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Series No.....Customer.....Date of delivery.....

## Operating instructions GRANUDOS 10-S3

### **Safety Devices**

1. Chlorine and acid may not be mixed together or with other chemicals

Pay attention to the safety devices on chemical Containers

2. Close hopper immediately after filling
3. If an adapter to a chemical container is used the hopper must be screwed even and firmly to the container
4. Clean environment with water if chemical was spread
5. Only instructed personnel may work with the GRANUDOS
6. Ensure booster pump does not run dry, always isolate pump when backwashing.

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## 1 Function of GRANUDOS 10S3

### 1.1 Data, Measures, Performance

The GRANUDOS 10-S3 dosing system comprises:

- polyethylene housing one piece
- filling hopper 5 kg (option 10 kg or adapter to 10 kg containers)
- calcium hypochlorite screw feed arrangement
- peristaltic acid pump
- dissolving system

#### Measures:

base: 60 x 50 cm

height: 80 cm

weight: 30 kg

#### Material:

PE, polyethylene

#### Booster Pump

centrifugal pump: SS - 0.3 kW, 230 Volt

supply pressure: 0,2 – 1,2 bar

counter pressure: 0 – 1,2 bar

(depending on supply pressure)

water flow: app. 1000 l/h

#### Dosing performance:

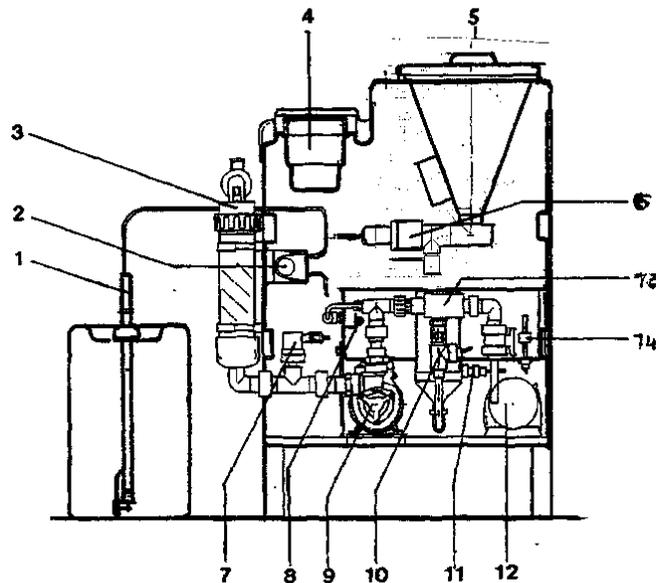
chlorine: 0,7 kg/h (standard - optional 1,5 kg/h)

acid: 1,5 l/h

Fault remote indication

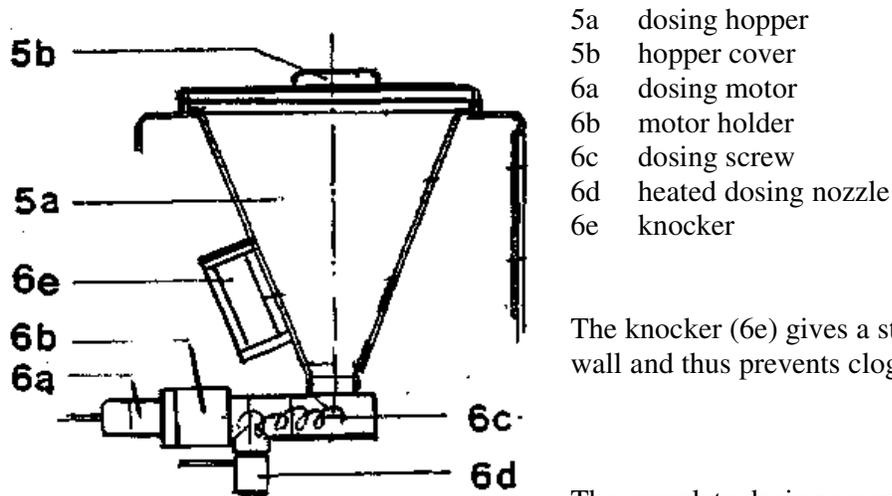
by relay

- 1 supply carboy lance
- 2 dosing pump for acid
- 3 strainer GR 10 complete
- 4 control system
- 5 dosing hopper
- 6 dosing assembly GR 10
- 8 floating valve d25 complete
- 9 booster pump
- 10 suction tube with flow switch
- 11 acid dosing valve GR
- 12 mixing cyclone GR 20
- 13 venturi complete
- 14 level switch GR 20



## 1.2 Dosing Assembly

The dosing assembly, placed into the main housing consists of the dosing hopper (5a) and the dosing unit with dosing motor (6a) pushed into and screwed to the motor holder (6b) the dosing screw (6c) and the dosing nozzle which is heated eliminating condensation of the warm pool water vapour. The dosing unit is screwed into the dosing hopper. The required dosing rate is adjusted at the control board by means of a dosing cycle and dosing time – see para 1.5.



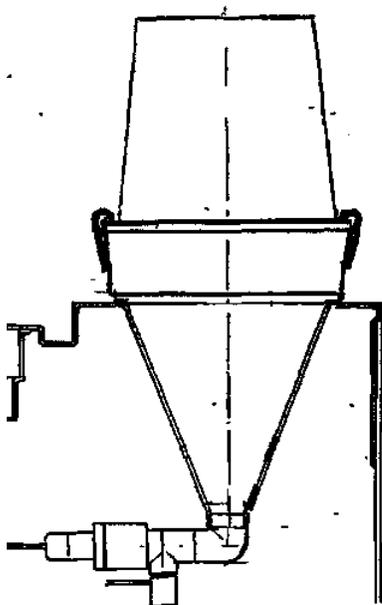
- 5a dosing hopper
- 5b hopper cover
- 6a dosing motor
- 6b motor holder
- 6c dosing screw
- 6d heated dosing nozzle
- 6e knocker

The knocker (6e) gives a stroke to the dosing hopper wall and thus prevents clogging of the chemical.

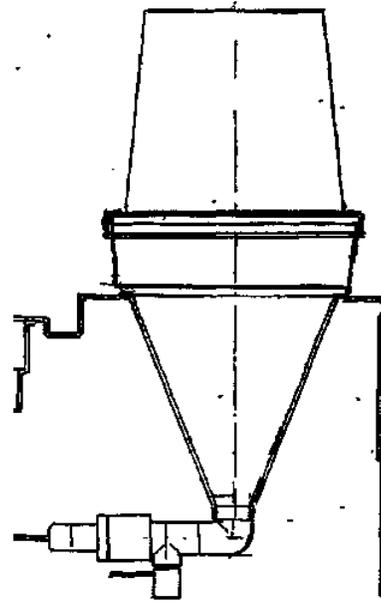
The complete dosing assembly can be taken out of the frame for service.

With the shown fitting systems chemical containers of 10 kg can be fitted directly to the hopper so that the chemical must not be moved from the container to the hopper.

Fitting system to join a  
10 kg container with round edge



Fitting system to join a  
10 kg HTH container



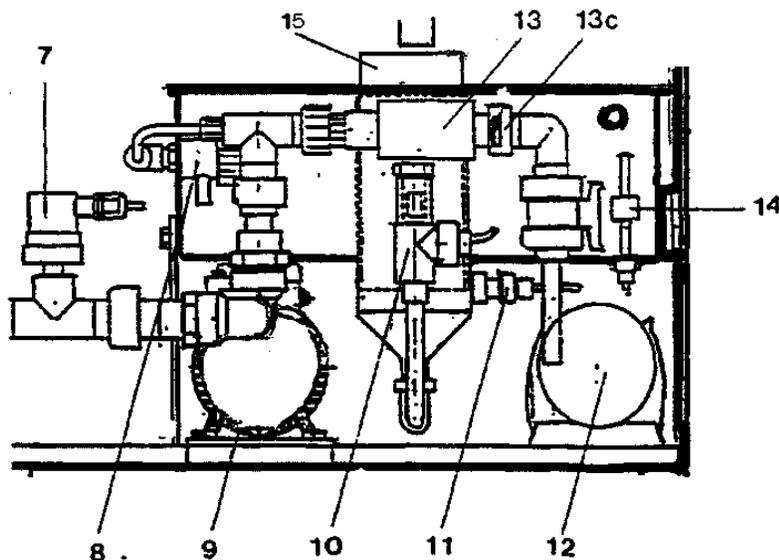
### 1.3 Dissolving System

The supply water coming from the pool circulation from behind filter (minimum pressure 0,2 bar) is divided at the discharge of the booster pump (9), one way leading to the flushing tank via the floating valve (8), the other branch directed to the venturi nozzle (13), where the flushing water is sucked together with the dosed chemicals out of the flushing tank. A flow switch (10), being installed in the suction tube of the venturi monitors the suction force of the venturi. To adjust the suction to different pressure conditions an orifice washer (13c) with different bores can be used. To mix the chemicals and to ensure the complete dissolving of the hypochlorite granules a cyclone mixing chamber (12) is fitted after the venturi.

To ensure that calcium hypochlorite and acid do not come into contact with each other in the open part of the dissolving assembly a sophisticated control system is installed:

- metering of the two chemicals is regulated with pauses between the metering intervals
- dosing motors of chlorine and acid are controlled by connected relays – joint dosing is impossible
- flow switch (10 indicates if water flow to venturi falls below 150 – 200 l/h
- level switch (14) indicates water maximum or water minimum level in the flushing tank thus supervising water supply conditions.
- 4 red lamps indicate any fault.

If any non-compliance with the given limits occurs, the chemical dosing will be stopped.



7	Pressure switch (option)	13	venturi nozzle
8	floating valve	13c	orifice washer
9	booster pump Lo 2HMS3	14	level switch low/high
10	suction tube with flow switch	15	lid on flushing tank
11	acid dosing valve		with chlorine dust protection
12	mixing and dissolving chamber with PVC ball valve	16	overflow to drain

#### **1.4 Acid Dosing**

The acid required either for pH-control or just for cleaning of the flushing, mixing and dosing system is metered by the peristaltic pump (2, option) to the flushing water via the dosing injector (11). As the cleaning procedure is vital for the correct function of the complete dosing assembly, chlorine dosing is stopped if the level switch at the supply carboy lance indicates container empty.

Please do not use concentrated hydrochloric acid for this duty as that penetrates the peristaltic hose and will destroy the pump head.

## 1.5 Control Panel (GRD S3)

The control board is of analogical type, one part together with the front plate. All connectors are push type (see wiring diagram).

### Service elements:

On top of front plate:

- 1 main switch on/off
- 1 main fuse 3,15 amp. slow
- 1 potentiometer knob to adjust dosing cycle time from 1 – 8 minutes
- 2 potentiometer knobs to adjust dosing time of dosing motors chlorine and acid:  
100 % = 20 seconds dosing
- 2 push button switches to test dosing motors: if pushed, dosing is running accordingly
- 1 green lamp to indicate service
- 4 red lamps to indicate faults: acid empty, suction venturi low, water level in tank low, water level in tank high, dosing is stopped
- 1 select switch for dosing by auto controller or continuous dosing

Inside on control plate:

- 1 primary fuse 1,25 amp slow
- 1 secondary fuse 315 mA slow for all outputs: dosing motors, switches, relays

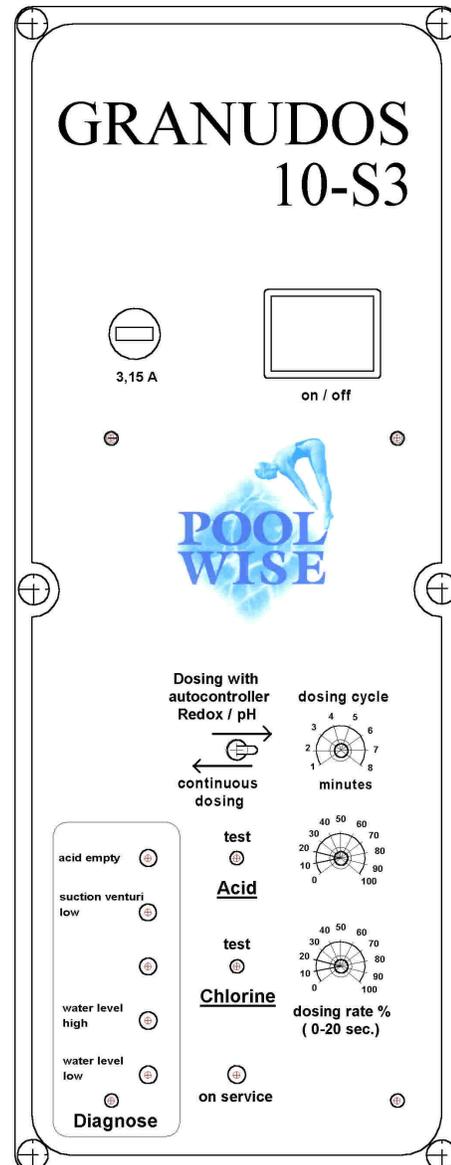
The function of the booster pump is not influenced by any fault, only dosing is stopped.

### 6.6 Dosing control

The dosing performance is set by setting a dosing cycle time (1 – 8 minutes) valid for both chemicals and a dosing time for each chemical separately (0 – 20 seconds). At continuous dosing all cycle dosing of chlorine and acid is running as set.

Maximum dosing is got with a cycle of 1 minute and dosing times 100 %, actually: 20 sec dosing acid, 10 sec. pause, ...20 sec. dosing chlorine, 10 sec. pause  
At setting a longer cycle time, the pause in between the dosing of chlorine and acid are becoming accordingly longer.

At connecting an external **auto controller** for free chlorine and pH this dosing cycle is activated, too. Dosing is running if the external control output meets the internal set “ability”. To get a sufficient dosing performance **the controller cycle** should be in the range of some minutes and the dosing control at the GRANUDOS should be set to maximum. The auto controller output must be 230 VAC on/off.



## 2. Installation

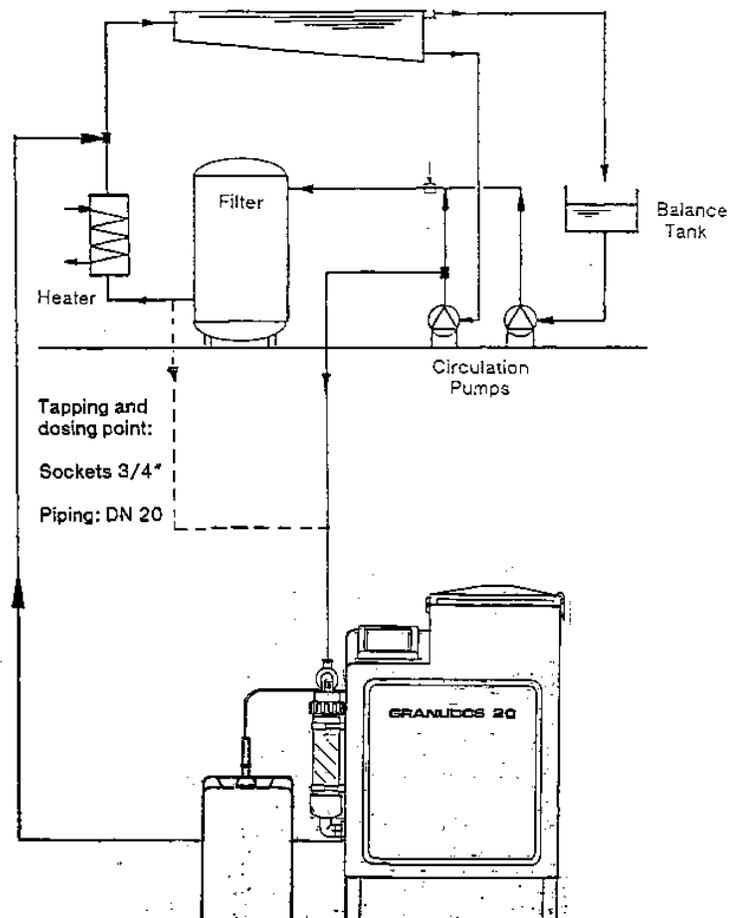
### 2.1 Tubing – please see installation diagram page

For satisfactory water flow through the dissolving system the supply pressure must be at least 0,2 bars. At low service pressure the counter pressure must be low, too. Counter pressure and pressure loss in the dosing line should be as low as possible. At works the GRANUDOS has been tested at following pressure conditions:

Service pressure	1,2 bars	Counter pressure	1,2 bars
	0,6 bars		0,8 bars
	0,3 bars		0,5 bars

Within these ranges the GRANUDOS should function well. In addition please pay attention to the following:

1. Tapping point for supply water to be between filter and heat exchanger, dosing point after heat exchanger.
2. Ensure that the tapping/dosing points are free flowing and not blocked by scale or corrosion.
3. Pipe runs to be kept as short as possible. PVC-tubing 25 mm or hose 1". For longer distances or poor pressure conditions use bigger tubing.
4. Use high quality PVC ball valves.



**GRANUDOS**

## 2.2 Electrical connection

The electrical supply of the GRANUDOS has to be controlled by the electrical supply of the circulation pumps that dosing can only be with water circulation and accordingly water supply to GRANUDOS. The GRANUDOS has to be stopped at back washing, too! See wiring diagram To connect external systems to the GRANUDOS please use only flexible cable type.

Electrical works are only to be executed by authorised people.

## 3 Start

After having executed points 3.1 and 3.2 open the ball valves at the tapping points and at GRANUDOS. Press floater of floating valve inside the tank down to let water flow into ^the flushing tank. When the flushing tank is half full only then switch on the GRANUDOS mains as the booster pump of GRANUDOS should not run dry.

To ensure correct dosing water flow through the flushing tank must run in the correct way as described below.

### 3.1 Deaeration of the water supply tubing

At switching on the GRANUDOS take care to deaerate the supply water tubing completely. For this please observe the water level inside the pre-filter. If he get's empty switch off the pump/machine and wait till the filter is full again, then switch on again. On operation the filter must be and stay full of water; a little air at top staying steadily does not matter. The deaeration procedure can take some minutes depending on the length of the supply tubing.

### 3.2 Water level in the flushing tank

Water level in the tank should be maintained at half full. To obtain a higher level unscrew float rod, for a lower level screw in the float rod. One turn gives about 1 cm in height.

### 3.3 Water flow/Suction performance of the venturi

At stable water level the switch bobbin of the flow switch inside the suction tube (10) should definitely have risen up to the top, the control lamp of the switch may **not** burn.

To adjust the water flow to the pressure conditions of the filter system a nozzle is inserted in the union (13c) behind the venturi. If water level in the tank tends to run low or if switch bobbin is at top without pump running (too high suction at the venturi – high pressure difference between tapping points ) fit the nozzle with the 5,5 mm diameter hole you find in the spare parts kit. If the water level tends to run high and/or suction is too low – switch bobbin does not rise (too high counter pressure?) put in the 7 mm nozzle or use without nozzle.

### 3.4 Filling of chlorine into the hopper

Before carrying out any task involving chemicals the operator should put an personal protective equipment to provide adequate protection to eyes, respiratory orifices, hands and clothing.

- Lid of control box is closed. Open the chlorine hopper lid.
- Fill the chlorine into the hopper carefully to the hopper wall with help of a scoop from the drum that no chemical dust will arise.
- Fill in only the consumption of chlorine for appr. 2 weeks.
- After filling the hopper carefully cover the lid of the chemical drum again.
- Close the hopper lid.

### 3.5 Acid dosing

The acid dosing pump mounted left side of the housing is delivered with loose dosing hose to prevent deformation on stock time. Push the hose back into the yellow housing and turn the roller clockwise some times so that the hose is situated even back in the housing. Then push the safety disc on the shaft and the pump cover –both in the small bag attached above the pump. Position the acid container beside the GRANUDOS, open it and put the acid lance into it. Push the “Test” button for acid. If no fault indicates, acid must now be sucked up through the transparent suction tube to the pump and further to the dissolving system.

As acid use one on base of sulphuric acid (37 – 50 %). Do not use concentrated hydrochloric acid as this damages the peristaltic pump.

### 3.6 Dosing Performance Adjustment

#### 1. Chlorine

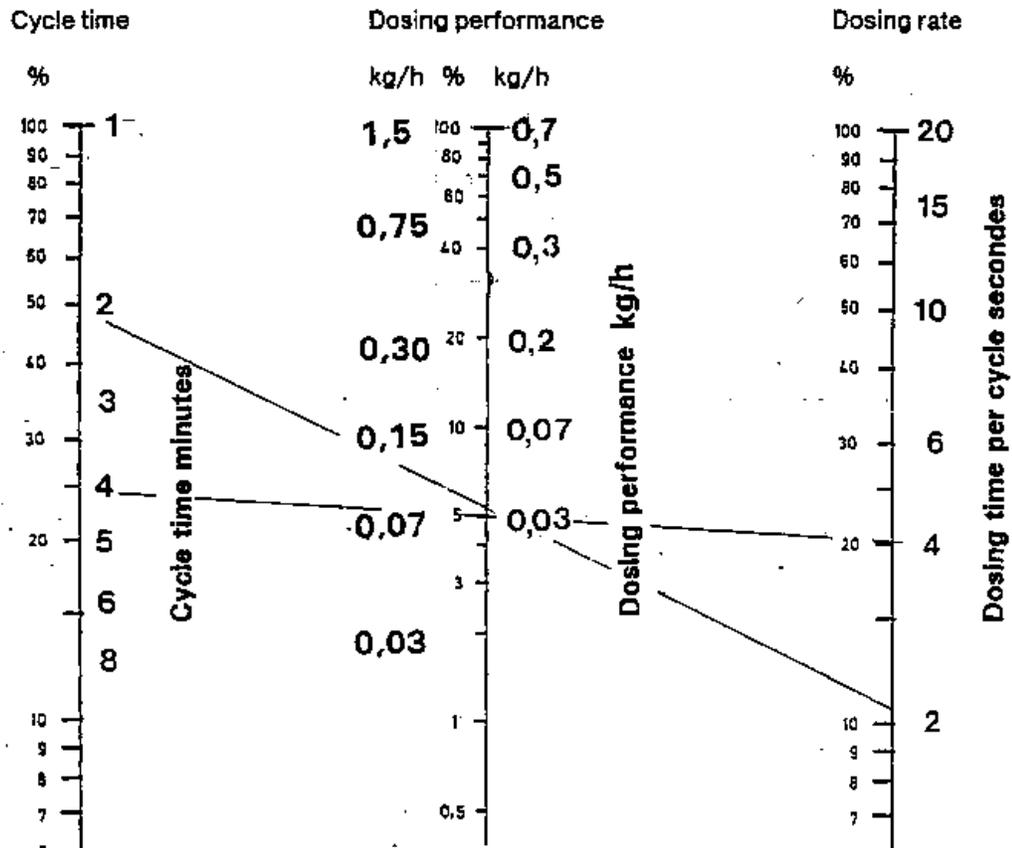
In principle the chlorine consumption of a pool depends on a variety of influences: Loading, temperature, wanted chlorine concentration etc. Normally a standard indoor pool needs about 300 g of calcium hypochlorite per 100 m<sup>3</sup> in volume per day. So a pool of 300 m<sup>3</sup> in volume needs app. 900 g/day or app. 37 g/h at continuous dosing. These 37 g/h corresponds to 5 % of the maximum dosing performance of 0,7 kg/h. This is achieved with a cycle time of 2 minutes and a corresponding dosing rate of 10 %. The same dosing performance is achieved with a cycle time of 4 minutes and a dosing rate of 20 %. See performance table next page.

An outdoor pool needs at good weather conditions about 3-5 times more chemical.

#### Acid

2. The consumption of acid is harder to predict as that of chlorine. For the beginning set a dosing performance as same as for chlorine. The actual need has to be found by trial and error. The pH should be at 7,0 – 7,4.

**Diagram for the determination of dosing cycle and dosing rate for a 0,7 kg/h dosing performance screw (standard) or one of 1,5 kg/h**



### 3.7 Dosing Controlled by Auto-Controller

Connecting an external auto controller for free chlorine and pH the set dosing cycle is activated, too. Dosing is running if the control output of the auto controller for free chlorine / pH comes together with the internal set dosing time. To get a sufficient dosing performance the controller cycle should be in the range of some minutes (on-off, possibly proportional) and the dosing set at the GRANUDOS should be at high level or maximum: cycle time 1 minute, dosing 100%.

The auto controller output must be of 230 VAC. See wiring diagram.

## 4. Irritation diagnosis

### 4.1 Irritations caught by sensors / indicated by red lamp

All sensors separately monitors and indicate by a red LED on the fascia. If the red LED burns the sensor must catch an irritation, in this case dosing is stopped, booster pump is running on. To clear up the situation it must be found out, whether

1. there is really an irritation or
2. the sensor is faulty

Normally the “good status” is obviously to be seen at all switch functions. To check a faulty switch, he only has to be disconnected at the control plate. As the switches ( contrary at the chlorine empty switch) are “normally open”, irritation is indicated by a closed switch. By opening the switch at the plate, the red lamp must go out and dosing goes on.

#### **4.1.1 Acid empty**

If the acid tank is empty, provide a full one. If tank is not empty, the empty switch is faulty.

#### **4.1.2 Water level in flushing tank too high**

There is coming more water to the tank as is sucked off by the venturi.

1. Suction power of venturi is O.K.: switch bobbin of flow switch in suction tube is at top of tube. By pressing the supply hose to the suction tube the bobbin goes down and switch LED burns. If loosened again, bobbin goes up and switch LED goes out. In this case there should be a fault in the floating valve: check whether with moving the floater slowly up and down the incoming water flow decreases or increases steadily. If so adjust water level by turning the floater rod one turn right. If floating valve does not work steadily, fit a new valve membrane.
2. Suction power of venturi is not enough: switch bobbin of flow switch in suction tube is at bottom of tube. By pressing the connecting hose to the suction tube the bobbin does not move, switch LED burns.

Possibilities:

- at installation: service pressure too low – counter pressure too high. tubing faulty or too small: take out orifice washer (13c) from union behind venturi.
- Booster pump performance too low – see pressure limits on page 7. Fit the by packed pressure gauge to inlet and outlet to check pressure situation.
- Particles inside venturi or at outlet nozzle of flushing tank
- Suction tube and/or mixing cyclone are turbid by calcium: acid dosing too low: if there is still a little suction this can be easily cleaned by pouring hydrochloric acid into suction cone of the tank.

After cleaning increase acid dosing performance.

#### **4.1.3 Water level in tank too low**

Suction power of venturi is higher than water supply.

Possibilities:

- Suction power too high: fit an orifice washer (13c) of 5,5 mm inside union behind venturi.
- Supply water tubing is blocked
- Floating valve to tank is blocked

#### **4.2 Irritations not indicated by monitoring switches**

1. No chlorine dosing: no free chlorine in pool water

By pushing the test button on fascia no dosing

- dosing screw blocked

- 
- dosing screw loose
  - dosing nozzle (heated) faulty or blocked
  - dosing motor faulty

If dosing at pushing the test button see to auto controller for free chlorine

2. No acid dosing: pH in pool water high, suction tube/mixing chamber turbid

If acid tank is full, no fault indication at fascia LED: check dosing function of acid pump: push test button for acid. If pump runs, see whether an air bubble is sucked to pump, if not examine the pump roller and pump hose. If all is OK, choose lower set point for pH.

3. Overflow from tank too much at switch off of GRANUDOS

- switch bobbin of flow switch (10) blocked on top situation
- joint of switch bobbin faulty
- membrane of floating valve faulty
- supply pressure of an external booster pump too high

## 5. Maintenance

It is strongly recommended that a regular maintenance programme is undertaken. Consult your installer/supplier and take up a service/maintenance agreement. This way the machine will be maintained in good operating condition.

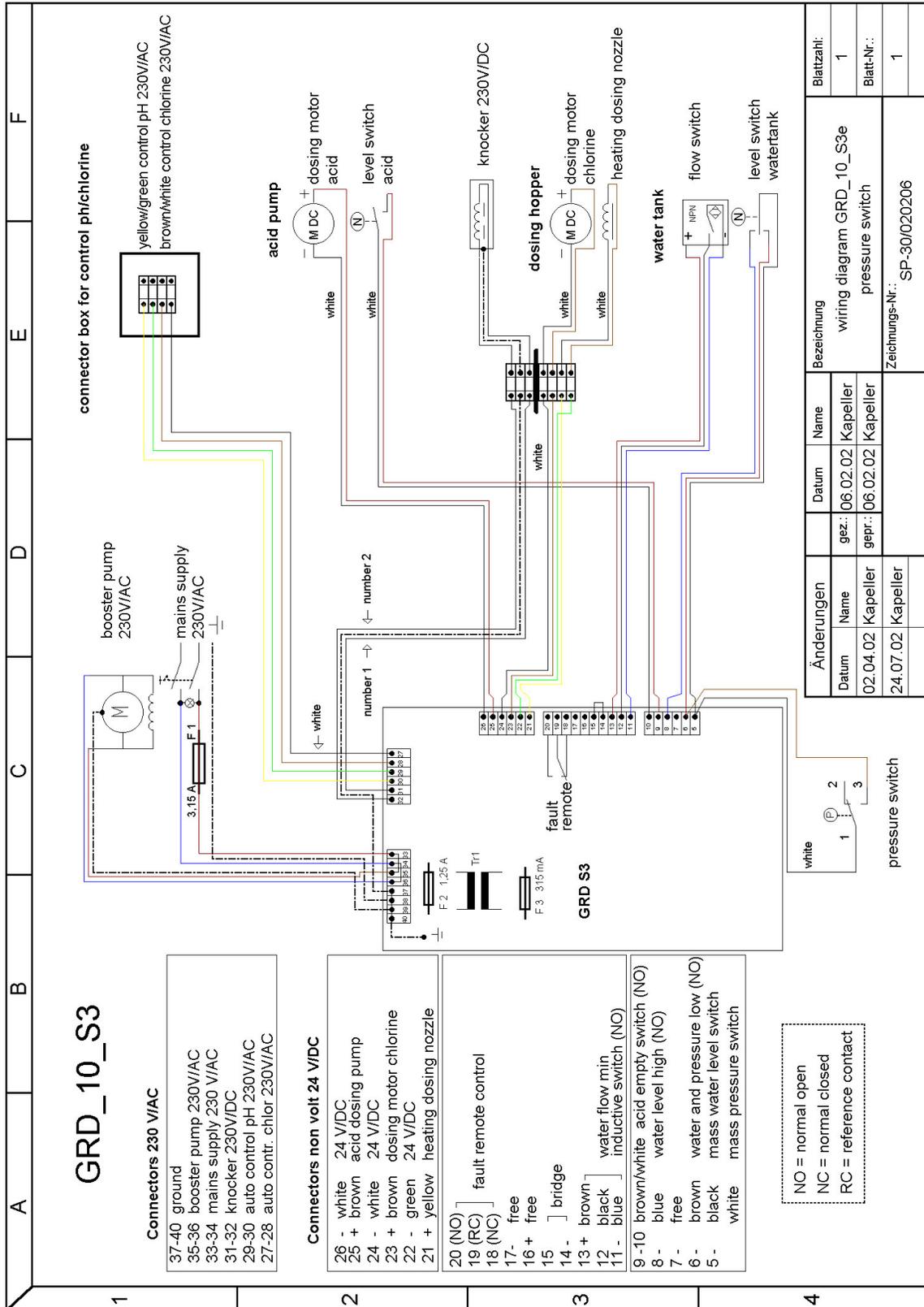
Minimum checks include the following items:

- clean strainer if necessary – a scaled filter causes cavitation and consequently damage of the booster pump
- maintain the machine clean – especially the booster pump
- pay attention to any noise of the pump: cavitation, bearings – if so, contact your supplier
- check monthly for the acid pump whether the springs are ok. If corrosion can be seen, change the dosing hose. In any case change it once per year.
- monthly or with each new drum check function of all sensors i.e. water flow, level and empty switches
- Monthly or with each new chemical drum check the dosing screw and clean it if blocked
- change membrane of floating valve once per year
- change seal of flow switch bobbin all ½ year
- check once per year acid dosing valve – change seals

A taking out of service

- disconnect acid dosing hose (or use a new one at starting again)
- empty the dosing hopper, take out chlorine dosing screw, clean it thoroughly and put it into granular chlorine or store it at a dry place
- clean all parts of GRANUDOS thoroughly.

6. Wiring Diagram/Fuses



## 7. Spare Parts GRANUDOS 10-S3

	<u>Designation</u>	<u>Item no.</u>
Chlorine. dosing	dosing hopper GR 10 5 kg	12798
	Cover for dosing hopper GR 10	12353
	dosing motor PLG 30-35	11676
	motor holder PLG-d25 GR 10	12799
	dosing screw GR10 d6/D19	12320
	dosing nozzle heated GR	11556
	knocker GR10 complete	12868
Acid dosing	Acid pump Sa complete	12374
	Pump housing Sa	12702
	Roller Sa	12609
	Dosing hose 3,2x1,6 N Sa	12782
	Supply carboy lance	12523
	acid injection valve GR	11633
	Repair set for acid valve	11636
Filter	Filter housing	12746
	Filter top with ball valve d25	12304
	O-ring on top	11258
Control system	Control plate S3	12335
	transformer S3, 18 volt, 5VA	10924
	main switch GR	11338
	fuse holder GR	12324
	Knob 6mm S1/3	11031
Floating valve	Cover control box	12338
	floating valve d25 GR10 complete	12916
	membrane for floating valve	11619
	floater	11621
	level switch GR 10	10497
Booster pump	booster pump Lo 2HMS3-A	10657
	slide ring seal complete -A	12800
suction tube	suction tube GR ½'' – S14	11599
	flow switch GR ind. 18x1 long lead	12430
	flow switch bobbin GR ind. ½''	11606
	Flow switch bobbin	11606
	Seal ring Vi 14/9 flow switch bobbin	11090
	connecting tube Si 10/2,5/170	11565
venturi	venturi complete	11792
	orifice washers for venturi-kit	11594
	venturi-nozzle ½''	12306
cyclon	venturi-body with connector ½''	12305
	mixing cyclon GR 10	12329