

Sound Signal Surveillance System S 900

User's manual

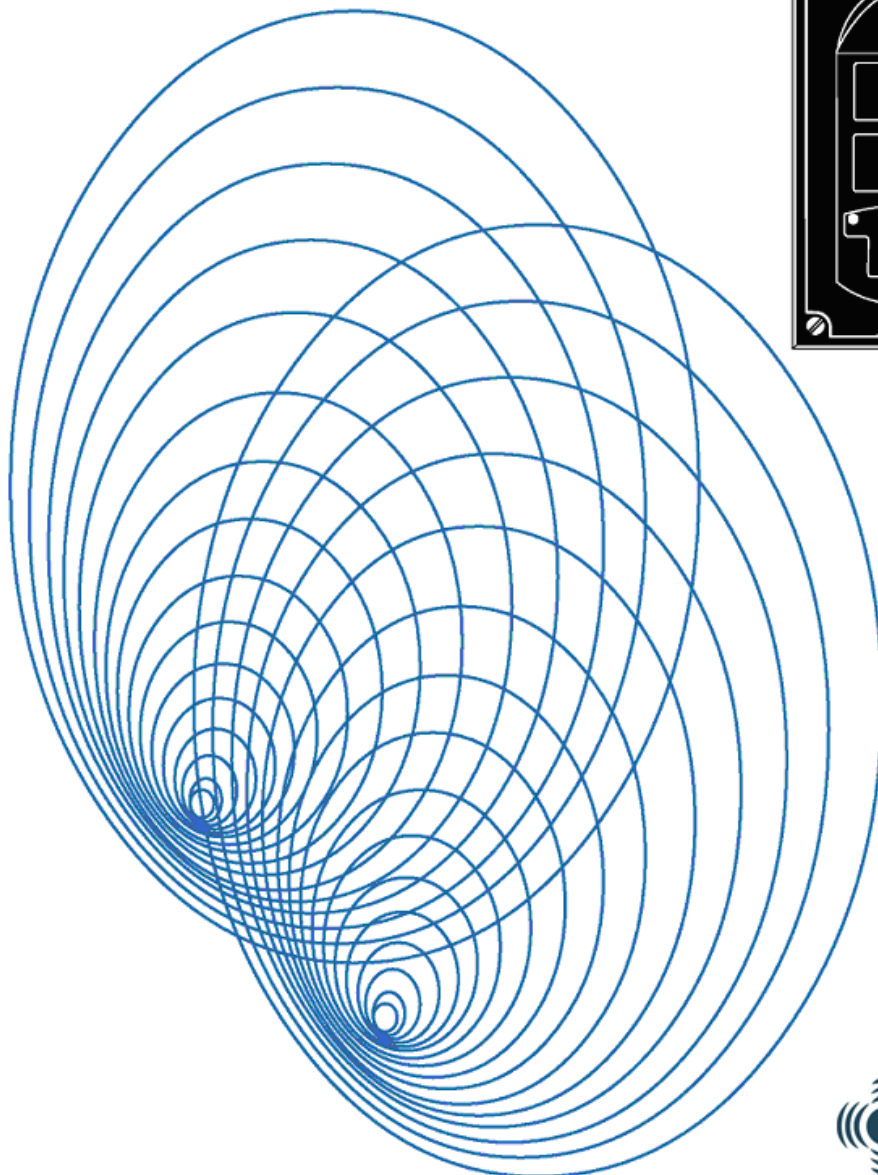


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1. INTRODUCTION

A sound reception system (S 900) consists of one MASTER station, type 900, mounted on the bridge and 2 or 4 distributed microphones, type 901, located at the port and starboard, or port, starboard, fore and aft on the vessel.

The S 900 system will then serve as an acoustical electronic navigational aid to the officer on the watch to hear outside sound signals inside a totally enclosed bridge. This makes him able to alone perform look-out function as required in the International Regulations for Preventing Collision at Sea, 1972.

The system will receive sound signals in all directions in the audio band 70Hz-820Hz and reproduce these incoming signals acoustically inside the bridge.

It will, in a normal 4-microphone installation, indicate the approximate direction of the signals using 4 light indicators on the front panel. The indication will be either of these combinations:

- Fore – starboard
- Fore – port
- Aft – starboard
- Aft – port

The compact design makes the S 900 system easy to install. The space requirement for the Master station S 900 is DIN-standard 144 x 144 mm flush mounted. Wall mounting required a backbox. The S 901 microphone is delivered with mounting bracket and 2m cable for easy termination.

2. GENERAL DESCRIPTION

The S 900 system is delivered as follows:

- S 900, MASTER STATION for max. 4 microphones type S 901
- S 901 MICROPHONE
- External LOUDSPEAKER (optional)
- Wall mounting box (optional)

The MASTER station S 900 contains the electronics required in a sound reception system. 3.

3. FACILITY LIST

S 900:

- Connection for 4 microphones S 901 (port, starboard, fore and aft)
- Built-in wide-band loudspeaker
- Loudspeaker volume control
- Back lighted position LED's (faint green)
- Red direction/activity indicator LED's

- External loudspeaker output connection
- Sensitivity adjustment (one potentiometer per microphone inside the unit)
- Mute circuit for the ships own foghorn
- Configuration dependent squelch function
 - Always open
 - Active microphone channels open only
 - All microphones open during arbitrary activity
- Configuration dependent electronic foghorn bypass-filter 70Hz-850Hz
 - Filter: 12 dB/octave at 850 Hz
 - Filter: 24 dB/octave at 850 Hz
- Configuration dependent LED indicator behaviour
 - Sector direction display – indicating by 2 simultaneous illuminating lights the approximate direction of the sound source.
 - Main direction display – indicating by 1 illuminated light, the main direction of sound source.
 - All direction lights displays individually – **FOR TEST and INSTALLATION PURPOSES**

S 901:

- Condenser microphone for very good reception in the required audio band
- Anti condensing element.
- Robust construction withstands rough environments.

4. INSTALLATION

4.1. Mounting

The master station S 900 is delivered for flush mounting. On request the unit may be delivered with wall-mounting box (option).

Front plate dimensions S 900:	144 x 144 mm (H x
Cut- out dimensions for flush mounting:	115 x 115 mm (H x
Depth, flush mounted:	100 mm
Depth, wall mounted:	100 mm

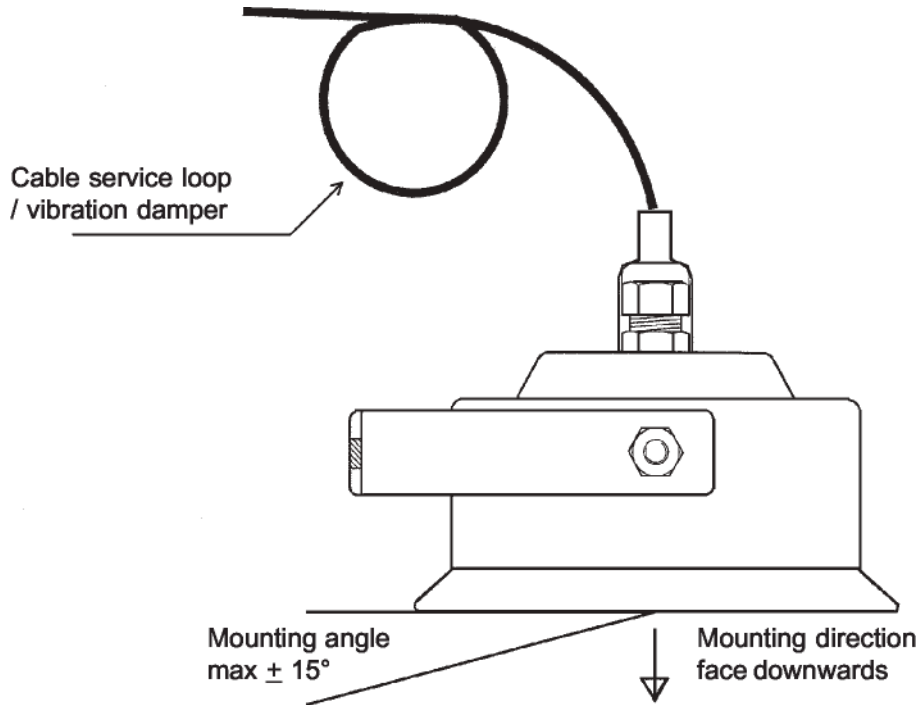
IMPORTANT:

The S 901 microphone unit must be mounted according to the drawing shown in figure 1. This is important to prevent water penetration and corrosion.

Special care must be taken to locate the microphone units to a silent place, with least possible wind noise and without a direct sight line from the exhaust funnel or other noise sources to the microphones vibrations from the ship.

The cable must be looped in the microphone end to make service possible and to reduce the risk of vibration transmission through the cable.

FIGURE 1. S 901 mounting orientation.

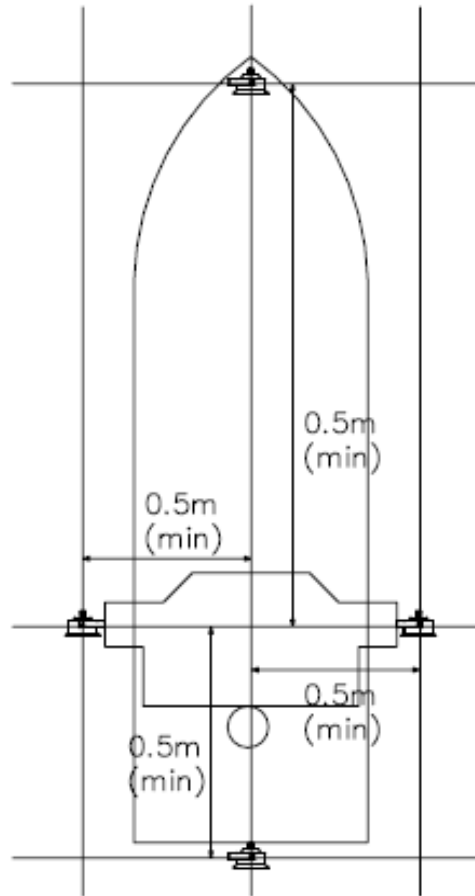


4.2. S 901 relative mounting distance

In order to achieve sufficient sound direction detection control there is a requirement for a **minimum** distance between the microphone units S 901. This relative minimum distance from each microphone to the centerline is 0.5m.

Please see figure 1b for a graphical illustration.

FIGURE 1b. S 901 relative mounting distance



4.3. Cable requirements

Cable between master S 900 and Microphones S 901:	Two pairs individually twisted, outer screen.
Power cable:	Single pair, twisted, outer screen.
To external loudspeaker:	Single pair, twisted, outer screen.
Minimum conductor area all cable types:	0.75 <u>sq. mm.</u>

IMPORTANT:

**TO SECURE UNINTERFERED OPERATION, DO NOT COMBINE SIGNAL CABLES WITH OTHER CABLE TYPES SUCH AS MAINS SUPPLY etc.
THE CABLING FOR THE SOUND RECEPTION SYSTEM SHOULD BE A SEPARATE NETWORK.**

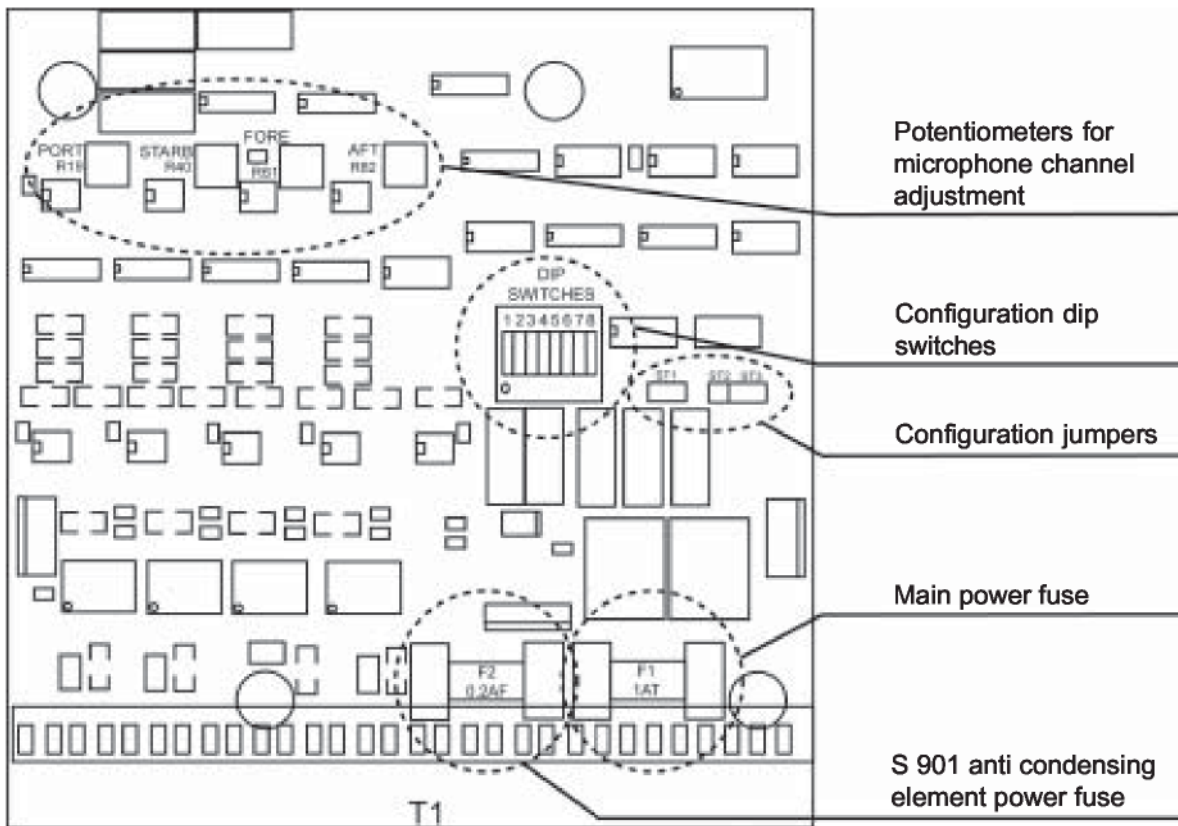
THE MICROPHONES MAY BE DAMAGED IN CASE THE 4 WIRES ARE EXCHANGED AND SPECIAL CARE MUST BE TAKEN TO TERMINATE ACCORDING TO THE DIAGRAM.

4.4. Configuration

The S 900 have some configuration settings in order to make a very flexible system. These configuration alternatives can be selected by internal jumpers and DIP switches.

IMPORTANT:
SPECIAL CARE MUST BE TAKEN WHEN OPERATING INTERNAL JUMPERS AND DIP SWITCHES AS THE PCB CONTAINS LIVE ELECTRONICS. PREFERABLY POWER SHOULD BE TAKEN OFF THE UNIT IN ADVANCE OF OPENING.

FIGURE 2. S 900 PCB layout/location drawing



4.4.1. Dip switches
INPUT FILTERING:

DIP SW			Description
3	2	1	
0	0	0	No function
0	0	1	No microphone lowpass filter/ not valid for type approval DNV
0	1	0	12 dB/octave low pass filter / 820 Hz
0	1	1	No function
1	0	0	24 dB/octave low pass filter / 820 Hz
1	0	1	No function
1	1	0	No function
1	1	1	No function

LED BEHAVIOUR:

DIP SW		Description
5	4	
0	0	Sector direction display – indicating by 2 simultaneous illuminating lights the approximate direction of the sound source. This functionality requires four microphones (S 901) installed (PORT, STB, FORE and AFT).
0	1	Main direction display – indicating by 1 illuminating light, the main direction of the sound source. Both 2 and 4 microphones can be used in this application.
1	X	All direction lights display individually – FOR TEST and INSTALLATION PURPOSES

SQUELCH / LOUDSPEAKER BEHAVIOUR:

DIP SW		Description
7	6	
0	X	Always ON, except during MUTE (external input)
1	0	All microphone channels ON during arbitrary activity
1	1	Active channel ON only

OTHERS:

DIP S	Description
8	
X	No operation / prepared for future use

FACTORY SETTING:

FACTORY DIP SWITCH SETTING							
8	7	6	5	4	3	2	1
0	1	1	0	0	1	0	0

4.4.2. Jumpers

LOUDSPEAKER OPERATION:

JUMPER ST 1	Description
ON	Enable internal loudspeaker (alone or in addition to an external loudspeaker)
OFF	Disable internal loudspeaker (external loudspeaker only)

LED LIGHT BRIGHTNESS:

JUMPER		Description
ST 3	ST 2	
OFF	ON	The intensity is controlled by an external potentiometer connected to the PCB connector J2.6 & J2.7
ON	OFF	Normal preset intensity

FACTORY SETTING

FACTORY JUMPER SETTING		
ST 3	ST 2	ST 1
ON	OFF	ON

5. INSTALLATION PROCEDURE

In order to maximise the performance of the system, each installation must be configured and adjusted on site. In most cases the configuration of DIP switches and jumpers can be kept in the factory set positions, but customer requirements may require different settings.

Each microphone channel must be separately adjusted. Inside the unit there are 4 potentiometers available, one per channel. The potentiometers are of multiturn type with 15 turns from max to min.

- In order to adjust the microphone channels properly, the DIP switches must be set to INSTALLATION MODE:

Installation mode							
8	7	6	5	4	3	2	1
0	0	0	1	0	X	X	X ¹

¹The adjustment of the microphones must be done with the appropriate microphone filter selected.

In this mode all LED's will work independently of each other with.

The system must be powered up and set to work. The surrounding noise level should be as close to the real operating conditions as possible. Avoid adjustments during unnatural noise situations.

- Adjust each channel's potentiometer counter clockwise until the corresponding LED LIGHT UP. Or clockwise until it turns off and then carefully counter clockwise until it LIGHTS UP again.

This sets the activation threshold level equal to the surrounding noise floor.

- To set the final working threshold level, finally turn the potentiometer ½ turn clock wise.

The adjustment procedure must be repeated for all installed microphone channels. In case there are uninstalled channels the respective potentiometers must be turned 10 times clockwise to disable.

- Set the DIP switches back to normal (factory or customer specified) before test and finalisation.

Nota bene!

The installation and the adjustment of the system are verified by using the handheld SIGNAL HORN supplied with the system.

Move 100-150 meters away from the ship and activate the signal horn. Verify an audible and visual indication. If possible move around the ship to verify direction indication.

6. OPERATION AND FUNCTIONALITY DESCRIPTION

The S 900 system is operative as soon as the power is connected. Most of the functionality is configurable with DIP switches and jumpers inside the unit. It is intended these are set according to the customer's requirements in the installation phase. They can also be set as a reconfiguration of the system, but this may require an additional re-adjustment of activation threshold limits. Other functions are installation dependent. The S 900 contains very few operator controls and are very easy to operate.

6.1. Main system configuration (internal configuration/installation dependent)

The S 900 system can operate with 3 different microphone configurations. It will, however not comply fully with the IMO regulation MSC 70/23/Add.2 in more than the factory set configuration.

COMPLIANT:
(FACTORY SETTING)

- 4 microphones installed – port, starboard, fore and aft;
- Sector direction display using 2 simultaneous illuminating LED's to indicate approximate direction. DIP switch 4 OFF / DIP switch 5 OFF.

NOT FULLY COMPLIANT:

- 4 microphones installed – port, starboard, fore and aft;
- Main direction / 360° display using only 1 illuminating LED. DIP switch 4 ON / DIP switch 5 OFF.

NOT COMPLIANT:

- 2 microphones installed – port, starboard
- Main direction / port / starboard display using only 1 illuminating LED. DIP switch 4 ON / DIP switch 5 OFF.

6.2. Microphone circuit filter configuration (internal configuration)

In order to customise the audio reproduction, 3 different filter configurations are available.

- Flat frequency response – reception close to reality. DIP switch 1 ON / DIP switch 2 OFF / DIP switch 3 OFF (FACTORY SETTING)
- Medium filter response, 12dB / octave / 850 Hz – some hollow sound letting in mostly fog horn sounds. DIP switch 1 OFF / DIP switch 2 ON / DIP switch 3 OFF
- Maximum filter response 24dB / octave / 850 Hz – hollow sound letting in only fog horn sounds. DIP switch 1 OFF / DIP switch 2 OFF / DIP switch 3 ON

6.3. Squelch / loudspeaker behaviour (internal configuration)

It is also possible to configure some alternatives for the behaviour of the loudspeaker (internal/external).

- Always on – except during mute from the ships own foghorn. DIP switch 7 OFF.
- Muted during no activity, all microphones are monitored during arbitrary activity. DIP switch 6 OFF / DIP switch 7 ON.
- Muted during no activity, only the microphones on the active microphones are monitored during activity. DIP switch 6 ON / DIP switch 7 ON. (FACTORY SETTING)

6.4. Loudspeaker connection (installation dependent)

The S 900 is prepared for connection of external loudspeaker(s). Terminals are provided for this purpose with the capacity of driving an 8 Ohms loudspeaker.

With an external loudspeaker connected the internal loudspeaker can be disabled. This is done during installation by removing the jumper ST1.

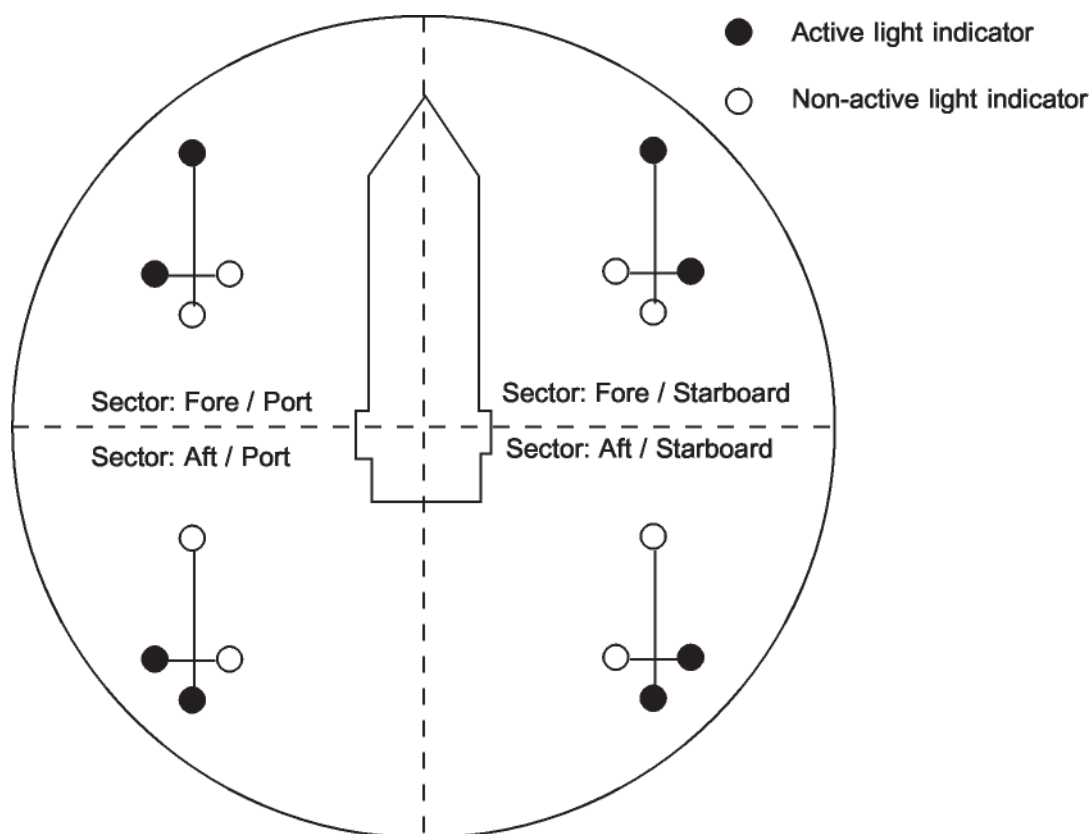
6.5. Master station S900 volume adjustment (operator control)

The volume knob does the volume adjustment, clockwise from silent to maximum. Both the internal and, if connected, the external loudspeaker is affected by the volume adjustment.

6.6. LED indicators (operator control)

The LED indicators are bicolour green and red. The green light is faint and serves as backlighting of the panel. The red lights are bright and indicate activity direction. The indication modes are described in the previous chapter; 6.1. Figure 3 shows LED sector versus sound source directions.

FIGURE 3. LED sector indication diagram



6.7. System mute (installation dependant)

There is provided terminals for connection of an external system mute facility. This is meant for the ships own foghorn circuit. The requirement is a dry closing contact input. A mute will have approximately 3 sec. release time after the activation. It will mute both the LED's and the loudspeaker.

6.8. LED indicator intensity control (optional)

The system is prepared for light intensity control. With an external or internal potentiometer connected internally the light intensity can be adjusted from minimum to maximum. The intensity control affects both the green backlight and the red direction indication light. The implementation of the LED intensity control also requires the jumper ST3 to be moved to ST2.

7. TECHNICAL DATA

S 900

Operation voltage	20-30 VDC
Current drain:	300mA typical / 1A maximum continuous / 2A short peak

Main fuse:	1 AT
Anti condensing element fuse:	200mA F

Frequency range:	70-5KHz / 70-280Hz (configuration dependent)
Internal loudspeaker output power (max):	5W
External loudspeaker impedance	>8 OHM
Mute input:	Dry closing contact

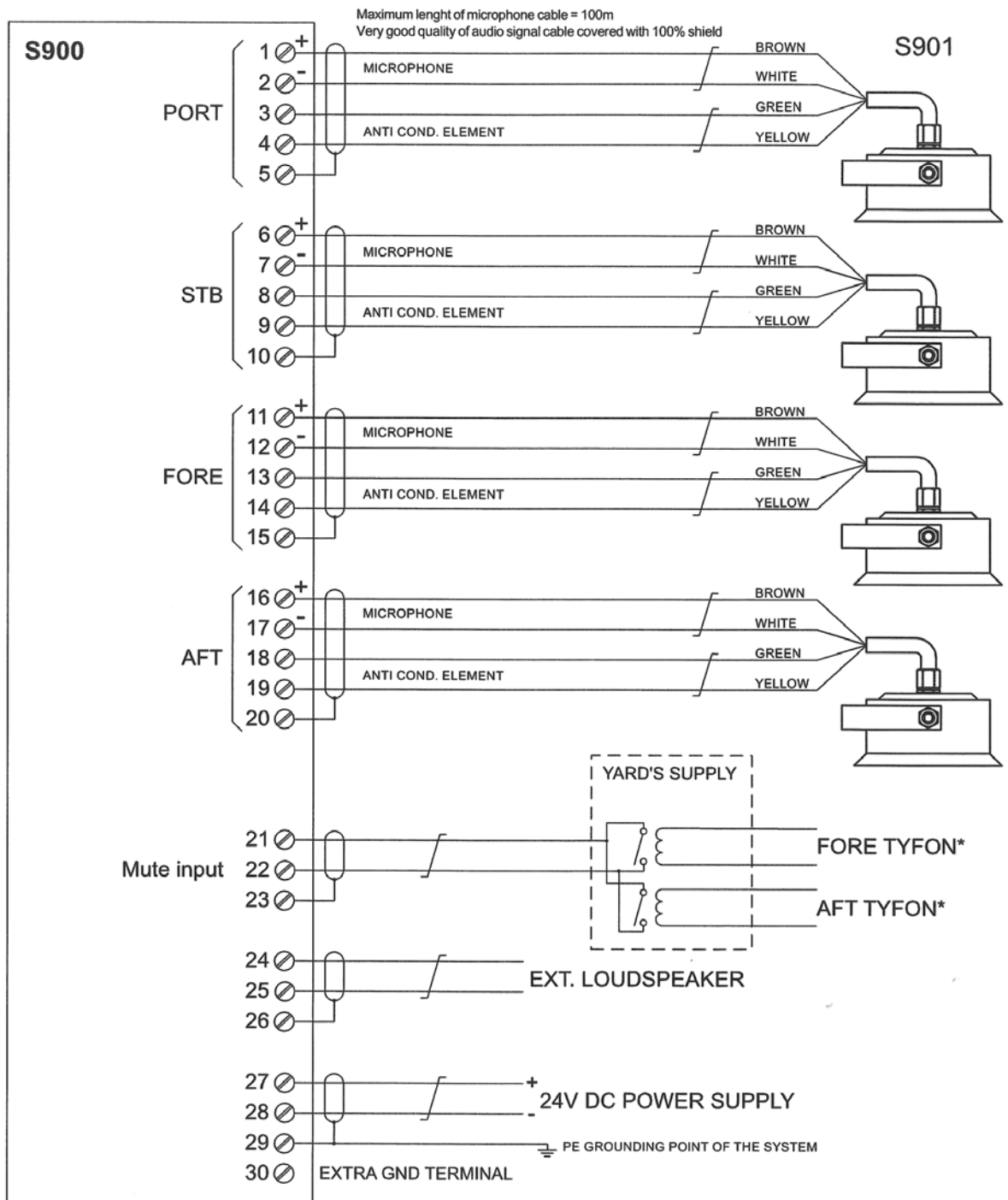
Microphone capacity:	4 pcs.
Weight:	0.75kg

S 901

Microphone:	
Type:	Condenser microphone element
Bias (max):	10V / 0.5 mA
Frequency bandwidth (min):	20Hz – 20kHz
Signal level (typical):	5mV

Anti condensing element:	
Operation voltage:	24VDC
Power dissipation:	750mW
Weight:	0.5kg

8. ELECTRICAL INSTALLATION

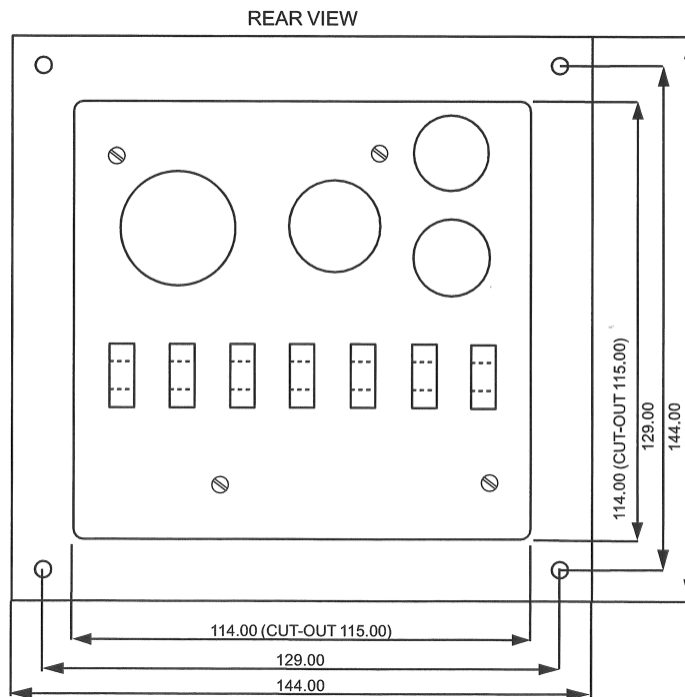
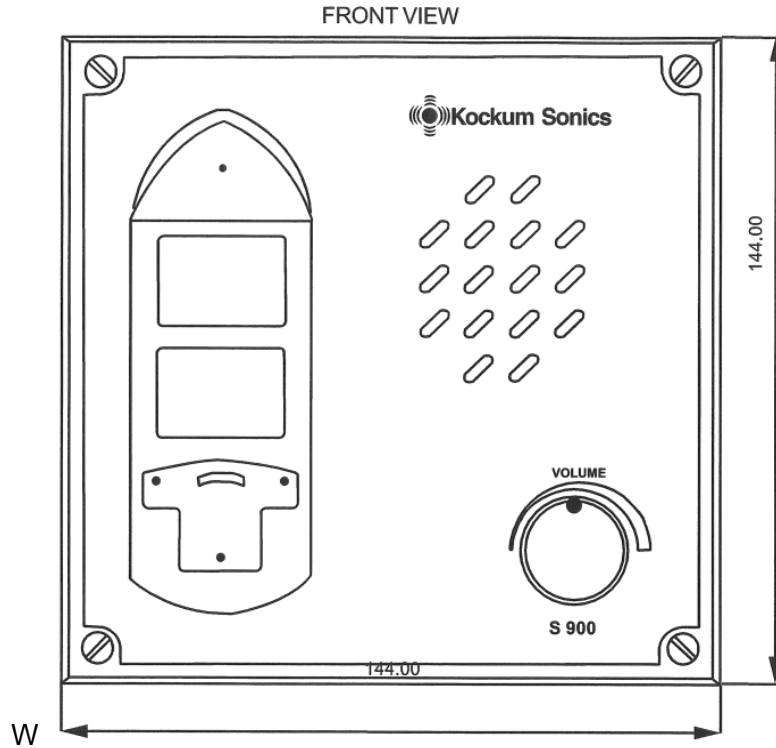


* Note!

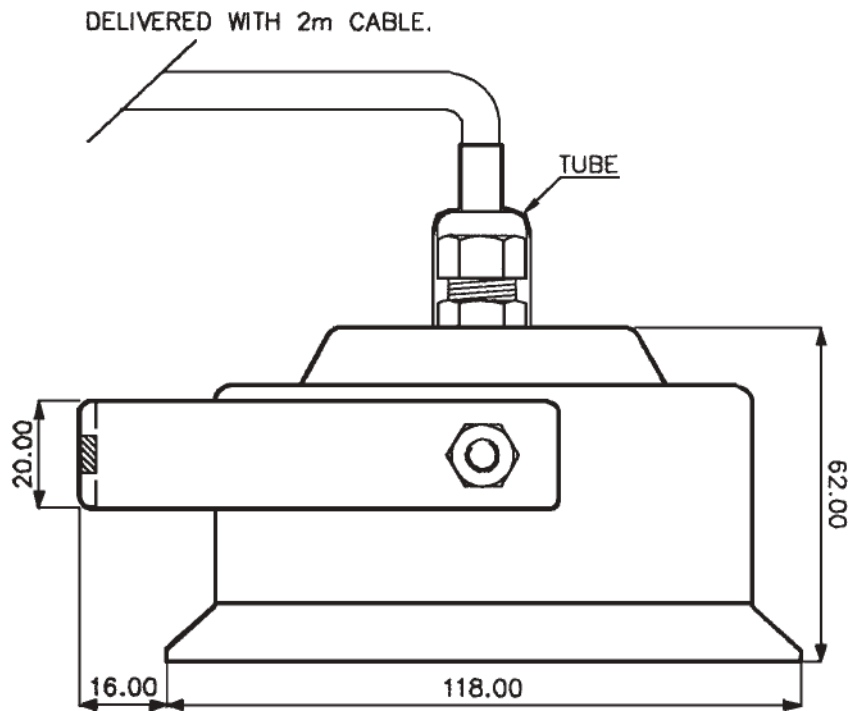
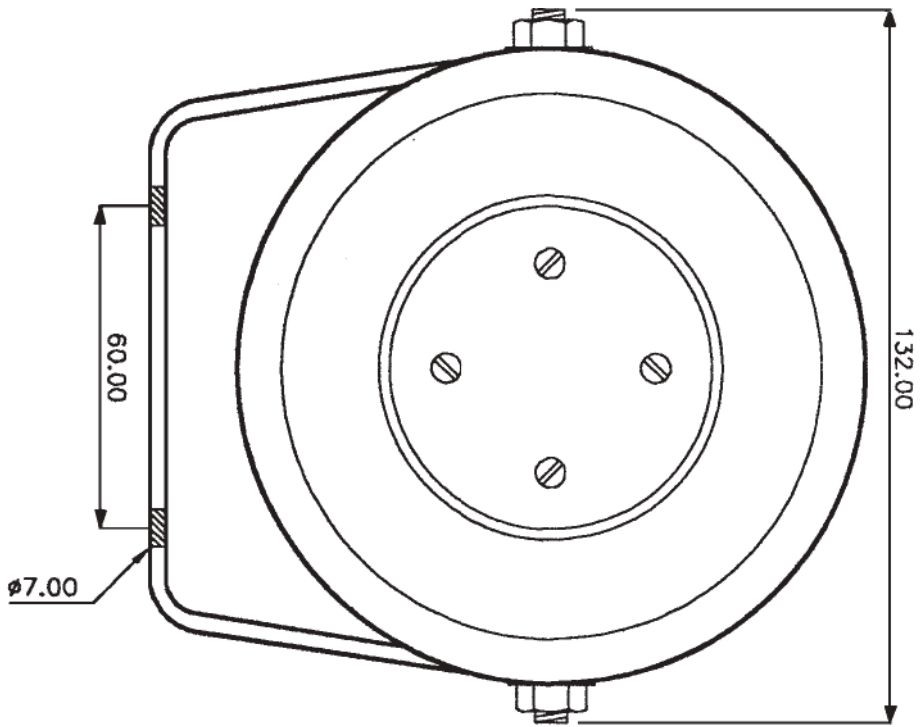
To be connected in parallel to existing whistle solenoids, i.e. to all whistles that should be muted.

9. MECHANICAL DIMENSION

9.1. S900, main unit



9.2. S901, microphones



10. APPENDIX-APPROVALS



DET NORSKE VERITAS

TYPE EXAMINATION CERTIFICATE

CERTIFICATE NO. A-10013
This Certificate consists of 2 pages

This is to certify that the
Sound Reception System

with type designations
Phontech SR8200 or Kockum Sonics S900

Manufactured by
Phontech AS
HORTEN, Norway

is found to comply with

IMO Res. MSC.86(70) Annex 1, Recommendation on Performance Standards for
Sound Reception Systems
IMO Res. A.694(17), General requirements for shipborne radio equipment forming
part of the global maritime distress and safety system (GMDSS) and for electronic
navigational aids

Place and date
Høvik, 2006-06-30

for DET NORSKE VERITAS AS

This Certificate is valid until
2010-06-30



Local Office
DNV Sandefjord

Jan Tore Grimsrud
Jan Tore Grimsrud
Surveyor

Olaf Jansen
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Head of Section

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Examination Certificate and not to the approval of equipment/systems installed.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Cert. No.: A-10013
Case No.: 262.1-001707-1

Product description

- One SR8200, MASTER STATION
- Four SR8201 MICROPHONEs

Location

(protected)
(exposed)

Applications/Limitations

- The SR8200 and the four SR8201 are to be installed in accordance with the installation procedure described in Doc.No.97802-000-DE.
- Cabling: twisted pair $\geq 0,75 \text{ mm}^2$, screened

Type Approval documentation

- Handbook for sound reception system SR8200, Document 97802-00-DE, Rev.no.5.
- Sound reception system, master station board circuit diagram. Drawing: 97802-006-CD.
- EMC Testing of Sound reception system, type SR8200. Report no: 2002-3357.
- Environmental testing of Sound reception system, type SR8200. Report no: 2003-3331.
- Performance test, MSC 86-70-1.doc.

Tests carried out

- Performance testing for compliance with MSC. 86(70) annex 1
- Environmental testing: IEC 60945 (2002)

Marking of product

- Phontech SR8200, or
- Kockum Sonics S900
- Serial number

Certificate retention survey

A retention survey is to be carried out during the year 2008 and again upon renewal of this certificate.

The scope of the retention/renewal survey is to verify that the production quality conditions stipulated for the type approval are complied with and that no alterations are made to the product design or its components and/or materials without appraisal by the Society.

END OF CERTIFICATE

