2: Depth data
3	ccc	Unit ID	VD1: Log 1 VD2: Log 2 SD1: External echosounder VD9: Simulated Log
4	x.x	Depth below transducer [m]	Null field indicates out of range
5	x.x	Distance between transducer and keel or water line[m]	
6	x.x	Maximum range scale in use	
7	hh	Checksum	

Example: From log 2, depth = 34.3:

$PSALU,2,VD2,34.3,,*

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JLN-900
Harbour Acceptance Test

Harbour Acceptance Test.
NJC-80 Sig.Processor, Transducer (TRU) and optional Sig.Distributor

Contents

1 Scope

This document describes the Harbour Acceptance Test (HAT) for JLN-900 Speed Log. The HAT for JLN-900 Speed Log tests the Sig.Processor, the transducer (TRU), the optional Sig.Distributor and their interaction.
The Sig.Processor contains a Water Track SAL WATER TRACK U unit (which measures speed through the water) and a SAL T2 BTU Bottom Track PCB unit (which measures speed over the ground). This document contains a list of equipment needed, test procedures and a prepared test protocol.

2 Equipment needed

In addition to the Sig.Processor, TRU, Sig.Distributor and Main display(s) under test, the following equipment is needed:

- Calibrated DMM for measurement of VAC, VDC, ohm and frequency
- This HAT instruction, including an additional copy of the protocol pages.
- NMEA test equipment for monitoring the serial NMEA 0183 communication (such as terminal-emulating PC).
- **§ 11** for NMEA message description.

3 Test procedure for TRU

Refer to and note in protocol on page 12-8!

- Verify the serial number of the transducer.
- Verify that the transducer is correctly positioned and aligned according to the installation manual.
- Measure the defined resistance values of the TRU and write down the result in the protocol.
- Verify that the cable is of original length, has not been cut and is without any visual damages and that the factory prepared termination ends are intact.
- Connect the TRU cable to Sig.ProcessorT2M-pcb terminals. Ensure that the red and blue earth connections are connected to the ground screw (M5) on the Sig.Processor chassis plate.
- Verify that the TRU cable outer screen braid is firmly connected in the EMC cable gland at the bottom of the Sig.Processor cabinet.
- Verify that the Sig.Processor cabinet has a firm ground connection to ship's hull from the ground screw at the bottom of the Sig.Processor.

4 Test procedure for SOG

Refer to and note in protocol on page 12-10!

Prior to power-up of the Sig.Processor:

- Verify serial number and revision of the JLN-900 Speed Log Sig.Processor unit.
- Verify serial numbers and revisions of the PCBs T2M, T2F and T2R.
- Verify MAIN PRIMARY transformer plug to be connected according to ship's power supply, 230VAC or 100 / 115VAC
- Verify BACKUP PRIMARY transformer plug to be connected accordingly ***if*** the Sig.Processor is equipped with two transformers, 230VAC or 100 / 115VAC. For JLN-900.
- Check mains supply voltage and, if applicable, the backup supply.
- Check mains supply frequency and, if applicable, the backup supply.
- Temporarily connect a PC/LapTop to the NMEA output, terminals 108(A)/109(B) and initiate a terminal emulating program to monitor NMEA messages.

  Power-up the Sig.Processor:
- Connect mains supply voltage and within a few seconds observe as below. Repeat if needed.
- Monitor the serial messages from the T2R-pcb during the start-up sequence and verify the SW version appearing as 'VDTXT……..SALT Rev 702275***??***......'
- If the Sig.Processor is equipped with two transformers also connect backup power supply.
- Check T2F regulated voltages and note in protocol.
- Again **power-off** mains (and backup) supply and proceed as below.

5 Test procedure for STW

Refer to and note in protocol on page 12-9!

Prior to power-up of the Sig.Processor:

- Verify the serial number of the WATER TRACK U unit.

  Power-up the Sig.Processor:
- Connect mains (and backup) supply voltage.
- From here go to the wheelhouse and use the Speed Log Master Display to access the menu system of the WATER TRACK U. Sig.Distributor must also be powered, see below.
- Verify the SW version in Menu M6, using the Master Display.
- Test the EEPROM by setting a new value in the speed simulation menu T1.1, press Enter and wait for "SAVE OK" and observe the new test speed on the Master Display. Return to default value, 8.00KN, press Enter and wait for "SAVE OK".
- Exit Simulation mode and Menu mode and return to normal operation.
- The STW log will start its ``scanning´´ sequence to search for a valid speed.

6 Test procedure for Sig.Distributor

Refer to and note in protocol on page 12-11!

- Note revisions and serial numbers of the Sig.Distributor and the three PCBs in the protocol.
- Connect power to the Sig.Distributor wait for completed start-up and then use the NWW-82 Master Display to access the menu system in the Sig.Distributor.
- Revisions of software and firmware can be inspected via the menu system (M8 and M9*)*. Note the revisions in the protocol.
- Refer to the manual to access the Sig.Distributor menu system via the NWW-82 Master Display. Generally default settings are used. If any customer or installation options, then set and note accordingly, e.g. for Docking Log function.
- Actual speed and depth values from the speed log can be viewed on the start menu of the Sig.Distributor. The next tests verify that the connections between the JLN-900 Speed Log speed log Sig.Processor and the Sig.Distributor are correct.
- Set the SOG speed log in speed simulation, i.e. default values in menus:
  T1 BTLONG= +12.00KN, T2 BTTRANS= +0.09KN and T3 DEPTH= 10.0 M.
  Check that same values are displayed in the start menu of the Sig.Distributor.
- Check that the NMEA-message contains same values and signs and corresponds with the NMEA standard $VDVBW message as defined in Technical Document **§11** .
- Verify that all NWW-82 indicators and external users of Sig.Distributor information receive the simulated speed and depth (NMEA, pulse and analogue users).
- Restore the SOG to normal operation. If the depth below the hull is at least 2 metres, the SOG shall lock to the depth and present zero or close to zero speed.
- A similar test procedure can be done from STW by entering the T1.1 menu as above and verify STW speed to appear on all displays and users.
- Exit all Simulation modes and Menu mode and return to normal operation.

7. Speed Log Master Display in JLN-900 Speed Log

Refer to and note in protocol on page 12-7!

- A set of labels, intended to identify the Speed Log Master Display function, is provided for all JLN-900 Speed Logs and normally found in a plastic bag attached to the Sig.Processor unit.
- Verify that these labels are applied accordingly to the dedicated NWW-82 Main Display as connected to the Sig.Distributor for the Master Display function. Refer to the manual for instructions.

8. STW/SOG Device for JLN-900 SPEED LOG

Refer to and note in protocol on page 7!

- Also a set of labels, intended to identify the two speed log device functions in a JLN-900 Speed Log system, is provided and normally found in a plastic bag attached to the Sig.Processor unit.
- Verify that these labels are applied accordingly to each of the two NWW-82 Displays as connected to the Sig.Distributor for the relevant function.
  Refer to the manual for instructions.

9. Final inspection

Refer to and note in protocol on page 12-7!

- When the Sig.Processor, TRU, Sig.Distributor and NWW-82 display(s) have passed all tests the summary protocol on p.7 shall be completed and signed.
- One copy of the completed protocol (pp 7–11) shall be returned to JRC for reference purpose.

10. Protocol

Harbour Acceptance Test for JLN-900 Speed Log System;
- Summary

JLN-900 Speed Log Log System	Order#:	**Comment**
Owner:		
Yard:		
Ship:		
Type:		
TRU	S/N:	
Sig.Processor	S/N:	
Sig.Distributor	S/N:	
Indicators:	S/N:	
	S/N:	
	S/N:	
Maste (JLN-900)	S/N:	Labels applied? Yes / No
STW Device/Master	S/N:	Labels applied? Yes / No
SOG Device	S/N:	Label applied? Yes / No
Status:		

Comments: ____
____

Passed ☐ / Failed ☐

Date: ____________________ Sign: ______________________
(JRC)

Date: ____________________ Sign: ______________________
(Customer, if applicable)

Harbour Acceptance Test for JLN-900 Speed Log

TRU S/N:	Order#:	**Comment**
Water track DC test	**[ohm]**	**Type values below**
1=>2		1.8–2.6 ohms
4=>5		1.8–2.6 ohms
1=>3		> 20 Mohms
4=>3		> 20 Mohms
1=>4		> 20 Mohms
Bottom track DC test		
Resistance [ohm]	**Resistance to GND (Red) [ohm]**	**Isolation to GND (Red) > 20 Mohm**
38=>39:	37:	38:
41=>42:	40:	41:
44=>45:	43:	44:
47=>48:	46:	47:
50=>51:	49:	50:
53=>54:	52:	53:
	GND (Blue):	
Cable check:	Damages: Yes / No	Cut: Yes / No
Status:		

Harbour Acceptance Test for JLN-900 Speed Log

Water Track	Order#:	**Comment**
WATER TRACK U PCB Unit	U/N:	S/N:
WATER TRACK U software version	Boot:	Flash:
Sig.Processor	**Test result**	
EPROM Read/Write		SAVE OK
Status:		

Harbour Acceptance Test for JLN-900 Speed Log

Bottom Track	Order#:	**Comment**
Sig.Processor	U/N:	S/N:
T2M:	U/N:	S/N:
Main transformer connection primary		115VAC or 230VAC
Power input voltage Main	L1-L2:	Tol: 198... 253 VAC or 99…127 VAC
Power input frequency Main	L1-L2:	Tol: 47... 63 Hz
Backup transformer connection primary		115VAC or 230 VAC
Power input voltage Backup	L1-L2:	Tol: 198... 253 VAC or 99…127 VAC
Power input frequency Backup	L1-L2:	Tol: 47... 63 Hz
T2F:	U/N:	S/N:
Vcc: + 5 VDC	P5-P10:	Tol: 4.85... 5.25 VDC
+12 VDC	P4-P10:	Tol: 11.6... 12.4 VDC
- 12 VDC	P6-P10:	Tol: -11.6... -12.4 VDC
Int +5 VDC	P8-P10:	Tol: 4.85... 5.25 VDC
Int - 5 VDC	P9-P10:	Tol: -4.85... -5.25 VDC
T2R:	U/N:	S/N:
SW boot OK?		
Status:		

Harbour Acceptance Test for JLN-900 Speed Log

Sig.Distributor (Optional)		**Comment**
Identity Sig.Distributor Sig.Processor	U/N: NQA-4480 rev:	S/N:
Identity CPU-PCB	U/N: 704550 rev: (Menu M10)	S/N:
Identity IO-PCB	U/N: 704560 rev:	S/N:
Identity PSU-PCB	U/N: 704570 rev:	S/N:
Software	U/N: 704519 rev:	Menu M8
Firmware	U/N: 704517 rev:	Menu M9
Output programming		According to user demand
Display of Simulated speed and depth on Sig.Distributor.		Correct speed and depth on Sig.Distributor start menu
NMEA Syntax OK		According to §11
NWW-82 indicators and external listeners receive correct data		All users receive correct values?
Status:		

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JLN-900
Calibration and
Sea Acceptance Test

JLN-900 Speed Log

Calibration and Sea Acceptance test. NJC-80 Sig.Processor, Transducer (TRU) and optional Sig.Distributor

Contents

1 Scope

This document describes the Calibration procedures and also serves as a Sea Acceptance Test (SAT) for JLN-900 Speed Log. The SAT for JLN-900 Speed Log is used to verify that the system works, and to calibrate the log. The document contains a list of equipment needed, how to perform the test and a test protocol.

To aid future customer support, it is necessary that two sets of the protocol pages are filled-in. One set should be returned to JRC and the other set should be left in the reference manual on board the ship.

2 Equipment needed

In addition to the log system, the following equipment is needed:

- The log system must have a Speed Log Master Display such as an NWW-82 Main Display with two-way communication to access the different menu systems.
- Display unit for speed and distance indication (such as NWW-82 Main Display). The Speed Log Master Display can be used.
- This SAT instruction.
- For the STW log calibration a test site is needed, where accurate distance and speed trials can be made.
- A reference positioning system if the speed over the ground log is to be calibrated. Note! Calibration of the SOG log is hard to perform and is normally not done on merchant ships. If DGPS is used as positioning system, always compare it with BTR distance, bottom track resulting distance, and the SOG log must be within depth range and indicate speed for the total distance accumulation.

3 Test procedure for bottom track (ground speed)

Ensure that the bottom track log locks on bottom within measurement range and indicate speed.

3.1 SOG Transducer angle calibration

If the SOG shows a transversal speed bias (= the transversal distance trip counter accumulates false distance) when no drift is present, the transducer alignment may be adjusted. There are two ways to compensate for the transducer angle.

We strongly recommend the method in which the transducer is mechanically accurately aligned by test runs.

If this is not possible, there is also an alternative way to compensate the angle in software by adjusting the calibration angle.

To align the transducer represents an even harder problem in finding accurate enough reference systems. In some installations, where two axis speed is fed to an integrated navigation system together with accurate gyro data, the two-dimensional ”dead reckoning” performed by the navigation computer can be directly compared with other position data and the angular error produced by the log can be calculated directly or indirectly.

For most installations. however, this is not possible, and the ***following procedure is proposed:***

a) Place the ship on a straight course directly against current and wind so that the true transversal motion of the ship is zero.

b) Read the transversal speed output of the log as the same time as the transducer is accessible (the transversal speed can for instance be read on an NMEA output of NQA-4480).

c) Trim the transducer angle until the transversal speed reading fluctuations are centred around zero. (this is described in the section ”Installation of transducer and bottom parts”.)

Where it is necessary to perform a software calibration of the transducer angle, some reference system to establish the desired correction angle must be used. The accuracy of this system must be verified. The following formula can be used:

$$\Phi_{NEW} = \Phi_{OLD} + \Theta_{measured} - \Theta_{reference} ,$$

where $\Theta_{reference}$ is the direction of movement (referenced to the keel line) obtained from the reference system and $\Theta_{measured}$ is the same direction obtained from the log during the trial run. The angular values for both reference system and log output can be found using the relationship:

$$\Theta = \arctan (D_t / D_l),$$

where D_t is the transversal distance (or speed) component and D_l is the longitudinal component.

The angular correction ”Φ” entered on the thumbwheel switches are represented in 0.1° steps, using menu C2.

3.2 Speed Calibration (SOG)

It is possible to calibrate the speed value with a correction factor in 0.01% increments.

However, for most installations, where the transducer is installed exactly vertical and where normal reference systems, like DGPS or other electronic navigation systems, are used it is not necessary/possible to get improved performance by calibrating the log.

If good enough reference data are possible to obtain, the calibration value to be set in the system can be calculated using the following formula:

$$BScale_{NEW} = BScale_{OLD} \times D_{expected} / D_{sensed}$$

where $BScale_{NEW}$ is the new absolute value and $BScale_{OLD}$ is the old value that was set during the distance run. Note that values in the menu system are relative in percent and the formula uses absolute values.

Example: Old value was 0.00%, expected distance was 2.01 NM and the sensed distance was 1.99 NM. The new distance is then:
$BScale_{NEW}$ = (1+0/100) x 2.01 / 1.99 =1.0100
Calibration factor =($BScale_{NEW}$-1.0) x 100 = +1.00%

It should be noted that accuracy of the distance obtained as reference must be verified against defined performance of used reference system. It should also be noted that if reference distance is used, the distance measured by the log system for comparison must be taken from the distance counter of an indicator being set to show resulting SOG or could be obtained from longitudinal and transversal trip distance counters being added geometrically.

The calibration correction values entered are represented in 0.01% increments in the menu C1.

4 Test procedure for the STW unit, WTU PCB.

4.1 The boundary layer

The water moves slower close to the hull than it does further away. The layer with lower speed is called the boundary layer, see figure 1.

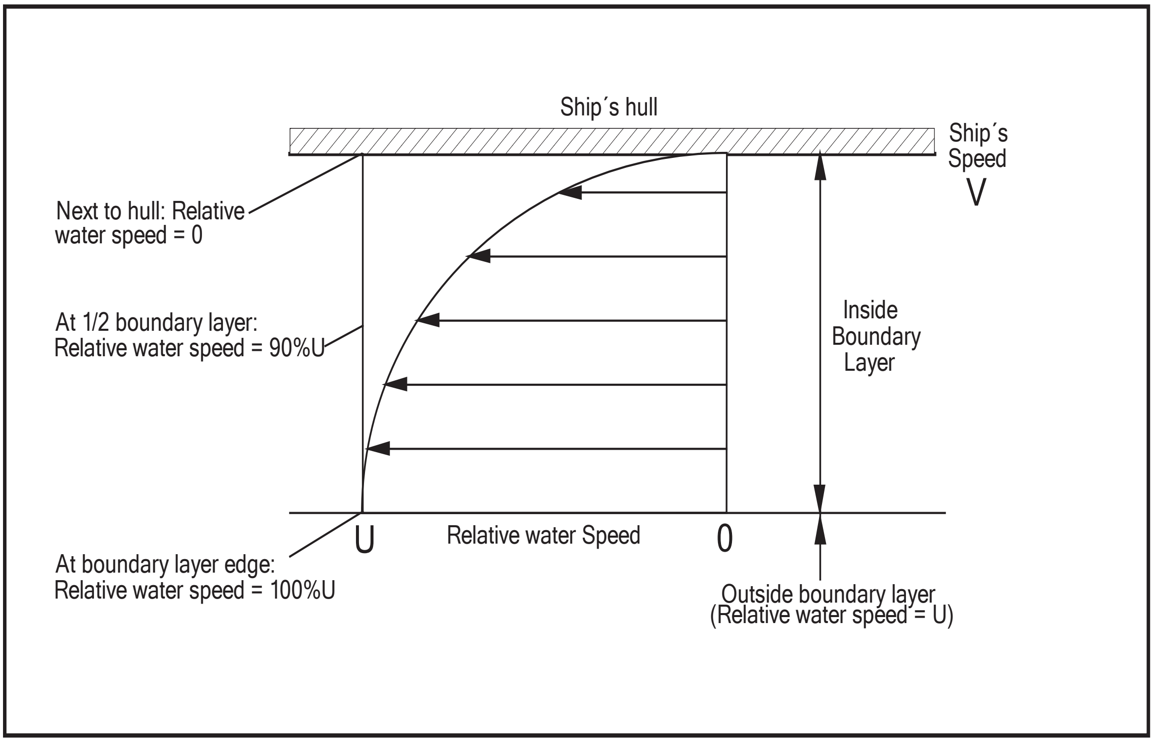

Figure 1 Boundary layer speed distribution.

The WATER TRACK U, Water Track Unit, measures speed close to the hull, and may thus measure a lower speed. When the ship is in shallow waters, the boundary layer may be different from normal. This physical effect will affect all logs measuring relative speed.

4.2 Calibration factors STW

How to enter calibration values using the menu system is described in Section 10 “WTU Assembly Technical Manual”.

The STW part (WTU) has three different methods for calibrating the speed.

- TRU calibration - a fix calibration factor (marked on the TRU and the TRU-cable) compensating small differences in characteristics of individual transducers. To be set at the speed log set-up at installation and when changing TRU only.
- Draught calibration – a single point calibration factor compensating differences in indicated speed, due to load and trim of the ship. Three different preset draught conditions can be programmed. They are named: FULL LOAD, BALLAST 1 and BALLAST 2.

- Speed depending calibration - multiple point calibration factors compensating differences in indicated speed over the whole speed range. Factors can be preset for up to ten different speeds. Speeds between the calibrated points are interpolated automatically.

Note: The minimum necessary calibrations to be set are the TRU-calibration plus at least one of the draught calibrations. If so, after setting the TRU-calibration, choose e.g. FULL LOAD and compensate for the normal cruising speed used at normal load conditions (se below)

Draught Calibration and Speed Depending Calibration shall normally not be used at the same time.

4.2.1 TRU Calibration

This type of calibration is compensating small differences in characteristics of individual transducers. The transducer has been independently calibrated in factory and its compensator factor must be programmed in-to the speed log it is connected to. The factor is engraved on the transducer housing as TC±000. It is also labelled at the termination end of the TRU-cable. Example: TC+123 means calibration factor +1,23% and TC-101 means calibration factor –1,01%.

Note: The TRU Calibration shall be set to its value before any other calibration is performed.

4.2.2 Draught calibration (Single point calibration)

This type of calibration is meant for merchant vessels where the water flow around the hull is changing due to different draughts and trims. Three calibrations can be performed for cruising speeds relevant to each of three decided draught/load conditions (FULL LOAD or BALLAST 1 or BALLAST 2). These calibrations are compensating with the same calibration percentage, respectively, over the whole speed register.

Changing between the three draught/load calibration types can then be done later in menu C1 by pressing plus (+) or minus (-). However the change must be saved by pressing the ENTER button. Before the calibration runs, make sure:

- that correct TRU-calibration factor is set (see above)
- that the desired draught condition is chosen and set to 0% (Menus C1/C1.1)
- the Multi Point Calibration is DISABLED (Menu C3)

The system is calibrated by sailing a true, known distance in calm waters. To eliminate variations caused by tide, current and wind, the ship should run the same route in both directions. For each separate run, carefully observe beginning and end of the true sailed distance and corresponding measured distance on log display. Then, for each speed, do following calculation to find the calibration factor CF:

CF=[(expected dist.1 + expected dist.2) / (measured dist.1 + measured dist.2)] x100-100

Normally the true distance is based on optical observations, but it is also possible to use other reference systems like DGPS or similar. If the calibration factor is based on a very long (several hours or days) comparison with GPS observations, make sure that it has not been affected by wind and current.

Use the menu system to enter the calibration factor in menu C1.1. Note that the correlation shall be expressed in percentage.

4.2.3 Speed Depending Calibration (Multiple Point Calibration)

This type of calibration is meant for vessels needing varying speed compensation in the whole speed register. Up to ten different speeds can be calibrated for, spread to speeds both ahead and astern. Speeds between the calibration points are interpolated automatically, except the area nearest zero, which uses its nearest calibration factor down (up) to speed zero.

The Multiple Point Calibration can be ENABLED and DISABLED in menu C3. Store the setting by pressing the ENTER button.

Make the calibration runs and calculations as described above for Single Point Calibration, but now repeat the procedure for each speed desired.

Before the calibration runs, make sure

- that correct TRU-calibration factor is set (see above)
- that the chosen draught condition (e.g. BALLAST 1) is set to 0% (Menus C1 and C2)
- that the Multi Point Calibration is DISABLED (Menu C3)

Due to the interpolation between the compensation factors the Multi Point Calibration must be DISABLED during all calibration runs, also when making a later run for an extra calibration point.

5 Test procedure for optional Sig.Distributor

- Check that the Sig.Distributor enters normal operation mode and presents the correct speeds to different users.

It should also be noted that there are numerous settings to be done on the Sig.Distributor in order to configure outputs etc. This is described in the Sig.Distributor manual section of this manual.

5.1 System signal flow

The different sections of the manual covers installation and also describes testing procedures for each sub-unit. Especially the section about the Sig.Distributor (if this is included) contains useful information about testing large installations.

If correct operation of all connected indicators and users (radar etc) was not verified during the tests described in the previous sections, the following procedure can be used to verify signal flow throughout the system:

a) On the STW part of the log, WTU: go to the menu for simulated speed using the Speed Log Master Display and enter a value of +10 knots.
b) All connected indicators and/or display in Sig.Distributor (if present) should display STW speed 10 knots ahead. If not, NMEA connection from Sig.Processor should be checked. Also all connected external equipment (via relay or opto-coupler pulses or IEC 61162-1/NMEA 0183 serial data) should display STW speed 10 knots ahead.
c) Put the STW log back to normal operation mode.
d) Set the SOG unit to internal test mode by entering menu T1 in the SOG unit menu system. The SOG part of the Sig.Processor now generates simulated speeds and depth according to T1
e) All connected indicators and/or display in Sig.Distributor (if present) should display according to values in menu T1. If not, NMEA connection from Sig.Processor should be checked. Also all connected external equipment (via relay or opto-coupler pulses or IEC 61162-1/NMEA 0183 serial data) should display these values.
f) Put the SOG log back to normal operation mode.

6 Final inspection

- When the system have passed all tests the protocol is signed with signature and date. Send one copy to JRC for reference purposes.

7 SAT protocol

Sea Acceptance Test for JLN-900 Speed Log

JLN-900 Speed Log SAT	Order#:	**Comment**
Owner:		
Yard:		
Ship:		
Type:		
TRU S/N:	Sig.Processor S/N:	Sig.Distributor S/N:
Gyro S/N:		
Indicators:	S/N:	S/N:
S/N:	S/N:	S/N:
Calibration		**(single point calibrations)**
BT magnitude calibr		%
BT Angle calibration		degrees
WT Ballast 1 Condition		(BALLAST 1 ±??.??)
WT Ballast 2 Condition		(BALLAST 2 ±??.??)
WT Full load Condition		(FULL LOAD ±??.??)
WT Transducer Calibration		(TC=±???)

Result:

Passed ☐ / Failed ☐

Date: ______________________ Sign: ______________________
(JRC)

Date: ______________________ Sign: ______________________
(Customer, if applicable)

SAT protocol (copy for JRC)

Sea Acceptance Test for JLN-900 Speed Log

JLN-900 Speed Log SAT	Order#:	**Comment**
Owner:		
Yard:		
Ship:		
Type:		
TRU S/N:	Sig.Processor S/N:	Sig.Distributor S/N:
Gyro S/N:		
Indicators:	S/N:	S/N:
S/N:	S/N:	S/N:
Calibration		**(single point calibrations)**
BT magnitude calibr		%
BT Angle calibration		degrees
WT Ballast 1 Condition		(BALLAST 1 ±??.??)
WT Ballast 2 Condition		(BALLAST 2 ±??.??)
WT Full load Condition		(FULL LOAD ±??.??)
WT Transducer Calibration		(TC=±???)

Result:

Passed ☐ / Failed ☐

Date: ______________________ Sign: ______________________
(JRC)

Date: ______________________ Sign: ______________________
(Customer, if applicable)

8 Protocol Multiple point calibration

Sea Acceptance Test for JLN-900 Speed Log Multiple point calibration part

JLN-900 Speed Log SAT	Order#:	**Comment**
Owner:		
Yard:		
Ship:		
Type:		
TRU S/N:	Sig.Processor S/N:	Sig.Distributor S/N:
Gyro S/N:		
Indicators:	S/N:	S/N:
S/N:	S/N:	S/N:
Calibration		**(Multi point calibrations)**
BT magnitude calibr		%
BT Angle calibration		degrees
WT C3.01 Speed	%	(??.??KN ±?.??%)
WT C3.02 Speed	%	(??.??KN ±?.??%)
WT C3.03 Speed	%	(??.??KN ±?.??%)
WT C3.04 Speed	%	(??.??KN ±?.??%)
WT C3.05 Speed	%	(??.??KN ±?.??%)
WT C3.06 Speed	%	(??.??KN ±?.??%)
WT C3.07 Speed	%	(??.??KN ±?.??%)
WT C3.08 Speed	%	(??.??KN ±?.??%)
WT C3.09 Speed	%	(??.??KN ±?.??%)
WT C3.10 Speed	%	(??.??KN ±?.??%)

Result:

Passed ☐ / Failed ☐

Date: ________________________ Sign: ________________________
(JRC)

Date: ________________________ Sign: ________________________
(Customer, if applicable)

Protocol Multiple point calibration (Copy for JRC)

Sea Acceptance Test for JLN-900 Speed Log Multiple point calibration part

JLN-900 Speed Log SAT	Order#:	**Comment**
Owner:		
Yard:		
Ship:		
Type:		
TRU S/N:	Sig.Processor S/N:	Sig.Distributor S/N:
Gyro S/N:		
Indicators:	S/N:	S/N:
S/N:	S/N:	S/N:
Calibration		**(Multi point calibrations)**
BT magnitude calibr		%
BT Angle calibration		degrees
WT C3.01 Speed	%	(??.??KN ±?.??%)
WT C3.02 Speed	%	(??.??KN ±?.??%)
WT C3.03 Speed	%	(??.??KN ±?.??%)
WT C3.04 Speed	%	(??.??KN ±?.??%)
WT C3.05 Speed	%	(??.??KN ±?.??%)
WT C3.06 Speed	%	(??.??KN ±?.??%)
WT C3.07 Speed	%	(??.??KN ±?.??%)
WT C3.08 Speed	%	(??.??KN ±?.??%)
WT C3.09 Speed	%	(??.??KN ±?.??%)
WT C3.10 Speed	%	(??.??KN ±?.??%)

Result:

Passed ☐ / Failed ☐

Date: ________________________ Sign: ____________________________
(JRC)

Date: ________________________ Sign: ____________________________
(Customer, if applicable)

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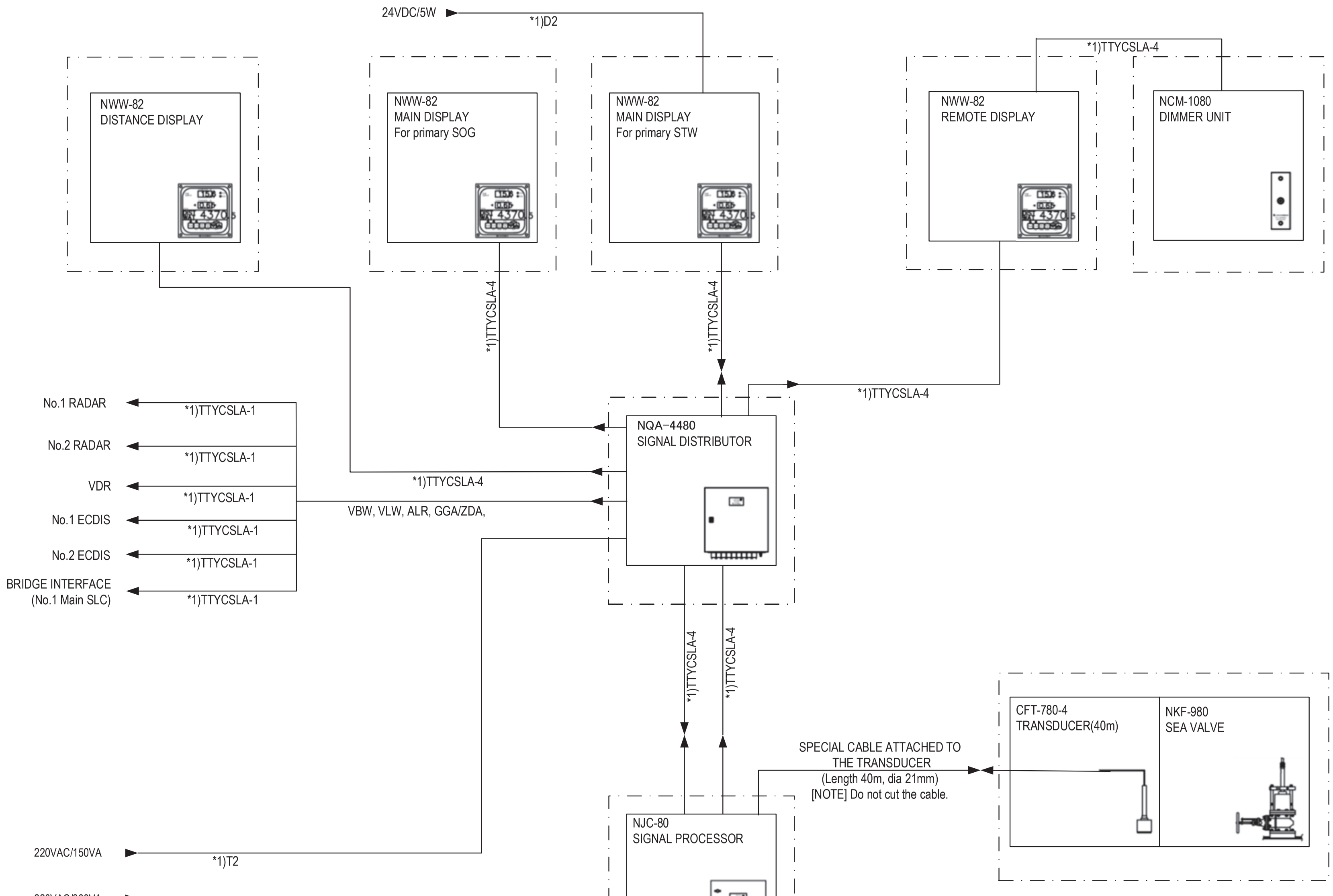
JLN-900
system drawings

Components

JLN-900 SPEED LOG

Table of Components

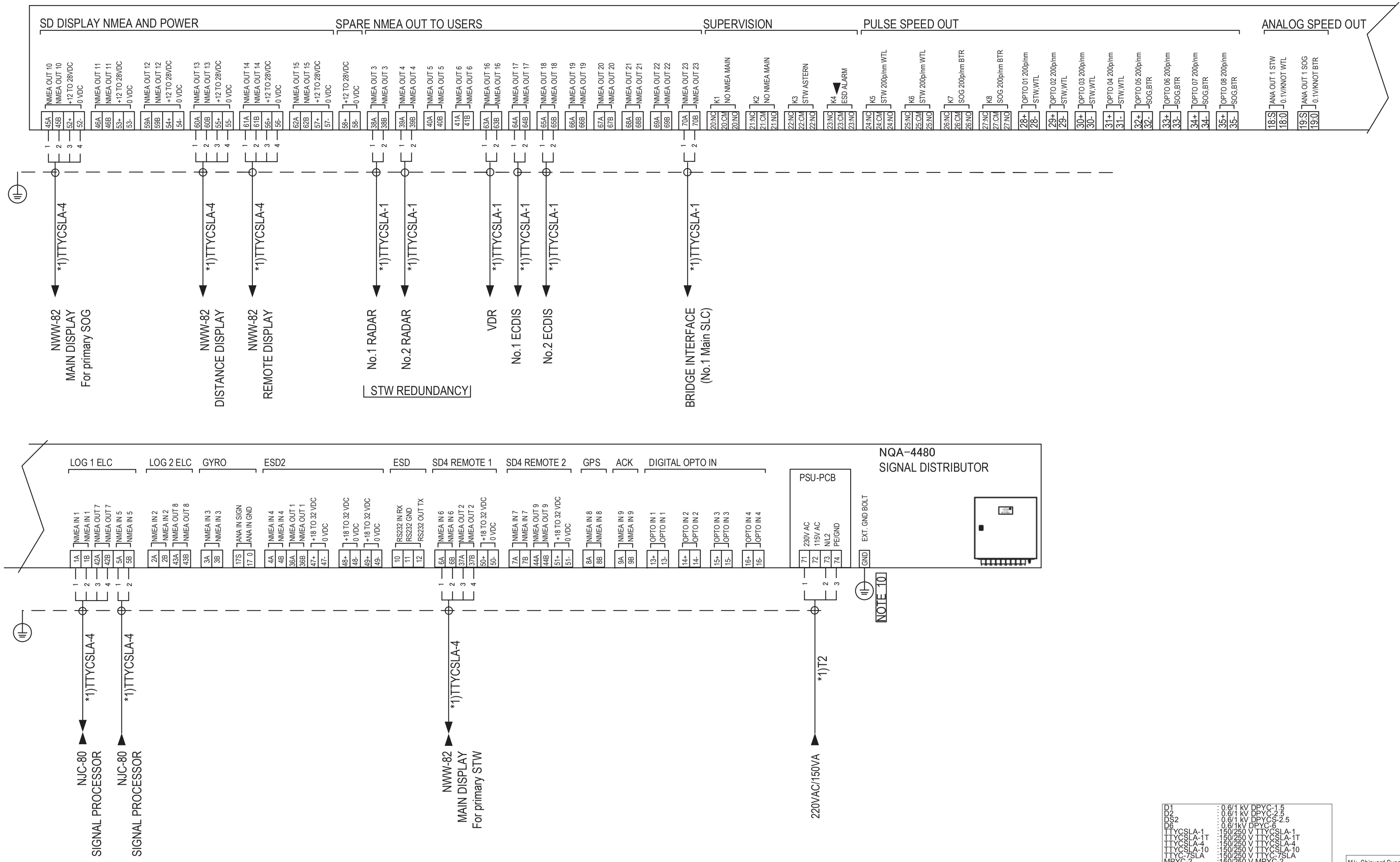
No.	Name	Type	Quantity	Mass 1Unit	Remark
Standard Components					
1	SIGANAL PROCESSOR	NJC-80	1	18kg	
2	SIGANAL DISTRIBUTOR	NQA-4480	1	20kg	
3	SEA VALVE	NKF-980	1	125kg	
4	MAIN DISPLAY	NWW-82	1	0.6kg	for primary STW
5	MAIN DISPLAY	NWW-82	1	0.6kg	for primary SOG
6	DISTANCE DISPLAY	NWW-82	1	0.6kg	
7	REMOTE DISPLAY	NWW-82	1	0.6kg	
8	DIMMER UNIT	NCM-1080	1	0.15kg	for REMOTE DISPLAY



D1	: 0.6/1 kV DPYC-1.5
D2	: 0.6/1 kV DPYC-2.5
DS2	: 0.6/1 kV DPYCS-2.5
D6	: 0.6/1kV DPYC-6
TTYCSLA-1	:150/250 V TTYCSLA-1
TTYCSLA-1T	:150/250 V TTYCSLA-1T
TTYCSLA-4	:150/250 V TTYCSLA-4
TTYCSLA-10	:150/250 V TTYCSLA-10
TTYC-7SLA	:150/250 V TTYC-7SLA
MPYC-2	:150/250 V MPYC-2
MPYC-4	:150/250 V MPYC-4
MPYC-7	:150/250 V MPYC-7
LAN	:CAT-5e LAN Cable

*1): Shipyard Supply
*2): JRC Supply

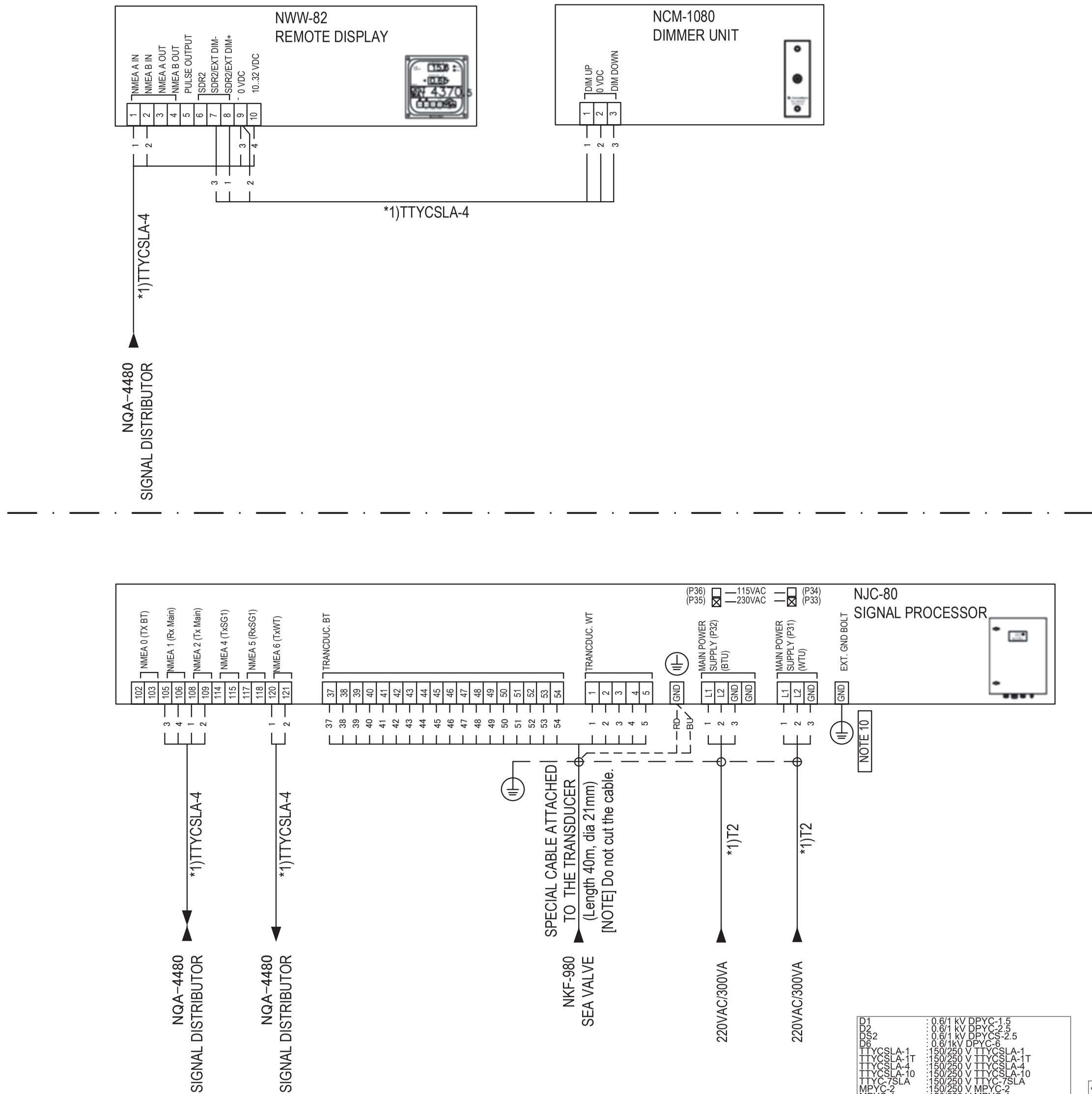
JLN-900 SPEED LOG CONNECTION DIAGRAM



D1	: 0.6/1 kV DPYC-1.5
D2	: 0.6/1 kV DPYC-2.5
DS2	: 0.6/1 kV DPYCS-2.5
D6	: 0.6/1kV DPYC-6
TTYCSLA-1	:150/250 V TTYCSLA-1
TTYCSLA-1T	:150/250 V TTYCSLA-1T
TTYCSLA-4	:150/250 V TTYCSLA-4
TTYCSLA-10	:150/250 V TTYCSLA-10
TTYC-7SLA	:150/250 V TTYC-7SLA
MPYC-2	:150/250 V MPYC-2
MPYC-4	:150/250 V MPYC-4
MPYC-7	:150/250 V MPYC-7
LAN	:CAT-5e LAN Cable

*1): Shipyard Supply
*2): JRC Supply

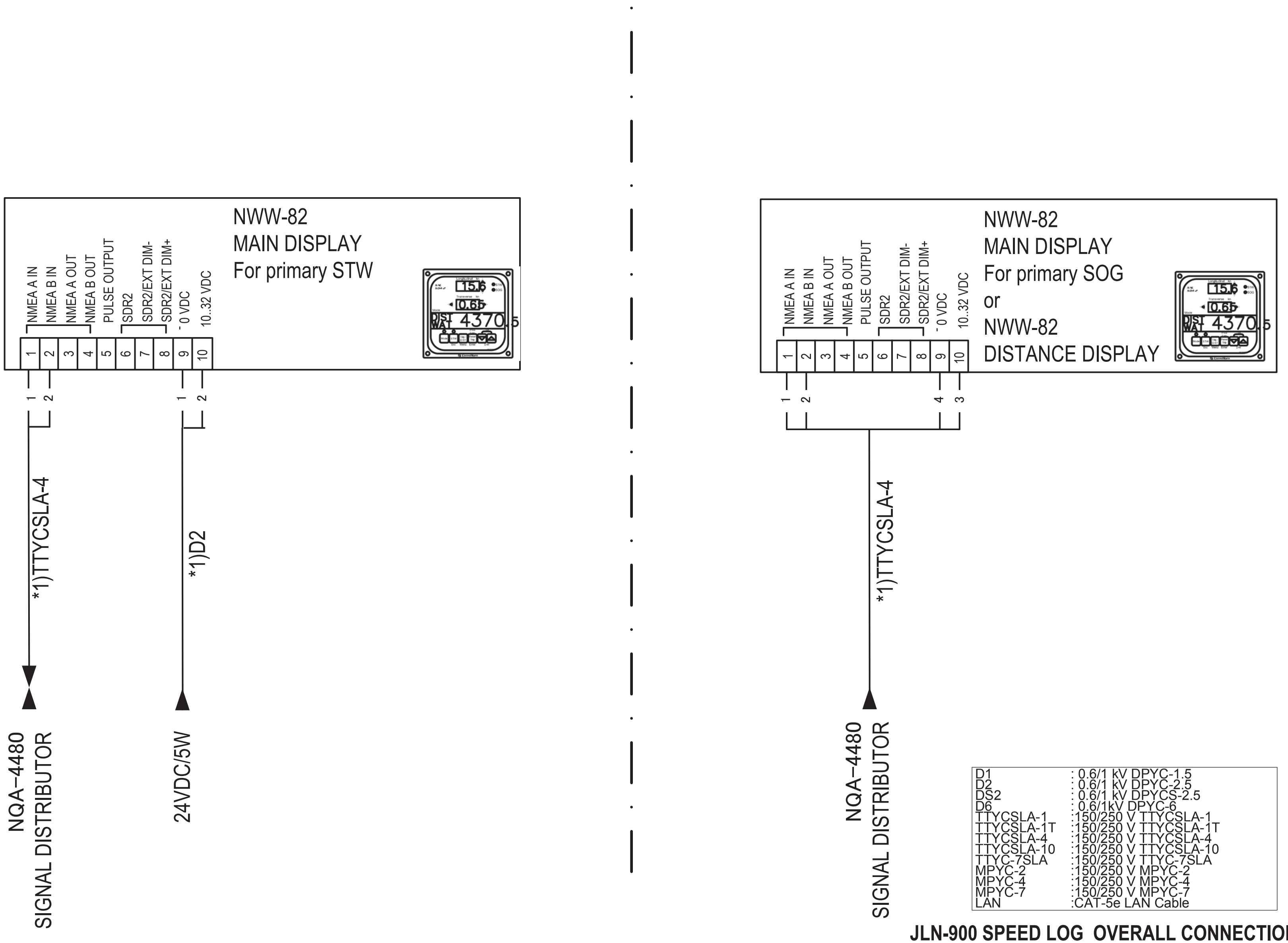
JLN-900 SPEED LOG OVERALL CONNECTION DIAGRAM(1/3)



D1	: 0.6/1 kV DPYC-1.5
D2	: 0.6/1 kV DPYC-2.5
DS2	: 0.6/1 kV DPYCS-2.5
D6	: 0.6/1kV DPYC-6
TTYCSLA-1	:150/250 V TTYCSLA-1
TTYCSLA-1T	:150/250 V TTYCSLA-1T
TTYCSLA-4	:150/250 V TTYCSLA-4
TTYCSLA-10	:150/250 V TTYCSLA-10
TTYC-7SLA	:150/250 V TTYC-7SLA
MPYC-2	:150/250 V MPYC-2
MPYC-4	:150/250 V MPYC-4
MPYC-7	:150/250 V MPYC-7
LAN	:CAT-5e LAN Cable

*1):	Shipyard Supply
*2):	JRC Supply

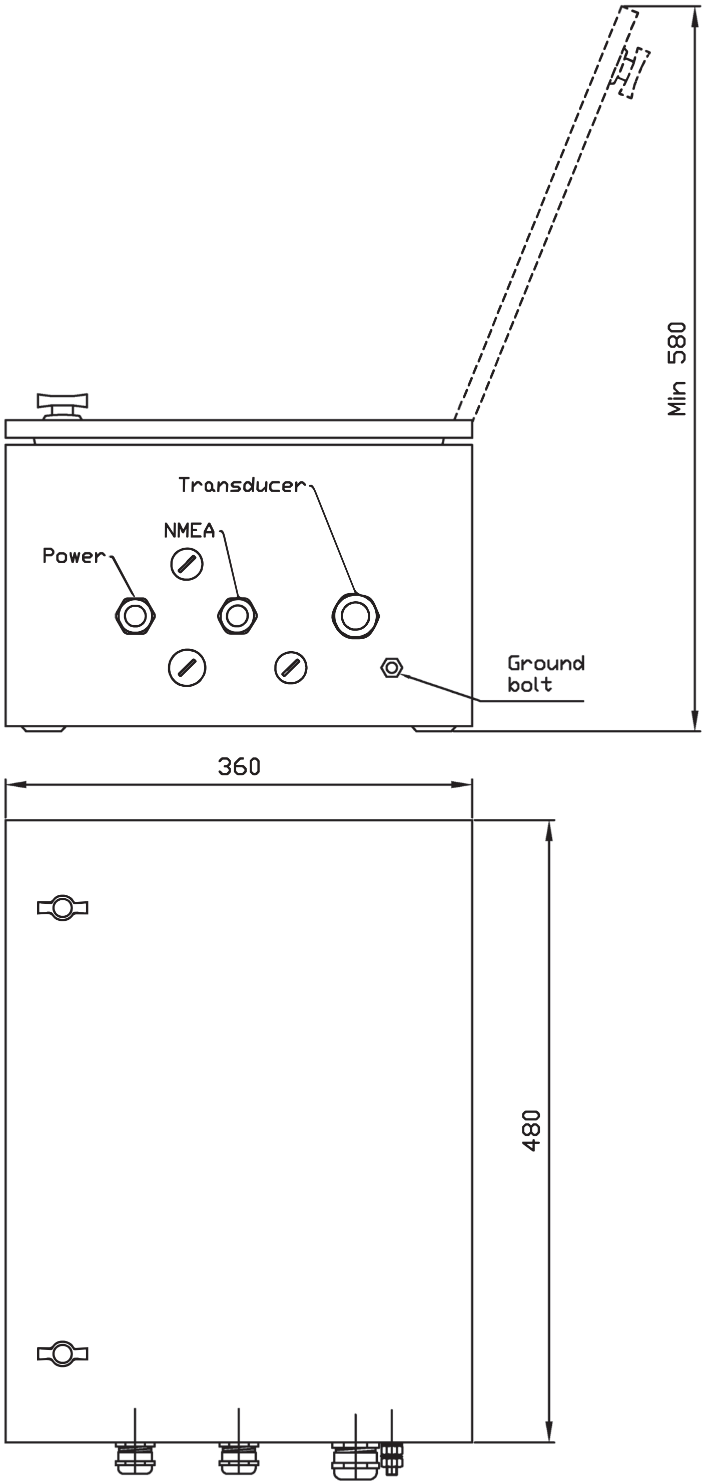
JLN-900 SPEED LOG OVERALL CONNECTION DIAGRAM(2/3)



D1	: 0.6/1 kV DPYC-1.5
D2	: 0.6/1 kV DPYC-2.5
DS2	: 0.6/1 kV DPYCS-2.5
D6	: 0.6/1kV DPYC-6
TTYCSLA-1	:150/250 V TTYCSLA-1
TTYCSLA-1T	:150/250 V TTYCSLA-1T
TTYCSLA-4	:150/250 V TTYCSLA-4
TTYCSLA-10	:150/250 V TTYCSLA-10
TTYC-7SLA	:150/250 V TTYC-7SLA
MPYC-2	:150/250 V MPYC-2
MPYC-4	:150/250 V MPYC-4
MPYC-7	:150/250 V MPYC-7
LAN	:CAT-5e LAN Cable

*1): Shipyard Supply
*2): JRC Supply

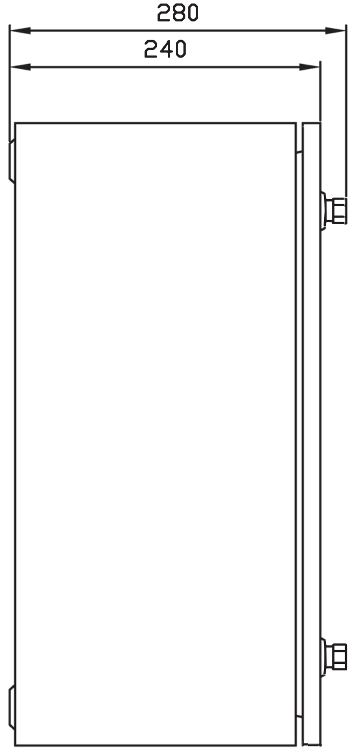
JLN-900 SPEED LOG OVERALL CONNECTION DIAGRAM(3/3)



Cable gland
- 1x M32, designed for 14-21mm cable
- 2x M25, designed for 11-16mm cable
- 2x 20mm Tapped holes
- 1x 25mm Tapped hole

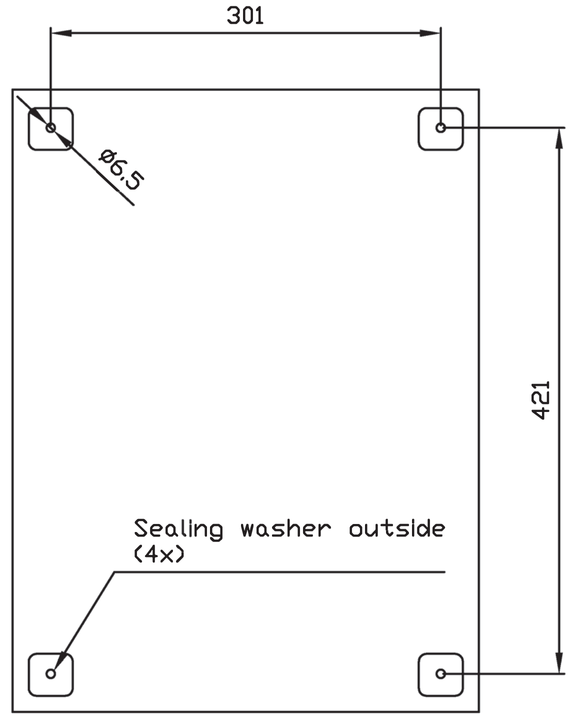
- Ground bolt M8

-IEC 60945 Tested

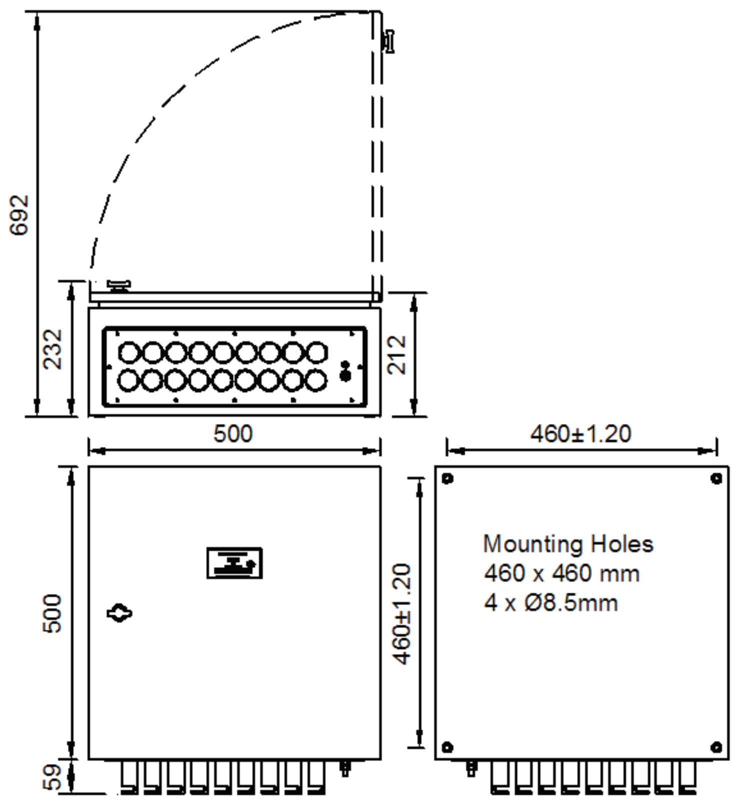


Weight ELC - 18kg
IP Grade - 44
Power Consumption - <300VA
Color - RAL7035

Mechanical mounting
- 4 x 6mm steel bolts.
- Use sealing washer to maintain water tightness.



NJC-80
Sig. Processor



Dimensions

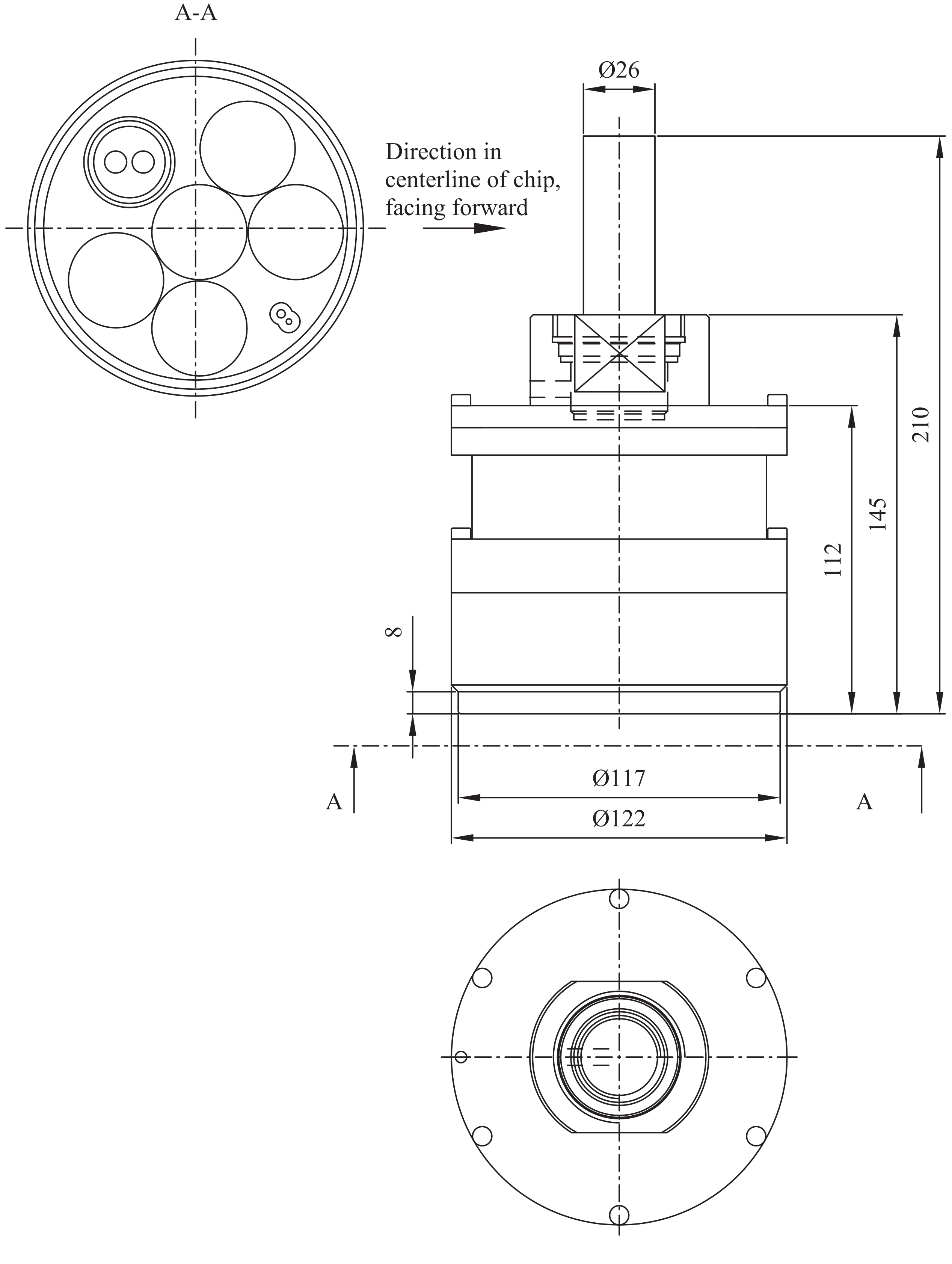
LPU2 ELC: 500 x 500 x 212mm (H x W x D) + 60 mm under the LPU2 for cable gland.

NOTE: When mounting, reserve a space of at least 150 mm under the cabinet for cable routing.

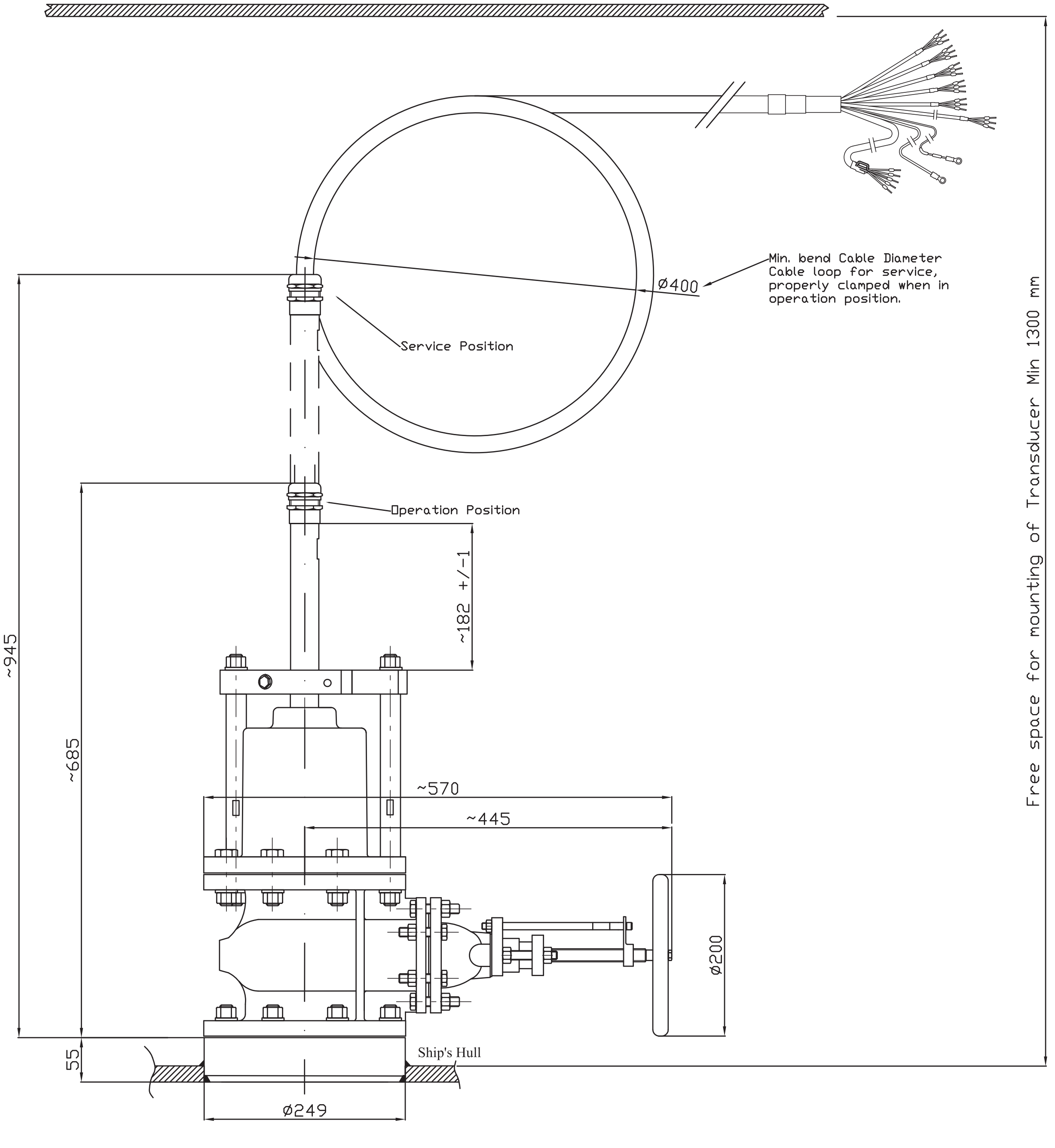
Cabinet location

- The LPU2 cabinet shall be vertically mounted in a location where necessary cabling from bridge equipment can be brought to the unit, preferably on the bridge or a space close to the bridge.
- The location must have space enough to give sufficient space and accessibility for service of the unit.
- The location shall be protected from weather and shall offer a stable temperature.
- The location shall not expose the unit to excessive vibration levels.
- The location shall be far from electrical installations giving excessive electric and/or magnetic fields.
- The cabinet bottom shall be placed approximately 1.2 m from the floor where practical.
- Compass safe distance 2 meters.

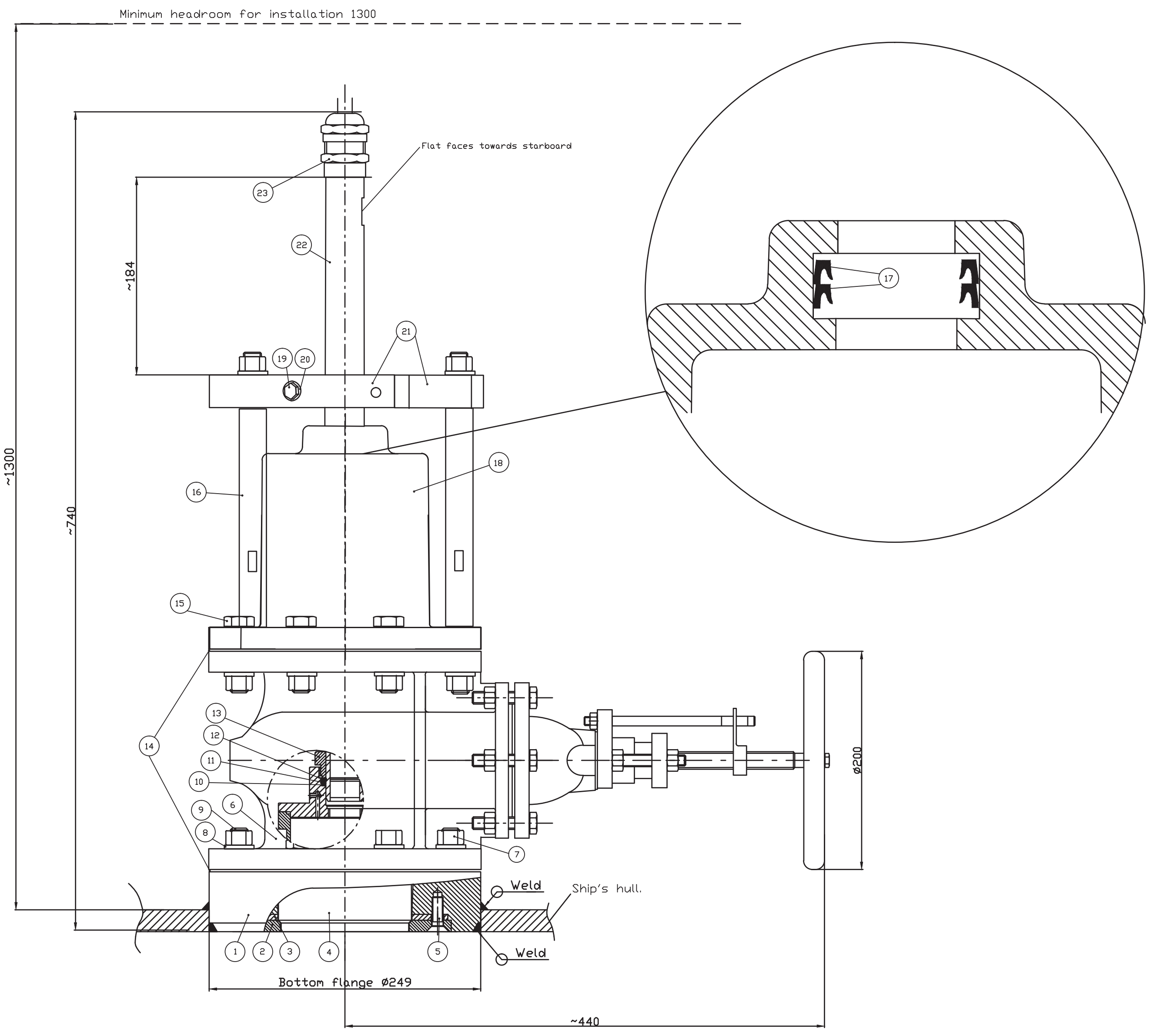
NQA−4480
SIG.DISTRIBUTOR



CFT-780-4 TRANSDUCER(40m)



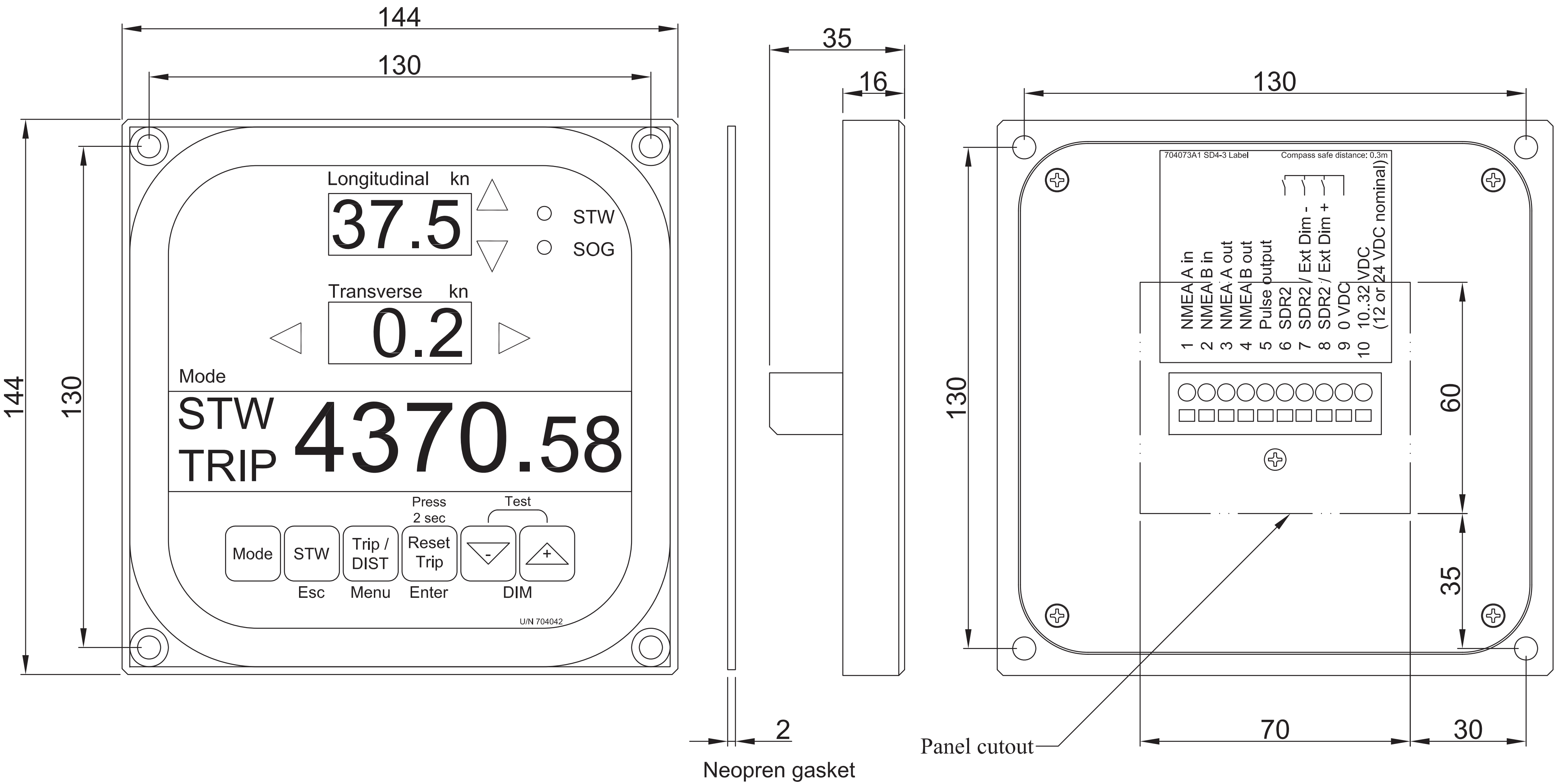
NKF-980 Sea Valve



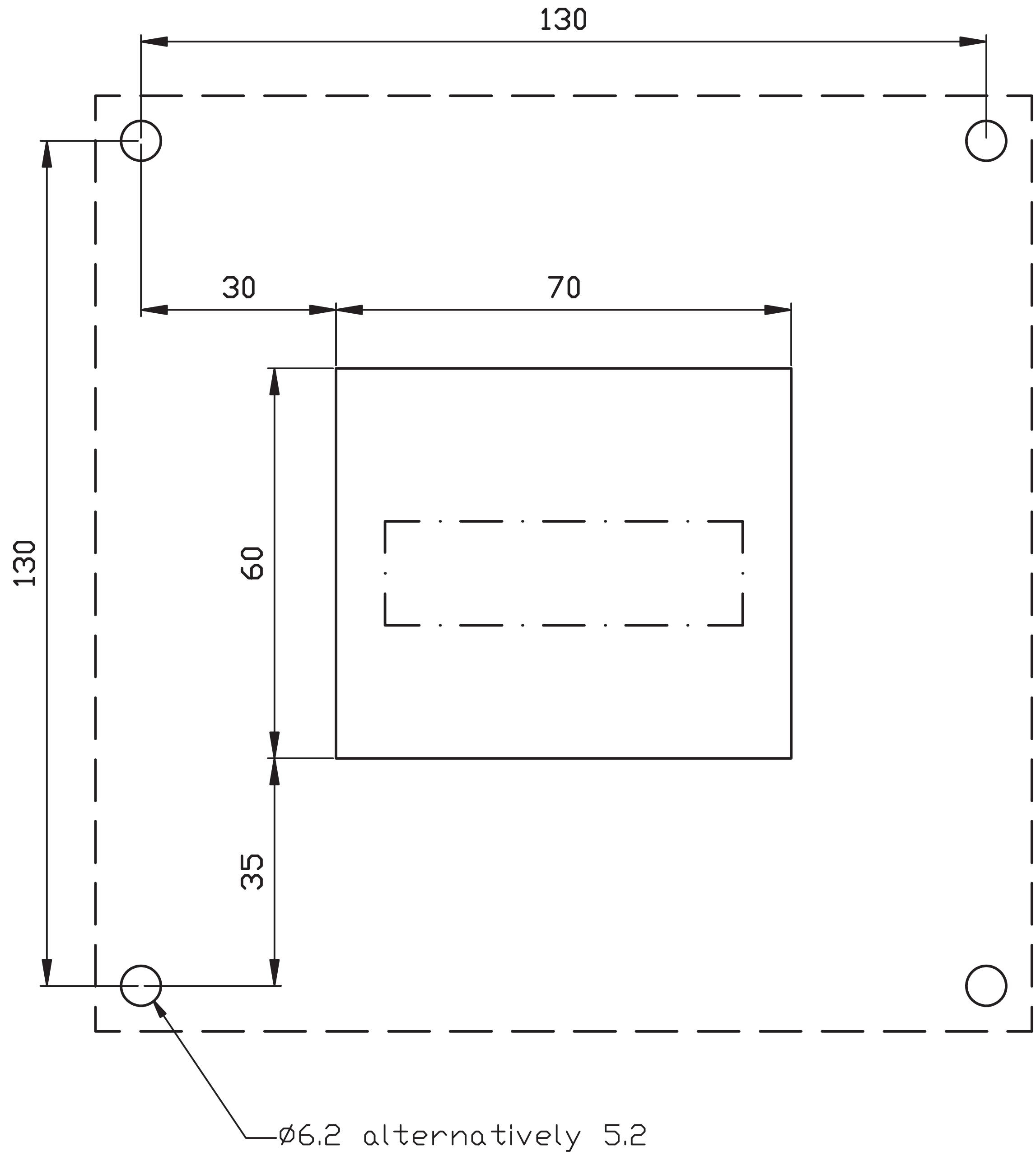
pos.	num.	name	part number
23	1	Cable gland Assy	71–22450–00
22	1	Connecting tube 580mm	71–19839–00
21	2	Tube bracket	5413310
20	2	Spring washer FBB 10.2	5493313
19	2	Screw M6S M10x60	5493312
18	1	Valve cover H	5413320
17	2	Lip Seal / DI 137	00–00500–23
16	2	Bracket Bolt	5413323
15	6	Screw M6S M16x60	71–22023–00
14	2	Flange gasket	71–22186–01
13	1	Nut Tru	71–19832–00
12	1	Locking washer/circlip	71–19834–00
11	1	Washer TRU	71–19835–00
10	1	O-ring 34.52x3.53	00–00730–87
9	8	Stud PS 16x40	71–22021–00
8	18	Spring Washer FBB 16.2	5493311
7	18	Nut M6M M16	5493310
6	1	Sea valve	71–22187–00
5	6	Screw MFS 10x30	00–02104–95
4	1	Transducer with cable 30/40m	704400/01
3	1	Zinc ring	71–22182–00
2	1	Guide ring	71–22181–00
1	1	Bottom flange	5413200

NKF-980 Sea Valve

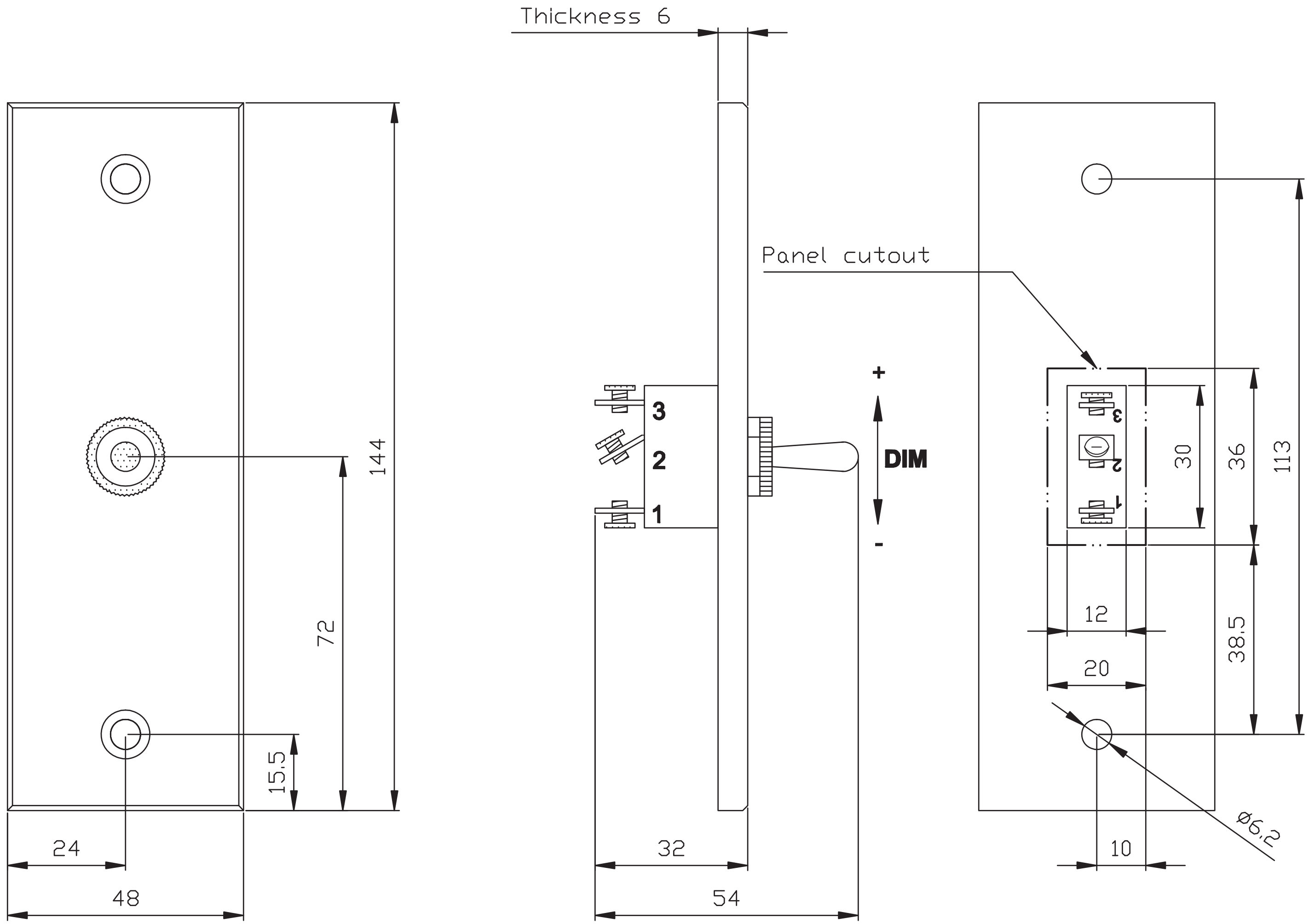
Note! The transducer is not incuded in part no 5493300.



NWW-82 MAIN DISPLAY



DISPLAY PANEL CUT



Weight: 0.15kg

Mechanical mounting:
- 2 x M5x30mm screws and nuts with plastic sealing washer and nuts (included).

1. + Dim up
2. 0VDC
3. - Dim down

NCM-1080 DIMMER UNIT

JLN-900

Description,labels and drawings

Contents

1. Introduction

This section explains how to fulfil the needs for a normal electrical installation of a SAL T2+JLN-900 Speed Log system.

2. Regulations

A complete JLN-900 Speed Log system consists of two separate speed log devices for measuring STW (Speed Through Water) and SOG (Speed Over Ground). The two devices are named "JLN-900 Speed Log STW DEVICE" and "JLN-900 Speed Log SOG DEVICE".

The JLN-900 Speed Log system fulfils the MSC.334(90) regulation requirement of two separate speed logs.

Two NWW-82 displays, one for each device, are mandatory equipment. Both displays are able to show information from both devices simultaneously, since information is shared between the devices. Therefore, the NWW-82 display belonging to the STW device is also able to show SOG, and the NWW-82 display belonging to the SOG device is also able to show STW. This redundancy coupling is illustrated on page 4.

3. Marking of the two devices

The NWW-82 Speed Log Master Display is a mandatory part of the STW DEVICE and the other NWW-82 Display is a mandatory part of the SOG DEVICE. The two displays must be marked with labels to clearly indicate to what device they belong. In every shipment of a JLN-900 Speed Log Sig.Processor a set of four labels is included. The labels should be placed as follows:

Speed Log Master Display

Place it on the panel close to the Speed Log Master Display.

Master

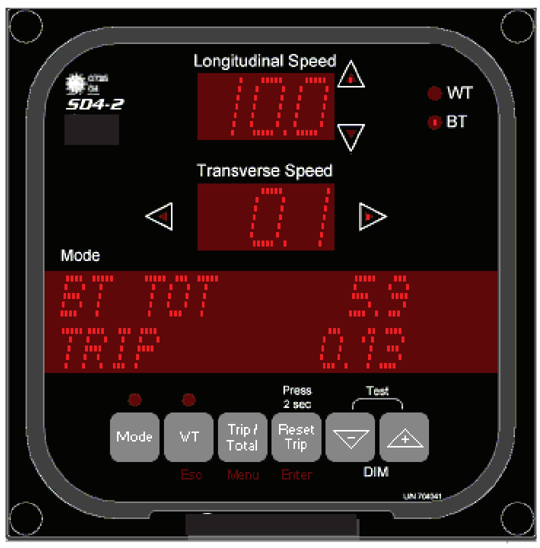
Place it on the surface of the Speed Log Master Display, see example below.

Example:

<u>JLN-900 STW DEVICE</u>

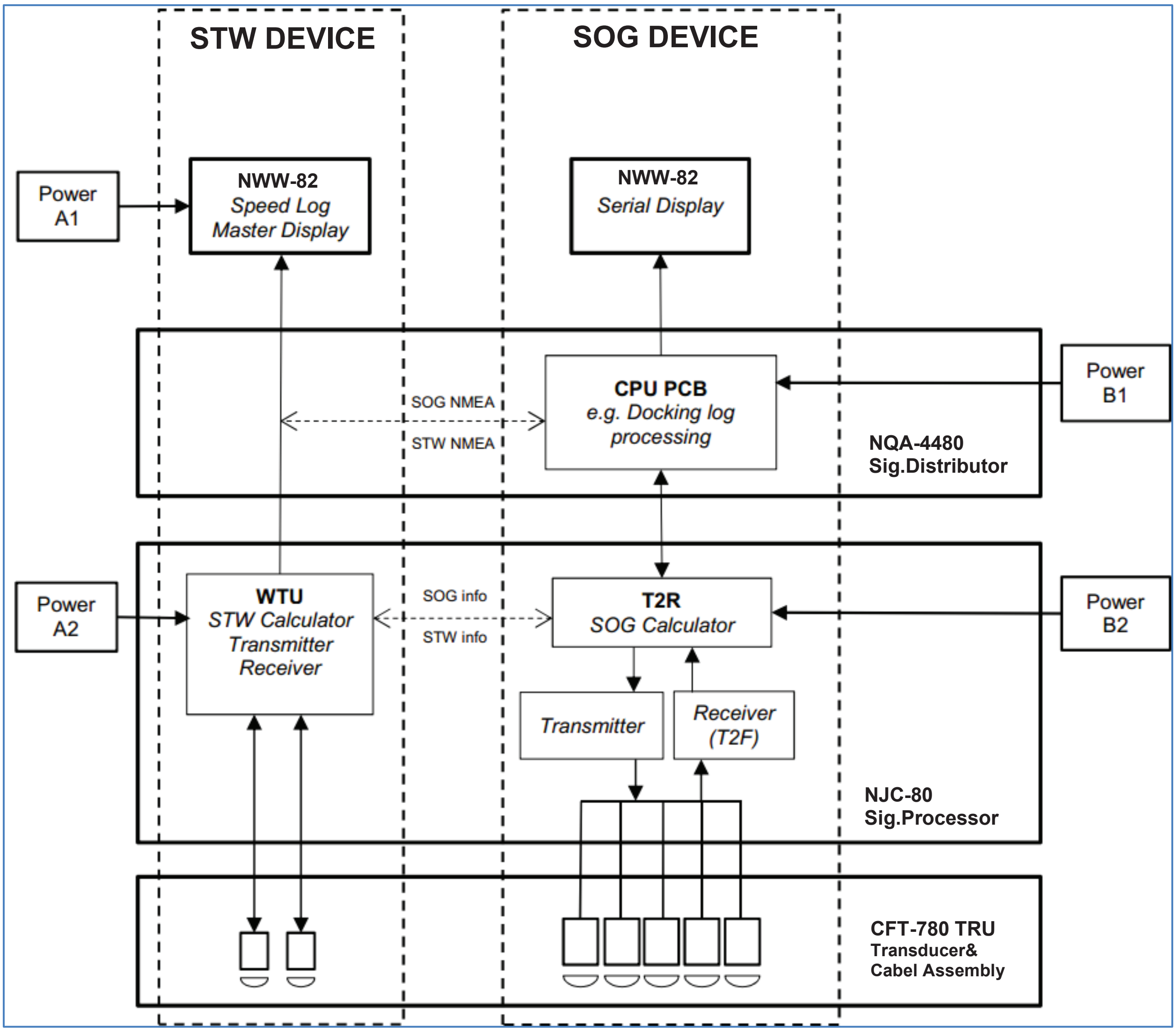
Lavels

<u>JLN-900 SOG DEVICE</u>



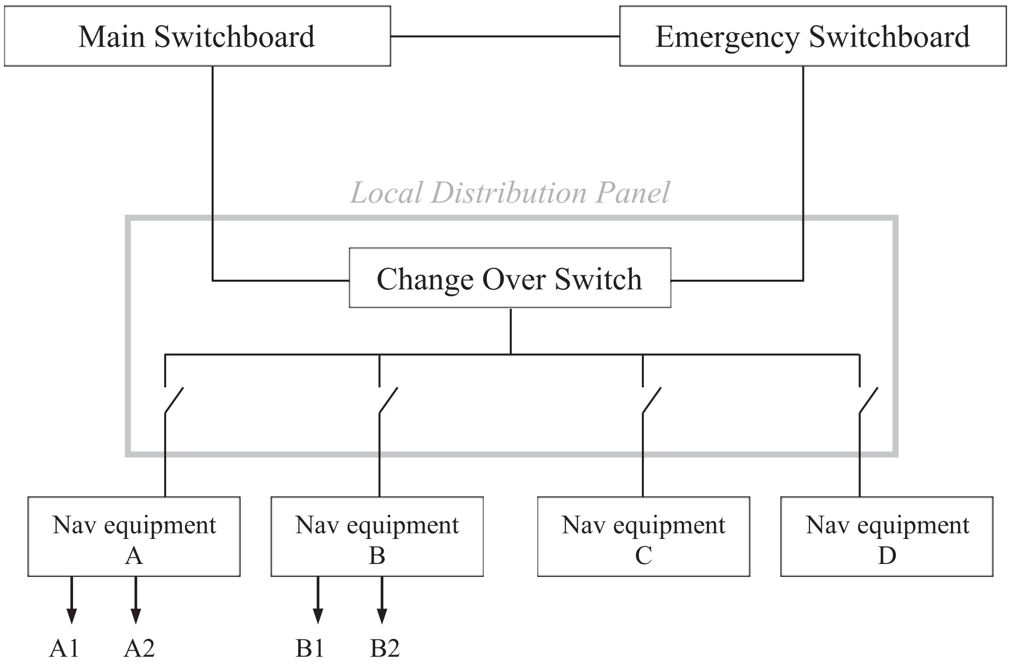
4. JLN-900 Speed Log illustration

The picture below [1] illustrates the separation of the two devices JLN-900 Speed Log STW and JLN-900 Speed Log SOG. The dashed double directional arrows indicate non-critical, independent information exchange.



5. Electrical power supply

The STW Device and the SOG Device should be powered from different sources. The exact connection is dependent on class requirements. The below figure is an example from DNV, C100 Main Electrical Power Supply:



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Annex

JLN-900
Speed Log System Manual

Annex

Table of contents

ANNEX I – EQUIPMENT RECYCLING

RMRS RULES FOR EQUIPMENT UTILIZATION

Following actions to be taken into consideration by the owner according to the paragraph 219 of the ***"Technical Regulations on the Safety of Sea Transport Items"***:

"The safety of decommissioned or subject to utilization sea transport infrastructure item shall be ensured by the owner of such item or operating organization. During this period it is necessary to perform regular monitoring of safety condition of the decommissioned sea transport infrastructure item which has been":

When equipment has to be utilized:

- It should be done according to Recommendations mentioned below.
- The company utilizing ships/ship equipment shall develop appropriate utilization documentation for all equipment where technological process modes, scope and sequence of utilization stages are specified (*ref. to paragraph 160 of the* ***"Technical Regulations on the Safety of Sea Transport Items")***.

Recommendations for utilization of **Speed Log** components according to "**Interim provisions for the application of the Technical Regulations on the Safety on Sea Transport items in the RS activity**":

- Survey of materials and products prior to recycling has to be carried out in conformity with requirements set in paragraphs 158 and 160 of *"****Technical Regulations****"*.
- Report by the established form **6.3.79RF** has to be issued and documentation on recycling has to be approved by the bodies authorized for approval of documentation on recycling in conformity with the legislation specified in subparagraph "**a**" of the paragraph 160 of the *"****Technical Regulations****"*.
- All electrical **Speed Log** components (Speed Log **Sig.Processor**, **TRU** Transducer Unit, Digital display, optional Sig.Distributor and other displays) as well as optional interfaces shall be **switched off** and **disconnected** from their power sources. **TRU** Unit to be disconnected from the speed log **Sig.Processor**.
- All **Speed Log** components (**as above**) interfacing with and/or receiving signals from Navigational Systems and other sources shall be duly **disconnected** from all these systems.
- It is recommended to protect and maintain existing wires/cables and retain for any future upgrade or installation of a replacement system.
- The **Speed Log Sea Valve**, an assembly consisting of purely mechanical/metallic items, is permanently mounted to and forming a part of the bottom hull plating of the ship. It may be left in place with the Sea Valve assured to be in fully closed/tight position. Possibly a blanking flange arrangement might be added as a safety precaution.

- The **TRU Unit**, with its integrated cable, should be dismounted and utilized/recycled as intended or possibly retained for any future upgrade or installation of a replacement system.
- All **Speed Log** components (**as above)** shall be packed into proper cartons/containers for transportation to the utilization company.
- The utilization company considers itself how to utilize and recycle the **Speed Log** components according to Russian Federation rules for utilization of such components and paragraph 219 of the ***"Technical Regulations on the Safety of Sea Transport Items"***.

  Speed Log PCB/Module units can be easily dismounted from their metallic cabinets (i.e. from all units as stated **above**) and utilized/recycled separately as electronic equipment.

ANNEX II – ENERGY SAVING

"Technical Regulations on the Safety of Sea Transport Items", approved by the RF Government Order No. 620 of 12 August 2010, declare following in **Paragraph 6**:

"Designers, builders and manufacturers of sea transport and infrastructure items shall ensure the energy efficiency of such items".

SPEED LOG UNITS AND MODULES

Speed Log Sig.Processor and optional Sig.Distributor are using AC-supply powered from the ship's 230 VAC emergency power supply. The Sig.Processor and optional Sig.Distributor are then feeding other units with internal power providing protection against excessive voltage and interference.

Speed Log Units are developed in accordance with the following guidelines:

- Modular platform design based on re-use of proven hardware architectures yielding stability and reliability.
- Software running under Linux and dedicated processor operating system yielding stability and reliability during normal operation.
- Quality of selected material i.e. recognized brand name components.

The **Speed Log** uses low power dissipation components and is based on solid state technology without moving parts such as rotating storage media and cooling fans. This reduces wear and maintenance to a minimum.

POWER CONSUMPTION CALCULATION

Speed Log, power consumption (example):

1.) Speed log **Sig.Processor**: Power consumption **≤ 300 VA @ 230 VAC.**
2.) Optional Sig.Distributor**:** Power consumption < **115 VA @ 230 VAC** with nine displays.

Total power supply needed: **300 VA (Sig.Processor) + 115 VA (LPU2) = 415 VA.**
Recommended power supply for the mentioned example: **230 VAC, 500 VA.**

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アスベストは使用しておりません
Not use the asbestos

For further information,contact:

JRC Japan Radio Co., Ltd.
Since 1915

URL Head office： http://www.jrc.co.jp/eng/
Marine Service Department
1-7-32 Tatsumi, Koto-ku, Tokyo 135-0053, Japan
e-mail ：tmsc@jrc.co.jp
One-call：+81-50-3786-9201

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