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

Operating instructions GRANUDOS 45/100-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. The dosing hopper must be screwed even and firmly to the container
3. Ensure after changing a drum, that it is firmly fixed in position and the securing systems are used
4. In service the dissolving system must be covered with the supplied cover
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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Safety devices

Test certificate

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1. Function of GRANUDOS

1.1. Data, Measures, Performance

The GRANUDOS 45-S3 dosing system comprises:

- main vertical support with rotating drum carrier assembly
- calcium hypochlorite granules metering
- acid metering equipment
- dissolving system
- control panel

Measures:

base needed: 120x70x180 cm

height: 140 cm

weight: 50 kg

material:

main vertical support and drum carrier:

steel, zinc and powder coated

other parts: PVC, PE

booster pump

centrifugal pump: 0,3 kW, 230 VAC,

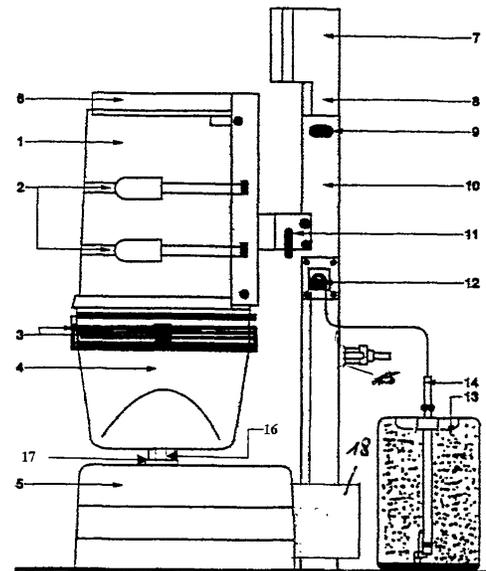
supply pressure: minimum 0,2 bar

Water flow: app. 1000 l/h

Dosing Performance:

chlorine: GR 45: 1,5 kg/h. GR 100: 3 kg/h

acid: GR 45: 3 l/h, GR 100: 3 l/h

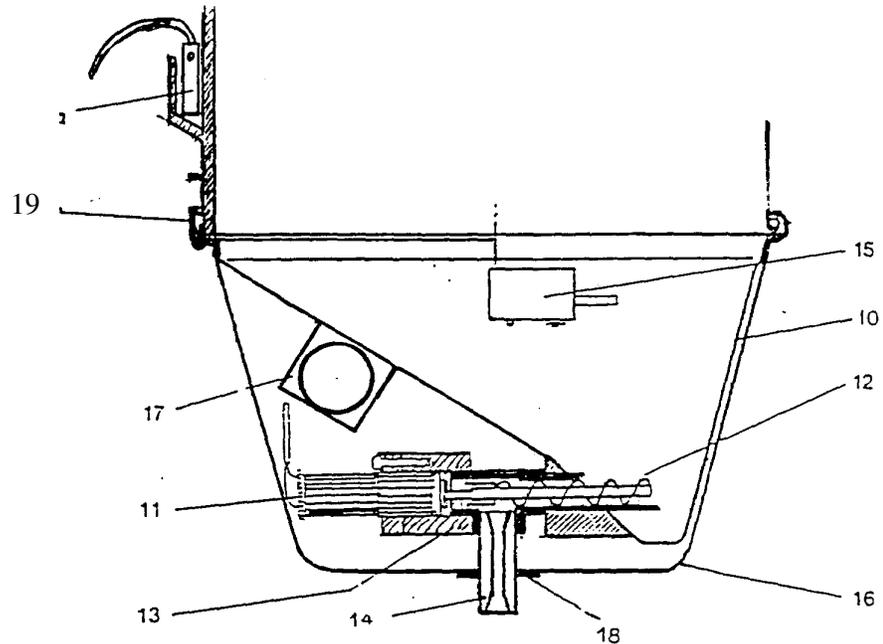


- | | |
|---------------------|-----------------------------|
| 1 drum | 9 type label. |
| 2 2 clamp bands | 10 vertical carrier |
| 3 lid curl | 11 locker |
| 4 dosing hoper | 12 acid pump |
| 5 dissolving system | 13 acid carboy |
| 6 drum carrier | 14 carboy lance |
| 7 controlsystem | 15 water supply with filter |
| 8 conn. Housing | 16 heated dosing nozzle |
| | 17 dust protection |
| | 18 pump cover |

1.2 The Drum Carrier

The rotating drum carrier assembly (6) is fixed to the main vertical support (10). The drum (1) with hypochlorite is fixed on the carrier assembly (6) by 2 band clamps (2) and a retaining belt. The dosing hopper (3) is fixed on the drum in place of the drum lid. The carrier with the drum is then turned through 180° to the dosing position, the chemical is dosed into the dissolving system (5) where it is fully dissolved and conveyed by a venturi to the swimming pool.

1.3 Chlorine Dosing Assembly



- | | | | |
|----|--|----|--------------------------|
| 10 | dosing hopper | 16 | hopper cover |
| 11 | dosing motor | 17 | knocker (option) |
| 12 | dosing screw | 18 | seal washer |
| 13 | motor mounting | 19 | dosing hopper screw ring |
| 14 | dosing nozzle heated | | |
| 15 | drum empty switch with adjusting screw and LED | | |

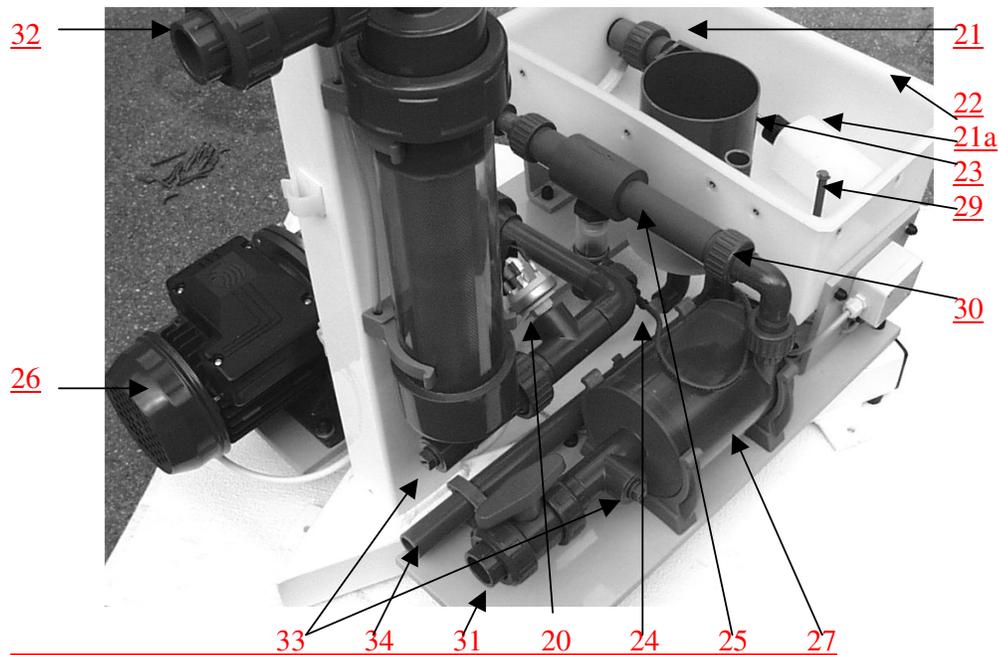
The dosing screw (12) meters the chlorine through the heated dosing nozzle (14) to the dissolving system. If the drum empty switch (15) is indicating, the LED 4 burns continuously, dosing is running on. The knocker (17, optional) gives a hit to the hopper at each dosing motor run so supporting dosing.

Dosing performance is adjusted by 2 turning knobs at front fascia, see para starting.

1.4 Acid Dosing

The acid is dosed down in the flushing cone (23 - see next para) by the peristaltic pump which is fitted directly right side at the vertical support. If acid level switch indicates acid container empty, the GRANUDOS chlorine dosing is stopped too to avoid scaling. As acid use sulphuric acid 37%. Concentrated hydrochloric acid (HCl) penetrates the pump hose and will attack the pump rollers and further the pump

1.5 Dissolving System



2
0

| | | | |
|----|--------------------------------|----|--------------------------------------|
| 20 | pressure switch (optional) | 27 | cyclone mixing/dissolving chamber |
| 21 | floating valve | 29 | level switch |
| 22 | flushing tank | 30 | union bush with nozzle inside |
| 23 | flushing tube | 31 | outlet ball valve |
| 24 | suction tube with flow control | 32 | water supply ball valve |
| 25 | venturi nozzle | 33 | fitting 1/4" for test pressure gauge |
| 26 | booster pump | | |

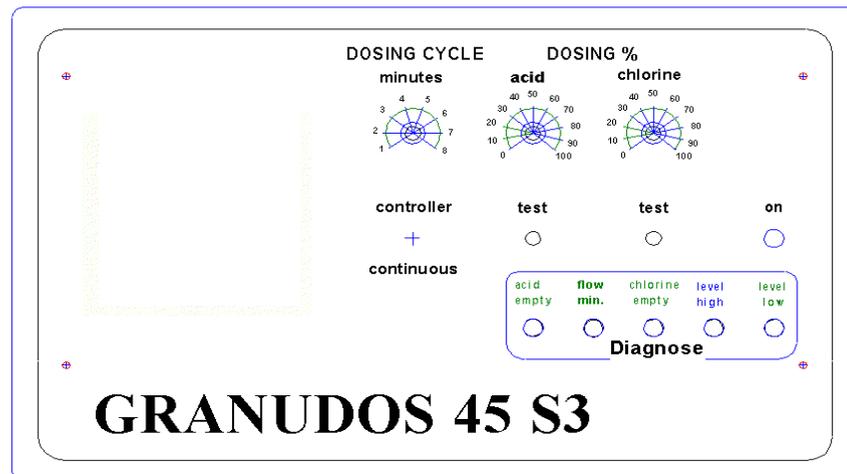
The supply water coming from the pool water is divided at the discharge of the booster pump (26), one way leading to the flushing tank (22), the other branch directed to the venturi nozzle (25), where the water is drawn out of the flushing tank together with the dosed chemicals. The supply water flow is controlled by means of a floating valve (21) and monitored by a flow switch (24), the latter being installed in the suction tube of the venturi. To mix the chemicals and to ensure the complete dissolving of the hypochlorite granules a cyclone mixing chamber (27) is fitted after the venturi. Optionally the supply water pressure is monitored by the pressure switch (20).

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

- metering of the two chemicals is regulated with pauses between the metering intervals (para 4.2 'Adjusting dosing performance').
- power supply for chlorine and acid dosing motors are connected by a relay system so that only one of them can get power (24VDC).
- flow switch (24) , level switch (29), and optional pressure switch monitoring water supply and flow conditions. If any non-compliance with the given limits occurs, the dosing will be switched off.

1.6 Control Panel (GRD S3)

1.6.1 Front plate – service elements



The control board is of analogical type, one part together with the front plate. All connectors are push type directly on the control board.

Service elements:

On connector housing below:

- 1 main switch on/off
- 1 main fuse 3,15 amp slow

On front plate:

- 1 select switch for dosing by auto controller or for continuous dosing
- 1 potentiometer knob to adjust dosing cycle from 1 – 8 minutes
- 2 potentiometer knobs to adjust dosing time of dosing motors chlorine and acid:
100 % = 20 seconds
- 2 push button switches to test dosing motors of the chemicals: if pushed, dosing is running accordingly if no fault is indicated.
- 1 green lamp to indicate service

-
- 4 red lamps to indicate faults: acid empty, suction venturi low, water level in tank low (indicated too, if pressure switch is fitted and indicating), water level in tank high, dosing is stopped in these cases.
 - 1 red lamp to indicate chlorine empty – dosing is not stopped.

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.

1.6.2 Dosing control system

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 dosings 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 external control output meets the internal “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 input must be 230 VAC on/off.

1.6.3 Dosing Performance Adjustment – see diagram next page

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 m³ in volume per day. So a pool of 300 m³ 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

2. Acid

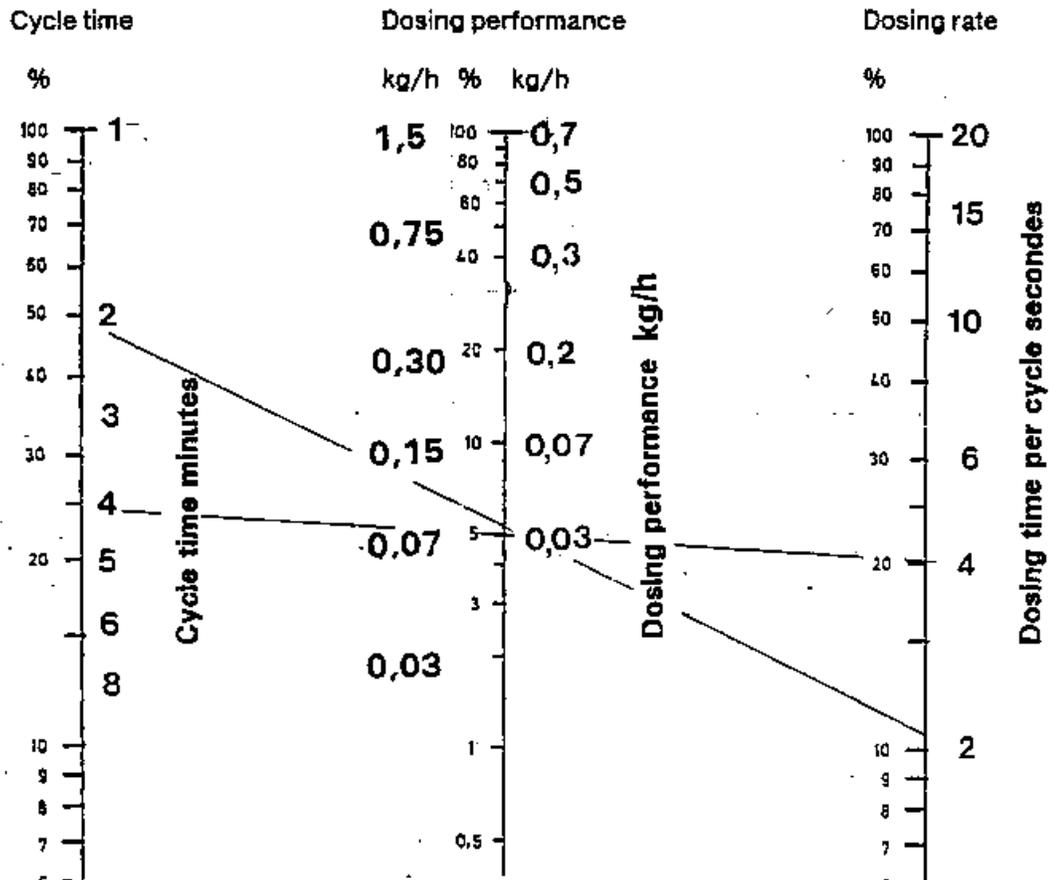
The consumption of acid is harder to predict as that of chlorine. For the beginning set a dosing performance of same as for chlorine. The actual need has to be found by trial and error. The pH should be at 7,0 – 7,4.

1.6.4 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.

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



2. Installation

2.1 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 the GRANUDOS. The GRANUDOS has to be stopped at back washing, too!

To connect external systems to the GRANUDOS please use only flexible cable type.

Electrical works are only to be executed by authorised people.

2.2 Providing Acid

As acid please use one on base of sulphuric acid (37 – 50 %) preferably supplied in 30-50 kg transportable containers. If bigger stock containers are used the acid empty switch must be connected to the GRANUDOS.

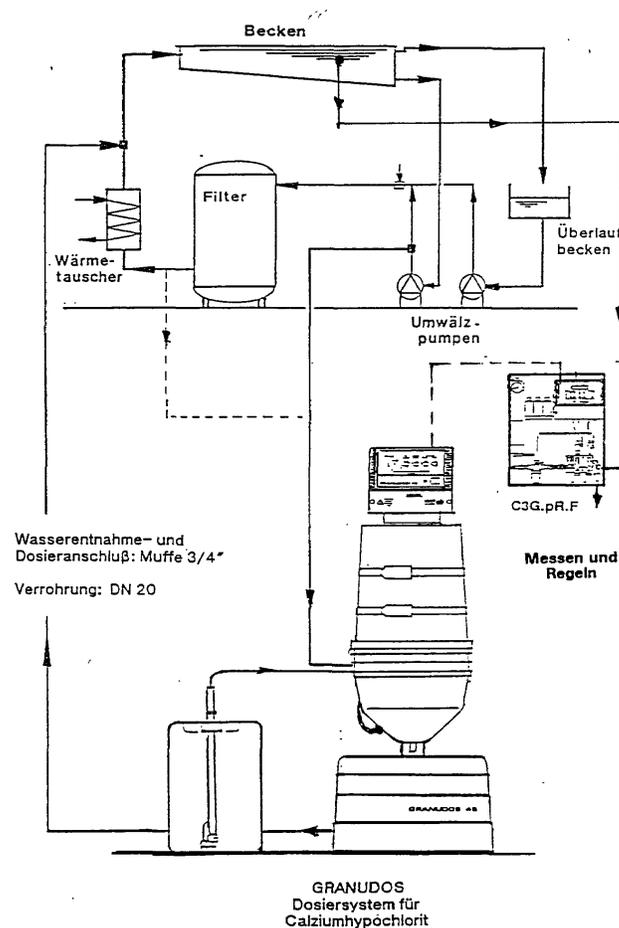
2.3 Tubing

For satisfactory waterflow 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.



3. Start

After having executed points 3.1 to 3.3 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 flushing 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 level 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 be risen up definitely to top, the LED of the switch may not burn.

To adjust the water flow to pressure conditions of filter system a nozzle is inserted in the union (13c) behind the injector. If water level in the tank tends to run low (too high suction at the injector) 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 Loading the chemical drum onto machine

Before carrying out any task involving chemicals the operator should put on the relevant protective clothing, at least for protection of eyes, breathing, skin and clothing i.e. goggles, respirator, gloves and apron. As the chemical can be compressed within the conical drum by vibration on transport and this could make problems at dosing, please roll the drum on the floor before loading.

- 1 Before loading the drum onto machine the dosing hopper should be fitted on to the drum:
- 2 Position the drum on the floor, adjacent to the machine within comfortable reach of the hopper cable i.e. do not strain the cable. The two handles of the drum are sideways from your position.
- 3 Screw off the drum lid. Remove the blue plastic scoop from inside the drum.
- 4 Position the dosing hopper on the open drum so that the cable is coming on right side after screwing the hopper onto the drum. Ensure that the hopper curl ring fits well to the drum.
- 5 . Ensure that the drum carrier is in the upright position and ready to receive the drum i.e. that it is locked in this position (locking device 7).
- 6 Load the drum, carefully, onto the drum carrier so that the cable is at right. This may be lifted manually, but ensure no injury to the back by lifting properly – or better still use a GRANUDOS drum lifter.

-
- 7 Ensure that the drum is standing upright and symmetrically on the drum carrier, touching the rear rails being with the drum edge below the retaining rod.
 - 8 Fix the drum securely in position using the drum band clamps. Adjust the clasp tension by adjusting the nut on the screwed end at left end of the band clamps. These screwed ends are located in the lugs on the rear of the drum carrier. Lock the clamp clasps with the securing springs provided so that they cannot open itself.
 - 9 Pull the hopper safety belt from rear to front over the hopper cover and push the belt clasps with the front belt together.
 - 10 When you are absolutely certain that the drum is firmly fixed in position and that the hopper is firmly clamped to the drum THEN AND ONLY THEN – unlock the drum carrier swivel lock (7) and slowly rotate the drum and carrier left side through 180°. Care should be taken not to stretch or entangle the cable joining the hopper to the control box.
 - 11 Lock the drum carrier in this position via the swivel lock (7).

The GRANUDOS is now in the dosing position. Push “Test” button switch for chlorine. If no fault indicates, chlorine must now fall down to the dissolving system

3.5 Acid dosing

The acid dosing pump mounted right side of the vertical carrier 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.

4. Irritation diagnosis

4.1 Irritations caught by sensors / switches - indicated by red lamp

All monitoring switches separately indicate by a red LED on the fascia. If the red LED burns the switch 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 chlorine empty switch) are “normally open”, by opening the switch 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 monitored or indicated by 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. A list of necessary works see last page.

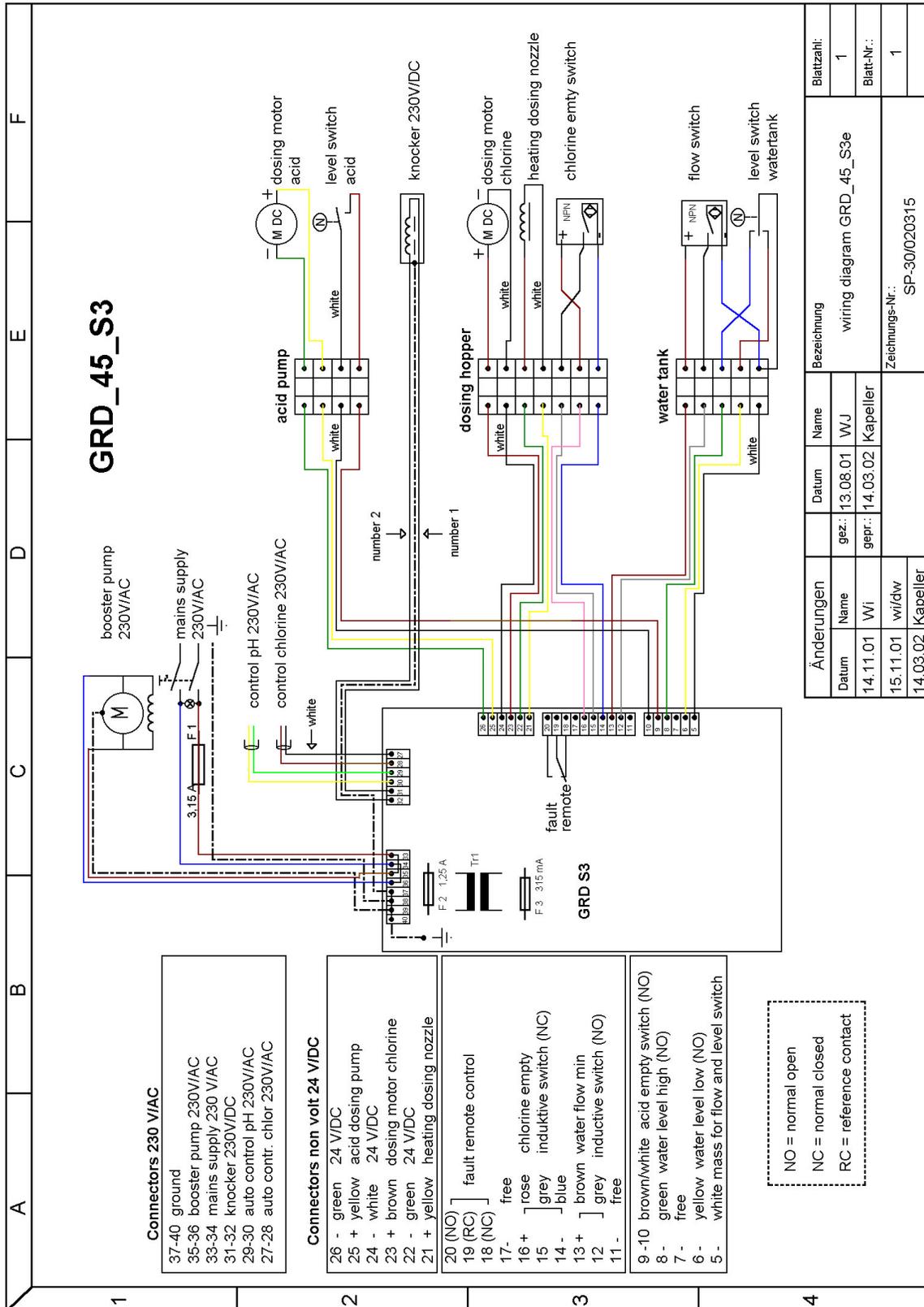
Minimum checks include the following items:

- 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 o.k. 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 store it at a dry place
- clean all parts of GRANUDOS thoroughly.

6 Wiring diagram, fuses



7. Spare Parts GRANUDOS 45-S3

| | <u>Designation</u> | <u>Item No.</u> |
|----------------------|--------------------------------------|-----------------|
| Chlorine dosing | dosing hopper HTH 40 kg | 11527 |
| | Cover for dosing hopper GR 45 | 11530 |
| | dosing motor PLG 30-35 | 11676 |
| | Motor holder PLG-d32 | 11542 |
| | dosing screw d6/D26 | 11550 |
| | dosing nozzle heated GR | 11556 |
| Acid dosing | knocker GR 45complete | 11558 |
| | Acid pump Sa complete | 11628 |
| | Pump housing Sa | 12702 |
| | Roller Sa | 12609 |
| | Dosing hose 4,8x1,6 Sa | 12608 |
| | Supply carbuoy 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 | 11338 |
| | fuse holder GR | 12324 |
| | knob | 11757 |
| Floating valve | Cover control box | 12600 |
| | floating valve d25 complete | 11617 |
| | membrane for floating valve | 11619 |
| | floater | 11621 |
| | level switch GR/PAK | 10496 |
| Booster pump | booster pump Lo 2HMS3-A | 10657 |
| | slide ring seal complete -A | 12800 |
| Flow switch assembly | Flow switch holder GR ½'' – S14 US | 12729 |
| | flow switch GR/PAK ind. 18x1 | 11603 |
| | flow switch bobbin ind. ½''US | 12730 |
| | Seal ring Vi 14/9 flow switch bobbin | 11090 |
| | connecting tube Si 10/2,5/180 | 11565 |
| | Venturi ½'' GR/PAK complete | 11792 |
| | orifice washer for venturi | 11594 |
| venturi-nozzle ½'' | 12306 | |
| cyclon | venturi-body with connector ½'' | 12305 |
| | mixing cyclon GR 45-6 | 11612 |

8. Maintenance List GRANUDOS 10/45/100

Object:.....
 GRANUDOS-Type:..... series no.....
 Maintenance executed by
 date:.....
 Sign of pool
 operator:.....

| | <u>This has to be done</u> | <u>this is necessary</u> |
|----------|--|---|
| 1 | <u>Dissolving system</u> | |
| 1.1 | check level switch: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 1.2 | check pressure switch: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 1.3 | check flow switch: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 1.4 | cleaning flow switch bobbin <input type="checkbox"/> | change <input type="checkbox"/> |
| 1.5 | change membrane flow switch <input type="checkbox"/> | |
| 1.6 | check function flow switch OK <input type="checkbox"/> | adjust water level <input type="checkbox"/> |
| 1.7 | clean filter <input type="checkbox"/> | |
| 2 | <u>Dosing Chlorine</u> | |
| 2.1 | check function heating nozzle: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 2.2 | check function empty switch: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 2.3 | check dosing screw OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 2.4 | check power dosing motor: OK <input type="checkbox"/> (I max: 150+/- 30 mA OK) | change <input type="checkbox"/> |
| 2.5 | change sealing of dosing motor <input type="checkbox"/> | |
| 3 | <u>Dosing acid</u> | |
| 3.1 | check function empty switch: OK <input type="checkbox"/> | change <input type="checkbox"/> |
| 3.2 | check function dosing pump OK <input type="checkbox"/> (I max: 100+/- 20 mA OK) | change <input type="checkbox"/> |
| 3.3 | change dosing hose <input type="checkbox"/> | change roller <input type="checkbox"/> |
| 3.4 | change acid valve insert <input type="checkbox"/> | |
| 4 | <u>Additional jobs</u> | |