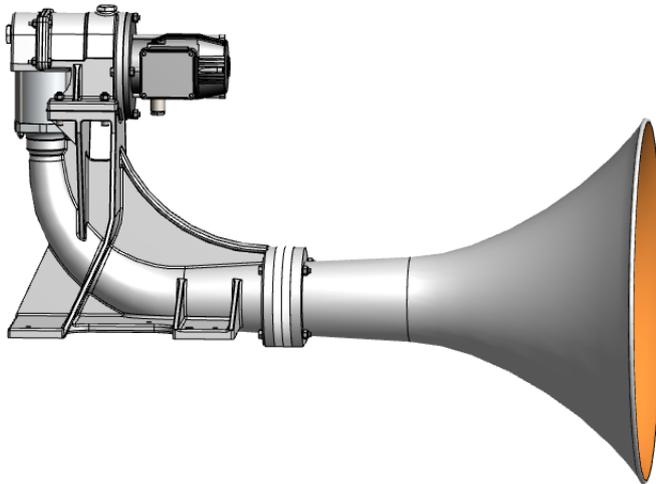
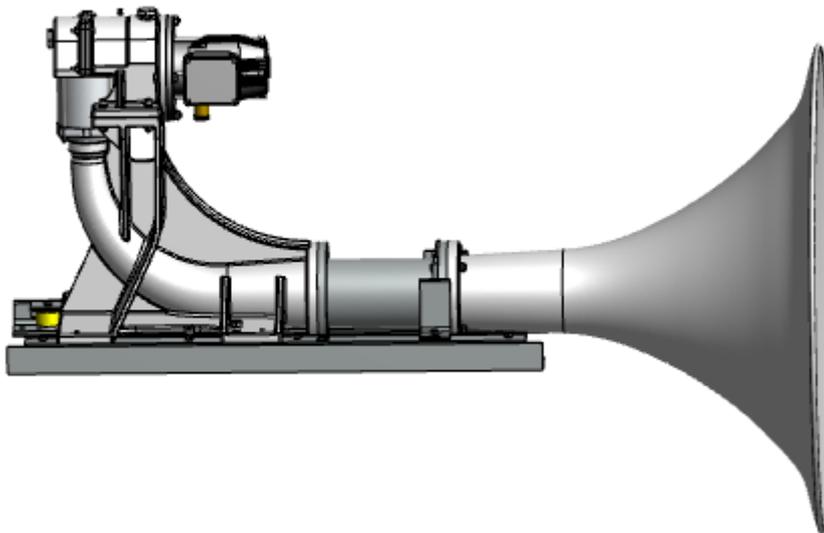


ZET-Horn 131 AC
ZET-Horn 141 AC



ZET-Horn 90 AC
ZET-Horn 110 AC



ZET-Horn 70 AC

1 General remarks

ZÖLLNER ZET-Horns are available for voltages from 230-690 Volts/ 50 or 60 Hz AC 3phase. Special voltages can be delivered on request.

The essential component of the ZET-Horn is the piston which, driven by an AC 3phase motor over a direct tooth-wheel gear, crankshaft and connecting rod, oscillates at a fixed frequency.

The sympathetic vibrations caused by the oscillating piston produce a pure tone with a wide audibility range. The motor which is flange-mounted to the casing has a powerful starting torque and will start immediately when signals are released.

The gear system is of plain, solid design: The tooth wheels are made of highly alloyed, wear resistant tool steel; the cylinder is made of corrosion-resistant material with its bearing surface accurately hardened and ground. The one-piece crankshaft allows easy assembly with standard on-board tools. Grease will guarantee reliable lubrication. To provide faultless operation also at extremely low temperatures and to avoid condensation water an electric motor heating can be applied.

The ZET-Horn is adjusted to a duty factor of 15%!

2 Motor protection

The minimum protection of the ZET-Horn motors should be a thermic over-current relay (bi-metal). Other methods of motor protection are also possible.

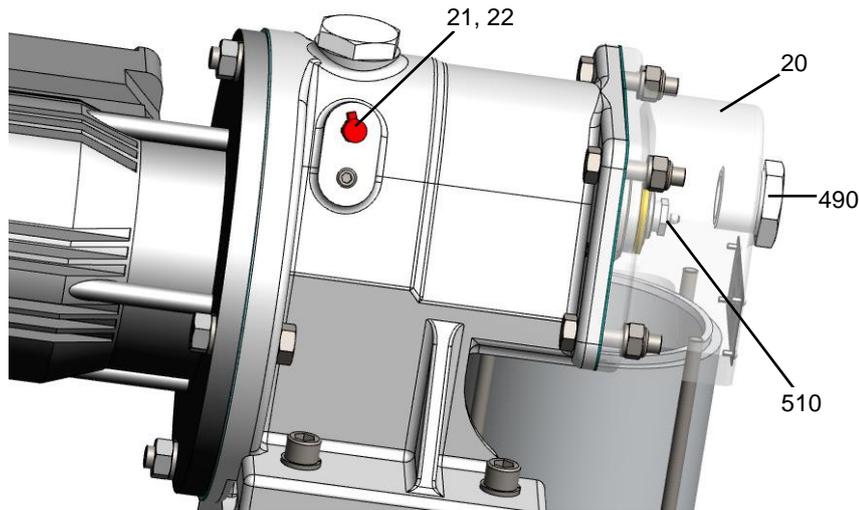
Fuses and cables have to be provided by the shipyard according to classification societies and other standards. Only apply 35 ampère time-lag fuses.

3 Installation and Connection

1. The sound horns have to be installed **as high as practicable** to obtain an optimal sound emission and make sure that sound intensity does not exceed 110 dB (A) at the listening posts. **The console should be designed large enough to provide a safe possibility for inspection.**
2. The ZET-Horns are fixed by 4 well secured M12 screws.
3. Electrical connections have to be laid according to the producers' wiring diagram. It is important to use only flexible cables.

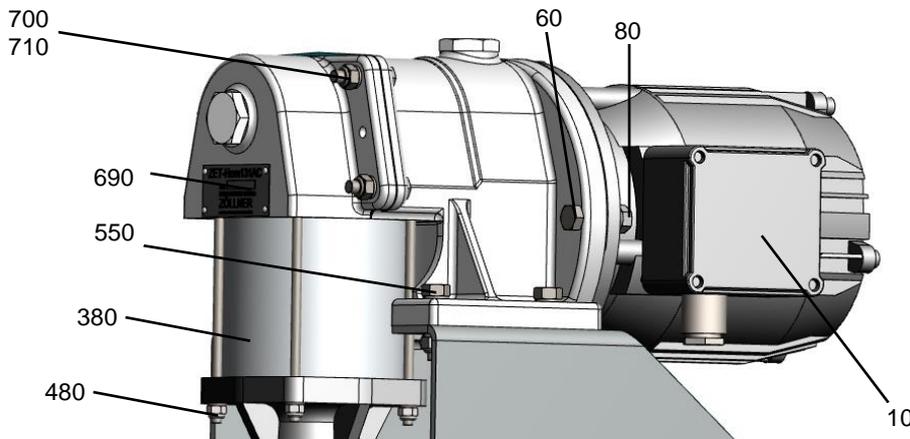
4 Maintenance

Generally, there is no maintenance required for the ZET-Horn. Only the lubrication grease has to be checked at intervals of about 3 to 6 months. Normally, the grease has to be exchanged in 5-year intervals; but when found dirty it must be replaced immediately.



The connection rod bearing is lubricated automatically through the crankshaft bore. Additionally, there is a grease nipple **(510)** at the crankshaft extensions. Lubrication of the big-end bearing can also be effected through an aperture of casing B. This aperture is plugged by screw plug **(490)**. On one side of the ZET-Horn casing, close to the tooth wheels, there is another grease nipple **(21)**. **At intervals of about 3 to 6 months, the screw plug (22) has to be opened and grease (AVIANAT 0 EP or equivalent) has to be filled in underneath the grease nipple.**

To exchange the grease proceed as follows:



a. ZET-Horn 141AC/131AC

1. Loose cables from motor **(10)**.
2. Remove 4 screws **(550)** between the both casingparts and carriers.
3. Remove 4 nuts **(480)** between cylinder and sound horn.

b. ZET-Horn 110AC/90AC/70AC

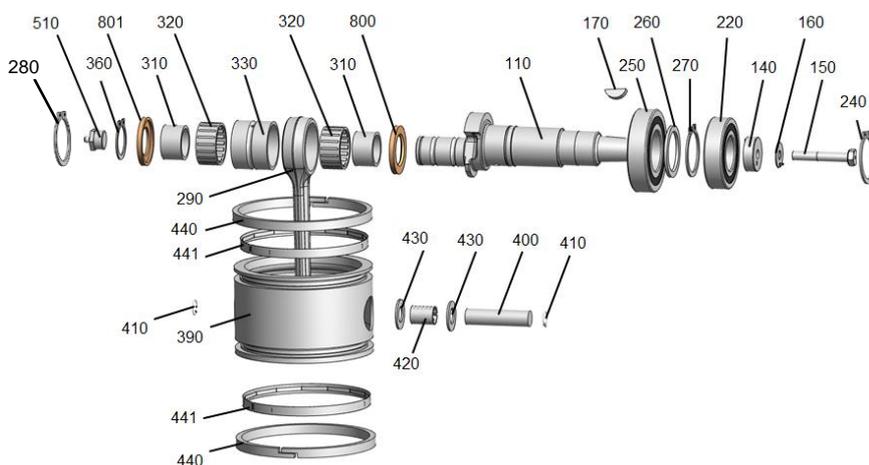
1. Loosen cables from motor **(10)**.
2. Remove screws **(550)** between the both casingparts and arched piece of horn.
3. Remove nuts **(480)** between cylinder and flange of horn.

In the vessel's workshop, the motor has to be detached from the casing by unscrewing 4 screws **(60)** and nuts **(80)**. Make sure that the motor remains in overhead position. Now, exchange the grease (approx. 0.800 cm³). At this opportunity, also check tooth-wheels and crankshaft bearings. In addition, check state of piston ring and wrist pin and exchange them if they are worn out.

5 Disassembly

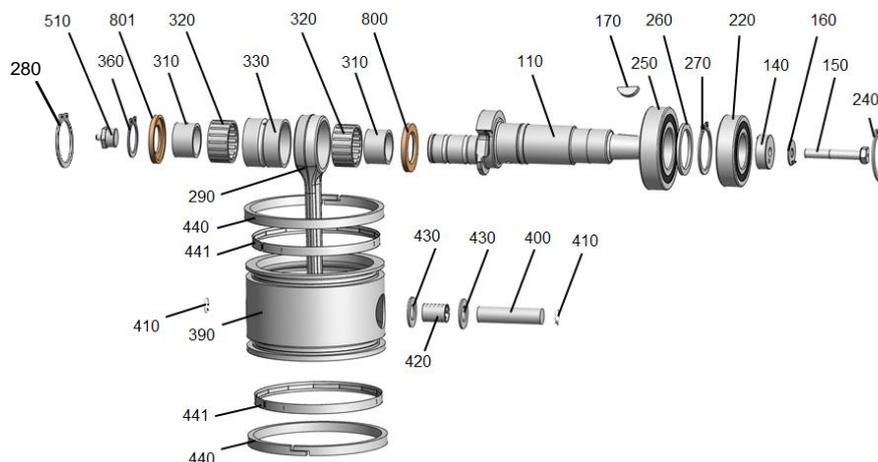
If good tools are provided on board disassembly and reassembly of the ZET-Horn will not cause any trouble. After the ZET-Horn has been taken down from the mast proceed as follows to disassemble:

1. Loosen screws **(550)** – between casing and arched piece of horn (carriers) – and nuts **(480)** and carefully lift the whole gear system.
2. Remove 4 nuts **(480)** and pull off cylinder **(380)**.
3. Loosen hexagon screws **(700)** from nuts **(710)** and carefully remove front of casing.



4. In order to pull off the whole connection rod bearing, first, detach the safety ring **(360)** with appropriate pliers and then remove the thrust washer **(801)**. Now use a take-off tool to remove the complete needle bearing with inside and outside rings **(310, 320, 330)**, thrust washer **(800)** and the still fixed connection rod **(290)**.
5. Use a work bench to carefully press outside bearing ring **(330)** out of the connection rod **(290)**. Before reassembling the ZET-horn again, make sure that the needle bearing with inside and outside rings **(310, 320, 330)** and thrust washer **(800, 801)** are replaced by new parts.
6. To disassemble the crankshaft, remove safety ring **(280)**, unscrew hexagon screws **(150)** and take off washer **(140)** and locking plate **(160)**. Now pull off tooth-wheel **(130)**. Use a mallet to expel the crankshaft. Pull off the bearings.
7. Each time the ZET-Horn is disassembled, the bushes and guard plates **(420 and 430)** between connecting rod, piston and wrist pin have to be checked. Basically, it is the best to always exchange these parts.
8. The piston rings **(441, 440)** also have to be checked and exchanged when necessary.

6 Reassembly



To reassemble, reverse procedures as described above:

First, press ball bearing **(250)** on crankshaft **(110)** and fix it with support disc **(260)** and safety ring **(270)**. Then, press on ball bearing **(220)**.

To assemble connecting rod, also use work bench. At first, the rear washer **(800)** and the inside bearing rings **(310)** are pushed on to the crankshaft journals. When mounting the inside bearing rings, make sure that the bores are exactly above the crankshaft journal groove.

The outside bearing ring **(330)** has to be pushed into the connecting rod and has to be fixed in its exact centre. Now, assemble the needle bearing cages **(320)**. The spaces between needles and cage have to be filled manually with the AVIANAT 0 EP or equivalent. After the connecting rod with the outside bearing ring **(330)** has been pushed on the bearing cages put on washer **(801)** and fix it with the safety ring **(360)**. It must still be possible to turn the washer by hand.

Before the complete crankshaft is pushed into the casing **(20)**, which possibly can be done by a mallet, check if the smaller safety ring **(240)** is exactly positioned in its groove. After the crankshaft has been inserted, fit in the bigger safety ring **(280)** carefully.

Finally, screw grease nipple **(510)** in the crankshaft and fill the crankshaft bore with grease. Lubrication of the connecting rod bearing will then be self-acting.

7 Maximum Sound Volume

Maximum volume will only be achieved with the power frequency the ZET-Horn has been laid out for. A change by -1 Hz, +1,5 Hz won't have any influence on the volume. Voltage variations of +/- 20 % will not affect the ZET-horn's sound intensity either. All ZET-Horns have been adjusted by the company. Should there be deviations concerning volume it will be necessary to state board main frequency with operating and non-operating ZET-Horn. Both values as well as the ZET-Horn's serial no. which you will find on the type plate **(690)** have to be reported to the producer.

8 Heating

An electric motor heating ensures the ZET-Horn's faultless operation also at low temperatures and avoids condensation water. The heating is controlled by the motor contactor, which is installed in the ZET-Horn's switch-box, together with the heating relay and the required transformer. Vessels of the "Arctic Class" can additionally be equipped with an extra heating for the horn to avoid deposits of snow and ice.

9 Trouble shooting

examples for voltage (other voltages on request):

main voltage with 3phase AC 50/60 Hz available: 230V / 380V / 400V / 415V / 440V / 450V AC
control voltage: 1phase: 24 V DC, 115 V AC, 230 V AC

<u>Fault</u>	<u>Fault Diagnoses</u>	<u>Elimination</u>
1. No sound	No power supply	Switch on power supply
2. No sound	Fuses 35 A of the main control panel defective	Renew fuses
3. No sound	No tension of 440 V AC 60 Hz (380 V AC 50 Hz) at the terminals L1, L2, L3 and of the control unit 4476	Check cabeling and fuses
4. No sound	Contacts of the contactor panel (01707555) do not close when pressing the button for sound signals	1) Examine cabeling and signal automaton if there is no tension of 230 V AC/ 110 V AC at the terminal board contactors e1+2 in the control unit 4476 2) If there are 230 V AC/ 110 V AC before but not behind the contactors renew fuses 3) Contacts still do not close, switch in the bimetal relay T20 manually 4) Contacts still do not close, exchange contactor panel T30
5. No sound	Contacts of the contactor panel (01707555) do not close when pressing the button for sound signals	If there is no tension of 440 V AC 60 Hz (380 V AC 50 Hz) at the terminals U,V,W exchange bi-metal relay. Examine key connections.
6. No sound	Control unit is not defective but no tension at the terminals U, V, W.	Examine cables and cable connections.
7. No sound	Control unit and cables are not defective but the motor is	Exchange motor
8. No clear sound	Check ZET-Horn power plant and piston	Disassemble ZET-Horn and renew defective parts
9. Sound pressure level too low	Check present sound frequency	Adjust sound frequency of the ship's network at 60 Hz -1 Hz, +1,5 Hz (50 Hz-1 Hz, +1,5 Hz)