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

Operating instructions GRANUDOS 45/100-V61

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.

Table of Content

1. Technical Data

The GRANUDOS 45/100 dosing system comprises:

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

Measures:
space needed: 60 x 150 cm
height: 140 cm
weight: 50 kg

material:
main vertical support and drum carrier:
steel, powder coated
other parts: PVC, PE

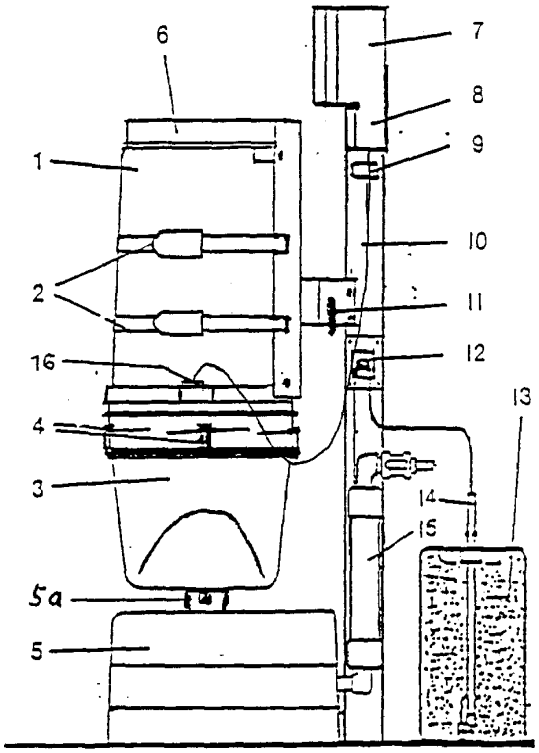
GRANUDOS booster pump(if installed)
centrifugal pump: 0,3 kW, 230 VAC,
supply pressure: minimum 0,2 bar
Fresh water supply: min. 2 bars

Water flow: app. 1000 l/h

Dosing Performance:

chlorine: GR 45: 2 kg/h. GR 100: 5 kg/h *
acid: GR 45: 2 l/h, GR 100: 3 l/h

Chlorine dosing performance depends on chlorine quality and is affected by too fine or too coarse material. Acid dosing performance is given in litres per hour. It is recommended to use sulphuric acid 37-50%.

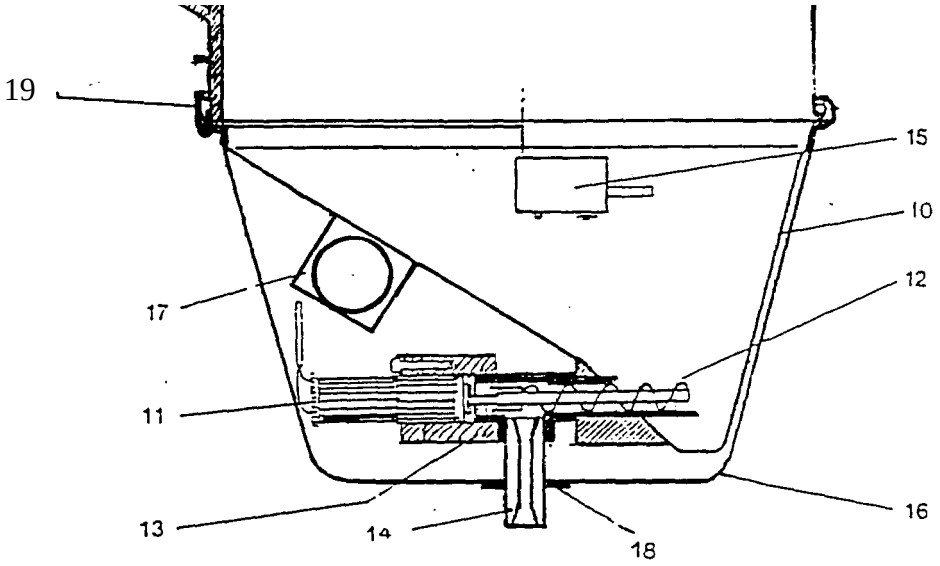


1	drum	9	type label.
2	2 clamp bands	10	vertical carrier
3	dosing hoper	11	locker
4	lid curl	12	acid pump
5	dissolving system	13	acid carboy
6	drum carrier	14	acid carboy lance
7	controlsystem	15	water supply with filter
8	conn. Housing	16	heated dosing nozzle
		17	dust protection
		18	pump cover

1.1 The Drum Carrier

The rotating drum carrier assembly (6) is fixed to the main vertical support (10). The drum (1) with chlorine 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 buffer tank.

1.2 Chlorine Dosing Assembly



10	dosing hopper	16	hopper cover
11	dosing motor	17	knocker
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, app 1 kg chlorine is left in the hopper. The knocker (17) gives a hit to the hopper at each dosing motor run cycle so supporting flowing of the granules.

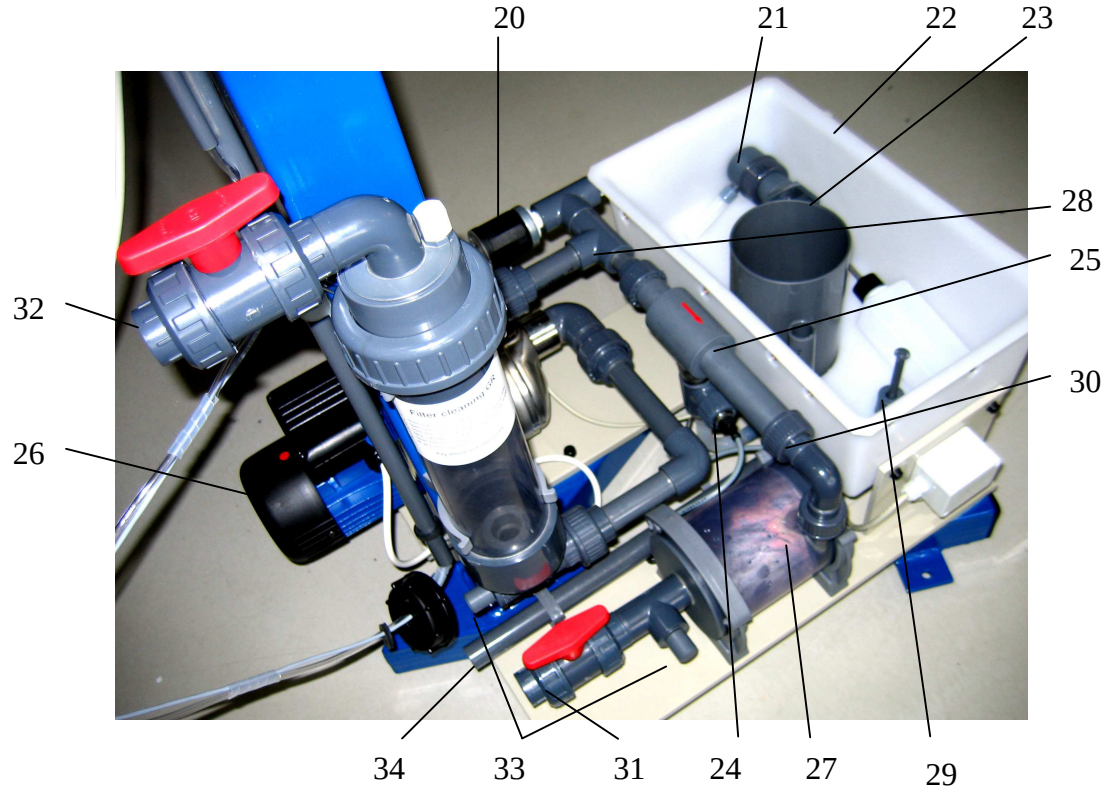
Dosing performance is adjusted by the switch 4 at front fascia, see para "Start up operation".

1.2 Acid Dosing

The acid is dosed down in the flushing cone (23 - see next para) by the peristaltic pump, which is fitted right side on the vertical support. If acid is empty, indicated by the level switch chlorine dosing is stopped to avoid scaling in the dissolving system and tubing.
For acid use sulphuric acid 37-50%. Concentrated hydrochloric acid (HCI) penetrates the pump hose and will attack the pump rollers and further the pump. Diluted HCI will be not strong enough for the neutralisation job.

The dosing performance of acid is to be set to suit each individual pool.

1.3 Dissolving System



20	pressure switch	28	allocation rinsing water
21	floating valve	29	level control switch
22	flushing tank	30	union bush with washer nozzle
23	flushing tube	31	outlet ball valve d25
24	flow monitoring	32	supply connection d25 with filter
25	venturi nozzle	33	fitting to connect pressure gauge
26	circulation pump	34	overflow tube
27	cyclone mixing/dissolving chamber		

The dissolving water is normally supplied from before or from behind the filter. **There must be a sufficient pressure to avoid cavitation on the booster pump, at least 0.2 bar**. The actual supply pressure is controlled by the pressure switch (20). At pressure below the set switch point the machine stops.
The supply water is divided in the allocation rinsing water (28) 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 sucked together with the dosed chemicals out of the flushing tank. The supply water flow is controlled by means of a floating valve (21) and 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 chlorine granules a cyclone mixing chamber (27) is fitted after the venturi. To ensure that chlorine and acid do not come into 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 or none of them can get power (24VDC) and dose chemical.
- flow switch (24) , level switch (29), pressure switch (20) supervising water supply and flow conditions. If any non-compliance with the given limits occurs, the GRANUDOS will be switched off.

1.4 Control Panel

The microprocessor based control of the GRANUDOS has three functions:

- Contains the circuit self check and dosing programmes for chlorine and acid

- Function control and interruption display (1 green + 4 red LED). If any interruption is displayed, the GRANUDOS is switched off - 'Chemicals on reserve' is only indicated. All faults normally activate the fault remote control.

The control system is enclosed within a dust proof and splash proof housing (IP 65). External switches and fault remote indication are to be connected in the lower part of the housing.

1.4.1 Programme Selection (GRD 61)

P: Proofing programme for control board, only used by authorized personnel

For test and check of dosing motors:

C5: Continuous dosing of chlorine for 5 minutes
A5: Continuous dosing of acid for 5 minutes

After the 5 minutes dosing the green LED will flash continuously

ECA: External control of chlorine and acid by an auto controller
EC: Auto control only chlorine, acid dosing continuously as set, but only if chlorine is dosed

E15: Monitoring of the external auto controller chlorine and acid: After an excess time of 15 minutes dosing stops.(see next para)

E60: Monitoring of the external auto controller chlorine and acid: After an excess time of 60 minutes dosing stops.(see next para)

To prevent clogging of the chemical in the hopper with the E-programmes all hour 1 dosing is activated independent from the auto-controller.
When changing a programme there is always a delay of 4 seconds until the new programme is verified. During this time the green lamp will flash.

1.4.2 Monitoring of external controller and dosing with programme E15/E60

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

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

The GRANUDOS controller adds up all ordered dosing time (input time) that exceeds 50% of total time and stops dosing if a certain excess time is reached: 15 minutes with programme E15, 60 minutes with programme E60. Indication by flashing of all 4 red lamps.

Dosing can be switched off by an additional external switch e.g. a flow por pressure switch in the measuring water tubing or in the circulation to prevent dosing if there is an irritation

2. Installation - piping

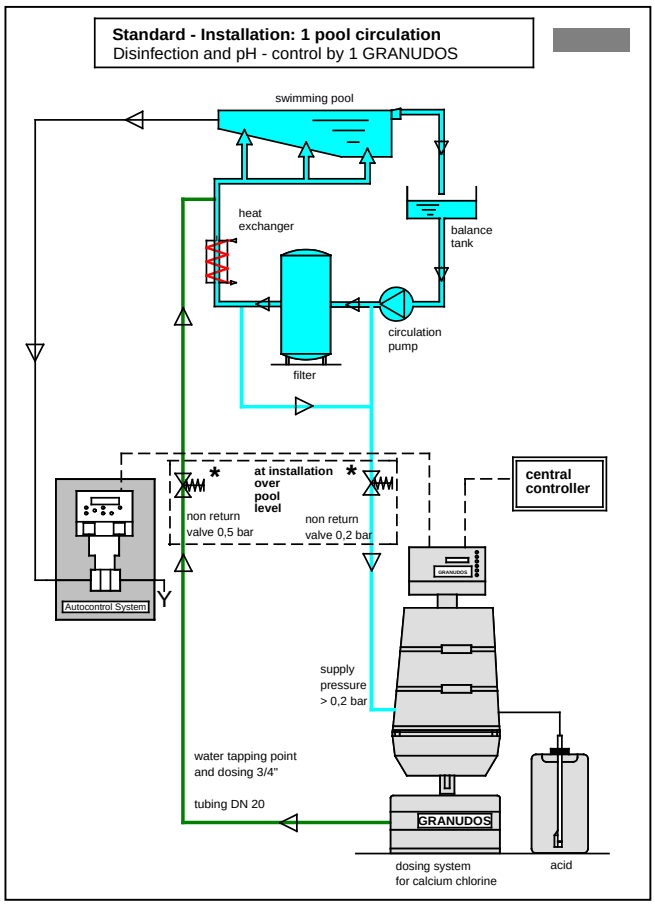
For satisfactory water flow through the dissolving system the **supply pressure must be at least 0,2 bars to avoid cavitation at the pump**. At low service pressure the counter pressure must be also low. Counter pressure and pressure loss in the dosing line should be as low as possible. At works the 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 circulation pump and filter, 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 i.e. 10m or poor pressure conditions use bigger tubing and swept bends instead of elbows.
4. Use high quality PVC ball valves to isolate take off points.

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 condition



3. Start up Procedure

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 Adjustment of water flow

To adjust the water flow to supply pressure conditions a nozzle is inserted in the union (30) behind the venturi nozzle. 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 put in the 7 mm nozzle or use without nozzle.

3.3 Water level

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.

3.4 Loading the Drum onto Machine (25-50 kg plastic drum - ret. sketch p. 3)

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.

Before loading the drum ensure that the dissolving system cover is fitted

1. Fitting of dosing hopper onto the drum:

a) 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 sideward from your position.

b) Screw off the drum lid. Remove any plastic scoop from inside the drum.

c) 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 screw ring fits well to the drum.

2. 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).

3. Load the drum, carefully, onto the drum carrier so that the cable is on the right. This may be lifted manually, but ensure no injury to the back by lifting properly. (Mechanical lifting devices are available)

4. 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.

5. Fix the drum securely in position using the drum band clamps. Adjust the clasp tension by adjusting the nuts on the screwed end of the band clamps. Lock the clamp clasps with the securing clips provided so that they cannot open by itself.

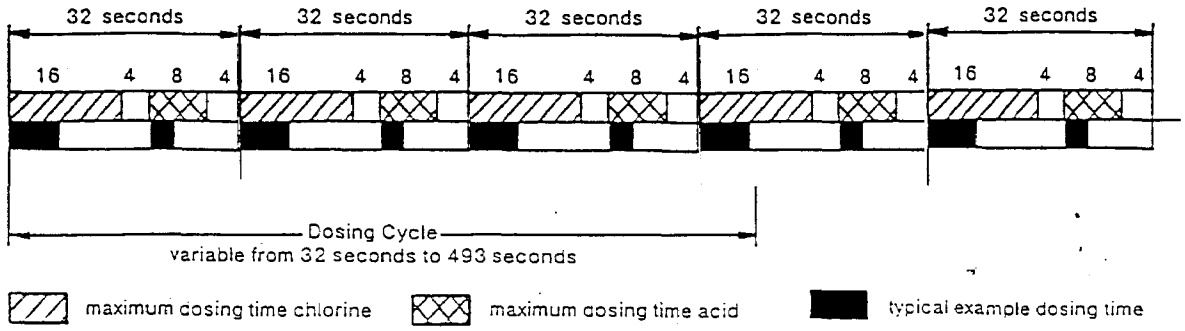
6. Pull the hopper retaining belt from the rear to the front over the hopper cover and push the belt clasps with the front belt together.

7. 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.
Lock the drum carrier in this position via the swivel lock (7).

The GRANUDOS is now in the dosing position

3.5 Adjusting dosing performance of GRANUDOS

On principle dosing of the GRANUDOS is working to the following scheme where the dosing cycle is set on 32 seconds – cycle knob on 16:



On the dosing cycle and dosing time knobs the scale of 1-16 is set to give the most appropriate cycle time and dosage to suit the individual pool. The diagram and table below shows the cycle timing and given values for various settings

Dosing Performance Adjustment

1. Chlorine
   In principle the chlorine consumption of a pool depends on a variety of influences: Loading, temperature, required chlorine concentration etc. Normally a standard indoor pool needs about 300 g of calcium hypochlorite per 100 m^3 in volume per day. So a pool of 600 m^3 in volume needs app. 1800 g/day or app. 75 g/h at continuous dosing. These 75 g/h corresponds to app. 3 % of the maximum dosing performance of 2 kg/h. This is achieved with a cycle time of 138 seconds –Position 8 at the cycle knob and a corresponding dosing rate of 13 % - position 4 at the dosing time knob.
   An outdoor pool needs in 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 the dosing knob similar to chlorine. The actual need has to be found by trial and error. The pH should be at 7,0 – 7,4.

3.5 Dosing Controlled by Auto-Controller

If an auto-controller is used, set an “E-Programme” – see above and use app. 3-5 times higher dosing rate as calculated above. It is to adjust both, cycle and dosing time.
If CO2 is used for pH-correction, it is proposed to connect the controller output at the GRANUDOS in parallel to the CO2 control valve and set a low dosing performance for acid. So the acid dosing for cleaning is controlled.
To connect the auto-controller to the GRANUDOS please see the wiring diagram

Diagram for the Determination of the Switch Positions for the Cycle and Dosing Time

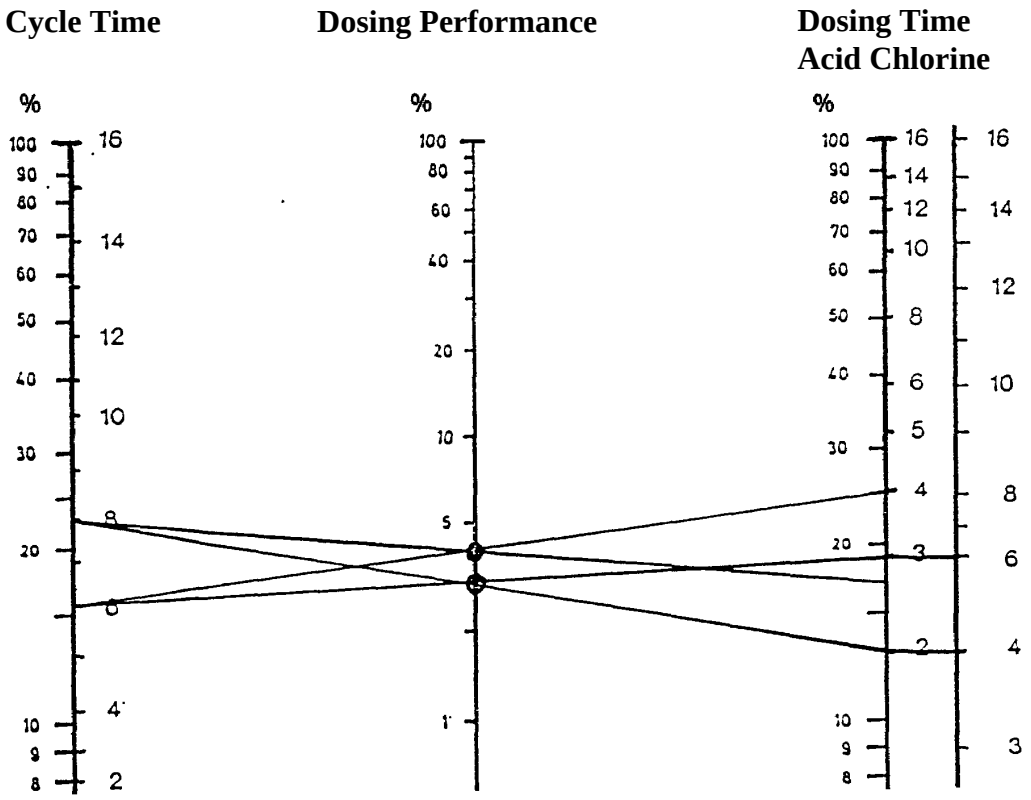


Table for Cycle amd Dosing Times

Switch Position	Cycle Time		Dosing Time Chlorine		Dosing Time Acid	
	Sec.	%	Sec.	%	Sec.	%
1	439	6	0,5	3	0,5	6
2	411	8	1	6	1	13
3	342	9	1,5	9	1,5	19
4	285	11	2	13	2	25
5	238	13	2,5	16	2,5	31
6	198	16	3	19	3	38
7	165	19	3,5	22	3,5	44
8	138	23	4	25	4	50
9	115	28	5	31	4,5	56
10	95	34	6	38	5	63
11	80	40	7,5	47	5,5	69
12	66	48	9	56	6	75
13	55	58	10,5	66	6,5	81
14	46	69	12	75	7	88
15	38	84	14	88	7,5	94
16	32	100	16	100	8	100

The percentage values of the performance table are to be related to the maximum dosing rates:

GRANUDOS 45: Chlorine app. 2. kg/h. acid app. 2,5 1/h
GRANUDOS 100: Chlorine app. 4 kg/h, acid app. 3 l/h

4 Diagnosis Programme / LED Signification (GRD 61)

4.1 Starting self check programme

When the machine is switched on a diagnosis programme for the control equipment runs. The same happens when the reset key is pressed.

1. All lights burn together 3 seconds
1. Each light comes on one after another for one second
2. If there is no fault, all red lamps go out and the dosing programme commences.

4.2 LED Indicators for function and irritations

Green LED – indicates program switch and external inputs

on contiuously: GRANUDOS in operation

no light: Transformer Tr. 2 or fuse F1 for control system burnt

fast blink (0,5 second on, 0,5 second off...)

- Programme knob not on a programme station
- End of test programme A 5, C 5
- Dosing switched off with front fascia switch

Glimmering: indicates filling of buffer tank with programme PB

Red LED shows function of dosing and interruptions indicated by the different Sensors. At any interruption dosing stops.

Glimmering: indicates dosing: L3 = acid, L4 = chlorine
on *continuously:* Interruption indicated by a sensor (see below)

slow blinking: (2 seconds on, 2 seconds off....) fuse of an output is burnt

LED (red) signal		Interruption indicated – more detailed below
L1	on continuously	Venturi suction - water flow too low, water level high (more details see below)
L1 + L4	fast blink slow blink together	Fuse F3 burnt (power 24 VDC–800 m amp slow) or transformer Tr1 faulty
L2	on continuously	water level in tank low. water supply pressure low (more details see below)
L3	on continuously	acid container empty
L4	on continuously	Chlorine drum empty
L4	slow blink	fuse F4 burnt (chlorine dosing motor – 315 m amp slow)
L1 to L4 all blink together		monitoring of dosing time active: ordered dosing time of controller exceeds 50 % of total times for 15/60 minutes with programmes E15/E60 (dosing performance too low)

L1 on continuously: Water level in flushing tank too high, suction too low

There is coming more water to the tank as is sucked through 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 quickly and switch LED goes out.
   In this case there should be a fault in the floating valve: check whether by 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 at para "**Installation – piping**". Fit the supplied pressure gauge to inlet and outlet to check pressure situation.
   - Particles inside venturi or at outlet nozzle of flushing tank (good possibility at installation)
   - 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 or special cleaning chemical into suction cone of the tank. After cleaning increase acid dosing performance.

L2 on continuously: Water level in tank too low

Suction power of venturi is higher than water is supplied.

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

4.3 Irritations not indicated by monitoring switches

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

By using the test program chlorine on facsia no dosing
- dosing screw blocked
- dosing screw loose
- dosing nozzle (heated) faulty or blocked
- dosing motor faulty

If dosing works by using the test program see to auto-controller for free chlorine whether the output is correct

2. **No acid dosing:** pH in pool water is high, suction tube/mixing chamber is turbid.
If acid container is not empty, no fault indication at the fascia: check dosing function of acid pump use test program 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, increase dosing rate and choose lower set point for pH

3. **Continuous dosing of chlorine or acid** on program "auto" without command from the auto-controller: Check whether the output from the auto-controller is correct – no voltage from there. If so, the 130 volt relay of the GRANUDOS input is faulty. Replace the relay or mount a new power plate.

4. **Overflow from tank too much at switch off of GRANUDOS**
- switch bobbin of flow switch is blocked on top situation or does not fall down completely
- joint of switch bobbin faulty
- diaphragm of the floating valve faulty
- piston of floating valve is blocked by impurities (sand if diaphragm is faulty)
- supply pressure of an external booster pump too high

5. Maintenance

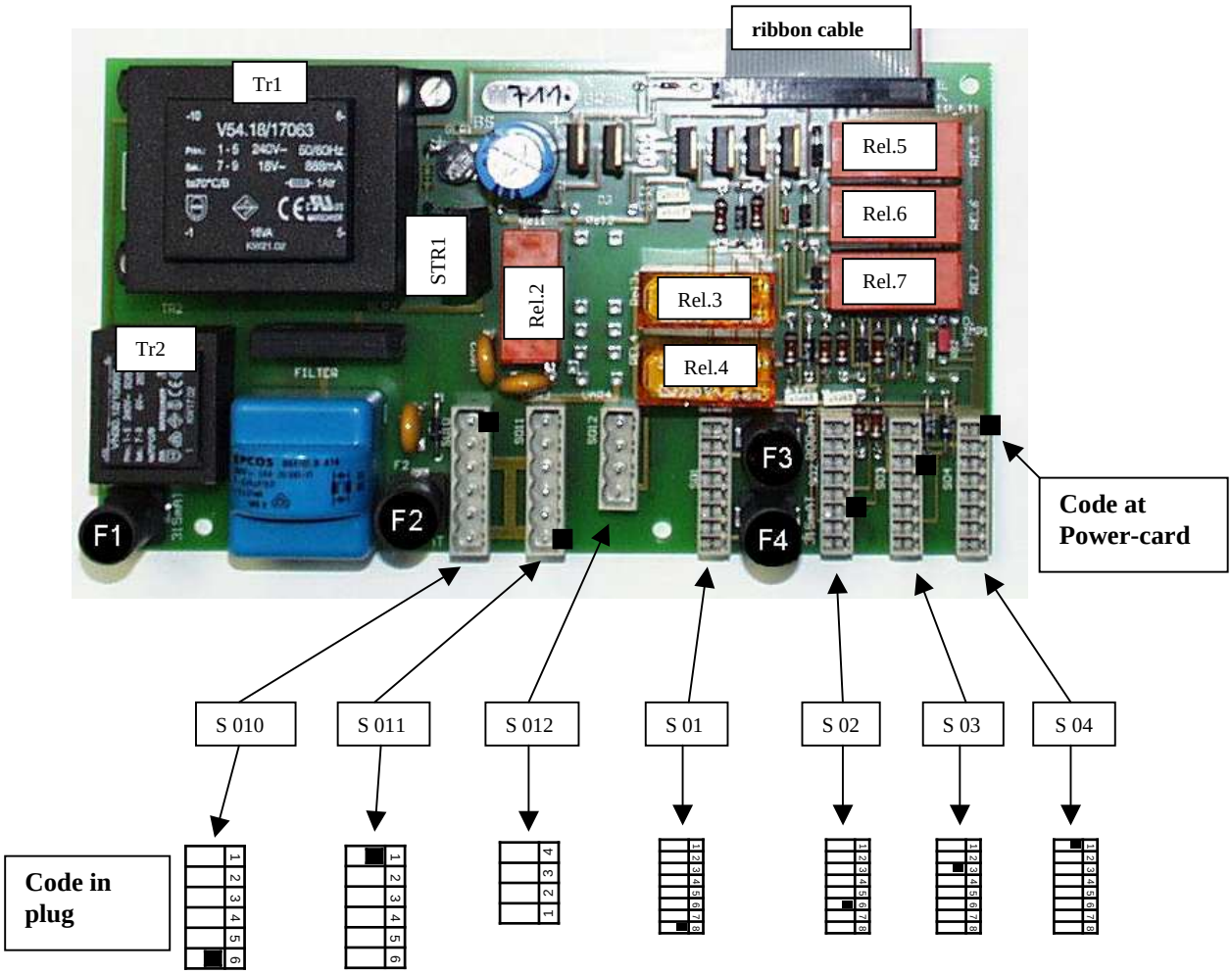
It is strongly recommended that a regular maintenance programme is undertaken. Consult your installer/supplier and take up a service/maintenance agreement. This way the machine will be maintained in good operating condition.

Minimum checks include the following items:
- clean strainer if necessary – a scaled filter causes cavitation and consequently damage of the booster pump
    - **For cleaning take out the complete filter from the machine and clean the 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 drum check function of all sensors i.e. water flow, level and empty switches
- every 2 months clean the chlorine dosing screw: dismantle the hopper and take out dosing motor with the screw, clean with a brush – do not use water
- 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

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".

6. Electrics – connectors - fuses

6.1 Connectors on power plate



Connectors 240 volts – connectors in detail see next page

SO10	Mains supply 240 volt and knocker 205 volt DC
SO11	Booster pump and water supply cut off valve
SO12	external auto-control input 230 volt chlorine, pH

Connectors low voltage or non volt – connectors in detail see next page

The switch inputs are normally open for service, closed for fault/function indication

SO 1	outputs 24 VDC
SO 2	external non volt inputs
SO 3	monitoring switches from dissolving system
SO 4	Empty switches chlorine, acid

Connector SO 10 – mains supply – knocker at dosing hopper

1	black	no. 1	- 205 volt DC knocker
2	black	no. 2	+ 205 volt DC knocker
3	yellow/green		Earth
4	Ph	brown	Mains supply 240 volt
5	N	blue	Mains supply 240 volt
6	SL	yellow/green	Earth

Connector SO 11 – booster pump / water supply cut off valve

1	Ph	brown	Booster pump
2	N	blue	Booster pump
3	SL	yellow / green	Earth
4	Ph	brown	solenoid valve water supply
5	N	blue	solenoid valve water supply
6	SL	yellow / green	Earth

Connector SO 12 - auto-control inputs 230 volts

1 – 2	Chlorine control 230 volts
3 – 4	pH-value 230 volts

Connector SO 1 controlled outputs 24 VDC

1-2	heating dosing nozzle
3	- 24 VDC chlorine dosing motor
4	+ 24 VDC chlorine dosing motor
5	- 24 VDC acid dosing motor
6	+ 24 VDC acid dosing motor
7-8	fault remote non volt – only for low voltage

Connector SO 2 external controls non volt

1	chlorine control non volt
2	acid control non volt
3	- mass for both
4	shock disinfection
5	external switch off dosing only
6	external switch off GRANUDOS – attention, with fault indication
7	+ 24 VDC
8	– 24 VDC

Connector SO 3 switches from dissolving system in ( ) connected in system terminal

1	level in tank high (= water flow low)
2	level in tank low (=supply pressure low
3	- mass for both
4	free
5	+ 24 VDC
6	- mass
7	free
8	- mass

Connector SO 4 empty switches chlorine, acid

1	mass
2	acid empty
3	- mass for both
4	chlorine empty
5	+ 24 VDC for chlorine empty
6	- mass
7	free
8	- mass

6.2 Fuses, transformers, relays

Fuses

FO	mains fuse in front plate	3,15	amp slow
F1	fuse control plate	315	m amp slow
F2	Fuse booster pump	3,15	amp slow
F3	fuse power output except chlorine dos. motor	800	m amp slow
F4	Fuse chchlorine dosing motor	315	m amp slow

Transformers

Tr1	transformer for power outputs	18 volt, 16 va
Tr2	transformer for control system	6 volt, 1,5 va

Relays

SSR. 1 solenoid knocker 240 v (solid state relay)
Rel. 2 booster pump 240 v
Rel. 3 relay auto control chlorine
Rel. 4 relay auto control acid
Rel. 5 fault remote control non volt
Rel. 6 internal locking chlorine dosing
Rel. 7 internal locking acid dosing

7. Spare Parts GRANUDOS 45

	Designation	Item No.
Chlorine dosing	dosing hopper HTH 40 kg	11527
	Cover for dosing hopper GR 45	11530
	dosing motor PLG 30-35	11676
	Dosing motor PLG 30-60 (GR100 / GB)	11546
	Motor holder PLG-d32	11542
	Motor holder PLG- d25 (GB)	11541
	dosing screw d6/D26	11550
	dosing screw d6/D19 (GB)	11549
	dosing nozzle heated GR	11556
	knocker GR 45complete	11558
Acid dosing	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 MCU 1c	11505
	Power plate NRGRD-6	11517
	Power transformer, 240/18 volt, 16VA	11665
	Control transformer 240/6V-2VA	10929
	main switch	11338
	fuse holder GR	12324
	Knob 4mm	11757
	Cover control box	12600
	Locker for control housing	11512
Floating valve	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	Venturi ½” GR/PAK complete	11792
	orifice washer for venturi	11594
	venturi-nozzle ½´´	12306
	venturi-body with connector ½´´	12305
cyclon	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:.....

	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	[ ]
1.4	cleaning flow switch bobbin, fit new seal		[ ]	change bobbin	[ ]
1.5	change diaphragm of floating valve		[ ]		
1.6	check function floating valve	OK	[ ]	adjust water level	[ ]
1.7	check connecting hose tank-flow switch holder		[ ]	change connecting 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		[ ]		

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