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INSTRUCTION MANUAL

FOR

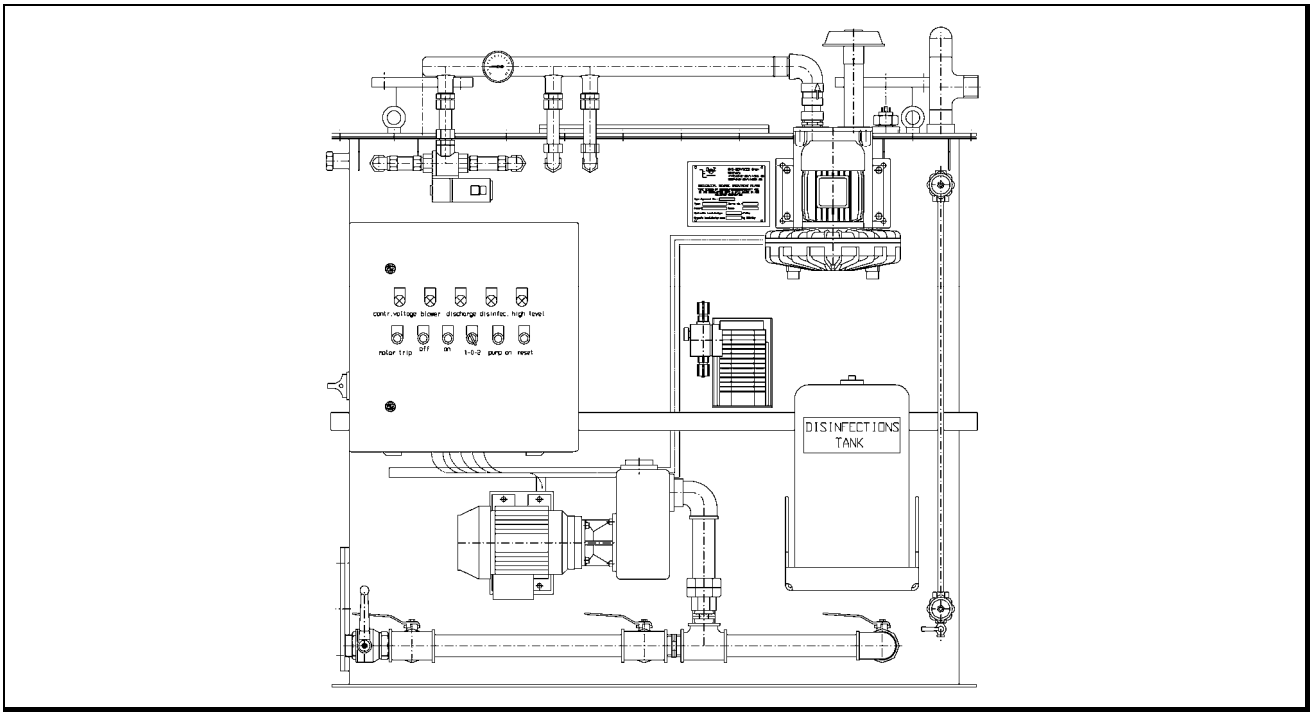
BIOLOGICAL SEWAGE TREATMENT PLANT

DVZ - SKA - „BIOMASTER“

TABLE OF CONTENTS

1.0 G E N E R A L

The DVZ-SKA ”BIOMASTER” system has been developed using the state-of-the-art ”submerged fixed bed bio-film process”. The advantage of this treatment method is its extremely large reactive area, which is up to 15 times larger than that of conventional systems. Within a short time this area is occupied by active micro-organisms, thus forming a so-called sheet of bio-mass. The sewage to be cleaned has to flow through this bio-mass and is cleaned using organic methods. The supply of small oxygen bubbles aerobically stimulates the organisms into extreme activity.
Digested sludge formation is prevented by continuously feeding activated sludge back into the active system.



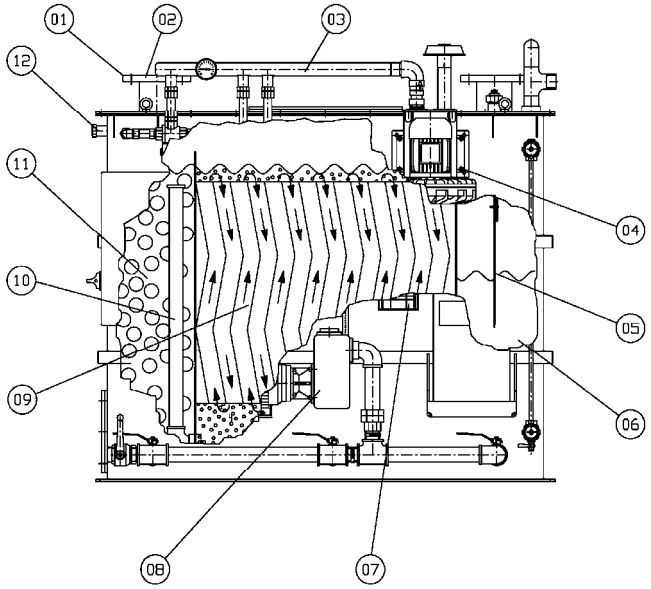
Biological Sewage Treatment Plant DVZ-SKA-“BIOMASTER“

The return flow of activated sludge also compensates for an intermittent supply of sewage and allows shutdown periods of approx. 1 week without the bio-system breaking down.
The intrinsic dynamics of the bio-film process are one of its major advantages, i.e. no activators or the like are required to start up the system since the active micro-organisms naturally develop from the sewage.
According to international regulations (MARPOL 74/78), raw ship’s sewage must not be released into coastal waters or so-called ”restricted areas”. Ship’s sewage from toilets and urinals is designated ”black water”. ”Grey water” is all other water from baths, showers, washbasins and the galley. Galley waste water is fed to the sewage treatment system via a fat separator.
”Grey water” does not need to be treated, but merely made germ-free by means of disinfecting.

Here are the essential advantages and innovations of our latest development at a glance:

- **Type-tested in accordance with IMO Res. MEPC 2 (VI) Annex IV**
- **Approved by the US Coastguard for non-US flag vessels**
- **Developed using the state-of-the-art ”Submerged fixed bed bio-film process”**
- **Problem-free operation, low operating costs**
- **Can be used in gravity systems and all vacuum systems**
- **Use of all-aerobic sewage treatment method prevents methane gas forming**
- **Custom-built systems for limited space availability or retrofitting**
  Fixed bed bio-film process produces excellent treatment results
- **Up to 15 times more activated sludge area than conventional systems**

2.0 FUNCTIONAL DESCRIPTION



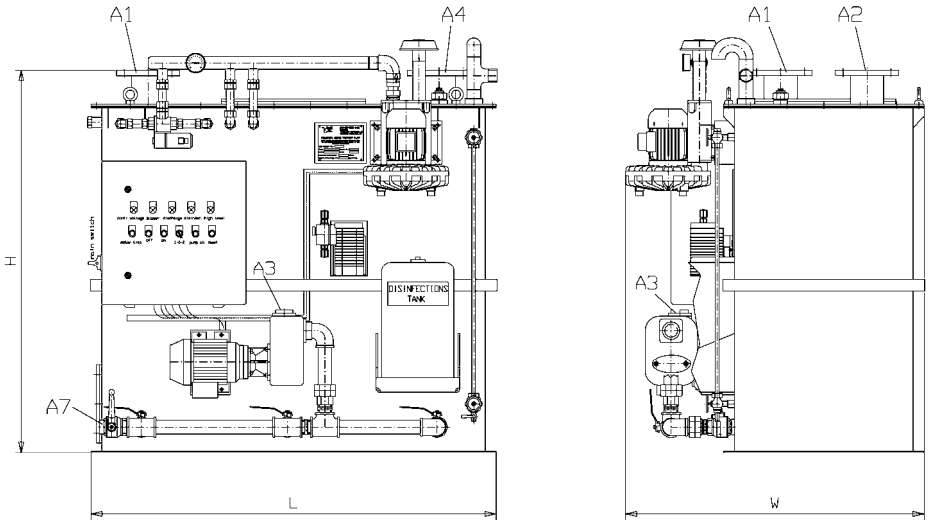
01 Sewage Inlet
02 Ventilation
03 Ventsystem
04 Air Blower
05 Level Sensor
06 Disinfection Tank
07 Dosing Pump
08 Discharge Pump
09 Treatment Tank with Bio-Reaktor
10 Sludge Recirculating System (SRS)
11 Pre-Treatment Tank
12 Dilution Water (Optional)

Operating Principle Biological Sewage Treatment System DVZ-SKA-"BIOMASTER"

The "black water" is fed through the pipeline using gravity or a vacuum, and flows through the sewage inlet **01** into the pre-treatment tank **11**, where intensive sedimentation and pre-treatment takes place using oxygen, a continuous supply of which is provided by a fan **04**. The system is ventilated to the open deck via the ventilation system.

The pre-treated "black water" flows through a special overflow into the treatment tank **09** containing the submerged fixed bed, which is at the centre of the system.
The sewage to be treated must circulate through this bed. Fine oxygen bubbles blown in by a special disperser keep the sewage in suspension and excite the micro-organisms on the surface of the fixed bed into extreme activity, causing almost complete aerobic-biological degradation of the faecal mass.
Remaining activated sludge is fed back into the pre-treatment tank using a sludge syphon and continues to serve as an active bio-mass within the system.
The biologically cleaned sewage is fed to the disinfecting tank **06** via a rising pipe. Adding disinfectant via the metering pump **07** kills off germs and bacteria.
When the maximum filling level is reached, the level sensor **05** activates the drainage pump **08**, which empties the tank down to a specified minimum level.
The "grey water" enters the disinfecting tank via the grey water inlet. The filling level of the disinfecting tank and the condition of the disinfected water can be visually inspected through a viewing glass.
For Dilution Water **12** it is possible to use fresh- and seawater.

3. TECHNICAL DATA



TYPE	DIMENSION DVZ-SKA-"BIOMASTER					
	Persons	Lenght [mm]	Widht [mm]	Height [mm]	Empty Weight [kg]	Full Weight [kg]
SKA 10	10	1.288	1.095	1.330	480	1.080
SKA 20	20	1.410	1.095	1.330	550	1.500
SKA 30	30	1.495	1.395	1.330	650	2.300
SKA 40	40	1.660	1.730	1.330	940	3.110
SKA 50	50	2.030	1.730	1.330	1.040	3.700
up to						
SKA 800	800	on request				

ELECTRIC POWER SUPPLY	
Electric Power Supply:	3 x 380 V 50 cs / 3 x 440 V 60 cs

PIPE CONNECTIONS	
A1 Black Water Inlet	DN 100
A2 Deairation	DN 100
A3 Discharge	R 1 ½ female
A4 Grey Water Inlet	DN 100
A7 Flushing Water Inlet	R 1 ½ female

technical modifications without notice

4.0 SAFETY INSTRUCTIONS

Please observe the information in these operating instructions, to ensure that the unit functions satisfactorily and remains serviceable for a long period:

- When planning the application of the device, and during its operation, observe the general technical rules!
- Take suitable measures to prevent unintentional operation or impermissible impairment!
- Note that lines and valves must not be unscrewed from systems that are under pressure!
- Always switch off the voltage supply before working on the system!
- If this information is ignored, or if unauthorised work is carried out on the device, we will not accept liability of any kind, and the warranty will no longer be valid for the unit and its accessories!
- Work on the unit must only be performed by skilled personnel using suitable tools!
- Always keep in mind during maintenance and repairs, that bacteria and viruses are present in the waste water. Health risks are minimal when good personal hygiene is observed and proper precautions are taken. Use protective clothes, gloves, and rubber boots where necessary.
  DO NOT EAT, DRINK OR SMOKE when working on the sewage system. Always wash up with water and preferably disinfecting soap after works.
- Chlorine in tablets of liquid form can be hazardous. Do not inhale vapours. Protect eyes and skin from contact with chlorine. Handle with rubber gloves and use safety glasses. Wash thoroughly with water after contact.
- Vapours and gasses: Make sure tanks are ventilated properly before entering. When access to a sewage tank is necessary, always arrange for a second person to watch outside the tank to give help when needed.
- Keep chlorine container tightly capped. void contact of chlorine with oil, rags, paper and other combustible materials. Store in cool dry area. In case of fire, use water.
- Do not install this equipment in or expose it to an explosive atmosphere, unless the unit was especially designed for this purpose, see type shield on the unit (Always refer to Supplier with type and serialnumber when not certain)
- Do not exposure the Treatment Tank interior or its vent termination to an open flame or other source of ignition.
- Installation of connecting pipeworks are subject to classification rules.
- Do not use or dispose Pine Sol, Lysol, or other disinfectants in the toilets or other drains leading to the system. Powder or liquid detergents may be used as long as they do not claim strong disinfecting properties.
- Do not dispose of grease through drains leading to system, install greasetraps where necessary.
- Paper towels, cigarette butts, sanitary napkins, condoms and rags should not be flushed down the toilets. Although it is unlikely that they could clog the unit, such practices should be discouraged

5.0 INSTALLATION INSTRUCTION

5.1 POSITIONING

The unit shall be positioned on a firm steel counter foundation, or flat surface.
Please take care that the unit will be installed stress- and vibration-free.

There shall be sufficient free space to service the unit.
Front side needs to be accessible for maintenance of pump and electric equipment.
Top side: The manhole shall be easily accessable for cleaning and maintenance.
If fitted with level electrodes on the 3nd stage; the pull out length of level electrodes is 850 mm. Check that the system is approx. level. The stainless steel bottom plate have to be secured to the foundation with bolts.

5.2 PIPE CONNECTIONS

1. Observe local and class rules when connecting the pipes to the system, for any local or special requirements.

2. Standard inlet is DN100-PN10 flange acc. DIN standard, in centerline of the tank (can differ in special cases) Connect the waste water pipe to this flange. It is strongly advised to install a bypass with valves.

3. Vent is DN100-PN10 and shall be connected to a suitable vent ending on weatherdeck or highest available point, to avoid smell. The vent shall have no excessive resistance or "goose necks". Airflow is appr. 50m3/h, max. backpressure 35mBar.

4. We advise to have the discharge pipe at least 1 diameter step large connect to suitable overboard with a checkvalve direct near the discharge pump, to prevent backflow in to the treatment plant. If system level is above outside water level, install a watertrap, to the same level as the tanktop and make sure that syphoning is avoided in the discharge pipe (install breather pipe or valve at highest point of watertrap) Overboard connection to be in accordance with applicable class. No valves are included in DVZ-SERVICES delivery.

5. Vent on effluent tank: Open to space of installation. This is a safety overflow to prevent overpressure on the system. In case class requirements prescribe connection to above main-deck, a suitable 2" overflow connection with waterlock (400 mm depth is sufficient) is advised.

5.3 ELECTRIC

6. Apply electric power to the unit from a main circuit breaker with fuses.
   Installation to be in accordance with class and safety rules. Standard controls include local circuit breaker and fuses. Free contacts NO/NC are available to connect to the ship's alarm system, indicating general malfunction, see manual.

6.0 S T A R T U P

This procedure applies to start up of the newly installed system, after the unit has been shut down, and after a "kill" of the culture requires air scour and pump out.

6.1 GENERAL PROCEDURE FOR START UP

1. Close all air and water valves, and inspect overall system visually.

2. Check motor rotations.

3. Check all motors for current draw.

4. Fill the Treatment Tank with water, NEVER start up a system with waste water. Use the same water source, if possible, as used for sanitary service.
   Fill Treatment tank until water spills into Contact tank and reaches a level 1/2 way up the Contact tank sight glass. Check for leaks, if any, repair before start-up.

5. Set up for normal operation of applicable system as specified in Section „SET UP FOR OPERATION“ below.

6. Start compressed air supply.

7. Bleed air out of centrifugal pump casing (if supplied). Check pump action by hand - start (sight glass level falls) and, if necessary, fill with water again.

8. Gradually add more water to the Contact Tank and check for proper cycling of pump(s)

9. Charge chlorine container with 15% Sodium Hypochloride solution, and check pumping action of dosing pump.(manual control switch).

10. Valve sewage into Treatment Tank.

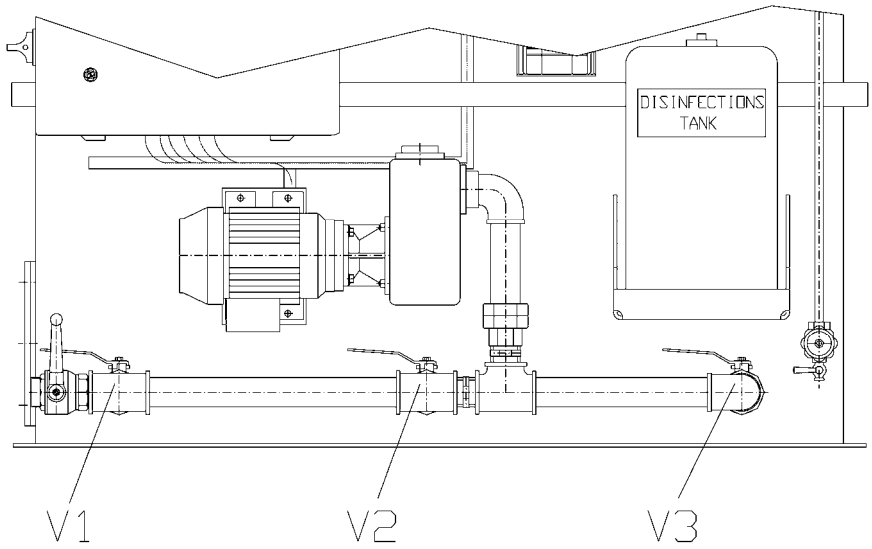
NOTE: It will take 5-10 days for the bacterial culture to grow to normal operating strength. During this period system effluent may change from clear to cloudy. If the bacterial culture has started properly it will revert to clear.

After starting up period of 2-3 weeks, check function of discharge pump, drain and flush out contact tank. Repeat item 7 and 8.

6.2 SET UP FOR OPERATION

The system should be set up for normal, automatic operation as specified below. If starting up the unit new or after shutdown, refer to section „SART UP“. The Contact tank must be about half full as indicated by Contact tank sight glass.

6.3 VALVE SETTINGS FOR OPERATION



Discharge valves			
Function	**Valve setting**		
	V1	V2	V3
Discharge of sludge from pre-treatment tank	open	close	close
Discharge of sludge from Treatment Tank	close	open	close
Discharge of disinfecting tank	close	close	open

All valves must be either fully opened or fully closed.

6.4 CONTROL SETTINGS

Switch	**Position**
Main circuit breaker	ON
Blower	Push ON to start
Pump	AUTO

7.0 M A I N T E N A N C E

7.1 SLUDGE PUMP OUT

If the accumulated sludge at the bottom of the Treatment Tank is not removed, it will spill over into the Contact tank. In general terms, if the water in the sight glass turns from clear to grey or brown, a pumpout is required to keep the effluent quality above that required by IMCO standards.

If it can be anticipated, that the ship will go to restricted waters, a sludge pump out shall be performed a few days before, in open (unrestricted discharge) waters, to ensure full operational time available without need of de-sludging. The procedure outlined below is recommended if the system is to consistently produce a clear effluent. The frequence of pumpout is determined by operating history and the owner's requirements. The time period specified below is average and based on the system operating at 100 % of rated capacity.

7.2 PUMPOUT PROCEDURE

1. Bypass sewage system or close sewage inlet valve.

2. Turn Discharge Pump off.

3. Close Disinfecting tank discharge valve V3.

5. Open the Pre-Treatment Tank valve V1 or Treatment Tank valve V2

6. Start discharge pump(s) manually (if provided) and drain or pump contents overboard, if outside of regulated waters, or into a suitable receiver for disposal.

7. Turn discharge pump(s) off when tanks are empty. **DO NOT RUN PUMP(S) DRY**.

8. Close the Pre-Treatment Tank valve V1 or Treatment Tank valve V2

9. Refill the Treatment Tank with water immediately after pumpout to maintain the bacteria and start up following procedure under „START UP“.

DO NOT ALLOW SYSTEM TO REFILL WITH SEWAGE WITHOUT FIRST FILLING WITH WATER.

For highest quality, drain Pre-Treatment Tank and Treatment Tank at 3 month intervals maximum.

7.3 DISINFECTANT SYSTEM

Check level in chlorine tank regularly. De-aerate system after changing chlorine tank according manufacturers documentation.
The system is set up for use of liquid sodium hypochloride in 15% concentration.

WARNING : Liquid chlorine is aggressive, and poisonous. Use proper protective clothing. See "SAFETY INSTRUCTIONS" further in this manual.

8.0 SHORT TERM LAY UP

If the crew will be off of vessel or platform for two weeks or less, electrical power should be left on. Leave the system on line with the blower running. The system will begin to go through a process known as endogenous respiration, during which the bacterial culture will consume itself in absence of another food source. Normally the system is able to restart without any problems within a period of one weeks. However, to ensure a high quality effluent at all times, it is recommended to monitor the effluent quality by visual inspection during the first days after starting up. If the vessel or platform is to be laid up or shut down longer than two weeks, consult Section „LONG TERM LAY UP/SHUTDOWN“ and Section „ START UP“.

8.1 LONG TERM LAY UP I SHUTDOWN

WARNING : Both solid as liquid Chloride are agressive and poisonous.
One should wear protective clothings, gloves and safety glasses. Spillings shall be rinsed away with plenty of water. Avoid contact with eyes and skin, do not inhale vapours.

1. There should be no flow into the unit, Valves in drains to the unit must be closed.

2. Liquid chlorine: disconnect chlorine tank and store in suitable place.
   Flush pump and hoses with fresh water and drain to prevent freezing.
   Close chloride container with cap.

3. Laundry bleach containing a 5-1/4% solution of sodium hypochloride may be used to disinfect the Treatment Tank. 6 litre of bleach is required for each 1000 litre of water held in the Media Tank. Laundry bleach may be flushed into the Media Tank from a toilet. When 15 % Hypochloride is used, 2 litre / 1000 is sufficient.

4. Pump water from Disinfecting Tank overboard, flush with fresh water, isolate Disinfecting tank.

5. Discharge Pre-Treatment Tank and Treatment Tank contents into a suitable receiving facility. Flush discharge pump with fresh water and drain to prevent freezing.
   It is advisable to fill the pump with antifreeze mixture containing corrosion inhibitor.

6. Refill Pre-Treatment Tank and Treatment Tank with water and pump water overboard.

7. Add antifreeze to Treatment Tanks if water must be left in tank. Use antifreeze tester to assure water will not freeze. Approximately one litre of antifreeze is required for each litre water remaining in the Treatment tank.

8. Shut off electrical power to system.

9. Drain pump casing, all piping, fittings and traps containing water.

9.0 T R O U B L E S H O O T I N G

There are six major indicators of trouble; odor, poor drainage into the unit, foam coming out of the Treatment Tank vent, poor effluent quality, high water level in Treatment Tanks, and water spilling out of the Contact tank vent.

9.1 ODOR

If there is a smell of hydrogen sulfide (rotten eggs) coming from the Treatment Tanks vent, or from a water sample, or if the water in the Disinfecting tank sight glass turns black, this means that the air delivery into the water through the Air Lift is inadequate.

9.2 ODOR FROM TREATMENT TANKS VENT

1. Make sure the blower is running and has been running for the last several hours. If not, leave the blower on and the odor will clear up in a few hours.

2. Take a water sample from the drain cock. Flush the drain cock before taking the sample. The water should be odorless. If the water sample is odorless, the bacteria have sufficient air, some "earth like", or carbondioxide odor is normal.

3. If the water sample is grey to black in colour and/or smells like rotten eggs (hydrogen sulfide), open the inspection hatch. Each Air Lift should be pumping vigorously and the water surface should be turbulent, indicating flow to all parts of the Treatment Tank.

4. If not, turn off blower, check silencer and inlet filter for blockage. Clean out or replace element. Try airlift again. If no good result, continue at 5.

5. Turn the blower off. Centrifugal blower: check acc. enclosed manufacturers documentation. (quick check: blower should generate at least 2 m.w.c. against closed valve. Do **NOT** run for longer period against closed valve!)

6. Check if vent outlet is properly located and relocated if necessary to a less sensitive area.

7. If the Air Lift is not operating and air is bubbling through the Bioreactor absolutely sure the Air Lift valve is open. If they are properly set, the air header or the individual piping leading from the air header to the Air Lifts may be damaged or disconnected. Check and repair.

9. If you are absolutely certain that the air piping is defective, shut the system down as per Section „SHORT TERM LAY UP“, then remove the inspection hatches and physically inspect the air header, hoses and internal connections and repair as necessary.

After taking appropriate measures, the odor in water clears up after 24 hours, and effluent should be clear within 48 hours again.

9.3 ODOR IN SPACE WHICH UNIT IS LOCATED

1. Make sure ventilation air inlets are not picking up discharge from Treatment Tank vent. If so, relocate vent termination.

2. With soapy water, check all flanges and penetrations above the Treatment Tanks water level for leaks.

3. Check the wet well vent. If it smells like rotten eggs, or the water in the Contact tank sight glass is grey, refer to Section „ODOR FROM MEDIA TANK VENT“.

4. If air is being forced out of the Disinfecting tank vent (regardless of the nature of the odor) there is excessive back pressure in the Treatment Tanks which is blowing out the Spillover water seal and allowing the Treatment Tank to vent into the space through the Disinfwecting tank vent. Refer to Section „EXCESSIVE BACK PRESSURE IN TREATMENT TANK“.

9.4 ODOR IN OTHER SPACES

1. Make sure ventilation air inlets are not picking up discharge from the Treatment Tank. If so, relocate vent termination.

2. If odor is coming from fixtures and air is bubbling up through the fixtures, there is excessive back pressures in the Treatment Tank which is blowing out the influent trap water seal and allowing the Treatment Tank to vent into the space through the shallow fixture traps. Refer to section „EXCESSIVE BACK PRESSURE IN TREATMENT TANK“.

3. Check for leaks in the Treatment Tank vent pipe.

9.5 POOR DRAINAGE (TOILETS DO NOT FLUSH PROPERLY)

1. Check the inlet trap, trap vent, and Treatment Tank vent for blockage.

2. Open the inspection hatch and check for excessive foam in the Treatment Tanks.

3. If the Treatment Tanks vent is blocked, it may be cleared with a stream of high pressure water.

4. If the blockage cannot be found quickly, by-pass the unit so that you may have sanitary facilities.

9.6 FOAM FROM TREATMENT TANK VENT

Make sure, a detergent with low foaming properties is used on board for cleaning sanitary spaces. Instruct the personal **NOT** to empty buckets in drains that lead to the treatment plant after cleaning

9.7 EXCESSIVE BACK PRESSURE IN TREATMENT TANK

1. Make sure that the Treatment Tanks vent is the size specified in the installation instruction or larger throughout its entire length. The flame screen (if used) at the vent termination must be at least two full pipe sizes larger than the vent pipe and free from blockage. If not, skip to step 5 below.

2. Make sure that all horizontal portions of the Treatment Tank vent are sloped upward and away from the Treatment Tank at least 1/2 inch per foot. If the run is aftward ship, make sure that the slope is greater than the list of the vessel. Otherwise, condensation will fill the vent and block airflow. If there is a low point, install a drain valve at the low point and drain water as required until the piping error can be corrected.

3. If the above cheek out, detergent foam may be blocking the Treatment Tanks vent (this is possible but unlikely, since the vent and traps are sized for this worst case).

4. If the back pressure persists, wash down the Treatment Tank vent from its upper termination with a stream of high pressure water to clear any possible blockage. Before doing this, set discharge Pump(s) to ON and watch Disinfecting tank sight glass to prevent flooding.

5. If the Treatment Tanks vent is not the correct size, back pressure will almost certainly occur every time a highsuds detergent is introduced into the system..

9.8 HIGH WATER LEVEL IN TREATMENT TANK

Obvious, check all valve positions, also in external piping to the overboard connection, if this is found in order.

There can be several causes; The spillover hose (inside treatment tanks, to disinfectin tank) are clogged, the vent on the disinfecting tank is blocked, or the Treatment Tanks are overdue pumpout.

1. To clean the spillover, open inspection hatch on top of the Treatment Tanks and wash out the vent with a stream of water. It is preferred to flush- and pump out the contact tank after this action.

2. To clean the spillover inside the Treatment Tanks by flushing with water.

9.9 WATER SPILLING OUT OF THE CONTACT TANK VENT

This almost certainly is caused by failure of the Discharge pump, its controls, or by discharge valves being closed.

1. Check valve positions, also in connecting pipe to overboard discharge.

2. Make sure the pump switch is set to Auto and that power is present.

3. Make sure the suction valve from the Disinfection Tank „V3“ is open

4. Check out the starter, motor, (especially thermal protection switch) and pump. Controls should be set per "Set-Up for Operation" of this manual. Check function by manual start of pump, if this does not work, check level switch for proper function, if needed, clean out or replace.

5. If the problem cannot be isolated and repaired quickly, bypass the sewage overboard to provide the crew with sanitary facilities.

9.10 AERATION BLOWER CIRCUIT

1. Press the reset button on the overload protection inside the control panel and turn the blower on to determine if the blower motor overloaded and dropped out of the circuit.

2. Make sure that all the overload protection on the blower starter is the size specified on the electric scheme and set for current as indicated on the motor typeplate.

3. If the blower motor will not start and the blower starter is energised, the problem is in the motor itself, the motor wiring, or the main contacts of the blower starter.

4. If the blower motor will only operate when the blower button is manually held on, the blower starter auxiliary contacts are not closing in parallel with the blower button contacts. Replace auxiliary relay and start again.

5. For mechanical malfunctions check the specific manufacturers documentation enclosed in this manual.

9.11 DISCHARGE PUMP CIRCUIT

1. Press the reset button on the overloadprotection inside the control panel and turn the pump on to determine whether the pump motor overloaded and dropped out of the circuit.

2. Make sure that all overload heater coils on the pump starter are the size specified on the electric scheme and check setting for current according motor type plate.

3. If the pump will not start and the pump starter is energised, the problem is in the motor itself, the motor wiring, or the main contacts of the starter.

4. For mechanical malfunctions, check the specific manufacturers documentation enclosed in this manual.

9.12 ELECTRODE TYPE LEVEL SWITCH

Clean tips of electrodes for dirt or corrosion. Clean with sandpaper, check isolation, for specific values and test, refer to enclosed documentation for the level relay enclosed with vendor's data. Function can be tested by simulation of waterlevels, just connect relevant electrodes temporarily with electric wire. A low, save voltage is used on the levelcontroler.

NOTE: When replacing a defective level switch, the pipe threads must be sealed with teflon tape or pipe dope.

9.13 HIGHWATERLEVEL

1. Silence the alarm

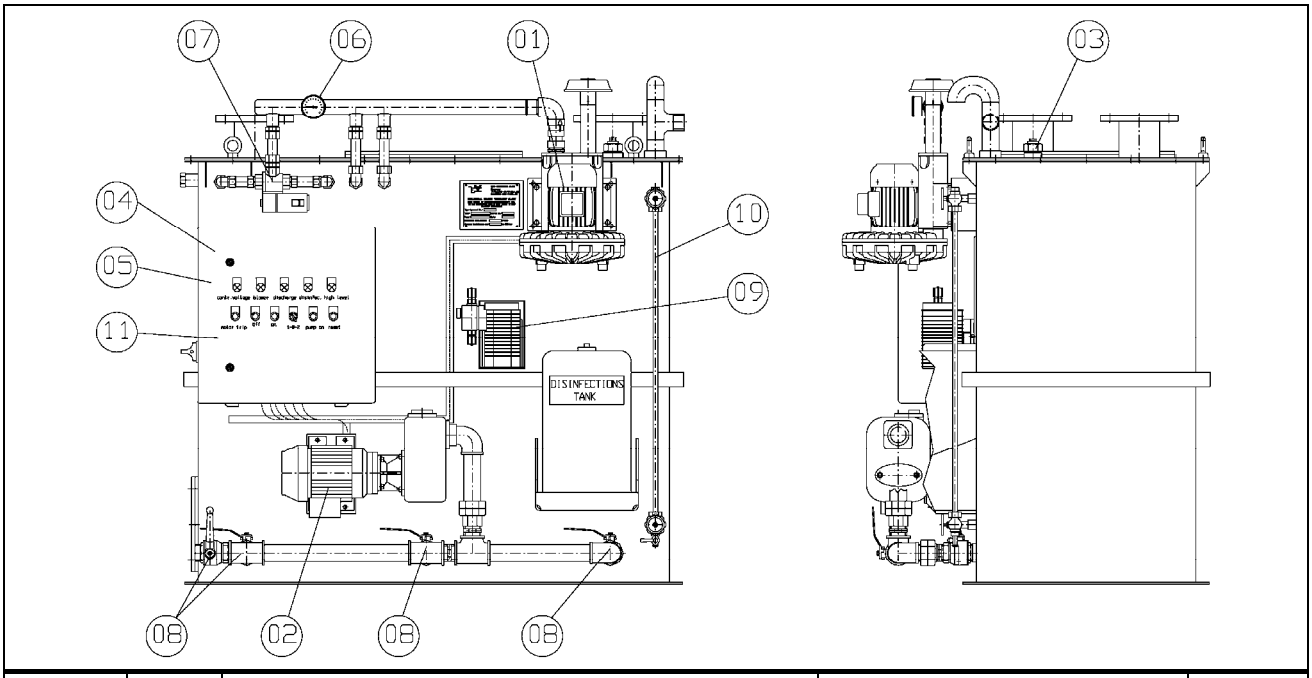
2. If the problem cannot be isolated and repaired quickly, bypass the sewage overboard.

3. Make sure that all valve settings and control settings are in accordance with section „SET UP FOR OPERATION“.

4. Check that the valves from the unit discharge connection to the overboard line is fully open.

5. Inspect pump starter relay and verify that it is energised. Check that pump is running. If running but no falling level (sightglass) De-aereate pump and observe level again. If not cured, open up the pump for inspection.

6. If the system is operating properly, the problem is an excessive volume of water entering the system. Check for stuck or leaking flush valves and fixtures.

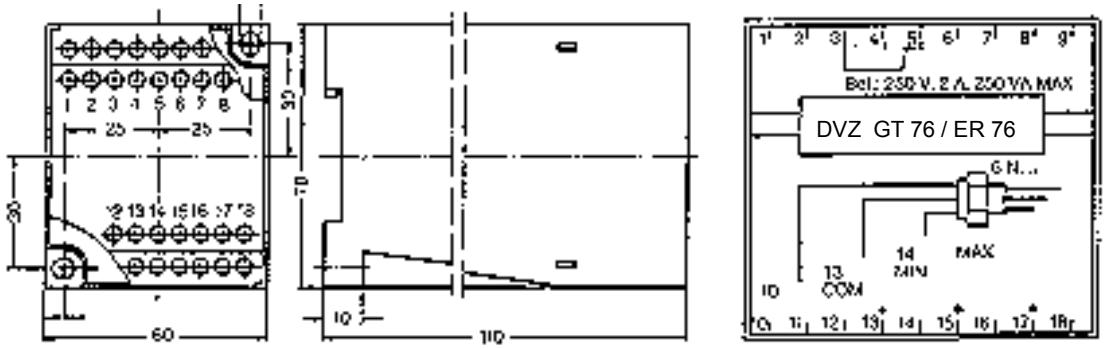


Item		***Describtion***		
1.		lateral blower	DVZ-V01/11/12/22/SD-42	
2.		discharge pump	DVZ-S 32/40/50	
3.		sensor electrode	DVZ-NK0631 3V-150x270x670	
4.		niveau relais	ER 75 D	
5.		transformator	T 45 E/hi	
6.		pressure gauge	ø 63 0-1 bar H 1/4 DVZ802 glycerine	
7.		solenoid valve-3 way	DVZ-323-F-20-B- G3/4-24/50-F-000	
8.		2-way cock	1 ½“ DVZ-90122 (K99)	
9.		dosing pump	DVZ-ALPB	
10.		sight glass		
11.		electric switch box		

Subject to technical modifications without notice

NIVEAU RELAIS / niveau relay

DVZ - ER 75-D / ER 76-D



Anwendung

Das Steuerrelais **ER 75-D / ER 76-D** kann in Verbindung mit der Niveau-Sonde NK 06 zur automatischen Kontrolle und Regelung von Füllständen eingesetzt werden.

Funktion

Füllstandsrelais der Type **ER 75-D / ER 76-D** arbeiten als Intervallrelais.
Die Ansteuerung erfolgt durch das Medium über die Sonden Typ NK 06, wobei die Eingangsempfindlichkeit im Bereich von 0-200 k Ohm liegt.
Um ein einwandfreies Schalten des Relais zu gewährleisten, darf die Leitfähigkeit von **5 µS** nicht unterschritten werden.
Durch das Medium fließt bei Kontaktgabe eine echte Wechselspannung, wodurch eine galvanische Abtragung des Sondenmaterials verhindert wird.
Je nach Anwendungsfall, Einsatzort sowie örtlichen Betriebsbestimmungen kann das Bezugspotential der Steuerelektroden sowohl durch eine gemeinsame Elektrode oder durch das Behältnis selbst gestellt werden.
Nach Montage und elektr. Anschluß von Relais und Sonde wird das Relais automatisch in Arbeitsposition gesetzt.
Wird der durch den mechanischen Aufbau der Sonde vorgegebene Füllstand durch das Niveau des Mediums erreicht, so schaltet das Ausgangsrelais in Ruhestellung. Dieser Zustand bleibt solange erhalten, bis der vom mech. Aufbau der Sonde vorgegebene min. Füllstand erreicht ist; d.h. beim Erreichen des min. Füllstandes wird das Relais neu gesetzt.
Bei Ausfall der Versorgungsspannung, bei einem Defekt im Steuerrelais oder bei Unterbrechung der Meßleitung geht die Anlage in einen ungefährlichen Zustand; d.h.: ein Überfüllen des Behälters ist nicht möglich.

Application

The Control relay **ER 75-D / ER 76-D** can be used together with the level sensor 6N for the automatic monitoring and/or control of liquid levels.

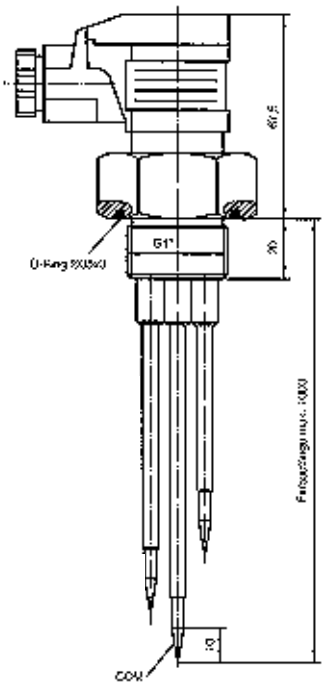
Operation

Level relays type **ER 75-D / ER 76-D** operate as three point controllers with an input sensitivity in the range from 0-200 kΩ.
They are operated via a sensor type 6 N by the rising and/or falling level of the process medium.
To ensure a correct operation of the system, a minimum conductivity of **5 µS** is required.
The current flowing through the medium is a real AC, therefore there will be no galvanic erosion of the electrodes.
The reference potential may be either a common electrode or the vessel depending on the application, on the location and on the local operating procedures.
When the system is powered up after completion of the electrical installation the relay will automatically be set to its "energized" condition.
When the liquid level reaches the maximum setpoint, which is predetermined by the mechanical construction of the sensor, the relay will change contact status and go into the "deenergized" condition. This condition will remain until the minimum setpoint is reached, which again is predetermined by the mechanical construction of the level sensor. Upon reaching the minimum setpoint, the relay will reset to the "deenergized" condition.
A power loss, a defective control relay or an interuption of the sensor lines will cause the system to fail to the safe position; i.e. an overfilling of the vessel is impossible.

Technische Daten / Technical Data

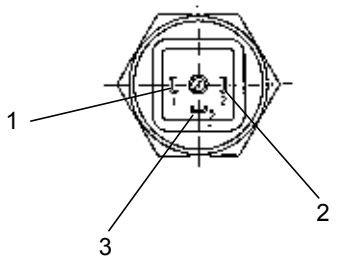
Betriebsspannung / Power supply:	24 V, 50/60 Hz
Eingangsempfindlichkeit / Input sensitivity:	0 - 200 k Ohm
Schaltungsfunktion / Operating mode:	Intervallausführung (3-Punkt-Regelung) / 3-point control
Kontaktausgang / Output contact:	potentialtreier Umschaltkontakt / Potential free toggle contact
max. Lastdaten / Contact rating:	U = 250 V,I = 2 A, P = 250 VA / 50 W
Schaltzustandsanzeige / Indication of contact status:	LED
Gehäuse / Casing:	Schienenaufbau / Rail mounting 60 x 70 x 110
Einsatzbereich / Applications:	auf allen Schiffen nach Richtlinien des Germanischen Lloyd, sonst nach örtlichen Vorschriften On all ships according to GL regulations, otherwise acc. to local rules and standards.

SENSOR - ELEKTRODE / sensing electrode
DVZ-NK06 - 150/270/670



Steckerbelegung
Steckfahne Nr.1 für kurze Elektrode
Steckfahne Nr. 2 für mittlere Elektrode
Steckfahne Nr. 3 für lange Elektrode

Plug Connection
pin terminal no. 1 for short electrode
pin terminal no. 2 for middle electrode
pin terminal no. 3 for long electrode



Anwendung

Niveau-Sonden dienen in Verbindung mit Transistor-Steuerrelais Type GT 76 und ER 76 zur automatischen Kontrolle und Regelung leitfähiger Flüssigkeitsstände.

Funktion

Sobald die Flüssigkeit die Elektroden benetzt, entsteht je nach Arbeitsweise eine leitende Verbindung von der Masseelektrode zu den anderen Elektroden oder von den Elektroden zum Behälter.

So können zum Beispiel
- minimale oder maximale Füllstände in Behältern überwacht
-Pumpen vor Trockenlauf geschützt.

Application

In connection with transistorized relays type GT 76 and ER 76, these level sensors are used to monitor and/or control the level of conductive liquids.

Operation

In case of a rising level in the vessel, the liquid will contact the electrodes and will form a conductive connection between the grounded electrode and the measuring electrodes or between the measuring electrodes and the wall of the vessel, depending on the operating mode.
The minimum required conductivity of the liquid is 5 µS.

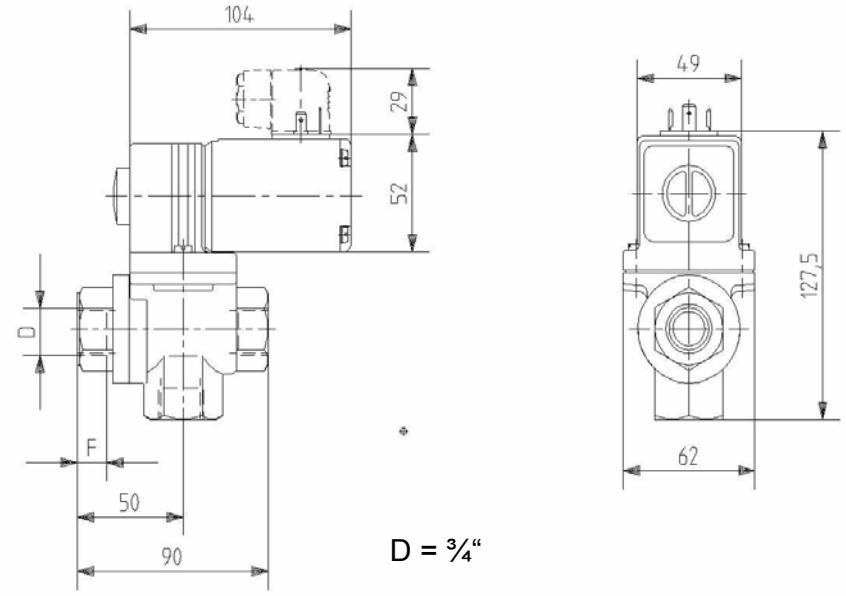
Examples
The **NK06** in connection with the GT 76 or ER 76 can
- monitor the liquid level in vessels for minimum or maximum value
-prevent pumps from running dry.

Technische Daten / Technical Data

Anzahl der Elektroden / Number of Electrodes:	1 - 4
Betriebsdruck / Operating Pressure:	10 bar
Schutzart / Enclosure Classification:	IP 65
El. Anschluß / Electrical Connection:	Connector acc. to DIN 43 650 with GL - approval
Max. Mediumtemperatur / Max. permissible liquid temperature:	60 °C
Werkstoffe/ Construction Materials	
Elektrodenkopf / Body:	Messing / Brass
Elektrode / Electrodes:	Stainless Steel 1.4305
Max. Elektrodenlänge / Max. Length of Electrodes:	1000 mm
Einschraubzapfen / Threaded Stem:	G 1" male

3/2 - WEGE - MAGNETVENTIL / 3/2 - way - solenoid valve

DVZ 323-F-G3/4-24/50-E



Bitte beachten Sie die Hinweise dieser Betriebsanleitung, damit das Gerät einwandfrei funktioniert und lange einsatzfähig bleibt:

- Halten Sie sich bei der Einsatzplanung und dam Betrieb desGerätes an die allgemeinen Regeln der Technik!
- Treffen Sie geeignete Maßnahmen, um unbeabsichtigtes Betätigen oder unzulässige Beeintrachtigung auszuschließben!
- Beachten Sie, daß in Systemen, die unter Druck stehen, Leitungen und Ventile nicht gelöst werden dürfen!
- Schalten Sie vor Eingriffen in das System in jedem Fall die Spannung ab!
- Bei Nichtbeachtung dieser Hinweise sowie bei unzulässigen Eingriffen in das Gerät entfällt jegiiche Haftung unsererseits, ebenso erlischt die Garantie auf Geräte u. Zubehörteile!
- **Achtung!** Die Oberfläche des Elektromagneten kann bei Dauerbetrieb sehr heiß werden. Verletzungsgefahr!

Eingriffe dürfen nur durch Fachpersonal und mit geeignetem Werkzeug erfolgen!

- Säubern Sie vor Montage des Ventils die Rohrleitungen!
- Schalten Sie gegebenenfalls zum Schutz vor Störungen einen Schmutzfänger vor.
- Nehmen Sie zur Montage von Flanschanschlüssen die Spule ab. Beachten Sie die Durchflußrichtung!
- Dichten Sie das Gewinde mit PTFE-Band ab.
- Verwenden Sie die Spule oder das Kernführungsrohr auf keinen Fall als Hebel, wenn Sie die Rohmnschlüsse einschrauben!
- Verspannen Sie das Ventilgehäuse beim Einbau nicht!
- Störungen können durch Verschmutzung, Kurzschluß und Spannungs-unterbrechungen entstehen.
- **Achtung!** Festsitzender Kern bewirkt bei Wechselspannung (AC) Spulenüberhitzungl
- Überprüfen Sie bei Störungen Leitungsanschlüsse, Spannungen und Betriebsdruck!
- Ersatzteile: Bitte bestellen Sie Spule oder Armatur komplett unter Angabe der Ident-nummer des Gerätes lt. Typenschild, z. B. Spulensatz für Typ 323 Identnummer XXX XXXX

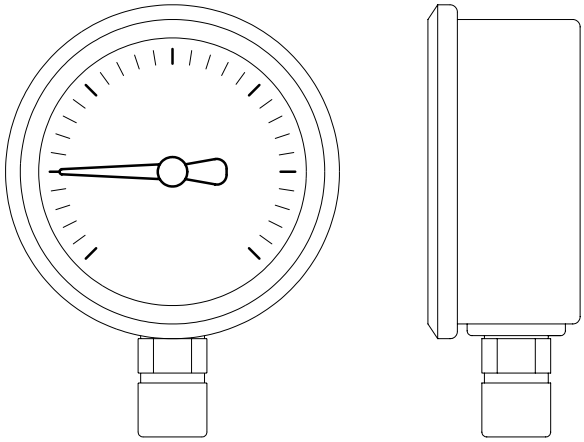
Please observe the information in these operating instructions, to ensure that the unit functions satisfactorily and remains serviceable for a long period:

- When planning the application of the device, and during its operation, observe the general technical rules!
- Take suitable measures to prevent unintentional operation or impermissible impairment!
- Note that lines and valves must not be unscrewed from systems that are under pressure!
- Always switch off the voltage supply before working on the system!
- If this information is ignored, or if unauthorised work is carried out on the device, we will not accept liability of any kind, and the warranty will no longer be valid for the unit and its accessories!
- **Warning!** The surface of the electromagnet can become very hot during continuous operation. Danger of Injury!

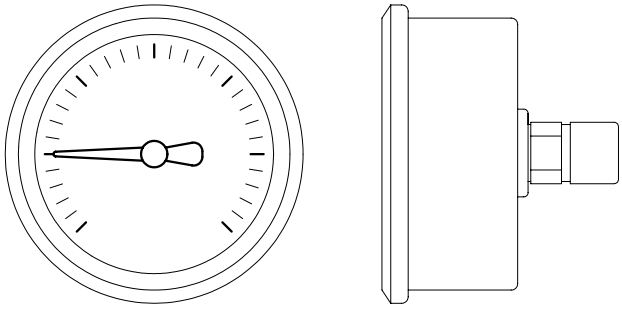
Work on the unit must only be performed by skilled personnel using suitable tools!

- Clean the pipe runs before fitting the valve!
- Fit a strainer if necessary as protection against faults.
- Remove the coil when fitting flange connections
- Observe the direction of flow!
- Seal the thread with PTFE tape.
- Never use the valve or the armature guide tube as a lever when screwing in the pipe connections!
- Do not subject the valve housing to stress when fittings!
- Faults can be caused by dirt, short-circufts or interruptions in the voltage.
- **Caution!** With an AC supply the coil can overheat d the core is stuck!
- In the event of fault, check the port connections, voltages and operating pressures.
- Spare parts: Please order coils or armatures complete, quoting the ident. number of the device according to the rating plate; a. g., coil set for Type 323 Id. No. XXX XXX X

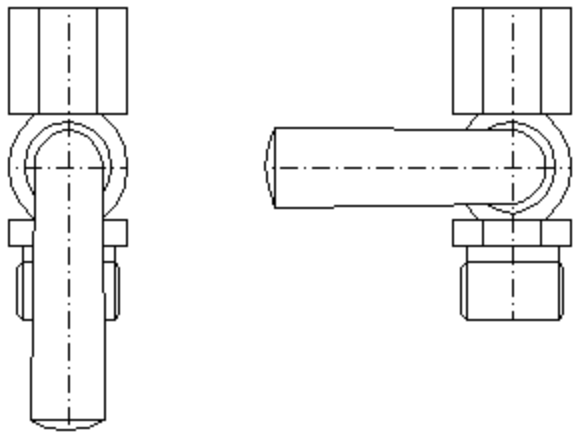
MANOMETER / pressure gauge
DVZ 63 -1-5 bar U 1/4”

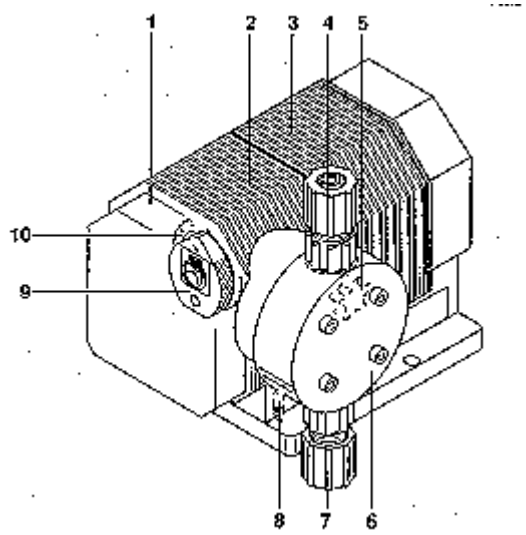


MANOMETER / pressure gauge
DVZ 63 0-1 bar H 1/4”



MANOMETERHAHN / root valve for pressure gauge
DVZ 63 0-1 bar H 1/4”





01 Cover
02 Motor Support
03 Enclosure
04 Discharge Connection
05 Bleed Valve with Fine Bleed Screw
06 Liquid End
07 Suction Connection
08 Bypass Hose Nozzle
09 Locking Bar
10 Eccentric Plate with Scale

Commissioning

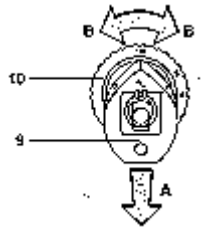
Connect the suction and discharge lines securely.

There is fluid in the suction tank.

Remove the cover (1) and check whether the stroke length is s 100%.

If not:

A: push back locking bar (9) to eccentric plate,
B: set eccentric plate (10) to 100%,
C: slot in locking bar again.



Refit the cover (1).

ATTENTION

The metering pump may only be operated when the cover (1) is closed!

Open the bleed valve (5) by turning it one turn anti-clockwise.

Now the passage is open for coarse suction bleeding via the bypass.

Switch on the pump and allow it to operate at 100% stroke length the medium has completely filled the liquid end without bubbles.

This can be recognised when the medium can be seen in the discharge l or bleed line.

Switch off the metering pump.

Close the bleed valve (5) by one turn clockwise. The pump is now ready to operate.

For media which easily emit gases, the fine bleeding can be additionally switched on continuously for PP liquid ends (only PP1 or PP2) with bleed valve**.**
For this purpose, after removing the attached star handle (5b), the fine bleed screw (5a) inside the bleed valve is opened approx. 1 turn anticlockwise**.**

As a result a partial flow of the metering quantity is constantly fed back to the supply tank.

The backfeed quantity should be approx. 20% of the metering quantity.

The media must be fluid and without any solid particles.

WARNING

These measures above do not guarantee any absolute reliable metering after the pump has come to a standstill!
It is essential that the pump is checked regularly!

Refit the star handle (5b).

Please note:
After approx. 24 operating hours the screws in the liquid end are to be tightened crosswise.

ATTENTION

It is essential that the torques of the screws are observed!
Torques for M5 screws: 4.5 to 5 Nm!

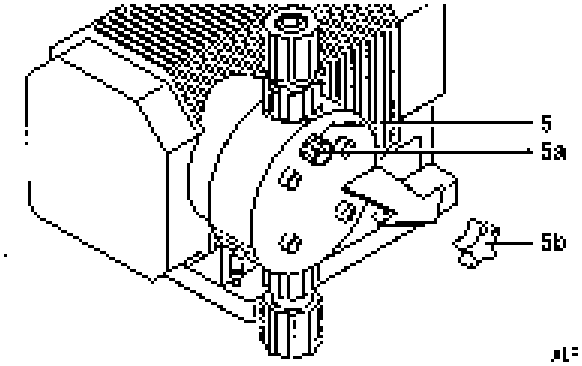
Maintenance

WARNING
Metering pumps and their peripheral equipment may only be serviced by trained and authorised personnel!

Service intervals: every quarter of a year!

Please note:

Service internval: every quater of a year!
Shorter intervals for heavy duty operation (e.g continuous operation)!



The maintenance of the DVZ metering pumps is limited to checking

The liquid end screws (fitting tightly, 4.5 - 5 Nm)

The discharge lines (fitting tightly)

The head and suction valves (fitting tightly)

The bleed valve for the PP version (fitting tightly)

The drain bore behind the liquid end side (dampness can indicate a diaphragm rupture)

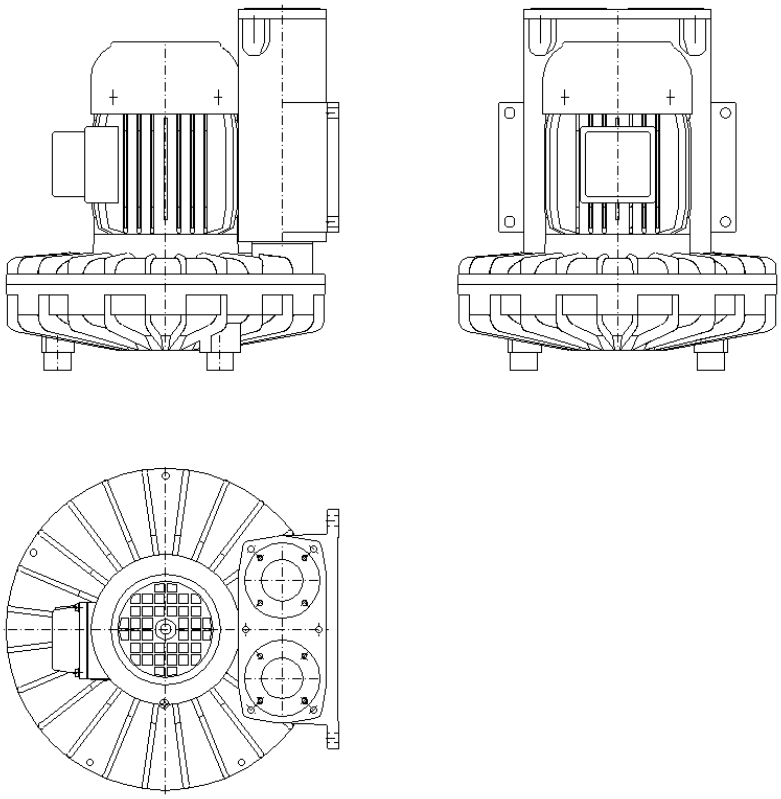
Troubleshooting		
Fault	**Possible cause**	**Corrective measures**
No metering pump intake (during initial operation)	Suction head too high Backpressure in metering line (delivery side)	Install pump closer to intake tank Eliminate backpressure (e.g. via bypass line)
No metering although drive is running (after longer period of operation)	Stroke setting 0 % Intake tank empty Gas cushion in intake line and liquid end	Increase stroke length (100 %) Top up medium and restart Bleed intake line, check for leaks and restart
Metered liquid emerges from leakage opening of delivery unit	Diaphragm defective	Replace diaphragm
Loss of metering capacity (after longer period of operation)	Wearing parts in valves defective Deposits in valves	Replace wearing parts Clean or replace valve parts

DVZ-ALPB

Spare part list for dosing pump DVZ ALPB 1001

Menge ***Qty.***	**Benennung** ***Description***
1 Satz set	Reparatursatz – Dosierpumpe DVZ-ALPB1001 Bestehend aus: 1 Stck. Membrane 1 Stck. Druckventil kpl. 1 Stck. Saugventil kpl. 2 Stck. Ventilkugel 1 Satz Dichtungssatz 1 Satz Anschluss-Satz Overhaul-Kit – Dosing Pump DVZ-ALPB1001 Consisting of: 1 pc. Diaphragm 1 pc. Discharge-Valve cpl. 1 pc. Suction-Valve cpl. 2 pcs. Valve-Ball 1 set Gasket-Set 1 set Connection-Set
1 Stück piece	Fördereinheit DVZ-ALPB1001 Liquid-End
1 Stück piece	Fussventil Chlor-Kanister DVZ-ALPB1001 Foot-Valve Chlorine-Tank
1 Stück piece	Dosierventil DVZ-ALPB1001 Proportioning-Valve

COMPRESSEUR DE LA CHAÎNE LATÉRALE / lateral channel compressor DVZ-SD-2n



Sicherheit

Unsere Seitenkanalverdichter zeichnen sich durch ein hohes Maß an Betriebssicherheit aus. Da es sich bei den Seitenkanal-verdichtern um sehr leistungsfähige Maschinen handelt, sind zur Vermeindung von Verletzungen, Beschädigungen von Sachen und der Maschine selbst, folgende Sicherheitshinweise streng zu beachten.

Ansaugwirkung
Seitenkanalverdichter erzeugen eine starke Saugwirkung.

Warnung!
Am Ansaugstutzen können Gegenstände, Kleidungsstücke und auch Haar angesaugt werden (Verletzungsgefahr).
Während des Betriebs nicht in der Nähe der Ansaugöffnung aufhalten.
Der Seitenkanalverdichter darf nie mit offener Ansaugöffnung betrieben werden. Der offene Ansaug muss mit einem Schutzgitter nach DIN EN 294 abgedeckt werden.

Nicht in die Ansaugöffnung hineingreifen.

Ausblaswirkung
Warnung!

Safety

Our side-channel blowers excel by a high degree of operating safety. As the side-channel blowers are rather high-powered machines, the safety instructions must be strictly adhered to in order ro avoif injuries, damage to objects and to the machine itself.

Suction effect
Side-channel blowers produce a powerfull suction effect.

Warning!
Object, items of clothing and also hair can be sucked into the intake port (danger of injury)!
Do not stand near the intake opening during operation.
Never operate the side-channel blower with open intake port. The open intake port must be covered with a wire guard in accordance with DIN EN 294.

Do not reach into intake opening.

Blowing effect

Sehr starke Ausblaswirkung am Ausblasstutzen.
Angesaugte Gegenstände können mit hoher Geschwindigkeit herausgeschleudert werden (Verletzungsgefahr).
Seitenkanalverdichter eignen sich ausschließlich zum Fördern von Reinluft. Das Ansaugen von Fremdkörpern oder Verunreinigungen, die ausgeblasen werden könnten, müssen unbedingt vor Eintritt in den Seitenkanalverdichter ausgefiltert werden.
Der Seitenkanalverdichter darf nie mit offenem Ausblasstutzen betrieben werden und muss daher mit einem Schutzgitter nach DIN EN294 abgedeckt werden. Nicht in die Ausblasöffnung hineingreifen.

Motorschutzschaltung
Vor Inbetriebnahme des Seitenkanalverdichters muss der Antriebsmotor mit einem Motorschutzschalter abgesichert werden.

Bestimmungsgemäße Verwendung
Die Seitenkanalverdichter eignen sich ausschließlich zum Fördern von Reinluft.

Der Einsatz für
- aggressive,
- giftige
- explosionsfähige oder
- sehr feuchte

Medien ist nicht zulässig.

Im Fördermedium enthaltene Feststoffe oder Verunreinigungen müssen vor Eintritt in den Seitenkanalverdichter ausgefiltert werden.
Die maximale Umgebungstemperatur darf +60°C nicht überschreiten, die minimale –20°C nicht unterschreiten.
Der Seitenkanalverdichter eignet sich nicht für die Aufstellung in explosionsfähiger Atmosphäre.
Sonderausführungen für den Einsatz außerhalb der oben beschriebenen Anwendungen stehen auf Anfrage zur Verfügung.
Umbau und Veränderung des Seitenkanalverdichters sind nicht zulässig.

Installation

Transport
- Prüfen Sie vor Montage und Inbetriebnahme alle Teile auf Transportschäden
- Seitenkanalverdichter nicht ungeschützt im Freien lagern (vor Feuchtigkeit schützen).
- Hebezeug sicher anschlagen. Nur Hebezeuge und Lastaufnahmeeinrichtungen mit ausreichender Tragfähigkeit verwenden.

Aufstellen, Montage
- Seitenkanalverdichter vor Witterung geschützt, horizontal oder vertikal aufstellen.
- Keinen Schwing- oder Stoßbelastungen aussetzen.
- Seitenkanalverdichter mit Fuß; am Einsatzort auf ebenem, festem Untergrund fest verschrauben.
- Seitenkanalverdichter, welche auf die vorhandenen Gummielemente gestellt werden, sind gegen Verdrehung zu sichern.
- Offene Ansaug- und Ausblasöffnungen mit Schutzgitter nach DIN EN 294 abdecken.
- Für ausreichende Motorbelüftung sorgen, max Umgebungstemperatur +60°C

Elektrischer Anschluß
Hinweis!
Die in diesem Abschnitt beschriebenen Arbeiten dürfen nur

Warning!
Powerful blow-out at the discharge flange.
Sucked-in objects may be ejected at very high speed (danger of injury).
Side-channel blowers are meant for conveying clean air only. The sucking-in of solid particles and other containments - which might be discharged - must be avoided at all times. These objects have to be withheld before entering into the side channel blower by installing a filter.
The side-channel blower may never be operated with open discharge flange, and therefore has to be protected with a wire guard in accordance with DIN EN 294. Do not reach into the discharge opening.

Motor circuit breaker
Before starting operation of the side-channel blower, the drive motor has to be safeguarded by a motor circuit-breaker.

Proper application
The side-channel blowers are designed for conveying air only.

Using them for
- aggressive
- poisonous
- explosive or
- very most

media is not permitted.

Solid particles or contaminantes must be withheld by a filter unit before entering the side-channel blower.

The maximum ambient temperature must not exceed +60°C, the minimum not below –20°C.
The side-channel blower cannot be operated in an explosive atmosphere.
Special versions for applications not mentioned above are available on demand.
Remodelling and modifications of the side-channel blower are not allowed.

Installation

Transport
- Check all parts for damage during transport before installation and starting of operation.
- Do not store the side-channel blower unprotected in the open (protect against moisture).
- Attach hoist securely. Only use hoist and load suspension devices with sufficient load-carrying capacity.

Installation, assembly
- Install side-channel blower horizontally or vertically and weather-protected.
- Do not subject to vibrations or shock.
- Side-channel blower with base; to be secured tightly at side of operation on solid, even ground.
- Side-channel blowers, which are placed on existing rubber elements, must be secured against twisting.
- Open intake and discharge ports are to be protected by wire guards in accordance with DIN EN 294.
- Ensure adequate motor cooling, max. ambient temperature +60°C.

Electrical connection
Note!
The work described under this section may be executed by a

von einer Elektrofachkraft ausgeführt werden. Anschluß nach dem Schaltbild im Klemmkasten und den einschlägigen örtlichen Bestimmungen vornehmen.

Als Antriebsmotor ist bei dem Seitenkanalverdichter SD ein Drehstrommotor angebaut.

- Der Antriebsmotor ist mit einem Motorschutzschalter abzusichern.
- Der Schutzleiteranschluß ist im Klemmkasten vorhanden.

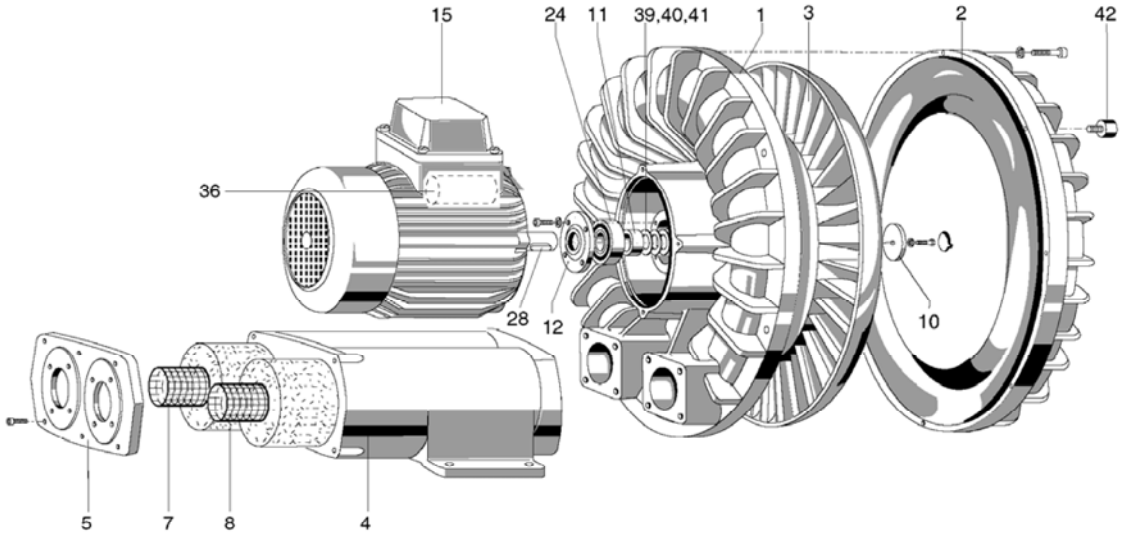
Wartung
Hinweis!
Reparaturen dürfen nur vom Hersteller ausgeführt werden. Bei Reparaturen durch Dritte übernehmen wir keine Haftung.

qualified electrician only. Connections to be carried out in accordance with wiring diagram in terminal boy and relevant local regulations.

As drive motor for the SD blower a three phase a.c. motor is fitted.

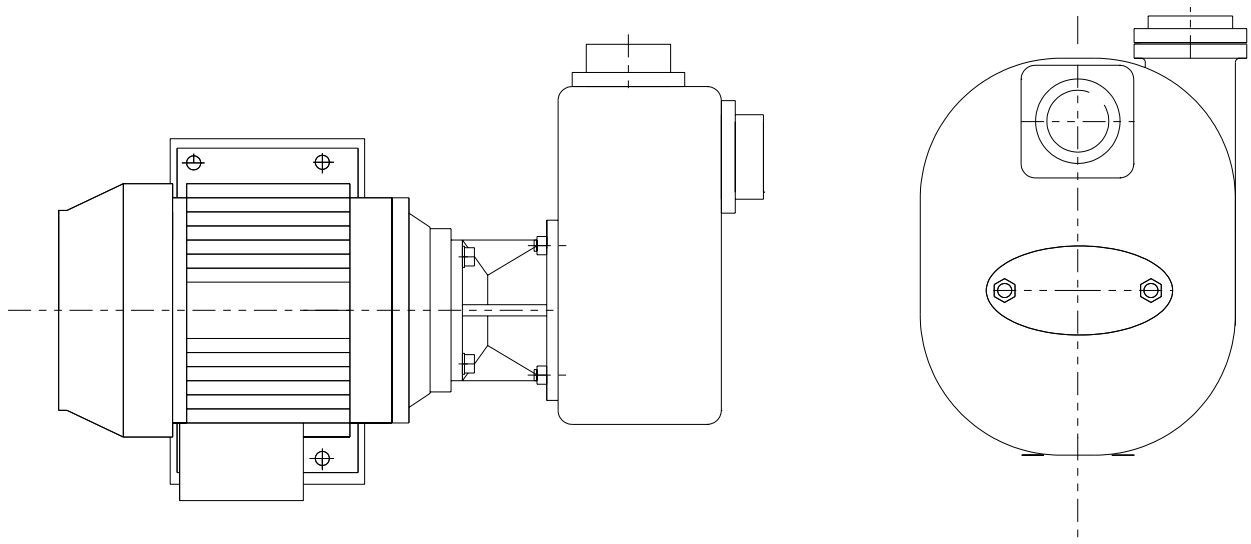
- The drive motor has to be safeguarded by a motor circuit-breaker.
- The safety earth terminal can be found in the terminal box.

Maintenance
Note!
Repairs must be carried out by the manufacturer only. We cannot accept any liability for repairs carried out by third parties.



Pos.	Typ Benennung	Type Designation	SD2n Artikel Nr./Part No.
1	Verdichtergehäuse	Blower housing	002404
2	Gehäusedeckel	Housing cover	002405
3	Laufrad bei 50 Hz	Impeller for 50 Hz	002407
	Laufrad bei 60 Hz	Impeller for 60 Hz	002407
4	Schalldämpfergehäuse mit Fuß	Silencer housing with base plate	002408
	Schalldämpfergehäuse ohne Fuß	Silencer housing without base plate	002409
5	Flansch	Flange	000529
7	Schutzgitter	Wire mesh guard	000499
8	Schaumstoff	Plastic foam	002406
10	Scheibe	Washer	002375
11	Büchse	Bush	004128
12	Lagerabschlußdeckel	Bearing cap	400799
15	Antriebsmotor	Drive motor	X
24	Kugellager DDU7 CM E EA3S	Ball bearing DDU7 CM E EA3S	000556
28	Paßfeder	Key	003406
36	Betriebskondensator	Operating capacitor	–
39	Distanzscheibe 0,05 mm dick	Spacer washer 0.05 mm thick	002382
40	Distanzscheibe 0,1 mm dick	Spacer washer 0.1 mm thick	003191
41	Distanzscheibe 0,2 mm dick	Spacer washer 0.2 mm thick	002384
42	Anschlagpuffer	Rubber foot	000498

KREISELPUMPE / centrifugal pump
DVZ-S 32/40/50



EINFÜHRUNG

Die Betriebsanleitung enthält wichtige Hinweise, die Pumpen sicher, sachgerecht, und wirtschaftlich zu betreiben. Ihre Beachtung hilft, Gefahren zu vermindern, Reparaturkosten und Ausfallzeiten zu senken und die Zuverlässigkeit und Lebensdauer der Pumpe zu erhöhen.

Die Betriebsanleitung muß ständig am Einsatzort der Pumpe verfügbar sein.

Die Betriebsanleitung ist von jeder Person zu lesen und anzuwenden, die mit Arbeiten mit/an der Pumpe beauftragt ist.

Neben der Betriebsanleitung und den im Verwenderland und an der Einsatzstelle geltenden verbindlichen Regelungen zur Unfallverhütung sind auch die anerkannten fachtechnischen Regeln für sicherheits- und fachgerechtes Arbeiten zu beachten.

SICHERHEITSHINWEISE

Eine Pumpe die nicht korrekt installiert ist, falsch bedient wird oder wenig gewartet wird, kann eine Gefahr darstellen. Falls die folgenden Hinweise nicht beachtet werden kann die Sicherheit des Personals gefährdet werden.

Vorsicht ist geboten bei der Handhabung aller Teile. Wenn Pumpen, Aggregate oder Teile davon mehr als 20 kg (44 lb.) wiegen, wird die Benutzung geeigneter Hebemechanismen empfohlen um Schaden an Pumpe oder Personal zu vermeiden.

ACHTUNG: Ösen die nur an einige Teile wie Pumpe oder Motor befestigt sind, dürfen nur diese abheben, nicht das ganze Aggregat.

Bevor eine Pumpe zerlegt wird, müssen alle Sicherheitsvorkehrungen getroffen werden, insbesondere wenn das geförderte Medium gefährlich oder giftig ist. Bei Zweifeln fragen Sie einen Arzt oder den Hersteller.

INTRODUCTION

The instruction manual contains important information on how to operate the pump safely, properly and most efficiently Observing these instructions helps to avoid danger, to reduce repair costs, downtimes and to increase the reliability and life of pump.

The operating instructions must always be available wherever the pump is in use.

The operating instructions must be read and applied by any person in charge of carrying out work on the pump.

Observe the mandatory rules and regulations for accident prevention and environmental protection in the country and place of use of the pump. The generally recognized technical rules for safe and proper working must also be observed.

SAFETY

A pump that is installed incorrectly, operated wrongly or maintained poorly can present a hazard. If the following considerations are overlooked, the safety of personnel or satisfactory operation of the pump may be endangered.

Attention must be given to the safe handling of all items. Where pumps, pump units or components weigh in excess of 20 kg (44 lb.), it is recommended that suitable lifting equipment should be used in the correct manner to ensure that personal injury or damage to pump components does not occur.

NOTE that lifting eyes fitted to individual pieces such as pump and motor are designed to lift only this part and not the complete assembly.

Before starting to dismantle a pump all relevant and appropriate safety precautions must be taken, particularly if the pumps have been handling hazardous or toxic products. Seek advice from your safety officer or the manufacturer if you have any doubts.

Wenn die Pumpe giftige oder gefährliche Mittel gefördert hat muß beim Zerlegen immer eine geeignete Schutzkleidung und Schutzbrille getragen werden. Atmungshilfen könnten notwendig sein.

Vor jeglicher Arbeit muß die Pumpe elektrisch isoliert werden. Es muß gesichert werden, daß während der Arbeit der Strom nicht zufällig wieder angeschlossen werden kann

Pumpe entleeren, bevor sie aus der Anlage ausgebaut wird.

Mit einer kompatiblen Flüssigkeit ausspülen. Die Flüssigkeit dann in einen sicheren Ort abfließen.

Mit dem Anlagenbauer nachprüfen ob besondere Entseuchungsprozesse durchgeführt werden müssen.

Alle Pumpen die für die Wartung zurückgegeben werden, müssen entseucht sein und einen Hinweis auf besondere Vorsichts-maßnahmen für das Wartungspersonal tragen.

LAGERUNG

Wenn die Pumpe nach Auslieferung nicht sofort eingesetzt wird, sollte sie wieder eingepackt werden und in einen passenden Ort gelagert werden. Schutzfolien auf nicht lackierte Stellen sollten auf Beschädigungen geprüft werden. Unlackierte Stellen ohne Rostschutzmittel sollten behandelt werden.
Plastikkappen oder Deckel sollten nicht abgenommen werden.
Die Pumpen sollten in einen sauberen und trockenen Ort lagern, andernfalls Pumpe mit feuchtabweisende Hauben schützen.

SELBSTANSAUGUNG

Vor der ersten Inbetriebnahme Deckel oder Verschlußschraube oben am Pumpengehäuse entfernen.

Pumpe vollständig mit der geförderten
Flüssigkeit füllen.

Deckel oder Verschlußschraube wieder schließen.

Die Drehrichtung der Welle muß mit dem Pfeil am Pumpen-gehäuse übereinstimmen (im Uhrzeigersinn wenn von der Welle oder vom Motor gesehen).

BETRIEBSSTÖRUNGEN

DIE PUMPE SAUGT NICHT AN

a) Luft dringt in die Saugleitung ein. Defekte oder falsch verschraubte Gewindeanschlüsse.

b) Pumpengehäuse leer oder zu wenig aufgefüllt.

c)Luft dringt durch die Gleitringdichtung ein, weil beschädigt oder nicht geschmiert. Gleitringdichtung auswechseln.

d) Falsche Drehrichtung oder Drehzahl zu niedrig.

e) Spiralgehäuse durch abrasive Flüssigkeit abgenutzt.

f) Überhitzung der Flüssigkeit in der Saugkammer. Kalte Flüssigkeit nachfüllen.

g) Überdruck in der Druckleitung. Luft kann nicht ausweichen. Luft durch den Auffülldeckel ablassen oder Entlüftungsventil in der Druckleitung anbringen.

h) Laufrad abgenutzt oder gebrochen.

DIE PUMPE BRINGT ZU GERINGE LEISTUNG

Always wear adequate protective clothing and eye protection when dismantling pumps that have been used to pump toxic or hazardous products. Breathing apparatus may be necessary.

Always isolate the pump electrically before dismantling. Ensure that the electrical switch gear cannot be operated whilst any work is being carried out on the pump.

Always drain the pump casing of product before removing the pump from its associated pipework.

Flush out the pump casing and shroud with a compatible flush and drain away to a safe area.

Check with your process people to see if any special decontamination procedures have to be followed before working on a pump.

All pumps returned for factory servicing must be decontaminated and labeled to inform what precautions should be taken before dismantling.

STORAGE

After receipt and inspection, a pump not immediately installed should be repackaged and placed in suitable storage.
Protective coatings on unpainted surfaces should be inspected and left intact. Unpainted surfaces, not factory treated with a rust inhibiting coating, should have a protective coating applied.
Plastic or gasket type port covers should be left in place. Pumps received wrapped with corrosion inhibiting treated material should be rewrapped.
Select a clean, dry storage location. When moist, dusty atmosphere must be used for storage, further protect the pump or unit with a moisture repellent cover until it is to be installed.

PRIMING

Open the priming cover or plug on the top of pump.

Fill pump chamber completely with the liquid to be pumped.

Close cover or plug and start the pump.

Check that direction of rotation is the same as shown by the arrow on the back of the pump (clockwise when looking from the shaft or motor end).

OPERATING TROUBLES

PUMP DOES NOT PRIME

a) Air leaks in the suction line (through couplings, threads, flanges, gaskets, hose clips, cuts, etc.).

b) Level of liquid inside pump casing is too low or empty

c) Air leaks through the mechanical seal because of damage or lack of lubrication.

d) Wrong direction of rotation or too low speed

e) Leading edge of the volute is worn out by the abra-sive action of the liquid.

f) Liquid inside pump chamber overheated. Allow liquid to cool down or refill it.

g) Delivery line does not let the air escape. Exhaust air through priming cover or install an automatic airrelease valve.

b) Saug- oder Druckleitung verstopft oder Gummischlauch geplatzt. Prüfen und Hindernis entfernen.

c) Hohe Druckverluste in der Saugleitung. Krümmungen, Engstellen oder Ventile entfernen.

d) Saughöhe zu groß. Pumpe so nah wie möglich an das Medium aufstellen.

e) Drehzahl zu niedrig.

f) Laufrad verstopft. Reinigen durch Inspektionsdeckel oder durch Demontage des Pumpengehäuse selbst.

g) Laufrad oder Verschleißplatte abgenutzt oder gebrochen. Ersetzen.

SCHMIERUNG DER KUGELLAGER *(für Modelle mit Lagerträger)*

Modelle **ohne** Schmiernippel haben auf Lebenszeit geschmierte Kugellager und brauchen deshalb keine Wartung.

Modelle **mit** Schmiernippel kommen mit geschmierten Lager und brauchen keine Wartung für die ersten 1500 Arbeitsstunden.

Niemals mit Fett übertreiben, **da dies** zu Überhitzung und später zu **Beschädigung der** Kugellager führen kann.

5. LAGERUNG

Pumpe durch den unteren **Deckel** oder Verschlußschraube völlig entleeren.

Wird die Pumpe im freiem gelagert, so muß sie mit einer wasserdichten Haube abgedeckt werden.

Niemals Wasser während der kalten Jahreszeit im Gehäuse lassen!
Das Wasser kann frieren und das Gehäuse brechen!

h) Clogged, broken or worn impeller.

LOW CAPACITY

a) Suction delivery lines clogged. Locate and remove obstruction.

b) High friction losses in the line. Get rid of unnecessary curves, valves and constrictions.

b) Static suction lift too high. Place the pump as close as possible to the surface of liquid to be pumped.

d) Low rotation speed. Increase RPM.

e) Impeller clogged. Free impeller through the inspection cover.

f) Impeller and/or wear plate(s) worn out. Replace.

BEARING LUBRICATION ***(for models with bearing housing)***

Models without grease nipple have lifetime lubricated ball bearings and do not require maintenance.

Models with grease nipple are supplied with lubricated bearings and do not require to grease for the first 1500 hours.

STORAGE

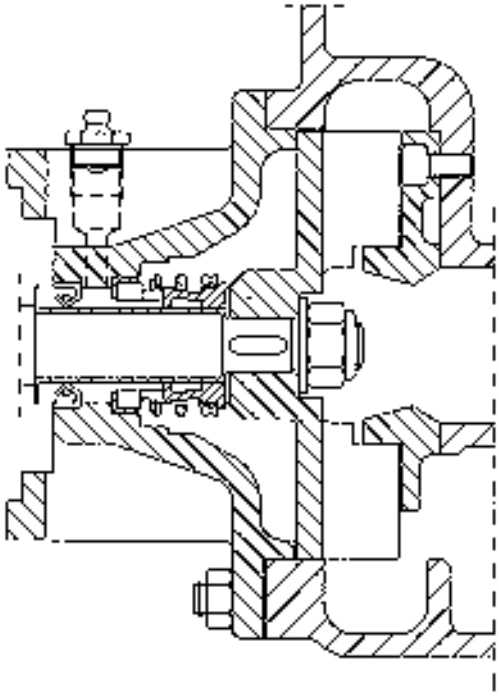
Drain all the liquid out the casing, through the drain cover or plug.

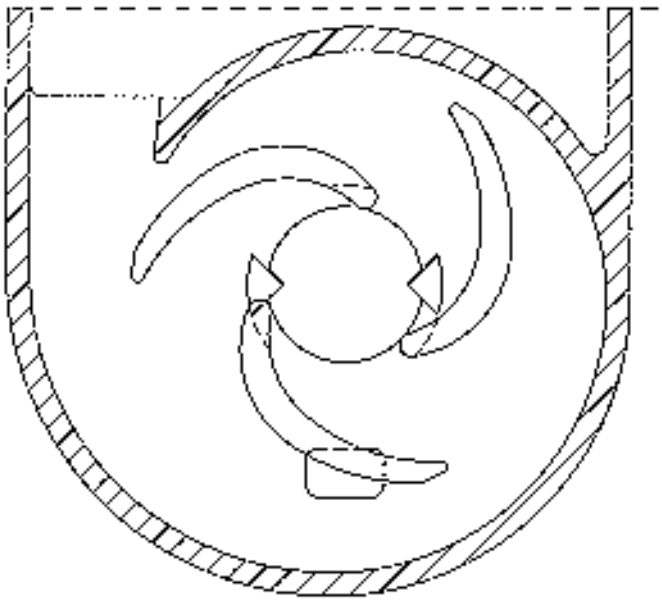
If the pump is to be left out in open air, protect it by waterproof canvas.

Never forget water inside pump casing during cold weather!
Water may freeze and break the pump casing!

SCHNEIDVORSATZ

CUTTING DEVICE

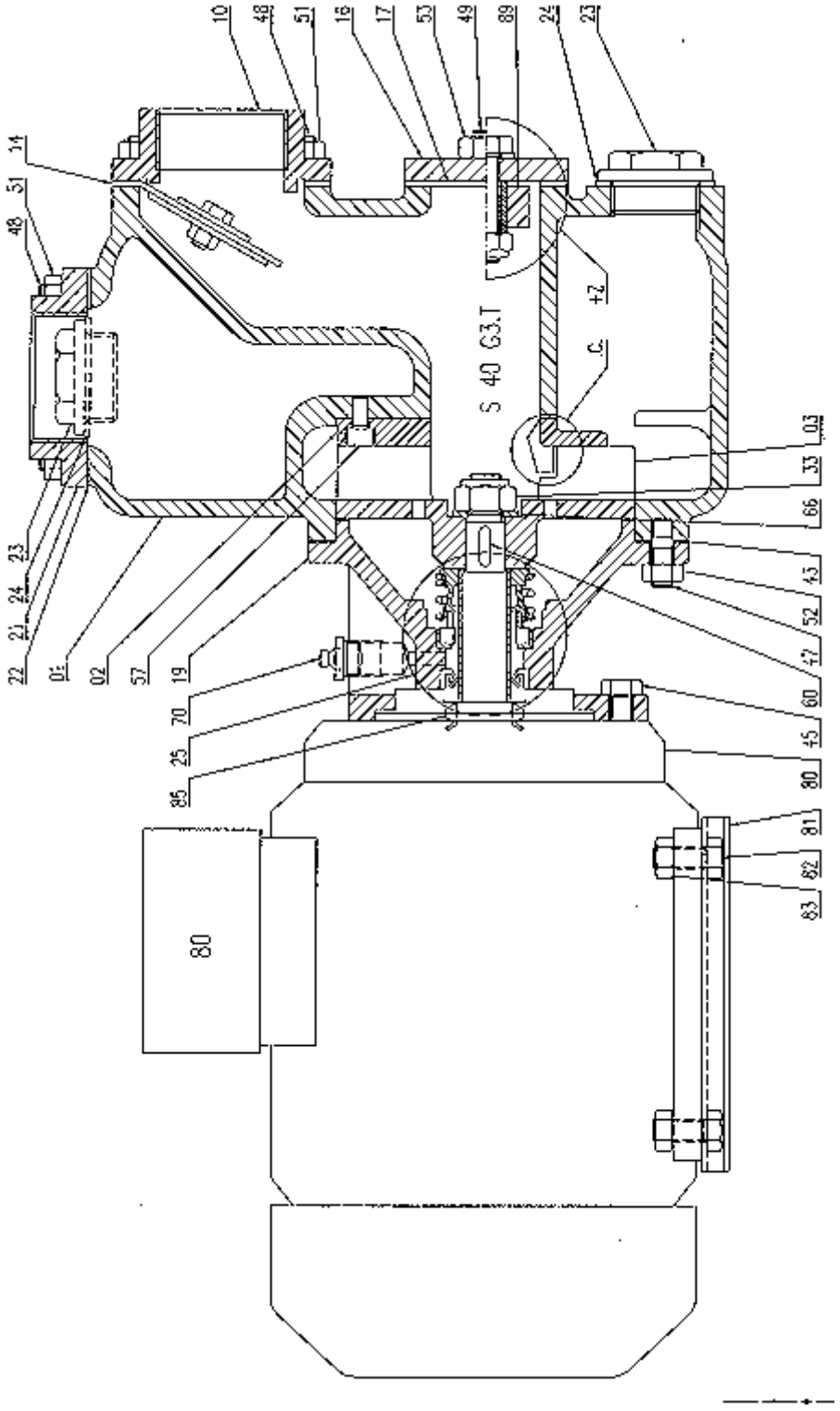




Der Schneidvorsatz besteht aus einem axialen Überhang an der Verschleißplatte, der einen Schereffekt mit dem dicht anliegenden Laufrad verursacht.

The cutting device consists of an axial part attached to the wear plate. Because of the close distance to the impeller solids sheared or cutted.

SCHNITTBILD **SECTION DRAWING**



Pos Ref	Best.Nr. Part No.	Ws Mat	Für For	Abmessungen Dimensions	Menge Q.ty	Benennung	Part Name
0	320354	G			1	Gehäuse (mit 23, 24, 47, 48, 49)	Casing (with 23, 42, 47, 48, 49)
02		S		40x109x10	1	Verschleissplatte (mit 57)	Wear Plate (with 57)
03		G		109x20	1	Laufrad	Impeller
10	402261	G		R 1½"	1	Saugstutzen	Suction Flange
	402067	G	+F	DN40 PN16			
14	322128	N+H	32		1	Ventilklappe komplett	Check Valve Assembly
	322089	V+K	34				
16	403510	S			1	Deckel	Cover
17	666205	N+H	32		1	Dichtung, Deckel	Gasket, Cover
	666202	V+K	34				
19	404864	G			1	Zwischenflansch (mit 77)	Head (with 77)
21	403275	G		R 1½"	1	Druckstutzen	Discharge Flange
	403063	G	+F	DN40 PN16			
22	665560	E		50x80x80x1	1	Dichtung, Druckstutzen	Gasket, Discharge Flange
23	620054	S		R 1"	2	Verschlussschraube	Plug
24	619980	E		33x44x2	2	Dichtung, Verschlussschraube	Gasket, Plug
25	303219	YYN	32	B19	1	Gleitringdichtung komplett	Mechanical Seal Assembly
	303419	YYV	34				
33	612491	H		M12x1,25 DIN985-A2	1	Laufradmutter	Impeller Nut
43	665999	D		110x130x0,5	1	Gehäusedichtung	Casing Gasket
45	600119	S		M8x20 DIN933-8	4	Schraube, Zwischenflansch	Screw, Head
47	613358	S		M8x16 DIN938-8	4	Stiftschraube, Gehäuse	Stud, Casing
48	613358	S		M8x16 DIN938-8	8	Stiftschraube, Flansch	Stud, Flange
49	612996	S		M10x20 DIN938-8	2	Stiftschraube, Deckel	Stud, Cover
51	612035	S		M8 DIN934-8	8	Mutter, Flansch	Nut, Flange
52	612035	S		M8 DIN934-8	4	Mutter, Gehäuse	Nut, Casing
53	612043	S		M10 DIN934-8	2	Mutter, Deckel	Nut, Cover
57	610228	K		M6x12 DIN912-A4	3	Schraube, Verschleissplatte	Screw, Wear Plate
60	610994	K		A 4x14 DIN6885-A4	1	Passfeder, Laufrad	Key, Impeller
62	615114	S		A20 DIN471	1	Sicherungsring	Circlip
66	610790	K		M12 DIN 125-A4	1	Scheibe, Laufrad	Washer, Impeller
70	660070	S		R ¼"	1	Schmiernippel	Grease Lubricator
77	622100	S		R ¼" #292	1	Verschlussschraube, Zwischenflansch	Plug, Head
	622110	B	+R	R ¼" x D,10	1	Schlauchtülle	Spigot
80	59114		T	3x240/400/50 1,1KW	1	Motor (mit 33, 45, 60, 66, 81,82, 83, 84, 85)	Motor (with 33, 45, 60, 66, 81, 82 83, 84, 85)
	59118		E	3x240/400/50 1,1KW EEx-e			
	59025		M	1x240/50 1,1KW			
81	715110	S		160x130x10x2	1	Motorfuß	Motor Base
82	600127	S		M8x25 DIN933-8	4	Schraube Motorfuß	Screw Motor Base
83	612035	S		M8 DIN934-8	4	Mutter Motorfuß	Nut Motor Base
84	614037	S		M8 DIN125A	4	Scheibe Motorfuß	Washer Motor Base
85	642071	N		V20	1	V-Ring	V-Ring
	329191	D+N	32			Dichtungssatz (mit 14, 17, 22, 24, 43)	Gasket Set (with 14, 17, 22, 24, 43)
	329294	D+V	34				