

# **GRANUDOS-10 Top MC**

## **Dosing System for Calciumhypochlorit, Acid and Flocculent complete with Auto-control System *TopControl MC* for Commercial Pools**



- Part 1:**
- **Manual for Dosing equipment GRANUDOS**
  - **Mounting, taking into service**
  - **Fault analysis, Maintenance**

(Part 2:) Manual for the Auto-controller *TopControl MC*

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

## Operating Instructions GRANUDOS 10 TOP MC

### **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. Ensure machine is kept clean. If chemical is spilled, clean up immediately.
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. The Functions of GRANUDOS 10 TOP:

The features:

- Measuring free chlorine , pH-value, redox tension, temperature
- Big red value displays
- 4-lines-display for service guide, operated by 1 selection turn key
- Control and monitoring of all operational functions
- Proportional dosing control
- Dosing of chlorine granulate from hopper 5 kg or directly from 10 kg bin
- Control Dosing of dry chlorine by measuring free chlorine **or** redox
- Acid dosing by a peristaltic pump included
- Dosing of flocculant by a peristaltic pump
- Filter backwash disinfection
- Shock chlorination programmable
- Night program with reduced set points for free chlorine and flocculant
- Filling a buffer tank with chlorine solution to disinfect other small pools by additional dosing pumps (optional)
  
- Interface RS485 to link a computer, printer, Mobil SMS or mimic . \* **optional from 7/06**
- fault remote control (non volt)
- Mimic (optional)

### 1.1 Data, Measures, Performance

#### Dosing performance:

chlorine:	0.5 kg/h, optional 2,5 kg/h motor 12rpm, optional 50 rpm
acid:	1,0 l/h, optional 2,0 l/h dosing hose 3,2x1,6, opt. 4,8x1,6
flocculant	105 ml/h with dosing hose 0,8x1,6

#### Measures:

base:	71 x 52 cm
height:	130 cm
weight:	40 kg

#### Material:

PE, polyethylene  
control housing ABS IP54

#### Booster Pump

centrifugal pump:	SS - 0.3 kW, 230 volt 1ph
supply pressure:	<b>minimum 0,1</b> – 1,2 bar
counter pressure:	0 – 1,2 bar (depending on supply pressure)
water flow:	app. 1000 l/h

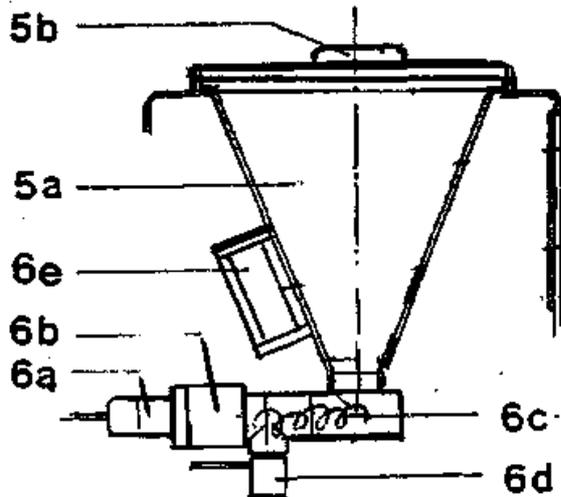
Fault remote indication by relay



## 1.2 Dosing Assembly dry chlorine

The dosing assembly, placed into the main housing consists of the dosing hopper (5a) and the dosing unit with dosing motor (6a), the dosing screw (6c) fitted together and pushed into and screwed to the motor holder (6b). The dosing nozzle (6d) is heated to eliminate 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. The solenoid knocker acting at each dosing prevents bridging of the chemical in the hopper



5a dosing hopper

5b hopper lid

6a dosing motor

6b motor holder

6c dosing screw

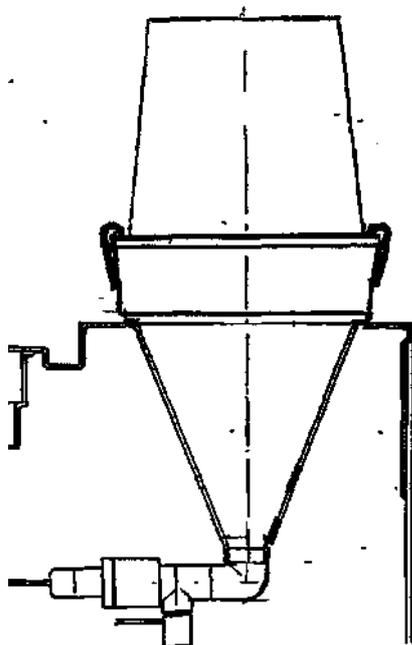
6d heated dosing nozzle

6e knocker

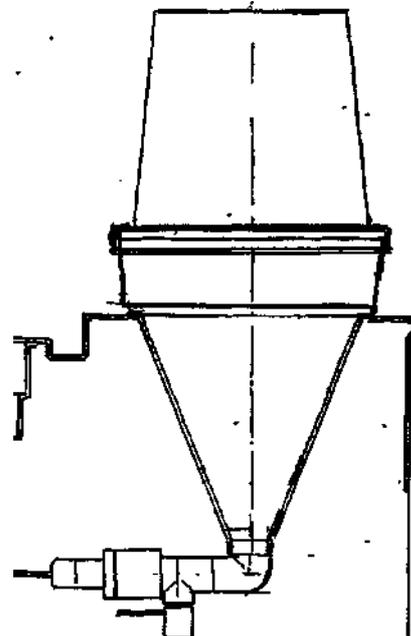
The knocker (6e) gives a stroke to the dosing hopper wall and thus prevents clogging of the chemical.

The complete dosing assembly can be taken out of the frame for service. Fitting systems as shown below allow chemical containers of 10 kg to be fitted directly to the hopper reducing the handling required ie. the chemical does not need to be transferred from the container to the hopper by hand using a scoop.

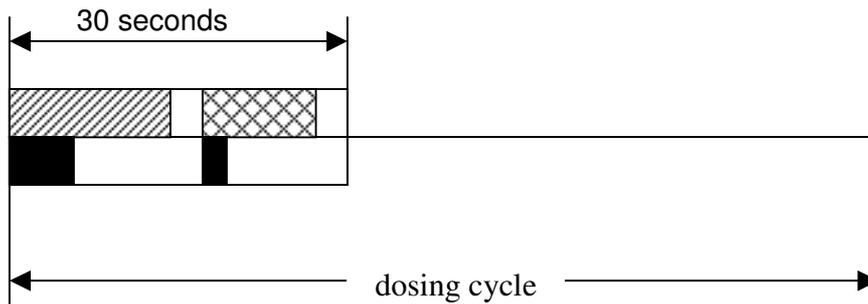
**Fitting system to join a 10 kg container with round edge**



**Fitting system to join a 10 kg HTH container**



The dosing is principally as to the following scheme:



Adjustable from 30 seconds to 10 minutes

 max. dosing time chlorine time     
  max dosing time acid     
  actual dosing

Dosing is always in the first 30 seconds of the set dosing cycle adjustable from 30 seconds to 10 minutes. Between chlorine and acid dosing there is always a pause of at least 3.5 seconds ensuring dosing of both chemicals never occurs.

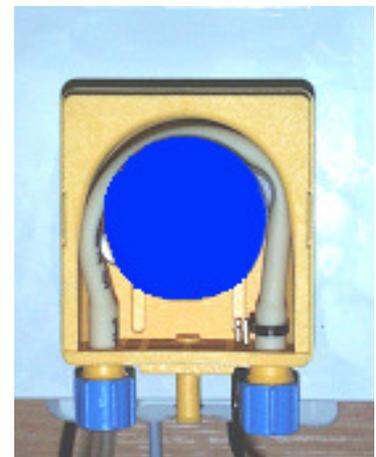
The actual dosing time for the chlorine and acid dosing motor is calculated by the processor as to the proportional gap between the actual and set values.

### **1.3 Acid Dosing**

The acid required either for pH-control and 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 on 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.

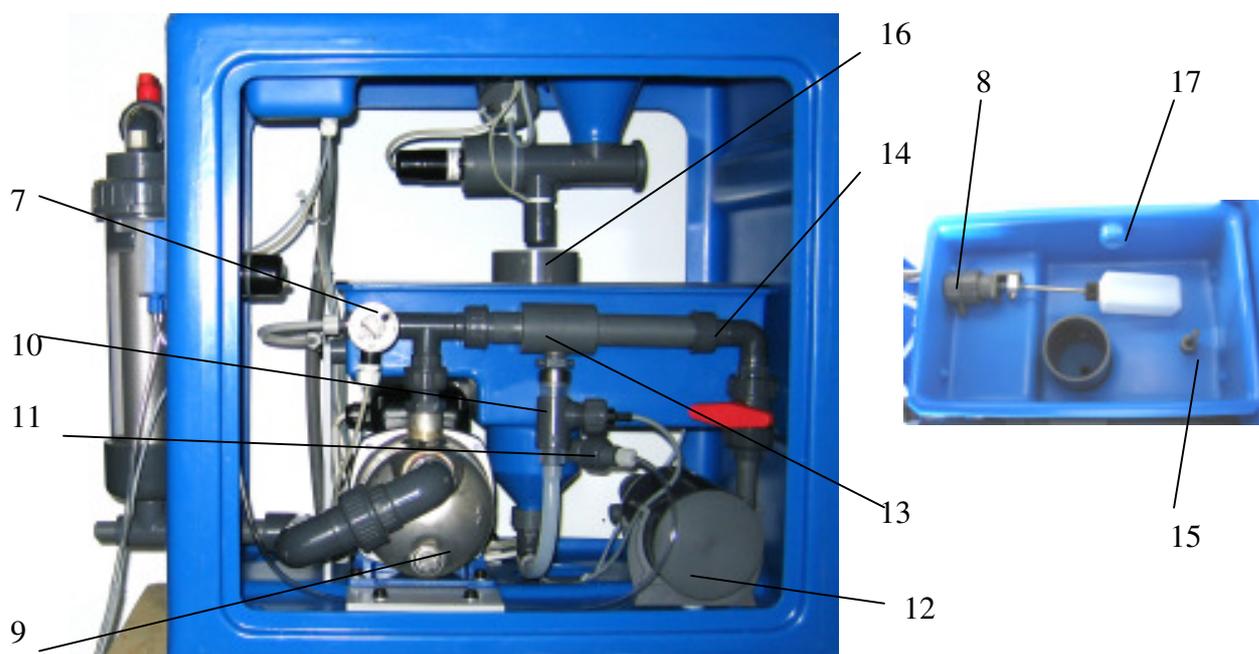


### **1.4 Flocculant dosing**

For the dosing of the flocculant the same type of peristaltic pump is used as for acid but is rpm-controlled ensuring a continuous chemical flow is achieved, which is important for best performance of the flocculant.

The dosing performance is set in the menu by setting the circulation rate of the filter system in m<sup>3</sup>/h and the specific dosing rate of the chemical in ml/m<sup>3</sup> of circulation. The dosing of flocculant works independent of the function of measuring/dosing of chlorine/acid.

## 1.5 Dissolving System



- |    |  |    |   |
|----|--|----|---|
| 7  | pressure switch                                      | 13 | venturi nozzle  |
| 8  | floating valve                                       | 14 | orifice washer  |
| 9  | booster pump Lo 2HMS3                                | 15 | level switch low/high                                 |
| 10 | flow switch holder with flow switch                  | 16 | lid on flushing tank<br>with chlorine dust protection |
| 11 | acid dosing valve                                    | 17 | overflow to drain                                     |
| 12 | mixing and dissolving<br>chamber with PVC ball valve |    |   |

The supply water coming from the pool circulation from behind filter (minimum pressure 0,2 bar) is divided at the discharge of the booster pump (9), one way leading to the flushing tank via the floating valve (8), the other branch directed to the venturi nozzle (13), where the flushing water is sucked together with the dosed chemicals out of the flushing tank. (A third way possibly goes as measuring water directly to the measuring cell). 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 chlorine 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.

**If any non-compliance with the given limits occurs, the chemical dosing will be stopped, the fault is shown on the display.**

## 2. The measuring system

The measuring water flow system consists of

- tubing connection with ball valve (1)
- filter (3)
- water flow control (5)
- measuring electrodes cell (11)

### 2.1 measuring water flow control

The measuring of free chlorine is dependent of the measuring water flow through the cell and must be controlled therefore within a range of +/- 10-20% of the set value. The switch bobbin (10a) of the flow monitoring switch must be at top and the blue cleaning glass beads in the chlorine measuring cell must rotate effectively.



### 2.2 Measuring cell

The measuring cell is fabricated of transparent PMMA and consists of three parts:

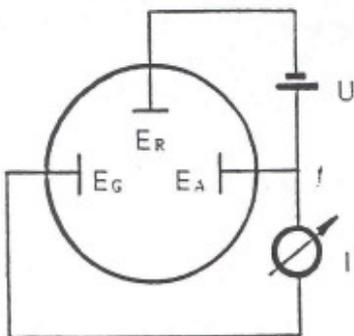
- flow control cell with temperature sensor
- Measuring cell for free chlorine
- Measuring cell for pH-value and redox tension

The measuring water flow is monitored by a reed switch. The flow bobbin (10a) is pushed upwards in the flow control cell to the temperature sensor fitted into the top of the flow control cell. The reed sensor is fitted simple pushed behind the temperature sensor in the flow cell. At low flow – the switch bobbin goes down in the bore, “meas. water low ” is indicated at the display and dosing is stopped.

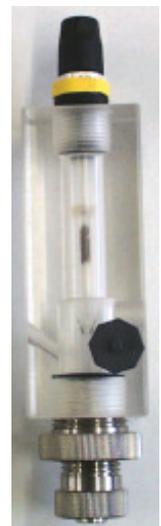
When the Granudos is stopped to avoid uncontrolled water flow through the open measuring cell a spring loaded stop valve is fitted into the inlet union of the measuring cell holding app. 0,7 bar supply pressure.

#### 2.2.1 Measuring Free Chlorine

The measuring method for free chlorine functions to the potentiostatic principle: The active gold electrode is loaded via a reference electrode by a certain potential at which the chlorine chemical reaction on the gold surface is optimised, the influence of the reaction of other chemicals on the gold is minimised. So a stable and reliable proportional measuring current is achieved at a very stable situation at the zero chlorine point



$E_R$	Reference electrode
$E_A$	working gold electrode
$E_G$	counter electrode
$I$	measuring current
$U$	Potential on reference electrode



The active gold electrode consists of a gold round piece and is fitted within a stainless steel body which is working as the counter electrode, the measuring current flows between these two electrodes. This assembly is screwed from the bottom into the measuring cell. Blue glass beads moved by the measuring water are cleaning the surface of the gold electrode. The Ag/AgCl reference electrode is screwed from top.

By using 3 separate electrodes for the system a high measuring stability is achieved and separation makes cost effective replacements in the future.

### **2.2.2 pH-Value**

The pH-electrode is screwed from top of the combination cell for pH-value and redox.

### **2.2.3 Redox Tension**

The redox tension is the relevant value to judge the hygienic state of the pool water. It is indicating the relation between the **red-**activ forces (organic chemicals) and the **ox-**idising forces (free chlorine) in the water. The relevant potential is built up on the surface of the platinum electrode and is measured against the reference electrode of the pH-electrode as a tension (mV). The higher the redox tension is, the quicker any micro organisms are killed. The platinum surface of the electrode is cleaned by glass beads as the gold electrode

As the redox tension is very dependent on the free chlorine and the pH-value it can be used very well to monitor these measurements.



### **2.2.4 Temperature**

For temperature measuring a digital sensor is used and it also acts as a distance holder for the flow sensor as well.

### **2.3 Test water take off**

At the outlet of the pH/redox cell the measuring water is flowing free out via a short hose to a tube connected to the flushing tank of the GRANUDOS. The measuring water goes back to the circulation. At this hose the test water to control the water quality by test reagents can be taken.

### **2.4 Test cylinder for redox tension**

For testing the redox system a test cylinder is fixed at the front right besides the measuring cell. The redox electrode is screwed in, test buffer is filled to the cylinder, the pH-electrode is put in from top and you can read the resulting redox tension at the display. See programme "**Redox test**".

### **2.5 Test and cleaning chemicals**

The test and cleaning chemicals for the electrodes are found on the left side of the GRANUDOS housing

- buffer solution pH 4,0 50 ml
- buffer solution pH 7,0 50 ml
- buffer solution Ag/AgCl - Pt 475 mV 50 ml
- cleaning liquid (diluted hydrochloric acid) 50 ml
- glass beads to clean the platinum and gold electrode

### 3. Installation

#### 3.1 Mounting the machine

pack out the machine, lay down it with the backside on the floor and support it at the lower part by about 5 cm. Now screw in the 4 feet with the screws on 1 side and female thread at the other into the moulded nuts in the bottom of the housing, do not turn them tight. Now adjust the tub to the 4 feet and fix it with the other 4 feet by screwing them through the bores in the tub. Then turn the machine up and settle it in the previewed place.

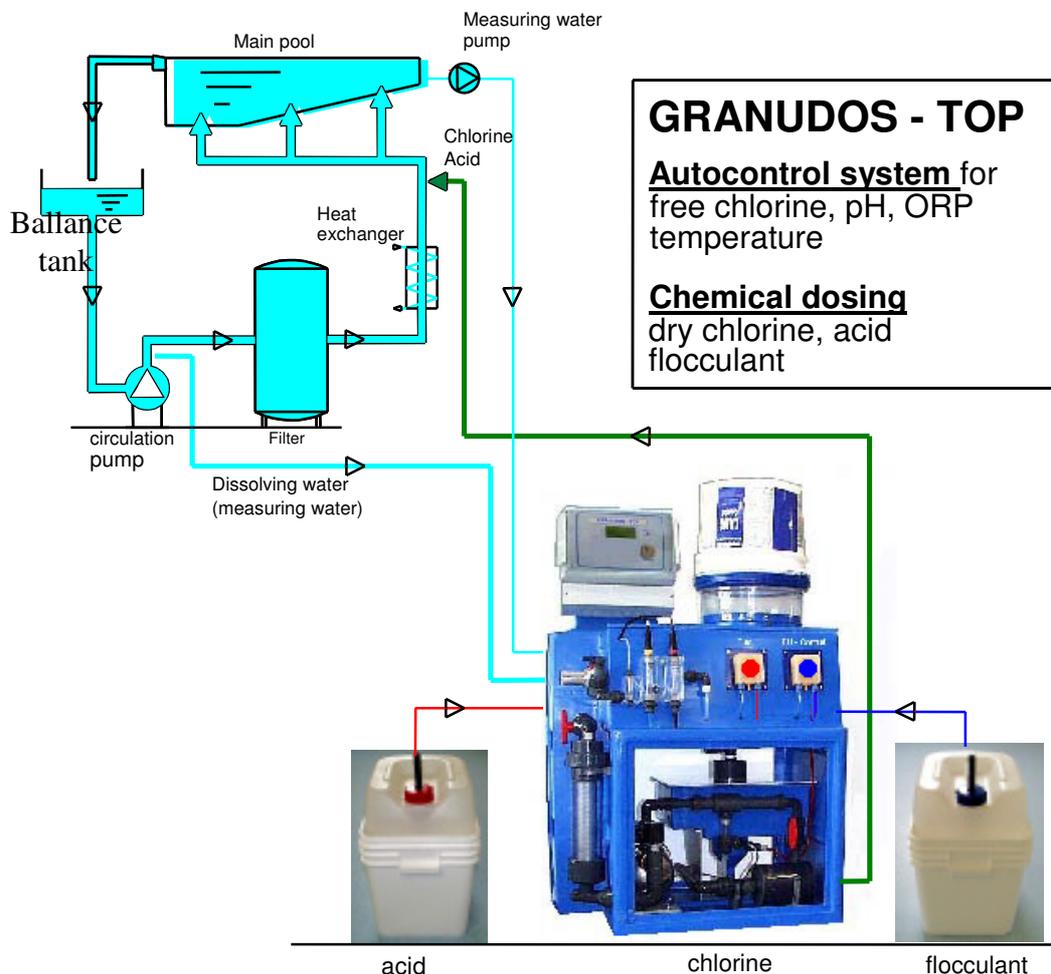
#### 3.2 Tubing – please see installation diagram

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

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

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

1. **Tapping point for supply water** to be before filter. Minimum pressure 2 mwg.. Measuring water supply directly from the booster pump or by an extra tapping point. In this case block the measuring water tapping above the booster pump by the attached PVC stopper 3/8"
2. **Dosing point** after heat exchanger - a **non return valve** must be installed in the dosing tube.
3. Ensure that the **tapping/dosing points are free flowing** and not blocked by scale or corrosion.
4. **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. If hoses are used do not kink them !!
5. **Piping should not go up and down** as there could be formed "air bags" in the tubing preventing free water flow with consequently damage of the pump – especially at taking into operation.
6. Use high quality PVC ball valves 3/4".
7. **If mounted above pool level** please install non return valves into the supply and dosing tube, the latter spring loaded (0,3-0,5 bar) to prevent self emptying of the flushing system



### 3.3 Electrical connection

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

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

### 3.4 Flocculant

If the GRANUDOS Top is supplied with the flocculant pump fit the injection valve ½” to the tapping point as far as possible before the filter directly before or behind the circulation pump. Do not kink the tubing. If it happens, use a new one!

## 4. Start

After piping is finished, 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 switch on the GRANUDOS mains, the booster pump of GRANUDOS should not run dry.

### 4.1 Setting the operation and dosing parameters

Take the attached list of settings and work through all settings as indicated. We recommend to write down all settings in this list for further discussions if needed.

To ensure correct dosing of the chemicals water flow through the flushing tank and measuring cell must run in the correct way as described below, otherwise you get faults indication and no function..

**Please note, that this start procedure must be executed at every new start after a longer stop of operation to prevent interruptions and pump failures**

### 4.2 Deaeration of the water supply tubing

When 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 it 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.

### 4.3 Adjusting measuring water flow

the flow is adjusted so that the switch bobbin in the flow monitoring is pushed up and the glass beads are rotating effectively in the chlorine as in the pH/redox cell. If measuring water is too low and the switch bobbin falls down, “meas. water low” is indicated at the display and dosing is switched off.

### 4.4 Water level in the flushing tank

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

### 4.5 Pressure switch booster pump

The installed pressure switch has a switch point at 1,5 bar to protect the pump against cavitation. If no supply pressure or air is in the supply tubing, the pump will be switched off.

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

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

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

#### 4.7 Filling of chlorine into the hopper

##### 4.7.1 Filling standard hopper 5 kg without adapter

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

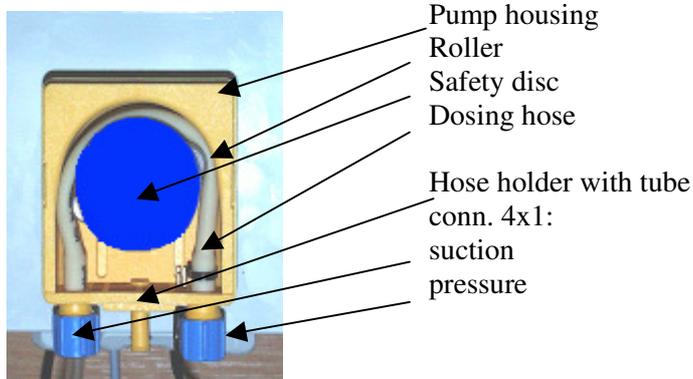
- Lid of control box is closed. Open the chlorine hopper lid.
- Fill the chlorine into the hopper carefully to the hopper wall with help of a scoop from the drum minimising any dusting up of the chemical.
- Add only the consumption of chlorine for app. 2 weeks.
- After filling the hopper carefully cover the lid of the chemical drum again.
- Close the hopper lid.

##### 4.7.2 Filling with adapter HTH 10 kg drum

Put new drum in front and screw off the lid. Lift out the empty hopper from the GRANUDOS housing and put it with the drum to floor. Fix the drum with your legs and turn the hopper off the drum. If chemical rests in the “empty” drum pour it carefully to the “full” drum. Now screw carefully the hopper onto the new drum that the curl fits well together. Take the full drum with the hopper, turn it and put it into the GRANUDOS housing that the cable is behind in the hole on backside and the bolt of the hopper in front in the hole.

#### 4.8 Acid and flocculant dosing pumps

The acid dosing pump (red mark, red dosing tube) and the flocculant dosing pump (blue mark, blue dosing tube) mounted front panel of the housing is delivered with loose dosing hose to prevent deformation on stock time. Push the hose holder into the shaped form of the housing and the hose back into the yellow housing. Turn the roller (half round to outside) clockwise some times so that the hose is situated evenly 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 chemical containers within their safety tubs beside the GRANUDOS, open and put the suctions lances marked red and blue into them.



#### **attention**

the hose must not  
be twisted

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

### **5. Calibration of the measuring systems**

For calibration a code no. must not be used. Please work through the displayed advises. Here some general remarks.

Even the measuring systems are working very stable, the characteristics of sensors are changing with time. By daily checks the measuring quality is monitored.

Please note, that the chemical check kits monitoring measures are not exact, that there are systems faults of about +/- 0.2 at pH-Value and +/- 0,05-0.1 mg/l at free chlorine possible. So calibration should only be done after repeated and higher deviation, **especially not at low values.**

### 5.1 Calibration of pH-Electrode

There are 2 calibration programmes offered by the *TopControl* system:

- Quick calibration only by using the phenol red indication – calib only within +/- 0.2 pH
- Full calibration programme by the 2 buffer solutions pH 7,0 and 4,0 – **normally used**

Worked through by the operators guide at the display. Please note, that the phenol red check has a systems fault of +/- 0,2. Only the full calibration will indicate the true pH-value – provided that the buffer solutions are ok.

### 5.2 Calibration of free chlorine

There are 2 calibration programmes offered by the *TopControl* system:

- Quick calibration by using the DPD 1 indication – **normally used**
- calibration zero point

Please note following guide lines. Calibration only if the DPD-check daily before the begin of pools opening:

:

- At several days there is a deviation in the same direction
- More than 0,1 - 0,15 mg/l shows with several checks
- Not too low values shown, at least 0,3 mg/l

Calibration only in the morning before opening the pool when all circulation water has the same quality. With high bathers load and maybe poor hydraulics in the pool the values can change rapidly and calibration can lead to bad results. If calibration seems necessary please calibrate only a half of the deviation and check again next morning.

Please note that the measuring fault with DPD is 0,05-0,1 mg/l . At a low free chlorine value of e.g. 0,2 mg/l the relative fault would be 25-50 % ! After coming up again with the free chlorine to 1 mg/l, the real free chlorine value could be then from 0,5 – 2 mg/l

### 5.3 Check of redox tension

At normal pool operation the indicated values of free chlorine, pH and redox are in an equilibrium, they show always the same relation. With free chlorine 0,3-0,6 and a pH of 7,0-7,4 the redox indicated should be about 720-780 mV. This actual values depend on fresh water quality and efficiency of the pool water treatment, but they stay constant. As the indicated values of free chlorine and pH are controlled, they stay very constant. If redox indication changes this is an indication for changes in real values of free chlorine or pH or there is a change in the water treatment, e.g. flocculation, bad backwashing, etc. So first check the free chlorine and pH and if they are ok than check the redox as shown in the programme. If this is ok too check your water treatment.

If there are inconsistencies mostly the fault is at the pH-electrode even it can be calibrated normally. The platinum electrode normally is very stable

## **6. Faults and alarm identification and problems solving**

All faults caught by a switch or sensor input as all value alarms are identified and shown at the display in the 3<sup>rd</sup> line. Here is only the 1<sup>st</sup> fault shown. Following faults are shown in a listing after “click” on the cursor before the fault indication. As all switches at the GRANUDOS 10 are normally open a fault is clearly indicated by the (1) at the end of the line indicating “closed”. In the line is also indicated on what connector the switch is connected.

The faults or alarms must stay for at least 6 seconds to be recognised. If a fault/alarm vanishes itself, the Granudos starts again automatically. If a switch obviously is faulty and stops function, you can start the machine by disconnecting the faulty switch, but see for a new one as this function is now not monitored.

## **6.1 Faults indicated by monitoring switches**

### **Flow meas-w**

Flow switch for measuring water indicates too low flow. Flow switch bobbin is not on top.

Increase flow, clean pre-filter and screens in the chlorine and pH-cell. Adjust water flow.

### **Empty Cl 2**

In the GRANUDOS 10 the chlorine hopper empty switch is **not** installed. Switch input bridged.

### **Empty pH**

Acid container indicates empty. Change container to a full one. Possibly switch is faulty

### **Empty flocc**

Flocculant container empty. Replace container with a full one. Possibly switch is faulty

### **Pressure GR**

Pressure of supply water to GRANUDOS is too low. Granudos stops.

When taking into operation the supply pressure is really too low. From works the switch pressure is fixed to 1.5 bar. At normal supply conditions the pump should reach this pressure. If not water supply tubing is shut, air is in the tubing, pre-filter blocked.

### **Suction low**

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 from tank to the suction tube the bobbin does not move, switch LED burns.

- 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 3. “**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 (high possibility after 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 into the suction cone of the tank.

### **Level high**

Water level in the flushing tank high. There is more water coming into the tank than is sucked away by the venturi.

If 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 diaphragm.

If suction is not sufficient, see above at “**Suction low**”

### **level low**

water level in the flushing tank is low.

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

### **Cl 2 missing**

chlorine missing switch is indicating at the program “buffer tank filling” no dosing chlorine. GRANUDOS switches off as obviously there is a problem at the chlorine dosing technics.

## 6.2 Software alarms

There are only allowed ranges for the setting of alarm levels depending on the set points. Some alarms can be deactivated by setting a "0" instead of a value in the settings windows.

*At soft ware alarms principally check the water figures free and combined chlorine and pH. If the shown values are not correct, first calibrate / check the electrodes .*

### **Redox high**

Indication for high free chlorine or good water quality.

If free chlorine indication at the display is high too, reduce dosing performance of chlorine and/or set higher redox alarm level.. See for better sampling water take off point. If chlorine indication is normal at set point, check free chlorine by DPD method and adjust the measuring system.

Check pH – may be too low – see para. 6.3

### **Redox low**

Indication for low free chlorine or poor water quality

If free chlorine indication at the display is low too:

- fault on chlorine dosing technics
- check output voltage, test dosing by activating output for chlorine dosing motor

- check pH – may be too high – see para. 6.3

### **Chlorine high**

- Chlorine dosing motor output faulty, dosing whereas set point is surpassed – use new electronic plate

- poor hydraulics in the pool can lead to uneven distribution of chlorine to the sampling water. Reduce dosing performance at increased basic dosing

### **Chlorine low**

- fault on chlorine dosing technics

- check output voltage, test dosing by activating output for chlorine dosing motor dosing screw blocked or loose, heated dosing nozzle blocked.

- poor hydraulics in the pool, clouds without chlorine coming to measuring water take out - increase dosing performance at increased basic dosing

### **pH high**

acid dosing motor output or dosing pump/hose faulty.

:

check dosing function of acid pump by selecting test program for acid pump. 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

### **pH low**

- acid dosing motor output faulty, dosing whereas set point is surpassed – use new electronic plate

## 6.3 Faults not indicated by monitoring switches

Overflow from tank too much at switch off of GRANUDOS

- switch bobbin of flow switch blocked on top situation
- sealing of switch bobbin faulty
- membrane of floating valve 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.

## **7 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. The machine should be serviced at least once a year.

### **7.1 GRANUDOS functions**

**Minimum checks include the following items:**

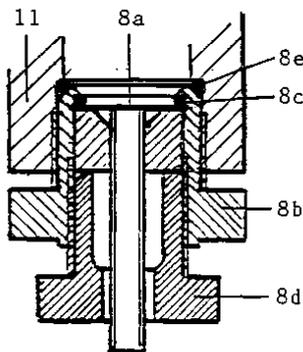
- **maintain the environment of the machine clean**
- clean strainer if necessary – a polluted filter causes cavitation and consequently damage of the booster pump.

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

- 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/filling up 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 every ½ year
- check once per year acid dosing valve – change seals

## 7.2 Measuring technics

### 7.2.1 Chlorine electrodes - Changing and cleaning



The chlorine sensor itself is the gold electrode (8a) with the contact tube. It is fitted into the stainless steel electrode holder 3/4" (8b) with a flat joint (8c). for cleaning or change if worn :

- Pull out the push connector down and place it to the side to prevent water entering connectors.
- Screw out the electrode holder (8b) from the cell.
- Screw out the pressure screw 1/2" (8d)
- Now take the isolated contact tube and pull it out
- clean the electrode with alcohol and electrode cleaner

**Attention! The electrode cleaning liquid is a light acid  
Before fitting the gold electrode clean and dry it well  
Fit a new flat gasket and fill than the cavity with cleaning glass beads.**

To change the reference electrode undo screw connector and place it to side that it does not get wet. A cleaning of the electrode is technically not necessary. In any situation do not wipe over the diaphragm to avoid scaling

### 7.2.2 pH-electrode

- At any circumstance avoid moisture getting into the connection of the electrode. The electrode will not function.
- Pay attention, that there is no air in the bottom part of the inner electrode. Remove air by shaking it like a medical thermometer.

**Attention! New electrodes are to be calibrated before taken into service**

### 7.2.3 Redox- electrode

The redox-electrode is fabricated the same as the chlorine electrode

## 7.3 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, empty all water containing parts as measuring cell, pump, filter, mixing cyclon
- leave the GRANUDOS switched **on** – use **program status "off"**
- clean the environment of the machine thoroughly.

If there is no risk of frost keep the electrodes within the cell.

**8. Spare Parts GRANUDOS 10 Top**

	<u>Designation</u>	<u>Item No.</u>
Chlorine dosing	dosing hopper 5 kg	12798
	cover for dosing hopper GR 10	12353
	dosing motor PLG 30-12 rpm	13811
	motor holder PLG- d25	11541
	dosing screw d6/D19 GR10	12320
	dosing nozzle heated GR	11556
Acid dosing	knocker GR 10 complete	12868
	acid pump Sa complete	11628
	pump housing Sa	12702
	roller Sa	12609
	dosing hose 3.2x1,6 Sa	12782
	supply carbuoy lance	12523
	acid injection valve GR	11633
Flocculant pump	repair set for acid valve	11636
	dosing hose 0,8x1,6Ph-Sa	13482
Filter	other pump parts identically to acid pump	
	filter housing d75 GR	12746
	filter top with PVC ball valve d25	12304
	O-ring filter GR	11258
Floating valve	cover control box GR10	10796
	floating valve d25 GR10 complete	12916
	membrane for floating valve	11619
	floater	11621
Booster pump	level switch GR/PAK	10496
	booster pump Lo 2HMS3-A	10657
Flow switch assembly	slide ring seal complete -A	12800
	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
Venturi	orifice washer for venturi	11594
	venturi-nozzle ½''	12306
	venturi-body with connector ½''	12305
Cyclon Control system	mixing cyclon GR 10 Top	13778
	measuring / basic plate TopControl MC	18104
	controller plate TopControl MC	18105
	Power plate TopControl	15083
	cover lid to Top Control	13779
Electrodes	pH-electrode	10933
	chlorine-electrode ¾'' gold insert with seal	17957
	reference/counter electrode TopControl MC	17179
	redox-electrode ½'' complete.	11984