

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

## Operating instructions GRANUDOS 10-S4

### 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 10-S4

### 1.1 Data, Measures, Performance

The GRANUDOS 10-S4 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 ( further see para 1.5.3)

Chlorine dosing motor PLG 30-35 app. 2,4 \* ( 0,44\*\*) kg/h

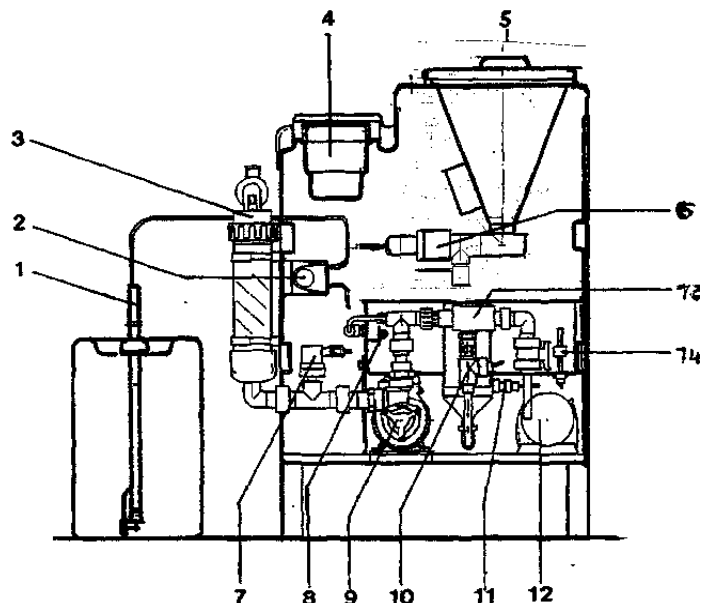
acid: 1,3 \* ( 0,15\*\*) l/h

\* cycle time 1 minute

\*\* cycle time 6 minutes

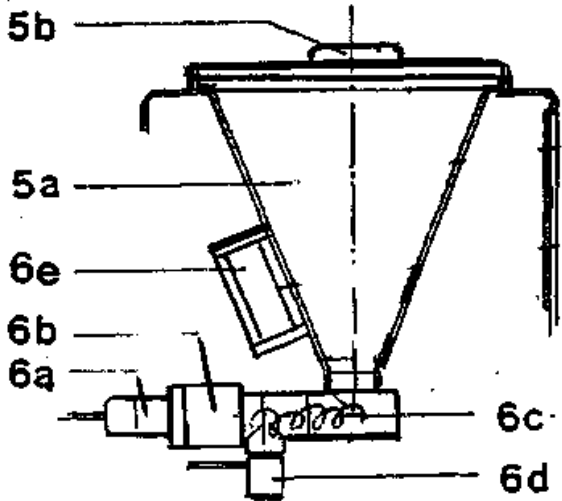
Fault remote indication by relay

- 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
- 7 pressure switch
- 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 preventing 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.



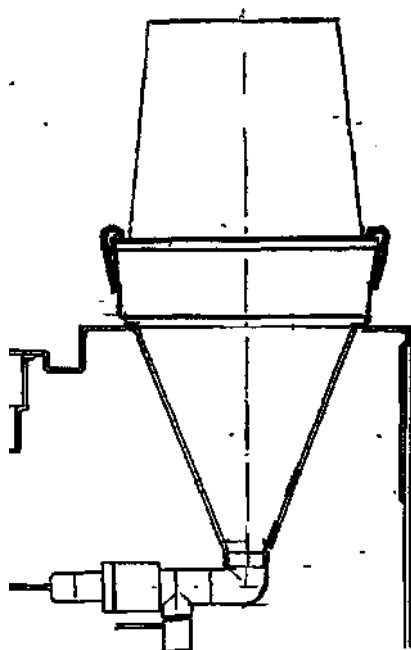
- 5a dosing hopper
- 5b hopper cover
- 6a dosing motor
- 6b motor holder
- 6c dosing screw
- 6d heated dosing nozzle
- 6e knocker

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

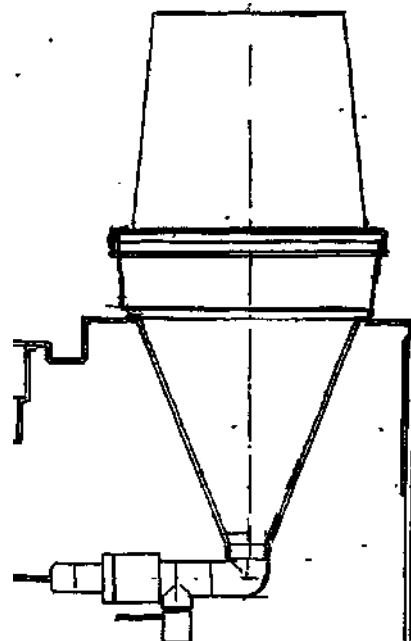
The complete dosing assembly can be taken out of the frame for service.

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

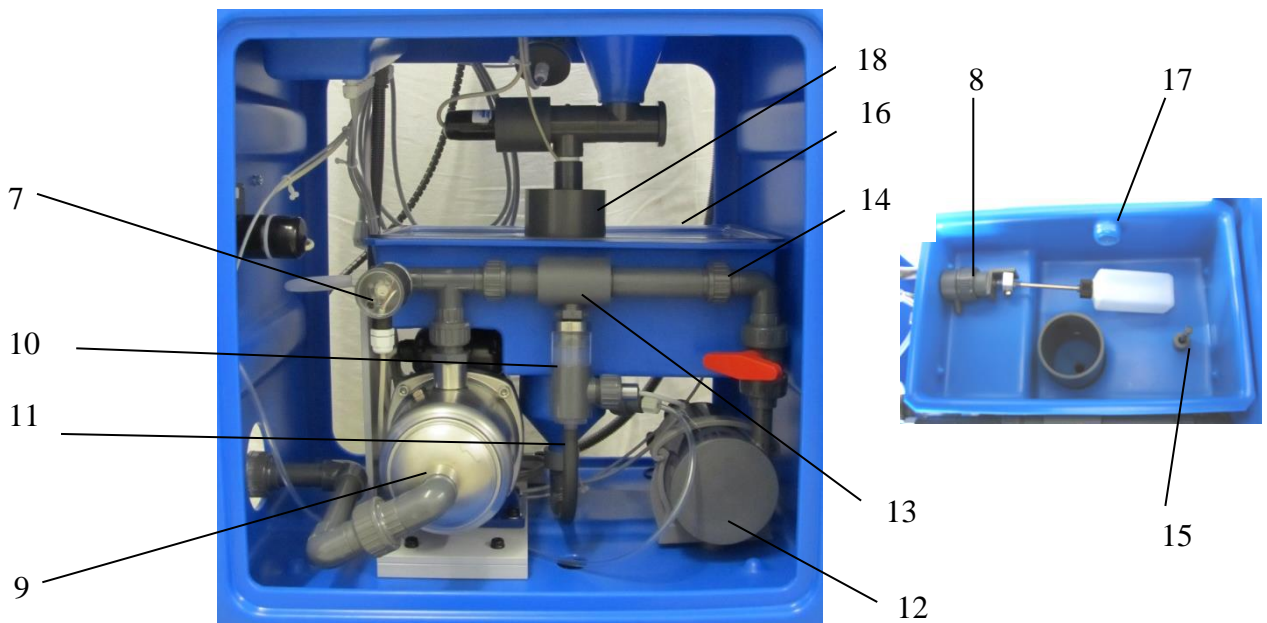
The dissolving water is normally supplied from before or from behind the filter. **There must be a sufficient supply pressure to avoid dry running and/or cavitation on the booster pump, at least 0.2 bar.** The pump pressure is controlled by the pressure switch (7) fitted on top of the pump. At a pressure below the set switch pressure by sucking air or at pressure drops the machine stops, lamp 1 & 2 will burn. At works 1,5 bar is set.

The supply water 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 power 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                                   | 13 | venturi nozzle                                     |
| 8  | floating valve                                    | 14 | orifice washer inside                              |
| 9  | booster pump Lo HM04 flux                         | 15 | level switch low/high                              |
| 10 | flow switch holder d40 with flow switch           | 16 | lid on flushing tank with chlorine dust protection |
| 11 | acid dosing valve                                 | 17 | overflow to drain                                  |
| 12 | mixing and dissolving chamber with PVC ball valve | 18 | dust prevention tube                               |

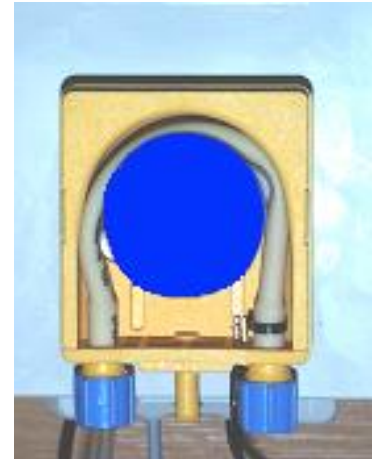
The flushing tank is an open system with two ways for a drain of water coming from the circulation to the flushing tank and possibly causing an overflow at switch off times. To avoid this, the flow switch holder as the floating valve are acting as non return valves: The floating valve closes the inlet bore at rising level (proved up to 4 bars at test), in addition a spring loaded non return valve is installed in the elbow fitting into the valve. The switch bobbin has a seal to close this way. Both devices function well if the seal/diaphragm are maintained in a good shape. But as a mechanical seal may leak after any time or by being blocked by impurities a 100% isolation may not be guaranteed. If this is needed for any cases, an electric valve must be installed.

## 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 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.

As acid use one on base of sulphuric acid (37 – 50 %), please do not use concentrated hydrochloric acid for this job as that penetrates the peristaltic hose and will destroy the pump head. Diluted hydrochloric acid may be not strong enough for the neutralisation job. Please note that using dry acid (sodium bisulphate) 20% (= maximum concentration) is equivalent to a only 10% sulphuric acid.

Maximum dosing performance is app. 3 l/h and is set as for chlorine. The dosing cycle set for chlorine is valid for acid too.



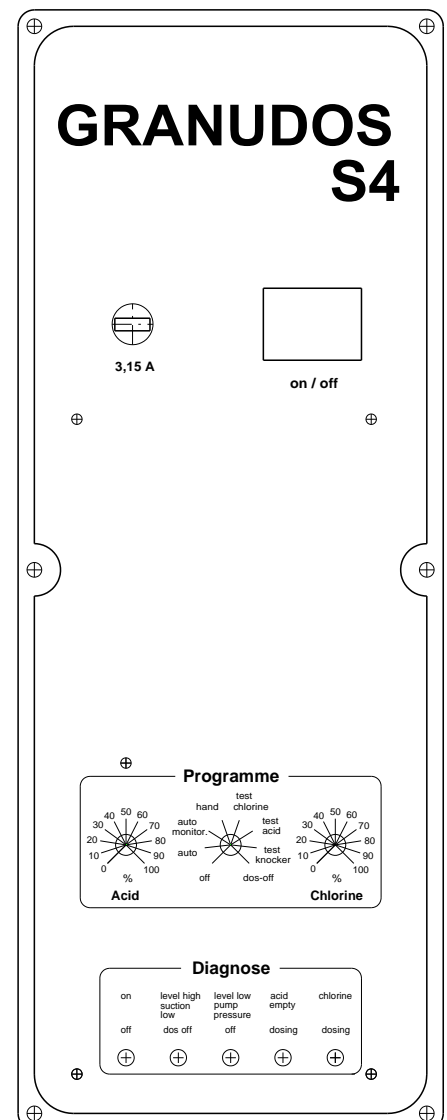
## 1.5 Control system S41

### 1.5.1 The service elements

The processor-plate S4 of the GRANUDOS is combined with the front fascia to a unit with the elements

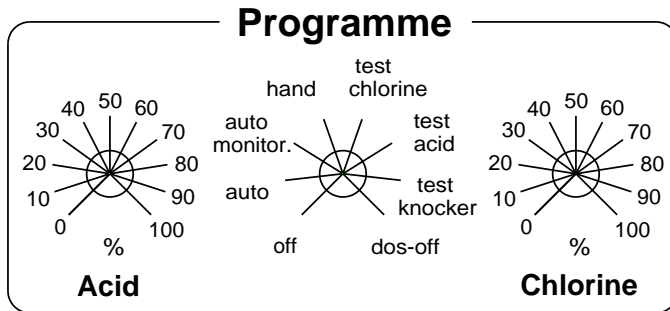
- main switch on/off
- main fuse 3,15 AT
- 1 programme switch for test- and operation programmes
- 2 knobs to adjust dosing performances 0-100%
- 1 green lamp to show „on operation“
- 4 red lamps for fault and dosing indication

Internal elements: fuses, program switch for alternatives in cycles and timers



## 1.5.2 Operation and test programmes

By turning the programme switch there is a retention time of 2 seconds with 2 flashes of the green lamp



### Auto:

Dosing control by external auto-controller free chlorine and pH-value. Dosing always within the dosing cycle advance or at the next cycle. The cycle is to be set on 1 minute with code switch S1 on "on", or on 6 minutes with code switch S2 on "off". **Dosing of chlorine and acid is independent.**

### Auto monitor.: as „Auto“ but with dynamic time monitoring: :

When controlling the GRANUDOS dosing by an external controller the dosing performance must be set high enough to ensure the dosing times (= dosing performance) of acid and chlorine shall not exceed 50% of total time, the actual values are near to the set points of free chlorine and pH. If controller output time exceeds 50% , there must be any interruption in the system:

- too high bathing load
- interruption at the dosing appliance: motor, valve
- interruption at the auto control system: hanging relay, faulty electrode etc.

The GRANUDOS controller S4 adds up all ordered dosing time (input time) that exceeds 50% of total time and stops dosing if 60 minutes excess time is reached. Indication by flashing of all 4 red lamps.

### Hand

Continuous dosing as set. dosing cycle as set on code switch S2 "on" 1 minute, "off" 6 minutes.. With the longer cycle time you get a lower dosing performance

### Test chlorine:

Test chlorine dosing for 6 minutes continuously, then stop, the green lamp flashes  
Can be used to test the real dosing performance.

### Test acid :

Test acid dosing for 6 minutes continuously, then stop, the green lamp flashes.  
Can be used to test the real dosing performance

### Test knocker

Test for knocker function: the knocker hits 4 times all 2 seconds then stop, the green lamp flashes

### Dos-off

Dosing switched off, the booster pump continues. Used for maintenance.

### Off:

Switch off of all functions. Used if the machine is taken out of operation for a longer period.

Dosing can be switched off by an additional external switch e.g. a flow or pressure switch

in the measuring water tubing or in the circulation to prevent dosing if there is an interruption.

### **1.5.3 Dosing performance / Dosing scheme**

The metering of the two chemicals is regulated in cycles with pauses between the metering intervals. The dosing performances are defined by setting dosing cycles ( time between the intervals in minutes) and dosing times (durance of running dosing motors 0-100%)

By means of the **Code-switches** on the control plate (see para 5) the dosing performance can be adjusted to the principle need of the pool by setting 4 cycle times and combination for dosing times for chlorine and acid.

#### **Dosing performance for chlorine and acid at continuous dosing – without pause :**

Dosing motor PLG 35-30 /dosing screw d19 : app. 4,8 kg/h

Acid pump Sa with dosing hose 3,2x1,6 mm : app. 4,0 l/h

#### **With a set dosing cycle of 1 minute following maximum dosing performances are reached:**

Here for dosing motor PLG 35-30– Dosing performance chlorine = chlorine granulate:

Dosing cycle		Dosing times Chlore - acid				Dosing performance at 100% set with knob max
Code switch	S1	S2		S3	S4	
1 minute	off	off	30-20 seconds	off	off	2,4 kg/h – 1,3 l/h
1 minute	off	off	40-10 seconds	on	off	3,2 kg/h – 0,7 l/h
1 minute	off	off	20-20 seconds	off	on	1,6 kg/h – 1,3 l/h
1 minute	off	off	10-10 seconds	on	on	0,8 kg/h – 0,7 l/h
6 minutes	on	off	at standard dosing times 30/20 sec.			0,4 kg/h – 0,22 l/h
8 minutes	off	on	at standard dosing times 30/20 sec.			0,3 kg/h – 0,16 l/h
12 minutes	on	on	at standard dosing times 30/20 sec.			0,2 kg/h – 0,11 l/h

**Using the dosing cycles 6 – 8 – 12 minutes the dosing performance is reduced to 1/6 – 1/8 or 1/12 of the dosing performance with dosing cycle 1 minute.**

Dosing is running always with the following steps::

- Dosing chlorine as long as set by the performance knob 0-100%,
- 5 seconds pause, then following directly
- Dosing acid as long as set by the performance knob 0-100%,
- Pause till end of set cycle time

#### **Example:**

Settings by the code switch on control plate:

Cycle 1 minute, chlorine dosing 100% = 20seconds, acid dosing 100% =20 seconds.

Performance set by performance knob: chlorine 30%, acid 10%

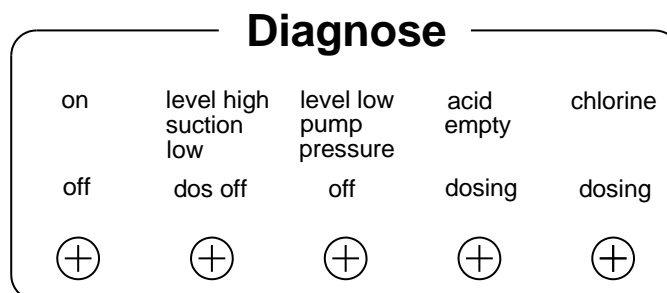
**Action:** Chlorine dosing 30% of 20 seconds = 7 seconds, then 5 seconds pause, then acid dosing 10% of 20 seconds = 2 seconds, then pause 60 – (7+5+2) = 46 seconds etc.

When controlling the GRANUDOS dosing by an external auto-controller the dosing performance must be set high enough to ensure the dosing times (= dosing performance) of acid and chlorine shall not exceed 50% of total time. Dosing performance should be set on 3-5 times normal consumption.

**Chlorine and acid dosing are working independent,,** it is dosed when the auto-controller commands for the chemical – but always in the cycle procedure..



## 1.5.4 Diagnose



The diagnose field shows the status of the system by 1 green lamp and 4 red lamps.

### Starting self check programme

When the machine is switched on a diagnosis programme for the control equipment runs.

1. All lights burn together 2 seconds
2. Every light comes on one after another for one second

If there is no fault, all red lamps go out and the dosing programme commences.

### Lamp Indicators for function and irritations

#### Green lamp – indicates program switch and external inputs

<i>on continuously:</i>	GRANUDOS in operation
<i>no light:</i>	Transformer or fuse for control system burnt - no mains supply
<i>fast blink</i>	(0,5 second on, 0,5 second off...)
	<ul style="list-style-type: none"> <li>• end of test programmes</li> <li>• programme on “dos. off “</li> <li>• programme on “off“</li> <li>• GRANUDOS switched off by the control switch board</li> </ul>

#### Red lamps - indicates faults caught by the switches and of dosing monitoring

All sensors separately monitors and indicate by a red lamp on the fascia. If the red lamp burns the sensor must catch an irritation. The system stops dosing and pump too, if necessary.

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 they are “normally open”, irritation is indicated by a closed switch. By opening the switch connection wires at the plate, the red lamp must go out and dosing starts again.

#### Red lamp 1:

<b>burns</b>	<b>level high</b>	level in the flushing tank is high
	<b>Suction low</b>	the suction performance of the venturi is too low
	<b>dos off</b>	dosing is switched off by an external monitoring switch, e.g. flow switch in the circulation (conn. 7-8 on push conn. S06)

There is coming more water to the tank as is sucked off by the venturi. For the following Test operations set the programme on “Dos off”.

<b>blinks</b>	Fuse F2 burnt (power 24V complete)
---------------	------------------------------------

1. **Water level in tank is high but suction power of venturi is OK:** switch bobbin of flow switch in suction tube is at top. By pressing the connecting hose to the suction tube the bobbin goes down and the switch lamp burns. If loosened again, bobbin goes up and switch lamp 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 lamp 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.
- Particles inside venturi or at outlet nozzle of flushing tank
- Booster pump performance too low – see pressure limits on page 9, para “Installation”.  
Fit the by packed pressure gauge to inlet and outlet to check pressure situation.
- 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.

3. **An external monitoring switch** e.g. a flow switch in the main tubing to avoid dosing if anything in the circulation goes wrong. Dosing is switched off.

**Red lamp 2:**

<b>burns</b>	<b>level low</b>	level in the flushing tank low
	<b>Pump pressure</b>	no sufficient water supply supply pressure too low, air in supply tubing
	<b>off</b>	pump and dosing switched off – restart only by switching the programme to “off” and “on” again

**Possibilities:**

- Suction power too high: fit an orifice washer of 5,5 mm inside union behind venturi.
- Supply water tubing is blocked
- too low supply pressure or air in tubing
- Floating valve cone into flushing tank is blocked by particles, diaphragm is faulty
- supply hole in the floating valve is blocked

**blinks** Fuse F4 burnt (chlorine dosing motor)

**Red lamp 3:**

<b>burns</b>	<b>acid empty</b>	Acid empty switch active (closed) or faulty leakage of the dosing hose (option)
	<b>dos. off</b>	dosing acid <b>and</b> chlorine off
<b>flickering:</b>	<b>dosing</b>	acid dosing pump runs. If not, motor is faulty or breakage on cable/connection
<b>blinks</b>		On programme “auto monitored” the monitoring time is exceeded. Valid for acid and chlorine independent. See programme description

- Too high bather load – increase dosing performance
- Fault in dosing system – see following para
- Fault in auto-controller– see following para

#### **Red lamp 4: chlorine**

##### **flickering: dosing**

chlorine dosing motor should run. If not, motor is faulty or breakage on cable/connection

##### **blinks**

On programme “auto monitored” the monitoring time is exceeded. Valid for chlorine and acid independent. See programme description

- Too high bather load – increase dosing performance
- Fault in dosing system – see following para
- Fault in auto-controller– see following para

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

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

##### **No dosing by using the test program chlorine on fascia**

- dosing screw blocked
- dosing screw loose
- dosing nozzle (heated) faulty or blocked
- dosing motor faulty
- faulty empty switch: drum empty not indicated

**If dosing works by using the test programme** there is something wrong on the connection of auto-controller for free chlorine to the GRANUDOS control plate

- correct output: on continuous dosing the 230 volts should be on the connectors
- faulty wiring – interruption in the cable, on connectors
- faulty electrode
- faulty input relay on control plate – does not switch

#### **2. pH in pool water is high, suction tube/mixing chamber is turbid.**

##### **No dosing by using the test programme acid on fascia**

If pump roller runs, see whether an air bubble is sucked to pump. If all is OK, increase dosing rate and choose lower set point for pH. If not, then

- pump roller does not move: motor faulty or interruption on wiring
- dosing hose faulty,
- suction tube not well fitted - loose
- injection nozzle faulty or blocked
- faulty empty switch: container empty switch did not indicate empty

**If dosing works by using the test programme** there is something wrong on the connection of auto-controller for pH to the GRANUDOS control plate

- correct output: on continuous dosing the 230 volts should be on the connectors
- faulty wiring – interruption in the cable, on connectors
- faulty electrode
- faulty input relay on control plate – it does not switch

#### **3. Continuous dosing of chlorine or acid on programme “auto” without command from the**

auto-controller: Check whether the output from the auto-controller is correct –there should be no voltage from there. If so, the 230 volt input relay of the GRANUDOS control plate is faulty/hanging. Replace the relay or mount a new control plate.

#### **4. Overflow from the flushing tank too much at switch off of GRANUDOS**

- switch bobbin of flow switch is blocked on top situation or does not fall down completely
- seal of switch bobbin faulty
- diaphragm of the floating valve is faulty
- piston of floating valve is blocked by impurities: particles from installation or sand if filter is faulty
- supply pressure of an external booster pump too high
- set in spring-loaded check valve in ell of floating valve. Please make sure that because of pressure drop you will need a pressure of at least 0,4 bar.

#### **5. Tank is sucked empty though pressure conditions are OK.**

- inlet bore of the floating valve is blocked by impurities
- at low counter pressure use washer nozzle with smaller hole behind venturi

### **Filter desinfektion at back wash – high chlorination**

**for the durance of the back wash the GRANUDOS must be switched off, as the flocculation(mains supply off or non volt signal from CCT). If at the end of backwash a filterdisinfection is wanted the GRANUDOS is switched on and the control inputs (push conn. S04-7/8) are to be closed. At the same time the dosing tube must be switch over by a 3/2-ways valve to before the filter. The GRANUDOS meters now with the set dosing performance as long the control intut is activ chlorine and acid to the back wash water.**

### **Pay attention to the pressure situation at back wash!!**

## **2. Installation**

### **2.1 Piping**

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 without washer nozzle:

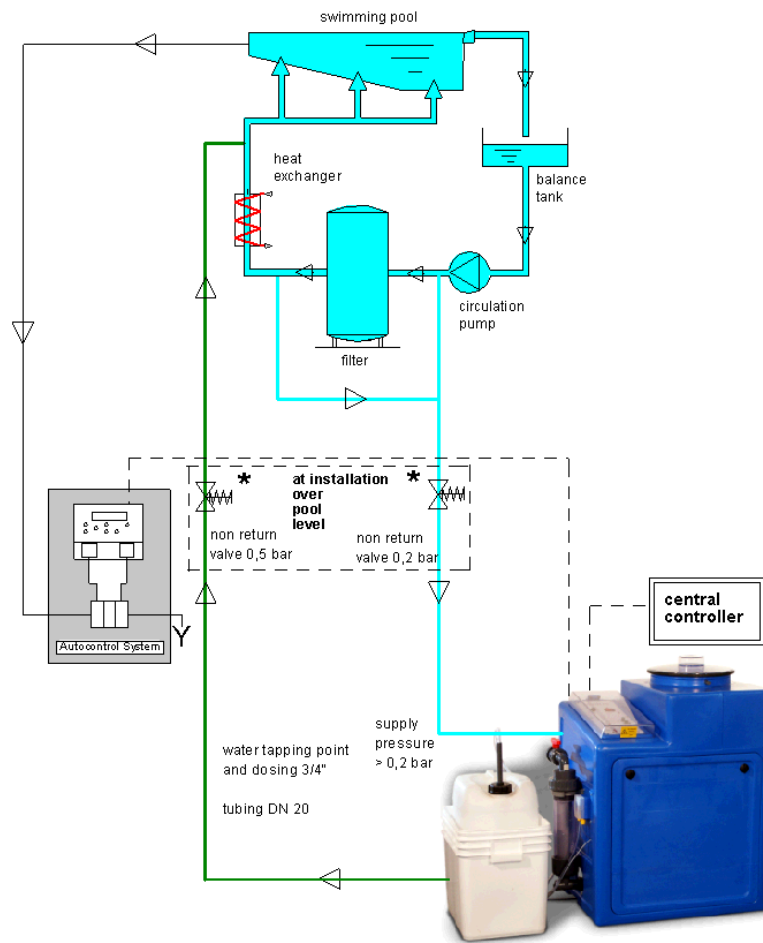
<b>Service pressure</b>	1,2 bars	<b>Counter pressure</b>	1,2 bars
	0,6 bars		0,8 bars
	0,3 bars		0,5 bars

Within these ranges the GRANUDOS should function well.

### **In addition please pay attention to the following:**

1. Tapping point for supply water to be before filter or – only if there is enough pressure - 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. Avoid up and down of tubing
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.

If the GRANUDOS is not working well, fit the pressure gauge supplied with at inlet and outlet of the GRANUDOS to measure the real pressure conditions.



## 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 together with water circulation and accordingly water supply to the 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. The control cable for pH and free chlorine (Redox) are pre-fitted into a connector box to be mounted at the wall.

**Electrical works are only to be executed by authorised people.**

## 3. Start up procedure

**Please note, that the following procedure must be executed at each new start or restart. Especially the deaeration of the pump is vital to the function of the machine.**

**Switch on the machine only if it is sure that the pump is deaerated and the isolation valves are opened.**

After having fitted the machine open the ball valves at the tapping points and at **GRANUDOS inlet valve**. Press the floater of the 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 the water flow through the flushing tank must run in the correct way as described below.

### 3.1 Check of pump

Check by means of a screw driver at back shaft of the pump whether the shaft is turning easily. If not, the slide ring seal is blocked. Try to loosen it by rapid moving of the shaft right and left. If no success, the pump must be dismantled completely and the slide ring loosened.

**If this is not done, the pump will leak in short time as the O-ring on the shaft will be worn.**

### 3.2 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 gets empty switch off the pump/machine and wait till the filter is full again, open the vent screw on top of the filter. 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.

**Attention! If electric valves are installed to isolate the machine the supply valve must be opened manually as otherwise the pump can not be deaerated and the pressure switch would not allow the pump to run.**

### 3.3 Water level in the flushing tank

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

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

At stable water level the switch bobbin of the flow switch inside the suction tube 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 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 washer nozzle or use without nozzle.

### 3.5 Adjusting the pressure switch

The pressure switch is fitted pressure side of the booster pump, so monitoring the real pressure. If air is sucked by the pump or at pressure drops the pump is switched off to avoid:

- overdosing if circulation is disturbed
- the booster pump is not destroyed by cavitation or running dry

The pressure switch is working from 1-3 bar. To adjust the switch to the working conditions take off the switch cover, turn clockwise the switch knob till the pump switches off, then turn back a little. As the GRANUDOS is now on fault, the machine must be restarted manually at the front plate by switching the machine to “off” till the 2 red lamps are off, then to “on” again. Now the GRANUDOS runs again and will be stopped if the pump pressure falls down to the set pressure.

If additional pumps are switched on or off in filtering service (e.g. pump from balance tank) the switch must be adjusted without the additional pump. At works the switch is adjusted to 1,5 bar.

### 3.6 Filling of chlorine into the hopper

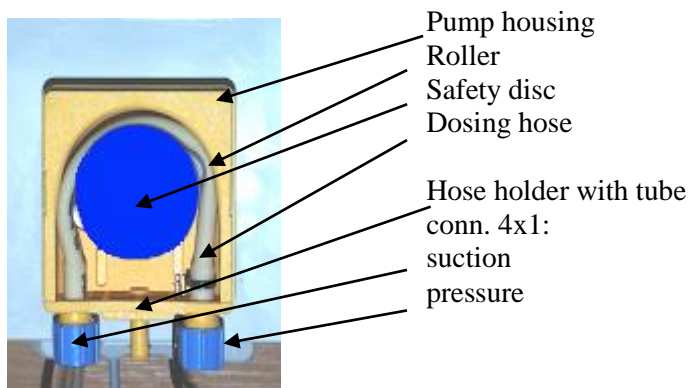
Before carrying out any task involving chemicals the operator should put on personal protective equipment to provide adequate protection to eyes, respiratory orifices, hands and clothing.

- Open the chlorine hopper lid.
- Fill the chlorine into the hopper carefully to the hopper wall by help of a scoop from the drum or bucket that no chemical dust will arise.
- Fill in only the consumption of chlorine for app. 2-3 weeks.
- After filling the hopper, put on the cover lid of the chemical drum again.
- Close the hopper lid.

### 3.7 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 at the pump. Position the acid container beside the GRANUDOS, open it and put the acid lance into it. Set the “Test acid” programme . If no fault indicates, the dosing pump must run and acid must now be sucked up through the transparent suction tube to the pump and further to the injection valve down at the bottom of the flushing tank.

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



#### **attention**

the hose must not be twisted

### 3.8 Dosing Performance Adjustment continuous dosing – see also para 1.5.3

**By means of the code switch on the control plate you can select different dosing performances to meet the needs of your individual pool. See hereto para 1.6.2 page 8 and para 5 page 17.**

The dosing performance is determined by the rpm of the dosing motor, the cycle time and the dosing time which are to be adjusted roughly by the code switches on the control plate and fine by the performance knob on the front plate.

#### **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 would need app. 900 g/day or app. 90 g/h at 10 hours continuous dosing. These 90 g/h would

correspond to only 4 % of the maximum dosing performance of 2,4 kg/h of the GRANUDOS: In this case we propose to set the dosing cycle to 6 minutes by means of the code switch on the control plate and get now a percentage of  $90/400 = 22\%$  what we set with the performance knob afterwards at the front plate. By this set dosing rate a certain chlorine concentration in the pool will result and you have to adjust it now by the performance knob whether you want to have a higher or a lower one

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

In practice the free chlorine/pH-auto controller does the job. You only have to set a high enough dosing performance.

**Acid**

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.

**Attention! At new filling of the pool normally the pH is far away from the wanted set point. So it is recommended to bring the pH at start near to the set point manually by pouring acid to the pool water – but pay attention that no droplets of acid will meet you – your clothes.**

**3.9 Dosing Controlled by Auto-Controller**

Using the programme “auto” and connecting an external auto controller for free chlorine and pH the set dosing cycle is activated. The dosing of the 2 chemicals is running independent from each other if the control output of the auto controller for free chlorine or pH is active. The dosing rate set at the GRANUDOS should be at high level or maximum.

It is strongly recommended to connect both, chlorine and pH auto-controller to the GRANUDOS even there is another dosing system for acid in use. In that case acid dosing of both systems should be connected in parallel, at the GRANUDOS a small dosing rate should be selected. This is to avoid overdosing of acid in case of malfunction of chlorine dosing. But please make sure that the acid dosing rate is enough for the cleaning job.

The auto controller output must be of 230 VAC on/off – or non volt contact pulse length control. see wiring diagram. The control cable for pH and free chlorine (ORP) are pre-fitted into a connector box to be mounted at the wall. Never switch off the GRANUDOS during dosing cycle: first switch off dosing, only then the GRANUDOS.

**Please note, that the measuring water never should be taken from behind the filter**



#### **4. 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, see also the attached maintenance list:**

- clean pre-filter if necessary – a scaled filter causes cavitation and consequently damage of the booster pump

**For cleaning take out the complete filter and clean the filter insert outside.**

- 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 filling of the dosing hopper check function of all sensors i.e. water flow, level and empty switches
- every 2 months or with each new filling of the dosing hopper check the dosing screw. Clean it with a brush if blocked – do not use water.
- change diaphragm of floating valve once per year
- change seal of flow switch bobbin all ½ year
- check once per year acid dosing valve – change seals

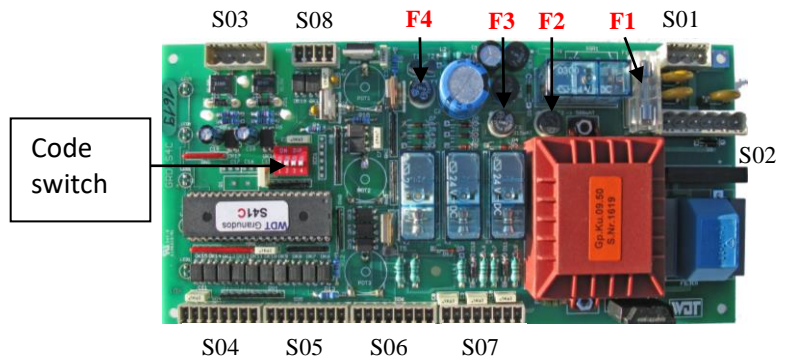
#### **A taking out of service**

- 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.
- leave the GRANUDOS switched on - programme switch on "0"  
clean the environment of the machine thoroughly.

**At taking into operation again  
please pay attention to the para 3. Start up procedure**

**5. Connection table of control plate GRANUDOS-S41C**

- F1** fuse primary 500mA delay
- F2** fuse 24V complete 500mA delay
- F3** fuse controller 315 mA delay
- F4** fuse dosing motor chlorine 315 mA delay



Dosing cycle Code switch	S1		S2		Dosing times chlorine - acid		Dosing performance at 100% set with knob max
	S1	S2	S3	S4	S3	S4	
1 minute	off	off	30-20 seconds	off	off	off	2,4 kg/h – 1,3 l/h
1 minute	off	off	40-10 seconds	on	off	off	3,2 kg/h – 0,7 l/h
1 minute	off	off	20-20 seconds	off	on	on	1,6 kg/h – 1,3 l/h
1 minute	off	off	10-10 seconds	on	on	on	0,8 kg/h – 0,7 l/h
6 minutes	on	off	at standard dosing times 30/20 sec.				0,4 kg/h – 0,22 l/h
8 minutes	off	on	at standard dosing times 30/20 sec.				0,3 kg/h – 0,16 l/h
12 minutes	on	on	at standard dosing times 30/20 sec.				0,2 kg/h – 0,11 l/h

**Connector S01 – mains 230 Volt**

- 1 L1 – braun phase
- 2 N – blau neutral
- 3 Sl – ge/gr earth

**Connector S02 – Pump / Chlorine valve**

- 1 L1 – black 1 knocker
- 2 N – black 2 knocker
- 3 Sl – ye/gr knocker
- 4 Sl – ye/gr booster pump
- 5 N – blue booster pump
- 6 L1– brown booster pump

**connector S03 – ext. contr. PH/Chlorine 240 volt with cable to connector box**

- 1–2 white-brown free chlorine
- 3–4 green-yellow pH-value

**connector S08 – PH/Chlorine non volt**

- 1–2 pH-value
- 3–4 free chlorine

**Connector S04 – switches**

- 1 – 2 white-brown acid empty
- 3 – 4 leakage dosing hose acid
- 5 – 6 machine off by control centre
- 7 – 8 filter disinfection

**Connector S05 – switches**

- 1 – 2 bridge
- 3 + 24 VDC
- 4 blue level high in tank
- 5 black - 24 VDC level switch
- 6 black flow switch venturi
- 7 blue – 24 VDC flow switch
- 8 brown + 24 VDC flow switch

**Connector S06 – switches**

- 1 – 2 machine off
- 3 – 4 wh-br pump pressure
- 5 brown level low in tank
- 7 – 8 external monitoring switch

**Connector S07 – outputs**

- 1 – 2 fault remote (NO)\*\*
- 3-4 wh-brown(4+) acid dosing pump
- 5-6 wh-brown (6+) dosing motor chlorine
- 7-8 gr-ye (8+) heating dosing nozzle

\*\* for low voltage < 40 volts only

Fuse on front plate 3,15 Amp slow

**6. Maintenance Check list GRANUDOS 10/45/100**

Object:.....

GRANUDOS-Type:..... series no.....

Maintenance executed by ..... date:.....

Sign of pool operator:.....

**This has to be done** ↓

**This was necessary too** ↓

**1 Dissolving system**

- 1.1 check level switch: OK [ ] change switch [ ]
- 1.2 check pressure switch: OK [ ] change switch [ ]
- 1.3 check flow switch: OK [ ] change switch [ ]
- 1.6 check function floating valve OK [ ] adjust water level [ ]
- 1.7 check connecting hose tank-flow switch holder [ ] change hose if brittle [ ]
- 1.8 check pump end plate (at Calpeda pump only) [ ] change pump end plate [ ]
- 1.9 check tightness of pump OK [ ] new slide ring seal [ ]
- 1.10 check ball bearings: is it noisy? OK [ ] new bearings [ ]
- 1.11 clean pre-filter, if polluted [ ]

**2 Dosing chlorine**

- 2.1 check function heating nozzle: OK [ ] change nozzle [ ]
- 2.2 check function empty switch: OK [ ] change switch [ ]
- 2.3 check dosing screw, clean it dry OK [ ] change screw [ ]
- 2.4 check power dosing motor: OK [ ] change motor [ ]
- 2.5 change sealing of dosing motor [ ]
- 2.6 check clamp bands and safety belt [ ] change [ ]

**3 Dosing acid**

- 3.1 check function empty switch: OK [ ] change empty switch [ ]
- 3.2 check function dosing pump OK [ ]: change pump [ ]
- 3.3 change dosing hose [ ] change roller [ ]
- 3.4 change acid valve insert [ ]

**4 Additional jobs**

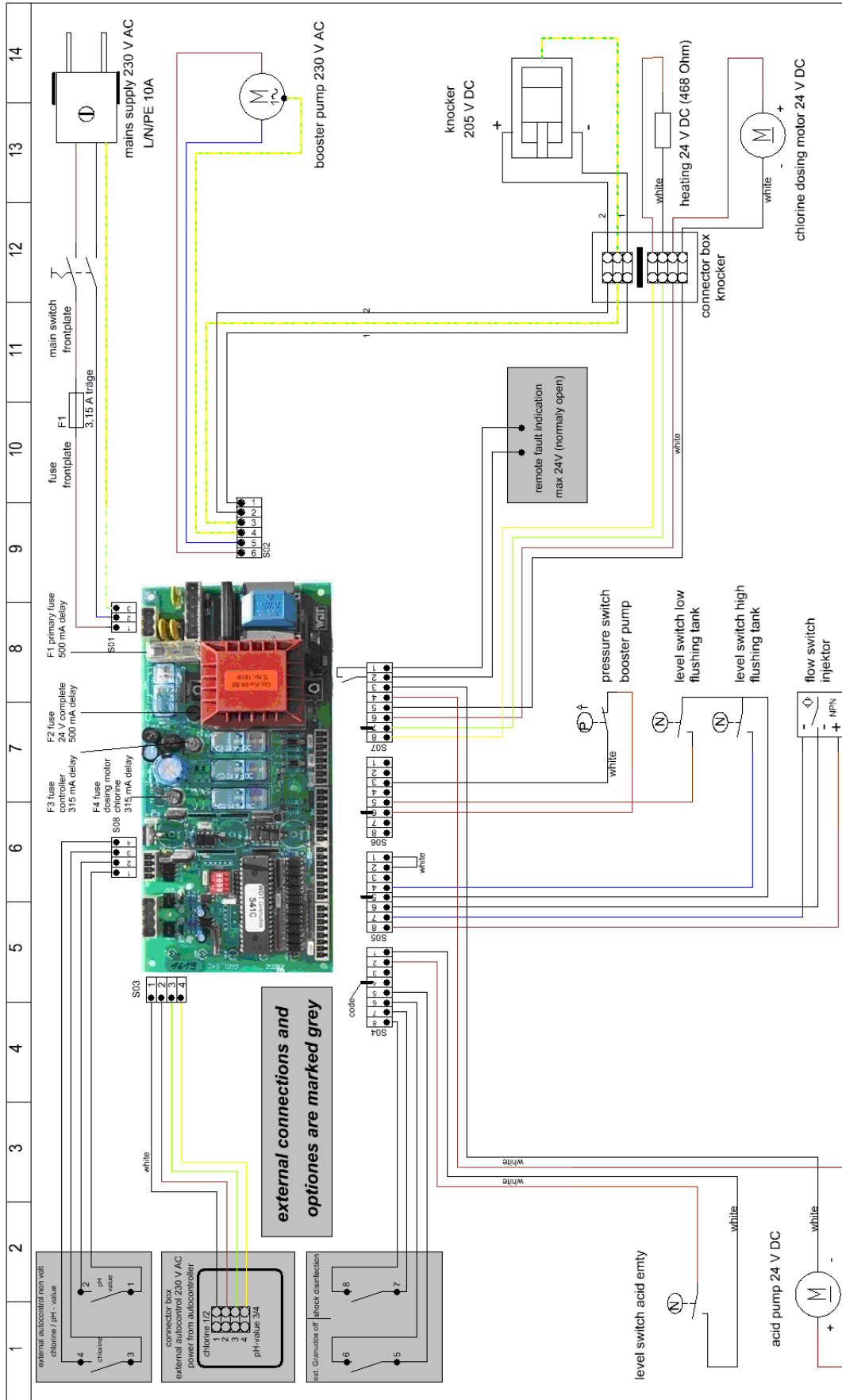
- 4.1 clean GRANUDOS carefully: [ ]
- 4.2 clean environment of the GRANUDOS [ ]

.....  
.....  
.....  
.....

## **7. Spare Parts list GRANUDOS 10-S4**

	<u>Designation</u>	<u>Item no.</u>
Chlorine. dosing	dosing hopper GR10 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
	maintenance kit dosing motor	16369
Acid dosing	acid pump Sa complete	12374
	pump housing Sa	14140
	roller Sa	13039
	dosing hose 3,2x1,6 N Sa	13413
	supply carboy lance	12523
	acid injection valve GR 1KFa	15099
	repair set for acid valve	15764
Filter	filter housing	12746
	filter top with ball valve d25	12304
	O-ring on top	11258
Control system	control plate S41c	14200-1
	transformer S4, 2x9 volt, 10VA	14383
	main switch GR	11338
	fuse holder GR	13960
	knob 6mm S1/3	11031
	cover control box GR10	12338
Floating valve	floating valve d25 GR10 complete	17006
	diaphragm for floating valve	16367
	non return valve d8 0,4 bar spring loaded GR10	16652
	floater	11621
Level switch	level switch GR 10	10497
Booster pump	booster pump Lo HM04-Flux	24618-1
	maintenance set: ball bearings, slide ring seal	17019
Flow switch	suction tube GR ½'' -D40	25659
	flow switch GR ind. 18x1 long lead	25671
	connecting hose Si 10/2,5/170	11565
Venturi	venturi nozzle 1/2" Ti GR/PAK complete	24997
	orifice washers for venturi-kit	11594
Cyclone	mixing cyclone GR 10	12329
Maintenance kit	For yearly maintenance: seals, diaphragms, fuses all GR	12631

## **8. Wiring diagram**



**WDT**  
 Werner Dosiertechnik  
 Hettlinger Straße 17  
 86637 Wertingen

Dateiname: **granudos 10 s4.spl**  
 Steuerung GRD S4C ab 3.10

Blattbezeichnung: **SP-30/100301**

Änderungen		Datum	Name
Datum	gez.:	11.02.2009	Müller
1.3.10	Platine S4b auf S4c	11.02.2009	Müller
	Norm:		

Datei Speicherplatz: z:\org-wdt\13 edv\programme\plan 40\schaltpläne\3-granulatdosieranlagen\30 granudos\granudos 10\granudos 10 s4.spl