

ZÖLLNER – Safety for today and tomorrow. World wide.

ZET-HORN[®]
MAKROFON[®]
ZETFON[®]

Safety for today and tomorrow. World wide.

Index

- 03. TECHNICAL DETAILS OF SOUND SIGNAL APPLIANCES COLREG 1972
- 04. / 05. ZET-HORN
- 06. MAKROFON
- 07. ZETFON
- 09. POSITIONING OF WHISTLES ON BOARD OF A VESSEL
- 10. AUTOMATIC SIGNAL CONTROLS
- 11. BELL AND GONG
- 12. SOUND RECEPTION SYSTEM
- 13. WHISTLES FOR INLAND VESSELS
- 14. SOUND SIGNAL APPLIANCES FOR OFFSHORE STRUCTURES
- 15. SUPERIOR LINE FOR LUXURY YACHTS



Full information at: www.zoellner.de



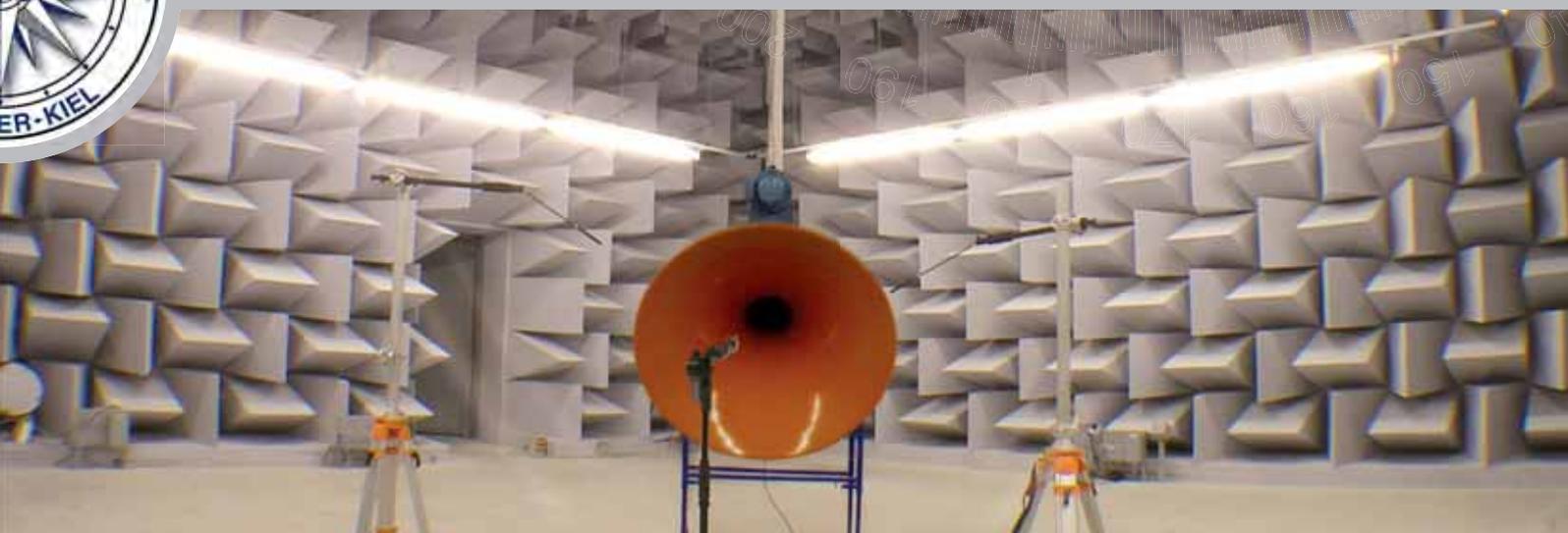
TECHNICAL DETAILS OF SOUND SIGNAL APPLIANCES COLREG 1972

Technical details of sound signal appliances are specified in Annex III of the "International Regulations for Preventing Collisions at Sea, 1972" (COLREG). Among others the rules 1(b) and 1(c) of Annex III define fundamental frequencies and intensities of sound signals in relation to the length of the vessel, they read as follows:

Class	length of vessel (meters)	limits of fundamental frequencies (Hz)	1/3rd-octave band level at 1m (0 dB referred to $2 \times 10^{-5} \text{ N/m}^2$)	Audibility range (nautic miles)
I	200 or more	70-200	143	2
II	75 but less than 200	130-350	138	1,5
III	20 but less than 75	250-700	130	1
VI	less than 20	180-450 450-800 800-2100	120 115 110	0,5 0,5 0,5

All ZÖLLNER sound signal appliances for sea going vessels - ZET-Horn, Makrofon, ZETFON – comply with the requirements of the COLREG 1972. They have a wide range of frequencies with many higher harmonics for best possible penetration of noise disturbances. Even at a stage where the actual fundamental frequency is being absorbed by the noise level, it is the residual sound that builds up the keynote in the human ear. The presence of only two higher harmonics make the human ear perceive the fundamental frequency.

With design and performance standards determined by the COLREG 1972, it goes without saying that all ZÖLLNER whistles meet the requirements and this is given proof of by the type approval certificates from numerous international maritime authorities such as the BSH Germany, NMD Norway, RINA Italy, CCS China, RMRS Russia, just to name a few.



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ZET-HORN

The ZET-Horn essentially consists of a piston inside a cylinder driven by an AC 3-phase motor and a joining sound horn. The piston oscillates at a certain frequency making the air inside the sound projector vibrate in resonance to produce a clean sound audible over a wide range. Higher amplitudes of the harmonics ensure best possible penetration of the normal background noise level on board. The ZET-Horn has a run-up time of less than 0.15 seconds which guarantees a pure, concentrated sound with best directional properties.

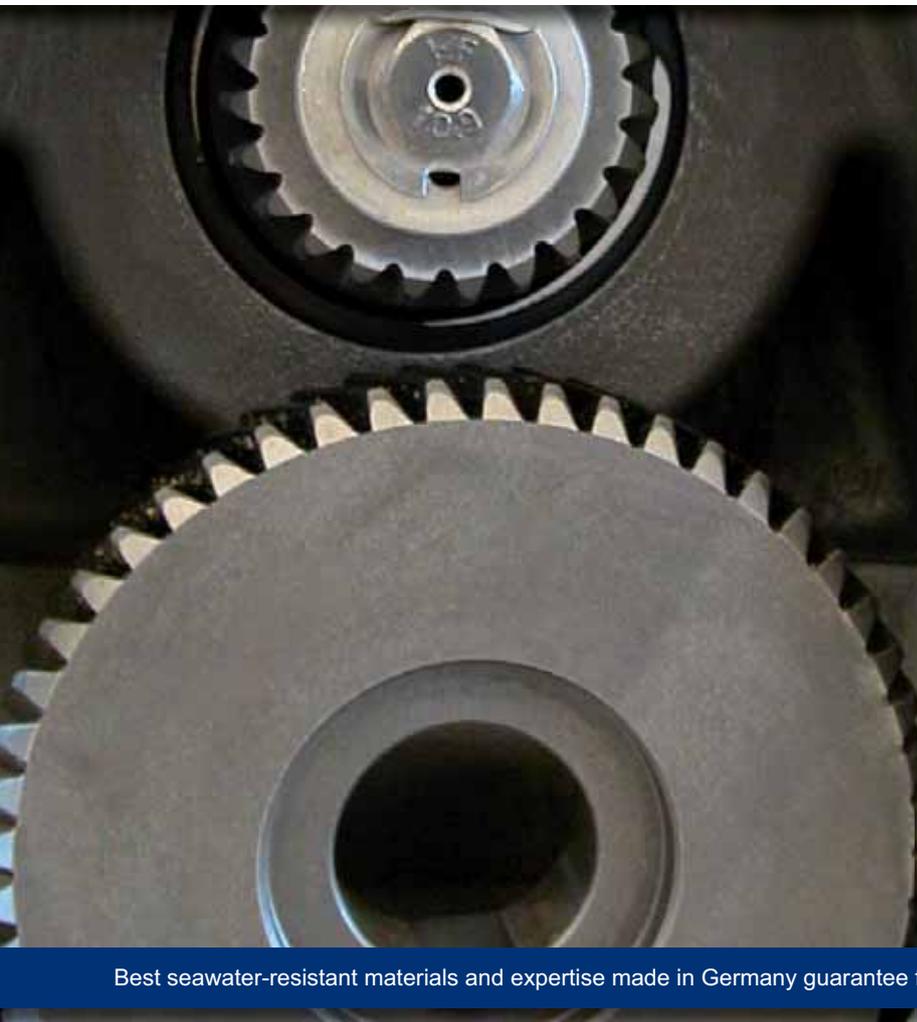
The following ZET-Horns are available:

Class I - vessels of 200 m or more in length

- | | |
|--|---|
| 1. ZET-Horn 110 AC, sound frequency 110 Hz | 143 dB in 1/3 rd -octave band level at |
| 2. ZET-Horn 90 AC, sound frequency 90 Hz | 1 metre referred to 2×10^{-5} N/m ² |
| 3. ZET-Horn 70 AC, sound frequency 70 Hz | |

Class II – vessels of 75 metres but less than 200 metres in length

- | | |
|--|---|
| 1. ZET-Horn 141 AC, sound frequency 140 Hz | 138 dB in 1/3 rd -octave band level at |
| 2. ZET-Horn 131 AC, sound frequency 130 Hz | 1 metre referred to 2×10^{-5} N/m ² |



Best seawater-resistant materials and expertise made in Germany guarantee first class, reliable products with extremely long service life.

ZET-HORN

The ZET-Horn was the first AC 3-phase driven piston-diaphragm sound transmitter ever produced. Standard appliances are available for connection to all common 3-phase voltages. Special arctic and military designs are available, same as high-end units for luxury yachts.

ZET-Horn 131 AC
BSH/4615/6021096/09



ZET-Horn 90 AC
BSH/4615/6021094/09



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MAKROFON

The Makrofon is a compressed air or carbon dioxide powered diaphragm sound transmitter. It is most commonly installed on board of all types of vessels and rail vehicles. Makrofons are reliable whistles distinguished by their low air consumption, strong sound intensity and wide range of audibility. Due to the simple and solid design, Makrofons are practically maintenance-free. The diaphragm casings are exclusively made of bronze or brass, seawater resistant plastic is used for the protective cover only. For vessels the sound frequencies of Makrofons range between 90 Hz and 370 Hz and go up to 660 Hz for rail vehicles and may exceed 1000 Hz for alarm purposes.

The following Makrofons are available: (selection reduced to types for seagoing vessels)

Class I - vessels of 200 m or more in length

- | | |
|--|--|
| 1. Makrofon ZM 200/110b Hz, sound frequency 110 Hz | 143 dB in 1/3 rd -octave band level at |
| 2. Makrofon ZM 200/ 90b Hz, sound frequency 90 Hz | 1 metre referred to $2 \times 10^{-5} \text{ N/m}^2$ |

Class II – vessels of 75 metres but less than 200 metres in length

- | | |
|---|--|
| 1. Makrofon M 125/160b Hz, sound frequency 160 Hz | 138 dB in 1/3 rd -octave band level at |
| 2. Makrofon M 125/130b Hz, sound frequency 130 Hz | 1 metre referred to $2 \times 10^{-5} \text{ N/m}^2$ |
| 3. Makrofon M 75F/260 Hz, sound frequency 260 Hz | |

Class III + IV – vessels of less than 75 metres in length

- | | |
|---|--|
| 1. Makrofon M 75F/260 Hz, sound frequency 260Hz | 130 dB 1/3 rd -octave band level at |
| 2. Makrofon M 75F/370 Hz, sound frequency 370Hz | 1 metre referred to $2 \times 10^{-5} \text{ N/m}^2$ |



Makrofon ZM 200/110b ZVEH
BSH/4615/6021098/09

Makrofon M 75F/260 ZVEH
BSH/4615/6029395/09

ZETFON

The ZETFON is an electronic sound transmitter. It consists of the ZETFON (sound emitter) itself mounted on the mast and a control and amplifier unit for wheelhouse installation. The control and amplifier unit contains all electronic components including the heavy transformer. This way heavy weight on the mast is avoided and vital components are within easy reach.

The ZETFON is an economic alternative to air whistles on small vessels without air compressor.

The following ZETFONS are available:

Class III – vessels of 20 metres but less than 75 metres in length

- | | |
|-------------------------|---|
| 1. ZETFON 300/310 DC | 130 dB in 1/3rd-octave band level at |
| 2. ZETFON 400/310 AC/DC | 1 metre referred to 2×10^{-5} N/m ² |

Class IV – vessels of less than 20 m in length

- | | |
|--------------------|---|
| 1. ZETFON 120/330K | 120 dB 1/3rd-octave band level at |
| 2. ZETFON 50/650K | 1 metre referred to 2×10^{-5} N/m ² |

ZET-Horn, Makrofon and ZETFON alike also find wide application as danger alarm systems in all kinds of industrial plants and on offshore structures.



ZETFON 400/310
DHI/49/26P/83

ZETFON 300/310
BSH/4615/6021225/09



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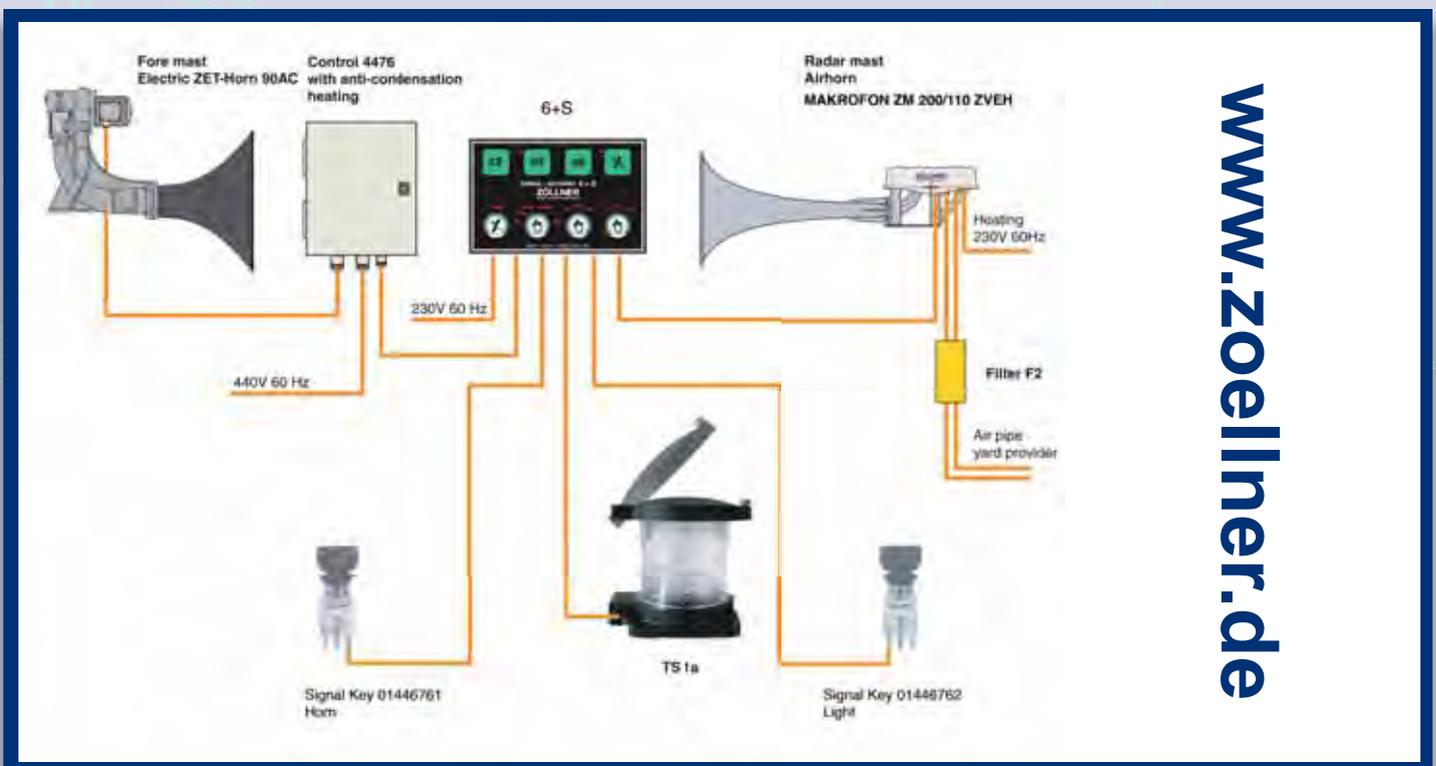


POSITIONING OF WHISTLES ON BOARD OF A VESSEL

When a directional whistle is to be used as the only whistle on a vessel, it shall be installed with its maximum intensity directed straight ahead.

A whistle shall be placed as high as practicable on a vessel, in order to reduce interception of the emitted sound by obstructions and also to minimize hearing damage risk to the personnel. The sound pressure level of the vessel's own signal at listening posts shall not exceed 110 dB(A) and so far as practicable should not exceed 100 dB(A).

Best position: as high as possible on the foremast.



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Combined whistle systems

If due to the presence of obstructions the sound field of a whistle is likely to have a zone of greatly reduced signal level, it is recommended that a combined whistle system be fitted so as to overcome this reduction. For the purpose of the rules a combined whistle system is to be regarded as a single whistle. The whistles of a combined system shall be located at a distance apart of not more than 100 metres and arranged to be sounded simultaneously. The frequency of any one whistle shall differ from those of the others by at least 10 Hz. If whistles are fitted at a distance apart of more than 100 metres, it shall be so arranged that they are not sounded simultaneously.

The many different types of ZET-Horns and Makrofonen allow all possible combinations within the limitations set by the rules. A typical example is shown above, more examples are available on request.

Basic connection requirements

- ZET-Horn: one 3-core cable only which also feeds the anti-condensation heating
- Makrofon: one to three cables for solenoid valves and heating plus a compressed air pipe and possibly a hand pull-rope
- ZETFON: one to three cables depending on type

AUTOMATIC SIGNAL CONTROLS

Signal Automaton 6+S and 10+SGA serve to automatically release manoeuvring and warning signals. Depending on the type, one to two whistles, a manoeuvre signal lamp, electronic bell and gong and any number of separate push-buttons can be connected. Muting contact to the sound reception system and interface for connection with the general alarm system are provided. Optionally type 10+SGA can be supplied with integrated general alarm function.

COLREG 1972 - Rule 34 Manoeuvring and Warning Signals

When vessels are in sight of one another, a power-driven vessel underway, when manoeuvring as authorized or required by these rules, shall indicate that maneuver by whistle signals. Any vessel may supplement the whistle signals by light signals, repeated as appropriate, whilst the maneuver is being carried out.

(a) + (b)	•	=	I am altering my course to starboard
	••	=	I am altering my course to port
	•••	=	I am operating astern propulsion
(d)	•••••	=	warning signal (This signal which is not repeated automatically, may be supplemented by a light signal.)

COLREG 1972 - Rule 35 Sound Signals in Restricted Visibility

In or near an area of restricted visibility, whether by day or night, whistle signals shall be used.

(a)	—	=	vessel making way through water
(b)	— —	=	vessel making no way through water
(c)	—••	=	vessel not under command, vessel restricted in her ability to manoeuvre, vessel engaged in fishing, or towing or pushing another vessel
(e)	—••	=	vessel towed
(g)	•—•	=	vessel at anchor



Signal Automaton 6+S

- 5 automatic signals according to rule 35 (a,b,c,e,g) of the COLREG 1972 and SOS
- for one to two whistles, one maneuver signal lamp, separate push-button keys



Signal Automaton 10+SGA

- 9 automatic signals according to rule 34 (a,b,d), rule 35 (a,b,c,e,g) of the COLREG 1972 and SOS
- for one to two whistles, one manoeuvre signal lamp, separate push-button keys
- for one electronic bell and gong system ZBG110
- optionally including general emergency alarm function with external key
- special design without panel available for luxury yachts

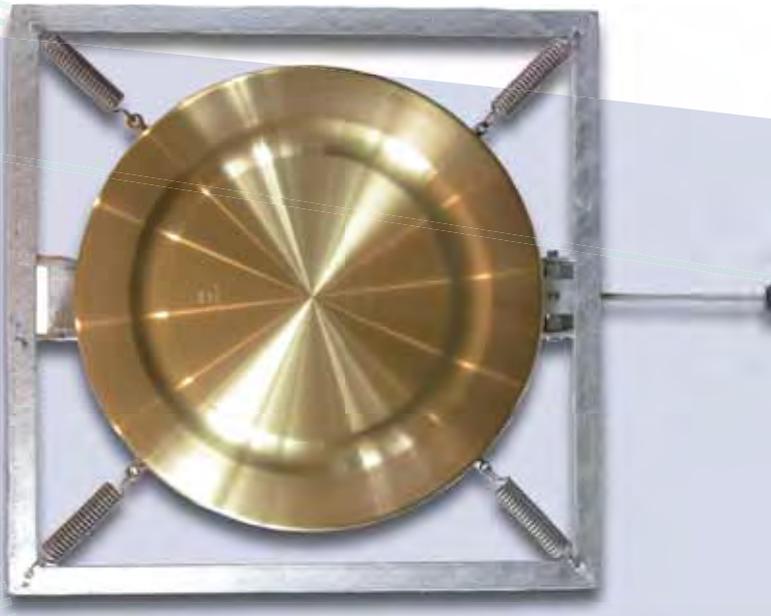
BELL AND GONG

COLREG 1972 – Rule 33(a)

... a vessel of 20 metres or more in length shall be provided with a bell in addition to a whistle, and a vessel of 100 metres or more in length shall, in addition, be provided with a gong ... manual sounding (of bell and gong) ... shall always be possible.

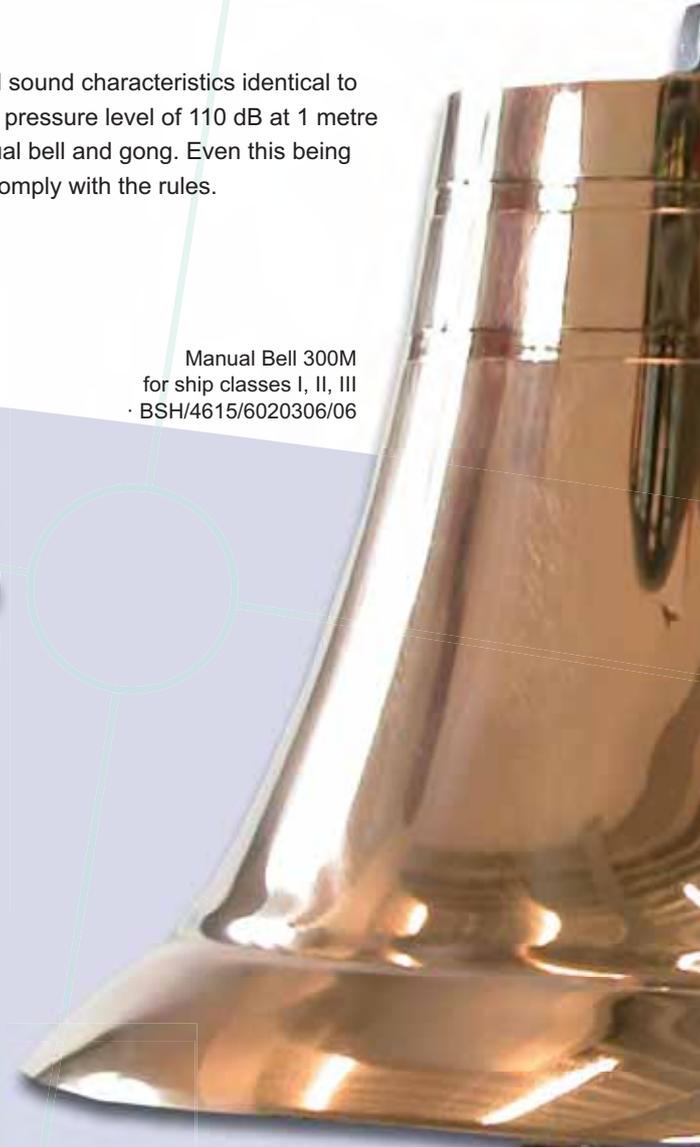
Bell ZB110 and Gong ZG110

The sound emitters ZB110 and ZG110 produce signals with unequivocal sound characteristics identical to conventional bell and gong. As required by the rules, they have a sound pressure level of 110 dB at 1 metre distance. The electronic sound emitters must be supplemented by manual bell and gong. Even this being the case, this bell and gong system is the most economical solution to comply with the rules.



Electro-Mechanical Gong 500EL
for ship classes I, II
· BSH/4615/601211/09
· operating on control 1+
· manual operation possible

Manual Bell 300M
for ship classes I, II, III
· BSH/4615/6020306/06



Electronic Bell / Gong ZBG 110
BSH/4615/6020397/09

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SOUND RECEPTION SYSTEM

SOLAS Chapter V – Resolution MSC.99(73), Regulation 18 and 19 and Resolution A694(17)

Sound reception systems are acoustical electronic navigational aids to enable the officer on the watch to hear warning signals from other vessels inside a totally enclosed bridge; in order to perform the look-out function as required in the International Regulations for Preventing Collisions at Sea, COLREG 1972. In addition to the general requirements contained in Resolution A694(17) they should comply with the following minimum functional requirements:

- receive sound signals from all directions in the audio band 70 Hz to 820 Hz
- reproduce incoming sound signals inside the bridge
- indicate the approximate direction of the incoming sound
- suppress unwanted background noise thus allowing reception of meaningful sounds only

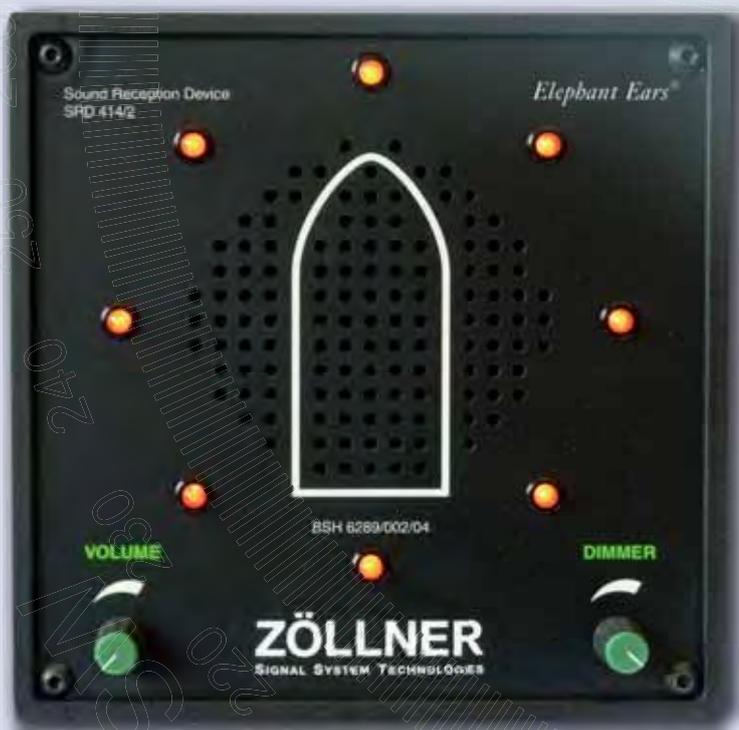
Sound Signal Reception Device SRD414/2

The Sound Signal Reception Device **SRD414/2** is a type approved system fully meeting the international rules and requirements. The unmatched design with the four microphones combined in one microphone sensor unit not only signify highest technical standard, but make installation as easy and cost saving as possible. Only one cable is required.

Technical Features:

- type approval BSH/4615/4182106/12 according to all relevant standards
- digital technology
- simple installation with only one microphone sensor unit
- effective noise suppression securing reliable system performance

Master Control Panel



Microphone Sensor Unit



WHISTLES FOR INLAND VESSELS

From the different types of whistles for seagoing vessels several are type approved for installation on inland vessels. In addition two electronic types are available meeting the special requirements for the river Danube emitting a triple-tone signal: **ZETFON Fonomat 1x70s** and **ZETFON Fonomat 4x70s**.

Whistles for inland vessels are type approved by the German authorities **BSH** and the **RRR - Russian River Register**.

SOUND SIGNAL APPLIANCES FOR INLAND VESSELS

Generally whistles for vessels sailing on inland waterways must meet the following requirements:



sound intensity

sound frequency

Vessels <20 m
Vessels >20 m

122 (± 2) dB(A)/1 m
132 (+2 / -3) dB(A)/1 m

250 – 700 Hz
130 – 350 Hz



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SOUND SIGNAL APPLIANCES FOR OFFSHORE STRUCTURES

According to IALA Recommendation O-139

The mushroom growth of man-made structures such as wind energy plants or oil and gas rigs in national and international waters will unavoidably affect the safety and facility in maritime traffic. For this reason the International Association of Administration for Sea Marking / Navigation Marking (IALA) has published a series of directions in their "Recommendation O-139 – On the marking of man-made offshore structures". The IALA recommendations serve as a basis for national maritime authorities to develop guidelines and regulations for the marking of offshore structures in their respective territories.

To meet with the growing demand for the safety on offshore platforms and maritime traffic in their vicinity, ZÖLLNER Signal GmbH provides a number of solutions including acoustic warning.

A special version of ZETFON-Fonomat 4x70 is available to serve the purpose of acoustic fog warning on offshore structures, especially offshore wind farms. This is part of the comprehensive Offshore SCADA System described in detail in brochure 06100011EN1.

In hazardous environments on other offshore structures Makrofons with explosion-proof operating valves can be installed as fog warning device.



SUPERIOR LINE FOR LUXURY YACHTS

The signal horns of the Superior Line from ZÖLLNER serve to underline the very special personality of a yacht with their materiality and handcrafted workmanship, and represent a sense of unique perfection, both optically and acoustically.

All Superior Line models are manufactured in accordance with the most stringent technical and aesthetic standards. And they are the personification of a level of expertise gathered upon a global scale over many decades. Because ZÖLLNER Signal GmbH in Kiel, Germany has been manufacturing signal horns for ships of all sizes and purposes for over 65 years. Superior Line – representing excellence made in Germany.



Superior
Line





ZET-HORN[®]
MAKROFON[®]
ZETFON[®]

ZÖLLNER
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